700 5th Ave. | P.O. Box 34023 | Seattle WA 98124-4023
TEL (206) 684-3000 TTY/TDD (206) 684-3225 FAX (206) 625-3709
seattle.gov/city-light
twitter.com/SEACityLight facebook.com/SeattleCityLight

Seattle City Light

January 28, 2022

KIMBERLY D. BOSE, SECRETARY
FEDERAL ENERGY REGULATORY COMMISSION
888 1ST STREET NE, SUITE 1A
WASHINGTON D.C., 20426

Re: Seattle City Light
Application for Surrender of License for Major Water Power Project 5 Megawatts or Less
Newhalem Creek Hydroelectric Project No. 2705

Dear Ms. Bose,

Seattle City Light is filing an Application for Surrender of License for the Newhalem Creek Hydroelectric Project (Project) with the Federal Energy Regulatory Commission (FERC) under Section 6 of the Federal Power Act, 18 CFR § 6.1 and 6.2. The current license for the Project expires on January 31, 2027.

The filing consists of this cover letter and the enclosed application and attachments. Should you have any questions regarding this filing, please contact me at 206-684-3618 or the Decommissioning Project Manager, Shelly Adams, at (206) 684-3117.

Sincerely,

Michael Haynes (Jan 25, 2022 12:59 PST)

Michael J. Haynes, P.E.
Assistant General Manager
Seattle City Light

Attachments

cc: David Turner, FERC
Diana Shannon, FERC
Mark Ivy, FERC

Newhalem Creek Hydroelectric Project (FERC No. 2705) Application for Surrender of License

January 28, 2022

Seattle City Light

Initial Statement
Before the Federal Energy Regulatory Commission
Application for Surrender of License for a
Major Project 5 Megawatts or Less

1.0 Application for Surrender of License

Pursuant to 18 Code of Federal Regulation (CFR) Part 6, Seattle City Light (City Light), Licensee for the Newhalem Creek Hydroelectric Project, FERC Project No. 2705 (the Project), hereby files with the Federal Energy Regulatory Commission (FERC) an Application for Surrender of License (Surrender Application) for the Project. As required by 18 CFR § 6.1, this Surrender Application is being filed in the same form and manner as an application for license.

2.0 Location of the Project

The location of the Project is:

State:	Washington
County:	Whatcom
Township or nearby town:	Newhalem
Stream or other body of water:	Newhalem Creek

3.0 Licensee's Business Address and Telephone Number

The physical address, mailing address, and telephone number of Licensee are:

Physical Address	**Mailing Address**	**Telephone No.**
Seattle City Light 700 Fifth Avenue Seattle, WA 98104	Seattle City Light PO Box 3402 Seattle, WA, 98124-4023	(206) 684-3000

4.0 Licensee's Authorized Agent

The name and mailing address of the person authorized to act as Licensee's agent for this application is:

Mr. Michael Haynes
Assistant General Manager
Seattle City Light
PO Box 3402
Seattle, WA, 98124-4023

5.0 Licensee's Organizational Status

City Light is a department of the City of Seattle, a municipality in Washington State.

6.0 Pertinent Washington State Statutory and Regulatory Requirements

The statutory or regulatory requirements of the state in which the Project is located that affect the Project as proposed with respect to bed and banks and the appropriation, diversion, and use of water for power purposes, and with respect to the right to engage in the business of developing, transmitting, and distributing power and in any other business necessary to accomplish the purposes of the license under the Federal Power Act, are:

Citation	Nature of Requirement	Steps Taken by City Light to Comply
RCW Title 90	State water rights	City Light's operation of the Newhalem Creek Project is authorized under Certificate of Water Right Number 38, Permit Number 145, issued by the Washington State Hydraulic Engineer on March 10, 1920. This agreement authorizes the diversion of up to 75 cubic feet per second (cfs) of surface water for power production and contains a provision that allows an additional 75 cfs to be diverted as needed. When the powerhouse was rebuilt in 1969, the Washington State Department of Water Resources renewed the original certificate and confirmed its validity.
RCW 35.92.050	Authority to own electric utility	City Light has used this authority under state law to own and operate its own electric utility.
RCW 35.92.010	Authority to operate waterworks for electrical generation	City Light has used this authority under state law to operate theNewhalem Creek Project for electrical generation.

7.0 Name and Address of the Owners of Existing Project Facilities

City Light owns the existing Project facilities.

Physical Address	**Mailing Address**	**Telephone No**
Seattle City Light 700 Fifth Avenue Seattle, WA 98104	Seattle City Light PO Box 3402 Seattle, WA, 98124-4023	(206) 684-3000

8.0. Statement Pursuant to 18 CFR § 4.32

8.1 Name and address of every person, citizen, association of citizens, domestic corporation, municipality, or state that has any proprietary right necessary to operate or decommission and remove the Project.

City Light is the only entity with the right necessary to operate or decommission and remove the Project.

Physical Address	**Mailing Address**	**Telephone No**
Seattle City Light 700 Fifth Avenue Seattle, WA 98104	Seattle City Light PO Box 3402 Seattle, WA, 98124-4023	(206) 684-3000

8.2 Name and address of every county in which any part of the Project, and any Federal facilities that are used by the Project are located:

The Project is in Whatcom County. There are no federal facilities used by the Project.

Whatcom County
311 Grand Avenue
Bellingham, WA 98225

8.3 Name and address of every city, town, or similar local political subdivision in which any part of the Project, and any Federal facilities that are used by the Project, are located:

The Project is in Unincorporated Whatcom County. There are no federal facilities used by the Project.

8.4 Lands occupied by the Project include and managed by:

The Project occupies 6.4 acres of lands managed by the National Park Service.

National Park Service
North Cascades National Park Complex
810 State Route 20
Sedro-Woolley, WA 98284

8.5 Name and address of every city, town, or similar local political subdivision that has a population of 5,000 or more people and is located within 15 miles of the Project dams:

No cities, towns, or communities of 5,000 or more people are located within 15 miles of the Newhalem Creek Diversion Dam.

8.6 Name and address of every irrigation district, drainage district, or similar special purpose political subdivision in which any part of the Project and any Federal facilities that would be used by the Project, would be located:

There are no irrigation districts, drainage districts, or similar special purpose political subdivisions in which any part of the Project is located. There are no Federal facilities used by the Project.

8.7 Name and address of every irrigation district, drainage district, or similar special purpose political subdivision that owns, operates, maintains, or uses any Project facilities or any Federal facilities that would be used by the Project:

Not applicable. There are no irrigation districts, drainage districts, or similar special purpose political subdivisions that own, operate, maintain, or use any Project facility. There are no Federal facilities used by the Project.

8.8 Name and address of every other political subdivision in the general area of the Project that there is reason to believe would likely be interested in, or affected by, the Surrender Application:

The nearest political subdivision that may be interested in the Surrender Application is the town of Concrete, approximately 30 miles to the west:

Concrete
PO Box 39
Concrete, WA 98237

8.9 Name and address of all Indian tribes that may be affected by the Project:

The following Native American tribes may be interested in the Project:

Sauk-Suiattle Indian Tribe
Chairwoman Norma Joseph
5318 Chief Brown Lane
Darrington, WA 98241

Upper Skagit Indian Tribe
Chairperson Jennifer Washington
25944 Community Plaza Way
Sedro-Woolley, WA 98284

Swinomish Indian Tribal Community
Chairman Steve Edwards
Administration Building
11404 Moorage Way
La Conner, WA 98257

9.0. Construction Schedule

Construction of the Project is planned to start within 24 months and to be completed within 48 months from the date of FERC's issuance of an Order to Decommission.

Executive Summary

The Newhalem Creek Hydroelectric Project (Project) is in the Cascade Mountains of northern Washington State on a tributary to the upper Skagit River. Project operations began in 1921 to supply power to the town of Newhalem for construction of Gorge Dam and Powerhouse, which are part of the Skagit River Hydroelectric Project. The Project occupies 6.4 acres of federal lands within the Ross Lake National Recreation Area, which is managed by the National Park Service as part of the North Cascades National Park Complex.

The Project consists of a concrete, overflow, diversion dam; a combination sluiceway/intake structure and small gatehouse at the dam; an unlined rock vertical shaft that conveys water from the intake to a power tunnel; a steel penstock that conveys water from the power tunnel to a wood-framed powerhouse with a double-overhung Pelton impulse turbine connected to a single generating unit; a tailrace channel that discharges into the Skagit River over a concrete tailrace fish barrier; and a 7.2 kilovolt transmission line, consisting of overhead and buried cable, that connects to Gorge Powerhouse.

The Project, which is owned and operated by Seattle City Light (City Light), was most recently licensed by the Federal Energy Regulatory Commission (FERC) in 1997 for 30 years (Project No. 2705). The dam is located 1 mile above the confluence with the Skagit River at Creek Mile (CM) 1.0, just above a 100-foot (ft) waterfall. When operational, it diverts a portion of the flow from the lower 1 mile of Newhalem Creek and generates 2.125 megawatts of power. The Project, however, has not been consistently in service since 2010 and cannot be operated due to three significant issues: leaks in the power tunnel, maintenance needs at the headworks and powerhouse, and access road safety concerns.

After conducting an engineering analysis in 2020, City Light concluded that the cost of relicensing the Project and making the necessary repairs and upgrades to equipment/facilities and the access road far exceeded the estimated future value of the Project. On April 28, 2021, City Light filed a Notice of Intent with FERC to surrender the Project license and proposed to decommission the existing infrastructure.

City Light proposes to remove the diversion dam and associated headworks structures, tailrace fish barrier, and overhead transmission lines. The rock shaft and power tunnel would be sealed, and the access road above elevation 840 ft would be decommissioned. The powerhouse, tailrace, and penstock would remain, and the powerhouse equipment would be de-energized. The electrical service line to the powerhouse would remain to provide heating and lighting.

Overall, the proposed action is expected to have long-term environmental benefits. It restores the natural fluvial geomorphology of Newhalem Creek, as well as the habitat and drainage along the access road above elevation 840 ft. It also restores aesthetics, terrestrial habitat, and the pre-Project cultural setting at the dam site and tailrace barrier area. The proposed action protects the most visible historic properties, which are the penstock and powerhouse, reduces long-term maintenance needs, and maintains or increases interpretive opportunities.

The proposed action would have short-term, minor to moderate environmental impacts. Access to the dam and headworks would need to be re-established, which requires making some road repairs. Equipment and vehicles generate noise that could impact wildlife and recreation sites. Removal of the

dam and tailrace barrier would disturb soils and vegetation and may require temporarily closing nearby trails. Decommissioning activities that generate noise and other disturbances would be timed, to the extent possible, to avoid the most sensitive times for wildlife and recreational use.

In the short term, potential effects of diversion removal on stream geomorphology and aquatic habitat include: a pulse of turbidity immediately following diversion removal; increased sediment transport capacity upstream from the diversion location to approximately 0.5-mile; and the downstream movement of existing sediment in the impoundment area. Dam removal activities would be timed to minimize impacts from increased turbidity on anadromous fish downstream of the falls.

City Light has collaborated with the National Park Service, other resource agencies, and affected tribes to develop a *Decommissioning Plan* that includes best management practices and mitigation measures that focus on the long-term benefits of decommissioning while minimizing the short-term impacts on fish, wildlife, vegetation, and water quality.

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Exhibit A Project Description

A.1 Location and Lands of the United States

The Newhalem Creek Hydroelectric Project (Project) is owned and operated by Seattle City Light (City Light) and is located in northern Washington State, in the Cascade Mountains of the upper Skagit River watershed. Newhalem Creek is a tributary to the Skagit River and enters the south side of the river at mile 93.3. The Project is in Whatcom County and across the river from the City Light-owned town of Newhalem, which is located along State Route 20, approximately 50 miles (mi) east from Burlington and the Interstate-5 (I-5) corridor (Figure A-1).

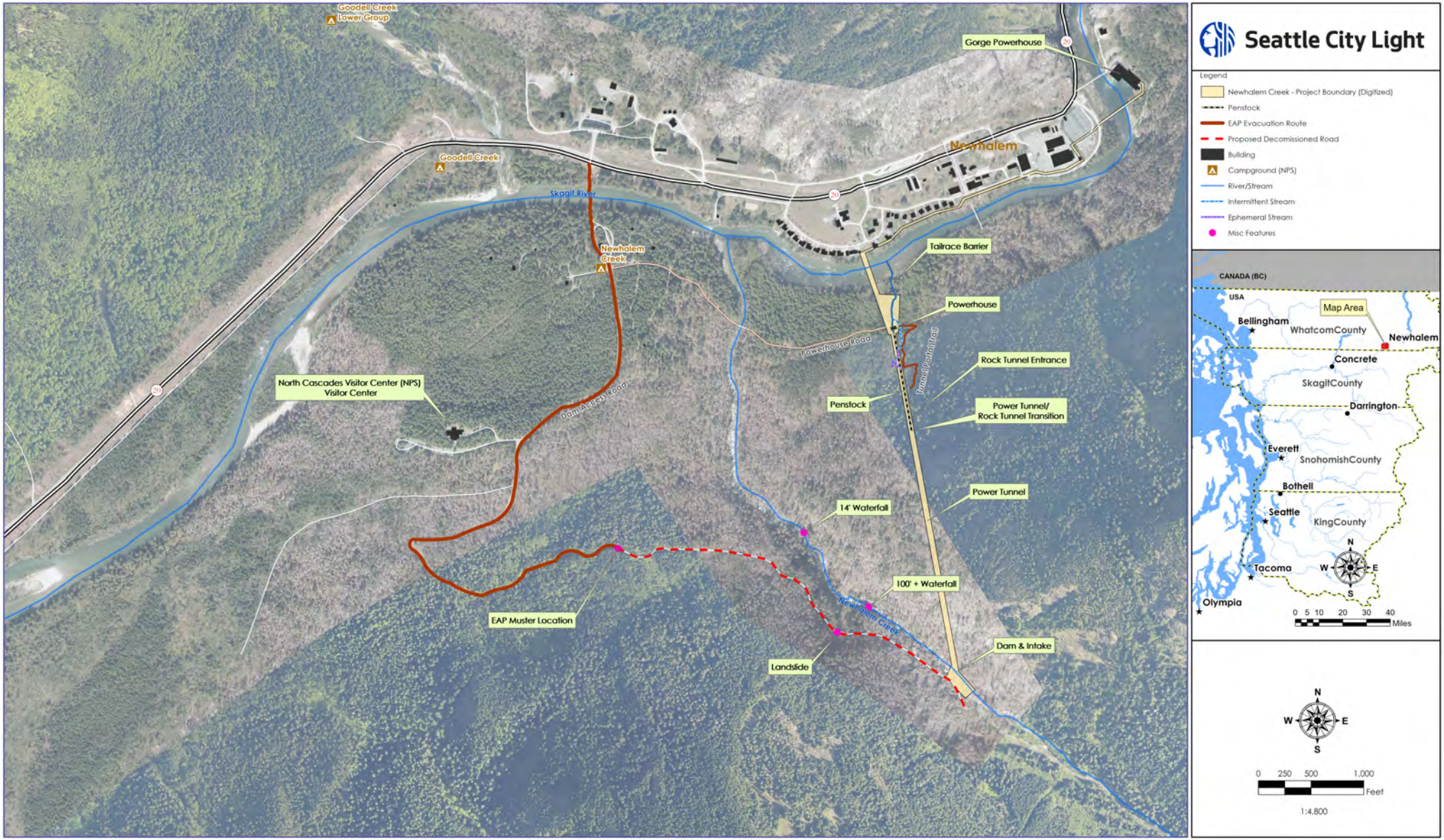
The Project occupies 6.4 acres (ac) and is entirely on federal lands within the Ross Lake National Recreation Area (RLNRA), which is managed by the National Park Service (NPS) as part of the North Cascades National Park Complex. The RLNRA was established in 1968 in the enabling legislation for the North Cascades National Park to provide for the "public outdoor recreation use and enjoyment of portions of the Skagit River and Ross, Diablo, and Gorge lakes." The legislation also mandated continued Federal Energy Regulatory Commission (FERC, formerly the Federal Power Commission) jurisdiction over the Newhalem Creek Hydroelectric Project, FERC No. 2705, and the nearby Skagit River Hydroelectric Project, FERC No. 553, within the RLNRA (Public Law 90-544, Section 505, dated October 2, 1968, as amended by Public Law 100-668, Section 202, dated November 16, 1988).

A.2 Current Project Description

The Project began operations in 1921 to supply power to the town of Newhalem and construct Gorge Dam and Powerhouse, which are part of the Skagit River Hydroelectric Project (No. 553). Most of the Project works are listed in the National Register of Historic Places as contributing resources to the Skagit River and Newhalem Creek Hydroelectric Projects, a historic district. The Project has an authorized installed capacity of 2.125 megawatts, and when operational, has an estimated annual generation capacity of 12,000 megawatt hours that can provide a backup source of power to Gorge Powerhouse and the Newhalem townsite. The hydraulic capacity of the Project is 69 cubic feet per second (cfs).

The Project consists of the following components (Figure A-2 through Figure A-6):

- Concrete, overflow, crest dam; 45 feet (ft) long by 10 ft high;
- Combination sluiceway/intake structure at the dam;
- Unlined rock vertical shaft, 55-ft-tall, 5-ft by 5-ft, that conveys water from the intake to a power tunnel;
- Small gatehouse near the sluiceway/intake structure that contains the control gate and access to the rock shaft;
- Pedestrian bridge across the creek near the dam that provides access to the sluiceway/intake and gatehouse;
- Unlined rock power tunnel, 6-ft-wide by 7-ft-high by 2,452-ft-long;



NEWHALEM CREEK HYDROELECTRIC PROJECT (FERC 2705)

Figure A-1. Location Map

Figure A-2. Diversion Dam, Sluiceway/Intake, and Gatehouse

Figure A-3. Newhalem Powerhouse

Figure A-4. Double Overhung Pelton Impulse Generator in Powerhouse

Figure A-5. Penstock and Concrete Saddles

Figure A-6. Tailrace Fish Barrier

- Steel penstock, 925-ft-long, that conveys water from the power tunnel to the powerhouse; includes a 218-ft-long, 30-inch-(in) diameter section within the lower end of the rock tunnel and a 707-ft-long, 33-in diameter above-ground section supported by concrete saddles;
- Wood-framed powerhouse, 30-ft by 56-ft, with a double-overhung Pelton impulse turbine rated at 3,000 horsepower and connected to a single generating unit rated at 2,125 kilowatts;
- Unlined tailrace channel, 350-ft-long, varying from 5 to 40 ft wide, which discharges into the Skagit River;
- Concrete tailrace barrier structure, 3.6 ft high by 18 ft wide, with two 22.5-ft-long wing walls, which prevents fish from entering the tailrace;
- 7.2 kilovolt transmission line, 4,387-ft-long and consisting of four segments: (1) buried cable from the Newhalem Powerhouse to the Skagit River crossing (350 ft); (2) overhead river crossing (400 ft); (3) buried cable through the town of Newhalem (3,000 ft); and (4) overhead river crossing from the town of Newhalem to the Gorge Powerhouse (637 ft); and
- Accessory equipment.

The diversion dam is located 1 mile above the confluence with the Skagit River at Creek Mile 1.0, just above a 100-ft waterfall. The Project is operated as run-of-the-river and impounds very little water (0.1 ac/0.6 ac-ft). A U.S. Geological Survey stream gage is located just upstream of the dam. Access to the dam is via a 1.4-mi-long gravel road that starts near the parking lot for NPS's Newhalem Visitor Center. The road is currently gated approximately 0.5 mi from the junction with the parking lot; this lower road section is identified as an evacuation route in the *Skagit River Hydroelectric Project Emergency Action Plan* (Skagit EAP) in case of failure at Ross Dam (see Figure A-1). The road beyond the gate is closed to public access because of a landslide and unstable slope conditions a short distance below the dam. The road was originally constructed by the U.S. Forest Service and is not within the Newhalem Creek Project boundary.

It is, however, maintained by City Light to the dam site; from there it extends for several miles up the Newhalem Creek drainage as an unmaintained trail.

The powerhouse is approximately 0.25 mi east of Newhalem Creek; it is reached via a road that traverses NPS's Newhalem Creek Campground and provides public access to the creek and several hiking trails. Electricity to the powerhouse is provided by a feeder from the Gorge Powerhouse Switchyard, which runs parallel with the transmission line from the Newhalem Powerhouse to the switchyard. Until recently, non-potable water for fire suppression and a bathroom was available at the powerhouse from a tap off the penstock. However, the penstock has been drained for safety reasons, and the powerhouse is currently without a water supply.

The power tunnel is completely underground, with access limited to City Light staff with permission and confined-space training. The upper end can be reached through a trapdoor in the gatehouse and a ladder down the rock power shaft; access to the lower end is through a hatch in the penstock at the power tunnel/penstock transition point. Water from the power tunnel is directed into the penstock via a 10-ft-thick concrete plug located approximately 2,400 ft down from the intake.

The 925-ft long penstock includes a 218-ft section within the power tunnel. Upon exiting the power tunnel at an elevation of 730 ft, the penstock runs down a steep slope to the powerhouse, elevation 507 ft. This 707-ft section of penstock is supported by 56 concrete saddles, which elevate the structure above the ground surface—approximately 6 in to 6 ft—depending on topography. The lower end of the penstock is accessible from behind the powerhouse. The upper end can be reached only on foot via a trail that is also identified as a dam failure emergency evacuation route in the Skagit EAP.

The tailrace fish barrier is approximately 300 ft from the powerhouse, toward the Skagit River. The concrete barrier consists of a vertical wall that spans the width of the tailrace, preventing fish from entering, with wing walls on either side to direct the water into the river. The walls are backfilled, with only the top 2 to 3 ft visible; the side walls are faced with riprap for erosion control and aesthetic purposes. Riprap was also placed along the sides of the lower portion of the tailrace and Skagit River shoreline for erosion control. There is no road access; however, the fish barrier can be reached via a short spur path off the Trail of the Cedars, which leads to an overlook.

A.3 Proposed Decommissioning Project

The Project has not been in consistent service since 2010. While the equipment and structural issues associated with the initial 2010 shutdown were addressed, others arose, including a wildfire in 2015 that burned many of the original wooden penstock saddles, necessitating a multi-year replacement project.

Currently, the Project cannot be operated due to three significant issues: leaks in the power tunnel, maintenance needs at the headworks and powerhouse, and access road safety concerns. The power tunnel requires grouting to address the leaks, the powerhouse needs electrical and control upgrades, and the headworks has various maintenance needs. However, maintaining a safe access road to the dam is the most difficult issue to address. The road crosses a large landslide that is part of an even larger ancient slide, which has become increasingly active over the last five years. Despite frequent clearing, the roadbed approximately 1,140 ft below the dam is now completely blocked by large boulders, with more poised to

come down (Figure A-7). Additionally, the road edge has developed tension cracks and minor slumps on the downslope side in several locations on both sides of the landslide, and the Hilfiker retaining wall (a welded wire mesh, reinforced earth wall) needs repairs. Currently, crews can access the dam and headworks only on foot, and only during dry conditions when rockfall from the slide is less likely.

An engineering analysis conducted in 2020 evaluated two options for relicensing the Project and making the needed repairs to the road, power tunnel, powerhouse, and headworks as well as an option for decommissioning. The analysis concluded that the revenues anticipated from continued operation of the Project were far exceeded by the estimated costs of making the needed repairs and relicensing. Based on this determination, City Light filed a Notice of Intent to surrender the Project license with FERC on April 28, 2021, and proposes to decommission the existing infrastructure, as summarized in Table A-1 (see *Decommissioning Plan* for details).

Figure A-7. Road Across the Slide Area

Table A-1. Decommissioning Summary

Project Features to be Removed	Project Features to be Abandoned	Project Features to be Retained
Diversion dam, sluiceway, and intake	Power tunnel	Powerhouse
Gatehouse	Underground utilities	Penstock and saddles
Pedestrian bridge over creek near dam	Dam access road above elevation 840 ft	Tailrace
Tailrace fish barrier and riprap		Electrical service line to powerhouse
Overhead transmission lines		Emergency evacuation route/trail along penstock (Skagit EAP route)
Transformer		Dam access road below elevation 840 ft (Skagit EAP route)

Exhibit B Project Operations

When operational, the Newhalem Creek Hydroelectric Project (Project) has a hydraulic capacity of 69 cubic feet per second (cfs), and minimum instream flow requirements ranging from 40 to 95 cfs, depending on the month. Instream flow requirements typically limit operations to 8 to 10 months of the year.

B.1 Licensed Operations

Although built in 1921, the Project was first licensed by the Federal Power Commission, the predecessor to the Federal Energy Regulatory Commission (FERC), on January 20, 1975, effective to January 1, 1970. The first license expired on December 31, 1994, and the Project was operated under annual licenses until 1997. The second, and current, license was issued on February 7, 1997, and expires on January 31, 2027. License articles and compliance status are summarized in Table B-1.

Table B-1. License Article Summary

Article	Description	Status
201	Sets acreage for annual charges requiring reimbursement to the U.S. Treasury for Project occupancy, use, and enjoyment of federal lands	Ongoing
202	Requires filing an original set and two complete duplicate sets of aperture cards of the approved drawings within 45 days	Filed 04/18/1997
301	Requires preparation and submittal of a feasibility analysis of upgrading the generating capacity at the Project	Filed 04/03/1998
401	Reserves FERC authority to require fishways as may be prescribed by the Secretary of Commerce	NA
402	Mandates that the Project be operated in a run-of-river mode	Ongoing
403	Stipulates minimum instream flows of 40 cfs from November – March; 70 cfs from April – June; 50 cfs for July; 95 cfs for August and September; and 75 cfs for October, or inflow, whichever is less	Ongoing
404	Sets ramping rates of 1 inch per hour (in/hr) from June 16 – October 31; 2 in/hr November 1 – February 15; 2 in/hr at night from 1 hr after sunset until 1 hr before sunrise from February 16 – June 15; and no ramping allowed during the day (1hr before sunrise until 1 hr after sunset) from February 16 – June 15	Ongoing
405	Requires filing a plan to install, operate, and maintain streamflow monitoring equipment in Newhalem Creek necessary to monitor and record compliance with Article 402, minimum flows as per Article 403, and ramping rate criteria as per Article 404	Filed 08/06/1997
406	Requires filing a plan to design, construct, install, operate, and maintain a tailrace barrier	Filed 08/06/1997; installation completed in 2000
407	Requires filing a monitoring plan for the tailrace barrier	Filed 08/06/1997
408	Provides for representatives of federal and state agencies and tribes to access the tailrace barrier site before and during construction of the tailrace barrier and operation of the tailrace barrier	Ongoing
409	Requires development and submittal of a plan to maintain County Line Pond No. 3 for fish management activities as determined by the Washington Department of Fish and Wildlife (WDFW) and the Skagit System Cooperative	Filed 08/06/1997

Article	Description	Status
410	Directs the development and submittal of a recreation plan to provide specific details for constructing a trail adjacent to the access road to the powerhouse	Filed 08/06/1997
411	Requires implementing the Memorandum of Agreement (MOA) executed on June 28, 1996, to avoid and mitigate impacts to the historical integrity of the Newhalem Powerhouse Site and filing the *Historic Resources Mitigation and Management Plan* (HRMMP) identified in the MOA, together with comments from the Washington State Historic Preservation Officer (SHPO) and National Park Service (NPS) on the HRMMP	Ongoing; HRMMP filed 02/09/1998
412	Establishes the process of consultation with the SHPO and NPS on any archaeological or historic sites that are found during Project construction or operation	Ongoing
413	Provides the licensee with the authority to grant permission for certain types of use and occupancy of Project lands and waters, and to convey certain types of use and occupancy	NA
501	Requires an assessment of headwater benefits if the Project benefitted from the construction of a reservoir by another licensee	NA

Notes: NA = not applicable

The license also includes Federal Power Act Section 4e conditions from the U.S. Department of the Interior and Section 10j conditions from the WDFW. Most of the conditions were fully incorporated into license articles except for two, which include:

- Excavate gravel from the forebay and place it at the edge of the channel below the diversion (4e Condition 4 and 10j Condition 4); and
- Continue the practice of moving any woody debris that accumulates behind the diversion or intake structure downstream into the bypassed reach (4e Condition 5).

In addition, the license incorporates the Department of Ecology's Water Quality Certification Conditions (Appendix A of the License Order). Conditions related to ramping rates and flows are addressed in license articles 403 and 404. Other standard conditions address spill prevention and control and requirements for permits for construction in water.

B.2 Role of Newhalem Creek in Skagit Project Operations

Power from the Newhalem Creek Project is transmitted via a 7.2 kilovolt (kV) line to the Gorge Switchyard, where it feeds into the Skagit River Hydroelectric Project transmission system. When operational, the Project is one of three sources of emergency backup power to Gorge Powerhouse and the town of Newhalem. However, the need for emergency backup power from the Project is rare, and there are no records of the last time it was required.

B.3 Proposed Replacement Power

With an estimated annual generation capacity of 12,000 megawatt hours, the power provided by the Project is a very small portion of the amount produced by Seattle City Light's (City Light) hydroelectric facilities (Skagit, Boundary, Tolt, and Cedar Falls). Furthermore, given that the Project has not generated for more than 10 years, the power previously generated by the Project has already been replaced by other

means, primarily efficiency upgrades at City Light's other hydroelectric facilities, purchased power, and conservation savings.

Power for Gorge Powerhouse and the town of Newhalem is currently provided via a 7.2 kV station service switchgear, which is supplied by two station service transformers (Banks 10 and 27 at the Gorge Powerhouse). The ability to use these transformers is dependent on which Gorge generators are online, which reduces the reliability and flexibility of station service. The Project was a third power source, and it has been unavailable for more than 10 years. Even when operational, the Project is typically offline for approximately three to four months of the year, when instream flows drop below 40 cfs.

City Light is proposing to improve station service reliability and flexibility by installing a new breaker in Gorge Powerhouse that would eliminate all single points of generator unit failures and allow the station service switchgear to be powered by any generator in the powerhouse or from the 230 kV switchyard if all the generators are offline. This work is needed regardless of Project decommissioning and is considered a separate project.

Exhibit C Proposed Decommissioning Schedule

C.1 FERC License Surrender Process

Seattle City Light (City Light) will file the Application for Surrender of License (Surrender Application) for the Newhalem Creek Hydroelectric Project by January 31, 2022. After the application has been filed, the Federal Energy Regulatory Commission (FERC) will issue a 30-day public notice, during which interested parties can provide comments on the application. FERC will then determine whether a National Environmental Policy Act (NEPA) Environmental Assessment (EA) is warranted. If a NEPA EA is warranted, FERC will issue the EA with a 30-day public comment period. Following completion of the NEPA process and other federal consultations, FERC will issue an Order approving the surrender of the license and *Decommissioning Plan*.

C.2 Decommissioning Schedule

Table C-1 provides the anticipated schedule for the decommissioning process, assuming the Order approving the license surrender is issued 12 to 24 months from filing the Surrender Application. The schedule may change depending upon when the Order is issued or for other reasons as decommissioning activities proceed.

Table C-1. Schedule of Decommissioning Activities

Decommissioning Activity	Anticipated Range of Dates	
	Start	**End**
City Light files the Surrender Application	01/31/2022	--
FERC issues public notice	02/2022 to 04/2022	03/2022 to 05/2022
FERC issues draft NEPA document	08/2022 to 02/2023	09/2022 to 03/2023
City Light develops: • Preliminary engineering drawings • Road Decommissioning Plan • Invasive Species Management Plan • Sediment and Erosion Control Plan • Restoration Plan • Historic Resources Mitigation and Management Plan City Light obtains local, state, and federal permits	09/2022 to 03/2023	09/2023 to 03/2025
FERC issues Order approving license surrender and *Decommissioning Plan*	01/2023 to 01/2024	--
City Light decommissions project, removing infrastructure and restoring disturbed footprint	06/2024 to 06/2025	12/2024 to 12/2025

Exhibit D Project Decommissioning Costs

The following addresses the requirements in 18 Code of Federal Regulations § 4.51(e) that relate to the license surrender process. Costs are preliminary and are subject to change as the Newhalem Creek Hydroelectric Project (Project) proceeds.

D.1 Estimated Project Decommissioning Costs

The preliminary estimated cost to remove Project features under the preferred alternative as presented in Exhibit E of this Application for Surrender of License (Surrender Application) is approximately $5.2 million.

Seattle City Light's (City Light) estimated cost of the process to prepare the Surrender Application and supporting documents through FERC's issuance of the Order approving the license surrender and *Decommissioning Plan* is approximately $1.3 million.

D.2 Estimated Annual Average Cost of the Project

The purpose of surrendering the Project license is to serve City Light customers by decommissioning a project that no longer provides hydropower. Surrendering the license eliminates the need for relicensing and greatly reduces the maintenance of hydroelectric facilities that can no longer be economically operated. Once the Project is decommissioned, Project features are removed, and areas are restored as required by Federal Energy Regulatory Commission's Decommissioning Order, City Light estimates annual maintenance costs for the remaining Project features to be approximately $20,000 per year, averaged over a 25-year maintenance cycle.

D.3 Sources of Financing

City Light is currently financially able to decommission the Project. City Light has two sources of funding to meet the decommissioning costs and maintenance expenses for the infrastructure proposed to remain intact. First, City Light generates cash from operations, which is available for purposes such as decommissioning costs after approval by the City's Mayor and City Council. Retail, net wholesale, and other revenue sources pay operating expenses, taxes, debt service, and some capital requirements. Total revenue for City Light in 2020 was $1,016 million. Second, City Light can borrow money from private markets to meet capital requirements above the amount met with cash from operations. As of December 2020, City Light had $2,554 million in outstanding debt.

Exhibit E Environmental Report

E.1 Background and Rationale for License Surrender

The Newhalem Creek Hydroelectric Project (Project) is a small hydropower facility owned and operated by Seattle City Light (City Light). It was originally constructed in 1921 to provide power to build the nearby Gorge Dam and Powerhouse and the associated construction camp—now the town of Newhalem (see Exhibit A). The Project's Unit 20 generator can produce 2.125 megawatts of power during the wetter months of the year, with an estimated value of $250,000 per year (see Exhibit B). When operational, the Project provides a secondary source of backup power to Gorge Powerhouse and Newhalem. Most of the Project facilities are listed in the National Register of Historic Places (NRHP). The diversion dam is upstream of two waterfalls that block anadromous fish passage.

The Project was in active use until 2010, when a series of equipment and structural problems caused an extended shutdown. Currently, it cannot be operated due to leaks in the power tunnel, maintenance needs at the powerhouse and headworks, and lack of safe access to the dam. An engineering analysis of the necessary repairs (see Exhibit B) determined that Project costs far exceed the revenue. For this reason, City Light has decided to decommission the Project.

The current Project license expires on January 31, 2027. On April 28, 2021, City Light filed a Notice of Intent to surrender the license with the Federal Energy Regulatory Commission (FERC). The Notice of Intent included a plan and schedule to submit an Application for Surrender of License (Surrender Application) and *Decommissioning Plan* for the Project by January 31, 2022.

E.2 Purpose and Need

The Project (FERC No. 2705) is 100 years old and has not generated power in more than 10 years. Maintenance needs have increased due to its age and natural events; an Engineering Cost Analysis conducted by City Light in 2020 determined that the cost to operate the facility outweighs its revenue. The purpose of surrendering the Project license is to serve City Light customers by decommissioning a project that no longer provides hydropower. Surrendering the license eliminates the need for relicensing and greatly reduces the maintenance of hydroelectric facilities that can no longer be economically operated.

City Light intends to decommission the Project in a manner that best preserves historic properties and protects cultural resources, while also restoring terrestrial and aquatic habitats, and providing for interpretive opportunities. The decommissioning action also needs to meet FERC's license surrender requirements and be consistent with the National Park Service's (NPS) purpose for the Ross Lake National Recreation Area (RLNRA), which is to "conserve the scenic, natural, and cultural values of the Upper Skagit River Valley and surrounding wilderness, including the hydroelectric reservoirs and associated developments, for outdoor recreation and education" (NPS 2012).

E.3 Decommissioning Action Alternatives Considered

Three decommissioning alternatives were considered. Alternatives A and B were eliminated from detailed analysis because they did not meet the purpose and need of decommissioning. Alternative C was identified as the preferred alternative.

E.3.1 Retain All Project Features (Alternative A)

Alternative A would retain all buildings, structures, and equipment associated with the Project. The powerhouse equipment would be de-energized, and the transformer would be removed; however, the powerhouse building and the transmission lines over the river would remain. The dam would stay in place; gravel and woody debris would eventually fill the small diversion impoundment and move downstream over the diversion during high flows. During low-flow conditions, water would continue to be conveyed downstream via the sluiceway; during higher flows, water would also go over the dam. The road would remain to approximately elevation 840 feet (ft) as an emergency evacuation route for the *Skagit River Hydroelectric Project Emergency Action Plan* (Skagit EAP) and would be maintained above this point to allow crews access on foot to the headworks for maintenance purposes.

The advantages and disadvantages of Alternative A compared to the other alternatives are summarized in Table E-1 at the end of this section. Alternative A would preserve all historic properties, including the dam, power tunnel, penstock, and powerhouse, and would avoid all short-term impacts associated with decommissioning construction activities. It would, however, not restore any aquatic or terrestrial habitats or the pre-Project cultural and aesthetic setting of Newhalem Creek. It would also result in a continued maintenance obligation of Project facilities, including the access road, with no off-setting long-term environmental benefits. Alternative A does not, therefore, meet the purpose and need of decommissioning and was eliminated from further analysis for these reasons.

E.3.2 Full Removal/Abandonment of Project Features (Alternative B)

Alternative B would completely remove all above-ground buildings, structures, and equipment associated with the Project, including the powerhouse, powerhouse equipment, tailrace fish barrier, penstock, penstock saddles, dam, sluiceway/intake, gatehouse, and pedestrian bridge. The only remaining above-ground features would be the tailrace, since it is part of an intermittent stream, and the Skagit EAP emergency evacuation routes, which include the diversion dam access road to elevation 840 ft and the trail leading to the lower end of the rock tunnel. The power tunnel and buried power lines through Newhalem, both of which are underground features, would be abandoned in place.

The diversion dam and headworks would be removed by first installing supersacks to divert the flow of water and enable working in the dry, then demolishing the concrete with an excavator-mounted jackhammer. Concrete would be disposed of at an off-site location, although it may be possible to use the rock shaft for disposal of a small amount of material. Work would require some road repair and stabilization to allow access by equipment and trucks. Helicopters could also be used for all or some of the work, which would reduce the number of truck trips and possibly decrease the amount of necessary road work. The gatehouse and pedestrian bridge would be removed after work on the diversion dam and

sluiceway/intake is complete. The road would be decommissioned above the Skagit EAP evacuation muster site once the dam and other headworks structures are removed.

The power tunnel would be abandoned and sealed at the upper end. The penstock would be cut from the concrete plug separating the power tunnel from the penstock and removed from the rock tunnel. The opening of the rock tunnel would be gated to allow for the drainage of ground water that enters the tunnel through cracks in the rock. Depending on the drainage volume of water, a pipe may be needed to convey water to a different location once the penstock is removed, or the tunnel could be sealed to allow water to infiltrate into the cracks present in the tunnel.

The penstock and saddles would be removed with a conventional excavator or an articulated excavator, the former of which would require constructing a new route partially up the slope to the lower thrust block above the powerhouse. The excavator would remove material along the alignment as allowed by the slope. Upper portions of the penstock would be taken down using cables to control movement or potentially with helicopter assist. The penstock would be separated at the expansion joints and pulled or lowered down the hill using an excavator. The 54 concrete saddles (plus 2 wooden saddles) situated every 20 ft up the hillside would also be removed. The saddles are 6 ft wide, 10 inches (in) thick, range from 4.3 to 6 ft tall, and are either buried approximately 3 ft deep or embedded onto bedrock with four rock anchors. The six concrete thrust blocks range in size from 5 ft long by 5 ft wide to 10 ft long by 7 ft wide, with heights between 5 and 8-ft and varying depths. The saddles and the thrust blocks would be broken apart with an excavator or hand tools and cut and chipped from the bedrock with a jackhammer and moved off the slope. Trucks would be used to remove material to an off-site disposal area.

The transmission and electrical service lines across the river would be removed, along with the power poles. The underground lines between the river and the powerhouse would be excavated and removed. The powerhouse and its foundation would be demolished with an excavator and/or other conventional equipment. Equipment inside the powerhouse and the transformer would be salvaged or disposed of off-site. The powerhouse site and the cleared area adjacent to the powerhouse, which includes a section of road, the transmission line right-of-way, parking, and storage, would be restored.

The tailrace would be retained because it is part of an intermittent stream. The tailrace fish barrier would be demolished with an excavator-mounted jackhammer, assisted by a non-explosive cracking agent, concrete saw, and/or waterjet cutter. Additionally, the riprap associated with the tailrace barrier and the spur trail and viewing area would be removed. The former road used to install the tailrace barrier is still evident and would be re-commissioned for this work.

The advantages and disadvantages of Alternative B are summarized in Table E-1. This alternative would restore natural stream processes, all terrestrial habitat (approximately 2.94 acres [ac]), and the pre-Project cultural and aesthetic setting of Newhalem Creek. It would eliminate the need for long-term maintenance of Project facilities and the access road above elevation 840 ft. However, Alternative B would remove all historic properties currently listed in the NRHP and existing interpretive/educational opportunities associated with the Project. Although the powerhouse could be moved to Newhalem, the historic context of the powerhouse and its associated infrastructure would be eliminated. In addition, decommissioning-related construction would involve significant noise and disturbance to cultural resources, terrestrial

resources, and recreation, and could potentially disturb unrecorded archaeological sites. It may also have long-term impacts to soils and drainage on the slope above the powerhouse and would require additional remediation. For these reasons, Alternative B does not meet the purpose and need for decommissioning and was eliminated from further analysis.

E.3.3 Partial Removal/Abandonment of Project Features (Alternative C, Preferred Alternative)

Alternative C is similar to Alternative B, but the powerhouse and penstock would remain and be interpreted as historic resources. The equipment in the powerhouse would be deactivated but retained in place. The electrical service line to the powerhouse and associated poles would also remain for heating and to illuminate the equipment inside for interpretive purposes. The existing interpretive panels along the front windows of the powerhouse would be updated, and other interpretive elements would be added. City Light would continue to maintain these historic properties and interpretive features in perpetuity. Additional opportunities for interpretation, including signage displaying tribal, NPS, and City Light history along the trails in the vicinity, may also be considered.

Most of the cleared area adjacent to the powerhouse would be revegetated except for a small site for parking up to three vehicles at the road's edge, south of the powerhouse. Routine vegetation maintenance outside the immediate footprint of the penstock would cease, which would result in the restoration of the adjacent corridor to forested habitat. Vegetation would be removed only as necessary to repair or repaint the penstock. Painting would occur approximately every 10 to 20 years. The penstock would continue to convey groundwater intrusion from the power tunnel to the tailrace. The access road above elevation 840 ft and the trail along the penstock would continue to be maintained by City Light as emergency evacuation routes, as part of the Skagit EAP.

The advantages and disadvantages of Alternative C are summarized in Table E-1. Alternative C was selected as the preferred alternative because it best meets the purpose and need for decommissioning and balances natural resource restoration with cultural resource protections. It maintains the powerhouse and penstock, which are historic properties that are visible to the public and provide interpretive opportunities. It restores natural stream processes, approximately 2.78 ac of terrestrial habitat, and the pre-Project aesthetics and cultural setting of Newhalem Creek, while minimizing decommissioning construction-related disturbance to recreation, wildlife, and undiscovered archaeological sites. It reduces long-term maintenance obligations and avoids potential slope destabilization from removing the saddles and introducing groundwater to the hillslope behind the powerhouse.

Table E-1. Summary of Decommissioning Alternatives Benefits and Disadvantages

Effect	Alternative A Retain All Project Features	Alternative B Full Removal/Abandonment of All Project Features	Alternative C Partial Removal/Abandonment of Project Features
Long-Term Benefits			
Protects historic properties	Protects all	Protects power tunnel only	Protects power tunnel, penstock, and powerhouse
Restores natural fluvial geomorphology of Newhalem Creek	No change – retains dam	Restores completely	Restores completely
Restores terrestrial habitat[1]	No change	Restores approximately 2.94 ac to native habitat	Restores approximately 2.78 ac to native habitat
Restores aesthetics and pre-Project cultural setting of Newhalem Creek and vicinity	No change	Restores to pre-Project conditions	Restores to pre-project conditions at dam and tailrace barrier sites
Reduces long-term maintenance needs	Maintains status quo	Maintenance needs reduced to none	Minimal maintenance needs continue
Maintains/increases interpretive opportunities	Maintains status quo	None	Increases opportunities
Restores habitat and drainage along the access road (above elevation 840 ft)	Requires ongoing maintenance	Decommissions	Decommissions
Impacts			
Soil disturbance	None	Extensive	Moderate
Adversely affects historic properties	None	Removes most historic properties (diversion dam, penstock, powerhouse)	Removes diversion dam only
Disturbance to vegetation	None	Extensive	Moderate
Impacts to fish	None	Minor	Minor
Noise disturbance to wildlife	None	Extended, moderate	Short-term, moderate
Downstream turbidity	None	Short-term increases following headworks removal	Short-term increases following headworks removal
Upstream channel gradient re-establishment	None	Approximately 0.5 mile (mi)	Approximately 0.5 mi
Potential changes to slope stability and drainage	No change	High potential in penstock area	No change
Potential disturbance to unidentified archaeological sites	No change	High potential in penstock area	Low
Noise disturbance to recreation sites and trails	No change	Extended, moderate	Short term, moderate
Trail closure	None	Extended temporary trail closures	Short-term, temporary trail closures

[1] The difference between Alternatives B and C for terrestrial habitat restoration is the area now occupied by the powerhouse (1,689 square [sq] ft) and penstock (4,242 sq ft) and retention of approximately 1,140 sq ft of cleared area adjacent to the powerhouse for access. This represents 7,071 sq ft or 0.16 ac.

E.4 Description of Preferred Alternative

Alternative C, the preferred alternative, is described in this section, along with the means and methods that would be used to accomplish the decommissioning work. Table E-2 provides a summary of the proposed disposition of the various Project features. More detailed drawings and a list of the required environmental permits are provided in the *Decommissioning Plan*.

Table E-2. Proposed Action Summary

Project Features to be Removed	Project Features to be Abandoned	Project Features to be Retained
Diversion dam, sluiceway, and intake	Power tunnel	Powerhouse
Gatehouse	Underground utilities	Penstock and saddles
Pedestrian bridge over creek near dam	Dam access road above elevation 840 ft	Tailrace
Tailrace fish barrier and riprap	--	Electrical service line to powerhouse
Overhead transmission lines		Emergency evacuation trail/route along penstock (Skagit EAP route)
Transformer		Dam access road below elevation 840 ft (Skagit EAP route)

E.4.1 Remove Diversion Dam and Headworks

E.4.1.1 Establish Access to the Diversion Dam and Headworks

The landslide that currently blocks the road to the diversion dam and other headworks creates challenges for establishing access to these facilities. The most feasible option, with the least environmental impacts, involves repairing the road to make it safe for personnel and vehicle access. Repairs would be focused on improving slope stability and the roadbed structure for safety and short-term access through the landslide area. Work would include the following:

- Clearing material from the roadway, including using a non-explosive cracking agent to break apart the large rocks
- Using some or all the cleared material to construct a protective berm as a barrier between the road and the slope above the road
- Repairing the tension cracks present on each side of the landslide
- Scaling the slope above the road to remove hazard rocks, which may involve the use of small explosives

Road repair and slope stabilization would occur in summer, in the weeks prior to dam removal, once conditions are dry and the danger of landslides and rockfall are lowest.

Once the repairs are complete, all equipment and materials needed to demolish the diversion dam and other headworks would be transported via the road. While the road is the most likely means of accessing the diversion dam and headworks, it is possible that a helicopter assist may occasionally be needed.

E.4.1.2 Remove Diversion Dam and Headworks

Diversion dam removal activities would be scheduled during low flow months and outside the anadromous fish spawning window (July 16 through August 19) to minimize impacts to water quality and fish. The diversion dam and headworks would likely be removed in successive phases to minimize or eliminate in-water work.

Phase 1: Remove Diversion Dam

Supersacks would be used to divert the creek during dam removal activities (Figure E-1). The supersacks would be filled with native creek sand, gravel, and cobble and placed in the channel upstream of the impoundment, diverting water into the sluiceway to dewater the area around the dam. Once isolated, the diversion dam and apron (concrete slab abutting the diversion immediately downstream) would be removed by demolishing the concrete with an excavator-mounted jackhammer and/or a non-explosive cracking agent. City Light would develop best management practices (BMPs) to minimize the impact of pH from concrete removal, as necessary.

Figure E-1. Diagram of Phase 1 Supersack Placement and Water Diversion

Phase 2: Remove Remaining Headworks

After the main channel is free of structures and cleaned, a temporary conduit (corrugated steel or plastic pipe) would be installed in the main channel and covered with native creek material to act as a roadbed to provide access to the far side of the creek. The supersacks would then be moved to direct water into the conduit, conveying water away from the Phase 2 construction site and isolating the intake/sluiceway area

for access. The intake, trashrack, and downstream shoreline concrete would be removed. Concrete would be broken apart with an excavator-mounted jackhammer and/or a non-explosive cracking agent. Once the in-water structures are removed, the gatehouse, bridge, and remaining concrete bulkhead would be removed. City Light would develop BMPs to minimize the impact of pH from concrete removal, as necessary.

Phase 3: Dispose of Concrete and Seal Power Tunnel Shaft

Removing the diversion dam and other concrete portions of the headworks is expected to result in approximately 560 cubic yards (CY) of concrete debris, in addition to other materials (Figure E-2). Approximately 50 CY of this material could potentially be disposed on site in the rock shaft for the power tunnel. Material not disposed of on site, would be removed via the access road. Highway legal dump trucks would remove the concrete and other demolition debris off site for disposal, requiring approximately 162 trips, at 12 trips per day, for 14 days. Concrete would not need to be removed from the site concurrently with demolition and could be stock-piled and scheduled for disposal at a time that is the least disturbing to wildlife and recreationists, such as in fall, if travel across the landslide remains safe.

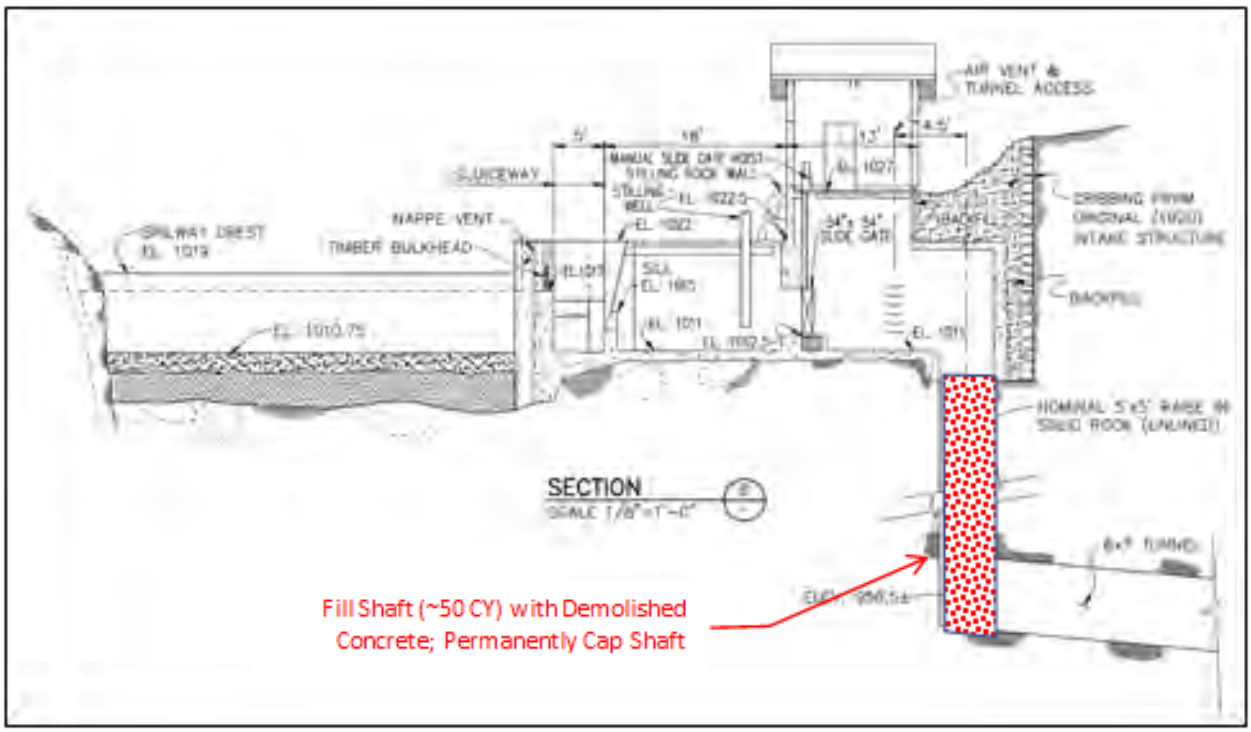


Figure E-2. Drawing of Power Tunnel Shaft with Fill

Finally, the supersacks would be removed and emptied back into the restored streambed. Minor grading would occur in the immediate dam removal area and where the supersacks would be emptied to smooth out the cobble and allow the free flow of water. The elevation after dam removal and this minor grading would be 1,009 ft.

In addition, the power tunnel would be sealed with a concrete sealing slab on the upstream end of the shaft; the downstream end is already sealed with the existing concrete plug. A grate would be placed at

the open end of the rock tunnel where the penstock daylights to prohibit human access (other than City Light employees for maintenance purposes) but allow wildlife to utilize the lower portion of the tunnel.

Once the work is complete, the areas disturbed by deconstruction activities and the sites previously occupied by headworks would be graded and restored. A restoration plan for these areas would be developed in coordination with the NPS.

E.4.2 Remove Tailrace Barrier and Transmission Lines

Tailrace barrier removal work would be scheduled outside the primary recreation season, and would involve the following general steps:

- Re-establish the previous access road and staging area: Based on the drawings for construction of the tailrace barrier, the access road to the site was 200 ft long and utilized approximately 50 ft of the transmission line corridor before veering towards the tailrace barrier. While revegetated, evidence of this road is still visible. Re-establishing this old road will require removing some small trees and shrubs and establishing erosion-control BMPs. Equipment and trucks for the tailrace barrier removal work would be staged in the existing cleared area between the powerhouse and the first set of transmission poles.
- Demolish concrete: The tailrace barrier consists of approximately 99 CY of reinforced concrete. The barrier would be demolished with an excavator-mounted jackhammer, concrete saw, and/or waterjet cutter. City Light would develop BMPs to ensure that concrete dust or slurry does not enter the Skagit River or any surface water drainage in the area. Dump trucks would transport the waste concrete and rebar to an appropriate disposal site.
- Remove riprap and regrade tailrace outlet: The riprap along the sides of the tailrace barrier walls and at the outlet would be removed and salvaged for use elsewhere. The site would be regraded to a shallow, natural-appearing outlet channel with the ability to convey water from the intermittent stream and tunnel drainage during periods of extended precipitation.

Once the tailrace barrier is deconstructed, the transformer next to the powerhouse would be removed, as would the electrical service line feeding Gorge Powerhouse, which is in conduit beneath the Ladder Creek pedestrian bridge, and the transmission lines that cross the river from Newhalem Powerhouse. The transmission lines would be removed with a truck-mounted cable reel, using access from the south side of the river on the same road established for the tailrace barrier work, or from the north side of the river on paved or lawn surfaces in Newhalem. The underground transmission lines on both sides of the river would be abandoned in place since they are within trenches with other electrical service lines that will remain active. The three-phase electrical service line to the powerhouse and the four poles (two on each side of the river) that support it would remain to provide the power needed for heating and lighting for interpretation and tours. Alternative methods of supplying electricity to the powerhouse may be investigated to eliminate the need to retain the overhead line and poles.

After the tailrace barrier, transformer, and transmission lines are removed, most of the area in front of the powerhouse, which is currently cleared and used for parking and storage, would be revegetated. Three

parking spots would be designated next to the powerhouse and a short segment of road would remain. A restoration plan for this area would be developed in collaboration with the NPS.

E.4.3 Decommission the Access Road

Once the concrete is removed from the diversion dam and headworks demolition phase, the access road above the Skagit EAP evacuation muster site (elevation 840 ft), a section approximately 0.75 mi long, would be permanently blocked and decommissioned. A road decommissioning plan would be developed based on U.S. Forest Service (USFS) and/or Washington Department of Natural Resources guidelines and in collaboration with the NPS. This may include removing the approximately eight existing culverts and restoring natural drainages, scarifying the road surface, natural regeneration and/or replanting, and controlling invasive plants for three years as needed.

E.4.4 Mitigation Measures and Best Management Practices

The most significant impact of the proposed Project decommissioning is to cultural resources, particularly historic structures. Mitigation for adverse effects to cultural resources will be developed in consultation with the Washington Department of Archaeology and Historic Preservation (DAHP), the NPS, and affected tribes. The preliminary proposal for mitigation includes compiling photography and written documentation of the diversion dam and power tunnel into a report for submittal to the DAHP and other consulting parties. Other potential mitigation measures may include updated interpretive signs at the powerhouse and along nearby trails and a penstock viewing platform. City Light may also add the powerhouse and penstock to its Skagit Project guided tour program. In addition, archaeological surveys and/or monitoring would be conducted in areas subject to ground disturbance during decommissioning activities.

Mitigation measures and BMPs for natural resources included in the preferred alternative are summarized in Table E-3 for each of the major decommissioning activities. Additional measures will be prescribed in resource-specific management plans developed in consultation with agencies and tribes and filed with FERC. Permits required for construction activities will also include BMPs and restoration specifications.

Table E-3. Summary of Proposed BMPs, Mitigation Measures, Plans, and Permits for Impacts to Natural Resources

Activity	Impact	BMP, Mitigation Measure, or Management Plan
Access road improvements	Noise	Time noise-generating activities to occur outside the spring to early summer breeding season
	Increased traffic	Set speed limits for trucks; provide signage for public
	Spills/oils, storm water runoff	Develop and implement a Spill Plan
	Invasive species spread/ establishment	• Wash vehicles and equipment prior to use on site • Control weeds along lower portion of road prior to construction start
	Erosion in work area	Develop and implement a Sediment and Erosion Control Plan

Activity	Impact	BMP, Mitigation Measure, or Management Plan
Diversion dam and headworks removal	Noise	Time noise-generating activities to occur outside the spring to early summer breeding season for birds
	Increased traffic	Set speed limits for trucks, provide signage for public
	Work in and near water	Develop and implement a Spill Plan
	Dewatering area by dam	Conduct fish exclusion/rescue
	Tree removal and vegetation disturbance	• Minimize number and size of trees removed • Develop and implement a Restoration Plan
	Invasive species spread/ establishment	• Wash vehicles and equipment prior to use on site • Control weeds along lower portion of road prior to construction start
	Concrete dust and slurry	Pump water and treat in upland location as necessary
	Downstream movement of sediment	Time supersack removal releases in July–August to avoid spawning periods
	Erosion in work area	Develop and implement a Sediment and Erosion Control Plan
Tailrace barrier removal	Noise	Time noise-generating activities to occur outside the spring to early summer breeding period for birds and outside the peak recreation season
	Invasive species spread/ establishment	• Wash vehicles and equipment prior to use on site • Control weeds along lower portion of road prior to construction start
	Concrete dust and slurry	Collect or vacuum and move off site
	Sediment	Time work to occur in late summer/early fall when stream is dry
	Tree removal and vegetation disturbance	• Minimize number and size of trees removed • Develop and implement a Restoration Plan
	Erosion along access route	Develop and implement a Sediment and Erosion Control Plan

E.5 Affected Environment and Environmental Effects

E.5.1 Description of Project Area

Newhalem Creek is 8.8 mi long and originates high in the North Cascades. The surrounding peaks are 5,000 to 6,500 ft in elevation, and some are glaciated. Elevations in the Project area range from approximately 500 ft at the powerhouse to 1,011 ft at the dam. The entire drainage is within the North Cascades National Park Complex, which is managed by the NPS and includes the RLNRA and North Cascades National Park.

Newhalem Creek drains a watershed area of 29.2 sq mi, with inflows from Stout Lake and melt waters from McAllister, Little Devil, and Neve Glaciers. It joins the Skagit River approximately 1 mi west of the town of Newhalem. Based on data from the U.S. Geological Survey (USGS) stream gauge, just upstream of the dam, flows in the creek over the last 5 years (2016 to 2020) ranged from lows of 20 to 40 cubic feet per second (cfs) in summer to peaks over 1,000 cfs in winter. When operating, the Project influences flow in the lowest 1 mi of the creek.

The Newhalem Creek area has a west coast marine climate modified by local topography and orographic effects. Heavy winter rains with some snowfall, dry summers, and moderate annual temperatures are typical of the area. The mean annual precipitation at the closest weather station (Diablo Dam; elevation 1,201 ft) is approximately 79 in (2000 to 2020), with roughly 80 percent falling from October through April. Monthly temperatures at Diablo Dam for the last 20 years range from an average of 34 degrees Fahrenheit (°F) in December to 66.8°F in August. The highest temperature recorded in that period was 104°F; the lowest temperature recorded was 2°F.

E.5.2 Geology and Soils

E.5.2.1 Affected Environment

The bedrock geology in the upper Skagit River Basin, including the Newhalem Creek drainage, is Skagit gneiss and is greater than 60 to 70 million years old (Misch 1966, as cited in Seattle City Light 1992). The North Cascades were heavily glaciated during the last Ice Age, and the higher elevations maintain some glacier cover. Glacial scour has left the valley sides in the upper reaches of Newhalem Creek with abundant bedrock. Mapped landforms include the steep valley walls surrounding the Newhalem Creek valley, the floodplain features in the lower gradient area upstream of the diversion, the bedrock canyon downstream from the diversion, and the alluvial fan near the confluence with the Skagit River that has cut into the moraines and terraces in the Skagit River valley (Figure E-3). Several debris cones control floodplain width in the lower gradient valley upstream from the Newhalem diversion dam; these debris cones control the confined/unconfined reaches of the stream and limit channel movement across the floodplain (Dube 2021).

The Soil Conservation Service's Skagit County soil survey (Klungland 1989, as cited in Seattle City Light 1992) terminates approximately 20 mi down the Skagit River from the town of Newhalem, and no detailed soil survey has been done in the Newhalem Creek area. However, a reconnaissance level assessment (Reidel 1990, as cited in Seattle City Light 1992) conducted for the last license identified a large, ancient, landslide geomorphic feature on the southern side of Newhalem Creek. Composed of alpine glacial deposits on top of bedrock, the entire area is deforming very slowly downslope. More recent Light Detection and Ranging (LiDAR) and hillside slope imagery indicates that this feature extends for approximately 2,000 ft along the drainage, with the diversion dam roughly in the center of the northern edge (Golder Associates 2021; Figure E-4). While much of this landslide feature is inactive, there is an active portion at the lower end, approximately 1,100 ft west of the dam site, where the cut-slope of the old USFS logging road (now the dam access road) over-steepened the larger landslide materials, leading to the failure of approximately 250 ft of road section.

E.5.2.2 Project Effects

Decommissioning would result in some short-term impacts on geology and soils associated with the Project:

- Soils would be temporarily disturbed by heavy equipment during deconstruction of the dam, other headworks structures, and tailrace barrier. The staging areas for these activities will cause soil compaction.

