FINAL LICENSE APPLICATION
EXHIBIT A
PROJECT DESCRIPTION

SKAGIT RIVER HYDROELECTRIC PROJECT
FERC NO. 553

Seattle City Light

April 2023

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ac-ft/yr.....acre-feet per year
ACHP.....Advisory Council on Historic Preservation
ARMMP.....Archaeological Resources Mitigation and Management Plan
cfs.....cubic feet per second
City Light.....Seattle City Light
CoSD.....City of Seattle datum
DAHP.....Department of Archaeology and Historic Preservation
DLA .....Draft License Application
DNR .....Department of Natural Resources (Washington State)
EA .....Environmental Assessment
Ecology .....Washington State Department of Ecology
ELC .....Environmental Learning Center
EMS .....Emergency Management System
ESA .....Endangered Species Act
FERC.....Federal Energy Regulatory Commission
FLA .....Final License Application
FSA .....Fisheries Settlement Agreement
ft .....feet/foot
gpm .....gallon per minute
hp.....horsepower
HVAC .....heating, ventilation, and air conditioning
kV.....kilovolt
kW.....kilowatt
LiDAR.....Light Detection and Ranging
LP.....licensing participant
MHz .....megahertz
MOA .....Memorandum of Agreement
MP.....milepost
MVA .....megavolt-amperes
MW .....megawatt
MWh .....megawatt hour

NAVD 88 .....North American Vertical Datum of 1988
NCI.....North Cascades Institute
NCC .....Non-Flow Coordinating Committee
NHPA.....National Historic Preservation Act
NMFS.....National Marine Fisheries Service
NPS .....National Park Service
NRHP.....National Register of Historic Places
O&M.....operations and maintenance
OFWF .....oil-forced and water-forced
PAD.....Pre-Application Document
PRM.....Project River Mile
Project .....Skagit River Hydroelectric Project
RCW .....Revised Code of Washington
RLNRA.....Ross Lake National Recreation Area
RM .....river mile
ROW .....right-of-way
RPM.....rotations per minute
RV .....recreational vehicle
SHPO .....State Historic Preservation Officer
SNOTEL .....snow telemetry
SR.....State Route
SRCC .....Skagit Resource Coordinating Committee
TEWAC .....totally enclosed water air-cooled
U.S.C.....United States Code
USFS.....U.S. Forest Service
USFWS .....U.S. Fish and Wildlife Service
USGS .....U.S. Geological Survey
WAC .....Washington Administrative Code
WRIA.....Water Resources Inventory Area
WSDOT .....Washington State Department of Transportation

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EXHIBIT A: PROJECT DESCRIPTION

1.0 CONTENTS AND PURPOSES OF THIS EXHIBIT

The Skagit River Hydroelectric Project (Skagit River Project or Project) is licensed by the Federal Energy Regulatory Commission (FERC) as FERC Project No. 553. The current FERC license expires on April 30, 2025.

This Exhibit A, that is being filed as part of the Final License Application (FLA), describes the existing Project under the current license, including details about the Project structures, the impoundment, turbines or generators, transmission lines and any additional equipment appurtenant of the Project. In addition, this Exhibit summarizes proposed modifications and enhancements to Project facilities. Comments filed on Exhibit A of the Draft License Application (DLA; filed November 30, 2022) have been addressed herein and responses to all DLA comments are included in Appendix B of Exhibit E of this FLA.

2.0 GENERAL PROJECT DESCRIPTION AND LOCATION

The Skagit River Project is owned and operated by the City of Seattle, Washington, through its City Light Department (City Light). The Project has a total authorized installed capacity of 700.27 megawatts (MW).[1] The Project supplies about 20 percent of the power needed to serve City Light's customer base. It is a reliable, renewable resource and one of City Light's most economical generation resources.

The Skagit River Project is located in northern Washington State, in the traditional territory of several Indian Tribes and Canadian First Nations. The Project crosses Whatcom, Skagit, and Snohomish counties, and consists of three power generating developments on the Skagit River – Ross, Diablo, and Gorge – and associated lands and facilities (Figure 2.0-1). The Project generating facilities are in the Cascade Mountains of the upper Skagit River watershed, between Project River Miles (PRM) 94.5 and 127.9 (U.S. Geological Survey [USGS] river miles [RMs] 94 and 127).[2] Power from the Project is transmitted via two 230-kilovolt (kV) powerlines that span over 100 miles and end just north of Seattle at the Bothell Substation. The Project also includes two City Light-owned towns (Newhalem and Diablo), the North Cascades Environmental Learning Center (ELC), a variety of recreation facilities, and multiple parcels of fish and wildlife mitigation lands.

The Project Boundary is extensive, spanning over 133 miles from the Canadian border to the Bothell Substation just north of Seattle, Washington. In addition, there are "islands" of fish and wildlife mitigation lands and recreation facilities within the Skagit, Sauk, and South Fork Nooksack watersheds that are also within the Project Boundary. Project generating facilities are entirely within the Ross Lake National Recreation Area (RLNRA), which is administered 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 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 maintains FERC's jurisdiction "in the lands and waters within the Skagit River Hydroelectric Project," as well as hydrologic monitoring stations necessary for the proper operation of the Project (16 United States Code [U.S.C.] § 90d-4; Public Law 90-544, Sec. 505 dated October 2, 1968, as amended by Public Law 100-668, Sec. 202 dated November 16, 1988).

[1] Authorized installed capacity values presented herein are those approved by the February 2, 2021 Order Amending License, Approving Revised Exhibits K and M, and Revising Annual Charges (174 FERC ¶ 62,066).

[2] City Light has developed a standard Project centerline and river mile system to be used throughout the relicensing process, including the study program, to replace the outdated USGS RM system. Given the long-standing use of the USGS RM system, both it and the PRM system are provided throughout this document. For further details see Appendix C in Exhibit E of this FLA.