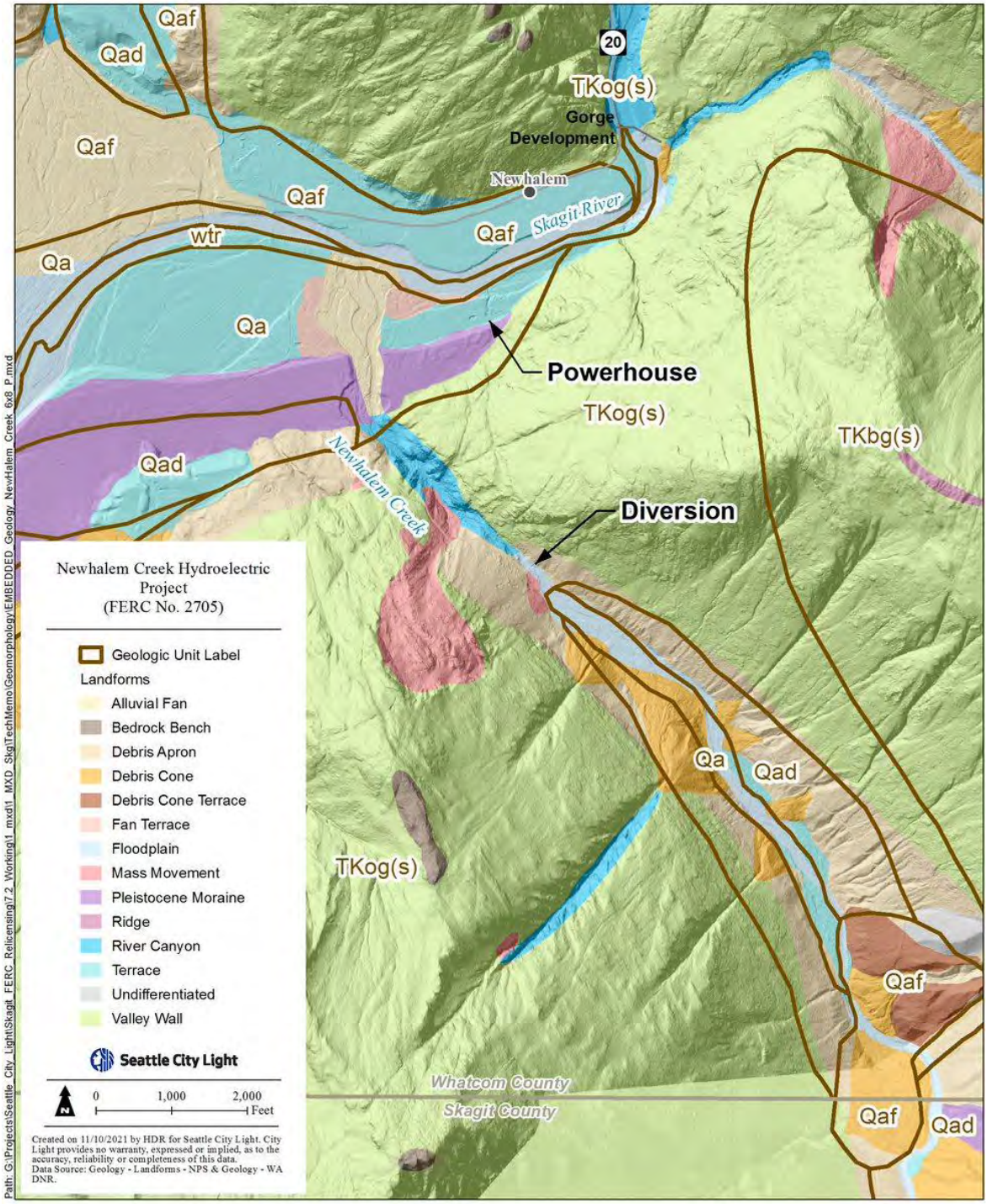


Figure E-3. Geologic Units and Landforms in the Newhalem Project Vicinity

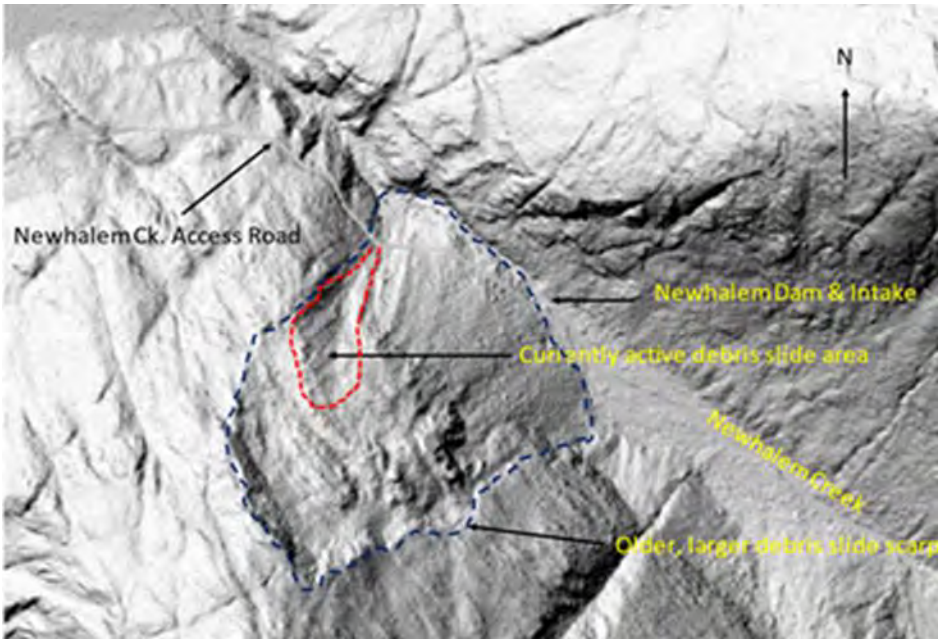


Figure E-4. LiDAR Image of Landslide Feature along Newhalem Creek

- Access road repairs would impact soils and geology in the immediate vicinity of the work, with the extent dependent upon the selected access option. Options under consideration would involve moving and breaking up fallen rock to form a berm along the road across the landslide area.
- Scaling and some rock above the road in this area may also be removed or stabilized. Repairs to the tension cracks in the road and/or the Hilfiker retaining wall would also disturb soils in and adjacent to the roadbed.

No long-term impacts on soils and geology are expected from decommissioning.

E.5.2.3 Mitigation Measures

No mitigation measures are proposed.

E.5.3 Water Quantity

E.5.3.1 Affected Environment

Discharge records for Newhalem Creek are available from a USGS gaging station (#12178100) just upstream of the diversion dam. These records show two periods of high flows during the year, both due to flooding from heavy rainfall on a large snowpack (Figure E-5). The first period of high discharge is related to spring snowmelt, from May through July, and results in the highest sustained flows of the year.

The second period of high discharge occurs in November and is associated with heavy precipitation during warm, early winter storms. The highest discharge for the USGS gage period of record (1960 to 2021) was 8,430 cfs in December 1981, but peak flows over the past 5 years have ranged from 1,000 to 2,500 cfs (Figure E-6; Dube 2021).

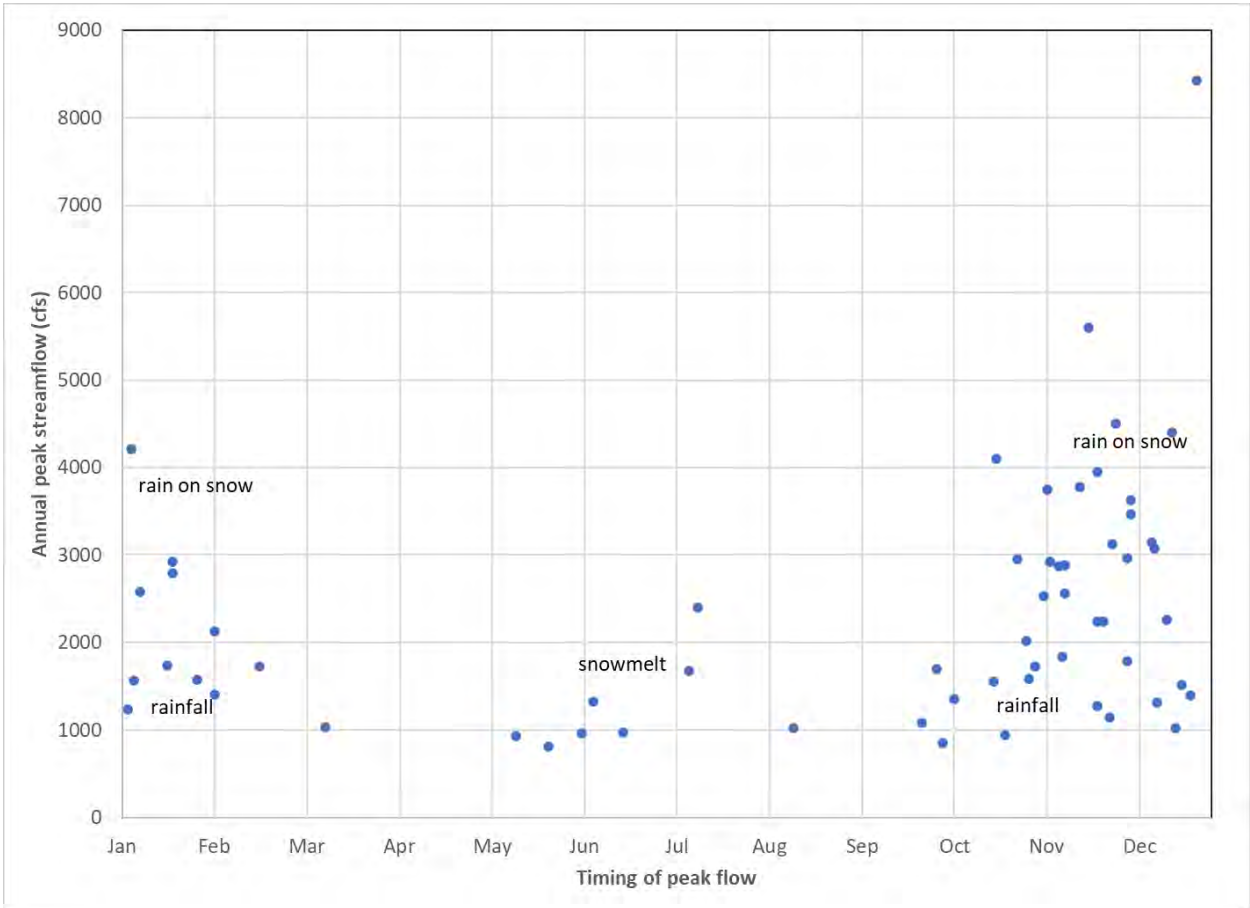


Figure E-5. Timing and Cause of Peak Stream Flows at Newhalem Creek Gage (USGS 12178100; 1961 to 2020)

Discharge in Newhalem Creek is lowest during summer dry periods, particularly under seasonal drought conditions, and during mid-winter freezing events. Aside from these extremes, discharge is typically lowest during September and February. During dry periods (90 percent exceedance), baseflow discharges in Newhalem Creek can be less than 50 cfs for 5 months of the year (Table E-4).

When operational, the Project can lower discharge in the 1-mi bypass reach by up to 69 cfs (peak powerhouse capacity) by diverting water to the powerhouse. However, the current Project license stipulates minimum instream flows, or inflow, whichever is less:

- 40 cfs from November through March
- 70 cfs from April through June
- 50 cfs for July
- 95 cfs for August and September
- 75 cfs for October

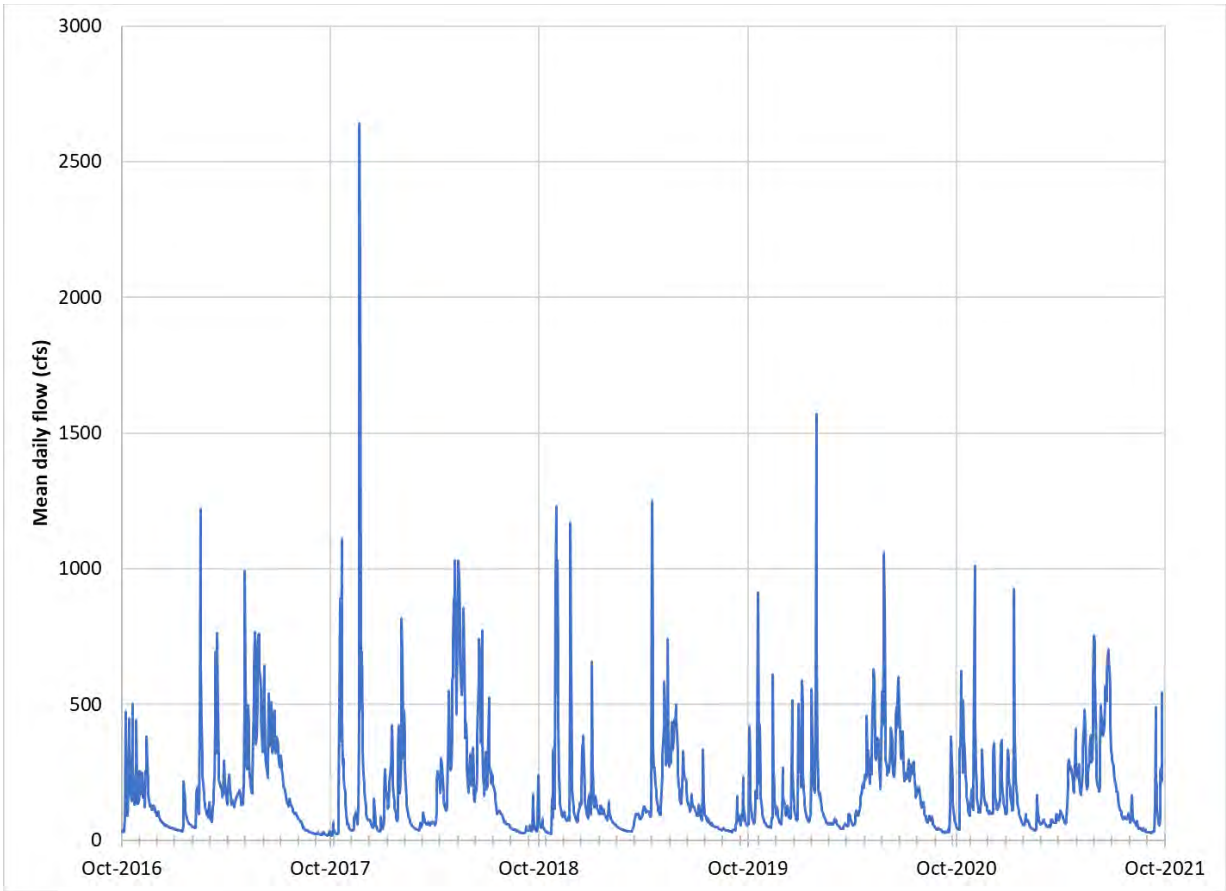


Figure E-6. Daily Flow at Newhalem Creek Gage (USGS 12178100; 2017 to 2021)

Table E-4. Monthly Median Newhalem Creek Flows (cfs), 1960 to 2020

Month	1960–2020 Median (50% Exceedance)	Wet Period Median (10% Exceedance)	Dry Period Median (90% Exceedance)
January	96	282	44
February	84	239	46
March	86	203	47
April	123	266	72
May	262	524	135
June	322	541	186
July	233	434	114
August	90	203	56
September	62	148	35
October	84	308	33
November	127	418	55
December	95	293	51

Source: USGS Gaging Station 12178100, 2017 to 2021

E.5.3.2 Project Effects

The Project is not operational, and all inflow passes through the sluiceway or over the dam; therefore, the Project does not currently influence water quantity in the creek below the diversion dam at any time of year. Removal of the Project will not affect water quantity.

E.5.3.3 Mitigation Measures

No mitigation measures are proposed.

E.5.4 Water Quality

E.5.4.1 Affected Environment

Water quality in Newhalem Creek receives the highest possible ratings from the Washington Department of Ecology for aquatic life uses, recreation uses, and water supply conditions[1]. Newhalem Creek's excellent water quality can largely be attributed to the pristine character of its watershed, which is in North Cascades National Park. The current Washington State Water Quality Assessment 303(d)/305(b) list (Ecology 2016 https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Assessment-of-state-waters-303d, accessed September 10, 2021) does not have any 303(d) listings in the Newhalem Creek area, but the creek downstream of the dam is listed as "impaired" (Category 4C) due to low instream flows.

Water quality characteristics of Newhalem Creek were sampled by City Light during spring, fall, and winter 1991; laboratory analysis was conducted using U.S. Environmental Protection Agency standard procedures. Dissolved oxygen concentrations were consistently at or near 100 percent of saturation for all water temperatures sampled (values were 12.8 parts per million [ppm] at 4.2 degrees Celsius [°C]; 12.4 ppm at 5.0°C; and 10.4 ppm at 0.8°C), indicating no dissolved oxygen problems.

Nutrient concentrations in Newhalem Creek were found to be very low. Nitrate-nitrogen concentrations ranged from approximately 0.01 to 0.043 milligram per liter (mg/L), and orthophosphate concentrations ranged from 0.005 to 0.008 mg/L. Suspended sediment concentrations were consistently low (less than 1.0 mg/L) on all sampling occasions (representing flows between 10 and 30 cfs). Sediment concentrations are expected to be greater during periods of higher runoff (greater than 30 cfs).

Total dissolved solids had a value of 26 mg/L in spring and fall and 18.0 mg/L during winter; these are relatively low values characteristic of headwater streams in the Cascade Mountains. Conductivity values were also extremely low, varying between 15 and 20 micromhos per centimeter. Low conductivity values are also characteristic of headwater streams in the Cascade Mountains. Alkalinity values were relatively low, ranging from 8.2 to 14 mg/L as calcium carbonate. Values for pH were neutral, ranging from 6.7 to 7.2. Both alkalinity and pH values indicate high water quality conditions in Newhalem Creek.

[1] WAC 173-201; https://apps.leg.wa.gov/wac/default.aspx?cite=173-201A-602&pdf=true, accessed September 10, 2021

E.5.4.2 Project Effects

Decommissioning the Project is not expected to have any effects on water chemistry or temperature. However, there would be temporary effects on suspended sediment concentrations, resulting in short-term increases in turbidity. Short-term but minor increases in turbidity are expected during the process of filling and placing supersacks to create the coffer dam to isolate removal of the diversion dam and other headworks. The greatest effect on turbidity is expected when the coffer dam is removed, and flow is returned to the channel. At this point, the creek would move through the accumulated sediment in the impoundment and the bed immediately upstream from the diversion structure. Since most of the sediment deposits behind the diversion and upstream are coarse-grained, the increase in turbidity in the creek downstream would likely be short term and transient.

Re-establishment of the stream gradient upstream of the former diversion dam would result in additional sediment input to the creek as the channel adjusts to the lower-grade control provided by the bedrock at the site. This is expected to occur over several decades and at times may result in minor and temporary increases in turbidity in the creek downstream, primarily during peak-flow events when natural turbidity is also higher (see Section E.5.5.3 for more detail).

Decommissioning the diversion dam and other Project works would ensure natural flows in Newhalem Creek in perpetuity and would establish a basis for removal of the Category 4C impairment listing from the lower 1 mi of the drainage.

E.5.4.3 Mitigation Measures

Dam removal work would occur during low flow. Supersacks would be used to isolate the work site, and work would be phased to eliminate or minimize in-water work. BMPs would be implemented to minimize the amount of concrete dust potentially entering the water during removal of the dam and tailrace barrier. This could involve use of a sump pump while chipping out concrete infill and treating this material in an upland location. Work in the tailrace fish barrier would also occur during low flow. City Light will comply with any conditions included in the Section 401 Water Quality Certification and Section 404 permit for in-water work associated with decommissioning.

E.5.5 Aquatic Resources

E.5.5.1 Affected Environment

Stream Geomorphology and Aquatic Habitat

Newhalem Creek is a boulder-dominated stream with a moderate to high gradient. The average gradient of the stream from the confluence of the Skagit River to the Project dam at Creek Mile (CM) 1.0 is 10 percent but varies by reach, as described below.

- Skagit River to CM 0.38: The lower section of the creek has a moderate gradient of 2.5 percent. The stream runs through a broad alluvial terrace for its last 0.27 mi. Consequently, this section is relatively wide and shallow, with broad lateral cobble and boulder bars along much of its length (Figure E-7). Substrates in this section of the stream are dominated by large cobbles and boulders.

Stream habitat types include boulder runs and cascades, broad riffles (dominated by cobbles and boulders), shallow pools in association with boulder runs, and deep pools adjacent to single, large, boulder blocks.

The Newhalem Creek alluvial fan appears to be forcing the Skagit River to the north; the Skagit River narrows and has a locally higher gradient at the confluence with the creek. Gravel and cobble material transported from Newhalem Creek provides a source of spawning-sized material to the Skagit River.

Figure E-7. Newhalem Creek just Upstream of the Skagit River

- CM 0.27 to CM 0.38: The stream in this 0.11-mi reach becomes more confined and runs through deeper alluvium. Banks in this section are much higher than the section below it. Substrates are dominated by small to large boulders. Stream habitat is characterized by plunge pools and lateral scour pools that occur in association with sets of large boulders. These pools are interspersed by narrow boulder cascades and runs. Fish habitat cover, provided by large spaces beneath boulders, is very abundant because of the large-sized bed materials in this section.
- CM 0.38 to CM 0.65: In this reach, Newhalem Creek steepens to a gradient of 7.7 percent. The stream becomes highly confined by steep rock canyon walls. Substrates are dominated by boulder blocks (greater than 6 to 7 ft in diameter), boulders, large cobbles, and occasionally by large bedrock outcroppings. Habitat in this section of the stream is characterized by plunge pools interspersed by boulder cascades. This type of habitat is sometimes referred to as "step pools" since the pools occur one above the other like stair steps. Fish cover is also abundant in this section and is provided by deep pools and large boulders.
- CM 0.65 to CM 1.0: From CM 0.65 to the diversion dam, Newhalem Creek is very steep, with a gradient of 10 to 25 percent, and has deep plunge pools interspersed by steep cascades and

waterfalls. A 14-ft waterfall at CM 0.65 provides a barrier to the upstream migration of anadromous fish (Seattle City Light 1990, as cited in City Light 1992). A waterfall exceeding 100 ft in height occurs at CM 0.8.

Upstream of the diversion dam, Newhalem Creek has a relatively consistent gradient (2 to 3 percent) with a cobble/boulder/gravel bed, bankfull channel width of approximately 75 ft, and valley widths of 500 ft in relatively unconfined reaches and 150 to 200 ft in areas where the stream is confined by debris cone deposits coming off the valley walls. There is a confining debris cone approximately 0.25 mi upstream from the diversion and another, larger cone approximately 0.5 mi upstream from the diversion. These two features limit channel movement across the valley.

Over the 100 years since the Project began operating, Newhalem Creek has re-adjusted its profile upstream from the diversion structure to the new base level provided by the diversion dam. The small impoundment retains at least some portion of the bedload coming from the watershed upstream from the diversion. While the Project was operating, an average of 200 to 400 CY of material were removed from the impoundment and placed in the channel downstream from the diversion dam on an annual basis to keep the area near the intake clear of sediment for Project operations. This provides a minimum estimate of the annual bedload transport volume in the stream. Since the removed sediment was placed downstream from the dam and the impoundment is very small, the Project did not cause a net change in sediment supply to downstream reaches of Newhalem Creek (Dube 2021).

A gravel study conducted in 1991 concluded that Newhalem Creek did not have an abundance of habitat for spawning steelhead and salmon (Seattle City Light 1992). These species require extensive stable accumulations of spawning gravel (typically large patches of substrate in the range of 0.5 to 6 in in diameter). This stream's flows, high gradient, and rapid and frequent flood response combine to create conditions favorable for gravel transport. In other words, Newhalem Creek exhibits a "high streamflow competence." A study done in Newhalem Creek by Morris (1990, included as Appendix A4 in Seattle City Light 1992) suggests that under these conditions, extensive permanent accumulations of spawning gravels are unlikely. Gravels are routinely flushed from the creek due to the combined effect of steep channel gradient and relatively high flows. This study concluded that "it appears that Newhalem Creek is competent, both up and downstream of the diversion dam, to flush the target particle sizes (0.5 to 6 in diameter) through the measured cross-sections on an annual basis."

Further evidence of the high competence of Newhalem Creek is the low amount of woody debris accumulation in this stream, the frequent occurrence of large boulder blocks in the active channel, and evidence of extensive historical floodplain rearrangement at the confluence with the Skagit River. This evidence attests to this stream's natural ability to mobilize instream materials. Gravel and wood do accumulate behind the diversion dam but under the current license, these materials have been regularly removed and reintroduced into the bypass reach. This was done nearly annually when the Project was operating but has not occurred in recent years as the landslide on the road precludes the ability to get an excavator to the site.

In addition to Newhalem Creek, there are two small streams within the Project boundary. An ephemeral stream drains the hillslope behind the powerhouse, intersects the penstock at about the midway, goes

subsurface near the powerhouse, and then enters the tailrace (**Error! Reference source not found.**). An intermittent stream, which drains the hillslope to the north of the powerhouse, also flows into the tailrace.

Figure E-8. Ephemeral Stream near the Powerhouse

Aquatic Species

Fish surveys conducted in 1981, 1983, 1990, and 1991 documented four salmonid species in Newhalem Creek downstream of the diversion dam, including rainbow and steelhead trout (*Oncorhynchus mykiss*), pink salmon (*O. gorbuscha*), coho salmon (*O. kisutch*) and Chinook salmon (*O. tshawytschain*). Surveys upstream of the diversion documented only resident rainbow trout (Seattle City Light 1992). When operational, the Project diverts water from the lower 1-mi reach of Newhalem Creek. The bypass reach can be divided into two zones based on fish use.

Anadromous Fish Zone

This zone extends from the confluence of Newhalem Creek with the Skagit River to a 14-ft waterfall located 0.65 mi upstream. At the time of the 1992 license application, consulting agencies and tribes agreed the 14-ft waterfall was a barrier to upstream migration of anadromous fish.

- Steelhead and rainbow trout: Surveys in the anadromous fish zone documented steelhead adults, juveniles, and fry as well as rainbow trout juveniles and fry. Steelhead spawning was also observed in three of the four survey years, with the greatest numbers of adults occurring in the upper one-third of the reach. Steelhead and rainbow trout were by far the most abundant fish recorded in this reach.

  The 1992 license application notes that the highly dynamic habitat conditions in Newhalem Creek appear more suitable for steelhead trout and resident rainbow trout than for salmon. Rainbow trout and steelhead are much more adapted to the heterogeneous hydraulic conditions and substrate cover provided by a boulder-dominated stream than the other salmonid species occurring in the upper Skagit River system. In addition to boulder cover, the surface turbulence associated with boulder-dominated runs and cascades can provide an important source of habitat cover for juvenile steelhead and rainbow trout. Of particular importance to juvenile steelhead and rainbow trout is Newhalem Creek's abundance of "pocket water" or "shear zone" habitat, which is

highly preferred by rainbow trout and juvenile steelhead in moderate to high gradient streams (Seattle City Light 1992).

- Other salmon species: Observations of other salmon species in the anadromous zone are limited. Spawning pink salmon were documented in this reach in 1991, and a few Chinook and coho salmon adults were seen during surveys in 1982 and 1983, with two possible Chinook salmon redds noted. Study results for the 1992 license application noted that of the salmon species that potentially use Newhalem Creek, rearing conditions appear most suitable for Chinook salmon because they prefer riffle and run habitat types and cobble and boulder substrates. The creek lacks the deeper, low-velocity pools in conjunction with overhanging banks or woody debris that are preferred by coho salmon fry or juveniles.
- Other fish species: Surveys conducted for the 1992 license application documented three other fish species in the anadromous zone of Newhalem Creek: prickly sculpin (*Coitus asper*), mountain whitefish (*Prosopium williamsoni*), Dolly Varden trout (*Salvelinus malma*), and possibly bull trout (*Salvelinus confluentus*).

Resident Fish Zone

The 0.35-mi resident fish zone extends from the 14-ft waterfall to the diversion structure located at CM 1.0. This reach includes a 100-ft waterfall, just downstream of the diversion dam site. Surveys of this reach found only rainbow trout, with adults, juveniles, and fry present.

The only other aquatic species observed during surveys of Newhalem Creek for the 1992 license application was the tailed frog (*Ascaphus trueii*). This species was recorded in the fast riffle and cascade habitats of the bypass reach. It has also been observed in recent years by NPS and City Light biologists both up- and downstream of the diversion dam.

Federally Listed Species and Critical Habitat

At the time the current Project license was issued in 1997, no fish species in the upper Skagit River basin were federally listed as threatened or endangered. Subsequently, three species were listed as federally threatened, including bull trout in 1998, Chinook salmon in 1999, and steelhead in 2007. Bull trout and Chinook salmon are also currently candidates for state listing.

The lower 0.65 mi of Newhalem Creek provides habitat for all three of these federally listed species. Steelhead and Chinook salmon were documented using this area during fish surveys conducted for the 1992 license application. Bull trout were not definitively identified during these surveys, but native char were found, and it was thought that the smaller char specimens were likely bull trout.

Spawning periods for the three federally listed species in the upper Skagit River basin are:

- Bull trout: late September to late November
- Chinook salmon: late August to early October
- Steelhead: March through June, peaking in May

The lower 0.65 mi of Newhalem Creek was included as designated critical habitat for bull trout in 2010 and steelhead in 2016. The Skagit River at the confluence with Newhalem Creek is designated as critical habitat for all three listed fish species. See the Biological Assessment (Appendix A) for more detailed information on these species.

E.5.5.2 Project Effects

Stream Geomorphology and Aquatic Habitat

Overall, decommissioning is expected to have long-term, beneficial effects on aquatic habitat in Newhalem Creek. Removing the dam and headworks would restore natural geomorphological processes to the channel from 0.4 mi upstream of the headworks to the confluence with the Skagit River. Dam removal would also result in more consistent input of wood and sediment to the lower 1 mi of the creek and into the river. Removal of riprap associated with the tailrace barrier would improve shoreline habitat along the Skagit River.

In the short term, potential effects of diversion removal on stream geomorphology and aquatic habitat include:

- Higher local stream gradient would temporarily increase sediment transport capacity immediately upstream from the diversion location.
- Existing sediment in the impoundment area would be transported downstream.
- Turbidity following diversion removal would likely increase. However, the majority of substrate in the channel appears to be relatively coarse grained (sub-surface samples were not collected to verify this assumption); therefore, any turbidity increases would likely be short term and transient.

Site conditions would be expected to minimize the amount of long-term geomorphic change in the creek. The channel immediately downstream of the diversion is a high-gradient, bedrock channel. The bedrock would limit further channel incision at the diversion site, and the high-gradient channel would quickly transport sediment from the impoundment to the alluvial fan and Skagit River. More detail on geomorphic changes is summarized below and in Dube (2021).

Changes to Stream Profile Upstream of Diversion Structure

Removal of the diversion structure would result in adjustment of the Newhalem Creek bed to a base level similar to pre-Project conditions. The existing longitudinal profile upstream from the diversion structure was used to estimate the potential amount of channel downcutting that could take place (Figure E-9). Due to sediment depositing behind the dam, the change in channel bed elevation would be greatest just upstream from the removed diversion, with 4 to 7 ft of bed-lowering extending approximately 1,000 ft upstream from the diversion.

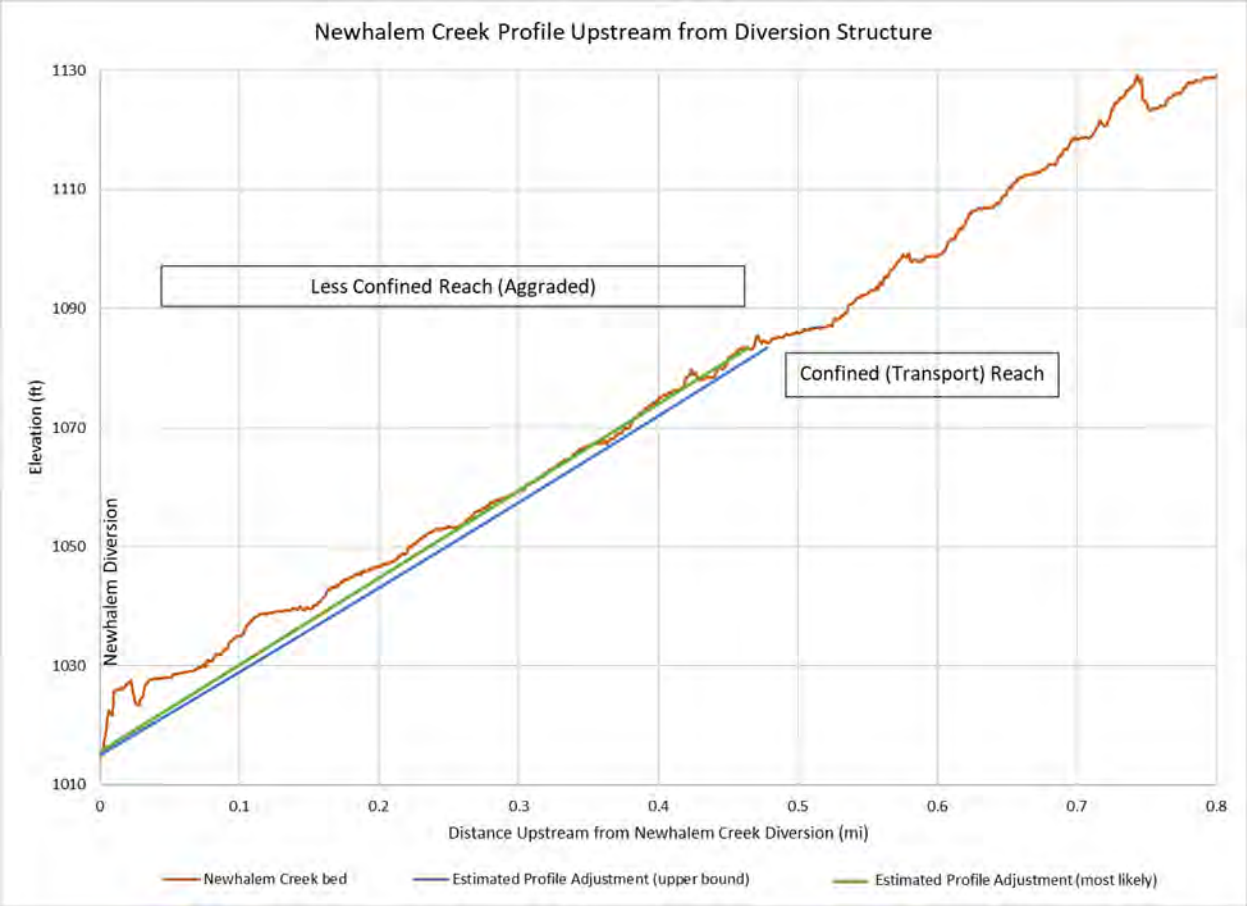


Figure E-9. Longitudinal Profile of Newhalem Creek Upstream from the Diversion Structure, with Potential Profile Adjustments (elevation is North American Vertical Datum of 1988)

The streambed gradient is relatively consistent between 0.25 and 0.5 mi upstream from the diversion structure. Extending this consistent gradient downstream to the top of the bedrock area at the diversion structure (see the green line on Figure E-9) suggests that the adjustments to the stream in this area were made following original diversion dam construction. This line was used as one estimate of the total (long-term) amount of channel change that could occur following diversion removal. A second bounding estimate was made based on the blue line in Figure E-9, which assumes the stream would continue to adjust up to the confined reach, approximately 0.5 mi upstream from the diversion.

The total volume of sediment that would be transported out of the adjustment area was calculated based on change in bed elevation and average channel width of 75 ft (existing channel width) and 100 ft (potential wider channel width if incision results in widening of the channel) to give bounding estimates. Total volume based on these methods is 12,600 to 16,800 CY (green line on Figure E-9) and 22,500 to 30,000 CY (blue line on Figure E-9). Assuming an average bedload transport rate of 400 CY per year, this represents 30 to 75 years of average bedload movement. Because of the coarse nature of the streambed (cobble/boulder/gravel), the re-adjustment of the base level would likely take place relatively slowly, over a decadal or longer time scale following the initial channel adjustment close to the diversion structure.

Sediment Transport from Upstream of the Diversion Dam

Based on stream hydraulics and the current stream substrate size, the flow that could initiate substrate movement was calculated under current conditions (reach-averaged stream gradient of 2.8 percent) and under conditions with the diversion removed (Table E-5). Frequencies listed in Table E-5 reflect the values calculated for the peak flow recurrence intervals at the USGS gage just upstream from the diversion (Dube 2021).

Table E-5. Calculated Discharge Required to Transport Substrate Upstream of the Diversion Structure under Existing Conditions and Following Diversion Removal

Stream Gradient	Discharge and Frequency of Median (D_{50}) Grain Size Transport	Discharge and Frequency of Larger (D_{84}) Grain Size Transport
2.8% (reach average over long term)	250 cfs; every year	3,000 cfs; 5 years
1.3% (existing local slope just upstream from diversion)	1,500 cfs; 1.5 years	more than 9,000 cfs; 100+ years
3.9% (short-term, local slope upstream from diversion, with diversion removal and drop in base level)	120 cfs; many times per year	1,500 cfs; 1.5 years

In the short term, immediately following diversion removal, the local stream gradient just upstream of the diversion would increase from 1.3 to 3.9 percent, which would increase the sediment transport frequency of the median-sized substrate from every 1.5 years to many times per year. Transport of larger particles would increase from very infrequently (more than 100-year recurrence frequency) to movement under a 1.5-year peak flow event. This analysis suggests that the bed immediately upstream from the diversion structure would respond quickly to diversion removal.

As material on the bed moves downstream, the locally high stream gradient would migrate upstream, resulting in transport of previously aggraded material. As more material moves downstream, the local gradient increase upstream of the dam site becomes less and less until a new long-term average slope condition is reached. As the local gradient increase becomes less and less, the corresponding energy to move particles becomes less, resulting in less frequent bedload movement and a slowing of the process. The large particle sizes in Newhalem Creek would also form an armor layer, and likely reduce the rate of change in local gradient and limit channel incision. As an armor layer forms, it is anticipated that the larger substrate would mobilize much less frequently, and channel adjustments would take several decades. Over time, a new equilibrium channel gradient would develop, with an average reach gradient of approximately 2.8 percent (Dube 2021).

Changes Downstream from the Diversion

Sediment that is moved out of the diversion area would be transported rapidly through the high-gradient canyon/waterfall reach to the alluvial fan area at the mouth of the creek (see Figure E-3). Boulders and large cobble would be deposited at the upstream end of the fan; actual deposition locations would reflect gradient and stream conditions on the fan (no channel dimensions were measured on the fan to calculate

actual transport capacity for different sizes of particles, but particles would accumulate in areas where similar-sized particles are currently accumulating). Some cobble, gravel, and finer sediment would be transported farther downstream and eventually reach the Skagit River, augmenting substrate there.

Aquatic Species

It is difficult to predict if decommissioning will have any long-term beneficial effects on fish use of the anadromous fish zone in the lower 0.65 mi of the creek. The natural flow regime was restored more than 10 years ago, when the Project ceased operations, and that change alone improved conditions for fish using this area. A return of natural geomorphic processes may provide additional beneficial changes to the boulder-dominated habitats in lower Newhalem Creek that are preferred by juvenile steelhead and rainbow trout. A significant increase in spawning substrate for salmon in the creek is unlikely as the stream's flows, high gradient, and rapid and frequent flood response would continue to favor gravel transport. Cobbles and gravel transported from the creek and deposited in the alluvial fan at the confluence with the Skagit River may have a beneficial effect on fish habitat, although the overall effect is likely to be small relative to existing Skagit River sediment volumes.

There would be some short-term impacts to aquatic habitat and resident fish near the dam. Native rock and gravel would be used to fill the supersacks making up the coffer dam, resulting in temporary disturbance of the creek bed. The coffer dam itself would temporarily alter aquatic habitat for resident fish in the area, and the work to place the supersacks in the stream may disturb resident fish.

Removal of the dam would increase turbidity initially and during peak flows as the creek cuts through the accumulated sediment in the impoundment and 0.5 mi upstream. The initial pulse, which would occur when the coffer dam is removed, would produce the greatest turbidity, but the sediment is expected to be transported rapidly through the high-gradient reach downstream of the diversion site. After the initial pulse, peak flows would release more material downstream until the channel becomes armored, whereafter this cycle of sediment release and armoring would repeat over a decadal period. Releases of sediment would occur while background turbidity levels are naturally higher. Smaller- and median-sized sediment would likely be transported downstream within a few years; larger material would take longer, depending on flows. The cobble/gravel that is mobilized would be deposited on the Newhalem Creek alluvial fan at and upstream of the Skagit River confluence, resulting in the potential for short-term effects on fish habitat.

The increased turbidity from coffer dam removal and smaller releases of sediment during peak flows would likely impact fish downstream of the diversion. Coffer dam removal would be timed to avoid spawning periods, when the numbers of adult steelhead, salmon, and bull trout in the stream are low, and to minimize impacts on adult fish and redds. Furthermore, work would occur during the low-flow season and would minimize sediment mobilization to downstream reaches. It would, however, be impossible to avoid short-term impacts to juvenile fish in the area. High-flow events that mobilize accumulated sediments would expose any rearing listed fish in the anadromous zone to elevated turbidity, resulting in temporary displacement from occupied habitats or modification of foraging and territorial behaviors. For these reasons, decommissioning may affect, and would likely adversely affect steelhead, Chinook salmon, and bull trout as well as critical habitat for steelhead and bull trout.

E.5.5.3 Mitigation Measures

Prior to dam removal work, fish rescue and exclusion would be conducted in the area to be dewatered. Removal of the coffer dams would be scheduled before late August, if possible, to avoid spawning and incubation periods for steelhead (March through July) as well as the spawning periods for Chinook salmon (late August through October) and bull trout (late September through November). This timing should reduce impacts to these species from the increased sediment load in lower Newhalem Creek expected from dam removal. City Light will comply with any measures included in the Biological Opinion and Incidental Take Statement for listed fish species.

E.5.6 Botanical Resources

E.5.6.1 Affected Environment

Vegetation

The Project is in the western hemlock (*Tsuga heterophyla*) vegetation zone as described by Franklin and Dyrness (1988). The 1992 license application identified five general forest cover types in the Project area, including old growth/mature conifer, closed canopy conifer, regenerative conifer, mixed conifer/deciduous, and deciduous. However, a large portion of the Newhalem Creek drainage burned in the 2015 Goodell Creek wildfire, so much of the Project area now supports young regenerative conifer stands of Douglas-fir (*Pseudotsuga menziesii*) and red alder (*Alnus rubra*), with smaller amounts of western hemlock and western red cedar (*Thuja plicata*) (Figure E-10). The entire road corridor also burned and is similarly dominated by young conifer stands.

The only areas spared from the fire were the forest stands near the powerhouse and tailrace, and along the lower 1,500 ft of the stream corridor. These areas are characterized primarily by closed canopy conifer or mixed conifer/deciduous forest stands, with a few large Douglas-fir and western red cedar trees. The understory consists of a variety of shrubs, ferns, other herbaceous perennials, and mosses; common species include sword fern (*Polystichum munitum*), salal (*Gaultheria shallon*), red huckleberry (*Vaccinium parvifolium*), and vine maple (*Acer circinatum*).

Figure E-10. Newhalem Creek Drainage, Post 2015 Goodell Creek Wildfire

Vegetation in the penstock corridor is maintained in an early successional stage to allow for inspections and access for repairs. The corridor supports a dense cover of low shrubs and ferns. A small seasonal stream runs along a portion of the western side of the corridor and discharges into the tailrace.

The transmission line between the Newhalem Creek Powerhouse and the Skagit River is approximately 300 ft long by 50 ft wide and is dominated mainly by deciduous shrubs and sapling cedars and hemlocks. Trees in the corridor are regularly pruned to protect the powerlines.

Rare Species

Rare plants are defined as species that fall into one or more of the following categories: (1) federally listed as threatened or endangered; (2) proposed for federal listing; (3) candidate for federal listing; (4) federal species of concern; (5) state listed as threatened or endangered; or (6) state designated as sensitive or vulnerable.

There are no records of known occurrences of federally listed plant species in the North Cascades National Park Complex (Bivin and Rochefort 2010, as cited in Seattle City Light 2020). Western whitebark pine (*Pinus albicaulis*), a proposed threatened species, is found in scattered stands above 5,900 ft in the southeastern portion of the park complex. These stands are miles away from, and at considerably higher elevations, than the Project area.

Rare plant surveys conducted in 1991 documented small northern bog orchid (*Platanthera obtusara*), a Washington state-listed sensitive species, at two locations along the road to Newhalem Creek dam, in second-growth conifer forest at elevation 850 to 900 ft. Another Washington state sensitive species—bog clubmoss (*Lycopodium inundatum*)—was tentatively identified near the access road to the dam during a site visit in 1989, but not confirmed nor found again. There have been no recent surveys for rare plant species in or near the Project area, and the recent wildfire has significantly changed habitat conditions.

Invasive Species

Invasive plant species for the adjacent Skagit River Project are defined as those species that are on one or more of the following lists: (1) Washington State-designated noxious weeds); (2) Whatcom County-designated noxious weeds; and (3) NPS-designated first-priority species, which are trees, shrubs, and herbaceous plants that have escaped cultivated landscapes into the surrounding RLNRA lands (State NWCB 2006, Whatcom County 2019, and NPS 2015, as cited in City Light 2020). These lists are applicable to the Project, and many of the same invasive species would be expected to occur.

Surveys conducted by the NPS and City Light after the Goodell Creek wildfire documented 43 invasive species in and near the town of Newhalem and/or along State Route 20 (SR-20) (NPS National Invasive Species Information Management System database, as cited in Seattle City Light 2020). No invasive species surveys have been conducted in the Project area or along the access road to the diversion dam. However, incidental observations in the undisturbed portions of the Project area, especially near the dam and powerhouse and along the tailrace, suggest that invasive species infestations are relatively few. More disturbed areas, particularly the access road to the diversion dam, would be expected to have greater occurrences of invasive species. Some of the more pervasive species that occur in the Project area include

oxeye daisy (*Leucanthemum vulgare*), foxglove (*Digitalis purpurea),* common tansy (*Tanacetum vulgare*), common mullein (*Verbascum thapsus*), and blackberry (*Rubus* spp.).

E.5.6.2 Project Effects

Over the long term, decommissioning would be expected to benefit botanical resources. Removing the headworks and tailrace barrier would increase the available area for native vegetation to establish and grow. Additionally, vegetation maintenance along the penstock corridor would cease, allowing shrubs and trees to grow taller and denser and ultimately restoring forested habitat. Decommissioning the access road above elevation 840 ft would allow this area to revegetate, once again supporting native trees, shrubs, and forbs. Additionally, the cleared area in front of the powerhouse, which includes the transmission line corridor, multiple parking spaces, and storage, would no longer be needed and would be restored. In the long term, decommissioning is expected to restore approximately 2.8 ac of native plant communities (Table E-6).

Table E-6. Approximate Gain in Native Plant Community Area from Project Decommissioning

Project Features	Length (ft)	Width (ft)	Area (sq ft)
Penstock corridor (20 ft on each side)	707	40	28,280
Cleared area in front of powerhouse (minus 3-vehicle parking area and road segment)[1]			9,320
Tailrace barrier	32	22	704
Headworks – north bank[1]			975
Headworks – south bank[1]			2,590
Access road above elevation 840 ft (0.75 mi)	3960	20	79,200
Restored			**121,069 (2.8 ac)**

[1] Estimated with Geographic Information Systems or from Google Earth.

Decommissioning would result in short-term loss of vegetation in areas used for staging equipment and removal activities. Some trees may need to be removed near the diversion dam and/or tailrace barrier for access to the work area. Road improvements may also result in the temporary loss of some vegetation. Construction-related disturbance can also foster the establishment and spread of invasive plant species.

E.5.6.3 Mitigation Measures

To the extent possible, any large trees near decommissioning activities would be retained. A restoration plan would be developed in collaboration with the NPS for areas temporarily disturbed by deconstruction activities. The plan would identify areas for regrading and replanting with native species and sites that can be left for natural recovery. Additionally, BMPs would be implemented to reduce the establishment of invasive plant species during construction. Invasive species monitoring and control measures would be included in the restoration plan for areas disturbed by Project-related activities.

E.5.7 Wildlife Resources

E.5.7.1 Affected Environment

Wildlife Habitat

Until recently, slopes adjacent to the lower 1 mi of Newhalem Creek supported sizable stands of mature and second-growth conifers, including Douglas-fir, western red cedar, and western hemlock. However, a wildfire in 2015 burned through this area, leaving only patches of forest. The burned acreage is now in the early stages of forest regeneration, with seedling conifers and a low shrub/forb layer. The area around the powerhouse, which is approximately 0.25 mi from the creek itself, was mostly untouched by the fire and still supports a canopy of second-growth conifer forest.

No wildlife surveys have been conducted in the area surrounding the Project in recent years, and the 2015 wildfire substantially altered the habitats along the lower portion of Newhalem Creek since the last relicensing. Early successional areas of shrubs and forbs provide habitat for a variety of birds and small mammals; wide-ranging mammals such as black bear (*Ursus americanus*), coyote (*Canis latrans*) and cougar (*Puma concolor*) would be expected. These areas are also likely used as forage habitat for big game, particularly black-tailed deer (*Odocoileus hemionus)*, which are relatively common in the Project vicinity. The numerous snags are probably used by cavity nesting birds and foraging woodpeckers. The unburned areas would be expected to support wildlife typical of lower elevation conifer forests in western Washington. The larger trees along the lower end of Newhalem Creek likely provide perch sites for bald eagles (*Haliaeetus leucocephalus*), which are common in the area during winter.

Threatened and Endangered Species and Critical Habitat

The Project is within the range of five federally listed threatened wildlife species; these species are also listed as threatened or endangered by the Washington Department of Fish and Wildlife (WDFW). An additional six species have varying federal and/or state status (Table E-7). There is no federally designated critical habitat in the Project vicinity for any of the listed wildlife species. Summary information on the federally listed species is provided below, with more detail on each species in the Biological Assessment (Appendix A).

Table E-7. Species with Federal or State Status Potentially Occurring in the Newhalem Creek Project Area

Species	Federal Status[1]	State Status[2]	Habitat	Occurrence in Project Vicinity
Western Toad (*Anaxyrus boreas*)		C	Variety of upland habitats; slow-moving waters, particularly wetlands for egg deposition and larval development	Documented near Newhalem and at various locations along the Skagit River
Marbled murrelet (*Brachyrampus marmoratus*)	T	E	Nests in old-growth forests	Radar detections up Thornton and Bacon Creeks, downriver from Newhalem, and along the Skagit River near the mouth of Newhalem Creek

Species	Federal Status[1]	State Status[2]	Habitat	Occurrence in Project Vicinity
Northern spotted owl (*Strix occidentalis*)	T	E	Nests in old-growth forests; second-growth used for dispersal	Historical breeding near Project boundary, but no recent documented pairs; closest pair was 2 mi upstream from Newhalem Creek diversion, last documented in 2009
Northern Goshawk (*Accipiter gentillis*)		C	Old-growth and mature forests	Nearest documented use near Diablo Powerhouse, 7 mi northeast of the Project
Townsend's big-eared bat (*Corynorhinus townsendii*)		C	Roosts in caves, buildings, and natural cavities	No documented occurrences
Yellow-billed cuckoo (*Coccyzus americanus*)	T	E	Continuous riparian habitats with cottonwoods and willows	No documented occurrences
Fisher (*Pekania pennanti*)	C	E	Forests and subalpine habitats	Recently reintroduced to the North Cascades and Skagit River watershed by NPS; 2018 release site was near Newhalem Creek, and there have been radio-collar detections near the Project
Wolverine (*Gulo gulo*)	C	C	Alpine and subalpine habitats	Scattered records; 2012 record west of Project vicinity; recent observation near Ross Lake
Grizzly bear (*Ursus arctos horribilis*)	T	E	Valley bottoms, high meadows, forest edge, and thickets	Rare, scattered, historical sightings
Canada lynx *(Lynx canadensis*)	T	E	Subalpine and boreal forests, typically higher than 4,500 ft	Uncommon but recent observation near Agg Ponds just west of Newhalem
Gray wolf (*Canis lupus)*		E	Highly adaptable where ungulate prey is available; forests, river valleys, and open spaces	Recent confirmation of a newly formed pack centered around Diobsud Creek, approximately 6 mi west of Newhalem

Sources: Seattle City Light 2020; Washington Department of Fish and Wildlife 2021 (https://wdfw.wa.gov/species-habitats/at-risk/listed, accessed December 10, 2021); U.S. Fish and Wildlife Service 2021 (Information, Planning, and Conservation System, https://ecos.fws.gov/ipac/, accessed on July 1, 2021)

[1] WDFW: C=candidate; T=threatened

[2] U.S. Fish and Wildlife Service (USFWS):C=candidate; E=endangered

Species with federal status that could occur in the Project area include:

- Northern spotted owl: Surveys were conducted in 1991 in the Project vicinity. Owls were detected on three occasions, but none could be confirmed as a northern spotted owl. Barred owls were, and remain, common in the area. However, one of the last known active spotted owl nest territories on the western side of North Cascades National Park was recorded by the NPS in the Newhalem drainage upstream of the Project in several surveys prior to 2010. Spotted owls have not been detected in subsequent surveys in the area. It is thought that competition with barred

owls for suitable habitat may be limiting spotted owl distribution and abundance (Kuntz and Christopherson 1996). Subsequent to these surveys, the 2015 wildfire burned approximately 2.5 mi of the drainage, eliminating much of what might have been suitable nesting and foraging habitat for this species at lower elevations. A few patches of larger trees near the tailrace barrier and along Newhalem Creek between the vehicle bridge and the Skagit River may still be suitable for nesting or roosting. The likelihood that spotted owls use the lower Newhalem Creek for nesting is low, but some dispersal activity could occur.

- Marbled murrelet: Newhalem Creek is located approximately 57 mi inland from the nearest marine coastline, which is just beyond the 50-mi distance generally considered to be the farthest distance from saltwater for murrelet nesting habitat in Washington (USFWS 1997). The 2015 wildfire burned much of the forest in the Project area, and any scattered remaining trees that have individual characteristics to support nesting are either in fragmented forest patches that were not burned or are isolated and surrounded by dead trees with little to no canopy. There may be some suitable nesting habitat on the slopes outside the burned area, and murrelet-like detections were recorded along the Skagit River near Newhalem Creek during radar surveys in 2021. However, concurrent audio/visual surveys conducted in and near the Newhalem Creek drainage in 2021 did not yield any confirmed murrelet use of the area.
- Yellow-billed cuckoo: Yellow-billed cuckoos are considered extirpated in Washington, though they appear rarely during summer (Seattle Audubon Society 20120. The last confirmed breeding records from Washington are from the 1930s. The only detection of a yellow-billed cuckoo in Whatcom County occurred prior to 1950 near Bellingham. Yellow-billed cuckoos are not known to occur within or near the Project area. Riparian habitat that is suitable for nesting and foraging either does not exist in sufficient quantities to support the species or has been burned.
- Grizzly bear: Grizzly bears have not been observed west of the Cascade crest in many years. The USFWS has periodically considered reintroduction of the grizzly bear to the North Cascades ecosystem over the last several decades, but the most recent planning process was terminated in July 2020. Potential habitat for this species would be expected in the upper reaches of the Newhalem Creek drainage, above the Project headworks.
- Fisher: Another state listed endangered species, the fisher, has been recently reintroduced to the North Cascades. One of the release sites was at the Newhalem Campground, so it is likely that this species may use the Project area.

E.5.7.2 Project Effects

Over the long term, decommissioning the Newhalem Creek Project would be expected to benefit wildlife, including state and federally listed species. Removing the headworks and tailrace barrier would increase available riparian habitat. Ceasing vegetation maintenance along the penstock corridor, decommissioning the upper portion of the access road, and reducing the size of the cleared area near the powerhouse would allow forested habitat to establish in these areas. The result would be a net gain of approximately 2.8 ac of habitat (see Table E-6).

Decommissioning would not have any long-term effects on wildlife-related disturbance or movement patterns. Once removal activities are complete, the diversion dam area would continue to be relatively free of human presence and noise. There would be no change from existing conditions in the powerhouse area because of nearby recreational uses. Although the penstock would remain in place, it does not represent a barrier to wildlife movement because it is elevated, sitting from 6 in to 6 ft above ground level, depending on location.

In the short term, there would be a minor loss of habitat in the dam and tailrace barrier areas from decommissioning activities. The development of staging areas for equipment may result in the removal of some trees and shrubs, and deconstruction activities would disturb nearby vegetation. Removing the dam and tailrace barrier would also result in temporary impacts on wildlife from noise and human presence, likely triggering avoidance behaviors. Equipment most likely to be used during site preparation and removal activities include chainsaws, drills, and excavators in addition to trucks. The loudest noise-producing decommissioning activities include jackhammering for concrete removal (95 decibels [dB] at 50 ft) and micro-blasting techniques to remove boulders from the access road landslide area (94 dB at 50 ft).

The Project's footprint on the landscape is small, and most mammals, including grizzly bears, gray wolves, lynx, and fishers, if present, should be able to utilize other nearby habitats and movement corridors during decommissioning activities. Decommissioning would have no effect on these species.

Noise has the potential to disturb spotted owls and marbled murrelets during the breeding season. However, there is very little suitable habitat available for either of these species in the Project area, and the likelihood of their occurrence is low. In addition, decommissioning activities that generate the most noise would be scheduled in the late summer and fall to avoid the more sensitive times for these species. For these reasons, decommissioning the Project may affect, but is not likely to adversely affect, spotted owls and marbled murrelets (see the Biological Assessment in Appendix A).

E.5.7.3 Mitigation Measures

Temporary impacts on wildlife would be minimized by timing activities that generate the most noise outside the spring to early summer breeding season. Disturbed areas would be revegetated to restore native habitat, including decommissioning approximately 3,960 ft of the existing access road, which is the distance between the Skagit EAP evacuation muster site (elevation 840 ft) and the dam. No suitable nesting habitat for spotted owls or murrelets would be removed as part of the proposed decommissioning activities.

E.5.8 Cultural Resources

E.5.8.1 Affected Environment

This section summarizes the known cultural resources within the Project area and its vicinity. Cultural resources include locations of human activity, occupation, or use that contain materials, buildings, structures, or landscapes that were used, built, transported, or modified by people. Typically, these take the form of archaeological sites, buildings and structures, and places of traditional cultural importance or

traditional cultural properties (TCP). The National Historic Preservation Act (NHPA) established the NRHP, which lists properties of local, state, and national historical, cultural, and architectural significance (King 1998).

Historic properties listed in the NRHP include buildings, structures, objects, sites, and districts that are at least 50 years old, meet one or more criteria of significance, and retain sufficient integrity to convey that significance. Historic properties can also be "properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria." (36 CFR 800.16(l)(1)). Often called TCPs, these are places associated with the cultural practices or beliefs of a living community that are both rooted in that community's history and important in maintaining the community's continuing cultural identity (Parker and King 1998). Historic properties often overlap in type and age. For example, a historic district can include buildings or structures and archaeological sites, and a TCP may include historic or archaeological features that date to the pre-contact (prehistoric) and/or historic period.

Archaeological Resources

One archaeological site within the Project boundary has been recorded. Site 45WH1029 was a dispersed lithic (stone) scatter that was identified during archaeological monitoring for the Newhalem penstock saddle replacement project in 2016. The site consisted of 34 pre-contact lithic artifacts within disturbed sediments associated with three of the lower saddles (Figure E-11). The artifacts included Hozomeen chert, metasediment, other chert, and fire-modified rock. The site is on a glacial terrace that extends approximately 1.8 mi southwest of the penstock. Five other pre-contact archaeological sites occupy the same terrace outside the Project boundary.

After artifacts were identified during monitoring at 45WH1029, shovel probes to the west of the penstock identified artifacts only in one probe adjacent to the saddles. The soils around and under the penstock and saddles, including the site matrix, were found to be contaminated and were part of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) cleanup effort. The contaminated soils within the site were screened by an archaeologist prior to their removal off site. The new saddles were placed within clean fill, and no native sediments remain within the archaeological site boundary.

The only other archaeological investigation conducted within the Project boundary was for the earlier relicensing effort (Larson and Lewarch 1990, as cited in Seattle City Light 1992). That investigation included shovel probes along the riverbank between the tailrace and Newhalem Creek, and unscreened shovel probes along the edge of the glacial terrace west of the penstock. No subsurface investigation was conducted adjacent to the tailrace channel, at the tailrace barrier, or along the penstock alignment, and no archaeological survey was conducted at the headworks.

Traditional Cultural Properties

The Project lies within the territory of an extensive Upper Skagit Indian Tribe village system that included Newhalem and retains significance to the Tribe today. The Upper Skagit Indian Tribe has recorded the Upper Skagit River Gorge and Canyons TCP District (45WH450), which includes the Project vicinity. The specific boundaries, locations, and elements of the TCP are confidential, but the Tribe has provided City

Light with information about the TCP to better understand potential decommissioning effects to the resource.

Figure E-11. Archaeological Monitoring along the Newhalem Project Penstock, 2016

Historic Resources

The Project dates to 1920 and is included in the NRHP-listed Skagit River and Newhalem Creek Hydroelectric Projects, a historic district (DT66). Notably, the Project is one of a very small number of remaining resources representing the historic growth and earliest period of development of the Newhalem townsite as well as historic equipment—the Pelton turbines and Westinghouse generator. Most of the Project components are contributing features to the District, including:

- Powerhouse (built 1969)
- Penstock (built 1921)
- Power Tunnel (built 1921)
- Diversion Dam/Weir (built 1969), including the intake structure

The original powerhouse (Figure E-12) burned in a wildfire in 1966; however, the equipment survived, and the powerhouse was rebuilt in 1969. It was added to the NRHP listing in 2010 when the NRHP for the district was updated to comply with a requirement in the Skagit River Hydroelectric Project license. Several of the penstock's timber saddles burned in a 2015 wildfire, which resulted in a project that replaced the original timber saddles with concrete in 2016. The penstock was listed in the NRHP in 1996

and remains listed. Both the powerhouse and penstock are connected to the town of Newhalem and the Gorge Powerhouse via the Trail of Cedars and the suspension bridges over the Skagit River.

The Project structures are contributing resources to the historic district and are significant for their "association with the Skagit River Hydroelectric Project and the town of Newhalem" (Johnson 2010). In December 2021 City Light contracted a consultant to evaluate the integrity of the powerhouse and penstock (Appendix B) since these particular features will be retained. The evaluation determined that the powerhouse and penstock each retain all seven aspects of integrity as defined in National Register Bulletin 15. Both structures retain integrity sufficient to convey their significance as contributing resources to the historic district.

Figure E-12. Original Powerhouse during Construction, 1921

E.5.8.2 Project Effects

The beneficial effects of Project decommissioning include restoring the aesthetic and pre-contact cultural setting to Newhalem Creek; eliminating operations and vehicle use near the waterfall; decommissioning the road; and ceasing vegetation maintenance along the penstock, which would increase forested habitat.

Long-term negative effects on cultural resources from Project decommissioning include the permanent loss of the diversion dam, which is a contributing structure to the NRHP-listed Skagit River and Newhalem Creek Hydroelectric Projects historic district (DT66). Removing this structure and permanently ceasing operations constitutes an adverse effect under the NHPA to the Newhalem Creek Project site and to the larger historic district.

Archaeological site 45WH1029 was subject to CERCLA cleanup during which the entire known site matrix was removed. No Project effects to the site are anticipated since all artifact-bearing soils were removed, and the preferred alternative leaves the penstock and saddles in place with no proposed ground disturbance near the archaeological site.

Decommissioning activities at the tailrace fish barrier and diversion dam have the potential to disturb unrecorded archaeological resources.

E.5.8.3 Mitigation Measures

A plan to mitigate the loss of the diversion dam/weir and intake structures would be developed in consultation with the DAHP, NPS, and affected tribes. Potential measures may include photographic documentation and reporting as well as new and updated interpretive signs at the powerhouse site.

Impacts to unrecorded archaeological resources would be identified by conducting a subsurface survey of any areas proposed for ground disturbance. In addition, an archaeologist would monitor ground disturbing activities in areas that were not accessible for subsurface archaeological investigation. Mitigation for adverse effects to any newly documented archaeological sites would be developed in consultation with the DAHP, NPS, and affected tribes and may include archaeological data recovery, additional archaeological survey, and development of interpretive materials.

City Light has been in consultation with the Upper Skagit Indian Tribe about the potential decommissioning effects to TCP 45WH450, and will continue to consult with the Tribe, DAHP, and NPS regarding mitigation for adverse effects to the TCP.

E.5.9 Soundscapes

E.5.9.1 Affected Environment

There have not been any studies on noise conducted in the Project vicinity. The NPS conducted noise studies between 2009 and 2011 at several locations within the Ross Lake National Recreation Area, with the closest monitoring site to the Project on a bench above Gorge Powerhouse (Winnings and Neal 2013). Monitoring at this site recorded noise from power generation facilities 100 percent of the time in addition to significant levels from vehicles on the nearby SR-20. However, the Project is not operational, so there is currently no noise related to power generation at either the powerhouse or the diversion dam sites. While the diversion dam site is quite remote and probably receives very little anthropogenic noise, the powerhouse area is almost certainly subjected to vehicle noise from the nearby Newhalem Campground and SR-20, particularly in the busy summer months. The emergency siren in Newhalem, which is tested daily at noon, can also be heard at the powerhouse. Sources of ambient noise near the Project include the creek at the diversion dam site and the Skagit River at the powerhouse, as well as wind, bird songs, and insects.

E.5.9.2 Project Effects

Decommissioning would have a slight long-term beneficial effect on the soundscape as the amount of vehicle use and maintenance—which is already low—would be reduced further. However, there would be a considerable increase in noise during decommissioning activities resulting from equipment, demolition work, truck traffic, and site restoration. These would be temporary, with noise duration and levels dependent on the types of equipment used for access and concrete removal and disposal. The construction season would likely occur during summer and fall.

E.5.9.3 Mitigation Measures

No mitigation measures are proposed beyond seasonal timing to reduce noise impacts on wildlife and recreation use.

E.5.10 Recreation and Visitor Use

E.5.10.1 Affected Environment

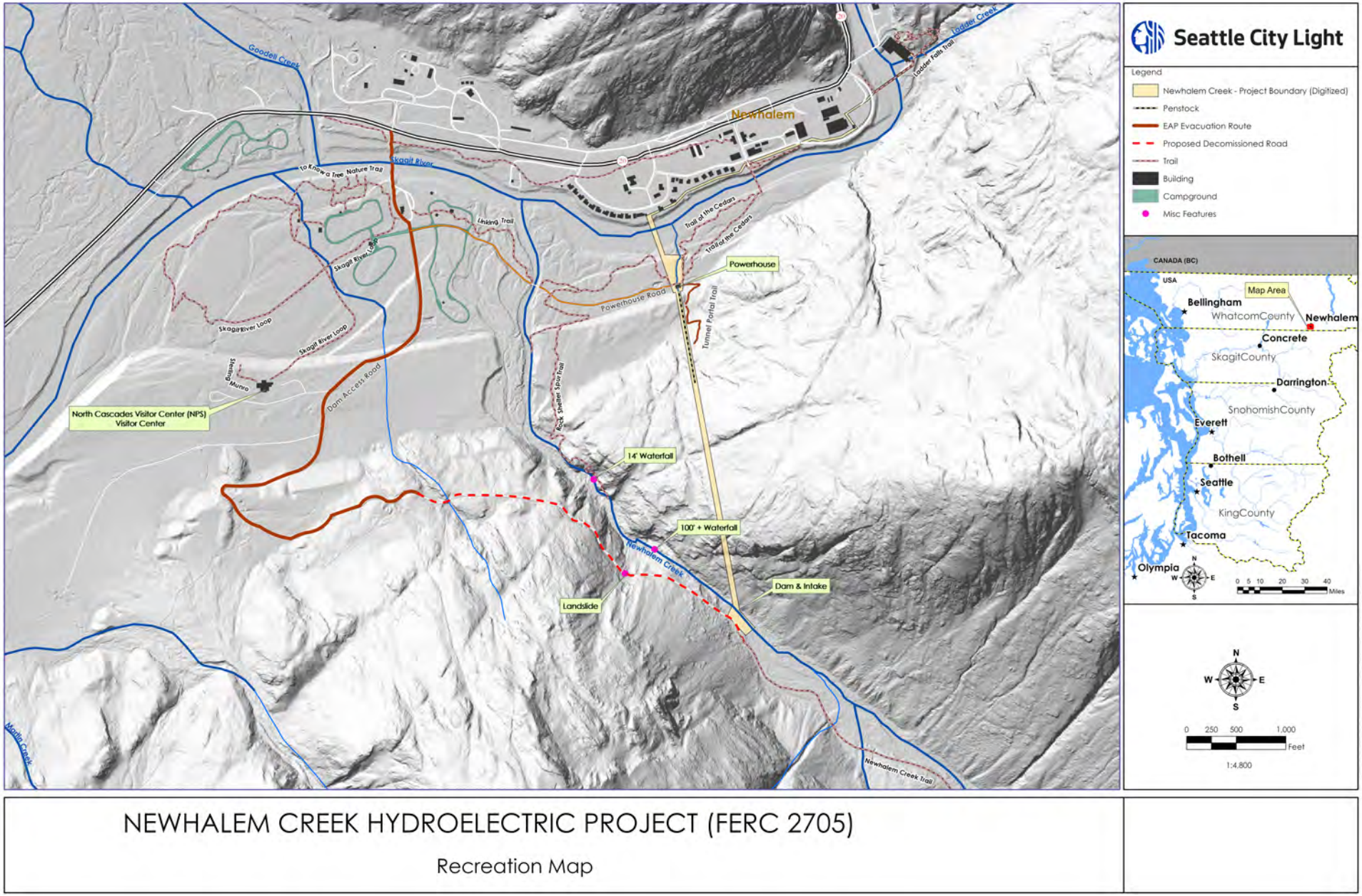
The Project is in the RLNRA, which provides a variety of recreational opportunities, including camping, backpacking, hiking, mountain climbing, boating, fishing, sightseeing, and wildlife viewing. Recreational use in the area tends to be highly seasonal, with 80 percent of the annual use occurring from May through September. A portion of SR-20, which provides access to the RLNRA from east of the Cascade Mountains, is closed from mid-November through mid-April or early May but is open from Interstate 5 to Newhalem year-round. Overall, visitation to the RLNRA was relatively stable from 2010 to 2014, with approximately 700,000 visitors annually; from 2015 through 2018, visitor use fluctuated between 760,000 to 900,000 visitors. Peak visitor use occurred in 2019, with nearly 1.1 million visitors to the RLNRA; visitation fell to 921,000 in 2020, coinciding with the first year of the SARS Coronavirus-2 pandemic[2].

The Project does not include any developed recreational facilities but is in proximity to NPS's Newhalem Visitor Center and Newhalem Creek Campground (**Figure E-13**). The campground has 107 sites in 4 loops, 2 of which are accessed from the road to the Newhalem Creek Powerhouse, and is open from mid-May to approximately mid-September. The Visitor Center operates on a similar schedule.

There are three developed trails near the Project:

- Rock Shelter Trail: This approximately 1,000-ft-long trail was developed by the NPS and is wheelchair accessible. It provides access to a platform that overlooks a 1,400-year-old hunting camp shelter under a large boulder near Newhalem Creek. The trailhead is along the road to the powerhouse, just north of the bridge across the creek. A 1,600-ft side trail leads to views of the lower portion of Newhalem Creek and continues to the base of the 14-ft waterfall. The portion of the trail to the falls is not regularly maintained and is frequently overgrown.
- Trail of the Cedars: This well-used trail on the south side of the Skagit River is connected to the town of Newhalem by a suspension bridge and provides pedestrian access to Newhalem Creek Powerhouse and the tailrace fish barrier. It is an approximately 0.6-mi-long loop trail with interpretive signs; a short spur leads to an overlook of the tailrace barrier. The trail is outside the Project boundary and is informally maintained by both the NPS and City Light. A trail counter installed in 2014 recorded 3,780 users from May through September, but the trail is used year-round by visitors and Newhalem residents.

[2] (https://irma.nps.gov/STATS/SSRSReports/Park%20Specific%20Reports/Annual%20Park%20Recreation%20Visitation%20Graph%20(1904%20-%20Last%20Calendar%20Year)?Park=ROLA, accessed November 3, 2021)



NEWHALEM CREEK HYDROELECTRIC PROJECT (FERC 2705)

Recreation Map

Figure E-133. Recreational facilities in the Project vicinity.

- Linking Trail (Figure E-1414): This trail connects the Trail of the Cedars to Newhalem Creek Campground. It begins near the Newhalem Creek Powerhouse and was developed in partnership between the NPS and City Light as a part of the Recreation Plan for the current Project license (City Light 1997). The NPS built the trail with City Light funding, provided signage, and currently maintains it. City Light modified the bridge over Newhalem Creek to make it wheelchair accessible

Figure E-14. Linking Trail from Newhalem Powerhouse

There are two other trails near the Project facilities that are available but not maintained for public use:

- Tunnel Portal Trail: This trail was built by City Light to access the penstock and power tunnel portal for inspection. Currently, it is also an emergency evacuation route identified in the Skagit EAP and is marked with a "Flood Evacuation Route" sign. It begins east of the powerhouse and is approximately 1,000 ft long. While it was recently improved for use in the penstock saddle replacement project, it is very steep and narrow. It is not on any maps of the area and does not have an official name or public signage. Use is probably limited to the few people who notice it while visiting the powerhouse or while walking the Trail of the Cedars.

    - Based on information in the 1992 license application, the Tunnel Portal Trail is the lower portion of a trail that originally extended all the way to the diversion dam. The upper section of trail was called the Gatehouse Trail, and in the 1990s was steep and overgrown and difficult to follow. Its use was apparently not encouraged or advertised by City Light or the NPS because of the hazardous conditions. The trail's presence on the landscape is now indiscernible.

- Newhalem Creek Trail: The Newhalem Creek Trail is a continuation of the access road to the diversion dam and headworks and provides access to the backcountry in the upper portion of the drainage. The trail begins at the diversion dam, enters the southern unit of North Cascades National Park approximately 0.5 mi from the trailhead, and ends 4 mi later at Newhalem Creek Camp. According to the 1992 license application, this trail receives limited use, with fewer than 100 visitors reported in 1989, the latest year with any data. Currently, it is not signed and is not

considered part of NPS's trail system; NPS does not maintain it or the back-country campsite that the trail provides access to. However, it is listed on the Washington Trails Association website, and appears to have a small but ardent group of users who perform ad hoc maintenance annually. Since the road is now closed because of the landslide, the trailhead is not accessible by vehicle, and users must walk an additional mile to start the hike.

E.5.10.2 Project Effects

Decommissioning would have few long-term adverse effects on recreation because the Project does not have any associated recreational facilities, and removal of the dam and tailrace barrier would not impact the nearby Trail of the Cedars or Linking Trail. However, the diversion dam access road, which is blocked by a recurring landslide, would be permanently closed between the Skagit EAP evacuation muster site and the dam (a distance of approximately 3,960 ft), making the Newhalem Creek Trail slightly more difficult to reach for its few users.

Short-term adverse impacts to recreational sites would occur during decommissioning activities. These include increased vehicles and noise from equipment and removal activities at the tailrace barrier and dam sites. Trucks and equipment would travel part of the paved route to the Newhalem Visitor Center to access the diversion dam and would need to use the road that bisects part of the Newhalem Campground to reach the tailrace barrier site. Noise from removal of the tailrace barrier would impact people walking on the Trail of the Cedars and Linking Trail as well as possibly the Rock Shelter Trail. Noise may also reach portions of the Newhalem Creek Campground. Increased noise and vehicle use may occur during the peak recreational season depending on the timing of decommissioning activities. Construction activities may also require temporary closures of portions of the Trail of the Cedars and Linking Trail as well as the entire Newhalem Creek Trail.

Once decommissioning is complete, new interpretive signs would be installed at the Newhalem Creek Powerhouse with information about the history of the Project. This would provide a long-term benefit to the public. In addition, the powerhouse area represents an opportunity for City Light, the NPS, and the Upper Skagit Indian Tribe to collaborate on developing trail-based natural and cultural resource interpretive amenities. These might include connecting the Trail of the Cedars with the Linking Trail, replacing signs, and expanding interpretive themes. Possible themes include tribal uses of plants, fish, and wildlife; the role of fire in the ecosystem; and human prehistory/history in the area.

E.5.10.3 Mitigation Measures

Equipment and vehicle use associated with decommissioning would be limited to daylight hours to minimize impacts to Newhalem Creek Campground, with times set in coordination with the NPS. Trail closures would also be coordinated with the NPS, along with appropriate signage, physical barriers, and detours. Information about decommissioning and its impacts on recreational use would be made available to the public at the Newhalem Visitor Center and Skagit Information Center. Work to remove the tailrace fish barrier and transmission lines, which are near the Trail of the Cedars and Linking Trail, would be timed to occur in September through October to avoid the peak recreation season.

E.5.11 Visual Resources

E.5.11.1 Affected Environment

Views in the Project area are generally limited by the dense forest vegetation and steep terrain. Visitors can view Newhalem Creek from the bridge on the powerhouse access road or from the diversion dam access road. The creek mouth and the tailrace discharge area can be seen from points along the northern bank of the Skagit River in Newhalem.

Figure E-15. Newhalem Creek 100-foot Waterfall

The two waterfalls in the lower 1 mi of Newhalem Creek are difficult to find; they do not appear on any maps and are not well known. Until the 2015 wildfire, dense forest made the 100-ft falls (Figure E-15) impossible to see without negotiating the very steep slope below the road. With much of the forest burned, this waterfall is now visible from the access road, just west of the slide area, approximately 0.2 to 0.4 mi from the diversion. The view of the 14-ft falls requires walking along the western side of Newhalem Creek from the Rock Shelter Trail.

The Project facilities generally blend into the surrounding landscape. The powerhouse and gatehouse are rustic in construction and painted brown, the penstock is green, and the diversion dam is gray, generally matching the rock of the creek. With the access road blocked by the landslide, the diversion dam and gatehouse are visible to only those few people who decide to walk up the road. Neither the powerhouse nor the penstock is visible from Newhalem, SR-20, or Newhalem Campground. The powerhouse and a small segment of the penstock can be seen by visitors who walk the Trail of the Cedars from Newhalem or the Link Trail from Newhalem Campground, or who drive the powerhouse access road to the end. Viewing the entire penstock requires walking the steep Tunnel Portal Trail.

E.5.11.2 Project Effects

Decommissioning would have a beneficial effect on visual resources. Removing the dam and headworks would restore the natural setting in these areas for those who use the Newhalem Creek Trail. Removing the tailrace barrier and associated riprap would restore the natural vegetation in this area and would improve views from Trail of the Cedars and along the Skagit River. Ceasing vegetation maintenance along the penstock would increase forest habitat and eventually eliminate the hard visual line that currently exists.

In the short term, construction equipment and activities would disturb vegetation and soils, impacting views of and near Project facilities proposed for removal, such as the tailrace barrier and transmission line. However, the powerhouse area, Linking Trail, and Trail of the Cedars would be closed to public use during

decommissioning work, so impacts to visual resources near these facilities would not be experienced. However, disturbance-related impacts to visual resources would last several years following construction until vegetation establishes and matures.

E.5.11.3 Mitigation Measures

Ceasing vegetation maintenance along the penstock would increase forest habitat and eventually eliminate the hard visual line that currently exists.

E.5.12 Greenhouse Gases

E.5.12.1 Affected Environment

The Project is nearly greenhouse gas neutral at this time. It is not currently operational, so is not producing clean energy via hydropower. Very few vehicle trips are needed to maintain the plant.

E.5.12.2 Project Effects

A potential source of green energy is eliminated by decommissioning the Project. However, the power produced by the Project has been replaced by energy generated by the Skagit River Project, other City Light hydroelectric facilities, and/or conservation, so its removal would not result in a long-term net increase in greenhouse gases over current conditions.

The Project has not been able to provide backup power to Newhalem and Gorge Powerhouse for more than 10 years. This function will be replaced by a separate project to upgrade equipment in Gorge Powerhouse and does not involve installation of a diesel generator.

The vehicles and equipment used for removing Project facilities would result in a short-term, temporary increase in greenhouse gases. Decommissioning activities would not add traffic capacity or increase vehicular emissions over the long term.

E.5.12.3 Mitigation Measures

To the extent possible, electric or fuel-efficient equipment and vehicles will be used for decommissioning activities. Vehicles will not be left to idle.

E.6 Consultation and Coordination

On July 8, 2021, City Light was designated by FERC as the non-federal representative for purposes of consultation under Endangered Species Act (ESA) Section 7 and NHPA Section 106. To date, ESA Section 7 informal consultations have consisted of meetings with the USFWS and National Marine Fisheries Service (NMFS). The draft Biological Assessment is included as Appendix A. NHPA Section 106 consultations have consisted of meetings with the DAHP and tribes, as shown in Table E-8. Tribes that City Light is consulting with include the three tribes that participated in the process for the current license.

Table E-8. Record of Informal Meetings to Date

Date	Parties	Meeting/Site Visit
June 6, 2021	NPS	Kick-off meeting
August 2, 2021	Upper Skagit Indian Tribe	Kick-off meeting
August 18, 2021	USFWS; NMFS	Kick-off meeting
August 23, 2021	U.S. Army Corps of Engineers; Washington State Department of Ecology	Kick-off meeting
August 25, 2021	DAHP	Kick-off meeting
August 25, 2021	Swinomish Indian Tribal Community	Kick-off meeting
September 1, 2021	NPS	Follow-up meeting
September 15, 2021	Upper Skagit Indian Tribe	Site visit
September 16, 2021	Sauk-Suiattle Indian Tribe	Kick-off meeting
September 23, 2021	Sauk-Suiattle Indian Tribe	Site visit
September 30, 2021	Swinomish Indian Tribal Community	Follow-up meeting
October 4, 2021	NPS	Site visit
October 18, 2021	Upper Skagit Indian Tribe	Follow-up meeting

City Light began the decommissioning process by meeting with state and federal agencies and tribes potentially interested in the undertaking (Table E-8). The kick-off meetings included a presentation of the existing Project facilities and operations, the rationale for decommissioning, and a summary of the preferred alternative. City Light also provided site visits to all interested parties. Following the meetings and site visits, a written description of the current Project and the preferred alternative was provided to the agencies and tribes for scoping-level comments. Written informal comments on decommissioning were provided by the NPS, Upper Skagit Indian Tribe, and Sauk-Suiattle Indian Tribe (Appendix C). These comments were used for further discussion with the parties and to refine the preferred alternative.

Drafts of the Surrender Application and *Decommissioning Plan* were sent to all the interested parties on November 11, 2021, with a request for comments by December 1, 2021. Comments were received from the NPS, WDFW, USFWS and Upper Skagit Indian Tribe. These comments were used to further refine the Surrender Application and *Decommissioning Plan*. See Appendix C for their comments and City Light's responses.

E.7 References

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Parker, Patricia L., and Thomas L. King

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1997 *Newhalem Creek Recreation Plan (Article 410)*. Submitted to FERC, August 6, 1997.

2020 *Pre-application document, Skagit River Hydroelectric Project (FERC 553)*. Submitted to FERC, April 2020.

U.S. Fish and Wildlife Service (USFWS)

1997 *Recovery Plan for the Threatened Marbled Murrelet (Brachyramphus marmoratus) in Washington, Oregon, and California*. Portland, Oregon.

Winnings, C.J., and E.G. Neel

2013 *North Cascades National Park Service Complex: Acoustical monitoring, 2009-2011*. National Park Service, Marblemount, Washington.

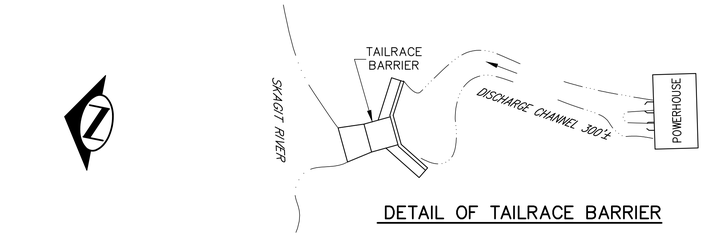
Exhibit F Project Drawings

REFERENCES

1. D-25443 FERC EXHIBIT L-2 1969.

NOTE

THIS DRAWING WAS COPIED FROM 1969 ORIGINAL FERC APPLICATION FOR LICENSE DRAWING EXHIBIT L-2 AND MODIFIED TO SHOW TAILRACE BARRIER 11-27-01



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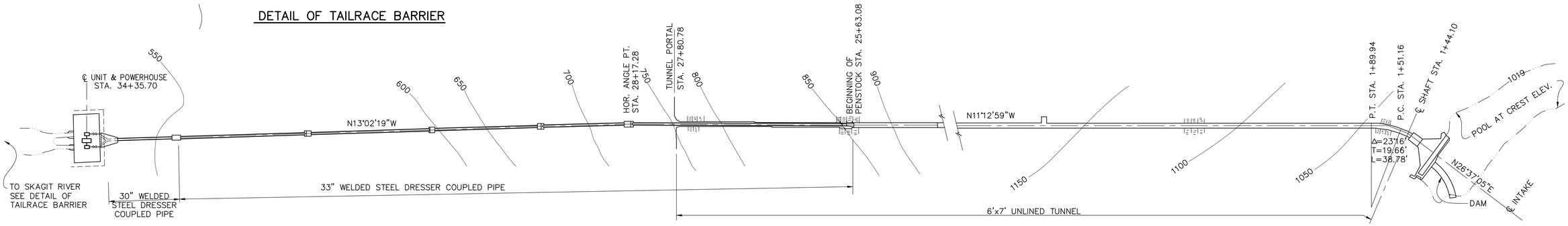
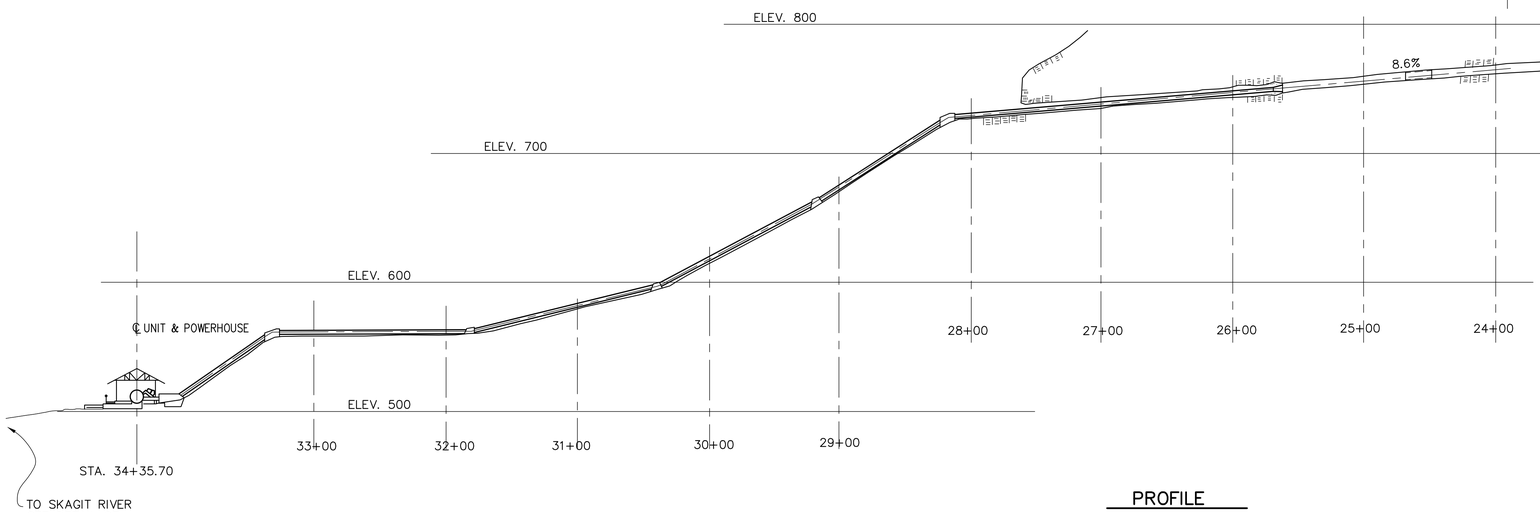


PLAN

DETAIL OF TAILRACE BARRIER



PROFILE

SCALE HORIZ. 1"=50'
VERT. 1"=50"

50 0 50 100 150 200 250

SCALE IN FEET

PROJECT NO. 2705 EXHIBIT F SHEET 2

CITY OF SEATTLE CITY LIGHT DEPARTMENT
ROBERTA PALM BRADLEY - ACTING SUPERINTENDENT OF CITY LIGHT
NEWHALEM CREEK PROJECT FERC NO. 2705-

EXHIBIT F - TUNNEL AND PENSTOCK PLAN AND PROFILE

DW. BY		SUBMITTED	ORD. 115950
TR. BY	DHI	RECOMMENDED	
CH. BY	SCR	APPROVED	DATE 14Sept.92

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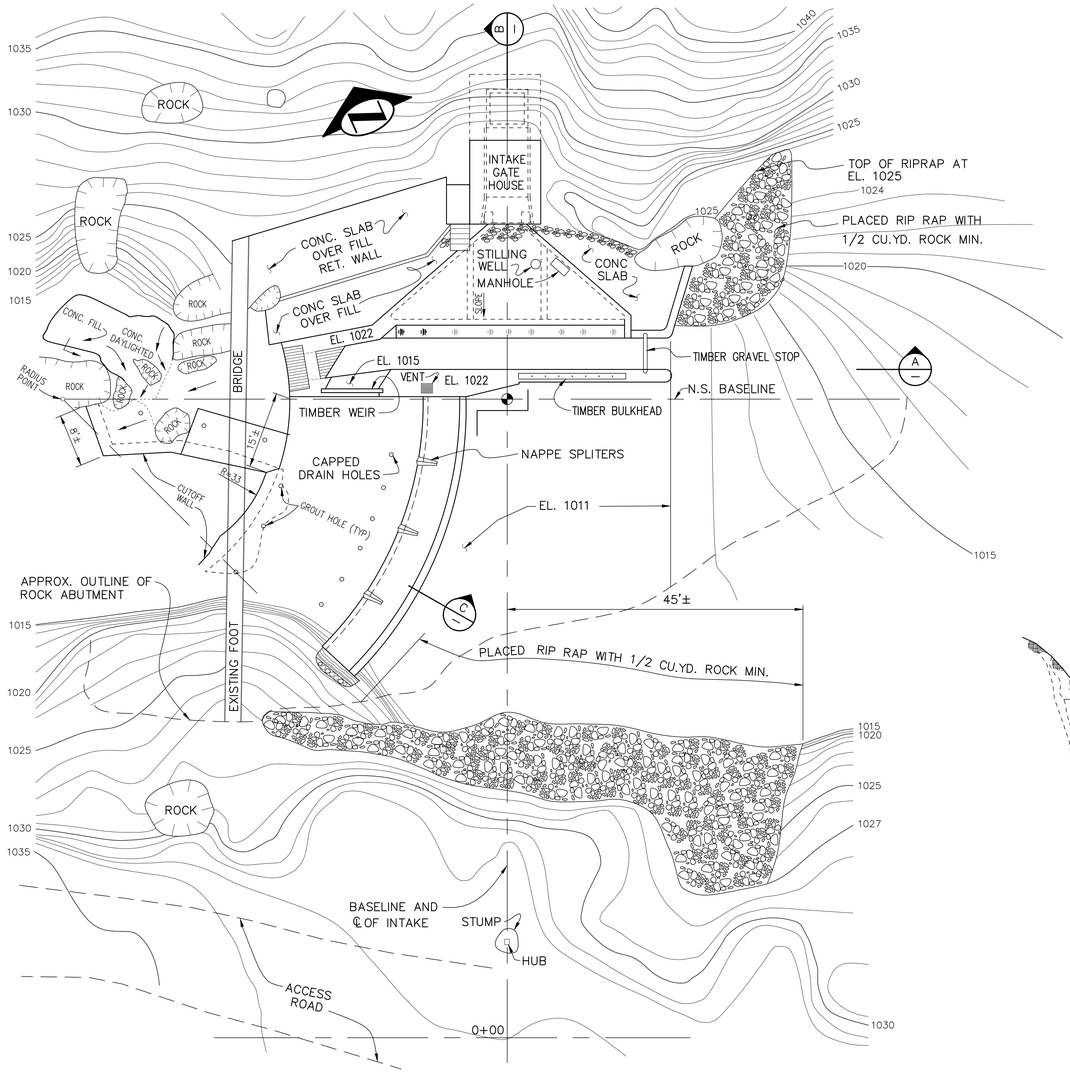
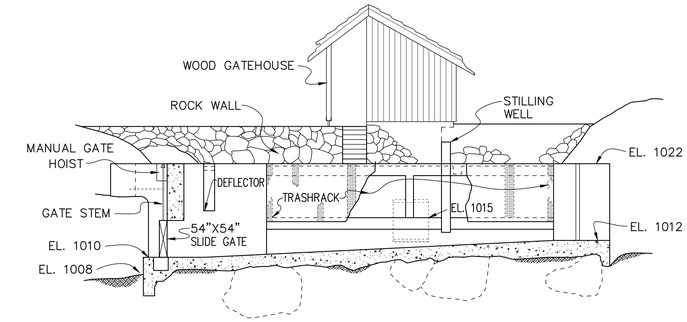
CITY OF SEATTLE, WASHINGTON.
BY Roberta Palm Bradley
ACTING SUPERINTENDENT OF CITY LIGHT

FERC 2705-106

D-30854



PLAN



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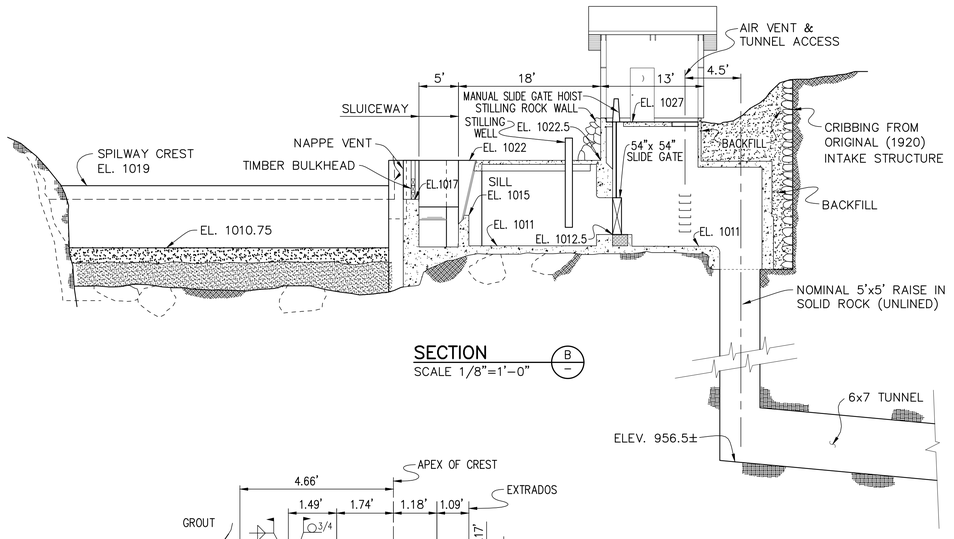

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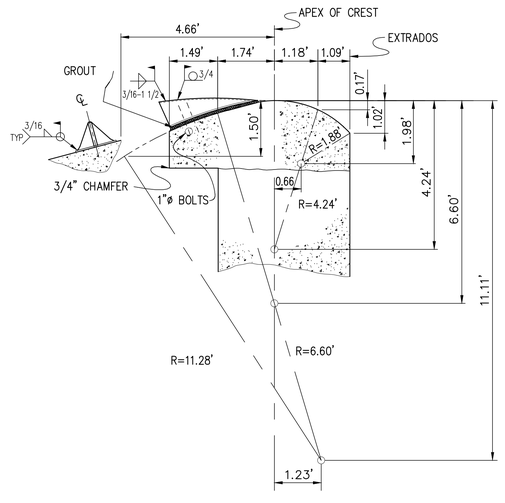
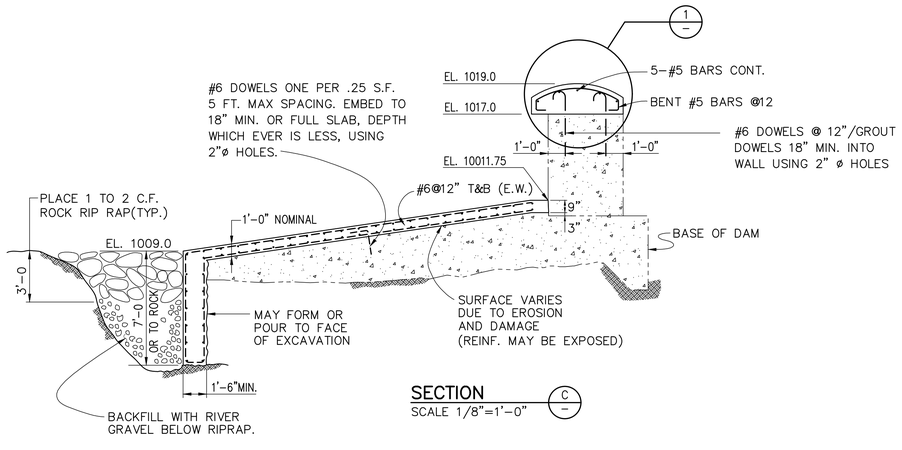


DETAIL

SCALE 1/8"=1'-0"



SECTION C

SCALE 1/8"=1'-0"

REFERENCES

1. D-25442 FERC EXHIBIT L-1 1969.
2. D-25353 DAM INTAKE.
3. D-26674 DIVERSION DAM REHABILITATION.

NOTE:

THIS DRAWING WAS COPIED FROM 1969 ORIGINAL FERC APPLICATION FOR LICENSE DRAWING EXHIBIT L-1 AND DRAWING D-25353, D-26674

10 5 0 10 20 30 40 50

SCALE IN FEET

PROJECT NO. 2705 EXHIBIT F SHEET 1

CITY OF SEATTLE CITY LIGHT DEPARTMENT
ROBERTA PALM BRADLEY - ACTING SUPERINTENDENT OF CITY LIGHT
NEWHALEM CREEK PROJECT FERC NO. 2705-

EXHIBIT F - DAM AND INTAKE PLAN AND SECTIONS

DW. BY		SUBMITTED	ORD. 115950
TR. BY	DHI	RECOMMENDED	
CH. BY	SCR	APPROVED	DATE 14Sept.92

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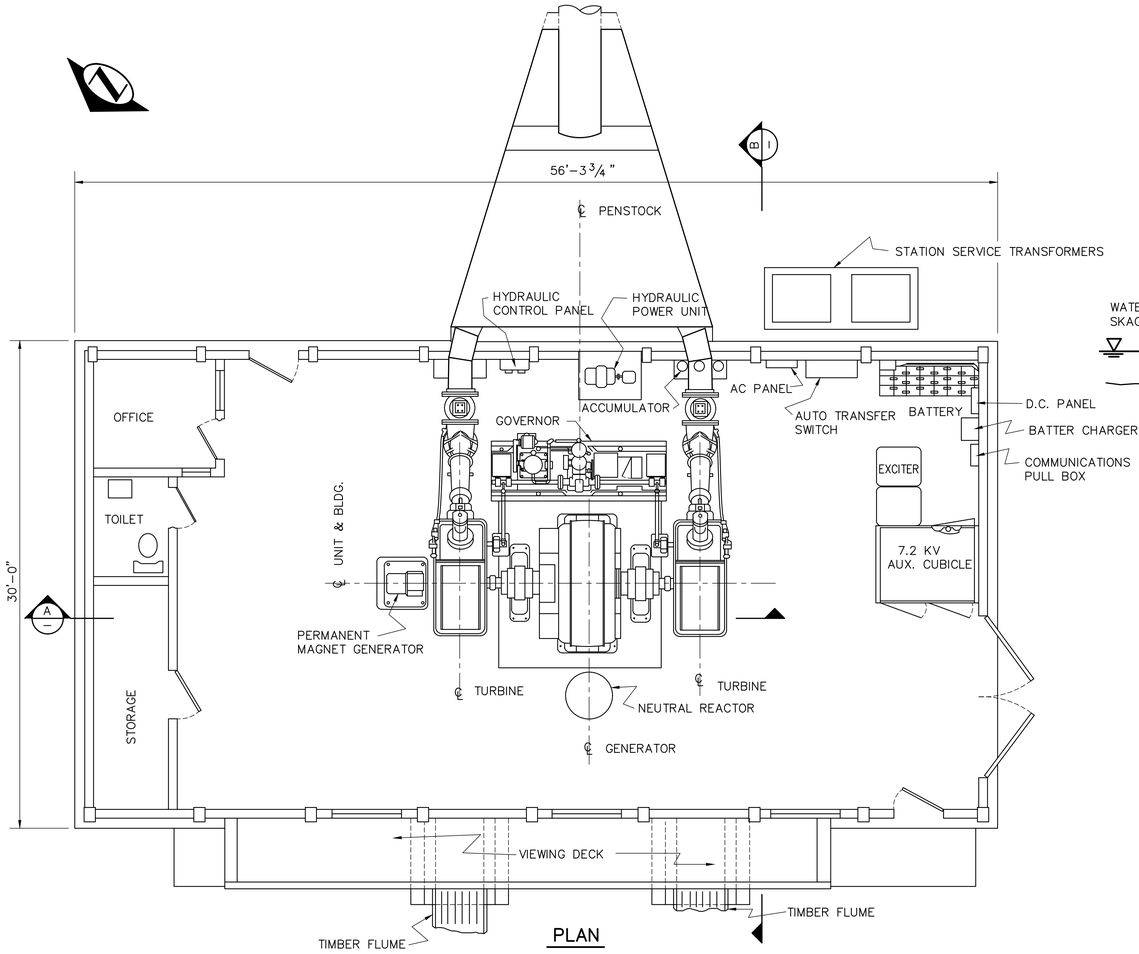
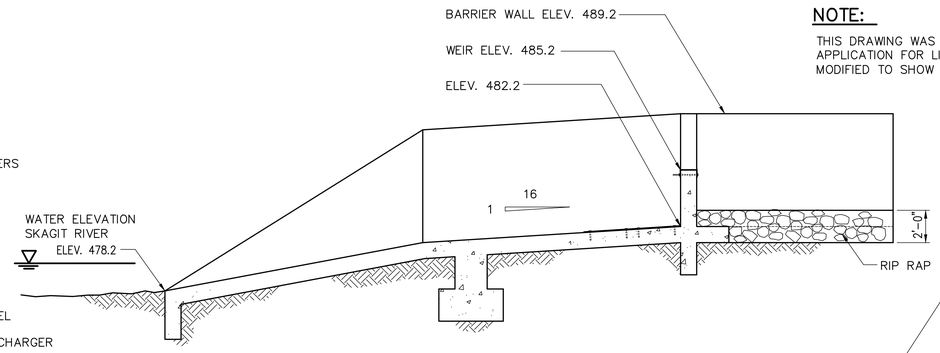
BY Roberta Palm Bradley
ACTING SUPERINTENDENT OF CITY LIGHT

FERC 2705-101

D-30853

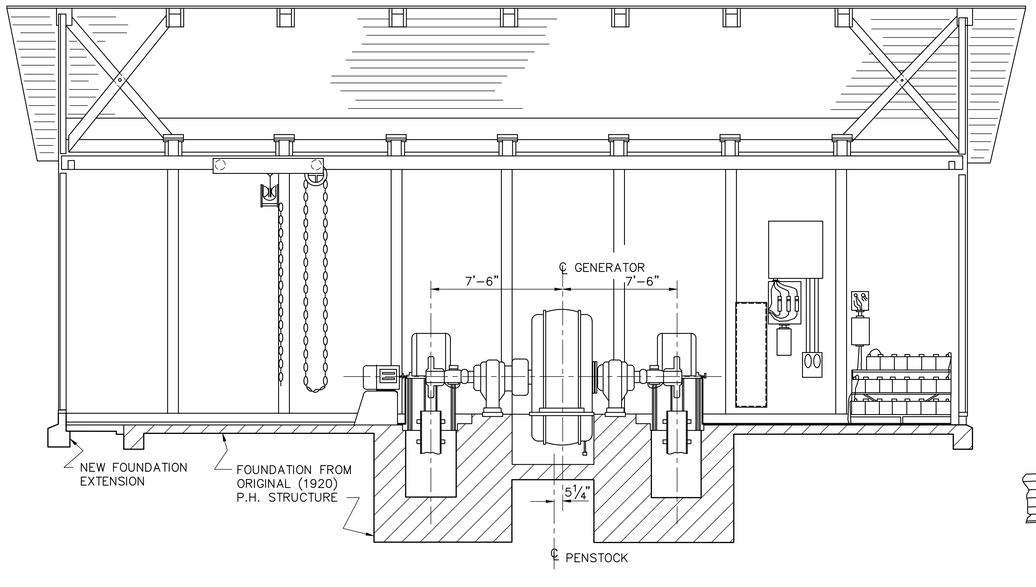


PLAN



SECTION C

TAILRACE BARRIER PLAN



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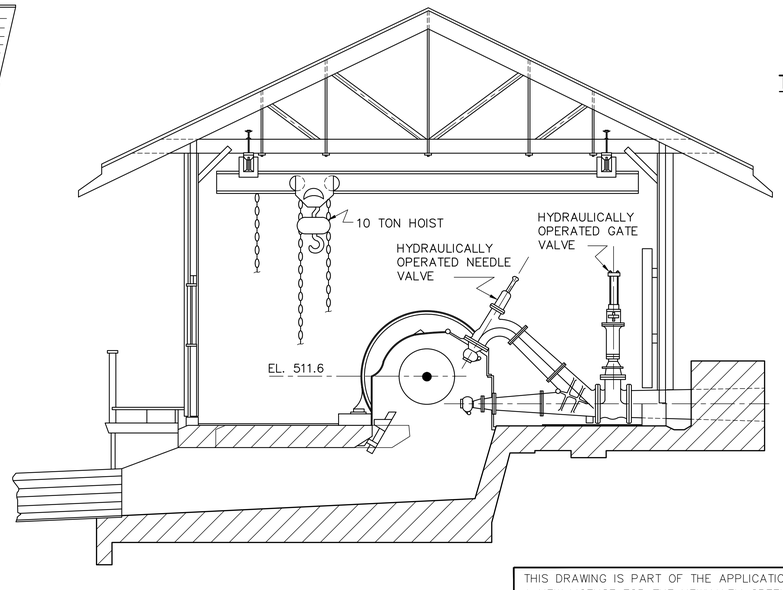

SECTION B

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SCALE IN FEET

REFERENCES

1. D-2544 FERC EXHIBIT L-3 1969.

NOTE:

THIS DRAWING WAS COPIED FROM 1969 ORIGINAL FERC APPLICATION FOR LICENSE DRAWING EXHIBIT L-3 AND MODIFIED TO SHOW TAILRACE BARRIER 11-27-01

PROJECT NO. 2705 EXHIBIT F SHEET 3

CITY OF SEATTLE CITY LIGHT DEPARTMENT
ROBERTA PALM BRADLEY - ACTING SUPERINTENDENT OF CITY LIGHT
NEWHALEM CREEK PROJECT FERC NO. 2705-

EXHIBIT F - POWERHOUSE & TAILRACE BARRIER PLAN & SECTIONS

DW. BY		SUBMITTED	ORD. 115950
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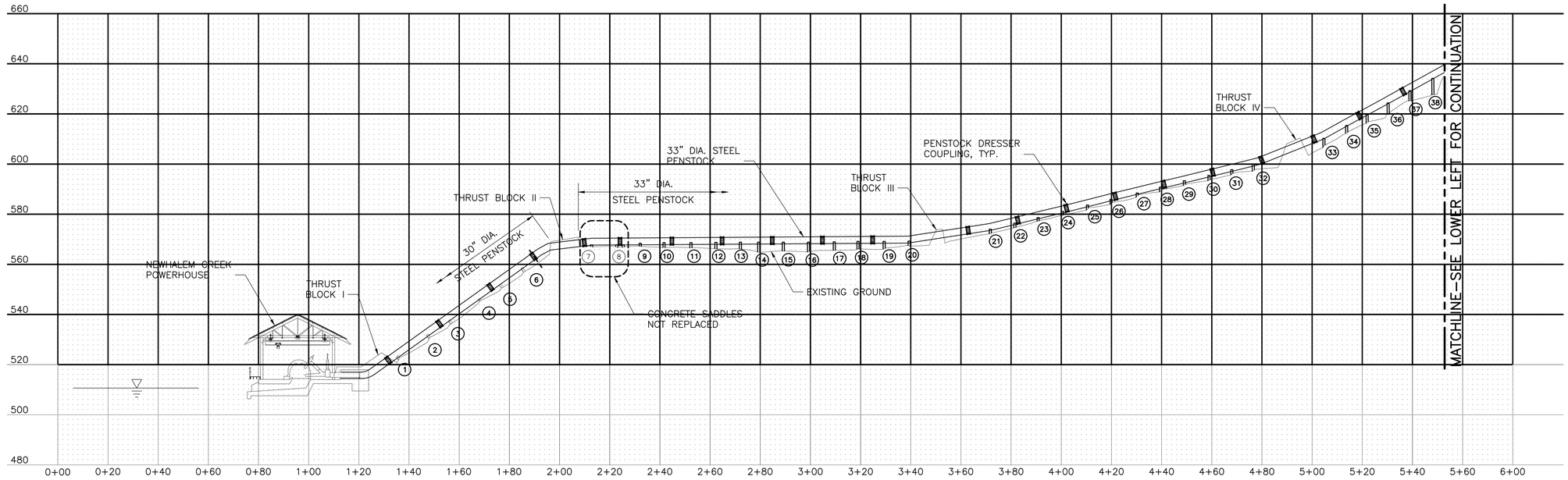
FERC 2705-107

D-30855

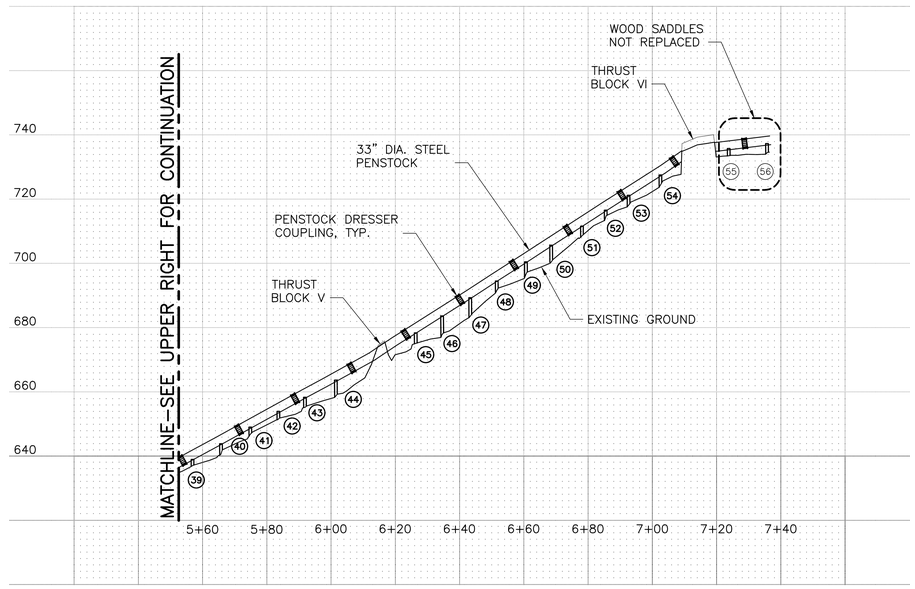


LEGEND:

(#) SADDLES REPLACED

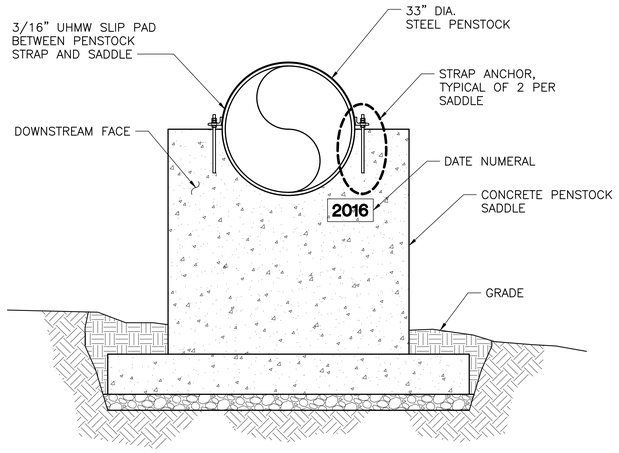
PROFILE OF PENSTOCK

SCALE: HORZ. SCALE: 1"=20'
VERT. SCALE: 1"=20'



PROFILE OF PENSTOCK

SCALE: HORZ. SCALE: 1"=20'
VERT. SCALE: 1"=20'



NOTE: SEE DETAILS 1/C–9 AND 2/C–9 FOR SADDLE TYPE 1A, AND DETAILS 3/C–9 AND 4/C–9 FOR TYPE 1B.

DETAIL (1/–) TYPE 1 SADDLE SOIL BEARING
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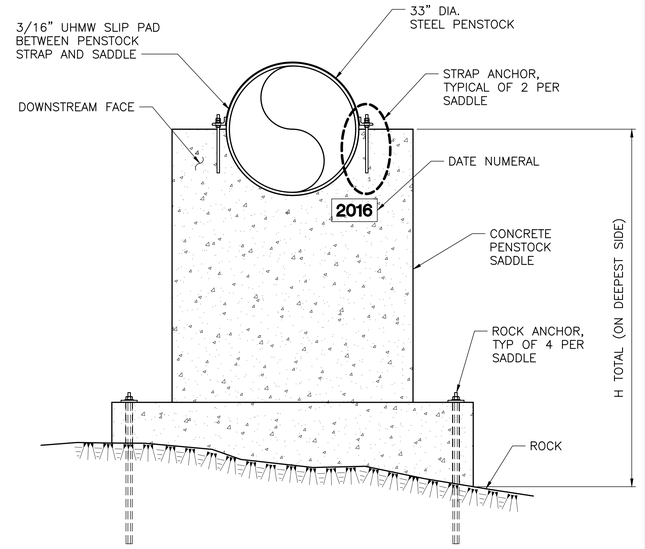

NOTE: SEE DETAILS 1/C–10 AND 2/C–10 FOR SADDLE TYPE 2A, DETAILS 3/C–10 AND 4/C–10 FOR SADDLE TYPE 2B, AND DETAILS 1/C–11 AND 2/C–11 FOR SADDLE TYPE 2C.

DETAIL (2/–) TYPE 2 SADDLE ROCK BEARING
SCALE: 3/4"=1'–0"

NOTE:

SEE DRAWING D–54872 FOR NEWHALEM PENSTOCK SADDLE REPLACEMENTS AS–BUILT DRAWING LIST AND REFERENCES.

CRITICAL ENERGY INFRASTRUCTURE INFORMATION
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PROJECT NO. 2705 EXHIBIT F - SHEET 4

NEWHALEM CREEK PROJECT
SEATTLE CITY LIGHT - CITY OF SEATTLE, WASHINGTON

NEWHALEM PENSTOCK PROFILE AND SECTIONS

50' 0 50' 100' 150' 200' 250'

ISSUE DATE : 12/25/2017	SCALE : AS NOTED	FERC PROJECT NO. 2705

ONE INCH AT FULL SIZE

REVISIONS			
REV	DATE		MF
DR	CK		APP
W.O.#	DESCRIPTION		
0	12/13/2017		PCL
STN.	DJR		

WORK ORDER #: 1600345
CREATED FOR LICENSE APPLICATION

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Exhibit G Project Site Map and Project Boundary

REFERENCES

1. D-25440 FERC EXHIBIT K 1969.

NOTE:

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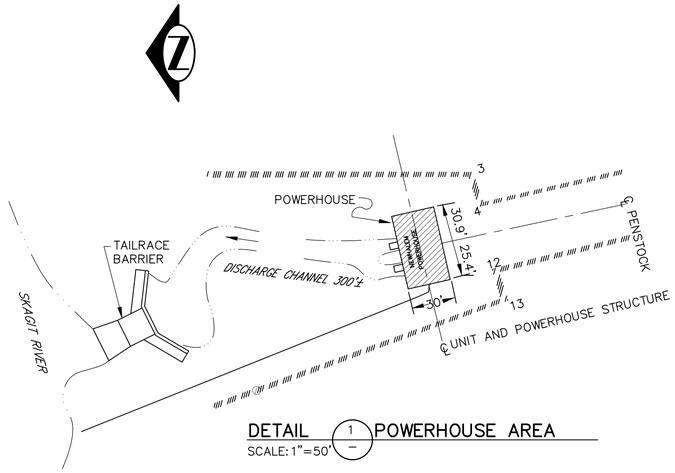

DETAIL (1) POWERHOUSE AREA
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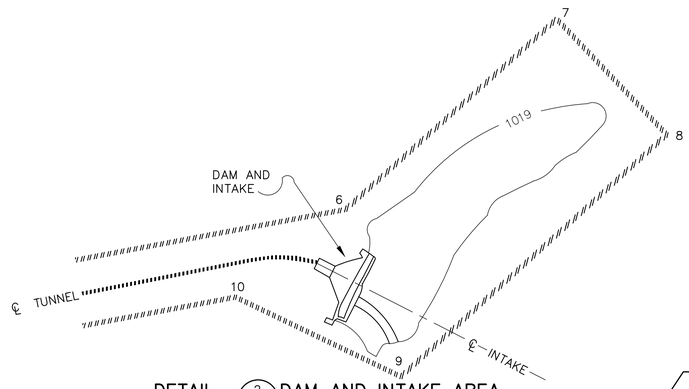

DETAIL (2) DAM AND INTAKE AREA
SCALE: 1"=50'

PLAN

PROJECT BOUNDARY SURVEY DATA

POINT	BEARING	DISTANCE IN FEET
1		
21 | 28	N 48° 53' 54" E	467.86
2	N 89 34 10 W	289.96
3	S 0 25 50 W	347.19
4	S 76 57 41 W	25.00
5	S 13 02 19 E	568.82
6	S 11 12 59 E	2702.24
7	S 42 46 33 E	217.93
8	S 47 13 27 W	125.00
9	N 42 46 33 W	275.00
10	N 26 37 05 E	140.83
11	N 11 12 59 W	2607.02
12	N 13 02 19 W	568.02
13	S 76 57 42 W	25.00
14	N 20 06 29 W	395.63
15	N 18 55 22 W	419.53
16	N 64 53 06 E	308.11
17	N 43 41 06 E	165.68
18	N 65 29 36 E	355.46
19	N 74 11 24 E	233.86
20	N 30 35 21 E	79.66
21	N 68 19 37 E	742.36
22	S 80 18 31 E	105.03
23	N 76 51 09 E	196.19
24	N 57 56 06 E	152.76
25	N 39 01 54 W	168.74
26	N 55 33 36 E	270.21
27	N 31 34 36 E	93.65
28	N 53 57 06 E	486.94
29	N 3 56 06 E	58.34
30	S 47 47 24 W	45.34
31	S 38 40 45 E	20.04
32	S 47 47 24 E	56.26
33	S 3 56 06 W	77.36
34	S 53 57 06 W	492.31
35	S 31 34 36 W	93.95
36	S 55 33 36 W	252.79
37	S 39 01 54 E	169.66
38	S 57 56 06 W	178.68
39	N 76 51 09 E	203.57
40	N 80 18 31 E	103.45
41	N 68 19 37 E	729.91
42	N 30 35 21 E	80.83
43	N 74 11 24 E	240.34
44	N 65 29 36 E	350.08
45	N 43 41 06 E	165.58
46	N 64 53 06 E	268.76
47	N 18 55 22 E	420.10
2	N 89 89 10 E	188.36

FEDERAL LAND	6.56 ACRES
CITY OF SEATTLE	1.42 ACRES
TOTAL	7.98 ACRES

INCLUDING 2.02 ACRES WITHIN PROJECT 553

NOTES: SHADED AREA IS OWNED IN FEE BY THE CITY OF SEATTLE. ALL OTHER LANDS ARE OWNED BY THE U.S. GOVERNMENT, ADMINISTERED BY THE DEPT. OF INTERIOR AS PART OF THE ROSS LAKE NATIONAL RECREATION AREA.

200 0 200 400 600 800 1000
SCALE IN FEET

PROJECT NO. 2705 EXHIBIT G SHEET 2

CITY OF SEATTLE CITY LIGHT DEPARTMENT
ROBERTA PALM BRADLEY - ACTING SUPERINTENDENT OF CITY LIGHT
NEWHALEM CREEK PROJECT FERC NO. 2705-

EXHIBIT G - PROJECT BOUNDARY

DW. BY		SUBMITTED	ORD. 115950
TR. BY	DHI	RECOMMENDED	
CH. BY	SCR	APPROVED	DATE 14Sept.92

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CITY OF SEATTLE, WASHINGTON.
BY Roberta Palm Bradley
ACTING SUPERINTENDENT OF CITY LIGHT

FERC 2705-108

D-30852

REFERENCES

1. D-25441 FERC EXHIBIT J 1969.

NOTE:

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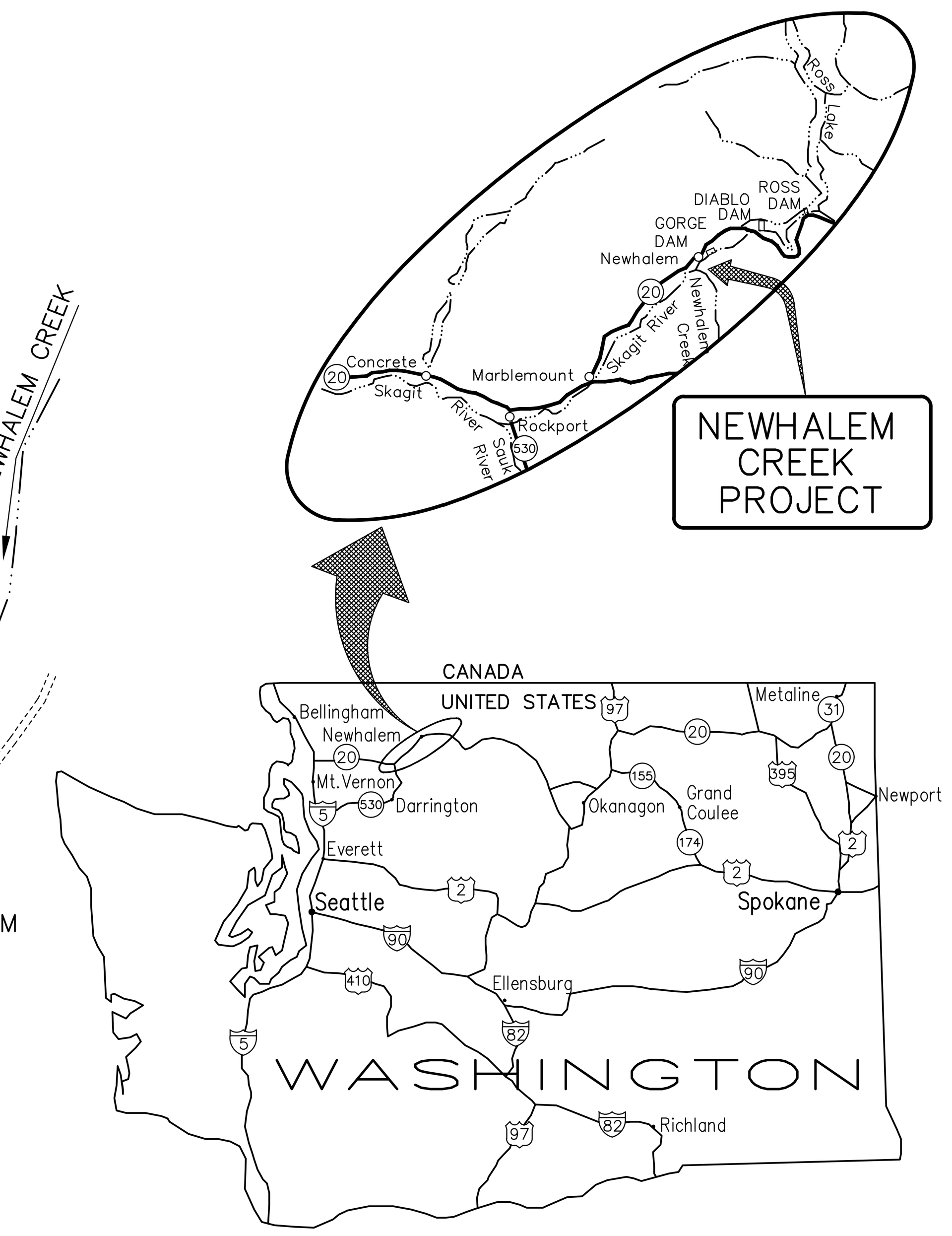


KEY MAP

(NOT TO SCALE)

300 0 300 600 900 1200 1500

SCALE IN FEET

PROJECT NO. 2705 EXHIBIT G SHEET 1

CITY OF SEATTLE CITY LIGHT DEPARTMENT

ROBERTA PALM BRADLEY – ACTING SUPERINTENDENT OF CITY LIGHT

NEWHALEM CREEK PROJECT FERC NO. 2705-

EXHIBIT G – SITE MAP

DW. BY		SUBMITTED		ORD. 115950
TR. BY	DHI	RECOMMENDED	[signature]	
CH. BY	SCR	APPROVED		DATE 14Sept.92

THIS DRAWING IS PART OF THE APPLICATION FOR A NEW LICENSE FOR THE NEWHALEM CREEK PROJECT NO. 2705 MADE BY THE UNDERSIGNED THIS 15th DAY OF Sept. , 1992 CITY OF SEATTLE, WASHINGTON.

BY Roberta Palm Bradley
ACTING SUPERINTENDENT OF CITY LIGHT

FERC 2705–104

D–30851

Appendix A.
Biological Assessment

BIOLOGICAL ASSESSMENT AND EFH ASSESSMENT

NEWHALEM CREEK HYDROELECTRIC PROJECT DECOMMISSIONING

January 2022

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

List of Acronyms and Abbreviations

°C .....degrees Celsius
BA .....biological assessment
BMP .....best management practice
CFR .....Code of Federal Regulations
cfs .....cubic foot per second
City Light .....Seattle City Light
CWA .....Clean Water Act
CY .....cubic yard
dB .....decibel
DPS .....Distinct Population Segment
EAP .....Emergency Action Plan
Ecology .....Washington State Department of Ecology
EFH .....Essential Fish Habitat
ESA .....Endangered Species Act
ESU .....Evolutionary Significant Unit
FERC .....Federal Energy Regulatory Commission
FMO .....foraging, migratory, and overwintering
FR .....*Federal Register*
IPaC .....Information, Planning, and Conservation
LAA .....likely to adversely affect
Magnuson-Stevens Act ....Magnuson-Stevens Fishery Conservation and Management Act
mg/L .....milligram per liter
mm .....millimeter
NA .....not applicable
NE .....no effect
NLAA .....not likely to adversely affect
NMFS .....National Marine Fisheries Service
NPS .....National Park Service
NRF .....nesting, roosting, and foraging
NTU .....nephelometric turbidity units
OHWM .....Ordinary High Water Mark

PBF .....physical and biological feature
PHS .....Priority Habitat Species
Project .....Newhalem Creek Hydroelectric Project
RLNRA.....Ross Lake National Recreation Area
RM .....river mile
Skagit EAP.....*Skagit River Project Emergency Action Plan*
SWPPP.....Stormwater Pollution and Prevention Control Plan
TESC.....temporary erosion and sedimentation control
TSS.....total suspended solids
USACE .....U.S. Army Corps of Engineers
USFWS .....U.S. Fish and Wildlife Service
USGS .....U.S. Geological Survey
WDFW.....Washington Department of Fish and Wildlife
WRIA.....Water Resource Inventory Area
WSDOT .....Washington State Department of Transportation

1.0 INTRODUCTION

Seattle City Light (City Light) owns and operates the Newhalem Creek Hydroelectric Project (Project), which is licensed by the Federal Energy Regulatory Commission (FERC). The Project is in Whatcom County, immediately west of the town of Newhalem, along Newhalem Creek, a tributary to the Skagit River (Figure 1.1-1). The current license for the Project (FERC No. 2705) expires on January 31, 2027. The Project was in active use until 2010, when a series of equipment and structural problems caused an extended shutdown. Currently, it cannot be operated due to leaks in the power tunnel, maintenance needs at the headworks, and lack of safe access to the dam. Based on an engineering and economic analysis of the necessary repairs, City Light has determined that Project costs far exceed the revenues. For this reason, City Light has decided not to seek a new license for the Project and proposes to decommission portions of the existing Project. City Light filed a Notice of Intent with FERC on April 28, 2021, to surrender the license for the Project.

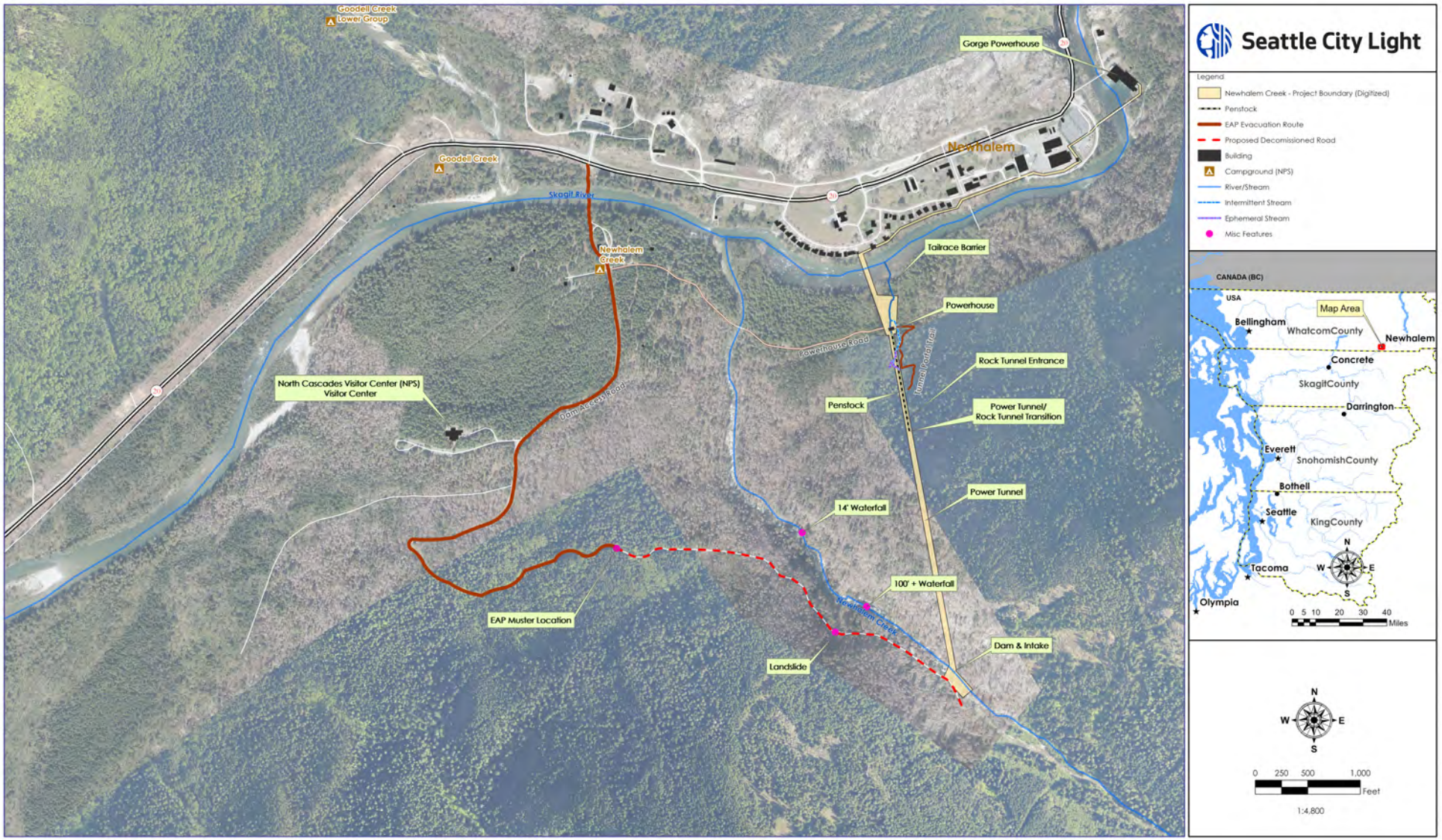
1.1 Existing Project

The Project began operations in 1921 to supply power to the town of Newhalem and to construct Gorge Dam and Powerhouse, the latter of which are part of the Skagit River Hydroelectric Project (FERC No. 553). The Project occupies approximately 6.5 acres of land within the Ross Lake National Recreation Area (RLNRA), which is managed by the National Park Service (NPS) as part of the North Cascades National Park Service Complex. When operational, the Project provides a backup source of power to Gorge Powerhouse and Newhalem, with a generating capacity of 2.125 megawatts. The hydraulic capacity of the one powerhouse turbine (Pelton) is 69 cubic feet per second (cfs).

The Project consists of the following components (Figure 1.1-2):

- Newhalem Creek diversion dam, a run-of-river dam located on the creek at approximately river mile (RM) 1.0, which is a concrete, overflow structure that is 45 feet long by 10 feet high and diverts 69 cfs into an intake structure.
- Combination sluiceway/intake structure on the right bank of Newhalem Creek.
- 55-foot-tall, 5-foot by 5-foot unlined rock vertical shaft that conveys water from the intake to a power tunnel.
- Small gatehouse near the sluiceway/intake structure that contains the control gate and access to the rock shaft.
- Pedestrian bridge across the creek near the dam that provides access to the sluiceway/intake and gatehouse.
- 6-foot-wide by 7-foot-high by 2,452-foot-long unlined rock power tunnel.
- 218-foot-long, 30-inch-diameter steel penstock section within the lower end of the rock tunnel.

  925-foot-long by 33-inch-diameter steel penstock, supported by saddles, that conveys water from the tunnel to the powerhouse; includes a 218-foot-long, 30-inch-diameter section within the lower end of the rock tunnel and a 707-foot-long, 33-inch-diameter above-ground section supported by concrete saddles.



NEWHALEM CREEK HYDROELECTRIC PROJECT (FERC 2705)

Figure 1.1-1. Prominent features of the Newhalem Creek Project

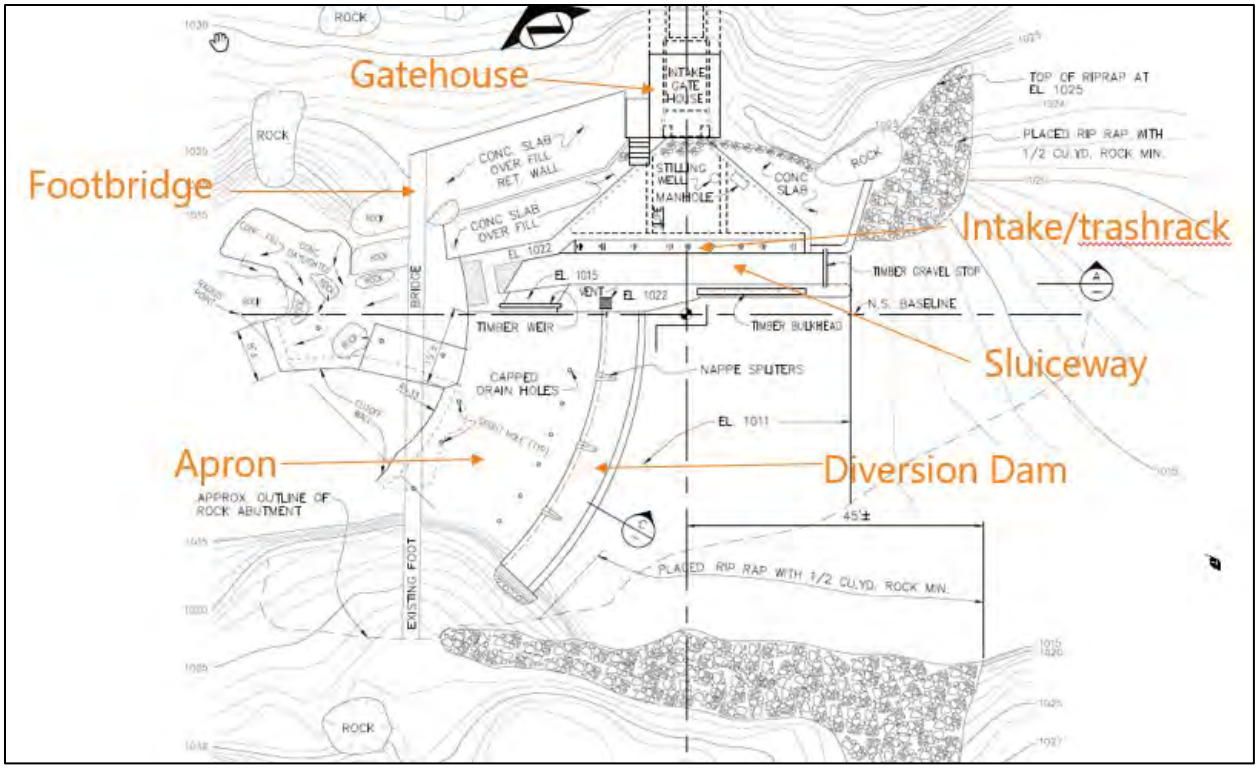


Figure 1.1-2. Newhalem Creek Diversion Structure – existing features.

- 30-foot by 56-foot wood framed powerhouse with a single generating unit—a double-overhung Pelton impulse turbine rated at 3,000 horsepower connected to a generator rated at 2,125 kilowatts.
- 350-foot-long unlined tailrace channel, varying from 5 to 40 feet wide, that discharges into the Skagit River.
- Concrete tailrace barrier structure, 3.6 feet high by 18 feet wide, with two 22.5-foot-long wing walls to prevent fish from entering the tailrace.

- Accessory equipment.

Article 403 of the license requires a minimum instream flow of 40 cfs downstream of the dam. Because of this instream flow requirement, the Project typically only operated four to six months per year. Additionally, Conditions 4 and 5 in the license stipulate that City Light must annually move woody debris and accumulated gravel over the dam. The quantity of accumulated gravel authorized to be passed over the dam is 200 to 400 cubic yards (CY) per year., Since 2019, however, a landslide along the access road to the diversion dam has made it impossible to comply with Conditions 4 and 5 and City Light has received exemptions from FERC.

1.2 Proposed Action Summary

City Light's proposed decommissioning Project includes the following activities:

- Remove the dam, sluiceway/intake structure, gatehouse, and pedestrian bridge;
- Plug the power tunnel and abandon in place;
- Deactivate the equipment in the powerhouse;
- Gate the road to the dam at or near elevation 840 feet and maintain the road up to this point (approximately 0.5 mile) for emergency evacuation per the Skagit River Project Emergency Action Plan (Skagit EAP) in case of failure at Ross Dam; an approximate 0.75-mile section of road above elevation 840 feet will be permanently blocked and decommissioned;
- Remove the tailrace fish barrier;
- Remove the transformer and overhead transmission lines and abandon the underground transmission lines; and
- Work with the U.S. Geological Survey (USGS) to determine the disposition of the stream gage above the dam.

City Light plans to retain the powerhouse, penstock, and penstock saddles to interpret as historic resources, as they are accessible and visible to the public and are designated in the National Register of Historic Places as contributing resources to the Skagit River and Newhalem Creek Hydroelectric Projects Historic District. There are currently three interpretive panels along the front of the powerhouse; these will be updated, along with other interpretive elements, in collaboration with NPS and the Department of Archeology and Historic Preservation. The equipment in the plant will be deactivated but retained in place. City Light will continue to maintain these features in perpetuity.

Other Project features to be retained include the tailrace, electrical service line to the powerhouse and four associated poles, and trail along the penstock. The tailrace will remain in place because it is part of an intermittent stream. The trail along the penstock is an emergency access route identified in the Skagit EAP, and City Light will continue to maintain it.

1.2.1 Anticipated Benefits of the Project

Following diversion structure removal, the Proposed Action will permanently restore pre-dam instream flow conditions, sediment transport, and nutrient transport to downstream reaches. Dam removal will restore natural riverine processes and will improve spawning gravel recruitment and transport to downstream reaches that may be used by Puget Sound steelhead, Puget Sound Chinook salmon, bull trout, and other salmonid species. Further, infrastructure removal and abandonment of the access road above elevation 840 feet will return areas to a more natural state.

1.3 Location

Newhalem is located between State Route 20 and the Skagit River, just downstream of the Gorge Powerhouse (see Figure 1.1-1) on NPS-managed land within the RLNRA. The powerhouse is reached via a road that traverses NPS's Newhalem Creek Campground and provides access to Newhalem Creek and several hiking trails.

The Newhalem Creek diversion structure, located at RM 1.0 just above a 167-foot waterfall (Newhalem Falls, RM 0.8), is run-of-the-river and impounds very little water (approximately 0.1 acre/0.6 acre-feet). A USGS stream gage is located roughly 200 feet upstream of the dam. Access to the dam is via a 1.4-mile-long gravel section of a former logging road, starting near the parking lot of NPS's Newhalem Visitor Center, and continuing past the dam along the Newhalem Creek drainage as an unmaintained trail. This road is currently gated approximately 0.5 mile from the start. The lower road up to the gate is identified as an emergency evacuation route in the Skagit EAP. The upper portion of the road is closed to public access due to a landslide and unstable slope near the dam. The road is not within the Project boundary.

The entire area affected by the Proposed Action is located within Whatcom County on federal land managed by NPS (Table 1.3-1).

Table 1.3-1. Location of Proposed Action.

Description	Location
Section, Township, Range	S28, T37N, R12E
Nearest city	Newhalem
County	Whatcom
WRIA	Upper Skagit: WRIA 4
Hydrologic unit code (8th field)	17110005 (Upper Skagit Watershed)
Latitude/Longitude (dam site)	48°39'36.93"N; 121°14'48.77"W
Land management	NPS

Notes: N = North; R = Range; S = Section; T = Township; W = West; WRIA = Water Resource Inventory Area

1.4 Federal Nexus, Threatened and Endangered Species, and Essential Fish Habitat

Section 7 of the Endangered Species Act (ESA) requires that federal agencies ensure that any action they authorize, fund, or carry out does not jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of designated critical habitat for such species. When a federal action agency authorizes, funds, or carries out an action, it must consult with the National Marine Fisheries Service (NMFS) and/or the U.S. Fish and Wildlife Service (USFWS; collectively, the Services) if the agency determines that the action may affect ESA-listed species or designated/proposed critical habitat.

For the Proposed Action, FERC is the federal lead as the regulatory authority for decommissioning. FERC will therefore consult with NMFS and USFWS as required under Section 7(a)(2) of the ESA. Additional federal nexus includes the NPS as the federal land manager for lands in the action area, and the U.S. Army Corps of Engineers (USACE), which will issue an authorization for work in waters of the U.S. pursuant to Section 404 of the Clean Water Act (CWA).

In a letter dated July 8, 2021, FERC designated City Light as the non-federal representative for the purpose of conducting informal consultation with the Services pursuant to the regulations at 50 Code of Federal Regulations (CFR) § 402.08 implementing Section 7 of the ESA. The role of the non-federal representative may include conducting studies, developing and supplying

information, attending meetings, ensuring that pertinent endangered species information is maintained in a Project file, participating in informal consultation with USFWS and NMFS, developing a draft BA if necessary, and keeping FERC apprised of its actions. However, FERC remains ultimately responsible for all findings and determinations regarding the effects of the Project on any federally listed species or critical habitat.

In July 2021, City Light initiated informal consultation with NMFS, and USFWS and coordination with USACE to solicit early technical assistance for the Project. The initial solicitation consisted of an outreach email and phone call to set up a pre-submittal meeting to discuss the Proposed Action and anticipated consultation needs. City Light hosted a Microsoft Teams webinar on August 18, 2021, to introduce the Project to the Services, identify preliminary concerns and consultation points of contact, and discuss next steps prior to submittal of a BA to initiate consultation.

The ESA-listed species with potential to occur in the action area (see Section 3.0 of this BA) are summarized in Table 1.4-1 below. The ESA listing status and critical habitat designations for fish in Newhalem Creek were obtained from NMFS and the USFWS. An official species list for the action area was obtained from the USFWS Information, Planning, and Conservation (IPaC) System on July 1, 2021 (USFWS 2021) and is appended to this BA (Appendix A). The potential occurrences of ESA-listed species managed by NMFS and USFWS in the action area (Table 1.4-1) were supplemented with data from previous consultations in the area and by cross-referencing Priority Habitat Species (PHS) and Salmonscape data obtained for the action area (WDFW 2021a, 2021b).

In addition to ESA resources, this document analyzes and determines the effect of the Proposed Action on Essential Fish Habitat (EFH) for Pacific Coast salmon pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) and the 1996 Sustainable Fisheries Act. Under this legislation, an evaluation of effects is necessary for activities that may adversely affect EFH. The Magnuson-Stevens Act, in 50 CFR § 600.905-930, defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” The lower reach of Newhalem Creek downstream of a 14-foot natural waterfall at RM 0.65 contains EFH for Pacific Coast Salmon including Chinook Salmon (*O. tshawytscha*), Coho Salmon (*O. kisutch*), and Pink Salmon (*O. gorbuscha*). Summer Chinook Salmon and odd-year Pink Salmon are documented in the lower reaches of Newhalem Creek; Coho Salmon presence is assumed (WDFW 2021b).

Table 1.4-1. ESA-listed species with potential to occur in the action area.

Species		Listing Status	Critical Habitat	
Common Name	**Scientific Name**		**Designated**	**In Action Area**
Birds				
Marbled Murrelet	*Brachyramphus marmoratus*	Threatened	Final	No
Northern Spotted Owl	*Strix occidentalis caurina*	Threatened	Final	No
Western DPS Yellow-billed Cuckoo	*Coccyzus americanus*	Threatened	Final – None in WA	No
Mammals				
Gray Wolf[1]	*Canis lupus*	Proposed Endangered[2]	No	NA
Canada Lynx[2]	*Lynx canadensis*	Threatened	No	NA
Grizzly Bear[2]	*Ursus arctos horribilis*	Threatened	No	NA
Fish				
Bull Trout	*Salvelinus confluentus*	Threatened	Final	Yes
Puget Sound Steelhead	*Oncorhynchus mykiss*	Threatened	Final	Yes
Puget Sound Chinook Salmon	*O. tshawytscha*	Threatened	Final	Yes
Conifers				
Whitebark Pine	*Pinus albicaulis*	Proposed Threatened	No	No

Notes: DPS = Distinct Population Segment; NA = not applicable; WA = Washington

1 Although gray wolves throughout the Lower 48 states were delisted in January 2021 (85 *Federal Register* 69778), the IPAC list obtained for the Proposed Action in July 2021, as appended to this BA, indicates that gray wolves in the action area are proposed endangered. An IPaC from November 2021, however, did not list gray wolves as endangered. In September 2021, the USFWS determined that a petition to list gray wolves may be warranted and commenced a twelve-month status review to determine whether listing is warranted. For the purposes of this assessment, and in consideration of the dynamic listing status for this species, gray wolves are included in this BA.

2 The IPaC obtained for the action area did not include Canada lynx or grizzly bears; however, these species are included in this BA based on previous consultations completed in the area and the presence of potentially suitable habitat in the action area.

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2.0 PROPOSED ACTION

City Light proposes to remove the Newhalem Creek diversion dam and associated headworks structures, tailrace fish barrier, and overhead transmission lines. The rock shaft and power tunnel will be sealed, and the access road above elevation 840 feet, a section approximately 0.75 mile long, will be permanently blocked and decommissioned. The powerhouse, tailrace, and penstock will remain, and the powerhouse equipment will be de-energized.

Elements of the Proposed Action are described in detail below. A range of feasible means and methods is considered for several elements and will ultimately be determined by the contractor. If any Project element is conducted in a manner not considered in this assessment, City Light will coordinate with the Services to ensure that coverage is provided for ESA-listed species and their critical habitats.

2.1 Elements of Proposed Action

As described in Section 1.2 of this BA, the Proposed Action includes the elements summarized in Table 2.1-1.

Table 2.1-1. Decommissioning elements summary.

Project Features to be Removed	Project Features to be Abandoned	Existing Project Features to be Retained
Diversion dam, sluiceway, and intake	Power tunnel	Powerhouse
Gatehouse	Underground utilities	Penstock and saddles
Pedestrian bridge over dam	Access road above 840 feet elevation	Tailrace
Tailrace fish barrier		Electrical service lines
Overhead transmission lines		Emergency access trail along penstock
Transformer		
		Dam access road below elevation 840 feet

2.2 Decommissioning Approach – Means and Methods

City Light is coordinating with NPS to develop appropriate means and methods to remove the various Project elements, identify best management practices (BMPs) to minimize effects to natural and cultural resources, and restore areas disturbed by decommissioning work. City Light evaluated several possible alternatives for accessing the diversion dam, removing the dam and other headworks structures, and resolving the disposition of the access road. City Light will refine these alternatives and work with NPS and the Services to ensure that all proposed actions are covered in the ESA consultation. For the purposes of this draft BA, effects to ESA-listed species (Section 6.0 of this BA) are considered for all actions proposed under all means and methods alternatives. Therefore, the assessment of impacts considers the "worst-case scenario" approaches for all actions to ensure coverage for all possible approaches, for all listed species.

2.2.1 Diversion Dam Access Alternatives

A significant challenge in removing the Newhalem Creek diversion dam and other headworks is access. Currently, the road is blocked with large rocks from an active landslide approximately 1,140 feet (0.2 mile) below the diversion dam (Figure 2.2-1). In addition to the recurring landslide, the road is failing near the landslide in the form of tension cracks and a failing retaining wall on both sides of the landslide.

Two alternative approaches were evaluated to access the dam for removal: truck access via improvements to the existing access road or use of helicopters (Table 2.2-1). A combination of both access approaches may also be considered (e.g., trucks may primarily be used, but helicopters may be required for some elements such as bridge removal).

Figure 2.2-1. Photos of Dam Access Road showing landslide and embankment instability.

2.2.1.1 Access Alternative 1: Road Repair

The preferred approach to accessing the diversion dam site is to repair the road to the extent needed for safe, short-term use by personnel, equipment, highway-legal dump trucks and other vehicles. Road improvements would require about three weeks to accomplish, and no trees would be removed. For this assessment, City Light assumes any or all proposed methods could be used to improve the existing access road to allow access to the dam site, including:

- Clearing material from the roadway, including using a non-explosive cracking agent to break apart large rocks;
- Using some of the cleared material to construct a catchment structure as a barrier between the road and the failing slope above the road, and using broken-up rocks to armor the slope next to the road (creek side) and scale the slope on the opposite side;
- Repairing the retaining wall and filling roadway tension crack; and
- Scaling the slope above the road, which may involve the use of small explosives to remove large rocks and debris fencing.

For large rock removal, the non-explosive rock cracking method includes drilling a small-diameter hole into rock and adding an expansive chemical agent that will expand and crack the rock over a period of hours, making removal more manageable for large boulders and other materials (e.g., concrete) (Al-Bakri and Hefni 2021). The U.S. Department of Transportation (2006) reports that rock drills equipped with top hammers to bore holes for blasting typically generate a peak noise of 98 decibels (dB) at 50 feet. In a recent blasting event at the Marblemount Quarry, Revey Associates (2019) reported that the drills used for such work contained "down-hole hammers" and generated noise below 90 dB at 50 feet. Relative to the chemical expanding process itself, although some studies indicate that no noise or vibration is associated with the use of chemical expansion agents, other studies report that noise ranges from 60 to 65 dB at 23 feet from the action, making this a relatively quiet approach for boulder fracturing (Hong Kong Government 2016).

Table 2.2-1. Comparison of dam access alternatives.

Alternative	Physical Disturbance	Duration	Noise
Truck (preferred alternative)	• No trees removed • Scaling • Rock breaking • Berm construction	• Mobilization (1 day) • Road improvement (3 weeks) • Scaling (2 weeks) • Dam removal and disposal (3 weeks) • Demobilization (1 day) • Road decommissioning (1 week) • Total duration ≅ 9 weeks	• Scaling – small explosives • Heavy equipment for clearing and improving the road • Breaking existing rock with equipment or expansive materials and building berm between road and slope • Excavator for dam removal loading directly into trucks • Highway legal truck traffic along access road and highway for disposal • Excavator noise for decommissioning road
Helicopter (if needed)	0–10 trees removed for landing area and temporary stockpile for material disposal	• Mobilization (1 week) • Dam removal (3 weeks) • Helicopter disposal (4 weeks) • Demobilization (1 week) • Road decommissioning (1 week) • Total duration ≅ 10 weeks	• Helicopter noise for mobilization and equipment fuel during dam removal and for disposal material transport • Excavator for dam removal transported by helicopter in pieces and assembled on site • Disposal material stockpiled on site prior to helicopter transport • Helicopter transport to highway • Highway-legal truck traffic along highway for disposal

Note: Disposal and dam removal are parallel timelines for the trucking options since material will be taken from the creek and loaded into the trucks.

2.2.1.2 Access Alternative 2: Helicopter Transport

Helicopter use for access to the diversion dam site is not preferred, but this alternative is included in the BA in case road repair is infeasible. It is also possible that helicopters may occasionally be needed to aid with the decommissioning process at the headworks (i.e., removal of the bridge) even if the road is repaired.

This access alternative will primarily use helicopters to transport equipment to the dam to facilitate removal. It will require use of an existing helipad in Newhalem and a drop zone near the dam to transport the equipment necessary to deconstruct the diversion structure (Figure 2.2-2). Construction equipment will be disassembled and transported in pieces, then reassembled at the dam site. Two types of helicopters may be used, depending on the size of excavator required to conduct the work:

- S64 Skycrane: capacity is 15,000 pounds; will take 16 trips total for mobilization and demobilization of parts for a large excavator; or
- Bell 205: capacity is 8,000 pounds; will take 10 trips total for mobilization and demobilization of a medium-sized excavator.

Figure 2.2-2. Existing and potential helicopter landing areas at the dam site (left) and Newhalem (right).

Personnel can also be transported using the helicopters if the access road improvements do not occur. Alternatively, personnel could reach the site by foot along the road, assuming that the slide area can be crossed safely. Helicopter disposal of dam debris would require about four weeks; up to 10 trees, several of which were burned during a recent wildfire, may be removed to accommodate helicopter landings upstream of the dam site (Figure 2.2-3).

Figure 2.2-3. Potential drop zone location, upstream of dam site on left bank, showing burned trees and limited canopy.

2.2.2 Diversion Dam and Headworks Removal Alternatives

Removal of the diversion dam and headworks will require work within and adjacent to Newhalem Creek. Infrastructure removal will occur in phases to accommodate phased dewatering and an in-channel creek bypass.

2.2.2.1 Dewatering Timing and Overview

All work below the Ordinary High Water Mark (OHWM) for diversion structure removal would be completed in four weeks and within the in-water work period for Newhalem Creek, which is July 16 through August 19 (WDFW 2018). However, for the purposes of this consultation, and in consideration of potential delays to access road repairs required to access the dam site, City Light requests that in-water work be authorized through September 1 of the construction year. Therefore, the requested in-water work window for dam and headworks removal under the Proposed Action is July 16 through September 1[1]. All cofferdam materials will be removed by September 1.

Prior to infrastructure removal, the dam site will be dewatered and isolated from active flow. City Light anticipates the following approach for dewatering:

(1) Establish upstream and downstream water quality monitoring stations.

(2) Identify the portion of the off-channel area to be used for temporary settling of nuisance water from isolation area, if required.

[1] The License Surrender application (City Light 2022) includes a July 16 – August 19 work window. For ESA consultation purposes, City Light requests a July 16 – September 1 work window, and the analysis of effects of the Proposed Action in this BA consider are commensurate with this extended window.

(3) Install fiber wattles or sediment fences parallel to both creek banks. These features will be positioned to the extent necessary to isolate streamside disturbances, including spoil piles, from the creek.

(4) Isolate in-water work areas for each phase of dam removal (see next section) using supersacks (bulk bags) filled with native streambed materials.

Specific dewatering strategies for each phase are discussed in the following sections. Any substantive deviation from the approach presented herein will be coordinated with NPS, NMFS, USFWS, Washington Department of Fish and Wildlife (WDFW), and USACE a minimum of 30 days prior to in-water work for approval.

2.2.2.2 Phase 1: Remove Diversion Dam and Downstream Concrete Apron

During the first phase of dam infrastructure decommissioning, the selected contractor will fill supersacks with native creek sand, gravel, and cobble and place them in the channel upstream of the impoundment, diverting water into the sluiceway to dewater the area around the dam (Figure 2.2-4). Excavators may be used in the wetted channel to place cofferdam materials. During low-flow periods in summer and early fall, the creek flows along the right bank into the intake, and the left side of the channel is dry. This condition will allow for use of an excavator to fill supersacks with streambed gravels "in the dry." Once isolated, the contractor will remove the weir by breaking apart the concrete with an excavator, jack hammer, and/or non-explosive cracking agent Figure 2.2-5), and shoreline concrete fill (Figure 2.2-6). An alternate method for coffer-damming may include the use of excavators to create a streambed gravel berm for in-water work isolation. If this occurs, excavators will operate on portions of the streambed that are naturally dewatered during the low-flow in-water work period or will use materials placed on the substrate (e.g., timber cribbing) to ensure that excavator tracks are elevated above water level.

Figure 2.2-4. Phase 1 dam removal approach – divert creek into right bank sluiceway.

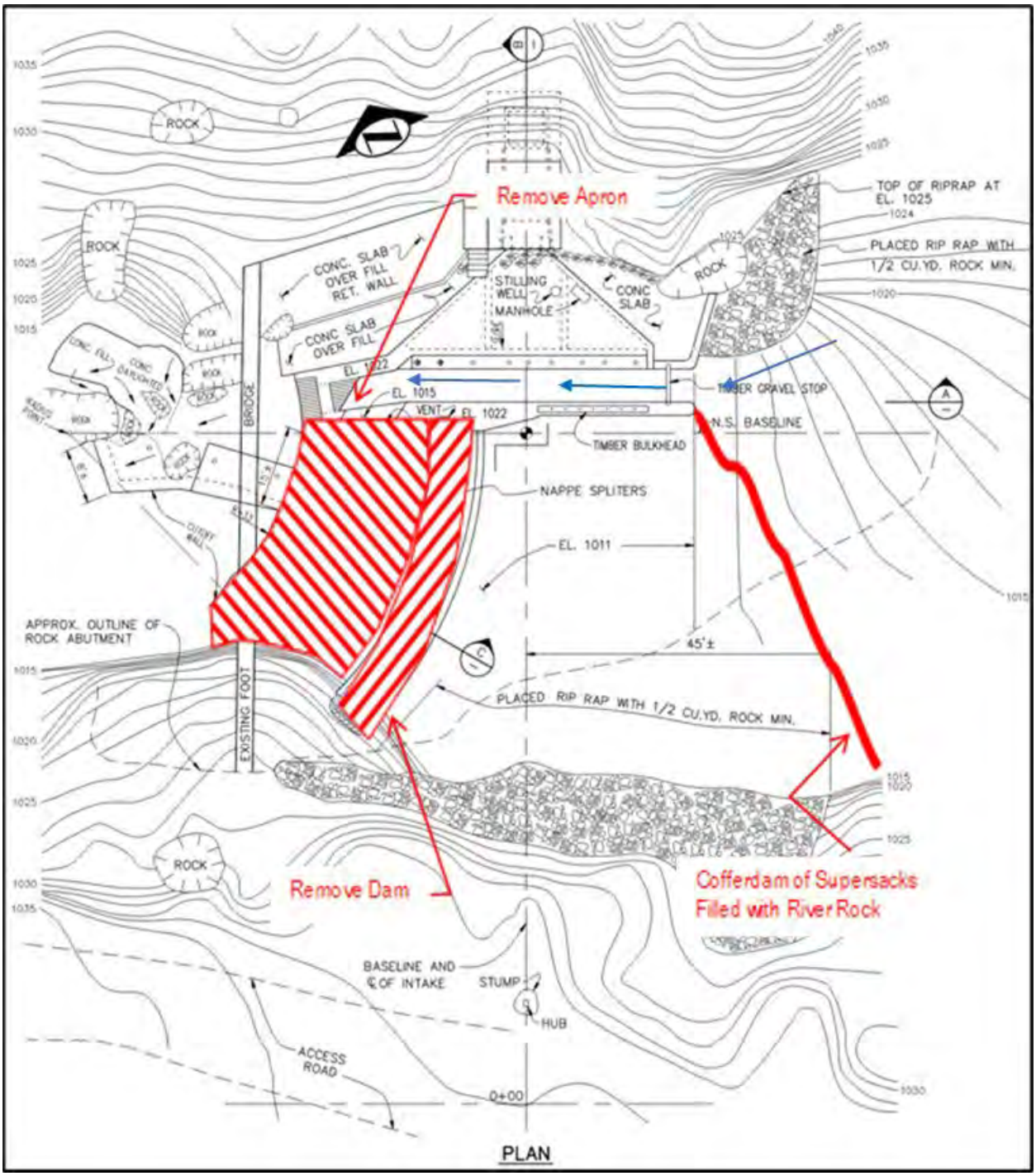


Figure 2.2-5. Dam and Apron Removal Site Plan.

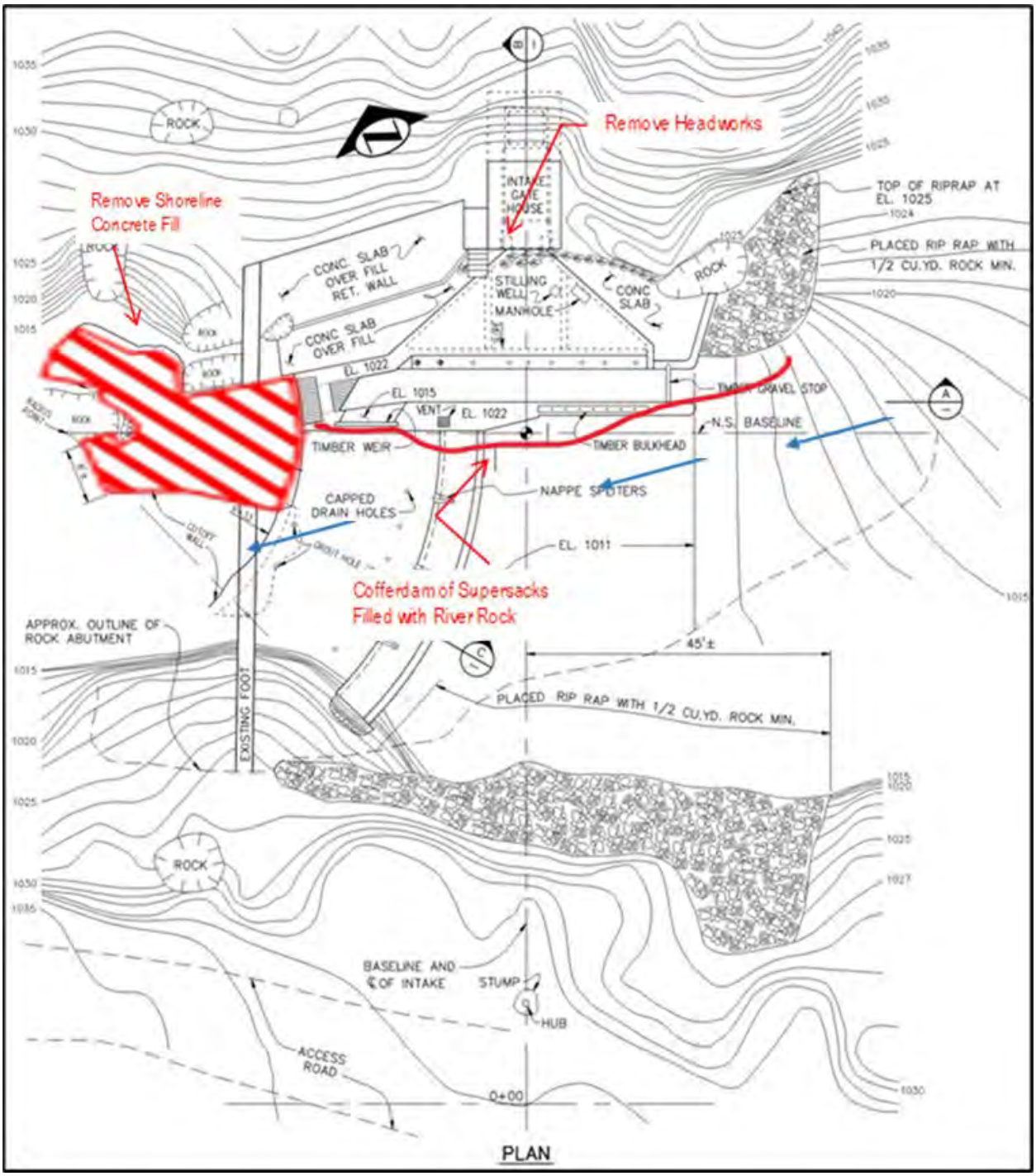


Figure 2.2-6. Shoreline Concrete Fill Removal - Site Plan.

2.2.2.1 Phase 2: Remove Other Headworks

During Phase 2, the selected contractor will re-position the supersacks to direct flow into a conduit (corrugated steel or plastic pipe) that will be placed in the main channel and covered with native creek substrates to allow an excavator to access the channel and isolate the right bank intake/sluiceway area. The conduit will be sized to convey anticipated flows during in-water work, with a 10 percent exceedance. Following isolation, the contractor will remove the trashrack, intake, and sluiceway (Figure 2.2-7 and Figure 2.2-8). An area of right-bank substate armoring (concrete) located under the bridge and extending approximately 20 feet downstream will also be removed. Concrete will be broken apart with an excavator, jack hammer, and/or non-explosive cracking agent.

Phase 2 will also include the removal of the gatehouse, pedestrian bridge, and bridge abutments. The pedestrian bridge abutments are located along the streambank atop bedrock, primarily landward of the OHWM (Figure 2.2-9). Therefore, in-water work to remove the bridge will be limited to an excavator that may be positioned within the dewatered area for access to the right bank. If removed, it could be dismantled in pieces, or could be airlifted as a full span depending upon equipment capabilities and availability. The bridge remnants will be transported to an approved upland location to be determined by City Light.

Figure 2.2-7. Right bank infrastructure to be removed during Phase 2.

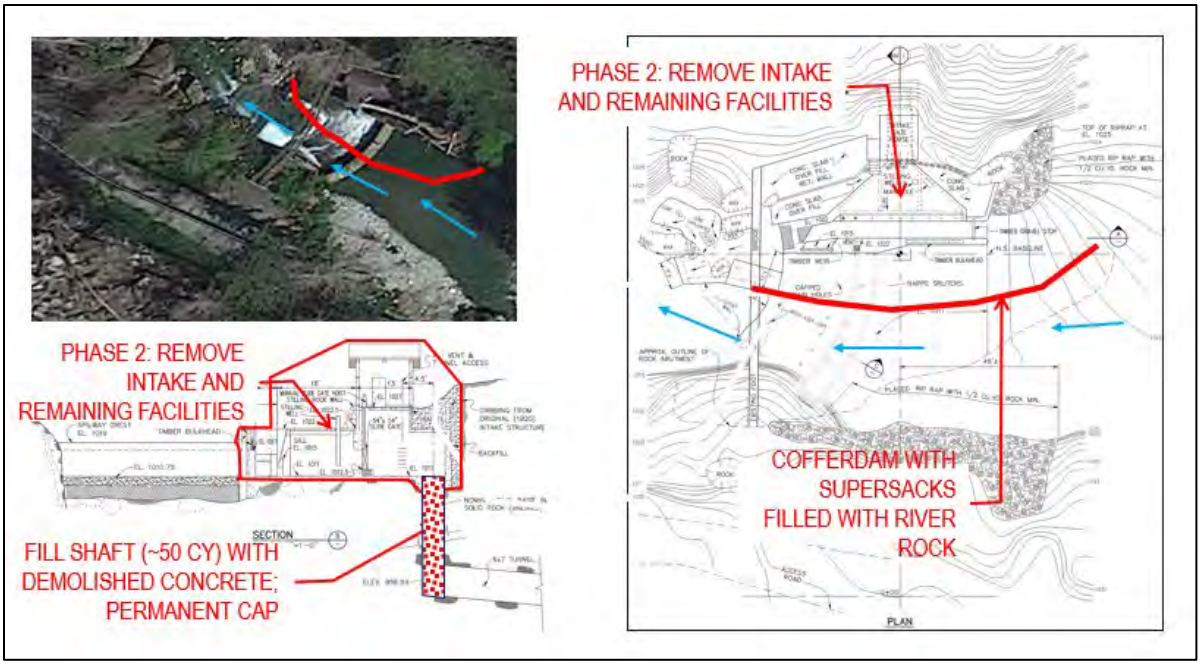


Figure 2.2-8. Conceptual site plan showing facilities to be removed during Phase 2.

Figure 2.2-9. Newhalem Creek diversion dam pedestrian bridge, showing left bank abutment downstream of the dam.

2.2.2.2 Phase 3: Dispose of Demolished Concrete and Seal Power Rock Shaft

Approximately 560 CY of concrete would be removed from the creek if all infrastructure is removed (i.e., the dam, intake/sluiceway, and downstream apron). Concrete would be temporarily stockpiled in uplands in the staging area until removed from the site. At the diversion site, the staging area will include a previously cleared, gravel parking area along the left bank, upstream of the dam. A small portion of the demolished concrete may be placed in the rock shaft, to be abandoned, which has approximately 50 CY of capacity. Approximately 511 CY of concrete will be transported to approved upland disposal sites via highway legal dump trucks. Assuming 12 trips per day, disposal using small trucks would require approximately 162 trips over 14 days; large trucks would require approximately 81 trips over 7 days. No material will be disposed in wetlands or waters of the U.S.

If needed, some or all concrete material could be transported off site via helicopter. Concrete debris and other materials could be moved to a temporary upland storage site in Newhalem, then loaded into trucks for transport to an existing and approved disposal area. For disposal of all concrete, a Bell 205 would require approximately 252 trips over 21 days and an S64 Sky Crane would require 151 trips over 13 days, assuming 12 trips per day for both helicopter types.

At the end of Phase 3, the upstream end of the power tunnel will be sealed with grout; the lower end is already blocked with a concrete plug, which will remain in place. The supersacks will be removed and emptied, and all equipment will exit Newhalem Creek. Areas disturbed by deconstruction activities and the sites previously occupied by headworks will be graded and replanted. A restoration plan for these areas will be developed in coordination with NPS.

2.2.3 Decommission the Access Road

Once the concrete is removed from the diversion dam and headworks demolition phase, the access road above the Skagit EAP evacuation muster site (elevation 840 feet), a section approximately 0.75 mile long, will be permanently blocked and decommissioned. A road decommissioning plan will be developed based on U.S. Forest Service and/or Washington Department of Natural Resources guidelines. This may include removing the approximately eight existing culverts and restoring natural drainages, scarifying the road surface, reseeding, and implementing weed control for five years as needed.

2.2.4 Removal of Tailrace Barrier

The dam diverts water into a buried shaft under the left-bank gate house. Water is then delivered into a buried tunnel and to a penstock that traverses the Newhalem Creek canyon, ending at the powerhouse located about 3,600 feet northeast of the dam. The powerhouse discharges water diverted at the dam into a 350-foot-long tailrace channel; a concrete barrier at the lower end of the channel prevents fish from the Skagit River from entering the tailrace during high flow (Figure 2.2-10).

Under the Proposed Action, the tailrace barrier will be removed during the drier months outside the peak recreation season in September through October. An excavator with a mounted jackhammer will likely be used to remove the concrete barrier, and dump trucks will haul spoils to an approved upland location. If any water is present upstream of the barrier during removal, a cofferdam of bulk bags, Washington State Department of Ecology (Ecology) blocks, or similar

will be used to isolate any tailrace water from active excavators. However, no in-water work is expected.

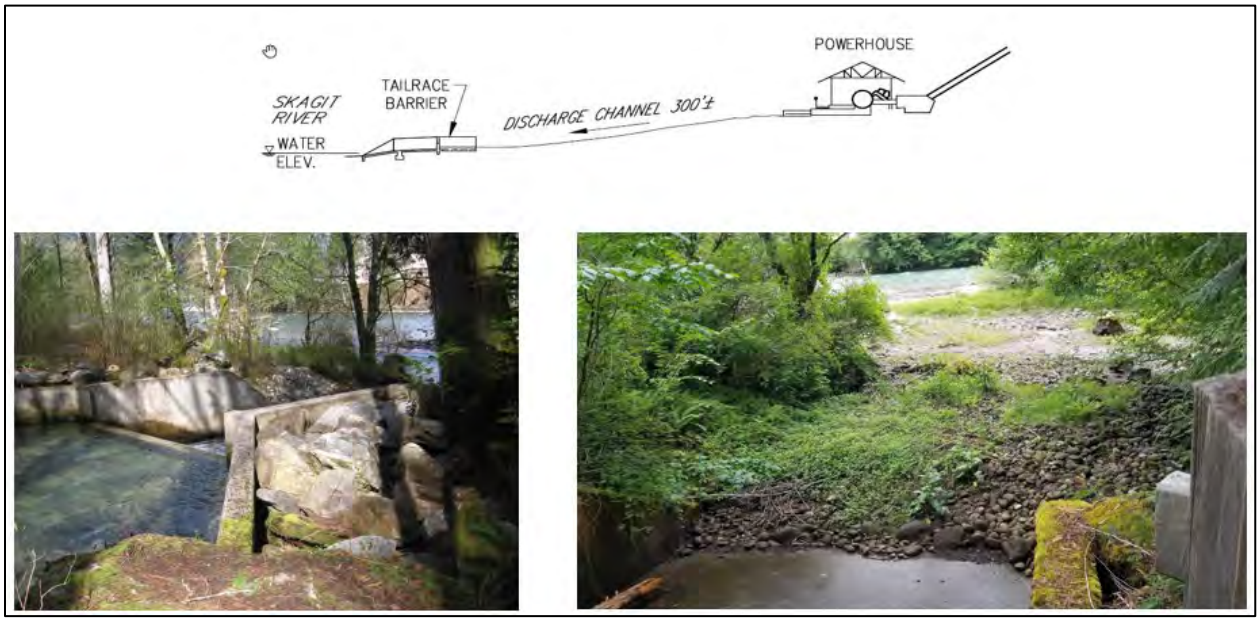


Figure 2.2-10. Tailrace fish barrier (left), showing land separation from Skagit River (right; Skagit River in the distance).

Tailrace barrier removal work will involve the following general steps:

- Re-establish the previous access road and staging area: Based on construction drawings of the tailrace barrier, the access road to the site was 200 feet long and utilized approximately 50 feet of the transmission line corridor before veering towards the tailrace barrier. Although revegetated, evidence of this road is still visible. Re-establishing this old road will require removing some small trees and shrubs and establishing erosion-control BMPs. Equipment and truck staging for the tailrace barrier removal work will be in the existing cleared area between the powerhouse and the first set of transmission poles.
- Demolish concrete: The tailrace barrier consists of approximately 99 CY of concrete reinforced with rebar. The tailrace barrier will be demolished with an excavator-mounted jackhammer and/or a non-explosive cracking agent, concrete saw, and/or waterjet cutter. City Light will develop BMPs to ensure that concrete dust or slurry does not enter the Skagit River or any surface water drainage in the area. Dump trucks will transport the waste concrete and rebar to an appropriate disposal site.
- Remove riprap and regrade tailrace outlet: The riprap along the sides of the tailrace barrier walls and at the outlet will be removed and salvaged for use elsewhere. The site will be regraded to a shallow, natural-appearing outlet channel with the ability to convey water from the intermittent stream and tunnel drainage during periods of extended precipitation.

2.2.5 Removal of Overhead Transmission Lines and Transformer

Once the tailrace barrier is deconstructed, the transformer next to the powerhouse and the transmission lines and poles will be removed, likely using an excavator or crane. The poles on the southern side of the river near the powerhouse will be accessed using the same road established in the transmission line corridor for the tailrace barrier work. The poles on the northern side of the river can easily be accessed from Newhalem; the transmission lines that cross the river can be removed from either side using a truck-mounted cable reel. It may be necessary to keep one pole on either side of the river and the distribution line to supply electricity to the powerhouse to provide lighting for interpretation and tours. The use of batteries for lighting and/or undergrounding the distribution line will be investigated and would eliminate the need to retain the distribution overhead line and poles.

After the tailrace barrier, transformer, transmission lines, and poles are removed, most of the area in front of the powerhouse, which is currently cleared and used for parking and storage, will be revegetated. Three parking spots will be designated next to the powerhouse, and a short road segment will remain. A restoration plan for this area will be developed in collaboration with NPS.

2.3 Construction Equipment

Equipment use will vary depending on the alternative selected for each element of the Proposed Action. A comprehensive list of equipment is included below (Table 2.3-1).

Table 2.3-1. Construction equipment.

Equipment Description	Potential Equipment Use during Specific Elements of Proposed Action				Average Noise (dB) at 50 Feet from Equipment[1,2]	Maximum Number on Site
	Dam Removal	Access Road Repair	Tailrace Barrier Removal	Overhead Line Removal		
Mini-track excavator	X	X	X		87	1
12,000-pound excavator	X	X	X		87	2
Dump truck or similar	X	X	X	X	73	1
Heavy-capacity helicopter	X	X			117[2]	1 to 2
Light-weight helicopter	X	X			95[2]	1 to 2
Rock trim-blasting		X			94[3]	NA
Light explosives for blockholing boulders		X			60[4]	NA
Grader		X	X		79	1
Jackhammer	X		X		95	1
Concrete saw	X		X		85	1 to 2

Equipment Description	Potential Equipment Use during Specific Elements of Proposed Action				Average Noise (dB) at 50 Feet from Equipment[1,2]	Maximum Number on Site
	Dam Removal	Access Road Repair	Tailrace Barrier Removal	Overhead Line Removal		
Diesel generators	X	X	X		68	2 to 4
Air compressor	X	X	X		68	1
Dewatering pumps	X		X		74	2 to 4
Rock drill	X	X	X		93	2 to 4
Crane	X	X	X	X	79	1 to 2

1 Sources: Washington State Department of Transportation (WSDOT) 2020; Helicopter Association International 2017; Falzarano and Levy 2007; Hong Kong Government 2016.

2 City Light was unable to locate literature reporting noise levels from blockholing. In the absence of noise data specific to that activity, levels are assumed to be similar to those reported for mitigated rock fracturing (WSDOT 2020). WSDOT (2020) reports that when the charge is small enough, the use of heavy mats to cover the blast can significantly reduce blast energy. Mats will be required for any use of light explosives to fracture boulders along the access road.

Vehicle usage during construction is estimated as follows:

- Employee vehicles (parked at Newhalem or along the existing dam access road) – up to eight per day.
- Total during construction – from a minimum of 4 per day to as high as 10 per day.

Noise during construction will be produced by the following equipment/actions:

- Jackhammers to break up dam and tailrace infrastructure.
- Rock drills and small explosives to break up landslide boulders along the access road during repairs.[2]
- Construction equipment such as bulldozers, excavators, and dump trucks.
- Electric pumps used for construction dewatering.
- Concrete saws and other small tools used for concrete demolition.
- Portable diesel generators.
- Employee vehicles arriving for work in the morning and departing in the evening.
- Possible helicopter use if needed during work at the diversion dam or headworks.

2 The use of small explosives to break up rocks typically involves the placement of a light charge covered by wet sand or mud in small drill holes in the boulder, a technique known as blockholing (NPS 1999). If the boulder contains an existing seam, the explosive can be placed directly into the crack or seam.

2.4 Site Restoration

Following in-water work, all construction materials will be removed, and the channel will return to its pre-construction state, which is defined primarily by the bedrock foundation at the dam site and immediately downstream. The banks near the diversion dam and headworks will be returned to pre-construction contours and restored with native plantings, where suitable soils are available.

2.5 Schedule and Sequencing

The Proposed Action will involve construction in phases that optimize weather and soil conditions and cost effectiveness, and minimize environmental effects. The current phasing strategy and level of effort is based upon a one- or two-year construction process (Table 2.5-1), which may begin as early as 2024, but will most likely begin in 2025. Road improvements would occur in dry months, when the danger of landslides and rockfall are at their lowest, and within the same construction season as the diversion removal.

Table 2.5-1. Newhalem Creek Project decommissioning construction schedule.

Work Performed	Period	Construction Year
Access road improvements	June – July	Year 1
Dam, intake, sluiceway removal; abandonment of power tunnel	In-water work July 16 – September 1; other work to extend to mid-October	Year 1
Helicopter use for diversion structure removal and disposal (if needed)	July – mid-October	Year 1
Removal of tailrace barrier	September – October	Year 1 or 2
Removal of overhead transmission lines	Any time throughout the year	Year 1 or 2

2.6 Effects of the Proposed Action

Regulations for Interagency Cooperation under the ESA (84 *Federal Register* [FR] 44976) define "effects of the action" as follows:

> *…all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (84 FR 45016).*

Consistent with these regulations, in the Draft BA, City Light is analyzing consequences to listed species or critical habitat that are caused by the Proposed Action. The Proposed Action does not cause any consequences of other activities. The Proposed Action is independent from City Light's relicensing effort currently underway for the Skagit River Hydroelectric Project.

2.7 Impact Minimization and Avoidance Measures

2.7.1 General Impact Minimization Measures

Several construction techniques will be employed to minimize effects on listed or proposed species and designated critical habitat. The contractor will be required to adhere to BMPs prescribed in Ecology's most current *Stormwater Management Manual for Western Washington* as well as terms and conditions of all future permits and authorizations. The measures presented below are (1) components of the Proposed Action and (2) requirements of the contractor during Project implementation:

- Prior to work within or adjacent to Newhalem Creek, including the establishment of temporary spoils disposal areas and staging areas, access road improvements, and landslide boulder and debris removal, the selected contractor will install sedimentation and erosion control measures. These may include the use of silt fencing, certified noxious weed-free straw bales, plastic sheeting on erodible soils, jute matting, or mulch along the road embankments or streambanks to prevent sediments from entering waterways. Use of these BMPs should prevent construction stormwater from entering waters of the U.S.
- Clearing limits will be identified on all design drawings and will be fenced prior to initiation of staging or demolition activities. The fence will clearly define the clearing limits and will protect non-Project areas from vehicle intrusion or debris disposal.
- Because the Proposed Action is likely to affect more than 1 acre of land, particularly if access road improvements are required, the contractor will implement a grading plan and Stormwater Pollution and Prevention Control Plan (SWPPP), with a temporary erosion and sedimentation control (TESC) plan prior to site preparation, to ensure that ground disturbing effects are minimized. During clearing, grading, and construction activities, all exposed areas at final grade will be protected from erosion using weed-free straw mulch, coir fabric, plastic covering, or similar method in accordance with the SWPPP and TESC plan.
- Approximately 50 CY of concrete spoils from dam removal may be placed in the existing rock shaft, which will be abandoned. The remaining concrete spoils will be temporarily stored in a gravel parking area that has been previously cleared, located along the left bank, upstream of the diversion structure. Temporarily stored material will be hauled off site to an approved upland location. Spoils would be removed with dump trucks via the improved dam access road or helicopters if needed.
- All equipment will be inspected daily for fluid leaks before leaving the staging area, and any leaks will be repaired before the vehicle resumes operation. The contractor will be responsible for preparing and implementing a Spill Prevention and Response Plan prior to construction.
- Prior to arriving at the construction site, equipment will be washed and treated to remove seeds, plants, and plant fragments. Use of a high-pressure washing system is recommended to remove all seeds, plants, plant fragments, dirt, and debris from construction equipment, taking care to wash the sides, tops, and undercarriages.
- Disturbance of riparian vegetation will be limited to the minimum amount necessary to achieve construction objectives to minimize habitat alteration and limit the effects of erosion and sedimentation.

2.7.2 In-Water Construction Impact Minimization

ESA-listed fish have no access to the dam site due to the presence of two natural waterfall barriers downstream of the dam. Therefore, the primary way to avoid direct effects to aquatic species is to schedule in-water work during the low-flow window to minimize the potential for sediment transport during sensitive life-history periods in downstream habitats occupied by ESA-listed fish. Additional measures include the following:

- The cofferdam dewatering systems will be in place prior to any dam demolition. Excavators may be operated instream to set cofferdams or create a streambed gravel berm for in-water work isolation. If this occurs, excavators will operate on portions of the streambed that are naturally dewatered during the summer in-water work period or will use materials placed on the substrate (e.g., timber cribbing) so that excavator tracks are elevated above water level.
- Cofferdams will be constructed of an approved combination of streambed materials, including supersacks filled with native material that are placed within the channel by an excavator or other suitable lifting equipment.
- Aside from equipment used to set and reposition the supersack cofferdam, no equipment will be operated in the active flow of the river during any in-water activity. Supersacks would be filled with streambed materials using an excavator positioned on top of gravel bars that are naturally dewatered during low-flow summer conditions.
- The selected contractor will be required to install adequate provisions to limit seepage into the isolation area. However, because in-water work will be limited to infrastructure removal (e.g., concrete, rebar) and no new concrete will be poured, some seepage is acceptable. Measures to limit seepage into the work area could include the use of plastic sheeting aprons upstream of cofferdams, pumped flow from sumps, and isolation of clean versus sediment-laden water in the construction areas.
- Cofferdams will be removed and repositioned cleanly and incrementally to reduce sedimentation pulses downstream.
- Resident fish will be rescued and relocated from the in-water work isolation area, in compliance with future requirements of the Hydraulic Project Approval to be issued by WDFW.

Measures to reduce the potential for hazardous/contaminated material release include:

- Washing heavy equipment needed for work below OHWM before it is delivered to the job site.
- Inspecting construction equipment before accessing instream work areas to remove vegetation and dirt clods that may contain noxious weed seeds.
- Inspecting machinery daily for fuel or lubricant leaks.
- Inspecting and cleaning all equipment that will operate below OHWM (flowing or not); replacing all hydraulic fluids with biodegradable fluid (a standard requirement for Ecology 401 water quality certification and WDFW Hydraulic Project Approval terms and conditions).

2.7.3 Boulder Fracturing with Small Explosives

The use of small explosives to break up rocks typically involves the placement of a light charge covered by wet sand or mud in small drill holes in the boulder, a technique known as blockholing (NPS 1999). If the boulder contains an existing seam, the explosive can be placed directly into the crack or seam. Both methods produce noise and flyrock. Therefore, City Light will require the selected contractor to use blast mats to cover any explosives used for boulder fracturing during access road repairs/improvements.

2.7.4 Riparian Corridor Restoration

City Light will require that the selected contractor minimize vegetation clearing along riparian areas. Temporarily disturbed areas adjoining the creek and tailrace barrier location will be revegetated with appropriate plant species, and any mature trees removed will be replaced at a ratio determined by City Light and NPS. A formal riparian restoration/landscaping plan will be prepared during final design. City Light will coordinate with NPS to tailor a mix of appropriate native plant species for each restoration area. All sources of plant material will come from the Project vicinity, within the Skagit River basin.

3.0 ACTION AREA

The action area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR § 402.02). The action area considers all consequences of the action and includes the geographic extent of the effects resulting from the Proposed Action.

3.1 Terrestrial Portion of Action Area

The terrestrial portion of the action area (Figure 3.1-1) is defined by the geographic extent of effects from the Proposed Action and includes all potential helicopter access routes, construction and staging areas, and spoils stockpiling areas adjacent to and within the limits of construction. The three loudest noise-producing activities under consideration for the Proposed Action include jackhammering for concrete removal (95 dB at 50 feet), helicopter use (approximately 95 to 117 dB at 50 feet), and blockholing or other micro-blasting techniques to remove instream boulders from the access road landslide area (94 dB at 50 feet). These noises will collectively define the terrestrial (in-air) portion of the action area. If helicopters are used to access or transport materials in the action area, helicopter noise will define the extent of the in-air portion of the action area. At other times (e.g., dam removal), jackhammers or micro-blasting for concrete removal and rock fracturing will define the limits of the in-air portion of the action area.

Helicopter noise varies depending on the type of aircraft used. A heavy-duty helicopter will produce noise as high as 117 dB at 50 feet from the source, while a light-duty helicopter will produce noise similar to that of a jackhammer (95 dB at 50 feet) (Helicopter Association International 2017). In an NPS report on light-duty helicopter use at the Grand Canyon, a Bell helicopter was reported to produce noise of approximately 97 dB at 100 feet during takeoff, and 96 dB at 100 feet while hovering (Falzarano and Levy 2007). As a worst-case scenario, City Light assumes a louder heavy-duty helicopter (117 dB at 50 feet) may be used under the Proposed Action.

An ambient sound level of 46 dB was measured in the undisturbed forested areas behind the Gorge Powerhouse by the NPS Natural Sounds Program (NPS 2010). Given the proximity of the Gorge Powerhouse and the similarly remote setting along the Newhalem Creek access road location, ambient noise levels were assumed to be 46 dB. At the dam site, ambient sound levels are higher near the creek, likely closer to 60 or more decibels. However, ambient sound along the access road has been used as a conservative measure to estimate the extent of the in-air portion of the action area as defined by noise.

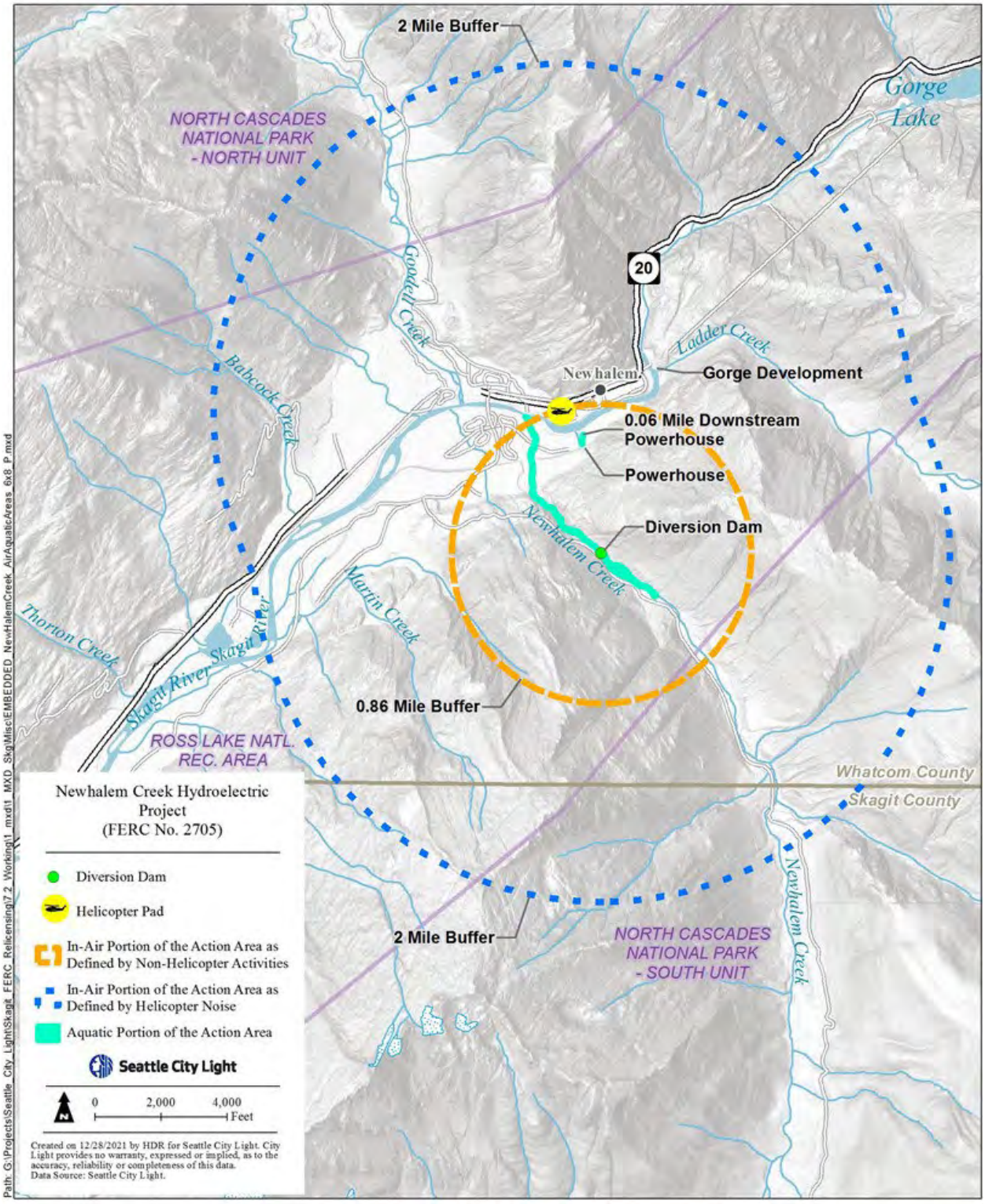


Figure 3.1-1. Action area for Newhalem Creek Hydroelectric Project decommissioning.

Using a point-source sound attenuation model where a noise reduction of 6 dB occurs per doubling distance from a point source activity, with an additional 1.5 dB of reduction due to soft site characteristics (dense vegetation and hillsides on both sides of the creek), noise from sporadic heavy-duty helicopter use will attenuate to baseline levels approximately 34,591 feet (6.5 miles) from the site. However, because the dam and access road are in a canyon, where steep slopes buffer Newhalem Creek on both sides, hillside topography will block noise transmission at closer distances. Therefore, it is estimated that in-air noise from helicopter use will attenuate to baseline levels within approximately 2 miles of the dam and access road work sites, including the helicopter access route from Newhalem to the drop zone. This defines the in-air, or terrestrial, portion of the action area, and encompasses the area that will be impacted by in-air noise during jackhammering and micro-blasting for rock trimming. For context, jackhammering and light-duty helicopter noise will attenuate to baseline levels approximately 4,560 feet (0.86 mile) from the activity. Because helicopters often depart from the Newhalem helipad during the fire season, which will overlap with the low-flow construction period, such noise is considered part of the baseline.

3.2 Aquatic Portion of Action Area

The aquatic portion of the action area considers short-term decommissioning actions and anticipates long-term changes to stream functions (e.g., flow restoration and sediment transport) both upstream and downstream of the dam site and the tailrace barrier location.

3.2.1 Newhalem Creek

The aquatic portion of the action area for Newhalem Creek considers construction-related effects and anticipated changes in stream function following dam removal, including changes in streambed profiles and/or sediment conveyance. The aquatic portion of the action area therefore includes that portion of Newhalem Creek from its confluence with the Skagit River to the extent of the unconfined reach approximately 0.5 mile upstream of the diversion dam (Watershed GeoDynamics 2021). A small portion of the Skagit River just downstream of the confluence with Newhalem Creek is also included in the action area to account for potential gravel transport at the mouth.

3.2.2 Powerhouse Tailrace

Open-cut trenching within the tailrace to remove the existing barrier will be conducted in September and October. The area affected by this work is isolated from the Skagit River. The aquatic portion of the action area at this location will be limited to an approximate 100-foot section of the tailrace downstream of the fish barrier (anadromous zone) that will be affected by the removal of concrete and riprap.

4.0 BASELINE CONDITIONS IN ACTION AREA AND EFFECTS OF THE PROPOSED ACTION ON ENVIRONMENTAL SETTING

This chapter provides information on existing environmental conditions and the effects of the Proposed Action on aquatic habitat and geomorphology, forest conditions, soundscapes, water resources, and climate change in the action area. The action area is within the RLNRA, which is managed by NPS as part of the North Cascades National Park Complex. Except for in the town of Newhalem, roads, campgrounds, and sites with other recreation amenities, most of the land surrounding the action area is undeveloped wilderness.

4.1 Aquatic Habitat and Geomorphology

Aquatic habitat in the action area includes Newhalem Creek, a small portion of the Skagit River mainstem (at the confluence with Newhalem Creek), and the tailrace downstream of the fish barrier. The following sections focus on conditions in Newhalem Creek and the tailrace.

4.1.1 Existing Conditions – Newhalem Creek

Newhalem Creek is a left-bank tributary that enters the Skagit River at RM 93.3. It is a moderate- to steep-gradient stream characterized by large cobble and boulder substrates. Discharge in Newhalem Creek is highest during the spring snowmelt period from April to June and during the large rainfall events in late fall and early winter. Low flows in Newhalem Creek occur during late summer, early fall, and mid-winter (refer to Table 2.2-2).

A gravel study conducted in 1991 concluded that Newhalem Creek did not have an abundance of habitat for spawning steelhead and salmon (City Light 1992). These species require extensive, stable accumulations of spawning gravel (typically large patches of substrate in the range of 0.5 to 6 inches in diameter). This stream's flows, high gradient, and rapid and frequent flood response combine to create conditions favorable for gravel transport. In other words, Newhalem Creek exhibits a "high streamflow competence." A study done in Newhalem Creek by Morris (1990, included in City Light 1992: Appendix A4) suggests that under these conditions, extensive permanent accumulations of spawning gravels are unlikely. Gravels are routinely flushed from the creek due to the combined effect of steep channel gradient and relatively high flows. This study concluded "it appears that Newhalem Creek is competent, both up and downstream of the diversion dam, to flush the target particle sizes (1/2 to 6 inches in diameter) through the measured cross-sections on an annual basis" (Morris 1990, included in City Light 1992: Appendix A4).

Further evidence of the high competence of Newhalem Creek is the low amount of woody debris accumulation in this stream, the frequent occurrence of large boulder blocks in the active channel, and evidence of extensive historical floodplain rearrangement at the confluence with the Skagit River. This evidence attests to this stream's natural ability to mobilize instream materials. Gravel and wood accumulate behind the diversion dam, but under the current license, these materials have been regularly removed and reintroduced into the stream immediately below the dam. This was done nearly annually when the Project was operating but has not occurred in recent years as the landslide on the road precludes the ability to get an excavator to the site.

At and downstream from the diversion, the stream enters a very high-gradient (10 to 25 percent) bedrock canyon with numerous waterfalls. This area was not visited, but based on observations just downstream from the diversion, it is likely that the substrate is bedrock with patches of cobble/gravel/boulder. This is a transport reach—sediment supplied from upstream areas moves relatively quickly through the reach into the downstream alluvial fan. The banks of the creek immediately upstream and downstream of the diversion structure are generally steep and composed of bedrock. The impoundment behind the dam is approximately 0.10 acre. During low-flow conditions, flow passes through the right bank intake/sluiceway. Flow passes over the dam during higher flow conditions.

Downstream from the canyon reach, Newhalem Creek encounters the Skagit River valley terraces and forms an alluvial fan with numerous relict channels. The stream averages 5 percent gradient, with gradients decreasing closer to the Skagit River confluence, and has cut through the higher Skagit River valley terraces. Alluvial fans are geomorphically active areas where the stream deposits the largest material near the top of the fan and finer-grained sediment near the distal (downstream) portion of the fan as the stream gradient/power drops. Observations from the bridge on the road to the powerhouse show a boulder/cobble bed with what appear to be lag boulders (moss-covered boulders, indicating infrequent transport) interspersed with fresh gravel/cobble material.

The section of Newhalem Creek from the confluence of the Skagit River to RM 0.38 includes boulder runs and cascades, broad riffles, shallow pools in association with boulder runs, and deep pools adjacent to single large boulder blocks. The stream becomes more confined from RM 0.27 to RM 0.38 and runs through deeper alluvium. Stream habitat is characterized by plunge pools and lateral scour pools that occur in association with sets of large boulders. Fish habitat cover is abundant because of the large-sized bed materials in this section. At the confluence with the Skagit River, the creek exhibits a lower-gradient fan that provides salmonid spawning habitat.

Although not mapped on WDFW's fish barrier inventory (WDFW 2021c), two natural waterfalls are total barriers to upstream passage at RM 0.65 (14-foot waterfall) and RM 0.8 (Newhalem Falls, 167-foot waterfall). From RM 0.65 to the diversion site at RM 1.0, Newhalem Creek is a transport reach characterized by high gradients with deep plunge pools interspersed by steep cascades and waterfalls.

Over the 100 years since the Project began operating, Newhalem Creek has re-adjusted its profile upstream from the diversion structure to the new base level provided by the diversion dam. The small impoundment retains at least some portion of the bedload coming from the watershed upstream from the diversion (Figure 4.1-1). Substrate size is generally coarse and characterized by boulders, cobbles, and gravels with very little fines (Watershed GeoDynamics 2021). While the Project was operating and up until 2019, an average of 200 to 400 CY of material were removed from the impoundment and placed in the channel downstream from the diversion dam on an annual basis to keep the area near the intake clear of sediment for Project operations. This provides a minimum estimate of the annual bedload transport volume in the stream. Because the removed sediment was placed downstream from the dam and the impoundment is very small, the Project did not cause a net change in sediment supply to downstream reaches of Newhalem Creek. Sediment monitoring during these activities demonstrated that turbidity levels returned to background within a few hours of the activity (City Light 2015, 2016, 2018).

Figure 4.1-1. Annual excavation and downstream redeposition of accumulated gravels and cobbles upstream of the Newhalem Creek diversion dam (2005).

Fish Presence

Downstream of the lower-most natural barrier, a 14-foot waterfall at RM 0.65, Newhalem Creek is occupied by Rainbow Trout (*O. mykiss*), summer and winter steelhead, Chum Salmon (*O. keta*), Summer Chinook Salmon, Pink Salmon (odd-year), Coho Salmon, resident Coastal Cutthroat Trout (*Oncorhynchus clarki clarki*), Dolly Varden, and Bull Trout (WDFW 2021a). City Light also reports that Mountain Whitefish and various sculpin species are present in the lower reaches. The 3,400-foot reach of the creek from the confluence of the Skagit River to lower-most waterfall provides spawning and rearing habitat for ESA-listed Puget Sound steelhead (winter) and Bull Trout (WDFW 2021b). Typical spawning periods in Newhalem Creek are presumed to be similar to those in the upper Skagit River (Table 4.1-1).

Table 4.1-1. Typical and approximate timing of migratory salmonid life stages in the lower portion of Newhalem Creek.

Species	Spawning Period[1]	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Chum	Nov. 1 – Jan. 6												
Coho	Nov. 1 – Mar. 31												
Pink	Sept. 12 – Oct. 31												
Steelhead	Mar. 15 – June 15												
Bull Trout	Sept. 15 – Nov. 30												
Chinook	Aug. 20 – Oct. 15												

1 Fish windows per the Skagit License (City Light 1992) and Bull Trout Biological Evaluation.

Rainbow Trout are reported to occur in a small reach of the creek between the 14-foot waterfall barrier and the next upstream barrier, Newhalem Falls, a natural 167-foot waterfall at RM 0.8. Upstream of Newhalem Falls, and in the dam reach, WDFW (2021a) reports the presence of Rainbow Trout and resident Cutthroat Trout. Other resident species are presumed present.

4.1.2 Existing Conditions – Skagit River and Tailrace

The tailrace is approximately 350 feet long and ranges from 4 to 40 feet wide. It discharges into a natural ephemeral stream that, during high-flow events, discharges to the Skagit River. The tailrace is a permanent, year-round barrier to upstream passage and is inaccessible to fish from the Skagit River.

As discussed in Section 3.2, the action area includes a small reach of the Skagit River at and immediately downstream of the confluence with Newhalem Creek. Aquatic habitat for spawning and rearing ESA-listed fish in the Skagit River mainstem portion of the action area is generally properly functioning (City Light 2011b). Puget Sound Chinook Salmon, Puget Sound steelhead, Bull Trout, and Dolly Varden are known to use the Skagit River in the area adjacent to the tailrace and at the confluence of the river and Newhalem Creek. Chinook Salmon and steelhead may spawn or rear in the Skagit River downstream of the Newhalem Powerhouse tailrace.

4.1.3 Effects of the Proposed Action on Geomorphology and Fish Habitat

Overall, decommissioning is expected to have long-term beneficial effects on geomorphology and fish habitat in Newhalem Creek. Removing the dam and headworks will restore natural geomorphological processes to the channel from 0.4 mile upstream of the headworks to the confluence with the Skagit River. Dam removal will also result in more consistent input of wood and sediment to the lower 1 mile of the creek and into the river. Removal of riprap associated with the tailrace barrier will improve shoreline habitat along the Skagit River.

In the short term, potential effects of diversion removal on stream geomorphology and aquatic habitat include (Dube 2021):

- Higher local stream gradient will temporarily increase sediment transport capacity immediately upstream from the diversion location.
- Existing sediment in the impoundment area will be transported downstream.
- There will likely be an increase in turbidity following diversion removal. However, the majority of substrate in the channel appears to be relatively coarse grained (sub-surface samples were not collected to verify this assumption); therefore, any turbidity increases will likely be short term and transient.

More detail on geomorphic changes and fish habitat is summarized below and in Dube (2021).

4.1.3.1 Changes Downstream from the Diversion

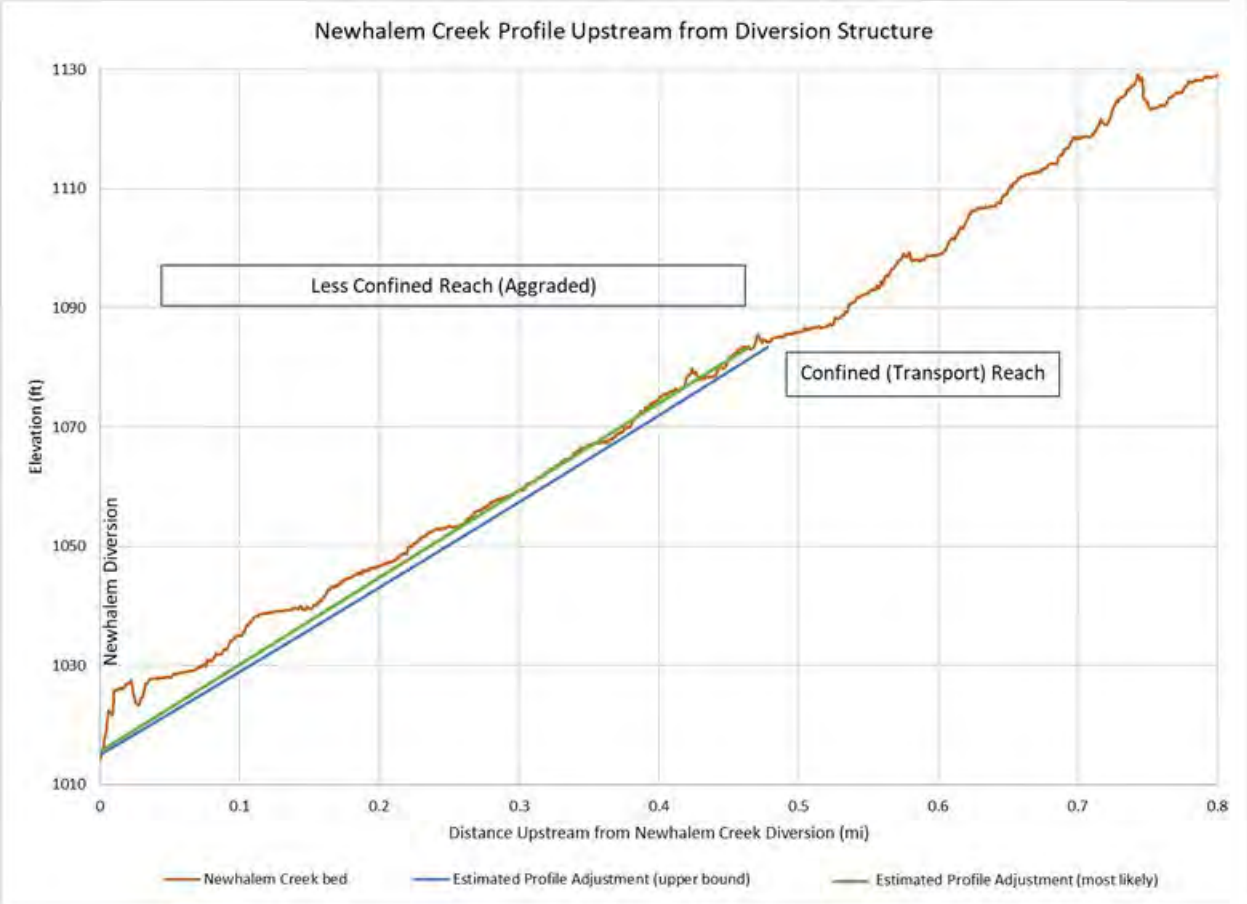
The reach immediately downstream of the dam is a high-gradient bedrock channel, which will limit channel incision at and below the diversion site. Following dam removal, accumulated sediment will be transported rapidly through the high-gradient canyon/waterfall reach to the alluvial fan area at the mouth of the creek, with the potential for short-term effects on fish habitat.

Material from the sediment wedge that has accumulated upstream of the dam to lower reaches of the creek will be transported during high flow events, most likely in late fall, early winter, and spring (see Table 2.2-2). Some cobble, gravel, and finer sediment will move farther downstream and eventually reach the Skagit River, augmenting substrate there. The quantity of potential sediment deposition on spawning and rearing areas in Newhalem Creek and the Skagit River is currently unknown.

4.1.3.2 Sediment Transport from Channel Changes Upstream of Diversion Structure

Removal of the diversion structure will result in adjustment of the bed of Newhalem Creek to a base level similar to pre-Project conditions. The existing longitudinal profile upstream from the diversion structure was used to estimate the potential amount of channel downcutting that could take place (Figure 4.1-2). Due to sediment deposition behind the dam, the change in channel bed elevation would be greatest just upstream from the removed diversion, with 4 to 7 feet of bed lowering, extending approximately 1,000 feet upstream from the diversion.

The streambed gradient is relatively consistent between 0.25 and 0.5 mile upstream from the diversion structure. Extending this consistent gradient downstream to the top of the bedrock area at the diversion structure (see the green line on Figure 4.1-2), suggests that adjustments to the stream in this area were made following original diversion dam construction. This line was used as one estimate of the total (long-term) amount of channel change that could occur following diversion removal. A second bounding estimate was made based on the blue line on Figure 4.1-2, which assumes that the stream would continue to adjust up to the confined reach approximately 0.5 mile upstream from the diversion.



Note: Elevation is North American Vertical Datum of 1988.

Figure 4.1-2. Longitudinal profile of Newhalem Creek upstream from the diversion structure with potential profile adjustments.

The total volume of sediment that would be transported out of the adjustment area was estimated based on change in bed elevation and average channel width of 75 feet (existing channel width) and 100 feet (potential wider channel width if incision results in widening of the channel) to give bounding estimates. Total volume based on these methods is 12,600 to 16,800 CY (green line, Figure 4.1-2) and 22,500 to 30,000 CY (blue line, Figure 4.1-2). Assuming an average bedload transport rate of 400 CY per year, this represents 30 to 75 years of average bedload movement. Because of the coarse nature of the streambed (cobble/boulder/gravel), the re-adjustment of the base level would likely take place relatively slowly—over a decadal or longer time scale following the initial channel adjustment close to the diversion structure.

Following the initial transport of sediment currently accumulated upstream of the dam, the creek will exhibit a natural sediment transport regime that will deliver more spawning gravels to the lower reach. This represents a small but positive effect on fish habitat given the low expected annual volume relative to Skagit River sediment volumes.

4.2 Forest Environment

4.2.1 Existing Conditions

Historically, the lower elevations in the action area consisted of a mosaic of old-growth forest types dominated by western hemlock (*Tsuga heterophylla*), western red cedar (*Thuja plicata*), and old-growth Douglas fir (*Pseudotsuga menziesii*) stands (Harrington 2003). Mountain hemlock (*T. mertensiana*) and fir (*Abies* spp.) would have been common on higher slopes.

In August 2015, the Goodell Fire burned approximately 7,118 acres in the Newhalem Creek and Skagit River valleys (WDNR 2016; Figure 4.2-1). Much of the forest near the dam site burned, except for some trees immediately adjacent to the creek. The fire burned a mosaic across the landscape, fragmenting what had been a relatively consistent evergreen forest with herbaceous and scrub/shrub land cover types. Figure 4.2-1 is at a large scale and does not illustrate the extent of burnt forests along the southern side of the Skagit River from Ladder Creek to the Newhalem Powerhouse and along the penstock route.

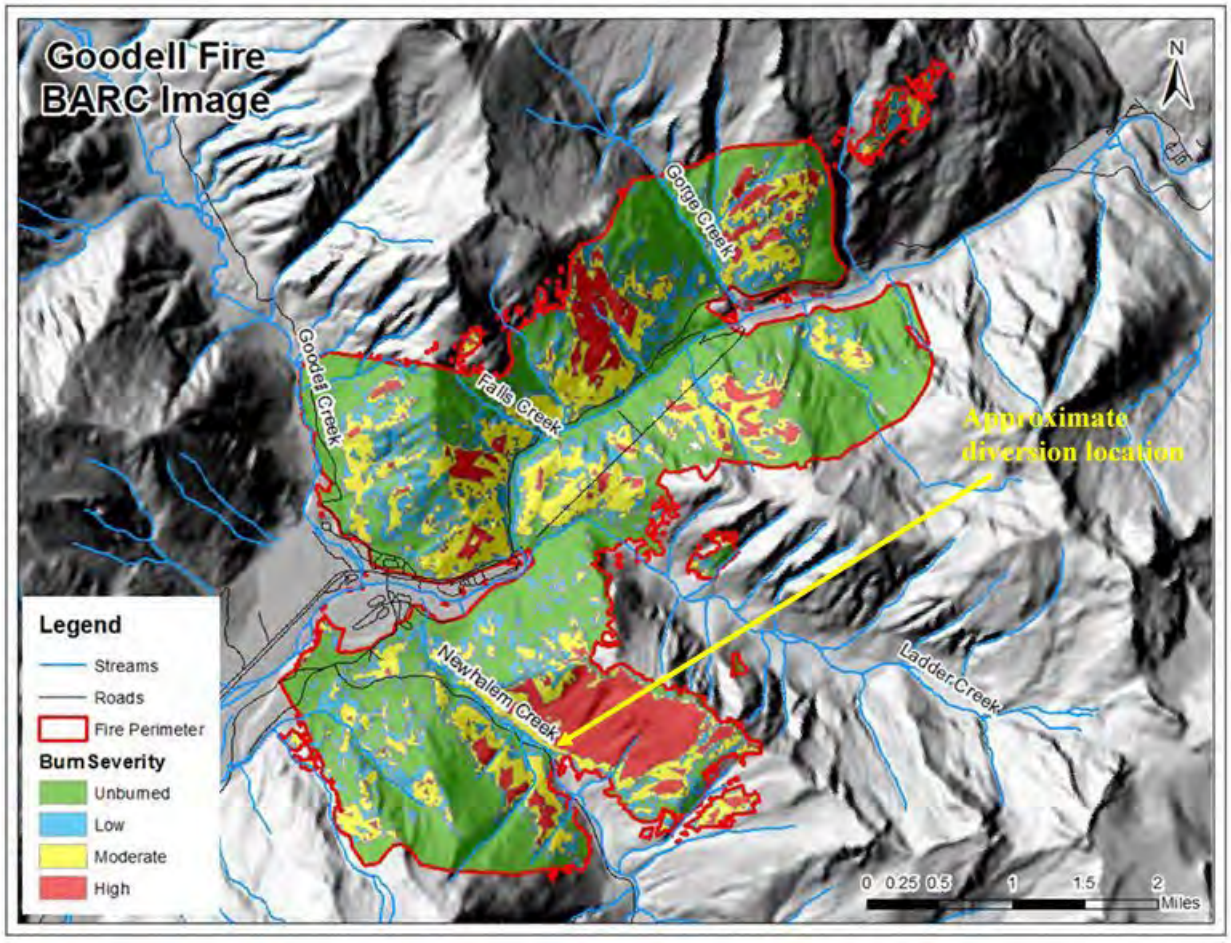


Figure 4.2-1. NPS map of burn intensities near Newhalem Creek; burn intensities in the action area are a mosaic of unburned, low, and moderate burn severity (Source: Oelfke and Siefkin 2015).

As a result of the fire, much of the potential nesting habitat for species that require older forest stands, such as northern spotted owls and marbled murrelets, was lost. Any remaining large coniferous trees with nesting platforms for murrelets are now isolated among a mosaic forest of dead trees, providing little to no canopy cover for nesting birds, eggs, or chicks.

4.2.2 Effects of Proposed Action

The area upstream of the diversion dam along the left bank is a previously cleared gravel parking lot that was historically used for maintenance vehicles. This area will accommodate staging and temporary storage of concrete and other spoils following diversion structure removal. Up to 10 trees may be removed to accommodate staging if the helicopter access is needed. The contractor would be directed to focus removal on trees that are severely burned or dead as a result of the Goodell Fire or on small trees (less than 8-inch-diameter at breast height) that contribute little to the canopy.

4.3 Soundscape

4.3.1 Existing Conditions

City Light is unaware of any site-specific ambient sound surveys conducted at the dam site, the access road, or the tailrace barrier location. However, as presented in Section 3.1 of this BA, based on similar remote site conditions, ambient sound levels along the access road are assumed to be similar to those measured in the undisturbed forested areas behind the Gorge Powerhouse (46 dB) (NPS 2010). At the dam site, ambient sound levels are higher next to the creek, and are likely closer to 60 dB or higher. At the tailrace, ambient sound levels are likely between 50 and 60 dB and are affected by recreational trail use and vehicular access to the powerhouse and adjacent campground.

4.3.2 Effects of Proposed Action

As shown in Table 2.5-1, temporary construction noise associated with potential access road improvements, diversion dam removal, and concrete hauling will occur over a period of approximately four to five months from June through mid-October. Tailrace barrier removal may occur during the first or second year of construction and would require approximately four weeks of work in September through October.

Work at the diversion site and tailrace barrier will require the use of jackhammers, concrete saws, excavators, small power tools, and small compressors and generators needed to run this equipment. Depending on the alternative selected for dam access, small explosives could be used to fracture boulders that have settled on the road and immediately upslope during recent landslides. These activities will affect the ambient soundscape for up to 0.85 mile from the activity over the course of the construction period at each site. As described in the Environmental Assessment prepared for the Ross Powerhouse Rockslide Stabilization Environmental Assessment (NPS 2012), noise from heavy construction equipment for this Project will be attenuated by steep topography and generally dense forests and will be reduced to background levels well under 1 mile from the activity (See Section 3.1).

Helicopter use would result in the highest levels of in-air noise affecting the soundscape under the Proposed Action. Flights will take place a safe distance above the tops of the tallest trees (no closer

than perhaps a few hundred feet). Regardless, takeoff and landing at the diversion site will result in sporadic noise effects that exceed ambient levels. If helicopters are used for diversion facility access and removal of concrete spoils, sporadic use would span a period of approximately four months from July through October. More frequent helicopter trips would be required during this period if the smaller Bell helicopter is used, as it has less capacity for transport.

4.4 Water Quantity and Quality

4.4.1 Existing Conditions

Except for water temperature, relatively little water quality data has been collected in Water Resource Inventory Area (WRIA) 4. However, it is believed that water quality in this area is in good to excellent condition because it is managed primarily as National Park, Provincial Forest, National Forest System, Wilderness Area, and National Recreation Area lands. Some parts of National Forest System and Skagit Provincial Forest lands were historically managed for timber harvest, but the level of harvest management has declined considerably in recent years and currently occurs primarily in portions of the basin downstream of Gorge Dam, in British Columbia, and within the Cascade River and Sauk River basins. Smith (2003) reported that unpublished temperature data collected by NPS in Zander Creek, Taylor Channel, Park Slough, Thunder Creek, Fisher Creek, Logan Creek, and McAllister Creek was generally "good." The temperature range regarded as "good" was not described.

From the mouth to the headwaters, including tributaries, Newhalem Creek provides char spawning and rearing habitat (from Table 604, Chapter 172-201A Washington Administrative Code: accessed July 7, 2021: https://apps.leg.wa.gov/wac/default.aspx?cite=173-201A-602&pdf=true). The current Washington State Water Quality Assessment 303(d)/305(b) list (Ecology 2016) includes no 303(d) listings in the action area; however, Newhalem Creek downstream of the dam is impaired (Category 4C) due to low instream flows (Table 4.4-1).

Table 4.4-1. Water quality categories for Newhalem Creek.

Category	WRIA	Reach Segment	Listing ID	Listed Parameter	Assessment Unit ID
1	4	Mouth to approximately RM 0.8	77187	Chloride	17110005000198
2	4	Mainstem Newhalem Creek upstream of confluence with East Fork	71171	pH	17110005000198
4C[1]	4	Mouth to just downstream of confluence with East Fork	6186	Instream flow	17110005000196

Source: Ecology 2016

1 Category 4C waters are impaired by causes that cannot be addressed through a Total Maximum Daily Load plan.

4.4.2 Anticipated Effects

In-water work area isolation will minimize the potential for adverse effects on water quality. However, cofferdam placement and removal will have temporary adverse effects on water quality parameters, primarily turbidity. Given the predominately gravel/cobble substrate, turbidity plumes resulting from cofferdam installation are anticipated to be minor, and the small resulting sediment plume is expected to settle out of the water column within 300 feet of the work site. During

construction, downstream sedimentation and required water quality parameters will be monitored and adaptively managed in accordance with future CWA Section 401 permitting conditions to ensure compliance with state water quality standards. As discussed previously, following dam removal, subsequent high-flow events will mobilize aggraded sediments upstream of the dam.

As presented above, Newhalem Creek downstream of the dam is a Category 4C reach for low flow. Decommissioning the diversion dam and other Project works will ensure natural flows in Newhalem Creek in perpetuity and may establish a basis for removal of the Category 4C impairment listing from the lower 1 mile of the drainage.

5.0 STATUS OF SPECIES AND CRITICAL HABITAT

5.1 Species List

Listed and proposed species that have potential to occur in the action area are provided in Section 1.4 of this BA. The following sections discuss those species (Table 1.4-1) and provide the status of listed species in the action area, or rationale for no effect determinations for several species for which suitable habitat is not present in the action area. Section 6.0 of this BA provides an analysis of effects on listed species and critical habitat that are designated or may occur in the action area.

5.2 No Effect Determination

Although identified to occur in the action area (which is generally defined by county-wide data), habitat for the following species is not present in the action area:

- Western Distinct Population Segment (DPS) yellow-billed cuckoo.
- Whitebark pine.

Therefore, a **no effect** determination or a provisional **no effect** determination for these species is recommended. Critical habitat for each of these species is either not designated (whitebark pine) or not designated within the action area (yellow-billed cuckoo). A brief discussion of each species and the rationale for a **no effect** determination are provided below.

5.2.1 Western DPS Yellow-billed Cuckoo

Yellow-billed cuckoos breed in large (greater than 40 hectares), wide (more than 100 meters), contiguous blocks of riparian habitat, particularly woodlands with cottonwoods and willows (USFWS 2016a). They are considered extirpated in Washington, but they appear rarely during summer (Seattle Audubon Society 2020). Yellow-billed cuckoos breed in dense willow and cottonwood stands in river floodplains (USFWS 2016a) but are not believed to breed in Washington. The last confirmed breeding records from Washington are from the 1930s. The nearest recently recorded breeding sites to the action area included a few scattered nesting pairs in southern Idaho (WDFW 2012). The only detection of a yellow-billed cuckoo in Whatcom County occurred prior to 1950 near Bellingham. Between 1990 and 2016, several scattered observations occurred in the eastern slope of the Cascades (Wiles and Kalasz 2017).

No yellow-billed cuckoos are expected to occur within or near the action area. Riparian habitat that is suitable for nesting and foraging either does not exist in sufficient quantities to support the species or has been burned. Therefore, the Proposed Action will have **no effect** on western DPS yellow-billed cuckoos.

5.2.2 Whitebark Pine

Whitebark pine communities in the Cascade Range are often mixed with sagebrush (*Artemisia* spp.) and mountain grassland communities at elevations from approximately 5,000 feet to tree line. At lower elevations, whitebark pine is often found among subalpine and Douglas fir. Whitebark pine are an important component of alpine larch communities at tree line, where they often persist as krummolz (Lillybridge et al. 1995). Whitebark pine are found in scattered stands above 5,900

feet (1,800 meters) in the southeastern portion of the North Cascades National Park Service Complex.

The elevation at the diversion site, the highest elevation at which construction would occur under the Proposed Action, is approximately 1,019 feet (311 meters), well below the elevation known to support this species. Further, no known stands are located in or near the action area (Rochefort et al. 2018). Therefore, the Proposed Action **will not jeopardize the continued existence of** the proposed threatened whitebark pine. If whitebark pine becomes listed prior to completion of the Proposed Action, the Proposed Action will have **no effect** on the species.

5.3 Species and Critical Habitats that May Be Affected by the Proposed Action

Based on habitat conditions and/or documented species use of the action area, the six species that could potentially be affected by the Proposed Action: gray wolf, marbled murrelet, northern spotted owl, Puget Sound steelhead, Puget Sound Chinook salmon, and bull trout. Information on the listing status, life histories, and potential for occurrence in the action area for each species is provided in the following sections. Potential Project-related effects on these species and their designated critical habitat (if applicable) are analyzed in Section 6.0 of this BA.

5.3.1 Gray Wolf

5.3.1.1 Listing Status and Distribution

Although gray wolves throughout the Lower 48 states were delisted in January 2021 (85 FR 69778), the IPaC list obtained for the Proposed Action, as appended to this BA (USFWS 2021; Appendix A), indicates that gray wolves in the action area are currently being considered for ESA relisting by USFWS Given this information, the following brief assessment is provided.

As of January 2021, there were at least 132 wolves in 24 known packs, including at least 13 breeding pairs in portions of Washington State managed by WDFW. In addition, there were 46 wolves reported on Confederated Tribes of the Colville Reservation (WDFW et al. 2021). Wolves are habitat generalists but occupy mostly forests and nearby open habitats with sufficient prey. Most known packs occur in northeastern and southeastern Washington, but increasing numbers are present in the north-central region.

5.3.1.2 Occurrence in the Action Area

The action area is in the North Cascades recovery region, which has six packs located primarily on the eastern slope of the Cascade Mountains. The pack nearest to the action area is the Diobsud Creek Pack. WDFW winter surveys documented only a single wolf from this pack during winter 2020–2021; denning status is unknown. Territory for this pack is generally in the area between Baker Lake and the Skagit River, southwest of the action area (WDFW et al. 2021).

5.3.1.3 Critical Habitat

Critical habitat is not designated for gray wolves in the action area.

5.3.2 Lynx

5.3.2.1 Listing Status and Distribution

The Canada lynx was state listed as threatened in Washington in 1993 and federally listed as threatened in 2000. Primary threats to the species include habitat loss and overutilization (trapping) (65 FR 16051). Critical habitat was designated in 2006 (71 FR 53355).

Lynx are closely associated with boreal forests because of their near-dependence on a single prey species—the snowshoe hare—which is mostly limited to this habitat type. In Washington, most records of lynx are from the northeastern and north-central portions of the state, in the Selkirks, Kettle Range, and North Cascades east of the crest (Stinson 2000). Lynx typically occupy high-elevation forests but can travel over 300 miles when dispersing during prey declines. Lynx populations in the northern boreal forest fluctuate on an approximate 10-year cycle in response to changes in snowshoe hare numbers. Cyclic variations in snowshoe hare-lynx populations are dramatic in Alaska and Canada but tend to be more moderate in Washington (Stinson 2000).

Critical habitat for lynx in Washington includes the North Cascades above 4,000 feet elevation and east of the crest (71 FR 53355). The dam is located at approximately 1,019 feet in elevation and is considerably west of the Cascade crest.

5.3.2.2 Occurrence in the Action Area

Lynx are considered uncommon in the general area; however, City Light reported a 2019 observation of a single lynx near the Aggregate Ponds just west of Newhalem (City Light 2022). Therefore, it is possible that Canada lynx may occasionally move through the area during dispersal, but they would not be expected to occupy the action area for long periods because of the lack of suitable habitat for their primary prey, snowshoe hares.

5.3.3 Grizzly Bear

5.3.3.1 Listing Status and Distribution

Grizzly bears were listed by the USFWS as threatened in 1970 (35 FR 16047). Remnant populations are currently managed in Washington and three other states. The Grizzly Bear Recovery Plan (USFWS 1982) includes the North Cascades as one of the six ecosystems in which grizzly bears are known to have occurred within the decade prior to listing. Recovery goals for the North Cascades region are to (1) maintain the current population, (2) provide protection under state and federal laws, and (3) collect baseline data on population status and habitat (USFWS 1982).

The North Cascades National Park Service Complex and adjacent wilderness areas are believed to have suitable habitat to support at least 90 grizzly bears, which is the number that USFWS considers necessary for statistical population viability (Almack 1986). Suitable spring forage areas in the North Cascades include marshes, riparian areas, and low elevation shrubfields. Upper elevation shrubfields and grass sidehill parks and alpine ridges represent suitable summer foraging habitat. Densely forested areas with downfall are considered to be important for cover. No den sites have been identified in the North Cascades. However, suitable denning habitat—in excavated chambers or natural caves—is not considered a limiting factor in the North Cascades (Almack 1986).

Between 1950 and 1991, there were 20 confirmed grizzly bear observations in the Washington North Cascades and 80 additional sightings that are considered highly probable. A photograph of a grizzly bear track was taken in 1991 in the Thunder Creek drainage, which is a tributary to Diablo Lake (Western Wildlife Outreach 2008). The current estimated population in the North Cascades is between 5 and 20 grizzly bears, with some of these ranging between Washington and British Columbia (Western Wildlife Outreach 2008). However, natural recovery of grizzly bears in this region is considered unlikely due to the demographic and environmental stochastic events associated with small populations (Romain-Bondi et al. 2004).

5.3.3.2 Occurrence in the Action Area

The action area contains suitable foraging habitat for grizzly bears but is too low in elevation for denning. No observations have been reported in the vicinity of Newhalem Creek at or near the Project, suggesting the action area is not typically used by grizzly bears. Grizzly bears have not been observed west of the Cascade crest in many years. The USFWS has periodically considered reintroduction of the grizzly bear to the North Cascades ecosystem over the last several decades, but the most recent planning process was terminated in July 2020. Potential habitat for this species would be expected in the upper reaches of the Newhalem Creek drainage, above the Project headworks.

5.3.4 Marbled Murrelet

5.3.4.1 Listing Status and Distribution

The marbled murrelet is a small, diving seabird that breeds in old-growth forests from central California to the Aleutian Islands of Alaska. It occurs in highest abundance between Vancouver Island, British Columbia, and the Alexander Archipelago in Southeast Alaska. In Washington, murrelets occur in the greatest numbers in Puget Sound and the Strait of Juan de Fuca. Historical records and observations indicate that murrelets were common and seen regularly along Washington and Oregon coastlines (USFWS 1997). The USFWS listed the Washington, Oregon, and California population as a threatened species under the ESA in 1992 (57 FR 45328).

The principal threats to marbled murrelet populations include the loss or modification of nesting habitats by commercial timber harvest of older forests, along with effects of coastal oil spills and gill-net fishing operations off the Washington coast (USFWS 1997). Extensive harvest of late-successional and old-growth forest was the primary reason for listing the murrelet as threatened. It is estimated that timber cutting over the past 150 years has removed at least 82 percent of the old-growth forests existing in western Washington and Oregon prior to the 1840s (USFWS 1997, 2019). Mortality associated with gill-net fishing and oil spills was also a cause for listing under the ESA (57 FR 45328). Predation of marbled murrelet adults, chicks, and eggs by various avian predators also inhibits their recovery (USFWS 2019).

5.3.4.2 General Life History and Habitat Requirements

The marbled murrelet spends most (greater than 90 percent) of its time on the ocean, resting and feeding, but flies inland to nest in old-growth forest stands. Marbled murrelets forage just beyond the breaker-line and along the sides of river mouths where greater upwelling and less turbulence occurs. At these locations, they feed on invertebrates and small fish such as anchovy, herring, and

sand lance (Burkett 1995). Murrelets fly between foraging areas off the coast and inland nesting habitat. In Washington, the marbled murrelet nesting season is April 1 through September 23.

In their terrestrial environment, the presence of nesting platforms (large branches or deformities) is the most important characteristic of nesting habitat. Nesting platforms can be composed of a wide bare branch, moss or lichen covering a branch, mistletoe, witches' brooms, or other deformities (Evans Mack et al. 2003). Adults nest on mossy-limbed branches of large conifers such as coast redwood (*Sequoia sempervirens*), western hemlock, Douglas fir, and Sitka spruce (*Picea sitchensis*), in mainland mature stands typically located within 60 kilometers (37 miles) of marine waters (USFWS 2019). Murrelets have been recorded nesting at greater distances inland (Lorenz et al. 2017), and projects occurring up to 70 miles inland should consider the potential for marbled murrelet occurrence (WSDOT Fish and Wildlife Program and FHWA 2015). Murrelet habitat use during the breeding season is positively associated with the presence and abundance of mature and old-growth forests, large core areas of old-growth forest, low amounts of edge habitat, reduced habitat fragmentation, proximity to the marine environment, and forests that are increasing in stand age and height (USFWS 2019).

Suitable marbled murrelet nesting trees are mature conifers (greater than 15 inches diameter at breast height) situated in contiguous conifer-dominant (greater than 60 percent) stands with at least one suitable nesting platform at least 33 feet off the ground (WSDOT Fish and Wildlife Program and FHWA 2015). These conifer-dominated stands may vary in size from several acres (at least 5 acres) to thousands of acres, with large unfragmented stands of old growth composing the highest-quality habitat. Marbled murrelets have a limit on their inland breeding distribution because of the energetic requirements of flying inland to incubate eggs and feed young. They forage at sea, carrying single prey items to the nest to feed their young several times per day during the late stages of nesting. Nesting greater distances from the coast may have developed over time to avoid higher nest predation by corvids and gulls, whose population numbers may be much higher in food-rich coastal areas (Hamer and Nelson 1995).

A successful breeding pair fledges only one chick per year. Nests are not built, but rather the egg is placed in a small depression or cup made in moss or other debris on the limb. Incubation lasts approximately 30 days, and chicks fledge approximately 28 days after hatching. Both sexes incubate the egg in alternating 24-hour shifts. The chick is fed up to eight times daily and is usually fed only one fish at a time. The young are semi-precocial, capable of walking but not leaving the nest. Fledglings fly directly from the nest to the ocean. During the nesting season (April through September) marbled murrelets fly inland from the coast, often using waterways as flight corridors to nesting areas.

5.3.4.3 Occurrence in Action Area

The action area is located approximately 57 miles inland from the nearest marine coastline (Samish Bay). In 2011, suitable nesting habitat was identified in the upper Newhalem Creek drainage and along the Skagit River south of Newhalem, where older forest stands were present (City Light 2011a). During May and June 2008, radar surveys conducted downstream of the town of Newhalem recorded possible detections of marbled murrelet flying along the Skagit River (Hamer Environmental 2008). The WDFW PHS database has no records of marbled murrelet sightings within 10 miles of the Project site (WDFW 2021a).

Regardless of past data regarding nesting habitat suitability in the Newhalem Creek area, the Goodell Fire destroyed most forest stands that could be used by marbled murrelet within and adjacent to the access road and diversion site. Although a few scattered conifers of suitable size with potential nesting platforms exist in portions of the action area that were not severely burned (e.g., near the Trail of Cedars, approximately 4,000 feet northeast of the diversion dam site [Hamer Environmental 2021]), such habitat is not present near the diversion site or access road. Any remaining suitable nest trees within several hundred feet of the diversion dam or access road are isolated and surrounded by dead trees with little to no cover. Such trees are highly unlikely to support nesting. At these locations, most of the remaining conifer trees have lost their needles and provide little to no canopy. Therefore, portions of the action area that were severely burned near the dam and access road landslide location do not provide the dense canopy typically required for nesting and predatory cover.

There may be some suitable nesting habitat for murrelets outside the burned area in the Newhalem Creek drainage. Radar surveys conducted in 2021 along the Skagit River in Newhalem recorded seven "murrelet-type" targets flying towards or away from the creek. Although, concurrent audio/visual surveys did not confirm whether these radar detections were indeed murrelets, use of the drainage by murrelets cannot be ruled out (Hamer Environmental 2021). In general, however, the radar surveys of the upper Skagit River (Newhalem to Ross Lake) suggest very low use of the entire area by murrelets (Hamer Environmental 2021).

The radar detection surveys conducted in 2021 did record two murrelet calls along the Skagit River mainstem (Hamer Environmental 2021). This indicates that the river may provide a migratory corridor for murrelets transiting to and from marine foraging grounds to suitable nesting habitat outside of the action area during the nesting season. Radar detections have also been reported up Thornton and Bacon Creeks, downriver from Newhalem.

5.3.4.4 Critical Habitat

Critical habitat was designated for the marbled murrelet in 1996 and revised in October 2011 (76 FR 61599). Designated critical habitat includes forested areas around Puget Sound. The preservation of both marine foraging habitat and terrestrial nesting habitat is important to the recovery of the species; however, only terrestrial nesting habitat has been designated as critical habitat for the marbled murrelet and includes forested stands with trees generally more than 32 inches in diameter that have potential nesting platforms at least 33 feet above the forest floor (USFWS 1997).

Marbled murrelet critical habitat is not designated within the action area. The nearest block of designated critical habitat is located approximately 6 miles southeast of the action area.

5.3.5 Northern Spotted Owl

5.3.5.1 Listing Status and Distribution

The northern spotted owl was federally listed as threatened in June 1990 (55 FR 26114). It is believed to have historically inhabited most forests throughout southwestern British Columbia, western Washington and Oregon, and northwestern California as far south as the San Francisco Bay. The primary causes of spotted owl population declines are loss and adverse modification of nesting, roosting, and foraging (NRF) habitat due to timber harvesting; land conversions; natural disturbances such as fire, windstorms, and insect outbreaks; and competition with encroaching barred owls (USFWS 2016b, 2020). An estimated 60 percent reduction of habitat has occurred over the last 190 years. Owl numbers appear to have declined annually since 1985, when many studies began. Range-wide, spotted owls are currently declining at an average rate of 2.9 percent each year (USFWS 2013).

5.3.5.2 General Life History and Habitat Requirements

The northern spotted owl is strongly associated with old-growth forests that are characterized by multi-storied canopies; several species of trees, sizes, and ages; and standing and downed dead trees. Northern interior forests typically require 150 to 200 years to attain the attributes important for nesting and roosting habitat (USFWS 1990). Suitable owl habitat has moderate to high canopy closure (60 to 80 percent); a multilayered, multi-species canopy dominated by large (greater than 30 inches in diameter at breast height) overstory trees; a high incidence of large trees with various deformities (e.g., large cavities, broken tops, dwarf-mistletoe infections, and other evidence of decadence); numerous large snags; large accumulations of fallen trees and other woody debris on the ground; and sufficient open space below the canopy for owls to fly (USFWS 1990; Thomas et al. 1990). Northern spotted owls prey primarily on small mammals, particularly flying squirrels (*Glaucomys sarbinus*) and woodrats (*Neotama* spp.) (USFWS 2008).

Stands dominated with trees as young as 50 years that contain remnant large-diameter trees or snags that survived, or were created by, a previous disturbance (e.g., fire; windstorm; or, in some cases, timber harvest) are sometimes used as nesting habitat (USFWS 1990; Gutiérrez et al. 1995; Courtney et al. 2004). Recent field investigations in northern California documented the presence of northern spotted owls in 30- to 80-year-old forests that contain suitable structural characteristics. In some instances, nesting pairs of northern spotted owls were found in stands that developed 60 to 80 years after either selective or clear cutting (USFWS 1990).

Northern spotted owls require large amounts of suitable habitat for nesting. Median home range sizes are typically on the order of 3,000 to 5,000 acres per pair. Spotted owls are territorial and remain on their home range throughout the year (77 FR 71876). Home range size varies geographically, generally increasing from south to north with a corresponding geographic shift in available small mammals, which compose most of their diet. Each home range generally contains a core area, which is most intensively used and tends to include the nesting site, and a larger surrounding area used for roosting and foraging. Habitat quality in the core area is more strongly related to habitat occupancy, survival, and reproductive success than habitat quality in the roosting and foraging area (77 FR 71876).

Spotted owls nest in cavities or platforms in trees, and pairs are typically spaced approximately 1 to 2 miles apart. Nests are usually found in forests in lower elevations (less than 5,000 feet) and

river valleys, and nest trees typically include Douglas-fir, mountain hemlock, western hemlock, or Pacific silver fir (*Abies amabilis*) (USFWS 2011). The northern spotted owl breeding season is characterized by the early nesting season and the late nesting season (Forsman et al. 1984). During the early nesting season, defined as March 1 to July 15 (WSDOT 2020), nesting owls are engaging in nest site selection, egg laying, incubation, and brooding of nestlings (Forsman et al. 1984). In the late breeding season, July 16 to September 30 (WSDOT 2020), juvenile spotted owls have fledged, are able to thermoregulate, can fly short distances, and are no longer completely dependent on adults for feeding (Forsman et al. 1984). By November or December, the young disperse from the nest site (Courtney et al. 2004; USFWS 2011).

Spotted owl dispersal habitat does not typically contain the same characteristics as NRF habitat. However, such habitat provides an important linkage among blocks of nesting habitat both locally and over the range of the northern spotted owl. Dispersal habitat, at a minimum, consists of forest stands with adequate tree size and canopy closure to provide some degree of protection to spotted owls from avian predators and to allow the owls to forage at least occasionally. In addition to forest structure, location proximate to home range habitat is an important characteristic of dispersal habitat. The most important habitats support all spotted owl life requisites, whereas some habitats provide only certain resources (e.g., prey) and not others (e.g., nest sites). Studies have indicated that owls select mature stands in rough proportion to their availability for roosting and use young and pole-sized stands less, indicating the importance of mature forests within the owl's range (USFWS 1990). In addition to habitat requirements for resident owls, suitable habitat for dispersing owls, particularly juveniles, is important for maintaining spotted owl populations. Dispersing owls require forests that support movement to unoccupied suitable habitat.

5.3.5.3 Occurrence in Action Area

Northern spotted owls are considered an uncommon resident in the North Cascades National Park Complex. It is thought that competition with barred owls for suitable habitat may be limiting spotted owl distribution and abundance (Kuntz and Christopherson 1996) as this species is frequently observed. Surveys conducted by NPS identified a single spotted owl nest in the Newhalem Creek drainage approximately 2 miles south of the dam in 2009, but it was not relocated in 2010 (City Light 2011b).

In 2011, the late seral stage conifer forests near Newhalem were identified as potential nesting habitat for northern spotted owls (City Light 2011a). Carroll (2008) mapped the action area and surrounding habitat as having a 40 to 60 percent chance for northern spotted owl occupancy, based on current climatic conditions. However, in 2015 the Goodell Fire eliminated most, if not all, suitable NRF habitat in the action area. The action area no longer contains forest stands with moderate to high canopy closure, nor multi-species canopies of trees to provide habitat for thermal refuge and predator avoidance. The upper reaches of the Newhalem Creek drainage were severely burned, and a substantial amount of previously suitable NRF habitat is no longer present or has been significantly altered (see Figure 4.2-1). Nonetheless, spotted owls could potentially use portions of the action area for dispersal. Dispersal habitat may persist in burned forested areas if they contain areas with canopy cover greater than or equal to 40 percent (77 FR 14093). However, such cover is no longer present near the diversion site and the access road, as most areas were severely burned and have limited, if any, remaining canopy. Further, the very low numbers of spotted owls in the North Cascades suggests that use of the action area is unlikely.

5.3.5.4 Critical Habitat

Critical habitat was designated for the spotted owl in 1991 and has since been revised multiple times, most recently on July 20, 2021 (85 FR 38246). No critical habitat for the northern spotted owl is designated within the action area. The closest designated critical habitat is approximately 5.5 miles southwest of the action area.

5.3.6 Puget Sound Steelhead

5.3.6.1 Listing Status and Distribution

Puget Sound steelhead were listed as threatened on May 11, 2007. The Puget Sound DPS includes more than 50 stocks of naturally spawned anadromous steelhead populations originating below natural and human-made impassable barriers of rivers that flow to Puget Sound. This includes all rivers east of the Elwha River, including rivers in Hood Canal, South Sound, North Sound, and the Strait of Georgia. Steelhead from six hatchery programs are also included in the DPS but are not applicable to the Skagit River watershed. Resident *O. mykiss* (i.e., Rainbow Trout) are not part of this DPS (NMFS 2006).

Puget Sound steelhead have two distinct forms: inland and coastal (Scott and Gill 2008). Skagit River steelhead belong to the coastal form found west of the Cascade Mountains. WDFW (2002) identifies three winter stocks (Skagit Mainstem, Sauk, and Cascade) and three summer stocks (Finney Creek, Sauk, and Cascade) in the Skagit River.

Most Puget Sound steelhead populations, including those in the Skagit River, experienced severe declines in the early 2000s (NMFS 2005). The DPS continues to be at very low viability, and trends in abundance of spawners remain predominantly negative. This DPS remains at moderate risk of extinction (NMFS 2016).

5.3.6.2 Life History of Skagit River Steelhead Stocks

Winter steelhead enter the Skagit River in November (NMFS 2005) and spawn from March through June, with peak spawning in May. Incubation of steelhead eggs occurs during spring and early summer, when flows are primarily from annual winter snowpack melt. Fry emergence peaks in early August (WDFW 2004). Most winter steelhead undergo smoltification and outmigration at age 2 and approximately 18 percent outmigrate at age 3 (NMFS 2005). Outmigration occurs primarily from late April through early June (WDFW 2004), with peak densities occurring in late April and early May (Kinsel et al. 2008).

Approximately 57 percent of Skagit River winter steelhead return to spawn after just one winter in the ocean, while approximately 42 percent do so after two winters (Scott and Gill 2008). Although most Skagit River winter steelhead die after spawning, as many as 14 percent may return to the ocean and spawn again.

Steelhead use a variety of habitat types, but generally use higher velocity water than other salmon. This allows them to migrate farther into higher gradient headwater streams than Chinook, Coho, Pink, or Chum Salmon. Juvenile steelhead tend to move away from stream edges and towards faster moving water as they grow. They may also move to larger streams if crowding occurs in headwaters. During winter, many steelhead juveniles will move back into smaller tributaries to

avoid high flows and utilize structures such as boulders, large woody material jams, root-wads, and undercut banks as cover (Scott and Gill 2008).

There is very little information on Skagit River steelhead egg to fry or fry to smolt survival rates in the Skagit River. It is generally understood that peak river flows and fine sediment are important factors that may adversely affect these life stages (Bjornn and Reiser 1991). However, the magnitude or frequency of adverse effects of peak flows and scour on steelhead is likely to be less than for Chinook Salmon because of the location and timing of spawning and incubation.

5.3.6.3 Occurrence in Action Area

The Skagit River mainstem and lower reaches of Newhalem Creek downstream of the lower waterfall at RM 0.65 provide spawning and rearing habitat for winter steelhead from the Puget Sound DPS. Summer steelhead presence is documented in the Skagit River at the confluence of Newhalem Creek, and the 1992 license application states that steelhead and Rainbow Trout were the most abundant species recorded in surveys of Newhalem Creek below the barriers (City Light 1992).

As depicted in Table 4.1-1, Puget Sound steelhead may spawn in the action area from March through June, and eggs are likely to present from March through early August. Rearing juveniles could be present year-round.

5.3.6.4 Critical Habitat

NMFS designated critical habitat for Puget Sound steelhead in February 2016 (81 FR 9251). Critical habitat is designated within the lower Skagit River from Puget Sound to Newhalem. The lowest 0.6 mile of Newhalem Creek is also designated as critical habitat due to known spawning (81 FR 9251).

Critical habitat consists of physical and biological features (PBFs) that are essential for the conservation of a species. Within designated critical habitat, six PBFs are considered essential for the conservation of Puget Sound steelhead. Of the six PBFs, only three apply to freshwater environments. These are listed below, along with descriptions of their condition in the action area:

- Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning incubation and larval development:

  Existing Condition: The lower reach of Newhalem Creek and that portion of the Skagit River within the action area provide sufficient water quantity and quality to support steelhead spawning and incubation (WDFW 2021a, 2021b).

- Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks:

  Existing Condition: Newhalem Creek downstream of the lower waterfall at RM 0.65 contains complex juvenile rearing habitat that supports rearing juvenile steelhead.

- Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival:

  Existing Condition: Although Newhalem Creek and the Skagit River provide migratory habitat for multiple life histories, passage in the action area is fully impeded at RM 0.65 due to the presence of a natural waterfall that is impassable to fish.

5.3.7 Puget Sound Chinook Salmon

5.3.7.1 Listing Status and Distribution

Chinook Salmon in the Puget Sound Evolutionary Significant Unit (ESU) were listed as threatened in March 1999 (64 FR 14308). The status was reaffirmed following a status review in June 2005 (70 FR 37160). The ESU includes all naturally spawned populations of Chinook Salmon from streams and rivers flowing into Puget Sound, the Straits of Juan de Fuca from the Elwha River eastward, and 26 hatchery programs. The Puget Sound Technical Recovery Team identified 22 independent Chinook Salmon populations within five biogeographic regions (Nooksack, Hood Canal, South/Central, Whidbey, and Strait of Juan de Fuca) in the Puget Sound ESU (Ruckelshaus et al. 2006).

5.3.7.2 Life History of Skagit River Chinook

Chinook Salmon juvenile life history patterns are typically grouped into "ocean-type" and "stream-type" (Healey 1991). Ocean-type juveniles out-migrate to marine waters as sub-yearlings, while stream-type juveniles rear in freshwater for at least a year. In the Skagit River ocean-type Chinook Salmon juvenile life history forms have been further refined to four life history strategies: fry migrants, delta rearing migrants, parr migrants, and yearlings (SRSC and WDFW 2005). Fry migrants are juveniles that outmigrate shortly after emergence and spend relatively little time in the Skagit River mainstem and delta, but some may spend a significant amount of time in a limited number of pocket estuaries situated along Skagit Bay. Delta rearing migrants emerge at the same time as fry migrants and move rapidly to the delta region, but then spend several weeks to months rearing in the Skagit River delta before moving into Skagit Bay at an average size of 74 millimeters (mm; range 49 to 126 mm). Parr migrants (also referred to as "fingerling" or "riverine" life history forms) rear in freshwater for several months, then move through the delta relatively quickly and enter Skagit Bay at about the same size as delta rearing migrants. Yearlings rear in freshwater for over 1 year and outmigrate from late March through May at an average size of 120 mm (range 92 to 154 mm) (SRSC and WDFW 2005).

Wild Chinook Salmon fry enter Skagit Bay in February and March at an average size of 39 mm (range 30-46 mm) (Beamer et al. 2005). Farther upstream, trapping at RM 17 during 2007 (at the Burlington Northern Railroad crossing in Mount Vernon) indicated that some fry may begin out-migrating in mid-January and peak fry migration is usually in mid-March (Kinsel et al. 2008). Median migration dates between 1997 and 2006, when 50 percent of the fry have passed the trap, averaged March 27 and have ranged from March 10 (1999) to May 2 (1998) (Kinsel et al. 2008).

5.3.7.3 Occurrence in Action Area

The Skagit River mainstem provides spawning and rearing habitat for summer Chinook Salmon from the Puget Sound ESU. WDFW (2021b) indicates that summer Chinook Salmon presence has been documented in the lower reaches of Newhalem Creek, and the creek is accessible to Chinook Salmon downstream of the lower waterfall located at RM 0.65. WDFW has not documented spawning or rearing in Newhalem Creek; however, the lower reaches of the creek are accessible from the Skagit River and therefore could be used for spawning and occupied by rearing juveniles spawned there or in the Skagit River, particularly during high-flow periods when the creek could provide high-velocity refuge from the Skagit River mainstem. Based on spawn timing (Table 4.1-1), pre-spawn adults may be present as early as June within the action area. Spawning begins in late August and extends through mid-October. Juveniles are likely to emerge from spawning gravels from December through February and will rear in the Skagit River mainstem year-round.

A limited number of Chinook Salmon adults were seen during surveys in 1982 and 1983, with two possible redds noted. Study results for the 1992 license application noted that of the salmon species that potentially use Newhalem Creek, rearing conditions appear most suitable for Chinook Salmon, because they prefer riffle and run habitat types and cobble and boulder substrates (City Light 1992).

5.3.7.4 Critical Habitat

Critical habitat for the Puget Sound Chinook Salmon ESU was designated by the NMFS on September 2, 2005 (70 FR 52630). The entire Skagit River mainstem up to Gorge Dam is designated as critical habitat, as well as portions of tributaries draining to the Skagit River. However, Newhalem Creek is not included in the designation. As with Puget Sound steelhead, critical habitat consists of six PBFs that are essential for the conservation of a species. Of the six PBFs, three are present in the action area: (1) freshwater spawning sites, (2) freshwater rearing sites, and (3) migratory corridors.

5.3.8 Bull Trout

5.3.8.1 Status and Distribution

In November 1999, the USFWS listed all populations of Bull Trout within the coterminous United States as a threatened species pursuant to the ESA (64 FR 58910). Bull Trout are distributed throughout the cold, clear waters of the high mountains and coastal rivers of northwestern North America, including Yukon, British Columbia, Washington, Oregon, Idaho, and western Montana. Bull Trout are threatened by the combined effects of habitat degradation, fragmentation, and alteration, including dewatering, road construction, mining, grazing, dams, entrainment, poor water quality, and introduced non-native species (65 FR 58910).

The most recent Bull Trout Recovery Plan (USFWS 2015a) delineates Bull Trout into six recovery units, parsed into 109 core areas. Core areas are expected to function similarly to Bull Trout metapopulations, in that spatial and temporal interactions between Bull Trout within a core area are more likely than between Bull Trout from separate core areas (USFWS 2015b).

5.3.8.2 Life History and Habitat Requirements

Bull Trout express both resident and migratory life history strategies (Rieman and McIntyre 1993). Resident forms of Bull Trout complete their entire life cycle in the tributary streams in which they spawn and rear, while migratory Bull Trout spawn in tributary streams for 1 to 4 years before migrating to either a lake or river (Fraley and Shepard 1989). Anadromous Bull Trout are found only in the Coastal Recovery Unit (USFWS 2015b), which includes the Newhalem Creek local population. Both resident and migratory Bull Trout may be found together, and offspring from either form may exhibit either behavior (Rieman and McIntyre 1993).

Those populations below dams are typically fluvial (i.e., migrating between mainstem rivers and tributaries). Most populations spawn from mid-September to mid-October, but several spawn between August and early September and late October to early November (USFWS 2015b). Juveniles typically remain in the tributaries in which they were spawned and begin migratory movements as subadults.

Bull trout have some of the most demanding habitat requirements of all salmonids (Rieman and McIntyre 1993). To successfully spawn and rear, Bull Trout need specific physical habitat characteristics that are not necessarily present even in pristine watersheds (Rieman and McIntyre 1993). These include the following (USFWS 2015a):

- Water temperatures ranging from -2 degrees Celsius (ºC) to 22ºC, depending on life history stage and form, geography, elevation, diurnal and seasonal variation, and local groundwater influence.
- A natural hydrograph, including peak, high, low, and base flows within historic ranges or if regulated, according to an opinion that supports Bull Trout populations by minimizing daily and day-to-day fluctuations.
- Migratory corridors with no physical, biological, or chemical barriers between spawning, rearing, overwintering, and foraging habitats.
- An abundant food base, including prey items such as macro-invertebrates of aquatic or terrestrial origin and forage fish.
- Permanent water of sufficient quantity and quality such that normal reproduction, growth, and survival are not inhibited.

5.3.8.3 Occurrence in Lower Skagit River Core Area

The action area is in the lower Skagit River core area, in the Puget Sound region of the Coastal Recovery Unit. The lower Skagit River core area defined as the river downstream of Gorge Dam (USFWS 2004), has been identified as a current population stronghold because of plentiful intact habitat and an abundant population (USFWS 2015b). This core area likely supports the largest population of Bull Trout in the state, numbering in the thousands. Long-term monitoring indicates that the Bull Trout population trend in the lower Skagit River core area is stable or increasing (USFWS 2006). The lower Skagit core area consists of 19 local populations, including Newhalem Creek, and 2 potential populations based primarily upon their spawning distribution.

Lowery (2009) conducted winter snorkeling in the lower Skagit River core area between Newhalem and Rockport during 2008 and estimated a population size of 1,602 Bull Trout greater

than 300 mm (age 4-plus) and 179,265 Bull Trout less than 300 mm (age 1 through 3). There appears to be consensus that Bull Trout populations in the lower Skagit River core area are generally healthy, and abundance is at least on the order of thousands of fish (USFWS 2004). In the early 2000s, the lower Skagit River core area spawning population may have been on the order of tens of thousands of individuals (Kraemer 2008, personal communication, as cited in City Light 2011a).

In the upper Skagit River core area (upstream of Gorge Dam), movement of mature fluvial Bull Trout towards staging and spawning areas occurs in July and August (peak in mid-July), while anadromous fish migrate through the lower river during June and July (Connor et al. 2009). Bull Trout spawning occurs in mid-September through mid- to late November as water temperatures decline to below 8°C, with peak spawning occurring in October (Downen 2006). The specific duration of incubation and emergence timing for Bull Trout in the lower Skagit River core area has not been determined. Bull Trout generally have a relatively long incubation period such that the time to fry emergence may take more than 200 days and occurs from early April through May (USFWS 2004).

After spawning, Bull Trout in the lower Skagit River core area disperse downstream to overwintering and foraging areas during October through November (Connor et al. 2009). Overwintering and foraging habitat for fluvial populations includes predominately larger pools and deep runs in the upper reaches of the Skagit River mainstem but may also include the Sauk River (USFWS 2004). Post spawning, anadromous Bull Trout outmigrate to the estuary during February through April with peak movements in mid-March (Connor et al. 2009). Goetz et al. (2004) report that some Bull Trout may switch between fluvial and anadromous behavior patterns in alternate years.

In the upper Skagit River core area, young Bull Trout may rear in tributary streams until age 4 and become predominately piscivorous after age 2 (Lowery 2009). After age four, larger fluvial Bull Trout move into the Skagit River mainstem (Lowery 2009). However, Goetz et al. (2004) report that 2- and 3-year-old Bull Trout with a mean size of 144 mm (range 91 to 198 mm) is typical for the first migration from the Skagit River to an estuarine environment. While the overall timing for migration into the estuary is broad, from mid-February to early September, most outmigration occurs during May and June (Goetz et al. 2004).

5.3.8.4 Occurrence in Action Area

Newhalem Creek from its confluence with the Skagit River upstream to a 14-foot natural waterfall barrier at RM 0.65 provides spawning and rearing habitat that is deemed essential for maintaining the distribution, abundance, and productivity of the Newhalem Creek local population of Bull Trout (Kraemer 2003; USFWS 2010; WDFW 2021a). Spawning and incubation periods are presumed to be similar to those presented previously for the upper Skagit River population. As depicted in Table 4.1-1, Skagit River Bull Trout may spawn in the action area from September through November, and eggs are expected to be present from September through approximately February, depending on water temperature. It is unknown if Bull Trout overwinter in Newhalem Creek, but overwintering is assumed. Rearing juveniles could be present in Newhalem Creek year-round, and subadults and amphidromous adults could occur at any time in the Skagit River mainstem portion of the action area.

Although Bull Trout are relatively abundant in the lower Skagit River core area and most local populations include more than 100 adults, adult abundance in Newhalem Creek is unknown (USFWS 2006). During surveys conducted for the previous license application, bull trout were not observed in the creek, although native char were documented (City Light 1992). Bull Trout have been reported staging in the lower reaches of Newhalem Creek (Kraemer 2003 as cited in USFWS 2010); City Light also has documented this species in the lower portions of the creek in fall.

No Bull Trout have been observed above the 14-foot-tall waterfall located approximately 3,400 feet upstream from the mouth, which is considered a migration barrier to anadromous fish (Ebasco Environmental 1991). Because Bull Trout cannot access habitat upstream of the lower waterfall (RM 0.65), they are not present in the reach above the dam at RM 1.0.

5.3.8.5 Critical Habitat

The USFWS designated critical habitat for Bull Trout in the coterminous United States in September 2005 (70 FR 56212) and revised designated critical habitat for the species in October 2010 (75 FR 63898). The lower reaches of Newhalem Creek to the 14-foot waterfall barrier at RM 0.65 provide spawning and rearing habitat, and this is the area designated as critical habitat. Newhalem Creek is essential for maintaining distribution, abundance, and productivity in the Lower Skagit River core area (USFWS 2010).

The nine PBFs of Bull Trout critical habitat as revised in 2010, along with their status in the action area, are as follows:

- Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia:

  Existing Condition: Shallow springs, seeps, and groundwater sources occur throughout the Newhalem Creek subbasin and may contribute to water quality and thermal refugia for Bull Trout in the Skagit River mainstem. Relative to this PBF, the action area is believed to be functioning properly.

- Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers:

  Existing Condition: The lower reach of Newhalem Creek downstream of a natural waterfall at RM 0.65 is used by migrating adults and subadults. Although PBF 2 is absent from the upper portion of the action area due to the presence of two natural waterfalls that are impassable, these waterfalls are upstream of designated critical habitat.

- An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish:

  Existing Condition: PBF 3 is likely functioning properly and contributes to foraging, migratory, and overwintering (FMO) and spawning habitat in the Newhalem River, and FMO habitat in the Skagit River.

- Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes that establish and maintain these aquatic environments, with features such as large

wood, side channels, pools, undercut banks, and unembedded substrates to provide a variety of depths, gradients, velocities, and structure:

Existing Condition: PBF 4 is present in the action area; however, until the diversion ceased operations 10 years ago, the PBF was not functioning fully, as habitat complexity was reduced by flow regulation associated with the Project. This condition has improved, however, since the Project ceased diversions.

- Water temperatures ranging from 2 to 15ºC, with adequate thermal refugia available for temperatures that exceed the upper end of this range; specific temperatures within this range will depend on Bull Trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence:

  Existing Condition: PBF 5 is present and fully functioning in the action area. No reaches of the action area are identified as temperature-impaired on the 303(d) list (see Section 4.4.1 of this BA).

- In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival; a minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions; the size and amounts of fine sediment suitable to Bull Trout will likely vary from system to system.

  Existing Condition: WDFW's PHS database reports that Bull Trout may spawn and rear in Newhalem Creek (WDFW 2021a). Although no spawning surveys have been conducted recently to confirm if this is occurring (E. Lowery, City Light, personal communication, August 15, 2021), this PBF is likely functioning properly.

- A natural hydrograph, including peak, high, low, and base flows within historical and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph:

  Existing Condition: Although flow impairment is still reported from the mouth of the creek to the confluence with the East Fork due to surface water diversion at the Project site (see Section 4.4.1 of this BA), the Project ceased operations 10 years ago. A natural hydrograph is now present, and this PBF is therefore likely functioning properly.

- Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited:

  Existing Condition: The baseline condition of this PBF is likely functioning fully in the action area.

- Sufficiently low levels of occurrence of nonnative predators (e.g., Lake Trout, Walleye, Northern Pike, Smallmouth Bass), interbreeding (e.g., Brook Trout), or competing (e.g., Brown Trout) species that, if present, are adequately temporally and spatially isolated from Bull Trout:

  Existing Condition: Currently, there are naturally reproducing populations of Brook Trout in the Skagit River basin. However, it is not known to what degree this species predates on Bull Trout in the action area. This PBF is likely functioning properly.

6.0 EFFECTS OF THE ACTION ON LISTED SPECIES AND CRITICAL HABITAT

The following sections analyze potential effects of the Proposed Action on ESA-listed species and their critical habitat.

6.1 Gray Wolf

The Diobsud Pack is currently thought to consist of a single wolf with a territory that does not overlap the action area. However, wolves are highly mobile, and transients may enter the action area during decommissioning. Noise levels associated with dam removal and access road improvements, including helicopter use, may result in temporary avoidance of the action area but are highly unlikely to result in behavioral changes. Effects from the Proposed Action would be insignificant and **will not jeopardize the continued existence of** the gray wolf. If this species becomes listed prior to completion of the Proposed Action, it may affect, but is **not likely to adversely affect,** gray wolves.

6.2 Canada Lynx

The action area does not contain suitable lynx habitat, although individuals may occasionally move through. The transitory nature of use and lack of typical prey items suggests that the likelihood of encountering a lynx during implementation of the Proposed Action is remote and considered discountable. Therefore, the Proposed Action **may affect, but is not likely to adversely affect**, Canada lynx.

6.3 Grizzly Bear

The action area contains suitable foraging habitat for grizzly bear, but there have been no confirmed observations of this species in or near the action area in decades. The human presence and noise from the Proposed Action would likely result in avoidance behavior by any individual bear moving through the action area. For these reasons, the chances of encountering a grizzly during implementation of the Proposed Action is remote and considered discountable. Therefore, the Proposed Action **may affect, but is not likely to adversely affect**, grizzlies.

6.4 Marbled Murrelet

Access road improvements, Newhalem Creek diversion infrastructure removal, and concrete removal will occur over a period of four to five months from approximately June through mid-October of the first construction year. The tailrace barrier would be removed during the low-flow season in September through October during the first or second construction year. Considering this schedule, construction activities would overlap with the end of marbled murrelet nesting season (April 1 to September 23).

6.4.1 Effects on Suitable Nesting Habitat

Habitat within the action area is predominately unsuitable for murrelet nesting, except for the area near the tailrace barrier (see Section 5.3.4.3). However, if any trees are required to be cleared for decommissioning activities (see Section 4.2.2), City Light will direct the contractor to remove only dead trees or those that lack suitable nest platform characteristics. Therefore, the Proposed Action will not result in the loss of trees that may be suitable for marbled murrelet nesting, and tree

removal would not cause new canopy gaps. Considering these factors, the Proposed Action will have **no effect** on suitable nesting habitat for marbled murrelets.

6.4.2 Effects on Individuals Transiting through the Action Area

Radar surveys indicate that adult marbled murrelets may use Newhalem Creek and the Skagit River as flight corridors to and from marine foraging areas and suitable habitat outside the action area. Therefore, if present, adult murrelets could be exposed to in-air noise from construction equipment, particularly helicopters, during their morning and evening trips to and from marine foraging grounds. However, decommissioning activities that generate the most noise will be scheduled in late summer and fall, which will avoid the more sensitive times for murrelets, and noise-producing activities will not typically occur at pre-dusk and pre-dawn hours.

The USFWS has implemented standard threshold distances for Washington State Department of Transportation (WSDOT) construction projects to aid in the determination of potential effects on murrelets (WSDOT 2020). Disturbance, disruption, and/or physical injury distance thresholds for marbled murrelet during the nesting season (April 1 to September 23) are listed below (Table 6.4-1) and may be considered for the Proposed Action. Distances provided are from the activity to suitable habitat or a known occupied marbled murrelet stand. Because suitable habitat is largely absent from the action area, instead of distance to suitable habitat, distances are considered from the Skagit River mainstem because it may be used as a flyway between ocean foraging grounds and nesting sites.

Table 6.4-1. Disturbance, disruption, and physical injury distance thresholds for marbled murrelet during the nesting season, April 1 – September 23.

Activity	ESA Effect Determination – Marbled Murrelet			
	No Effect	NLAA	LAA – Disruption	LAA – Direct Injury or Mortality
Light maintenance (e.g., road brushing and grading) and heavily used roads	>0.25 mile	<0.25 mile	NA	NA
Heavy equipment use	>0.25 mile	328 feet (110 yards) to 0.25 mile	<328 feet	NA
Pile driving, rock crushing equipment	>0.25 mile	363 feet (121 yards) to 0.25 mile	<363 feet (121 yards)	<15 feet (5 yards) injury
Blasting	>1 mile	0.25 to 1 mile	<0.25 mile	<300 feet (100 yards) injury

Note: NA = not applicable; NLAA = not likely to adversely affect; LAA = likely to adversely affect
Source: Adapted from WSDOT 2020

Although small explosives may be used to fracture rocks along the landslide area, these activities do not produce noise that is equivalent to large-scale blasting (see Table 2.3-1 of this BA, light blasting). Regardless, the landslide location is more than 0.25 mile from the Skagit River and, based on the threshold distances provided in Table 6.4-1, a **not likely to adversely affect** determination is appropriate for the Proposed Action's effects on marbled murrelets from in-air noise disturbance.

Although helicopters may be used for some portion of the Proposed Action, there will be no disturbance of fledglings or nest feedings due to the lack of suitable habitat in the action area. If a helicopter is used, it will be staged at the Newhalem helipad, more than 6 miles up valley from the nearest known nesting habitat in the Bacon Creek and Cascade River drainages (City Light 2016). If required for spoils removal, helicopter flights up the Skagit Valley will occur less frequently and at relatively high altitude and should not directly affect migratory, feeding, or rearing activities. Noise levels at nests outside the action area will be at background levels, as suitable nesting habitat is several miles north or south of the flight path up the valley. However, depending on the flight patterns of adults in the valley, helicopter flights to and from the Project could have a minor, short-term, disturbance-related effect on marbled murrelets. Regardless, the possibility that helicopter noise will alter transitory behavior to a point that triggers prey loss or nest abandonment is remote.

Based on the disturbance threshold distances presented above, adverse effects from helicopter use will not occur because the helipad is located more than 328 feet from the Skagit River, where transiting murrelets may occur during the post-dawn and pre-dusk hours. Noise from the Newhalem helipad will be audible to murrelets if they are transiting along the Skagit River mainstem at the same time helicopters are taking off or landing, which is unlikely at pre-dusk or pre-dawn. Further, given the low numbers of murrelet detections along the Skagit River as recorded during recent radar surveys, the potential for this concurrent occurrence is considered discountable. For these reasons, the Proposed Action **may affect, but is not likely to adversely affect,** marbled murrelets.

6.4.3 Critical Habitat

The nearest block of designated critical habitat for the marbled murrelet is approximately 6 miles southeast of the action area. Therefore, the Proposed Action will have **no effect** on critical habitat for marbled murrelets.

6.5 Northern Spotted Owl

6.5.1 Effects on Suitable Nesting Habitat

The 2015 Goodell Fire eliminated most, if not all, suitable NRF habitat in the action area (see Section 5.3.5.3), and dispersal habitat is limited to a few unburned coniferous forest stands with suitable canopy (i.e., greater than or equal to 40 percent). Any trees removed for the Proposed Action will be limited to those that are dead or live ones that do not contain the characteristics to support nesting (see Section 4.2.2). Therefore, the Proposed Action will not result in the loss of trees that may be suitable for spotted owl dispersal or create new canopy gaps in dispersal or NRF habitat. Considering these factors, the Proposed Action will have **no effect** on suitable NFR or dispersal habitat for spotted owls.

6.5.2 Effects on Individuals in the Action Area

Based on USFWS standard threshold distances for construction projects (WSDOT 2020) and the lack of suitable nesting habitat within 0.25 mile of decommissioning activities, noise from the Proposed Action would not affect nesting northern spotted owls. Table 6.5-1 provides disturbance, disruption, and/or physical injury distance thresholds for spotted owls.

Table 6.5-1. Disturbance, disruption, and/or physical injury distance thresholds for spotted owls.

Activity	ESA Effect Determination – Spotted Owls				
	No Effect (March 1 – Sept 30)	**NLAA (March 1 – Sept 30)**	**LAA – Harass Early Nesting Season Disruption Distance (March 1 – July 15)**	**LAA – Harass Late Nesting Season Disruption Distance (July 16 – Sept 30)**	**LAA – Direct Injury or Mortality (March 1 – Sept 30)**
Heavy equipment use, including chainsaws	>0.25 mile	>195 feet to 0.25 mile	≤195 feet	NA[1]	NA
Pile driving	>0.25 mile	360 feet to 0.25 mile	≤360 feet	NA[1]	≤15 feet (injury)
Blasting	>1 mile	0.25 to 1 mile	≤0.25 mile	NA[1]	≤300 feet (injury)

Note: Distances are to known, occupied spotted owl nest tree or suitable nest trees in unsurveyed nesting habitat (USFWS 2015, adapted from WSDOT 2020); this disturbance guidance applies to NRF habitat; disturbance to dispersal habitat is NLAA.

1 During the late nesting season, disturbance effects are considered discountable; therefore, they qualify for informal coverage.

If spotted owls use remnant forest stands in or near the action area for dispersal, noise from construction, including helicopter use, might cause an individual to avoid the affected area. However, considering the limited amount of dispersal habitat remaining in the action area, and because most spotted owl activity occurs at night when construction would not occur, noise from heavy equipment or helicopter use is highly unlikely to affect dispersal. Therefore, the Proposed Action **may affect, but is not likely to adversely affect,** northern spotted owls. This determination is also supported by the unlikely occurrence of spotted owls in the action area, as discussed in Section 5.3.5.3.

6.5.3 Critical Habitat

No critical habitat for the northern spotted owl is designated within the action area. The closest designated critical habitat is located approximately 5.5 miles southwest of the action area. Therefore, the Proposed Action will have **no effect** on critical habitat for the northern spotted owl.

6.6 Puget Sound Steelhead

Over time, the Proposed Action will restore pre-dam sediment and nutrient transport conditions to occupied habitat downstream of the dam. The Proposed Action will result in more natural riverine processes that provide benefits to Puget Sound steelhead from improved habitat conditions in Newhalem Creek. Such conditions may also benefit macroinvertebrate prey species in the action area. Therefore, over the long-term the Proposed Action is expected to benefit Puget Sound steelhead and may contribute to the overall recovery of the species in the lower Skagit River core area, particularly in Newhalem Creek. In the short term, however, the Proposed Action includes several construction and post-construction elements that could potentially affect Puget Sound steelhead; these are discussed in the following sections.

6.6.1 Newhalem Creek Diversion Removal

Instream work to decommission the diversion dam and headworks structure will occur from July 16 to September 1 (see Section 2.5). The work will occur approximately 2,000 feet upstream of a full passage barrier at RM 0.65 and outside habitat potentially occupied by Puget Sound steelhead (see Section 5.3.6). This species would therefore not be exposed to potential harm or harassment from instream excavator use, the placement and removal of cofferdams, fish salvage and relocation, or in-water noise or vibration during infrastructure removal. Although the proposed dam removal using jackhammers or non-explosive rock fracturing agents will occur "in the dry" behind cofferdams, such actions will produce noise that could transfer to the active channel. However, the creek's sinuosity and steep gradient downstream of the dam will truncate the area affected by elevated in-water noise levels. Upon hitting a land mass, noise transmission will stop, as sound waves do not transmit around river bends. Therefore, in-water noise from dam removal will not be perceptible in the lower reaches of the creek occupied by ESA-listed steelhead.

Downstream water quality degradation caused by construction-related turbidity from cofferdam installation and removal will be localized and will comply with Washington State water quality standards for turbidity in rivers exceeding 100 cfs. The substrate in the action area is dominated by gravels and cobbles, with few fines. It is expected that fine sediments in the water column will settle out to the streambed in a distance less than 300 feet downstream of the cofferdams. Therefore, Puget Sound steelhead, which are blocked from upstream passage at the lower natural waterfall at RM 0.65, will not be exposed to measurable levels of construction-related turbidity.

Puget Sound steelhead may be present year-round in the lower reaches of the creek, and in the Skagit River mainstem portion of the action area. If rearing juveniles are present in the lower reaches of Newhalem Creek during in-water work, construction presents risks associated with potential releases of fuel or oil into the creek from equipment and machinery. In the event of a spill, fish could be adversely affected by released chemicals or contaminants. Sources of fuel and oil spills or leakage into the stream channel include heavy equipment, portable water pumps, or products stored on site throughout the duration of the Project. However, spill risks will be greatly reduced with the implementation of the spill prevention, containment, and control plan to be prepared by the contractor selected for the Project. Specific minimization measures have been established regarding fuel storage, fueling of equipment, and spill containment (see Section 2.7). These measures will reduce or eliminate the potential for spill events, and therefore reduce or eliminate any effects on this listed species. Hydraulically operated equipment that may work below the OHWM will be retrofitted with biodegradable fluid in the hydraulic system. This measure will minimize the potential for deleterious effects on fish should a hydraulic line failure occur.

6.6.2 Dam Access Road Improvements

The existing diversion structure access road is located along a steep ridge that slopes toward Newhalem Creek. A steep, vegetated, rocky hillside separates the road from the creek below. Access road improvements will involve the use of excavators and other machinery to grade the surface, armor the slopes, remove landslide boulders, and stabilize the road embankments. These actions have the potential to cause erosion and introduce sediment and loose rocks and debris into the creek below. To minimize the potential for downslope erosion, the selected contractor would be required to implement sediment and erosion control measures, including the use of straw bales, fiber wattles, silt fencing, or similar. The timing of access road improvements will also minimize

erosion potential (see Table 2.5-1), improvements are proposed to occur a few months prior to diversion structure removal, in summer, when drier conditions should reduce the potential for erosion and runoff.

The landslide along the access road is adjacent to Newhalem Falls, well upstream of the lowermost waterfall at RM 0.65 that constitutes a full fish passage barrier. Therefore, no steelhead spawning or rearing occurs immediately downslope of the landslide. Any effects on instream water quality from access road improvements are expected to be insignificant and will not adversely affect any life stage of Puget Sound steelhead in the action area.

6.6.3 Tailrace Barrier Removal

Because the tailrace barrier fully excludes all fish and would be removed during the fall low-flow period when it is disconnected from the Skagit River, activities associated with its removal will have no effect on Puget Sound steelhead.

6.6.4 Post-Construction Effects – Changes in Sediment and Nutrient Transport

Steelhead do not occur upstream of the diversion dam due to the presence of two impassable waterfall barriers at RM 0.65 and RM 0.8. However, geomorphologic changes in the channel upstream of the dam following decommissioning will influence the amount of sediment transported downstream to habitats occupied by steelhead.

Accumulated sediment will be transported downstream during high-flow periods and is expected to reach equilibrium over approximately 10 years (Watershed GeoDynamics 2021). Sediment transported through the high-gradient reach below the dam will be deposited on the Newhalem Creek fan upstream of the Skagit River confluence (see Section 4.1.3). If a high-flow event coincides with peak steelhead spawning periods, sediment transport may increase turbidity to levels that cause sublethal and behavioral effects on juveniles, adults, and eggs in the lower reaches of Newhalem Creek, as presented in the following sections.

6.6.4.1 Potential Effects on Juveniles and Adults

In northwestern watersheds, natural background turbidity varies on a seasonal basis depending on when precipitation and runoff occur (Servizi and Martens 1987). High rainfall and storm events usually cause some erosion and a pulse of sedimentation in streams. Removal of the Newhalem Creek diversion structure will provide the opportunity for natural high-flow events to transport sediments that have accumulated upstream of the dam since its inception. Individual high-flow events will therefore transport more sediment for approximately 10 years post construction compared to previous years.

Studies of the effects of increased turbidity on salmonids suggest a range of potential impacts on their physiology and behavior (Lloyd 1987; Everest et al. 1987; Newcombe and MacDonald 1991; Gregory and Northcote 1993). Newcombe and MacDonald (1991) grouped effects of sediment on salmonids into three categories: lethal, sublethal, and behavioral. Lethal effects may kill individual fish, while sublethal effects may result in injury that leads to an individual's decline in fitness over time. Behavioral effects are those that result in a change in activity typically associated with an organism in an undisturbed environment.

Lloyd (1987) suggested that high levels of suspended solids may be fatal to salmonids, while lower levels of suspended solids and turbidity may cause episodic sublethal effects such as loss or reduction of foraging capability, increased stress, and interference with cues necessary for orientation in homing and migration. Newcombe and Jensen (1996) demonstrated that behavioral changes for both adult and juvenile salmonids began to occur at relatively low total suspended solids (TSS) levels at around 20 milligrams per liter (mg/L) after one hour of exposure (avoidance response). If individuals remained exposed to elevated TSS levels, sublethal effects began to occur, and major physiological stress occurred at approximately 1,100 mg/L after 24 hours of exposure.

Salmonid populations not normally exposed to high levels of natural turbidity or exposed to anthropogenic sediment sources may be negatively affected by levels of turbidity considered to be relatively low (18 to 70 nephelometric turbidity units [NTU]) (Gregory 1992). Still, it is apparent that salmonids can cope with some level of turbidity at certain life stages (Gregory and Northcote 1993). Evidence of this is the presence of juvenile salmonids in turbid estuaries prior to leaving for the ocean, and in local streams characterized by high natural levels of glacial silt and therefore high turbidity and low visibility (Gregory and Northcote 1993).

Turbidity is most likely to affect rearing steelhead if it reaches a level that alters typical behaviors. In laboratory settings, salmonids will move to less turbid waters, if available, after a short-term pulse (Berg and Northcote 1985). Bisson and Bilby (1982) illustrated the displacement of salmonids in water with turbidities greater than 70 NTU. Behavioral effects from short-term sediment pulses exhibited altered territory structure and feeding behavior in juvenile Coho Salmon (Berg and Northcote 1985). Following a sediment pulse, a breakdown in social organization among juvenile Coho Salmon occurred but was re-established when turbidity decreased to 20 NTU (Berg 1982). These results suggest that salmonids in a river system might seek out turbidity refugia when subjected to short-term pulses of sediment, such as those that could occur as sediment accumulated upstream of the dam is moved downstream during high-flow events following dam removal.

Under the Proposed Action, the increase in turbidity levels over baseline due to the transport of accumulated sediments is unknown. However, because accumulated sediments upstream of the dam are primarily coarse in nature with few fines, turbidity increases are expected to be relatively low but measurable. Accumulated sediments will be transported during high-flow events when background turbidity will be naturally elevated from runoff and other sediment transport. The effects on steelhead from the transport of accumulated sediment caused by the Proposed Action are expected to be sublethal in nature and will primarily affect the behavior of mobile juveniles and adults, as they would either swim through any plume or make evasive movements to avoid high levels of turbidity. Based on the best available information, the effects of suspended sediment on steelhead juveniles or adults resulting from downstream sediment transport under the Proposed Action **may affect, and are likely to adversely affect,** Puget Sound steelhead in the action area. The effects of the Proposed Action will continue until accumulated sediments reach equilibrium upstream of the dam. Adverse effects would be short term and episodic, associated with seasonal high-flow events that have the capacity to transport accumulated sediments to the lower reaches of Newhalem Creek and, ultimately, to the Skagit River.

6.6.4.2 Effects on Spawning Habitat and Incubating Eggs

Organic matter deposition on substrates supporting redds may reduce dissolved oxygen concentrations, harming eggs (Spence et al. 1996). The greater the proportion of fine sediments in redds, the greater likelihood that egg survival may be lowered (Lloyd 1987) or that hatched fry could be entrapped (Everest et al. 1987). Lloyd (1987) summarized the results of numerous studies on sedimentation effects on salmonids and reported reduced egg survival of Chum Salmon at turbidity levels of 97 mg/L and of Rainbow Trout at 110 mg/L. Coho and Chinook salmon egg fatalities were observed at much higher turbidity levels, ranging from 488 to 1,200 mg/L. In addition to direct effects on incubating eggs or newly emergent fry, the infiltration of fines into streambed gravels can alter the quality of the bed for future spawning or for use by instream biota that may provide prey to juvenile salmonids (Everest et al. 1987).

Assuming that spawning times in Newhalem Creek are similar to those in the Skagit River mainstem, Puget Sound steelhead may spawn in Newhalem Creek from March through June; eggs would be present from March through early August (see Section 5.3.6.3 of this BA). Flows increase during the later portion of the incubation period, from May through July (see Table 2.2-2) and may transport larger quantities of accumulated sediment from the wedge developed upstream of the dam. Because substrates accumulated upstream of the dam generally consist of boulders, cobbles, and gravels (Dube 2021), the potential for fine sediment deposition on downstream redds in the lower reach of Newhalem Creek is low and would not be expected to result in reduced egg survival. Sands that are carried downstream are not expected to be deposited in sufficient quantities to smother eggs and deplete them of oxygen.

6.6.5 Critical Habitat

The Proposed Action has the potential to affect PBFs for Puget Sound steelhead critical habitat as described below. Only those PBFs related to freshwater life history periods have the potential to be affected.

6.6.5.1 PBF 1: Freshwater Spawning Sites

In-water work to remove the Newhalem Creek diversion structure and the tailrace barrier will have insignificant to no effect on spawning sites in the lower reaches of Newhalem Creek. Steelhead have no access to the tailrace barrier, which is isolated from the Skagit River (see Figure 2.2-10). Steelhead do not occur near the dam reach, as passage is completely blocked by two downstream waterfalls. Construction-related turbidity from cofferdam removal and placement would not be measurable within designated critical habitat, which includes the lower reach of Newhalem Creek up to approximately RM 0.65.

Following removal of the Newhalem Creek diversion, the transport of sediments that have accumulated upstream of the dam to downstream reaches may affect spawning substrates. However, because accumulated sediments are primarily coarse in nature, fine sediment deposition is expected to be low, resulting in insignificant effects on this PBF. The transport of coarse substrates suitable for spawning may ultimately benefit Puget Sound steelhead critical habitat in the action area over time.

Under the Proposed Action, permanent removal of the diversion will continue the current condition for perpetuity (i.e., flow from Newhalem Creek will not be diverted upstream of critical habitat).

Over the long term, and consistent with current conditions, this could benefit spawning habitat by increasing flow during the early portions of the late-winter spawning period by increasing wetted width and available spawning habitat. Because the lower portion of Newhalem Creek is flow-impaired, the Proposed Action will permanently address a water quality degradation that has existed for 100 years.

In summary, because fine sediments are unlikely to be transported in quantities that may adversely affect spawning habitats, the Proposed Action is **not likely to adversely affect** PBF 1.

6.6.5.2 PBF 2: Freshwater Rearing Sites

Ultimately, elements of the Proposed Action will benefit PBF 2. Over time, the Proposed Action will restore natural sediment and nutrient transport processes. However, because juveniles rear in the action area year-round, the downstream transport of accumulated sediment may result in episodic turbidity increases that affect foraging, territorial behaviors, or predatory responses. These effects are expected until the creek reaches equilibrium following dam removal, which is expected approximately 10 years post construction. Therefore, although sediment transport is **likely to adversely affect** PBF 2 during high-flow events that increase downstream turbidity in critical habitat, the long-term benefits from increased nutrient transport will outweigh these short-term effects.

6.6.5.3 PBF 3: Freshwater Migration Corridors

The action area, which includes the Skagit River and lower reaches of Newhalem Creek to approximately RM 0.65, serves as a migration corridor for upstream migrating adults and downstream migrating kelts and smolts. The action area also supports local movements of rearing juveniles. Because steelhead do not occur upstream of RM 0.65, the existing Newhalem Creek diversion dam (RM 1.0) is not a barrier to migration (and is not located within critical habitat). Regardless, dam removal and the permanent cessation of flow diversion will improve flow conditions in Newhalem Creek over the long term, which could benefit staging adults during spawning, or outmigrating smolts in spring/early summer.

The levels of turbidity expected from the downstream transport of accumulated sediments could temporarily alter migration patterns if an individual fish became disoriented. However, high levels of turbidity that could cause fish to abandon migratory routes, or that block accessible reaches, will not occur. Therefore, the Proposed Action **may affect, but is not likely to adversely affect**, PBF 3 in the action area.

6.7 Puget Sound Chinook

Use of lower Newhalem Creek by Chinook Salmon for spawning has been reported (see Section 5.3.7.3) but this area is not considered prime habitat. However, the lower reaches of the creek could be a refuge for rearing juveniles during high-flow events in the Skagit River. The Proposed Action will result in more natural riverine processes in the creek that will benefit aquatic habitat and macroinvertebrate prey species in the action area. Therefore, the Proposed Action is expected to benefit Chinook Salmon over the long-term. In the short term, however, there are several construction and post-construction elements that could potentially affect Chinook Salmon; these are discussed in the following sections.

6.7.1 Newhalem Creek Diversion Removal

Instream work to decommission the diversion dam and headworks structure will occur from July 16 to September 1 (see Section 2.5). Potential dam-removal effects on juvenile Puget Sound Chinook Salmon that may occupy habitat 2,000 feet downstream of the in-water work site will be similar to those described previously for juvenile Puget Sound steelhead (see Section 6.6.1).

The timing of in-water work will overlap with adult upstream migration and spawning periods for adult Chinook Salmon. Although lower Newhalem Creek is unlikely to be used for spawning (see Section 5.3.7.3), in the remote event that spawning adults are present, they could be exposed to downstream water quality degradation caused by turbidity from cofferdam removal. However, considering cofferdams would be removed by September 1, when flows are typically low, and because the substrate in the action area contains few fines, turbidity levels in spawning areas more than 2,000 feet downstream of the in-water work area are expected to be minimal and remain within sublethal limits for adults or incubating eggs.

6.7.2 Post-Construction Effects

The Proposed Action has the potential to affect Puget Sound Chinook Salmon in the lower reaches of Newhalem Creek during seasonal high-flow events that transport accumulated sediment from upstream of the dam. The lower reaches of the creek could provide a refuge for rearing juveniles during high-flow events in the Skagit River (see Section 5.3.7.3). Juveniles present in Newhalem Creek during high-flow periods could be exposed to increased levels of turbidity as accumulated sediment is transported downstream. Sublethal and behavioral effects on juvenile Chinook Salmon would be similar to those presented for juvenile steelhead. Therefore, the Proposed Action **may affect,** and is **likely to adversely affect,** Puget Sound Chinook Salmon.

The mainstem Skagit River is used by Chinook salmon for spawning and rearing. Lower Newhalem Creek may also be used for these purposes although habitat conditions appear to be more suitable for rearing than spawning (see Section 5.3.7.3). If Newhalem Creek is used by summer Chinook Salmon for spawning, adults are unlikely to be affected by increased turbidity associated with mobilized sediments because they typically enter the action area and spawn at times when high flows are unlikely (Table 4.1-1). The Proposed Action may result in some sediment deposition on incubating eggs in the creek if flows during the incubation period are sufficient to mobilize sediments accumulated upstream of the dam.

For those individuals that spawn in the Skagit River, increased levels of turbidity from the transport of accumulated sediment under the Proposed Action are unlikely to be discernible from background levels beyond the immediate confluence with Newhalem Creek. Therefore, unless a redd was created at or just downstream of the confluence, Project-related effects on adults and incubating eggs would be insignificant.

6.7.3 Critical Habitat

Within the action area, critical habitat for Puget Sound Chinook Salmon is only designated in the Skagit River. Given that the Skagit River will experience seasonal pulses of sediment during seasonal high-flow events regardless of the Proposed Action, turbidity associated with accumulated sediment transport in Newhalem Creek is unlikely to be measurable beyond the immediate confluence with the Skagit River. Effects on all PBFs for Puget Sound Chinook Salmon

from the Proposed Action are anticipated to be insignificant, and it is highly unlikely that the Proposed Action will measurably affect the conservation value of critical habitat in the Skagit River mainstem. Therefore, the Proposed Action **may affect,** but is **not likely to adversely affect,** critical habitat for Puget Sound Chinook Salmon.

6.8 Bull Trout

Bull Trout may spawn or rear in Newhalem Creek downstream of the lowermost waterfall at RM 0.65 (see Section 5.3.8.4). Further, amphidromous adults and subadults use the Skagit River as a migratory corridor. Over the longer term, the Proposed Action will contribute to the restoration of more natural riverine processes that improve habitat conditions in Newhalem Creek. Therefore, the Proposed Action is expected to benefit Bull Trout and may contribute to the overall recovery of the species in the lower Skagit River core area. In the short term, however, several construction and post-construction elements that could potentially affect Bull Trout; these are discussed in the following sections.

6.8.1 Newhalem Creek Diversion Removal

Potential dam-removal effects on juvenile Bull Trout that may occupy habitat 2,000 feet downstream of the in-water work site will be similar to those described previously for juvenile Puget Sound steelhead (see Section 6.6.1).

The timing of in-water work overlaps with the potential upstream migration period for pre-spawning adult Bull Trout. Effects from turbidity from cofferdam removal would be expected to be similar to those for Chinook Salmon and would not result in lethal effects to pre-spawning, staging adults.

6.8.2 Post-Construction Effects

The Proposed Action has the potential to affect Bull Trout in the lower reaches of Newhalem Creek during seasonal high-flow events that transport sediment accumulated upstream of the dam. Bull Trout may rear in the Skagit River mainstem and may possibly spawn and rear in Newhalem Creek (see Section 5.3.8.4). Juveniles present in Newhalem Creek during high-flow periods could be exposed to elevated turbidity as accumulated sediment upstream of the former dam site is transported downstream. Sublethal and behavioral effects on juvenile Bull Trout would be similar to those presented for juvenile steelhead (see Section 6.6.4). Therefore, the Proposed Action **may affect,** and is **likely to adversely affect,** Bull Trout.

If Newhalem Creek is used by Bull Trout for spawning, adults are unlikely to be affected by increased turbidity associated with mobilized sediments because they typically enter the action area and spawn at times when flows are lower (Table 4.1-1). The Proposed Action may result in some sediment deposition on incubating eggs in the creek if flows during the incubation period are sufficient to mobilize sediments accumulated upstream of the dam.

6.8.3 Critical Habitat

Post-construction changes in stream function resulting from diversion cessation and infrastructure removal under the Proposed Action will affect designated critical habitat for Bull Trout in the

lower reaches of Newhalem Creek and the Skagit River. The anticipated effects on Bull Trout critical habitat PBFs from the Proposed Action are as follows:

- Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia:

  Effect: In-water work to remove the diversion structure and tailrace barrier will take place in areas that are not designated as critical habitat for Bull Trout. However, following the removal of the Newhalem Creek diversion structure and the permanent cessation of flow diversion, this PBF may improve, over time, particularly if such springs and seeps are hyporheic in nature. The permanent cessation of flow diversion, especially during base flow conditions, could improve thermal refugia for Bull Trout in lower reaches of Newhalem Creek during the low-flow summer months. Therefore, the proposed Action **may affect, but is not likely to adversely affect,** this PBF.

- Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers:

  Effect: Designated critical habitat in the action area, which includes the Skagit River and the lower reaches of Newhalem Creek to approximately RM 0.65, provides a migration corridor for amphidromous adults and subadult Bull Trout. The action area also supports local movements of rearing juveniles. Because Bull Trout do not occur upstream of the waterfall barriers at RM 0.65 and RM 0.8, the existing Newhalem Creek diversion dam (RM 1.0) is not a barrier to migration (nor located within critical habitat).

  The levels of turbidity expected from the downstream transport of accumulated sediments could temporarily alter migration patterns if an individual became disoriented. However, high levels of turbidity that could cause fish to abandon migratory routes, or that block accessible reaches, will not occur. Therefore, the Proposed Action **may affect, but is not likely to adversely affect,** this PBF in the action area.

- An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish:

  Effect: Rearing juvenile Bull Trout may occur in the lower reaches of Newhalem Creek. Although episodic increases in turbidity during seasonal high-flow events could temporarily affect prey species, turbidity levels are not expected to be high enough to result in chronic harm or mortality. Restoration of the natural nutrient and sediment transport regimes could improve natural productivity in the lower reaches of Newhalem Creek, which would benefit this PBF. Therefore, the Proposed Action **may affect, but is not likely to adversely affect,** this PBF in the action area.

- Complex river, stream, lake, reservoir, and marine shoreline aquatic environments as well as processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks, and unembedded substrates to provide a variety of depths, gradients, velocities, and structure:

Effect: The Proposed Action will restore sediment connectivity to downstream reaches and remove a barrier to large wood transport at the diversion structure. This may ultimately increase the complexity of instream and side channel features. The Proposed Action is expected to improve stream functions, including those related to geomorphology and biologic parameters, which should ultimately benefit this PBF. Therefore, the Proposed Action **may affect, but is not likely to adversely affect,** this PBF in the action area.

- Water temperatures ranging from 2 to 15ºC, with adequate thermal refugia available for temperatures that exceed the upper end of this range; specific temperatures within this range will depend on Bull Trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence:

  Effect: When in operation, the Project diverted up to 69 cfs into the power tunnel for hydroelectric production. Although this has not occurred in more than 10 years, the Proposed Action will remove the dam and make the current natural flow regime permanent. Therefore, the Proposed Action will have **no effect** on this PBF in the action area.

- In spawning and rearing areas, a substrate of sufficient amount, size, and composition to ensure the success of egg and embryo overwinter survival:

  Effect: In-water work to remove the Newhalem Creek diversion structure and the tailrace barrier will have insignificant to no effect on spawning substrates in the lower reaches of Newhalem Creek. Bull Trout have no access to the tailrace barrier, which is isolated from the Skagit River, particularly during low-flow summer periods (see Figure 2.2-10). Bull Trout do not occur near the dam site, as passage is completely blocked by two downstream waterfalls. Construction-related turbidity from cofferdam removal and placement would not likely be measurable within designated critical habitat, which includes the lower reach of Newhalem Creek up to approximately RM 0.65.

  Following removal of the Newhalem Creek diversion, the transport of sediments that have accumulated upstream of the dam to downstream reaches may affect spawning substrates. However, because accumulated sediments are primarily coarse in nature, fine sediment deposition is expected to be low, resulting in insignificant effects on this PBF. The transport of coarse substrates suitable for spawning may ultimately benefit Bull Trout critical habitat in the action area over time.

  In summary, because fine sediments are unlikely to be transported in quantities that may adversely affect spawning habitats, the Proposed Action is **not likely to adversely affect** this PBF.

- A natural hydrograph, including peak, high, low, and base flows within historical and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph:

  Effect: Because the Project has not diverted flows for more than 10 years, the Proposed Action would have **no effect** on this PBF except to make this relatively recent change (i.e., no surface water diversion) a more permanent condition.

- Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited:

  Effect: Ultimately, elements of the Proposed Action will benefit this PBF. Over time the Proposed Action will restore natural sediment and nutrient transport processes. However, because juveniles rear in the action area year-round, the downstream transport of accumulated sediment may result in episodic turbidity increases that affect foraging, territorial behaviors, or predatory responses. These effects will occur seasonally until the creek reaches equilibrium following dam removal, which is expected approximately 10 years post construction. Therefore, although sediment transport is **likely to adversely affect** this PBF during high-flow events that increase downstream turbidity in critical habitat, the long-term benefits from increased flow and nutrient transport will outweigh these short-term effects.

- Sufficiently low levels of occurrence of non-native predators (e.g., Lake Trout, Walleye, Northern Pike, Smallmouth Bass), interbreeding (e.g., Brook Trout), or competing (e.g., Brown Trout) species that, if present, are adequately temporally and spatially isolated from Bull Trout:

  Effect: The Proposed Action **will not affect** this PBF.

7.0 CUMULATIVE EFFECTS

The ESA defines cumulative effects (50 CFR § 402.02) as the additive effects of future state and private activities that are reasonably certain to occur in the action area. Federal actions are not considered because they require separate cumulative effects analysis consultation pursuant to Section 7 of the ESA.

Within the action area, the following non-federal actions may contribute to effects, both positive and negative, on ESA-listed fish:

- Presence and use of roads adjacent to waterbodies included in the action area.
- WDFW and Skagit River System Cooperative, Skagit Chinook Recovery Plan.
- Puget Sound Partnership, Salmon Recovery Plan.
- Skagit Watershed Council Strategic Plan.
- WDFW/Tribal Hatchery and Harvest Programs.

In the Skagit River mainstem, activities near the action area (e.g., upstream dams, roads, and bridge crossings) have altered the flow regime, decreased sediment transport, degraded the connection between river and riparian habitats, increased sedimentation in streams, and altered floodplain function. However, the Proposed Action is compatible with and additive to other aquatic habitat and fish management programs in the region intended to improve habitat for ESA-listed fish. When combined with ongoing and reasonably certain future activities in the Skagit River basin, the Proposed Action is unlikely to contribute to adverse cumulative effects on ESA-listed species or designated critical habitat. Over the long term, because the Proposed Action will restore sediment and nutrient conveyance to reaches downstream of the current diversion structure, measurable cumulative effects on ESA-listed species or designated critical habitat are expected to be positive in nature and will improve aquatic habitat baseline conditions in the action area.

8.0 SUMMARY OF EFFECTS DETERMINATIONS

8.1 Species-Specific Determinations

Species-specific effect determinations and supporting rationale are summarized below and in Table 8.1-1.

Table 8.1-1. Effect determinations for ESA-listed and proposed species and designated critical habitats in the action area for the Project.

Species	Status	Effect Determination for Species	Effect Determination for Critical Habitat
NMFS			
Puget Sound steelhead	Threatened	LAA	LAA
Puget Sound Chinook Salmon	Threatened	LAA	NLAA
USFWS			
Gray Wolf	Proposed Endangered	Will not jeopardize continued existence; NLAA provisional determination	NA
Marbled Murrelet	Threatened	NLAA	NE
Northern Spotted Owl	Threatened	NLAA	NE
Yellow-billed Cuckoo	Threatened	NE	NE
Bull Trout	Threatened	LAA	LAA
Whitebark Pine	Proposed Threatened	Will not jeopardize continued existence; NE provisional determination	NA

Note: NE = no effect; LAA = may affect, likely to adversely affect; NLAA = may affect, not likely to adversely affect.

8.1.1 Gray Wolf

The IPaC list obtained for the Proposed Action lists gray wolves as proposed endangered. Based on the analysis presented in Section 6.1 of this BA, the Proposed Action **will not jeopardize the continued existence of** the proposed endangered gray wolf. If this species becomes listed prior to completion of the Proposed Action, it **may affect, but is not likely to adversely affect,** gray wolves.

The Proposed Action **may affect** gray wolves because a gray wolf has been observed in the general vicinity of the action area in recent years. Therefore, the potential that transitory individuals may be present and therefore exposed to Project-related noise or increased human presence associated with decommissioning efforts is not completely discountable.

The Proposed Action is **not likely to adversely affect** gray wolves because increased noise associated with dam decommissioning and access road improvements, including possible helicopter use, is highly unlikely to result in behavioral changes that affect foraging or movement through or near the action area. No denning is known to occur in the action area. Therefore, effects from the Proposed Action would be insignificant.

Critical habitat for gray wolves has not been designated or proposed in the action area.

8.1.2 Canada Lynx

The Proposed Action **may affect** Canada lynx because the action area contains suitable dispersal for lynx, and individuals may occasionally move through the area.

The Proposed Action is **not likely to adversely affect** Canada lynx because the transitory nature of use and lack of prey suggest that the likelihood of encountering a lynx during implementation of the Proposed Action is remote and therefore discountable.

8.1.3 Grizzly Bear

The Proposed Action **may affect** grizzlies because the action area contains suitable foraging habitat for grizzly bears.

The Proposed Action is **not likely to adversely affect** grizzlies because the action area is too low in elevation for denning. No observations have been reported at or near the dam, access road, or tailrace barrier, suggesting that the action area is not typically used by grizzly bears, nor is it a travel corridor. For these reasons, the likelihood of encountering a grizzly during implementation of the Proposed Action is remote and considered discountable.

8.1.4 Marbled Murrelet

The Proposed Action **may affect** marbled murrelets because:

- Some blocks of unburned forest near the tailrace barrier location may contain trees with suitable nesting characteristics.
- Elements of the Proposed Action will occur during the marbled murrelet nesting season (April 1 to September 23), and a few adults may use the Skagit River as a migratory corridor between marine foraging areas and nests outside of the action area, in suitable habitat upriver from the Project.

The Proposed Action is **not likely to adversely affect** marbled murrelets because:

- Suitable nesting habitat is not present near the diversion structure and access road because the 2015 Goodell Fire burned most of the forest, leaving only scattered live conifers with little to no canopy for nesting and predator avoidance.
- No suitable nesting trees will be removed.
- Considering the distance of the Newhalem Creek diversion structure and access road from the Skagit River mainstem, which may be used as a flyway for adults to and from suitable nesting habitat upriver, in-air noise from most construction activities will not reach adverse disturbance threshold distances presented in Table 6.4-1.
- Noise from helicopter take offs and landings at the Newhalem helipad will be audible to murrelets if they are transiting along the Skagit River mainstem at the same time helicopters are taking off or landing (e.g., pre-dawn and dusk hours, when helicopters are highly unlikely

to operate). However, given the low numbers of murrelet detections along the Skagit River near the action area, the potential for this occurrence is considered discountable.

The Proposed Action will have **no effect** on critical habitat for marbled murrelets because critical habitat is not designated in the action area, and there will be **no effect** on the nearest critical habitat located approximately 6 miles southeast of the action area.

8.1.5 Northern Spotted Owls

The Proposed Action **may affect** northern spotted owls because:

- Remnant pockets of suitable dispersal habitat are present in portions of the action area that could be exposed to construction noise, including helicopter use.

The Proposed Action is **not likely to adversely affect** northern spotted owls because:

- Suitable NRF habitat is not present in the action area because the 2015 Goodell Fire burned much of the forest. Within 0.25 mile of the diversion site and access road, the action area contains scattered live conifers with little to no canopy for foraging and predator avoidance.
- No suitable nesting trees will be removed; tree removal, if any, would be limited to trees burned during the Goodell Fire. These trees do not contribute to canopy structure; therefore, removal would not create canopy gaps or affect dispersal habitat.
- Although spotted owls may be active during the day, they are primarily nocturnal, and construction (and related noise) would not occur at night.
- The lack of known nesting sites and the presence of barred owl in the action area indicate that the likelihood of encountering spotted owl is so remote as to be discountable.

The Proposed Action will have **no effect** on critical habitat for the northern spotted owl because critical habitat is not designated within the action area. The Proposed Action will have **no effect** on the nearest critical habitat, located approximately 5.5 miles to the southwest of the action area.

8.1.6 Puget Sound Steelhead

The Proposed Action **may affect** Puget Sound steelhead because:

- Adult steelhead are reported to spawn in the lower reaches of Newhalem Creek.
- Rearing juveniles may be present year-round in both the lower reaches of Newhalem Creek and the portion of the Skagit River in the action area.
- Although steelhead do not occur at the Newhalem Creek diversion site (RM 1.0) due to the presence of two downstream waterfalls at RM 0.65 and 0.8 that are full-passage barriers, the Proposed Action will affect downstream sediment transport and nutrient transport processes in the action area.

The Project is **likely to adversely affect** Puget Sound steelhead because:

- Diversion structure removal will result in the movement of sediments accumulated upstream of the dam to downstream habitats occupied by Puget Sound steelhead. The temporary,

episodic effects on steelhead from the transport of accumulated sediment caused by the Proposed Action are expected to be sublethal in nature and will primarily affect the behavior of mobile juveniles and adults in occupied reaches of the action area.

Although the determination is **likely to adversely affect** Puget Sound steelhead, the Project will not jeopardize its continued existence. Adverse effects will be minimized because:

- In-water work to remove the tailrace barrier and the Newhalem Creek diversion structure will not require handling of Puget Sound steelhead during fish salvage and relocation because steelhead cannot access either location.
- Considering the relatively coarse nature of sediments upstream of the dam, sediment transport to downstream reaches during seasonal high flows should not deposit fine sediments that measurably affect spawning habitat or incubating eggs.
- Beneficial effects associated with dam removal could improve spawning and rearing habitat in the lower reaches of Newhalem Creek. Diversion removal would restore natural sediment regimes over time and improve nutrient transport to the Skagit River and the lower reaches of Newhalem Creek.

Based on the PBF analysis presented in Section 6.6.5 of this BA, the Proposed Action **may affect, and is likely to adversely affect** designated critical habitat for Puget Sound steelhead in the action area in the short term. Adverse effects on critical habitat will be temporary and episodic in nature. Following a period of approximately 10 years, the reach immediately upstream of the diversion is expected to reach equilibrium, and turbidity levels associated with the transport of sediments that have accumulated upstream of the diversion will no longer be measurable above background levels.

8.1.7 Puget Sound Chinook Salmon

The Proposed Action **may affect** Puget Sound Chinook Salmon because:

- Spawning and rearing is reported in the Skagit River mainstem portion of the action area and, although not mapped as spawning or rearing habitat, juvenile Chinook Salmon may occur in the lower reaches of Newhalem Creek because there are no barriers to entry from the Skagit River mainstem.
- Although access to the Newhalem Creek diversion site (RM 1.0) is blocked by two downstream waterfalls at RM 0.65 and 0.8, the Proposed Action will affect downstream sediment transport and nutrient transport processes in the action area.

The Project is **likely to adversely affect** Puget Sound Chinook Salmon because:

- The proposed in-water work window (July 16 – September 1) will overlap with periods of potential, though highly unlikely, adult migration and spawning periods in areas 2,000 feet downstream of the in-water work area. Low levels of construction-related turbidity could extend to potentially occupied areas during cofferdam removal.
- Diversion structure removal will restore natural sediment regimes downstream of the dam, and sediments accumulated upstream of the dam will be transported to downstream habitats

occupied by Puget Sound Chinook Salmon. The temporary, episodic effects on individuals from the transport of accumulated sediment caused by the Proposed Action are expected to be sublethal in nature and will affect primarily the behavior of mobile juveniles if present in the action area.

Although the determination is **likely to adversely affect** Puget Sound Chinook Salmon, the Project will not jeopardize its continued existence. Adverse effects will be minimized because:

- In-water work to remove the tailrace barrier and Newhalem Creek diversion will not require handling of Puget Sound Chinook salmon during fish salvage and relocation because fish cannot access either location.
- Cofferdams would be removed by September 1, when flows are typically low (see Table 2.2-2). Therefore, turbidity levels associated with cofferdam removal in spawning areas more than 2,000 feet downstream of the in-water work area are expected to be minimal; such levels will remain within sublethal limits for spawning adults or incubating eggs.
- Considering the relatively coarse nature of sediments upstream of the dam, sediment transport to downstream reaches during seasonal high flows should not deposit fine sediments that measurably affect spawning habitat or incubating eggs.
- Beneficial effects associated with dam removal could minimally improve spawning and rearing habitat in portions of the Skagit River within the action area for Chinook salmon. Diversion removal would restore natural sediment regimes over time and improve nutrient transport to the Skagit River and the lower reaches of Newhalem Creek.

Within the action area, critical habitat for Puget Sound Chinook Salmon is only designated in the Skagit River. Based on the analysis presented in Section 6.7 of this BA, the Proposed Action **may affect, but is not likely to adversely affect,** designated critical habitat for Puget Sound Chinook Salmon. Effects on all PBFs for Puget Sound Chinook Salmon from the Proposed Action are anticipated to be insignificant and will not measurably affect the conservation value of critical habitat in the Skagit River mainstem.

8.1.8 Bull Trout

The Proposed Action **may affect** Bull Trout because:

- Bull Trout are reported to spawn in the lower reaches of Newhalem Creek.
- Rearing juveniles may be present year-round in both the lower reaches of Newhalem Creek and the small portion of the Skagit River in the action area. It is unknown if Bull Trout overwinter in the action area.
- Although Bull Trout do not occur at the Newhalem Creek diversion site (RM 1.0) due to the presence of two downstream waterfalls at RM 0.65 and 0.8 that are full passage barriers, the Proposed Action will affect the downstream sediment transport and nutrient transport processes in occupied portions of the action area.

The Project is **likely to adversely affect** Bull Trout because:

- Cofferdams would be removed by September 1, when flows are typically low (see Table 2.2-2). Therefore, turbidity levels associated with cofferdam removal in areas more than 2,000 feet downstream of the in-water work area are expected to be minimal and remain within sublethal limits for pre-spawn, staging adults if present in the action area.
- Diversion structure removal will restore natural sediment regimes downstream of the dam, and sediments accumulated upstream of the dam will be transported to downstream habitats occupied by Bull Trout. The temporary, episodic effects on individuals from the transport of accumulated sediment caused by the Proposed Action are expected to be sublethal in nature and primarily will affect the behavior of mobile juveniles and adults in occupied reaches of the action area.

Although the determination is **likely to adversely affect**, the Project will not jeopardize the continued existence of Bull Trout. Adverse effects will be minimized because:

- In-water work to remove the tailrace barrier and Newhalem Creek diversion will not require handling of individuals during fish salvage and relocation because Bull Trout cannot access either location.
- Considering the relatively coarse nature of sediments upstream of the dam, sediment transport to downstream reaches during seasonal high flows should not deposit fine sediments that affect spawning habitat or incubating eggs.
- Beneficial effects associated with dam removal could improve spawning and rearing habitat in the lower reaches of Newhalem Creek. Diversion removal would restore natural sediment regimes over time and improve nutrient transport to the Skagit River and lower reaches of Newhalem Creek.

Based on the PBF analysis presented in Section 6.8.1 of this BA, the Proposed Action **may affect, and is likely to adversely affect** designated critical habitat for Bull Trout in the action area. Adverse effects on critical habitat will be temporary and episodic in nature. Following a period of approximately 10 years, the reach immediately upstream of the diversion is expected to reach equilibrium, and Project-related turbidity levels associated with the transport of sediments that have accumulated upstream of the diversion will no longer be measurable above background levels.

9.0 ESSENTIAL FISH HABITAT

The objective of this EFH assessment is to determine whether the Proposed Action "may adversely affect" designated EFH for relevant commercial, federally managed fisheries species within the action area. It also describes measures proposed to avoid, minimize, or otherwise offset potential adverse effects to EFH resulting from the Proposed Action. The Proposed Action is described in Section 2.0 of this BA and cross-referenced for this assessment.

EFH is defined by the Magnuson-Stevens Act in 50 CFR § 600.905-930 as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Pacific Salmon EFH includes all those streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon in Washington, Oregon, Idaho, and California. Salmon EFH excludes areas upstream of longstanding, naturally impassable barriers (i.e., natural waterfalls in existence for several hundred years).

City Light reviewed NMFS's online EFH mapper (NMFS 2021) to determine the extent of EFH in the action area. The mapper, which is Geographic Information System based, includes the full Newhalem Creek subbasin as EFH (NMFS 2021). However, EFH does not include waters upstream of naturally impassable barriers such as waterfalls. City Light believes that the presence of two natural waterfalls that are impassable to fish precludes EFH in Newhalem Creek upstream of RM 0.65.

In summary, the lower reach of Newhalem Creek within the action area and the Skagit River at the confluence with Newhalem Creek (Section 3.0 of this BA) contains EFH for Pacific Coast Salmonids including Chinook, Coho, and Pink Salmon (Table 9.0-1). The powerhouse tailrace is not EFH.

Table 9.0-1. Species of fish and life-history stages with designated EFH in the action area.

Species	Adult Migration or Presence		Spawning		Eggs		Juvenile Rearing	
	Skagit River	Newhalem Creek	Skagit River	Newhalem Creek	Skagit River	Newhalem Creek	Skagit River	Newhalem Creek
Chinook Salmon (summer)	X	X	X		X		X	Possible
Coho Salmon	X	Presumed	X		X		X	Possible
Pink Salmon	X	X	X	X	X	X	X	X

Source: WDFW 2021b

9.1 EFH Species Description

9.1.1 Summer Chinook

Summer Chinook Salmon have been documented in the lower reach of Newhalem Creek downstream of the lower-most waterfall (WDFW 2021b; StreamNet 2021). Summer Chinook Salmon spawn and rear in the Skagit River at the confluence of Newhalem Creek and possibly in the creek. Fall Chinook Salmon do not occur in the action area. Based on spawn timing (Table 4.1-1), pre-spawn adults may be present as early as June within the action area. Spawning begins in late August and extends through mid-October. Juveniles are likely to emerge from

spawning gravels from December through February and will rear in the Skagit River mainstem year-round. As described in Section 5.3.7.2 of this BA, juvenile outmigrants exhibit several strategies and may outmigrate as fry beginning in March. Yearling smolts outmigrate from the Skagit River from late March through May.

9.1.2 Coho Salmon

WDFW (2021b) presumes Coho Salmon may occur in the lower reaches of Newhalem Creek, but spawning and rearing has not been documented. Coho Salmon spawning habitat occurs in the Skagit River at and downstream of the confluence with Newhalem Creek, and rearing habitat is mapped upstream of the confluence.

Although Coho Salmon are not documented to spawn in the lower reach of Newhalem Creek downstream of natural barriers, occasional spawning and limited rearing cannot be completely discounted. As reported in Table 4.1-1, Coho Salmon spawn in the Skagit River tributaries from November 1 through March 31 and may therefore enter the action area as early as late September. Juveniles may be present year-round in areas of the Skagit River that are suitable for rearing (e.g., side channels and low-velocity pools), and may use Newhalem Creek for rearing, particularly as a high-flow refugia.

9.1.3 Pink Salmon

Odd-year Pink Salmon reportedly spawn in the lower reaches of Nehalem Creek (WDFW 2021b). As reported in Table 4.1-1, Pink Salmon spawn in the Skagit River from approximately mid-September through October 31 and may enter the action area as early as late August. Juveniles will be present year-round in spawning reaches of the Skagit River and Newhalem Creek.

9.2 Effects of Proposed Action

The effects of the Proposed Action on EFH for Chinook Salmon, Coho Salmon, and Pink Salmon will be similar to those described above for Puget Sound steelhead (Section 6.6.1 of this BA) and will be primarily driven by post-Project changes in stream function following diversion structure removal. No EFH species can access the tailrace barrier construction location or the Newhalem Creek diversion site. Therefore, construction-related effects on EFH downstream of the natural waterfall barriers will not occur or will be insignificant.

Following diversion removal, EFH in the lower reaches of Newhalem Creek and the Skagit River portion of the action area will experience episodic increases in sediment transport during seasonal high-flow events with sufficient capacity to mobilize sediments that have accumulated upstream of the dam. These increases in sediment may affect rearing individuals from temporary turbidity spikes; however, considering the relatively coarse nature of sediments upstream of the dam, sediment transport to downstream reaches should not deposit fine sediments that alter EFH functions related to spawning and rearing in the action area. Following a period of approximately 10 years, the reach upstream of the diversion is expected to reach equilibrium, and downstream turbidity levels associated with the transport of sediments that have accumulated upstream of the diversion will no longer be measurable above background levels.

9.3 Determination of Effect

Negative effects on EFH for Pacific Coast Salmonids in the action area will be temporary in nature and primarily related to the transport of accumulated sediment during seasonal high flows. Therefore, the Proposed Action **will not adversely affect** Pacific Salmon EFH. The temporary degradation of rearing habitat in Newhalem Creek during seasonal high flows will be offset by the Project-related benefits to various stream functions (see Sections 4.1 and 4.4 of this BA). Beneficial effects will include long-term restoration of the hydrologic, sediment transport, and nutrient transport regimes downstream of the current diversion. Temporary effects on EFH will be minimized through implementation of measures presented in Section 2.7 of this BA.

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BIOLOGICAL ASSESSMENT AND EFH ASSESSMENT

APPENDIX A

OFFICIAL USFWS IPAC LIST

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington Fish And Wildlife Office
510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263
Phone: (360) 753-9440 Fax: (360) 753-9405
http://www.fws.gov/wafwo/

In Reply Refer To: July 09, 2021
Consultation Code: 01EWFW00-2021-SLI-1396
Event Code: 01EWFW00-2021-E-02789
Project Name: Newhalem Dam Decommissioning Project.

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, and proposed species, designated and proposed critical habitat, and candidate species that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. The species list is currently compiled at the county level. Additional information is available from the Washington Department of Fish and Wildlife, Priority Habitats and Species website: http://wdfw.wa.gov/mapping/phs/ or at our office website: http://www.fws.gov/wafwo/species_new.html. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether or not the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species, and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:
http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.). You may visit our website at http://www.fws.gov/pacific/eagle/for information on disturbance or take of the species and information on how to get a permit and what current guidelines and regulations are. Some projects affecting these species may require development of an eagle conservation plan: (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Also be aware that all marine mammals are protected under the Marine Mammal Protection Act (MMPA). The MMPA prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas. The importation of marine mammals and marine mammal products into the U.S. is also prohibited. More information can be found on the MMPA website: http://www.nmfs.noaa.gov/pr/laws/mmpa/.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Related website:
National Marine Fisheries Service: http://www.nwr.noaa.gov/protected_species/species_list/species_lists.html

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Washington Fish And Wildlife Office
510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263
(360) 753-9440

Project Summary

Consultation Code: 01EWFW00-2021-SLI-1396
Event Code: 01EWFW00-2021-E-02789
Project Name: Newhalem Dam Decommissioning Project.
Project Type: DAM
Project Description: Seattle City Light proposes to decommissioning a small hydroelectric dam on Newhalem Creek, a tributary to the Skagit River in Whatcom County, Washington. The dam and associated infrastructure would be removed, and several ancillary facilities would be abandoned or removed.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@48.65712175,-121.2413457759126,14z

Counties: Whatcom County, Washington

Endangered Species Act Species

There is a total of 7 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Gray Wolf *Canis lupus* Population: Western Distinct Population Segment No critical habitat has been designated for this species.	Proposed Endangered

Birds

NAME	STATUS
Marbled Murrelet *Brachyramphus marmoratus* Population: U.S.A. (CA, OR, WA) There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/4467	Threatened
Northern Spotted Owl *Strix occidentalis caurina* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/1123	Threatened
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

Fishes

NAME	STATUS
Bull Trout *Salvelinus confluentus* Population: U.S.A., conterminous, lower 48 states There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8212	Threatened
Dolly Varden *Salvelinus malma* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1008	Proposed Similarity of Appearance (Threatened)

Conifers and Cycads

NAME	STATUS
Whitebark Pine *Pinus albicaulis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1748	Proposed Threatened

Critical habitats

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Bull Trout *Salvelinus confluentus* https://ecos.fws.gov/ecp/species/8212#crithab	Final

Appendix B.
Historic Structures Review Technical Memo

HISTORICAL RESEARCH ASSOCIATES, INC.

Technical Memorandum

To: Shelly Adams, Decommissioning Project Manager - Seattle City Light

From: Matthew Sneddon, Senior Architectural Historian - Historical Research Associates, Inc.

Date: January 21, 2022

Subject: Integrity of Newhalem Creek Powerhouse and Penstock

1. **Technical Memorandum Purpose:** Evaluate the integrity of the Newhalem Creek[1] powerhouse and penstock under the National Historic Preservation Act (NHPA).

The Newhalem Creek Hydroelectric Project is listed in the National Register of Historic Places (NRHP) as part of the Skagit River and Newhalem Creek Hydroelectric Projects historic district (DT66). The Newhalem Creek Project power tunnel and penstock—two components from the original 1921 construction—were included in the 1996 NRHP nomination as contributing elements to the historic district. A 2010 update of the nomination added the Newhalem Creek powerhouse and dam—rebuilt in 1969 after a fire destroyed the original 1921 powerhouse in 1966—to the historic district. Both the powerhouse and penstock are connected to the town of Newhalem and the Gorge Powerhouse via the Trail of Cedars and the suspension bridges over the Skagit River.

To be listed in the NRHP under the NHPA, a resource must have historic significance *and* integrity. In *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*, the National Park Service defines integrity as the resource's ability to convey its historic significance, assessed in terms of seven "aspects of integrity": location, design, setting, materials, workmanship, feeling, and association (also see 36 CFR § 60.4).[2] An evaluation of integrity, therefore, must first consider the resource's basis for significance. This memorandum outlines the historical basis for the Newhalem Creek powerhouse and penstock's significance, summarizes the powerhouse and penstock's significance under the NRHP Criteria, and assesses the strength and sufficiency of each resource's aspects of integrity.

[1] For clarity, this memorandum uses the descriptor "Newhalem Creek" when referring to the hydroelectric project as a whole or various components to distinguish from the Gorge powerhouse, which was sometimes referred to as the Newhalem powerhouse due to its close proximity to the construction camp and later town of Newhalem.

[2] National Park Service, *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation* (Washington D.C., National Park Service, 1997), 44.

2. Historic Context and Site Overview[3]

The Newhalem Creek powerhouse and penstock are part of the Skagit Project's first hydroelectric system, a high-head, low-volume plant completed in 1921 to provide electricity for the larger construction effort. Because of the Skagit Project's remote location, City of Seattle engineers recognized the need for a local and dedicated source of electricity. The project team—against Superintendent J. D. Ross' preference for a fossil-fuel fired steam plant—proposed to use Newhalem Creek, which joined the Skagit River near the site selected for the Gorge Powerhouse, to power that hydroelectric facility.[4] To develop the necessary head—in this case approximately 510 feet (ft)—the design called for a 2,675 ft tunnel through solid granite and a steel penstock to deliver water to the powerhouse on the river valley floor below.[5] Although designed first and foremost to power equipment for the first stages of construction, the plant was intended for long-term use to justify the cost of its construction.[6]

Aside from its importance in terms of generating electricity, the Newhalem Creek Project served another purpose – to physically establish a City Light presence at this remote location. One of the reasons City Light had used to successfully wrest the federal development rights to the Skagit River sites (which were within the boundaries of a federal forest reserve under the jurisdiction of the Department of Agriculture) from the Boston-based Stone & Webster in 1917 was by highlighting their lack of development. Stone & Webster had held the rights since 1912.[7] To ensure the City's commitment to the larger Skagit Project, when the Department of Agriculture issued the final permit in 1920, it was contingent that work on the Newhalem Creek Project would begin by December 2, 1920, and end by December 22, 1922.[8] Completion of the Newhalem Creek plant would provide both a solid foundation for construction and show progress on a site yet undeveloped because of its remote and mountainous location.

With the federal permits in hand, City Light moved quickly to finalize plans and secure bids for the Newhalem Creek Project. The design reflected a mix of expediency and permanence, a characteristic of the Skagit Project as a whole. Plans called for a low 4-foot-high timber crib diversion dam with a simple wood intake structure at a location on a rough creek channel at 1,010 ft in elevation. From the intake structure, a comparatively expensive 50-foot-deep shaft and 2,700-foot-long tunnel through solid granite would feed a 905-foot-long steel penstock. By the end of 1920, work on the tunnel was underway and contracts were awarded for the penstock pipe and generation equipment.

Working in three shifts, the contractor used compressed air-driven jackhammers and Leyner drills to tunnel into the rock. The best weekly advance recorded was 119 ft. The nearly 2,700-foot-long, 5-

[3] This section draws on information from the 2010 update of the Skagit River and Newhalem Creek Hydroelectric Projects historic district NRHP Nomination Form and adds further details to more fully characterize the significance of the Newhalem Creek Project.

[4] For Ross' preference for a steam plant, see "Text of Ross' Answer to Mayor Edwards," *Seattle Times*, April 9, 1931, 12.

[5] For hydroelectric purposes, head is defined here as the difference in vertical feet between water intake and discharge from the turbines or waterwheels.

[6] "Good Progress in Skagit Development," *Power* 53 (April 12, 1921): 604.

[7] "Seattle Given Power Site As Yuletide Gift," *Seattle Times*, December 25, 1917, 1.

[8] "Erection of Huge Plant Authorized," *Seattle Times*, May 30, 1920, 1.

foot-wide by 7-foot-high tunnel at an 8.6-percent grade was completed in June 1921.[9] By then, the Coast Culvert & Flume Company, based in Portland, Oregon, was busy installing the 905-foot-long penstock. To improve the integrity of the transition between tunnel and penstock, the engineers decided to run the steel pipe some 200 ft into the tunnel, where it was secured with a concrete plug. From the plug, the 33-inch-diameter penstock reduced in size to a 30-inch diameter at the powerhouse intake, while the thickness increased from 5/16-inch flange steel at the top to 3/8-inch flange steel at the base to better handle the increased pressure. To account for expansion, 44 flexible Dresser couplings divided the penstock pipe into various sections, which were supported by 76 wooden saddles except where held in place at six locations by concrete thrust blocks. The Coast Culvert & Flume Company successfully employed electric arc welding on the penstock project, an innovative technique intended to reduce the cost of extensive field riveting in such a remote location. In an article describing the Newhalem Creek Project, the company's engineer noted "this is the first installation of welded pipe for such purposes in the Northwest, and no doubt it will be watched with interest by the engineers throughout the country. It will no doubt have great influence in the selection of other pipelines either for penstock or water mains or for other similar projects."[10]

At the powerhouse, the penstock split into a Y-shaped pipe to supply water to two double-nozzle, impulse-type waterwheels manufactured by the Pelton Water Wheel Company. The double-hung Pelton unit rated at 3,000 total horsepower directly drove a Westinghouse generator designed to deliver up to 2,500-kilovolt-ampere (kva) (with an 80 percent power factor), three-phase, 60-cycle, 6,600-volt electricity at 450 revolutions per minute (rpm). The generator had a 30-kilowatt (kW) belt driven exciter.[11] The powerhouse also contained a 500 kW generator motor unit to provide direct current electricity for an electric railroad and sawmill.[12]

City Light engineers considered a reaction-type turbine with a higher efficiency than the impulse waterwheels but went with the Pelton double-hung unit as part of a design that prioritized reliability and continuity of service. To this end, City Light specified independent governors for each waterwheel. This installation brought both operational efficiencies (as one governor could be adjusted for a narrow speed range while the other set for heavy load swings) and continuous generation as one unit could be shut down without decreasing the output of the plant. The independent governors drew the attention of the field editor of *Electrical World*, who noted that the arrangement "is expected to be a great advantage in times of light load requirements or limited water supply."[13] Collectively, the powerhouse equipment reflected the Newhalem Creek system's initial purpose to provide dedicated and continuous electrical service at the remote location. Without recourse to another source of power, any failure of the Newhalem Creek system would cause serious and costly construction delays.

If the extensive tunneling and independent governors represented the more expensive, permanent aspects of the Newhalem Creek project, the powerhouse embodied a more bare-bones approach. The modest barn-like structure, wood framed with board-and-batten siding, two rows of windows,

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[9] S. G. Roberts, "Skagit River Hydro-Electric Development," *Compressed Air Magazine* 29 (August 1924): 952

[10] F. W. Allen, "Electric Welded Penstock for Hydroelectric Power Plant," *Engineering World* 19 (December 1921): 401.

[11] "Construction Started on Seattle Hydroelectric Plant," *Engineering World* 17 (November 1920): 314.

[12] Roberts, "Skagit River Hydro-Electric Development," 950–51.

[13] "Two Governors on Hydraulic Unit Give Advantageous Regulation," *Electrical World* 79 (January 21, 1922): 139.

and a corrugated metal roof, stood in sharp contrast to the grand Neoclassical reinforced-concrete Gorge powerhouse under construction a short distance upriver.

After supporting construction of the camp at Newhalem, the Gorge diversion dam, and Gorge powerhouse, output from the Newhalem Creek plant was routed into the larger Skagit transmission and distribution network. The Newhalem Creek powerhouse also was integrated into the Skagit River tourist program developed by J. D. Ross and City Light to promote municipal stewardship of the city's electrical supply. After dinner the first evening of the two-day tour, guides led visitors over a bridge and through a woodland trail to Newhalem Creek, where the small powerhouse stood as a point of interest among the majestic cedars.[14]

After decades of reliable service, a fire of unknown origin destroyed the wood-framed powerhouse on July 18, 1966. The fire damaged most of the equipment, but the Pelton wheels and Westinghouse generator were salvageable. The *Seattle Times* lamented the loss of a "City Light landmark" and the city had to purchase electricity from the Bonneville Power Administration at $37,500 per year to replace the lost power.[15] After a year of evaluation, City Light committed to restoring the powerhouse and recovering the generating capacity of the Newhalem Creek system in a manner that "would minimize the needs for maintenance and operator attention."[16] Instead of a contemporary architectural design, City Light looked to the past with a new powerhouse that paid homage to the original. The "rustic" design, overseen by City Light engineer William L. Freitas, borrowed the simple single-story, side gabled form and rectangular footprint from the original powerhouse, and the wood-framed structure with cedar board-and-batten siding, hand-split cedar shake roof, exposed rafter ends, and fixed pane, wood-framed windows evoke images of its original appearance. After some repairs, the original Pelton wheels and Westinghouse generator were re-installed. Although a single Woodward governor replaced the original dual, independent Pelton governors, from a technological standpoint, the mechanical basis of design of the new governor differed little from its predecessor. Contemporary exciters, controls, batteries, valves, and other auxiliaries replaced those destroyed by the fire, but the primary water conveyance, prime mover, and power generation equipment remained remarkably true to the 1921 plant.

As part of the license for the restored hydroelectric system, City Light invested in re-integrating the powerhouse into the tourist program with a new pedestrian bridge across the Skagit River and a half-mile nature trail developed collaboratively with Grant Sharpe, Professor of Outdoor Recreation at the University of Washington's College of Forest Resources. At the end of the "Trail of Cedars," visitors could peer through the "rustic" powerhouse's windows to see "an example of early generating plants in operation."[17]

After briefly returning to service in February 1970, the new Newhalem Creek powerhouse experienced a nearly two-year outage to repair bucket fatigue in the Pelton wheels. When back online at the end of 1971, City Light's Annual Report noted that although accounting for only a

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[14] Writers' Program of the Works Progress Administration, *Washington: A Guide to the Evergreen State* (Portland: Binfords & Mort, 1941), 513.

[15] "Fire Destroys Newhalem Power Plant," *Seattle Times*, July 18, 1966, 46.

[16] Seattle City Light, *1968 Annual Report* (Seattle: Seattle City Light, 1968), 27.

[17] Seattle City Light, *1971 Annual Report* (Seattle: Seattle City Light, 1971), 11.

small percentage of Skagit generation, the Newhalem Creek project made an important contribution to the reliability of the Gorge plant.[18] The Newhalem Creek project won two awards, one from the Washington State Arts Commission for "environmental treatment" at the powerhouse site, and another from the American Public Power Association.[19]

Since 1971, the Newhalem Creek project has required relatively minor repairs and maintenance. A 1986 project repaired some of the penstock's flexible couplings, replaced wooden saddles within the tunnel section, and changed out two wood saddles near a thrust block with two concrete types. During the early 1990s, City Light rebuilt the diversion dam and intake structure and re-wound the Westinghouse generator.[20] At some point after 1987, the cedar shake roof on the powerhouse was replaced with a standing seam metal type. Within the last decade, new digital controls (a single panel integrated in the 1969 metal control cabinet near the service door) were added to the powerhouse. Another project carried out between 2016 and 2017 replaced the wooden penstock supports with concrete types. These changes have had minimal effect on the overall appearance of the 1969 powerhouse and the 1921 penstock and primary power generation equipment, the latter now with nearly a century of service.

3. NRHP Significance

The powerhouse and penstock are part of the Newhalem Creek Powerhouse Site, a 21.35-acre area that includes the Newhalem Creek powerhouse, penstock, power tunnel, and Newhalem Creek diversion dam and intake structure. This site is in turn part of a larger NRHP-listed historic district, the Skagit River and Newhalem Creek Hydroelectric Projects. The NRHP nomination for the historic district specifies that the Newhalem Creek Powerhouse Site is generally significant for its "association with the Skagit River Hydroelectric Project and the town of Newhalem." *See* NRHP "Skagit River and Newhalem Creek Hydroelectric Projects," Nomination Form (2010), 44.

A more detailed breakdown of the general significance of the Newhalem powerhouse and penstock in terms of NRHP Criteria A–C is discussed below:

Criterion A: associated with events that have made a significant contribution to the broad patterns of history.

> As a key part of the Skagit Project, the Newhalem Creek powerhouse and penstock are broadly associated with the development of the use of electricity in American society; with hydroelectricity in the state of Washington; the history of the City of Seattle; and the public power movement in the United States—in this case, municipal ownership of electrical utilities.
>
> The more individual significance of the Newhalem Creek project under Criterion A relates to its role as:
>
> - an essential starting point for construction of the larger project—specifically, the Gorge component—by providing electricity for a sawmill, a railroad, the construction camp of

[18] Seattle City Light, *1970 Annual Report* (Seattle: Seattle City Light, 1970, 21.
[19] "4 City Light Projects Win National Awards," *Seattle Times*, May 21, 1971, D-1.
[20] City Light Department, "Exhibit F – Dam and Intake Plan and Sections," 15 September 1992.

Newhalem, and various construction equipment where no other sources were immediately available due to remote location of site. Continued to provide electricity for town, and station service power for Gorge Powerhouse.

- an important stipulation in the permitting process to show progress on the overall project.
- a component of the tourist program developed by J. D. Ross and City Light to promote municipal stewardship of the city's electrical utility.
- part of efforts to address environmental and recreational concerns in the reconstruction of the plant after the 1966 fire.

Criterion B: associated with the lives of persons significant in our past.

The Skagit River and Newhalem Creek Hydroelectric Projects historic district is eligible for the NRHP under Criterion B for its association with James Delmage Ross. Although Ross favored a small steam plant over a hydroelectric system to support the initial construction, the Newhalem Creek project was ultimately part of the tourist program he promoted at the Skagit Project. Therefore, only aspects of the Newhalem Creek project that relate to tourism during his oversight of the Skagit Project are associated with J. D. Ross.

Although not considered in the current NRHP nomination form for Skagit River and Newhalem Creek Hydroelectric Projects, future updates of the nomination may find additional significance for the Newhalem Creek components under Criterion B for associations with City Engineer Arthur H. Dimock and Carl F. Uhden, chief engineer of the Skagit River Project. Both Dimock and Uhden oversaw the primary design and construction of the Newhalem Creek project. Dimock's tenure as City Engineer between 1911 and 1922 came during a period of significant development for Seattle—he oversaw bridge projects, regrading efforts, sewer line construction, and he played an important role in the design and management of the Skagit Project. Uhden, who had supervised construction of several hydroelectric plants before his employment with City Light, shepherded the Skagit Project through several challenges—both engineering and political—during the early period of design and construction.

Criterion C: resources that embody the distinctive characteristics of a type, period, or method of construction; or that represent the work of a master; or that possess high artistic values; or that represent a significant and distinguishable entity whose components may lack individual distinction.

The Newhalem Creek Project embodies the distinctive characteristics of a high-head, low-volume hydroelectric development typical of the mountainous West, including a run-of-the-river design (low dam designed for diversion rather than storage), long water conveyance systems (in this case, a power tunnel and penstock), setting with sufficient elevation differential, and impulse-type water wheels.

Innovative and significant features of the original project included use of independent governors for regulation of the waterwheels and electric-arc welding for assembly of the

penstock; innovative features of the 1969 reconstructed powerhouse include controls for remote operation.

Materials, design, and appearance represent both the 1921 and 1969 periods of construction—particularly the primary generation equipment (Pelton wheels, Westinghouse generator, and governor). The remaining elements of the 1921 design reflect its both its initial purpose to support larger construction effort (valuing reliability and continuity of service over efficiency and to some degree, cost) and later function to supplement the electrical grid at the Skagit Project (more permanent elements such as power tunnel and steel penstock). Design choices made for the 1969 reconstruction of the powerhouse (similar form, wood-frame structure, board-and-batten siding, cedar shake roof, windows for interior views) are significant as an attempt to preserve the history of the earlier site and integrate the new structure into the long-standing tourist program.

As any significance under a single criterion is sufficient for NRHP eligibility, the powerhouse and penstock need only to possess sufficient integrity to convey significance under either Criterion A, B, or C.

4. Integrity Analysis

Analysis of the powerhouse and penstock's integrity is complicated by the dual nature of the two resources' significance: they have significance associated with elements from both the original period of construction in 1921 and the 1969 restoration effort.

Another consideration in the analysis of integrity for hydroelectric resources relates to the necessity of change for operational and safety reasons. In her NRHP Multiple Property Listing "Hydroelectric Power Plants in Washington State, 1890–1938," Lisa Soderberg notes that

> Eligible hydroelectric installations will retain integrity of most of the components, sufficient so that the significance of the total system is well represented. Loss of some components will not irreversibly compromise the integrity of a plant if the surviving features are well-preserved and (1) convey a discrete significance on their own, or (2) satisfactorily convey the significance of the total system. In addition, because hydroelectric plants were routinely expanded and adapted to meet changing technologies and/or power loads, some replacement in kind or new construction is acceptable if the essential character of the historic plant is preserved.[21]

a. Newhalem Powerhouse

Background: As noted above, the original powerhouse was built in 1921 and rebuilt in 1969 after destroyed by a fire. The original primary power generation components (double-hung Pelton waterwheels and Westinghouse generator) survived the fire and were re-installed in the current powerhouse after some repairs. Although the plant has not operated for several years, it remains in working condition.

[21] Lisa Soderberg, "Hydroelectric Power Plants in Washington State, 1890–1938," 1988, F-9, on file at the Washington Department of Archaeology and Historic Preservation, Olympia, WA.

Essential or Distinctive Features: The essential physical features define why and when a property is significant. Essential characteristics that convey the relationship of the Newhalem Creek powerhouse to the historic town of Newhalem and the broader Skagit River Hydroelectric Project include:

- Proximity to Newhalem and Gorge powerhouse.
- Architectural features that drew on original design, one that reflected Newhalem Creek's more limited role compared to the showpiece Neoclassical Gorge powerhouse: side-gabled form, modest dimensions, wood-framing and siding, custom sized double-doors to service equipment, a 10-ton overhead crane, fixed-pane wood-framed windows, and cedar shake roof.
- Features that reflected continued role in long-standing tourist program: windows to view operating equipment, location at end of trail system, and design elements (board-and-batten siding, shake roofing, exposed rafters, and form) that sought to preserve historic associations with original building.
- Materials designed to blend in with forested setting, reflecting contemporary environmental concerns: cedar siding, cedar shake roofing, and modest profile.
- Components that reflect original design and purpose of the hydroelectric system: bifurcated penstock to supply double-hung Pelton wheel (a function in part of prioritization of simplicity, reliability, and continuity of service), Westinghouse generator rated at 2,500 kW (80 percent power factor), innovative aspects of design (independent governors), and electrical connections to larger Skagit transmission and distribution system.
- Components that reflect late 1960s automation program (remote control systems).

Aspects of Integrity Assessment

1. Location: The place where the historic property was constructed or the place where the historic event occurred.[22]

   The current powerhouse stands on the location of the original facility, which importantly maintains the original water conveyance and power generation configuration and relationship to the town of Newhalem and Gorge powerhouse.

2. Design: The combination of elements that create the form, plan, space, structure, and style of a property.

   The powerhouse structure retains most of the essential features of the 1969 "rustic" design including cedar board-and-batten siding, side-gable roof, wood-framed windows, barn-like form, double doors sided to match exterior walls, and 10-ton crane. Primary

[22] Aspects of integrity definitions are taken from National Park Service, *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*, 44.

alterations to the structure's design are limited to the replacement of the cedar shakes with a standing-seam metal roof.

The hydroelectric system retains its basic original 1921 configuration, with a single penstock (bifurcated at the end) supplying a double-hung, 3,000-horsepower Pelton unit directly connected to Westinghouse generator rated at 2,500 kW. Alterations since the 1966 fire included re-winding the generator (which currently provides electricity at 7,200 volts instead of the original unit's 6,600 volts), adding new valves on the double nozzle pipes, and replacement of the original dual, independent governors with a single unit. Some auxiliary systems such as the exciters and lubrication equipment similarly date to 1969—others, such as the remote controls, have been upgraded more recently. However, the current configuration still conveys basics of original design—an engineer from 1921 would undoubtedly recognize the continuities with the original design for a relatively high-head, low-volume water supply.

3. Setting: The physical environment of a historic property is composed of such elements as topography, spatial relationships, vegetation, and the surrounding built environment that contribute to the significance of the resource.

   The powerhouse's current setting is consistent with original forested environment at the end of a trail used by tourists. Due to the undeveloped nature of the site, spatial relationships are generally similar to the early era of operations. Minor differences in setting since 1921 and 1969 include a cleared parking area and road at the south end of the powerhouse, and the addition of updated interpretive panels.

4. Materials: The physical elements combined during a particular period of time, and in a particular pattern or configuration, to form a historic property. Materials ground a building or structure in time and reflect design choices, contemporary technologies, building codes, economic factors, and other considerations.

   Most primary materials from the 1969 rebuild remain intact, including the cedar board-and-batten siding, heavy wood columns, wood-framed fixed pane windows, wooden double service door, and personnel doors. As noted in the Design section above, the primary loss of historic materials is the cedar shake roof.

   The Pelton units and Westinghouse generator retain most of their original materials, although the generator core has been re-wound at least twice since 1966 and the Pelton wheels underwent repairs for bucket fatigue in 1971. Some elements such as the valves, governor, lubrication systems, switches, and exciter boxes represent the 1969 period of significance rather than the 1921 construction.

5. Workmanship: The physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.

   In the case of the Newhalem Creek powerhouse, workmanship primarily relates to methods that reflect its construction in the mid-twentieth century, especially pouring concrete and assembly and installation of mass-produced materials such as dimension

cut wood framing and siding, metal structural elements, pedestrian doors, windows, and electrical equipment.

6. Feeling: A property's expression of the aesthetic or historic sense of a particular period of time. It results from the presence of physical features that, taken together, convey the property's historic character.

   Due to its high integrity of design, materials, and setting, the powerhouse exterior conveys a connection to the 1969 period of significance, if not 1921. On the interior, the connection to 1921 is mixed—clearly the interior has some modern elements (most noticeably the digital controls, motor-operated valves, and overhead lighting) but the interior is designed to centerpiece the historic elements. If the age of some equipment such as the mechanical governor, lubrication systems, and switches may not be clear, the final effect is a historic sensibility associated with the mid-twentieth century, if not earlier. One measure of the powerhouse's feeling is that the site remains a "historic resource" in current City Light walking tour brochures for the Skagit Project.

7. Association: The direct link between an important historic event or person and a historic property—or in this case, a resource's association with the history and development of the Skagit Project, Newhalem, and City Light.

   Considered collectively within the larger system, the powerhouse, with its visible relationship to the penstock and tailrace, Pelton wheels, generator, and other components, is clearly associated with the generation of hydroelectricity despite its current inactive status. The connection to City Light's Skagit Project is conveyed by the proximity to the town of Newhalem and Gorge powerhouse and transmission lines. While the rustic architectural style of the Newhalem Creek powerhouse contrasts with the Neoclassical Gorge Powerhouse, it more closely fits with the wood-sided, side gabled, rectangular plan buildings of historic Newhalem.

*Conclusion: T*he Newhalem Creek powerhouse possesses excellent integrity, diminished only by the loss of its cedar shake roof and the installation of some modern control equipment. The building has undergone few alterations since the 1969 construction and retains the core of its original 1921 hydroelectric power system (penstocks, impulse wheels, generator, and tailrace). The powerhouse remains an important bridge between the original 1921 design conditions, intent, and historic significance and the late 1960s and early 1970s context, when reconstruction efforts mixed historic preservation, environmental considerations, a tourist program, and a need to minimize operational and maintenance requirements.

b. **Newhalem Penstock**

Background: As noted above, the original penstock, completed in 1921, survived the fire that destroyed the original powerhouse, and continued to supply water to the new powerhouse after its reconstruction in 1969. Primary alterations since 1921 include various repairs to pipe sections and couplings and replacement of wooden support saddles with concrete types. Although the plant has not operated for several years, the penstock remains in working condition.

Note: Due to conditions (snow) at the site, a field survey of the entire length of the penstock was not feasible. The following integrity assessment is based on survey of an approximately 90-foot-long section of the penstock from the powerhouse to the first concrete thrust block, and review of relevant documentation and drawings.

Essential or Distinctive Features: Essential characteristics that convey the relationship of the Newhalem Creek penstock to the Newhalem Creek hydroelectric system, historic town of Newhalem, and the broader Skagit River Hydroelectric Project include:

- Connection from Newhalem Creek power tunnel to Newhalem Creek powerhouse; proximity to Newhalem and Gorge powerhouse.
- Components that reflect original design and purpose of the high-head, low-volume hydroelectric system: dimensions and expansion couplings; materials (steel); methods of support (saddles and concrete thrust blocks); innovative aspects of design (electric arc welding); and bifurcated termination point at powerhouse to supply double-hung Pelton wheel.

Aspects of Integrity Assessment

1. Location

   The penstock remains in its original location, from its upper starting point in the power tunnel to its termination point at the powerhouse, which maintains the original water conveyance and power generation configuration.

2. Design

   The penstock retains the essential features of the 1921 design, including route, dimensions, expansion couplings, access points, and arc welds. Primary alterations to the penstock's design are limited to the replacement of the wooden support saddles with concrete types. Although removal of the wooden saddles eliminated one example of the timber and wood elements of the original Newhalem Creek project (timber crib dam, intake structure, and powerhouse) that reflected a lower cost approach to some project construction, the effect on the penstock's broader ability to convey its historic significance is marginal. Whether wooden or concrete, the saddles do not alter the primary design characteristics of the penstock, which relate to pressure, flow, cost, durability, safety, and maintenance.

   Aspects of the penstock's design such as length, diameter, thickness, material, and route represent important characteristics of a high-head, low-volume hydroelectric plant. The current configuration still conveys basics of original penstock design—an engineer from 1921 would undoubtedly recognize the continuities with the original design for a high-head, low-volume water supply.

3. Setting

   The penstock's current setting is consistent with its original forested environment and steep topography between the power tunnel and the powerhouse. The primary change

since 1921 relates to the 1969 construction of the new powerhouse and parking lot. The terrain still conveys aspects of the design (the elevation differential needed to develop power) and the challenges of field work on the penstock.

4. Materials

   Most of the penstock's primary materials—the steel pipeline and connections and concrete thrust blocks—remain relatively intact aside from some repairs to pipe sections and couplings. As noted in the Design section above, the primary loss of historic materials is the original wooden saddles, a necessary but supporting and secondary component.

5. Workmanship

   In the case of the Newhalem Creek penstock, workmanship primarily relates to methods that reflect its construction in the 1920s, specifically, the assembly of mass-produced materials such as sections of steel pipe, bolted expansion couplings, access ports, riveted components, and board-formed, poured-concrete thrust blocks. The most distinctive element of workmanship on the penstock are the electric arc welds that may have been one of the early examples in the West of an innovative technique.

6. Feeling

   The penstock has a relatively high integrity of location, design, setting, and materials for a period of significance that runs from 1921 to 1969. From its starting point in the power tunnel to just above the powerhouse, the penstock itself conveys a feeling associated with its 1921 origins, but sections within view of the powerhouse better evoke a connection with the 1969 reconstruction of the powerhouse. The newer concrete saddle supports diminish the feeling to some degree of the earlier periods of significance (1921 and 1969), although concrete saddles were not uncommon in either era.

7. Association:

   Considered collectively within the larger Newhalem Creek system, the penstock, with its visible relationship to the powerhouse and power tunnel, is clearly associated with the generation of hydroelectricity despite its current inactive status. The connection to City Light's Skagit Project is conveyed by the proximity to the town of Newhalem and Gorge powerhouse and transmission lines.

Conclusion: The Newhalem Creek penstock possesses excellent integrity, slightly diminished only by the loss of the wooden support saddles. The penstock itself has undergone few alterations since 1921 and remains a key representative of the original design.

FIGURES

Figure 1. Original Newhalem Creek powerhouse, ca. 1921.
Source: Special Collections, University of Washington Libraries.

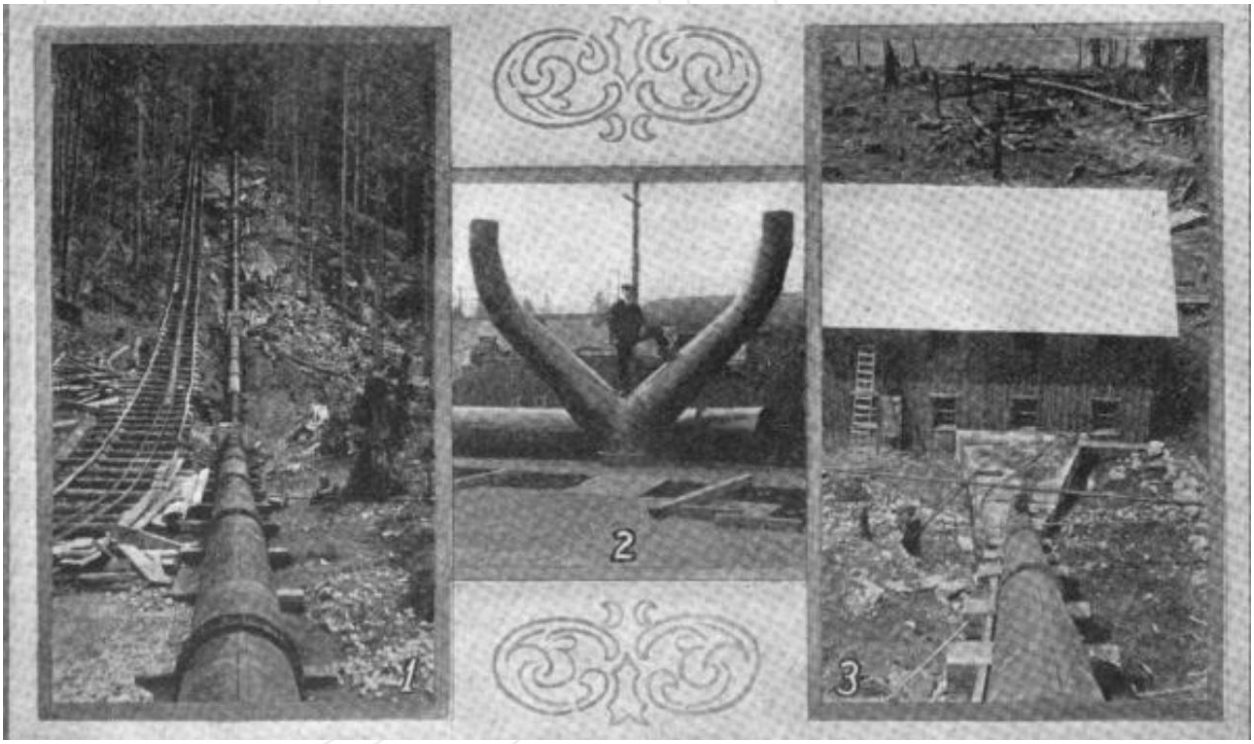

Figure 2. Views of electric arc welded pipe (*left*), Y-shaped pipe (*center*), and termination at powerhouse (*right*), 1921.
Source: F. W. Allen, "Electric Welded Penstock for Hydroelectric Power Plant," Engineering World 19 (December 1921): 401.

Figure 3. One side of original double-hung Pelton unit showing independent governor and dual-nozzle set up, ca. 1921.
Source: "Two Governors on Hydraulic Unit Give Advantageous Regulation," Electrical World 79 (January 21, 1922): 139.

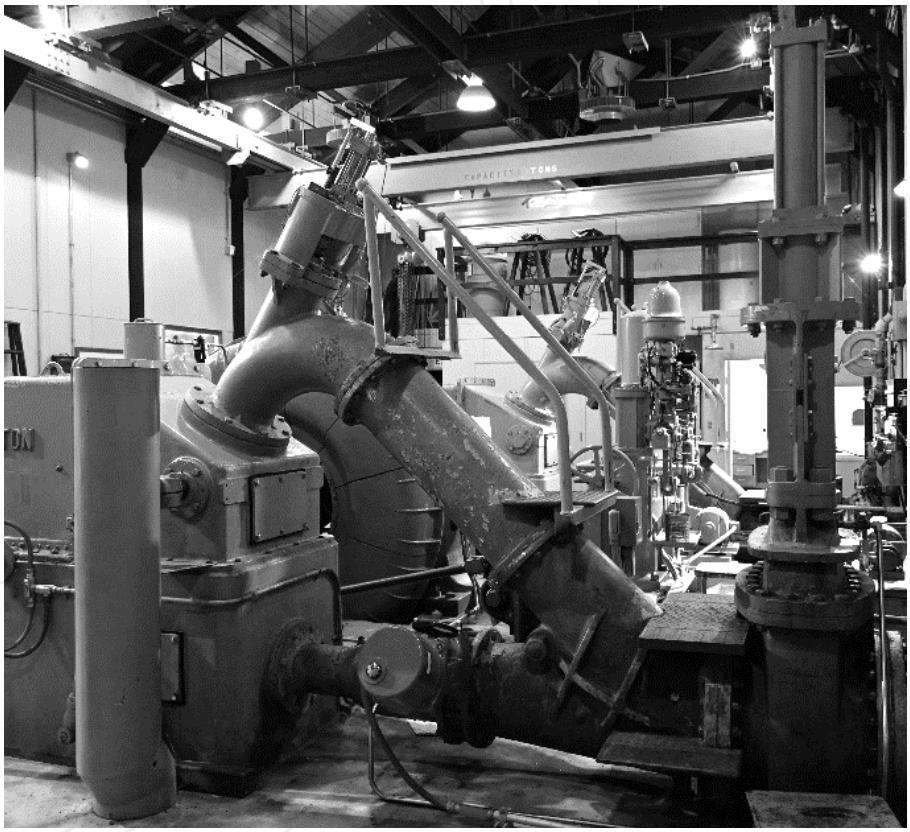

Figure 4. One side of double-hung Pelton unit showing new valves on double nozzle pipes, 2022.

Figure 5. Remnants of the Newhalem Creek powerhouse after 1966 fire, ca. 1967
Source: Seattle Municipal Archives, Digital Archives.

Figure 6. Newly reconstructed Newhalem Creek powerhouse, ca. 1969.
Source: Seattle Municipal Archives, Digital Archives.

Figure 7. Newhalem Creek Powerhouse, 2022.

Figure 8. Newhalem Creek powerhouse window and interpretive panel, 2022.

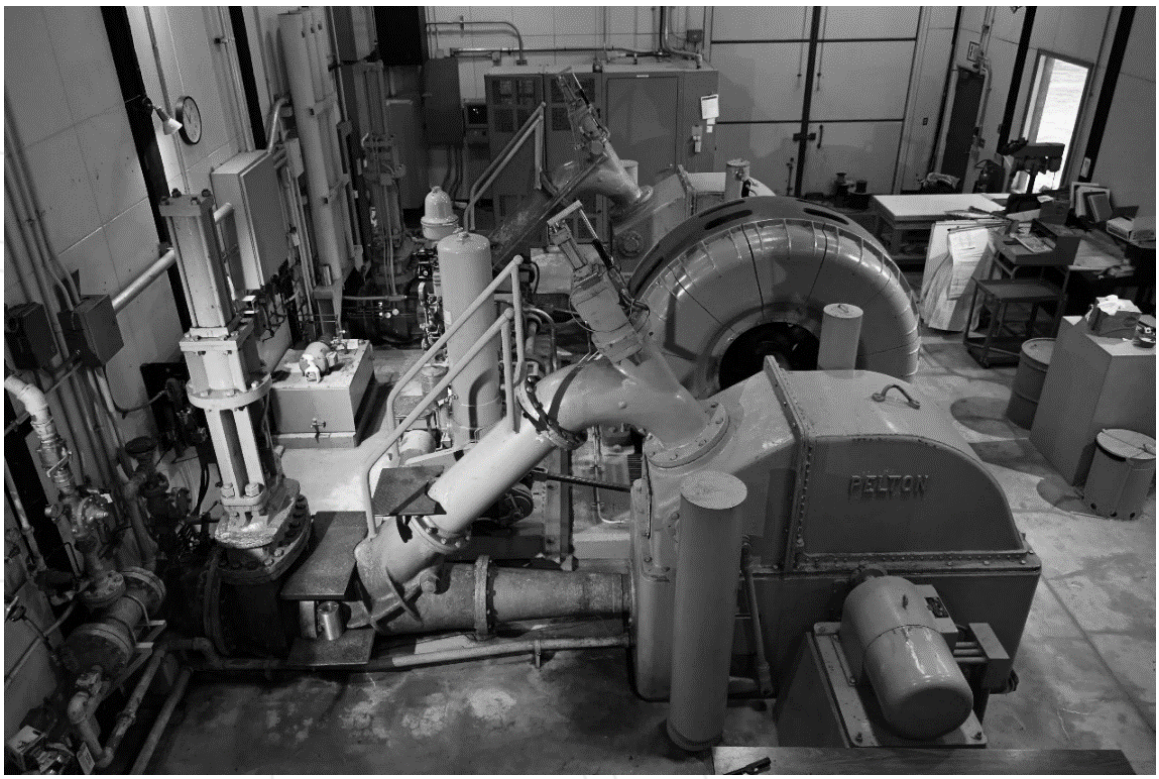

Figure 9. View from mezzanine toward powerhouse floor, 2022.

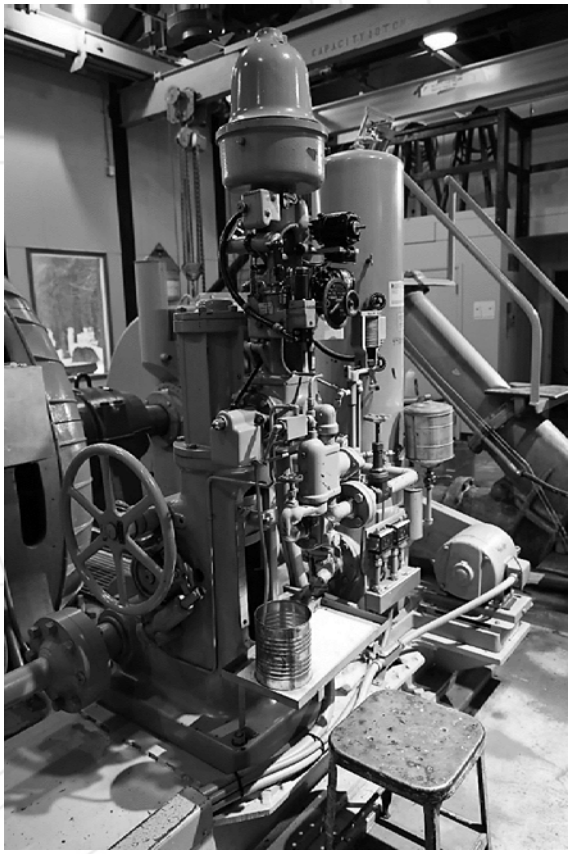

Figure 10. Woodward mechanical governor, 2022.

Figure 11. Final section of penstock from concrete thrust block to powerhouse, showing new concrete saddle supports, 2022.

Figure 12. Forested setting of Newhalem Creek powerhouse and lower section of penstock, 2022.

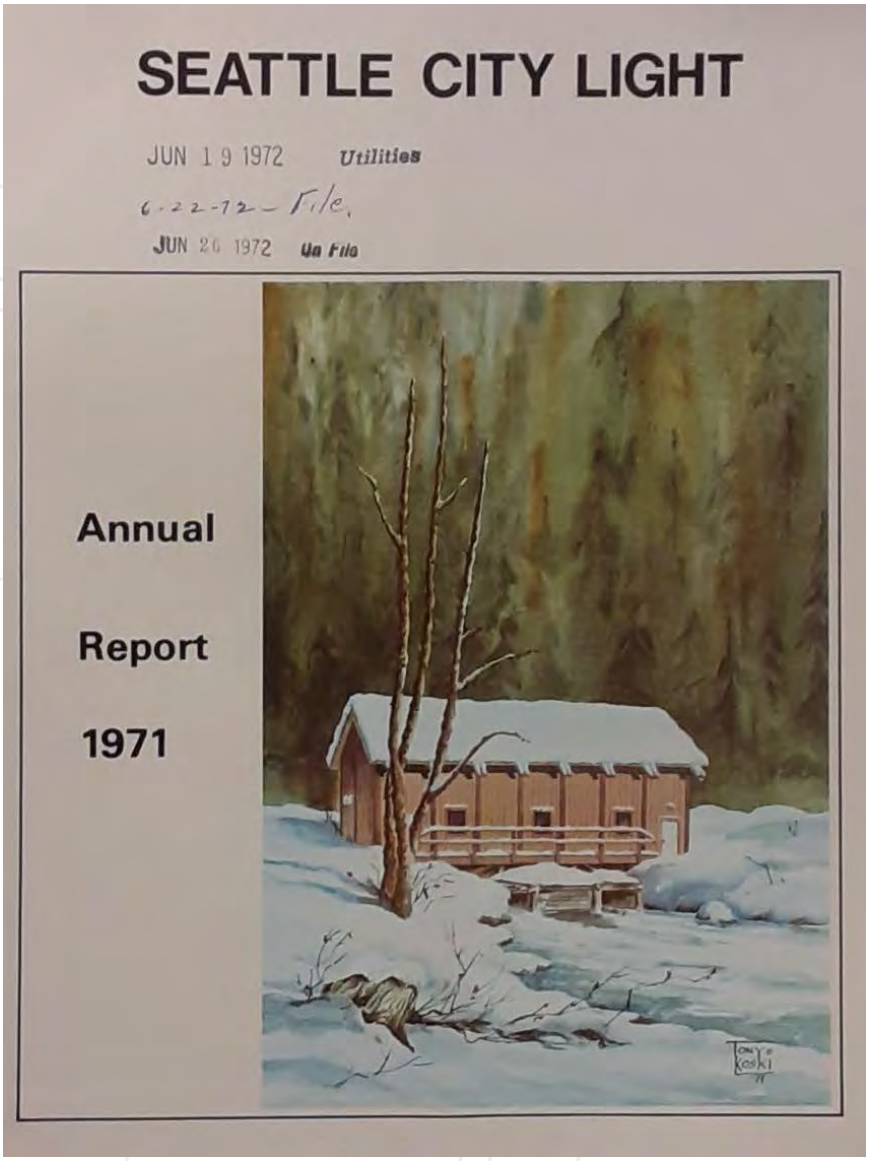

Figure 13. Cover of 1971 Seattle City Light Annual Report.
Source: Seattle Municipal Archives.

Appendix C.
Comments and Responses

Appendix C: Response to Comments on Preliminary Project Description and Pre-Submittal Review Draft Application and Plan

#	Comment	Response
NPS Comments on Preliminary Project Description – Received on 10/7/2021		
1	Will there be a detailed vegetation restoration plan created for the project? It seems like there will be some areas which can be left to naturally regenerate and others which may need planting. A restoration plan needs to be reviewed and approved by the NPS. If the NPS will be completing restoration or providing plants, we will need time to create a Reimbursable Agreement so please describe the work with the full understanding of the timeline to ensure that there is sufficient lead time to produce an agreement and appropriate plant stock. It takes up to 2 years to produce trees for replanting.	A Restoration Plan will be developed that will include natural regeneration and/or replanting disturbed areas with native vegetation. The Restoration Plan will be provided to the NPS for review. An agreement will be created with the NPS to propagate the needed plants via the existing plant propagation Memorandum of Agreement between the NPS and Seattle City Light (City Light).
2	Is there an invasive species management plan for the project to minimize and address any weeds appearing in work areas?	An Invasive Species Management Plan will be prepared and will be provided to the NPS for review.
3	The NPS supports City Light's historic preservation efforts and will work with them to create appropriate mitigations.	Noted.
4	Regarding diversion dam and headworks removal alternatives, the preference is for outcomes that remove all structures and associated features that are not determined historically necessary. This includes support for the following proposed alternatives: Dam Removal Alternative 2 - Remove weir and apron; Headworks Alternative 2 - remove intake/sluiceway/ gatehouse and downstream shoreline concrete fill; and Bridge Alternative 1- Deconstruct and remove bridge.	Noted. The preferred alternative will remove the weir, apron, intake/sluiceway/gatehouse, downstream concrete fill, and pedestrian bridge, and the tailrace fish barrier. The integrity of the historic powerhouse and penstock has been evaluated by a consultant with respect to National Register of Historic Places (NRHP) criteria. The integrity was determined to be intact and is documented in a technical memorandum in Appendix B of the Application for Surrender of License (Surrender Application). The integrity of the powerhouse and penstock has been determined sufficient to remain listed in the NRHP; thus, the powerhouse and penstock will be left in place and interpreted as historic resources.
5	Regarding the Final Road Disposition Alternative, the preference is for Alternative 1 - Abandon the road above the Emergency Access Plan location, scarify and replant.	The road will be decommissioned above the Skagit River Project Emergency Action Plan (EAP) muster point, which is at 840' elevation. Decommissioning will include restoration, the removal of culverts, and

	We also support the removal of culverts along the decommissioned road and establishment of aquatic organism passage at all water crossings along the road.	reestablishing drainage. A Road Decommissioning Plan will be developed based on USFS or DNR guidelines in coordination with the NPS.
6	The NPS supports the installation of entrance gates on the power tunnel for visitor protection and wildlife habitat.	A gate will be placed over the adit tunnel to prevent human access but still allow use by small wildlife.
7	The NPS supports Activity A as recommended by Golder Associates, Inc. of a photogrammetric survey of slide area and surroundings that clearly defines the extent of the unstable area. The survey would occur after completion of decommissioning, capturing condition of landslide post decommissioning activity which may include scaling.	The referenced Golder Associates report was prepared in 2021 prior to the decision to surrender the license on the assumption that City Light would continue Newhalem Creek Project operations. The recommended photogrammetric survey was to inform the engineering design for repairing the road for prolonged use. After the Newhalem Project and access road are decommissioned, City Light has no need to survey the landslide since it is naturally occurring and would not threaten any infrastructure. Thus, City Light is not proposing post-decommissioning photogrammetric surveys in the Surrender Application.
8	We have not received the Watershed GeoDynamics memo outline of geomorphology per actions items from Draft Meeting summary	This report was provided to the NPS on December 20, 2021.
9	The NPS does not support the disposal of concrete or the use of slurry for transporting debris into the power tunnel. Disposing concrete in the tunnel would negate the wildlife benefit of the tunnel and would effectively turn the power tunnel into a dump site. Per City Light, the power tunnel is contributing to the historic district (Draft Meeting Summary, pg. 4). Use of slurry to transport material would have potential water quality ramifications.	The proposal is to dispose approximately 50 CY of concrete in the rock shaft, not the power tunnel. The concrete would consist of dry rubble, not slurry, so would not contribute to degradation of water quality. The 55' tall x 5' diameter vertical rock shaft connects to the power tunnel, the latter of which will remain inaccessible following decommissioning because it is sealed with a concrete plug at the downstream end. The rock shaft opening would be permanently sealed after decommissioning. The rock tunnel that contains part of the penstock (the "adit" or “penstock tunnel”), on the other hand, is currently open at the lower end. After decommissioning, a gate would be installed to allow access by small wildlife but not humans other than City Light employees for maintenance purposes. The concrete plug on the upstream end of the adit/downstream end of the power tunnel will continue to prevent movement of material, runoff, and access to wildlife.

10	The NPS supports removal of any berm, hilfiker wall and other structures installed for decommissioning of the project and access road.	The road will be decommissioned above the EAP muster point, which is at 840' elevation. Decommissioning will include removing culverts, re-establishing drainage, and scarifying. The Hilfiker wall will remain in place because it will be difficult and dangerous to remove since it is in the landslide path and will create a significant amount of disturbance. It will eventually decompose in place so that effects would be gradual. Removing the Hilfiker wall would render the landslide area impassable for Tribal use, of which the USIT has indicated a preference for a trail, and post-decommissioning weed control. A Road Decommissioning Plan will be developed based on USFS or DNR guidelines in coordination with the NPS.
11	The NPS supports the development of a gravel and sediment management plan for project decommissioning, including the amount of material that is stored behind the project and is expected to be transported through headcut.	The project will restore the pre-project stream profile by reversing aggradation of material due to the dam. Because most of the sediment deposits behind the diversion and immediately upstream are coarse-grained, the increase in turbidity in the creek downstream will likely be short term and transient. Sediment will be managed by phasing construction, isolating the work site using supersacks to avoid working in the water, and timing the work to avoid fish spawning periods. When developing the Sediment and Erosion Control Plan, City Light will work with the NPS to develop any additional best management practices to minimize sedimentation during dam removal.
12	The NPS supports removing all structures including any temporary berm (i.e. hilfiker wall).	City Light understands that this comment is referencing the dam access road. Please see response to comment # 10.
13	The NPS supports Activity A as recommended by Golder Associates, Inc. of a photogrammetric survey of the slide area and surroundings that clearly defines the extent of the unstable area. The survey would occur after completion of decommissioning, capturing condition of landslide post decommissioning activity which may include scaling.	See response to comment #7.
14	The NPS supports alternatives for removal of all structures including culvert removal and AOP passage. We do	City Light understands that this comment is referencing the dam access road. See the response to comment #10 if referencing the dam access road and comment #4 if referencing other infrastructure.

	support a wildlife/visitor gate on the tunnel. We do not support disposing the concrete in the power tunnel.	A gate will be placed over the adit tunnel to prevent human access (other than City Light employees for maintenance purposes) but still allow small wildlife. Regarding concrete disposal, City Light is not proposing to dispose of concrete in the power tunnel, rather the rock shaft. Please see response to comment #9. Disposal in the rock shaft would reduce the number of trips to dispose of the concrete material.
15	The NPS would like to see all the concrete associated with the diversion dam, sluice, intake, and apron removed. As part of this action head cutting will need to be addressed. This could potentially mean that a grade control structure will need to be installed close to the powerhouse. However, these decisions should be informed by the results from the City Light survey.	The preferred alternative includes the removal of the diversion dam, sluiceway, intake, and apron. Upon removal of the dam, material that has deposited behind the dam since its construction will move downstream over a decadal period, and the channel gradient will adjust to pre-project conditions. The large grain size of the deposited material will armor the bed as it slowly re-adjusts to the new base level (e.g., without the diversion structure). Bed lowering beyond the level of accumulated material is not anticipated. Transport of this aggraded material downstream provides long-term benefits to aquatic habitat in Newhalem Creek and the Skagit River. City Light believes that a grade control structure nullifies the benefits of removing the dam and would limit the recovery of downstream habitat.
16	The NPS would like to see the road decommissioned with all the culverts removed and natural drainage restored.	Decommissioning will include the removal of culverts and reestablishing drainage. A Road Decommissioning Plan will be developed based on USFS or DNR guidelines in coordination with the NPS.
17	The NPS would like to see all the infrastructure (including rip-rap) be considered for removal so we can restore natural habitat conditions and minimize the need for hazard tree removal.	Based on an independent evaluation (see Appendix B in the Surrender Application), both the powerhouse and penstock retain sufficient integrity to convey their historic significance. Thus, the preferred alternative includes retaining the powerhouse and penstock. The preferred alternative includes a measure to significantly limit vegetation maintenance along the penstock to restore forested habitat. This, along with other restoration measures, results in the restoration of 2.78 acres of habitat, which is only 0.16 acres less than the full removal alternative.

		Restoration will include the removal of riprap in the tailrace.
18	The NPS requests a toxicology assessment of the materials in the penstock tunnel as well to determine if there is any seepage from the tunnel.	City Light will complete an evaluation of the materials in the penstock tunnel and the potential for toxicological effects. Groundwater that infiltrates through natural rock fractures and drains from the penstock tunnel will also be evaluated. The NPS will be provided a copy of the evaluations once available.
19	The natural intermittent stream which feeds into the tailrace channel passes through two culverts where the Trail of the Cedars crosses the channel. These culverts should be replaced with AOP culverts of a larger diameter which are countersunk and lined with material similar to the natural channel substrate upstream.	The two culverts are not components of the Newhalem Creek Hydroelectric Project; one of these culverts is beneath the emergency evacuation route associated with the EAP for the Skagit River Hydroelectric Project, and the other culvert is associated with the Trail of Cedars that is maintained by the NPS. If either of these culverts are impacted by decommissioning activities, City Light will evaluate passage for aquatic organisms and coordinate with the NPS on appropriately designed/sized culverts.
20	Could a low elevation portion of the penstock be retained for historic/ interpretation uses and upper portion of the penstock which is out of view of the public be removed to facilitate wildlife movement and reduce the amount of infrastructure which needs to be maintained in perpetuity?	City Light is proposing to remove Project features that directly affect the natural dynamics of Newhalem Creek and that are generally out of public view. The powerhouse and penstock are listed historic properties that have no direct effect on the creek and are in recreation areas regularly visited by the public; thus, City Light proposes to retain these structures. The current platform would be retained and improved to facilitate viewing of the full length of the penstock. This structure and the penstock will be maintained by City Light in perpetuity. City Light hired a consultant to evaluate the historic integrity of the penstock and powerhouse in accordance with NRHP criteria. It was determined that the penstock retains integrity sufficient to retain its significance (see Appendix B in the Surrender Application). Thus, the structure will be retained as described in Alternative C (the preferred alternative).

21	Any infrastructure that does not need to be retained due to its historic nature should be removed and the footprint should be restored to a natural condition.	See responses to comments #17 and 20.
NPS Comments on Pre-Submittal Review Draft Application and Plan – Received on 12/4/2021		
22	We request that the preferred alternative include complete removal of all above ground infrastructure associated with the hydropower facility (including the powerhouse and penstock). In a 12/6/21 email, NPS stated: I need to make a correction to the comments I sent earlier. I misunderstood the status related to the historic integrity of the infrastructure associated with the Newhalem Hydro project. As I now understand it, the integrity of the remaining historic properties need to be determined, and if they're lacking integrity, then the NPS prefers alternative C that addresses full removal of all infrastructure. If they do retain integrity, then the NPS supports an alternative that would remove what's necessary to reestablish natural conditions and mitigate for impacts to the historic district.	City Light hired a consultant to evaluate the historic integrity of the penstock and powerhouse in accordance with NRHP criteria. The consultant determined that both of the historic properties retain integrity sufficient to convey their significance (see Appendix B in the Surrender Application). Thus, the structures will be retained as described in Alternative C (the preferred alternative). The preferred alternative provides long-term benefits to terrestrial, aquatic, historic, and recreation resources. While the full removal alternative would restore approximately 2.94 acres of terrestrial habitat, there would be long-term adverse impacts to historic properties listed in the NRHP and a loss of existing recreation resources. In comparison, the preferred alternative preserves significant historic properties and existing recreation resources, and restores 2.78 acres of habitat, only 0.16 acres less than the complete removal alternative. This is achieved by minimizing vegetation maintenance to restore forested habitat around the penstock and limiting the powerhouse footprint to only that which is necessary for interpretive and maintenance purposes.
23	We are also requesting that City Light complete an environmental site assessment to determine the environmental liability associated with the existing footprint, including the materials and soils in the penstock tunnel, and the soils associated with the penstock and cradles. The site assessment should include, but not be limited to, all CERCLA hazardous substances including lead and asbestos. We also request the right to rely on this assessment.	Three environmental site assessments of the penstock footprint have been completed since 2014. In July 2014 City Light investigated site conditions along the penstock to assess potential impacts associated with suspected historical penstock coating activities. In October 2015, City Light conducted additional sampling along the alignment prior to completing saddle replacement work. Samples from the wood saddles were also collected in 2016. Results of the various sampling indicated that soil in the vicinity of the penstock contained elevated concentrations of metals and soil in very close proximity to the wood saddles contained polycyclic aromatic hydrocarbons (PAHs) above screening levels. In 2016 and 2017, in response to these findings and

		as part of the penstock saddle replacement project, a total of 171 tons of contaminated soil were removed from the site. The soil removal was completed as a Time Critical Removal Action (TCRA) under Superfund and an NPS Action Memorandum and Administrative Settlement Agreement and Order on Consent (ASAOC). Following completion of the TCRA, NPS determined that site conditions warranted additional response to evaluate the hazardous substances and the need for cleanup under a Non-Time-Critical Removal Action under CERCLA, as specified in 40 CFR Section 300.415(b). This determination was formalized in an Engineering Evaluation and Cost Analysis (EECA) Approval Memorandum, signed on December 19, 2017, by the Acting Regional Director, NPS Pacific West Region. In October 2018, an EECA investigation delineated the remaining lateral and vertical extent of contamination in the soil in the impacted area of the penstock and collected data for preparation of the EECA Risk Assessment pursuant to CERCLA. The EECA analyses were completed during 2020 and 2021. The Risk Assessment determined that contaminant concentrations that remain in site soil after the 2017 Removal Action do not pose unacceptable risk to people or ecological receptors and additional removal of contaminated soil is not required. EECA findings have been reviewed and accepted by NPS North Cascades National Park (NOCA), and the draft document is currently in NPS review. Regarding materials associated with the penstock tunnel, please see response to comment #18.
24	We are also concerned that the impacts associated with the diversion dam removal have not been adequately considered to address the impacts of head cutting in Newhalem Creek. As stated in the documents, City Light expects "4 to 7 ft of bed-lowering extending approximately 1,000 ft upstream from the diversion." This will result in an unacceptable impact to NPS lands both upstream and downstream of the diversion dam, and these impacts	Bed lowering beyond the level of accumulated material is not anticipated. Upon removal of the dam, material that has deposited behind the dam since its construction will begin to move downstream over a decadal period, and the channel gradient will adjust to conditions similar to those prior to the dam's construction. The large grain size of the deposited material will armor the bed as it slowly re-adjusts to the new base level (e.g., without the diversion structure). Transport of this aggraded material downstream provides long-term

	should be reduced by the construction of an NPS approved grade control structure.	benefits to aquatic habitat in Newhalem Creek and the Skagit River. City Light believes that a grade control structure nullifies the benefits of removing the dam and would limit the recovery of downstream habitat.
25	We also request that we be provided the opportunity to review the draft and final (when completed) report titled "Newhalem Dam decommissioning geomorphology considers. Newhalem Creek Hydroelectric Project FERC No. 2705," prepared for City Light by Watershed Geodynamics, that is cited in the documents.	This report was provided to the NPS on December 20, 2021.
26	The environmental analysis included in the documents appears to focus almost exclusively on short-term impacts and not the long-term benefits associated with the complete removal of all above ground infrastructure.	See Table E-1 in the Surrender Application, which includes both short term impacts and long-term benefits of all the alternatives. The preferred alternative provides long-term benefits to terrestrial, aquatic, historic, and recreation resources. While the full removal alternative would restore approximately 2.94 acres of terrestrial habitat, there would be long-term adverse impacts to historic properties listed in the NRHP and a loss of existing recreation resources. In comparison, the preferred alternative preserves significant historic properties and existing recreation resources, and restores 2.78 acres of habitat, only 0.16 acres less than the complete removal alternative. This is achieved by minimizing vegetation maintenance to restore forested habitat around the penstock and limiting the powerhouse footprint to only that which is necessary for interpretive and maintenance purposes.
27	The analysis also does not include the use of best management practices and a reasonable range of options/methods available for the removal of the infrastructure (i.e., the use of a spider excavator).	The Surrender Application describes best management practices, methods, and equipment needed to remove all infrastructure applicable to the preferred alternative.
28	We look forward to working with City Light on the Restoration plan for vegetation, prevention/control of invasive species, and erosion control.	A Restoration Plan, Invasive Weed Management Plan, and Sediment and Erosion Control Plan will be developed for decommissioning activities, as described in the Surrender Application. The Plans will be provided to the NPS for review and filed with FERC.
29	We also support the use of USFWS and WA DNR guidelines for the decommissioning of the access road and other	As described in the Surrender Application, a Road Decommissioning Plan will be developed based on USFS or DNR guidelines in

	disturbed sites and request that NPS be involved in determining the most appropriate BMPs that will be employed.	coordination with the NPS. A Restoration Plan will be developed in coordination with the NPS for restoring disturbed sites.
30	At this time, the NPS does not want the decommissioned roadbed to be converted into a trail.	Noted. The USIT has indicated a preference for leaving the trail in place; City Light will work with the NPS and USIT to find a mutually agreeable solution.
31	We are also requesting that the NPS be involved in determining the most appropriate mode of access to decommission the headworks and the location of the disposal site, given the potential impacts to visitor experiences and safety as well as natural and cultural resources in the area.	Based on the excessive costs, potential unavailability during the fire season, tree removal requirements, longer construction duration, and significant noise disturbance associated with using helicopters to transport materials and equipment, City Light has selected the road improvement option. This option repairs the road only to the extent that highway legal dump trucks and an excavator can safely traverse the road to access the dam for decommissioning. City Light will work with the NPS to determine the most appropriate disposal site(s). City Light anticipates offsite material disposal other than potentially utilizing the rock shaft.
USIT Comments on Preliminary Project Description – Received on 9/28/2021		
32	Diversion Dam Access: Prefer road improvement access alternative to minimize noise, tree removal, avoid need for slope stabilization, and minimize project duration. Prefer whichever combination of proposed approaches would minimize noise disturbance, tree removal, and time required to complete the removal project. Need more information to determine specific set of least impactful actions.	City Light appreciates this input and has selected this option accordingly. We agree that the helicopter access option results in greater environmental impacts such as potential tree removal, longer construction duration, and significant noise disturbance compared with the road access option to transport materials and equipment. The helicopter option also results in excessive costs for City Light and could prolong the construction schedule due to potential unavailability of helicopters during the fire season. Slope stabilization efforts will be commensurate with safety needs and the length of time in which the road would be in use, which is only anticipated for one construction season. Impacts related to noise, tree removal, slope stabilization, and project duration were discussed in a meeting with the USIT on October 18, 2021. A table summarizing these impacts was provided to the USIT on November 22, 2021, and the Surrender Application was updated with

		more detail regarding these impacts. The impacts table can be provided to other parties upon request.
33	Diversion Dam and Headworks Removal: Prefer all elements removed, including the dam, weir, intake, sluiceway, gatehouse, concrete infilling, and pedestrian bridge.	The preferred alternative includes the removal of these items.
34	Diversion Dam and Headworks Removal: Prefer use of small helicopter or small trucks vs large dump truck to avoid extensive road work.	Noted. The project description has since been updated to include only the use of smaller, highway legal dump trucks for the road improvement access option. Although not anticipated at this time, there may be instances when a few trips must be made by helicopter.
35	Diversion Dam and Headworks Removal: No objection to disposal in the rock shaft and power tunnel to minimize noise and traffic.	Noted.
36	Diversion Dam and Headworks Removal: Ensure power tunnel inlet is fully sealed to avoid capture of surface or hyporheic flow. Investigate source of water currently exiting the power tunnel and what will happen to the water after plugging the tunnel outlet.	The power tunnel will remain fully sealed upon completion of construction. Surface flow and hyporheic flow from the river is not anticipated; however, the power tunnel collects groundwater that infiltrates through natural rock fractures. This water is currently conveyed through the penstock and discharges into the tailrace and will continue to do so under the preferred alternative. Water flow has not been measured but is estimated at 3-5 gallons per minute during the summer.
37	Diversion Dam and Headworks Removal: Recontour channel banks to match surrounding condition	After meeting on October 18, 2021, City Light understands that there was concern on behalf of the USIT that banks would be steepened with the new channel gradient following dam removal. The geomorphological assessment by Dube (2021) does not indicate that banks would be over steepened. However, the south bank of the channel, that has been disturbed by construction and annual gravel passage activities, will be recontoured to match adjacent shoreline conditions. This will be addressed in the Restoration Plan.
38	Diversion Dam and Headworks Removal: Restore all disturbed areas with native vegetation	A Restoration Plan will be developed that will include natural regeneration and/or replanting disturbed areas with native vegetation.
39	Dam Access Road Disposition: Prefer decommissioning of road, with a trail left in place. Adhere to accepted	Decommissioning will include the removal of culverts and re-establishing drainage. A Road Decommissioning Plan will be developed based on USFS or DNR guidelines in coordination with the NPS.

	protocols for road decommissioning (e.g. WA Forest Practices Road Maintenance and Abandonment Plans)	The NPS prefers that a trail not be left in place at this time. City Light will work with the NPS and USIT to find a mutually agreeable solution.
40	Penstock and Saddles: Prefer full removal of penstock, saddles, and trail	City Light hired a consultant to evaluate the historic integrity of the penstock and powerhouse in accordance with NRHP criteria. They determined that both historic properties retain integrity sufficient to convey their significance (see Appendix B in the Surrender Application). Thus, the structures will be retained as described in Alternative C (the preferred alternative). The preferred alternative provides long-term benefits to terrestrial, aquatic, historic, and recreation resources. While the full removal alternative would restore approximately 2.94 acres of terrestrial habitat, there would be long-term adverse impacts to historic properties listed in the NRHP and a loss of existing recreation resources. In comparison, the preferred alternative preserves significant historic properties and existing recreation resources, and restores 2.78 acres of habitat, only 0.16 acres less than the complete removal alternative. This is achieved by minimizing vegetation maintenance to restore forested habitat around the penstock and limiting the powerhouse footprint to only that which is necessary for interpretive and maintenance purposes.
41	Penstock and Saddles: Presence of infrastructure and damage to forest vegetation is an ongoing impact to cultural resources (see cultural comments)	The preferred alternative has been revised accordingly. The preferred alternative minimizes future vegetation maintenance to the immediate footprint of the penstock and limits the powerhouse footprint to only that which is necessary for interpretive and maintenance purposes. With these measures, the preferred alternative restores 2.78 acres of habitat, which is only 0.16 acres less than the full removal alternative. The preferred alternative would avoid impacts to known archaeological sites since ground disturbance would not occur in the vicinity of the penstock and saddles. Additionally, cultural resource surveys will be conducted prior to decommissioning to identify unrecorded archaeological sites. Please also refer to the response to comment #40.

42	Penstock and Saddles: Impact from removal could be minimized by avoiding need for an access road. Consider use of helicopter for extraction and/or Spider Excavator for direct access to penstock without need for road building	The preferred alternative leaves the penstock in place due to its contributing significance to the NRHP historic district (DT66) and would avoid impacts associated with helicopters and excavators in the vicinity of the saddles and penstock. City Light has noted the suggestion to use helicopters and an articulated excavator in alternatives that were considered but dismissed.
43	Penstock and Saddles: Take measures to avoid disturbance of cultural site (see cultural comments)	Noted. The preferred alternative would avoid impacts to known archaeological sites since ground disturbance would not occur in the vicinity of the penstock and saddles. Cultural resource surveys will be conducted prior to decommissioning within the disturbed footprint to identify unknown archaeological sites.
44	Penstock and Saddles: EAP access point o Rely on existing EAP site on Newhalem dam access road o If additional site is needed, restrict to areas already disturbed and used by the public	As part of the Skagit River Hydroelectric Project EAP, evacuation routes are required by FERC to allow for Park visitors and City Light employees in Newhalem to evacuate in case of a dam breach. The Newhalem Creek Dam access road is too far away for people within the town of Newhalem, or visitors on the trails, to use as an evacuation route. The EAP trail occurs within a presently disturbed corridor that is used by the public; it parallels the penstock and occurs near the Trail of Cedars and Linking Trail, both of which receive a significant amount of visitation. Development of a new EAP muster location is not part of the proposal to decommission the Newhalem Creek Hydroelectric Project. City Light is noting this location only for the purpose of defining the extent of road decommissioning. If a new EAP muster location is required that would disturb ground, it would be addressed as its own standalone project. City Light notes USIT's suggestion to remain within the previously disturbed footprint and would consult with the USIT if ground disturbance was necessary. City Light has made its Dam Safety engineers aware of the USIT's concerns and interest in a different location, if possible.
45	Penstock and Saddles: Restore all disturbed areas with native vegetation	A Restoration Plan will be developed that will include natural regeneration and/or replanting disturbed areas with native vegetation.

46	Powerhouse: Prefer full removal of building, equipment, parking area, and related structures	Noted. See responses to comments 40 and 41.
47	Powerhouse: Restore all disturbed areas with native vegetation	A Restoration Plan will be developed that will include natural regeneration and/or replanting disturbed areas with native vegetation.
48	Powerhouse: Clean up any hazardous materials or water quality concerns	During decommissioning, hazardous materials will be removed and disposed of properly, and water quality concerns that are encountered will be addressed. Water quality would be protected via various measures, many of which would be developed in the Spill Plan and Sediment and Erosion Control Plan.
49	Tailrace and Barrier Weir: Intermittent stream channel has been altered by generation flows (routing of Newhalem flows) o Restore channel to natural dimensions, remove riprap, replant disturbed areas	City Light will restore the intermittent channel by removing riprap and recontouring the banks to resemble natural conditions; however, the channel banks upstream of the fish barrier contain mature conifers, so only minimal contouring is anticipated in these areas. A Restoration Plan or other designs will be developed to identify which areas will receive contouring. The Restoration Plan will include natural regeneration and/or planting areas that have been disturbed by decommissioning activities with native vegetation.
50	Tailrace and Barrier Weir: Remove barrier weir o Weir likely interacts with Skagit River high flows, thus impacting backwater habitat o Determine potential for incision following removal of weir and take actions to avoid or mitigate impacts to channel habitat conditions	Interaction of the weir with Skagit River high flows is noted. The potential for incision will be evaluated and precautions will be taken if anticipated conditions will not meet restoration goals.
51	Countyline Pond #3: Ensure maintenance of pond is not interrupted o Will the maintenance be transferred to the Skagit license or remain as an ongoing responsibility of this decommissioning?	City Light continues to occasionally conduct road and culvert maintenance as needed for Countyline Pond #3, although this facility has not been used by WDFW in recent years. Maintenance will be discontinued once the FERC license is surrendered. If ongoing maintenance is needed, the matter can be raised during the concurrent proceedings to relicense the Skagit River Hydroelectric Project.
52	Cultural Resource Comment 1. Why is City Light rushing to get this undertaking completed before the next reassessment of 45DT66, which will be coming up as part of a to-be-revised HPMP, presumably after a new license is	The update of the Skagit River and Newhalem Creek Hydroelectric Projects' (DT66) National Register nomination is a requirement of the current license for the Skagit River Hydroelectric Project and was begun in 2021. It will be completed and provided to the USIT for

	granted? The timeframe for this Sec. 106 undertaking creates a problem: how can the Tribe do its own evaluation and make its own assessment if it has incomplete data? Request: please clarify the schedule by which the Skagit River and Newhalem Cr. Hydroelectric Projects' (DT66) National Register nomination form will be reviewed and revised.	review in 2022. It will then be used to inform development of a Historic Resources Mitigation and Management Plan (HRMMP) for the new Skagit River Hydroelectric Project license. The Newhalem Creek Project is separate from the Skagit River Project. Decommissioning and relicensing these two projects, respectively, are on different timeframes, as determined by their license expiration dates. The Surrender Application for Newhalem Creek must be submitted to FERC by January 31, 2022; the application for a new license for the Skagit Project is due April 31, 2023. City Light is committed to formal Section 106 consultation with the USIT throughout the decommissioning process for Newhalem Creek, not just for the initial scoping. We are currently developing a proposed area of potential effect (APE) for the project, which will be sent to the USIT for review and comment before finalizing with DAHP.
53	Although City Light has provided considerable information regarding contributing resources to DT66, it has not addressed the loss of historic integrity to the penstock and other contributing resources. The Tribe has reason to believe that some resources have lost their historic integrity and it seeks to know which other of the authentic characteristics of the property's historic identity have not survived.	A consultant has evaluated the historic integrity of the powerhouse and penstock according to NRHP criteria and determined that they retain sufficient integrity to convey their significance. This is documented in a technical memorandum that is included as Appendix B in the Surrender Application.
54	Due to recent replacement of the penstock saddles, it appears that the penstock has lost historic integrity of design, materials, workmanship, feeling, and association, and therefore it may no longer contribute to the district's significance.	See City Light's response to comment #53.
55	Cultural Resource Comments: * The project as planned may adversely affect the Tribe's Upper Skagit River Gorge and Canyons TCP District (45WH450). Three of these effects are listed below: Cultural Resource Comment 4a. Environmental	As part of a CERCLA Removal Action overseen by the NPS, 171 tons of soil was removed from beneath the penstock. Prior to and after the Removal Action, sampling was conducted throughout the site to determine the nature and extent of contamination associated with the penstock. The CERCLA Risk Assessment determined that, following the

	contamination is an alteration of the historic character of the TCP. It is concerning also that despite toxic and hazardous substances in soils under the penstock, there appears to be plan or schedule at present on when the contamination problem will be completely and finally resolved.	Removal Action, remaining contaminant concentrations in site soil do not pose unacceptable risk to people or ecological receptors and additional removal of contaminated soil is not required. EECA findings have been reviewed and accepted by NPS NOCA, and the draft document is currently in NPS review.
56	*Cultural Resource Comment 4b. Waterfalls are important traditional cultural resources that impart significance to 45WH450. These include Ladder Cr. and Newhalem Cr. falls. Aspects of the hydro project that diminish the integrity of waterfalls in the District may constitute and adverse effect.	The preferred alternative removes the dam and other infrastructure on Newhalem Creek. The entrance to the rock tunnel, penstock, and powerhouse are approximately 1/3-mile from Newhalem Creek and the waterfall; any noise associated with maintaining the remaining infrastructure would likely not be noticeable at this distance. After meeting with the USIT on October 18, 2021, City Light understands that effects to the waterfall and spiritual purity of Newhalem Creek are primarily associated with the campground and town of Newhalem and believes that dam removal will have long-term beneficial effects to cultural resources. City Light will work with the Tribe to identify project effects to 45WH450. City Light will develop methods to avoid, minimize or mitigate adverse effects in consultation with the Tribe and DAHP.
57	*Cultural Resource Comment 4c. Although 45WH1029 (lithic scatter under the penstock) was informally assessed on its site form as not eligible for NRHP significance, it still retains significance in the eyes of the USIT as it contributes to setting, feeling, location, and association of the natural character of the Gorge TCP. But 45WH1029 also retains significance due to its membership within a group of pre-contact period archaeological sites that forms a cluster in the Newhalem area, inside of or in close proximity to the DT66 boundaries. In the Tribe's view, contrary to Sec. 106, the site's significance cannot be determined in isolation from all the other sites in the Upper Skagit dispersed village of k'wabacabs, which includes the Newhalem area. 45WH1029 continues to contribute important contextual	The preferred alternative would avoid impacts to known archaeological sites since ground disturbance would not occur in the vicinity of the penstock and saddles. City Light understands that there may be a potential impact to the TCP for leaving the penstock and powerhouse in place; thus, City Light will consider mitigating adverse effects to the TCP by conducting an archaeological survey along the portion of the glacial terrace extending from Newhalem Creek east to the penstock. An assessment of the known sites on the glacial terrace will be included in the cultural resources assessment report.

	and scientific information to the traditional places around it. Specifically, 45WH1029 joins three other lithic scatters (45WH400, --475, and -476 are contributing properties to TCP 45WH450) that are located on a prominent Pleistocene glacial landform (moraine) that includes today's NPS Visitor Center (see "Results of a Subsurface Archaeological Survey on a Pleistocene Terrace in North Cascades National Park Service Complex" by R. R. Mierendorf and D. J. Harry, Archaeology in Washington, Vol. V, 1993; also, the moraine surface and its inner-valley escarpment are clearly visible in Google Maps terrain view). These previously-recorded lithic scatters were located variously on the western, southern, and eastern portions of this extensive landform, and all the sites are west of Newhalem Creek; however, the presence of 45WH1029 near the eastern end of the landform and east of Newhalem Cr. Is new evidence that traditional cultural uses spanned the entire landform, and constitutes sufficient evidence for the Tribe to conclude that there are likely to be more unrecorded sites on the remaining unsurveyed portions of the landform. Clearly, site 45WH1029 adds to a broader understanding of the cultural heritage of which it is a part.	
58	Request an immediate significance reassessment of DT66 in order to make that information available during the Sec. 106 consultation period and prior to any record of decision regarding decommissioning of the Newhalem Cr. Dam hydro project.	See City Light's response to comment #53. The current update of the NRHP nomination for the district will include evaluation of buildings/structures that have reached 50 years of age since the last update. The entirety of DT66 includes approximately 177.4 acres and includes 87 contributing resources. The update does not reassess the significance of the entire district. City Light will provide the Tribe with the draft NRHP nomination update when it is ready in approximately second quarter 2022.

59	The Tribe would like to be consulted by whoever prepares a new assessment and registration form for 45DT66.	City Light's historic resource specialist is leading the effort with an experienced consultant. City Light will provide the Tribe with the draft NRHP nomination update when it is ready in approximately second quarter 2022 and will meet with the USIT to discuss any comments or questions.
60	The USIT also requests the ability to review and comment on any updated NRHP registration forms prepared for 45DT66, prior to its finalization.	City Light will provide the Tribe with the draft NRHP nomination update when it is ready in approximately second quarter 2022 and respond to any comments received from the USIT.
61	It appears that only portions of the bounded area of the Newhalem Cr. Dam hydro project have been surveyed for the presence of cultural resources, but the extent of surveyed lands is unknown or unreported. Lacking information about the extent of cultural resources surveys in the Newhalem Dam decommission project area, the Tribe cannot adequately comment on the effects to the Tribe of this undertaking. The Tribe requests that a cultural resources survey be conducted on any unsurveyed portions of the project. In addition, some previous surveys in the project area are decades old and should be resurveyed for cultural resources.	Cultural resource surveys will be conducted prior to ground disturbing activities needed for decommissioning. City Light will be developing the APE in consultation with Section 106 parties, including the USIT. Part of this consultation will be determining an appropriate cultural resource survey area.
USIT Comments on Pre-Submittal Review Draft Application and Plan – Received on 12/3/2021		
62	USIT requests City Light remove all associated infrastructure and restore the Newhalem Creek Project area to a naturally functioning ecosystem.	The preferred alternative provides long-term benefits to terrestrial, aquatic, historic, and recreation resources. While the full removal alternative would restore approximately 2.94 acres of terrestrial habitat, there would be long-term adverse impacts to historic properties listed in the NRHP and a loss of existing recreation resources. In comparison, the preferred alternative preserves listed historic properties and existing recreation resources, and restores 2.78 acres of habitat, only 0.16 acres less than the complete removal alternative. This is achieved by minimizing vegetation maintenance to restore forested habitat around the penstock and limiting the powerhouse footprint to only that which is necessary for interpretive and maintenance purposes.

63	Diversion dam access: Prefer whichever combination of proposed approaches would minimize noise disturbance, tree removal, and time required to complete the removal project.	Noted. City Light has selected the road repair option for diversion dam access. This will minimize noise disturbance, tree removal, and time required to complete the project.
64	Diversion dam access: Given the impact of the 2015 Goodell Creek fire, removal of living trees along the creek should not occur due to their critical roles in reforestation, bank stabilization, aquatic food-web sources and other terrestrial wildlife benefits.	Noted. The road access option will not require tree removal, whereas the previously considered helicopter access option would have.
65	Diversion dam access: We recommend consulting logging helicopter operators who are practiced in removing large trees or bundles of wood without landing.	Noted. Helicopters are no longer being considered for diversion dam access.
66	Diversion dam access: We recognize the need to have room to assemble and operate equipment but require more detailed information to determine a specific set of least impactful actions. Following are some helpful details and suggestions: * Length of road to be repaired * Number of trees (live and dead) to remove for road repair vs helicopter access * Explanation for need to land helicopter at dam. Could a suitable landing area be located 400 ft down the road with an existing pullout that wouldn't require removing live trees next to the creek? * Another option could be landing on the flat gravel bar built up behind the dam, which could be temporarily modified during low water and diversion. * Transit of work crew to and from site is easily achievable on the road with minimal road repair or easy walking distance from landslide. * IF tree removal is absolutely necessary we prefer the trees be knocked over with root wads and later replaced as if trees had fallen into the stream.	Noted. City Light does not know the exact length of roadway repair, particularly since the road may deteriorate further once the Order from FERC is received, but an estimate of road repair considering present-day conditions is approximately 1,200 linear feet. The preferred alternative does not involve the removal of trees. The helicopter and helicopter combination access options have been dismissed due to impacts such as tree removal for an adequate drop zone, longer construction duration, and significant noise disturbance.

	* Please provide more information on *Access Option 3: Combination*	
67	Diversion dam and headworks removal: *Phase 1: diversion dam* ** Prefer full removal (dam and weir)*	Noted. This is included in City Light's preferred alternative.
68	Diversion dam and headworks: *Phase 2: remaining headworks* ** Prefer full removal (intake/sluiceway/gatehouse and downstream shoreline concrete fill)* ** Prefer removal of pedestrian bridge*	Noted. This is included in City Light's preferred alternative.
69	Diversion dam and headworks: *Phase 3: concrete disposal and sealing power tunnel* ** No objection to disposal in the rock shaft and power tunnel* -Would minimize noise and disturbance from truck/helicopter traffic * If material disposal is required, prefer use of small helicopter or small trucks to avoid extensive repair work on access road (i.e. not alternative 2) * Ensure power tunnel inlet is fully sealed to avoid capture of surface or hyporheic flow * Investigate source of water currently exiting the power tunnel and what will happen to the water after plugging the tunnel outlet	Based on NPS comments, the NPS does not seem to prefer disposal of concrete in the vertical rock shaft, although City Light has provided clarifications that may affect their preference. See response to NPS Comment #9. City Light will work with the NPS and USIT to find a mutually agreeable solution. Comment is noted that the USIT does not prefer Access Option #2 (using helicopters for transport) but may be open to small helicopters or small trucks to avoid extensive road repairs. Based on the impacts associated with the helicopter access option, such as tree removal, longer construction duration, and significant noise disturbance, in addition to excessive costs and potential unavailability during the fire season, City Light has eliminated the helicopter access option and selected the road improvement option. The road access option repairs the road only to the extent that highway legal dump trucks and an excavator can safely traverse the road to access the dam for decommissioning. The upstream end of the power tunnel will be sealed upon completion of construction, the downstream end is already sealed with a concrete plug where the penstock adjoins the power tunnel. Surface flow and hyporheic flow from the river is not anticipated; however, the power tunnel collects groundwater that infiltrates through natural rock fractures. This water is currently conveyed through the penstock and

		discharges into the tailrace and will continue to do so under the preferred alternative. Water flow has not been measured but is estimated at 3-5 gallons per minute during the summer.
70	Diversion dam and headworks: * Use some form of turbidity capture and fish exclusion in the area immediately downstream of the dam. Either sediment mesh or supersacks to create settling ponds. * Recontour channel banks to match surrounding condition * Restore all disturbed areas with native vegetation	Fish will be removed and excluded from the dam area during construction. The south bank of the channel that has been disturbed by construction and annual gravel passage activities will be recontoured to match adjacent shoreline conditions. A Restoration Plan will be developed that will include natural regeneration and/or replanting disturbed areas with native vegetation.
71	Dam access road disposition: *Prefer decommissioning of road, with a trail left in place *Adhere to accepted protocols for road decommissioning (e.g. WA Forest Practices Road Maintenance and Abandonment Plans)	A Road Decommissioning Plan will be developed based on USFS or DNR guidelines in coordination with the NPS, which will include the removal of culverts and re-establishing drainage. The NPS prefers that a trail not be left in place at this time. City Light will work with the NPS and USIT to find a mutually agreeable solution.
72	Dam access road disposition: *Please note a discrepancy between Table E-2 in the "Newhalem_Surrender-Application_Review-Draft_20211111" and Table 1 in the "Newhalem_Decommissioning_Plan-Draft_20211111". In the second column and third row. Will the dam access road be abandoned at 735 ft elevation or 840 ft elevation?	The road will be decommissioned above the EAP muster point, which is at 840' elevation.
73	Penstock and saddles: *The penstock serves an ongoing purpose to drain water from the leaky tunnel. The erosion prevention provided by the penstock could be addressed in other ways. We would prefer the leaks were grouted so that water can continue as fractured flow to where it would otherwise go. Alternatively, if the volume of discharge is known we could consider the actual erosive potential and if necessary design a less obtrusive, inexpensive solution.	The preferred alternative includes continuing to use the penstock to convey water collected in the power tunnel from natural rock fractures; however, it is noted that there are other ways to convey or address the water collected from the power tunnel including the suggestion provided.

74	Penstock and saddles: *It might be possible to remove the penstock and footings by adapting practices that are common in the logging industry, where heavy equipment is often utilized on steep slopes. We suggest consulting with logging operators to discuss ways to utilize heavy equipment on slopes to preserve slope stability without need for extra roads (suspension systems and tethered options).	The preferred alternative includes leaving the penstock in place due to its contributing significance to the NRHP historic district (DT66). City Light has noted the suggestion to use helicopters and an articulated excavator in alternatives that were considered but dismissed, however.
75	Penstock and saddles: *Similarly, impact from removal could be minimized by avoiding need for an access road -Consider use of helicopter for extraction and/or Spider Excavator for direct access to penstock without need for road building	See response to comment #42.
76	Penstock and saddles: *Presence of infrastructure and damage to forest vegetation is an ongoing impact to cultural resources (see cultural comments) *Take measures to avoid disturbance of cultural site (see cultural comments)	The preferred alternative minimizes future vegetation maintenance to the immediate footprint of the penstock and limits the powerhouse footprint to only that which is necessary for interpretive and maintenance purposes. With these measures, the preferred alternative restores 2.78 acres of habitat, which is only 0.16 acres less than the full removal alternative. The preferred alternative would avoid impacts to known archaeological sites since ground disturbance would not occur in the vicinity of the penstock and saddles. Additionally, a cultural resource survey will be conducted prior to construction in areas proposed for ground disturbance.
77	Penstock and saddles: EAP access point * Rely on existing EAP site on Newhalem dam access road * If additional site is needed, restrict to areas already disturbed and used by the public	See response to comment #44.
78	Penstock and saddles: *Restore all disturbed areas with native vegetation	A Restoration Plan will be developed that will include natural regeneration and/or replanting disturbed areas with native vegetation.
79	Penstock and saddles: *Please provide information regarding the maintenance of the penstock if left, particularly the process and potential	City Light anticipates maintaining the penstock by painting approximately every 10-20 years (including the section that will remain within the rock tunnel) and maintaining vegetation in the immediate

	impacts of painting them periodically. How will the penstock in the rock tunnel be maintained?	footprint of the penstock annually. Painting the penstock would be conducted by hand and would have a relatively low impact to surrounding vegetation.
80	Penstock and saddles: *What wildlife are expected to use the tunnel when gated? We assume bears will be locked out. *Are there other documented species currently utilizing the tunnel?	Since human access would be prevented, the gate would not be large enough to accommodate bears. Wildlife use of the rock tunnel is unknown but it is likely that a number of smaller mammals may occasionally use this structure.
81	Powerhouse: *Prefer full removal of building, equipment, parking area, and related structures *Restore all disturbed areas with native vegetation *Clean up any hazardous materials or water quality concerns *Remove all power lines and poles	The preferred alternative was selected because it provides long-term benefits to terrestrial, aquatic, historic, and recreational resources, and restores 2.78 acres of habitat, which is only 0.16 acres less than the full removal alternative. This is achieved by minimizing vegetation maintenance to restore forested habitat around the penstock and limiting the powerhouse footprint to only that which is necessary for interpretive and maintenance purposes. A Restoration Plan will be developed that will include natural regeneration and/or replanting disturbed areas with native vegetation. Hazardous materials that are encountered as part of construction would be removed and disposed of properly. Water quality would be protected via various measures, many of which would be developed in the Spill Plan and Sediment and Erosion Control Plan. The transmission lines that transmit electricity from the Newhalem Creek Powerhouse to Newhalem would be removed as part of the preferred alternative, but the electrical lines and associated poles that supply power to the powerhouse would remain in order to provide heating and lighting for maintenance and interpretive purposes. The conduit supplying backup electricity to Gorge Powerhouse, derived from the Newhalem Creek generator, will be removed as part of decommissioning.
82	Tailrace and barrier weir: *Intermittent stream channel has been altered by generation flows (routing of Newhalem flows)	City Light will restore the intermittent channel by removing riprap and recontouring the banks to resemble natural conditions; however, the channel banks upstream of the fish barrier contain mature conifers, so

	-Restore channel to natural dimensions, remove riprap, replant disturbed areas	only minimal contouring is anticipated in these areas. A Restoration Plan or other designs will be developed to identify which areas will receive contouring, replanting, or regeneration in areas disturbed by decommissioning activities.
83	Tailrace and barrier weir: * Remove barrier weir - Weir likely interacts with Skagit River high flows, thus impacting backwater habitat - Determine potential for incision following removal of weir and take actions to avoid or mitigate impacts to channel habitat conditions	Interaction of the weir with Skagit River high flows is noted. The potential for incision will be evaluated and precautions will be taken if anticipated conditions do not meet restoration goals.
84	Regarding Countyline Pond #3: * Ensure maintenance of pond is not interrupted - Will the maintenance be transferred to the Skagit license or remain as an ongoing responsibility of this decommissioning?	See City Light's response to comment #51.
85	Water Quality: Please explain in greater detail the mitigation measures and the use of supersacks to isolate the work site. Does this include downstream for sediment trapping and settling measures or just for upstream water diversion?	Supersacks will be used upstream of the worksite to divert the flow of water to isolate the work area for removal of concrete and structures in the dry. A sediment trap with sump pump may only be needed when chipping out the "concrete infilling" as described in Section E.5.4.3 of the Surrender Application. The exact method for containing the water for the sump pump has not yet been determined.
86	Aquatic Resources, Stream geomorphology and habitat: USIT has concerns of temporarily infilling many of the step pools downstream of the dam after its removal. USIT would like this to be addressed due to the cultural and aquatic resource impact. *The geomorphology report was helpful at addressing questions regarding gradients, stream competency, flow statistics and some regrading plans. Some of these are not reflected in the decommissioning plan, such as regrading the streambed after dam removal to a target elevation of 1,009 ft (Skagit project datum). What is still not known is how far upstream the regrading will occur, an estimated	Sediment that is moved out of the diversion area will be transported rapidly through the high gradient canyon/waterfall reach to the alluvial fan area. Some temporary deposition of sediment in sheltered areas of the stream (e.g. in the lee of large boulders or bedrock protrusions) between the dam and the alluvial fan will occur, but it is not anticipated that step pools will be substantially filled. Transport of sediment out of the impoundment area will occur during high flows when hydraulic conditions in the step pool reach limit deposition; accumulations in this reach are anticipated to be similar to conditions when sediments were removed from the impoundment pool and placed below the diversion structure during the current license period. Boulders and large cobble will be deposited at the upstream end of the

	quantity and what will be done with the spoils. We recommend end hauling any spoils to the Skagit River to dampen the effect of increased sediment transport.	fan; actual deposition locations will reflect gradient and stream conditions on the fan. Some cobble, gravel and finer sediment will be transported farther downstream and eventually reach the Skagit River, augmenting substrate there. Minor grading will occur only in the immediate dam removal area, where construction will occur and the supersacks will be emptied, to smooth out the cobble and allow the free flow of water. The channel substrate elevation after dam removal and this minor grading will be approximately 1,009 feet. This has been clarified in the Decommissioning Plan. There will be no need to haul materials offsite since the supersacks would be filled with onsite native material. Potential impacts to cultural resources from minor grading will be assessed with a cultural resources survey and subsequent report, which will be conducted in consultation with Section 106 parties including the USIT.
87	Aquatic Resources, Stream geomorphology and habitat: *Table 4.1-1 of the Geomorphology report specifies a short-term local gradient of 3.9% upstream of the diversion dam once removed. Will this be a targeted slope created by regrading?	3.9% will be the short-term local gradient following removal. There will be no grading within the stream channel other than the minor grading described in comment response #86. As aggregated material is transported downstream and an armor layer forms, a new equilibrium channel gradient will develop, and the average reach gradient will be approximately 2.8 percent.
88	Aquatic Resources, Stream geomorphology and habitat: *What will be done with the material that in the supersacks? Will it be dumped back in the creek at the dam or hauled in the bags down the road and placed in the stream? We recommend placing it directly in the Skagit.	City Light will place material from the supersacks back into the same area where it was extracted from, which is the dam removal area. The material will be subsequently transported during high flows with the rest of the aggregated material, in which downstream deposition would be correlated with natural stream dynamics.
89	Aquatic Resources, Stream geomorphology and habitat: *The emphasis of the environmental effects of removing the dam seems to be on the near-term effects of increased turbidity caused by dam removal. This is important and likely has the highest potential to affect fish in the	The preferred alternative has been designed to minimize the release of sediment during dam removal by performing work during low flow; using a phased approach to remove the infrastructure; and diverting water around the work area to maintain dry working conditions. These measures should result in only a short-term, minor increase in

	anadromous zone. We'd like to discuss mitigation methods to help minimize the immediate impacts. If possible, establish some form of sediment retention immediately downstream of the dam during removal.	turbidity. Additional measures such as downstream sediment retention are likely unnecessary although City Light remains open for discussion.
90	Aquatic Resources, Stream geomorphology and habitat: *We request several years of monitoring to determine progress of channel morphology within 1,000 ft upstream and downstream of the removed dam. Distance proposed to reflect the geomorphic assessment (pg E-23). This will be useful information to help determine actual resource impacts as well as improve understanding of the processes that influence upper watershed streams in City Light's footprint.	City Light is not proposing monitoring because modeling indicates that the only long-term, anticipated effect of the preferred alternative is the re-establishment of pre-Project conditions, including gradient and sediment distribution.
91	Aquatic Resources, Stream geomorphology and habitat: *See comments on tailrace and barrier weir. Examine potential for head cutting upstream of the weir after its removal.	Regarding the tailrace and tailrace barrier, please see City Light's response to comment #83. Regarding the dam diversion, upon removal of the dam, material that has deposited behind the dam since its construction will begin to move downstream over a decadal period, and the channel gradient will adjust to conditions similar to those prior to the dam's construction. The large grain size of the deposited material will armor the bed as it slowly re-adjusts to the new base level (e.g., without the diversion structure). This adjustment would occur for approximately 0.5 miles upstream of the diversion dam over a decadal period. Bed lowering beyond the level of accumulated material is not anticipated. Transport of this aggraded material downstream provides long-term benefits to aquatic habitat in Newhalem Creek and the Skagit River.
92	Aquatic Species: *Even though the 1992 survey only observed resident rainbow upstream of the anadromous zone, WDFW sources also document cutthroat trout. The Tribe believes insufficient data currently exist to make any definitive recommendations.	City Light acknowledges the presence of cutthroat trout.

93	Botanical Resources: *The extent of the fire killing mature forest could impact the peak streamflow for decades to come. Although the vegetation succession has already begun, the sparse presence of large, living trees will continue to be important for forest regeneration. These trees will also have important ecological benefit for bank stabilization, food web inputs for aquatic species and terrestrial wildlife. As such, we expect significant effort to preserve the trees in the vicinity of the diversion dam.	Due to the need for tree removal, a longer construction duration, and significant noise disturbance, in addition to excessive costs and potential unavailability during the fire season, City Light has eliminated the helicopter access option and selected the road improvement option. The road improvement option repairs the road only to the extent that highway legal dump trucks and an excavator can safely traverse the road to access the dam for decommissioning. Tree removal would have been necessary for the dismissed helicopter access option to ensure that the drop zone or propwash area was clear. If there is a need to utilize helicopters under the preferred alternative, would only be removed if necessary for safety and operations.
94	Botanical Resources: * Invasive species surveys will be included in the restoration plan; what is the timeline for establishing this plan? How many years will these surveys take place?	City Light will develop an Invasive Species Management Plan prior to construction, as outlined in the schedule in Exhibit C of the Surrender Application. The need for surveys prior to and after construction will be determined during the Plan development.
95	Cultural Resource Comments: * The project as planned may adversely affect the Tribe's Upper Skagit River Gorge and Canyons TCP District (45WH450). Three of these effects are listed below: *1.a. Environmental contamination is an alteration of the historic character of the Tribe's TCP. It is concerning that toxic and hazardous substances were associated with soils under the penstock. Are there any other toxic/hazardous substances associated with any other part of this project?	See response to comment #55.
96	*Cultural Resource Comment 1.b. Waterfalls are important traditional cultural resources that impart significance to 45WH450. These include Ladder Cr. and Newhalem Cr. falls. Aspects of the proposed plan, such as leaving intact the tunnel access structure, the penstock, and the powerhouse means that the Tribe will continue to experience adverse effects to the integrity of Newhalem	See response to comment #56.

	Cr. waterfalls and the spiritual purity of Newhalem Cr. waters.	
97	*Cultural Resource Comment 1.c. Although 45WH1029 (lithic scatter under the penstock) was informally assessed on its site form as not eligible for NRHP significance, it still retains significance in the eyes of the USIT (regardless that City Light claims to have removed all of the site) as it contributes to the historic setting, feeling, location, and association of the other archaeological sites and natural features that contribute to the historic character of the Gorge TCP. Thus 45WH1029 retains significance due to its membership within a group of pre-contact period archaeological sites that forms a cluster in the Newhalem area, inside of or in close proximity to the DT66 boundaries. In the Tribe's view, contrary to Sec. 106, the site's significance cannot be determined in isolation from all the other sites in the Upper Skagit dispersed village of k'wabacábš, which includes the Newhalem area. 45WH1029 continues to contribute important contextual and scientific information to the traditional places around it. Specifically, 45WH1029 joins three other lithic scatters (45WH400, --475, and –476 are contributing properties to TCP 45WH450) that are located on a prominent Pleistocene glacial landform (moraine) that includes today's NPS Visitor Center (see "Results of a Subsurface Archaeological Survey on a Pleistocene Terrace in North Cascades National Park Service Complex" by R. R. Mierendorf and D. J. Harry, Archaeology in Washington, Vol. V, 1993). These previously-recorded lithic scatters were located variously on the western, southern, and eastern portions of this extensive landform, and all the sites are west of Newhalem Creek; however, the presence of 45WH1029 near the eastern end of the landform and east of Newhalem Cr. is new evidence that traditional	See response to comment #57.

	cultural uses spanned the entire landform, and constitutes sufficient evidence for the Tribe to conclude that there are likely to be more unrecorded sites on the remaining unsurveyed portions of the landform. Clearly, site 45WH1029 adds to a broader understanding of the cultural heritage and historic character of which it is a part. These previously-recorded lithic scatters were located variously on the western, southern, and eastern portions of this extensive landform, and all the sites are west of Newhalem Creek; however, the presence of 45WH1029 near the eastern end of the landform and east of Newhalem Cr. is new evidence that traditional cultural uses spanned the entire landform, and constitutes sufficient evidence for the Tribe to conclude that there are likely to be more unrecorded sites on the remaining unsurveyed portions of the landform. Clearly, site 45WH1029 adds to a broader understanding of the cultural heritage and historic character of which it is a part.	
98	Recommendations: 1. It appears that only portions of the bounded area of the Newhalem Cr. Dam hydro project have been surveyed for the presence of cultural resources, but the extent of surveyed lands relative to the project APE is unknown or unreported. Lacking information about the extent of cultural resources surveys in the Newhalem Dam decommission project area, USIT cannot fully comment on the effects to the Tribe of this undertaking. USIT requests that a cultural resources survey be conducted on any unsurveyed portions of the project. In addition, some previous surveys in the project area are decades old and should be resurveyed for cultural resources, consistent with plans adopted for Skagit River hydro project pre-license studies.	City Light will conduct an archaeological survey in areas in which ground will be disturbed by decommissioning activities.

99	Recommendations: 2. To address the issues raised in 1. above, the Tribe requests preparation of an APE map, consistent with other Sec. 106 undertakings under the NHPA to provide more complete assessment of potential decommissioning project effects.	City Light has been designated FERC's non-federal representative for purposes of Section 106 of the National Historic Preservation Act. Consultation has been initiated with all parties. An APE map will be developed and provided to the USIT for review and comment as part of upcoming steps in the Section 106 process.
100	Recommendations: 3. It is important to note that the descriptions of Water Quality, Wildlife and Botanical Resources, Soundscapes, and Visual Resources discuss aspects of the Tribe's traditional home environment that frames the historic character of the Tribe's TCP (45WH450). In the Tribe's view, some of these resources will potentially experience ongoing degradation from project effects.	City Light will work with the Tribe to identify project effects to 45WH450. Methods will be developed to avoid, minimize, or mitigate adverse effects in consultation with the Tribe and DAHP.
101	Recommendations: 4. The USIT believes that the scale of this proposed project warrants an EA (EIS?).	FERC is the lead federal agency and will determine the level of environmental review required by the National Environmental Policy Act.
Sauk-Suiattle Indian Tribe Comments on Preliminary Project Description – Received on 9/29/2021		
102	The Sauk-Suiattle Indian Tribe doesn't have any concerns about concrete being left in the creek after the dam is removed. As far as rebuilding the road or using helicopters for the equipment we don't have any concerns, so whatever works best for you guys.	Noted.
WDFW Comments on Pre-Submittal Review Draft Application and Plan – Received on 12/7/2021		
103	Although the City Light-preferred alternative, Alternative C, has many merits, WDFW recommends Alternative B, the full removal of above-ground project features. Full structure removal will restore the most fish and wildlife habitat. With the great reduction to old-growth and mature habitat from the latest wildfire, City Light has the opportunity to conduct restoration with little impacts to those associated species.	The preferred alternative (Alternative C) provides long-term benefits to terrestrial, aquatic, historic, and recreational resources. While the full removal alternative would restore approximately 2.94 acres of terrestrial habitat, there would be long-term adverse impacts to historic properties listed in the NRHP and a loss of existing recreation resources. In comparison, the preferred alternative preserves significant historic properties and existing recreation resources, and restores 2.78 acres of habitat, only 0.16 acres less than the complete

		removal alternative. This is achieved by minimizing vegetation maintenance to restore forested habitat around the penstock and limiting the powerhouse footprint to only that which is necessary for interpretive and maintenance purposes.
104	WDFW favors the removal of the penstock, saddles, powerlines, and the powerhouse, in addition of those structures removed in the City Light-preferred alternative. City Light could move the powerhouse and any other structures to Newhalem for future historic interpretation.	Please see response to comments #17 and #22. The penstock and powerhouse are historic properties listed in the NRHP. Removal of historic properties constitutes an adverse effect and would diminish their integrity of location, setting, and association, reducing their ability to convey significance according to NRHP criteria. Per comment #22 above, NPS supports the alternative that preserves those historic properties that have integrity sufficient to convey their significance according to the NRHP. This is achieved in the preferred alternative.
105	WDFW also recommends additional measures beyond Alternative B, with the removal of all overhead powerline Skagit River crossings from Newhalem to Newhalem Powerhouse and Newhalem to Gorge Powerhouse. WDFW recommends that City Light directionally drill their power lines beneath the Skagit River or remove the lines permanently. Powerlines consistently kill, through collision, migrating birds, including waterfowl and raptors, who use the Skagit River as a migration corridor.	The transmission lines that transmit electricity from the Newhalem Creek Powerhouse to Newhalem would be removed as part of the preferred alternative, but the electrical service lines and associated poles that supply power to the powerhouse would remain to provide heating and lighting for maintenance and interpretive purposes. The conduit supplying backup electricity to Gorge Powerhouse, derived from the Newhalem Creek generator, will be removed as part of decommissioning. City Light is unaware of any incidents involving bird collisions on these lines. If there is evidence of a problem, rather than horizontal directional drilling, City Light would be open to more conventional alternatives such as visual deterrents.
106	WDFW noticed that the NPS recommended a grade control structure around the dam area. WDFW supports this structure as long as the structure allows full upstream and downstream fish passage and receives constant maintenance to keep fish passage open. WDFW looks forward to the review of this structure and the entire	Upon removal of the dam, material that has deposited behind the dam since its construction will begin to move downstream over a decadal period, and the channel gradient will adjust to conditions similar to those prior to the dam's construction. The large grain size of the deposited material will armor the bed as it slowly re-adjusts to the new base level (e.g., without the diversion structure). Bed lowering beyond the level of accumulated material is not anticipated. Transport

	project, when our area habitat biologist issues City Light a Hydraulic Project Approval.	of this aggraded material downstream provides long-term benefits to aquatic habitat in Newhalem Creek and the Skagit River. City Light believes that a grade control structure nullifies the benefits of removing the dam and will limit the recovery of downstream habitat.
USFWS Comments on Pre-Submittal Review Draft Application and Plan – Received on 12/10/2021		
107	We are in alignment with the comments provided by NPS.	Noted.

Newhalem Creek Hydroelectric Project (FERC No. 2705) Decommissioning Plan

January 28, 2022

Seattle City Light

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1 Introduction

The Newhalem Creek Hydroelectric Project (Project) is a small hydropower facility owned and operated by Seattle City Light (City Light). It was originally constructed in 1921 to provide power to build the nearby Gorge Dam and Powerhouse and the associated construction camp, which is now the town of Newhalem. The Project's Unit 20 generator can produce 2.125 megawatts of power during the wetter months of the year, with an estimated value of $250,000 per year. When operational, the Project provides a secondary source of backup power to Gorge Powerhouse and Newhalem. Most of the Project facilities are listed on the National Register of Historic Places. The diversion dam is upstream of two waterfalls that block anadromous fish passage. A detailed description of the existing Project features is provided in the Surrender of License Application (Surrender Application).

The Project was in active use until 2010, when a series of equipment and structural problems caused an extended shutdown. Currently, it cannot be operated due to leaks in the power tunnel, maintenance needs at the powerhouse and headworks, and lack of safe access to the dam. After conducting an engineering analysis in 2020, City Light concluded that the cost of relicensing the Project and making the necessary repairs and upgrades to equipment/facilities and the access road far exceeded the estimated future value of the project. For this reason, City Light has decided to decommission the Project.

The current Project license expires on January 31, 2027. On April 28, 2021, City Light filed a Notice of Intent to surrender the license with the Federal Energy Regulatory Commission (FERC). The Notice of Intent included a plan and schedule to submit a Surrender of License Application and *Decommissioning Plan* (Plan) for the Project by January 31, 2022. This Plan describes the activities, permits and schedule for decommissioning.

City Light evaluated several alternatives for decommissioning the Project works (see Surrender Application). The selected alternative removes the diversion dam and other headworks as well as the tailrace fish barrier, overhead transmission lines, and transformer (Table 1). Other Project features, including the powerhouse and penstock, would be retained in place. Plans for the retained features are provided in Section 2; a detailed description of plans for the features to be removed or abandoned are described in Section 3. Section 4 describes mitigation measures and best management practices (BMP). Section 5 lists consultations and/or permits for Project decommissioning activities. Section 6 provides the Project's decommissioning schedule.

2 Plans for Retained Features

The selected decommissioning alternative retains the powerhouse, penstock and saddles, tailrace, and electrical service line. The equipment in the powerhouse would be deactivated but retained in place. The electrical service line to the powerhouse and associated poles would also remain for heating and to illuminate the equipment inside the powerhouse for interpretive purposes. The existing interpretive panels along the front windows of the powerhouse would be updated, and other interpretive elements would be added. City Light would continue to maintain these historic properties and interpretive features in

Table 1. Proposed Decommissioning Action Summary

Project Features to be Removed	Project Features to be Abandoned	Project Features to be Retained
Diversion dam, sluiceway, and intake	Power tunnel	Powerhouse
Gatehouse	Underground utilities	Penstock and saddles
Pedestrian bridge over creek near dam	Dam access road above elevation 840 ft	Tailrace
Tailrace fish barrier and riprap		Electrical service line to powerhouse
Overhead transmission lines		Emergency evacuation route/trail along penstock (*Skagit River Hydroelectric Project Emergency Action Plan* [EAP] route)
Transformer		Dam access road below elevation 840 ft (Skagit Project EAP route)

perpetuity. Additional opportunities for interpretation, including signage displaying tribal, National Park Service (NPS), and City Light history along the trails in the vicinity may also be considered.

Most of the cleared area adjacent to the powerhouse would be restored, except for a small site for parking up to three vehicles at the road's edge, south of the powerhouse. Routine vegetation maintenance along the penstock would cease, which would result in the restoration of the adjacent corridor to forested habitat. Vegetation would be removed only in the immediate footprint, and only as necessary to repair or paint the penstock. Painting would occur approximately every 10 to 20 years. The penstock would continue to convey groundwater intrusion from the power tunnel to the tailrace.

The tailrace is part of an existing intermittent stream that drains the slope behind the powerhouse and would be maintained by the water that periodically runs through this channel. The trail along the penstock and the access road below elevation 840 feet (ft) would also remain as these are designated emergency evacuation routes in the Skagit EAP. City Light would continue to maintain these routes.

3 Plans for Features to be Removed or Abandoned

Decommissioning activities would include removing the diversion dam and headworks, removing the tailrace barrier and transmission lines, decommissioning the access road above 840 ft elevation, and mitigating impacts for the loss of historic properties.

3.1 Remove Diversion Dam and Headworks

3.1.1 Establish Access to the Diversion Dam and Headworks

The landslide that currently blocks the road to the diversion dam and other headworks creates challenges for establishing access to these facilities. The most feasible option, with the least environmental impacts, involves repairing the road to make it safe for personnel and vehicle access. Repairs would be focused on

improving slope stability and the roadbed structure for safety and short-term access through the landslide area. Work would include the following:

- Clearing material from the roadway, including using a non-explosive cracking agent to break apart large rocks
- Using some or all the cleared material to construct a protective berm as a barrier between the road and the slope above the road
- Repairing the tension cracks present on each side of the landslide
- Scaling the slope above the road to remove hazard rocks, which may involve the use of small explosives

Road repair and slope stabilization would occur in summer, in the weeks prior to dam removal, once conditions are dry and the danger of landslides and rockfall are lowest.

Once the repairs are complete, all equipment and materials needed to demolish the diversion dam and other headworks would be transported via the road. While the road is the most likely means of accessing the diversion dam and headworks, it is possible that a helicopter assist may occasionally be needed.

3.1.2 Remove Diversion Dam and Headworks

Diversion dam removal activities would be scheduled during low-flow months and outside the anadromous fish spawning window (July 16 through August 19) to minimize impacts to water quality and fish. The diversion dam and headworks would likely be removed in successive phases to minimize or eliminate in-water work.

Phase 1: Remove Diversion Dam

Supersacks would be used to divert the creek during dam removal activities (Figure 1). The supersacks would be filled with native creek sand, gravel, and cobble and placed in the channel upstream of the impoundment, diverting water into the sluiceway to dewater the area around the dam. Once isolated, the diversion dam and apron (concrete slab abutting the diversion immediately downstream) would be removed by demolishing the concrete with an excavator-mounted jackhammer and/or a non-explosive cracking agent. City Light would develop BMPs to minimize the impact of pH from concrete removal as necessary.

Phase 2: Remove Remaining Headworks

After the main channel is free of structures and cleaned, a temporary conduit (corrugated steel or plastic pipe) would be installed in the main channel and covered with native creek material to act as a roadbed to provide access to the far side of the creek. The supersacks would then be moved to direct water into the conduit, conveying water away from the Phase 2 construction site and isolating the intake/sluiceway area for access. The intake, trashrack, and downstream shoreline concrete would be removed (Figure 2). Concrete would be broken apart with an excavator-mounted jackhammer and/or a non-explosive cracking agent. Once in-water structures are removed, the gatehouse, bridge, and remaining concrete bulkhead

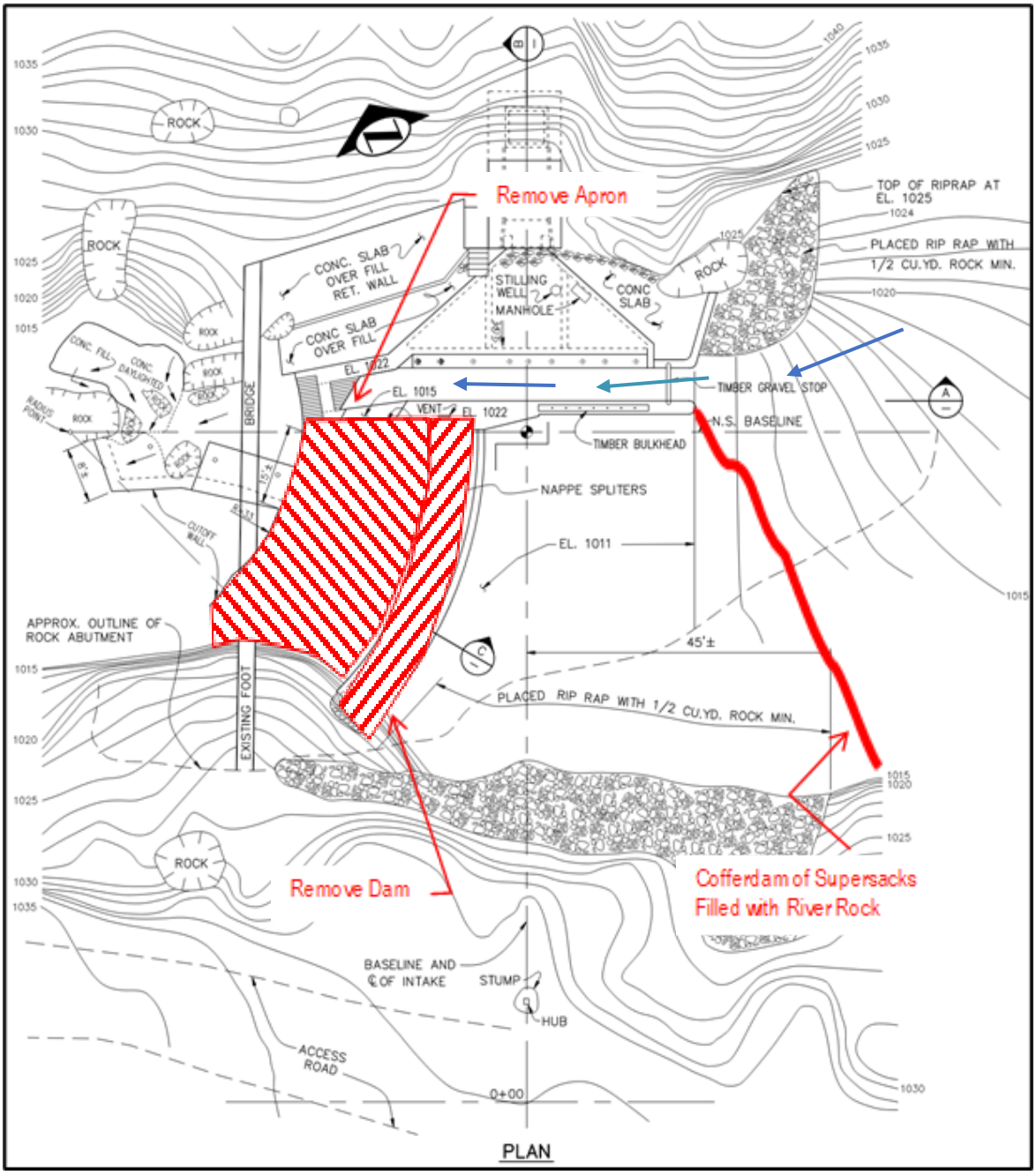

Figure 1. Drawing of Dam and Apron Removal

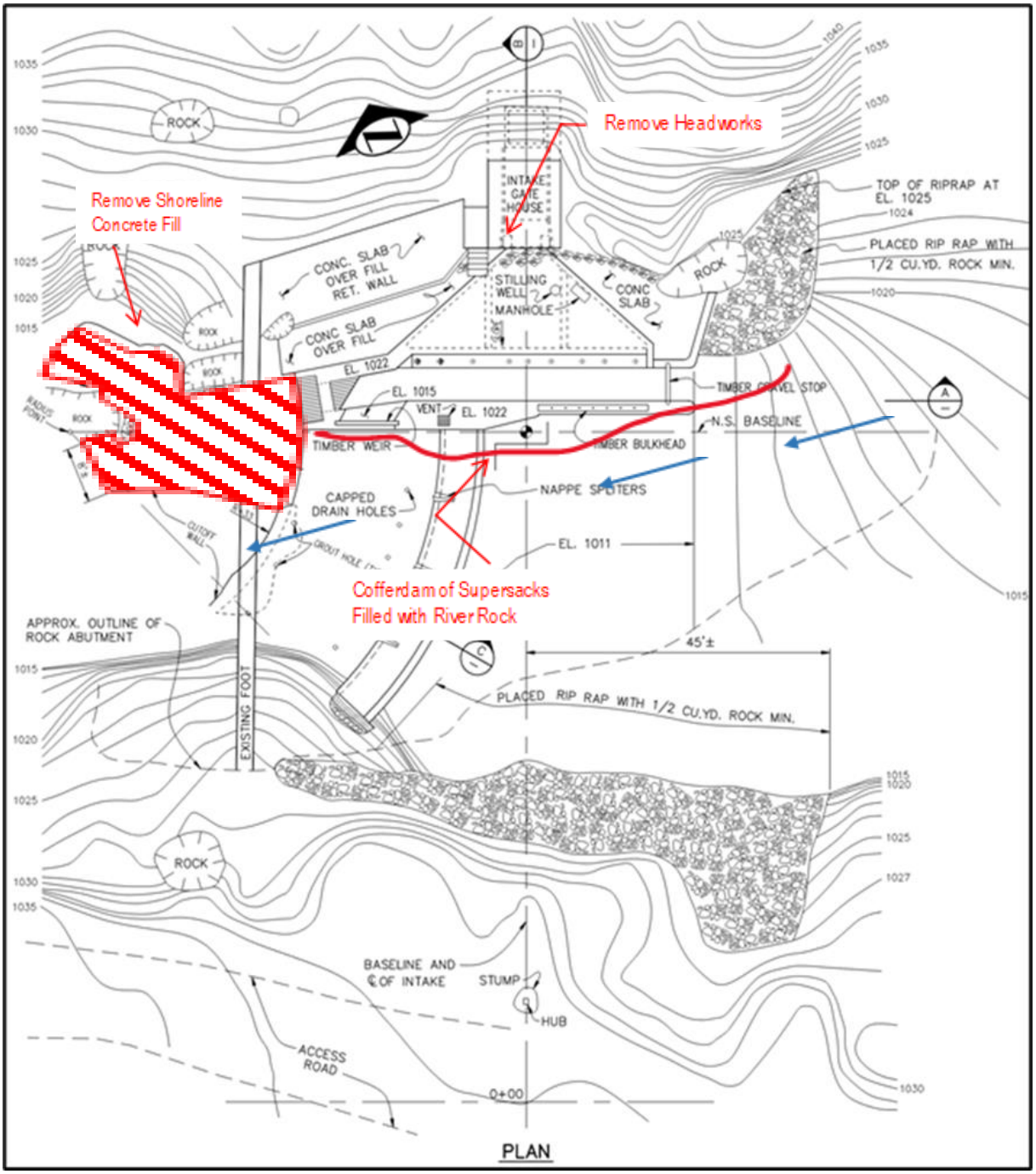

Figure 2. Drawing of Headworks Removal

would be removed. City Light would develop BMPs to minimize the impact of pH from concrete removal, as necessary.

Phase 3: Dispose of Concrete and Seal Power Tunnel Shaft

Removing the diversion dam and other concrete portions of the headworks is expected to result in approximately 560 cubic yards (CY) of concrete debris, in addition to other materials (Figure 3).

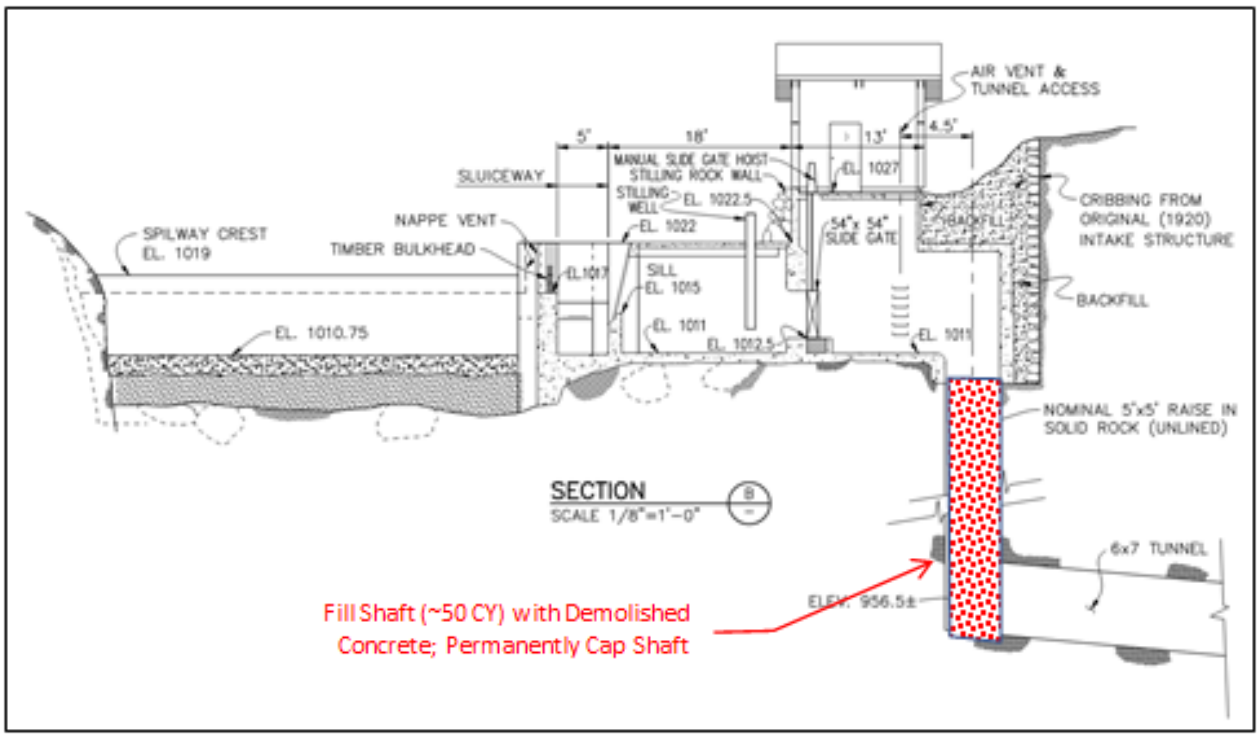

Figure 3. Drawing of Power Tunnel Shaft with Fill

Approximately 50 CY of this material could potentially be disposed on site in the rock shaft for the power tunnel. Material not disposed on site, would be removed via the access road. Highway legal dump trucks would remove the concrete and other demolition debris off site for disposal, requiring approximately 162 trips, at 12 trips per day, for 14 days. Concrete would not need to be removed from the site concurrently with demolition and could be stock-piled and scheduled for disposal at a time that is the least disturbing to wildlife and recreationists, such as in fall, if travel across the landslide remains safe.

Finally, the supersacks would be removed and emptied back into the restored streambed. Minor grading would occur in the immediate dam removal area and where the supersacks would be emptied to smooth out the cobble and allow the free flow of water. The elevation after dam removal and this minor grading would be 1,009 ft.

In addition, the power tunnel would be sealed with a concrete sealing slab on the upstream end of the shaft; the downstream end is already sealed with the existing concrete plug. A grate would be placed at the open end of the rock tunnel where the penstock daylights to prohibit human access (other than City Light employees for maintenance purposes) but allow wildlife to utilize the lower portion of the tunnel.

Once the work is complete, the areas disturbed by deconstruction activities and the sites previously occupied by headworks would be graded and restored. A restoration plan for these areas would be developed in coordination with the NPS.

3.2 Remove Tailrace Fish Barrier and Transmission Lines

Tailrace barrier removal work would be scheduled outside the primary recreation season and would involve the following general steps:

- Re-establish the previous access road and staging area: Based on the drawings for construction of the tailrace barrier, the access road to the site was 200 ft long and utilized approximately 50 ft of the transmission line corridor before veering towards the tailrace barrier. While overgrown with vegetation, evidence of this road is still visible. Re-establishing this old road would require removing some small trees and shrubs and establishing erosion-control BMPs. Equipment and trucks for the tailrace barrier removal work would be staged in the existing cleared area between the powerhouse and the first set of transmission poles.
- Demolish concrete: The tailrace barrier consists of approximately 99 CY of reinforced concrete. The barrier would be demolished with an excavator-mounted jackhammer, concrete saw, and/or waterjet cutter. City Light would develop BMPs to ensure that concrete dust or slurry does not enter the Skagit River or any surface water drainage in the area. Dump trucks would transport the waste concrete and rebar to an appropriate disposal site.
- Remove riprap and regrade tailrace outlet: The riprap along the sides of the tailrace barrier walls and at the outlet, would be removed and salvaged for use elsewhere. The site would be regraded to a shallow, natural-appearing, outlet channel with the ability to convey water from the intermittent stream and tunnel drainage during periods of extended precipitation.

Once the tailrace barrier is deconstructed, the transformer next to the powerhouse would be removed, as would the electrical service line feeding Gorge Powerhouse, which is in conduit beneath the Ladder Creek pedestrian bridge, and the transmission lines that cross the river from Newhalem Powerhouse. The transmission lines would be removed with a truck-mounted cable reel, using access from the south side of the river on the same road established for the tailrace barrier work, or from the north side of the river on paved or lawn surfaces in Newhalem. The underground transmission lines on both sides of the river would be abandoned in place since they are within trenches with other electrical service lines that will remain active. The three-phase electrical service line to the powerhouse and the four poles (two on each side of the river) that support it would remain to provide the power needed for heating and lighting for interpretation and tours. Alternative methods of supplying electricity to the powerhouse may be investigated to eliminate the need to retain the overhead line and poles.

After the tailrace barrier, transformer, and transmission lines are removed, most of the area in front of the powerhouse, which is currently cleared and used for parking and storage, would be restored. Three parking spots would be designated next to the powerhouse, and a short segment of road would remain. A restoration plan for this area would be developed in collaboration with the NPS.

3.3 Decommission the Access Road

Once the concrete is removed from the diversion dam and headworks demolition phase, the access road above the Skagit EAP evacuation muster site (elevation 840 ft), a section approximately 0.75 mi long,

would be permanently blocked and decommissioned. A road decommissioning plan would be developed based on U.S. Forest Service and/or Washington Department of Natural Resources guidelines and in collaboration with the NPS. This may include removing the approximately eight existing culverts and restoring natural drainages, scarifying the road surface, natural regeneration and/or replanting and controlling invasive species for three years as needed.

4 Mitigation Measures and Best Management Practices

The most significant impact of the proposed decommissioning plan is to cultural resources, particularly historic structures. Mitigation for adverse effects to cultural resources will be developed in consultation with the Washington Department of Archaeology and Historic Preservation (DAHP), NPS, and affected tribes. The preliminary proposal for mitigation includes compiling photography and written documentation of the diversion dam and power tunnel into a report for submittal to the DAHP and other consulting parties. Other potential mitigation measures may include updated interpretive signs at the powerhouse and along nearby trails and a penstock viewing platform. City Light may also add the powerhouse and penstock to its Skagit Project guided tour program. In addition, archaeological surveys and/or monitoring would be conducted in areas that would be subject to ground disturbance during decommissioning activities.

Mitigation measures and BMPs for natural resources included in the preferred alternative are summarized in Table 2 for each of the major decommissioning activities. Additional measures would be prescribed in resource-specific management plans developed in consultation with agencies and tribes and filed with FERC. Permits required for construction activities would also include BMPs and restoration specifications.

Table 2. Summary of Proposed BMPs, Mitigation Measures, Plans, and Permits for Impacts to Natural Resources

Activity	Impact	BMP, Mitigation Measure, or Management Plan
Access road improvements	Noise	Time noise-generating activities to occur outside the spring to early summer breeding season
	Increased traffic	Set speed limits for trucks; provide signage for public
	Spills/oils, storm water runoff	Develop and implement a Spill Plan
	Invasive species spread/ establishment	• Wash vehicles and equipment prior to use on site • Control weeds along lower portion of road prior to construction start
	Erosion in work area	Develop and implement a Sediment and Erosion Control Plan
Diversion dam and headworks removal	Noise	Time noise-generating activities to occur outside the spring to early summer breeding season for birds
	Increased traffic	Set speed limits for trucks, provide signage for public
	Work in and near water	Develop and implement a Spill Plan
	Dewatering area by dam	Conduct fish exclusion/rescue
	Tree removal and vegetation disturbance	• Minimize number and size of trees removed • Develop and implement a Restoration Plan
	Invasive species spread/ establishment	• Wash vehicles and equipment prior to use on site

Activity	Impact	BMP, Mitigation Measure, or Management Plan
		• Control weeds along lower portion of road prior to construction start
	Concrete dust and slurry	Pump water and treat in upland location as necessary
	Downstream movement of sediment	Time supersack removal releases in July–August to avoid spawning periods
	Erosion in work area	Develop and implement a Sediment and Erosion Control Plan
Tailrace barrier removal	Noise	Time noise-generating activities to occur outside the spring to early summer breeding period for birds and outside the peak recreation season
	Invasive species spread/ establishment	• Wash vehicles and equipment prior to use on site • Control weeds along lower portion of road prior to construction start
	Concrete dust and slurry	Collect or vacuum and move off site
	Sediment	Time work to occur in late summer/early fall when stream is dry
	Tree removal and vegetation disturbance	• Minimize number and size of trees removed • Develop and implement a Restoration Plan
	Erosion along access route	Develop and implement a Sediment and Erosion Control Plan

5 Permits

City Light anticipates the need for the following consultations and/or permits for decommissioning activities:

- Endangered Species Act, Section 7 Consultation (U.S. Fish and Wildlife Service and National Marine Fisheries Service [NMFS])
- Magnuson-Stevens Fishery Conservation and Management Act consultation (NMFS)
- National Historic Preservation Act, Section 106 consultation (DAHP)
- Clean Water Act, Section 401 Water Quality Certification (Washington State Department of Ecology [Ecology])
- Clean Water Act, Section 404 Permit (U.S. Army Corps of Engineers)
- Clean Water Act, Section 402, National Pollutant Discharge Elimination System, Construction Stormwater General Permit (Ecology)
- Coastal Zone Management Act Federal Consistency Review (Ecology)
- Washington State Environmental Policy Act (City of Seattle)
- Hydraulic Project Approval (Washington Department of Fish and Wildlife)
- Shoreline Substantial Development Permit and other local permits (Whatcom County)

6 Decommissioning Schedule

The Surrender Application and Plan for the Project must be filed with the FERC at least five years prior to license expiration, which is January 31, 2027. Once these documents are filed (by January 31, 2022) FERC will issue a 30-day public notice, during which interested parties can provide comments on the application. FERC will then determine whether a National Environmental Policy Act (NEPA) Environmental Assessment (EA) is warranted. If a NEPA EA is warranted, FERC will issue the EA with a 30-day public

comment period. Following completion of the NEPA process and other federal consultations, FERC will issue an Order approving the Surrender of License.

Table 3 provides the anticipated schedule for the decommissioning process, assuming the Order approving the license surrender is issued 12 to 24 months from filing the Surrender Application. The schedule may change depending upon when the Order is issued, or for other reasons as decommissioning activities proceed.

Table 3. Schedule of Decommissioning Activities

Decommissioning Activity	Anticipated Range of Dates	
	Start	**End**
City Light files the Surrender Application	01/31/2022	---
FERC issues public notice	02/2022 to 04/2022	03/2022 to 05/2022
FERC issues NEPA EA	08/2022 to 02/2023	09/2022 to 03/2023
City Light develops: • Preliminary engineering drawings • Road Decommissioning Plan • Invasive Species Management Plan • Sediment and Erosion Control Plan • Restoration Plan • Historic Resources Mitigation and Management Plan City Light obtains local, state, and federal permits	09/2022 to 03/2023	09/2023 to 03/2025
FERC issues Order approving license surrender and *Decommissioning Plan*	01/2023 to 01/2024	---
City Light decommissions project, removing infrastructure and restoring disturbed footprint	06/2024 to 06/2025	12/2024 to 12/2025

CERTIFICATE OF SERVICE

Pursuant to Rule 2010 of the Rules of Practice and Procedure of the Federal Energy Regulatory Commission, I hereby certify that I have this day caused the foregoing document to be served upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated at Washington, DC, this 28th day of January, 2022.

Sharon L. White
Rock Creek Energy Group, LLP
1 Thomas Circle, NW Suite 700
Washington, DC 20005
Tel: (202) 998-2775
swhite@rockcreekenergygroup.com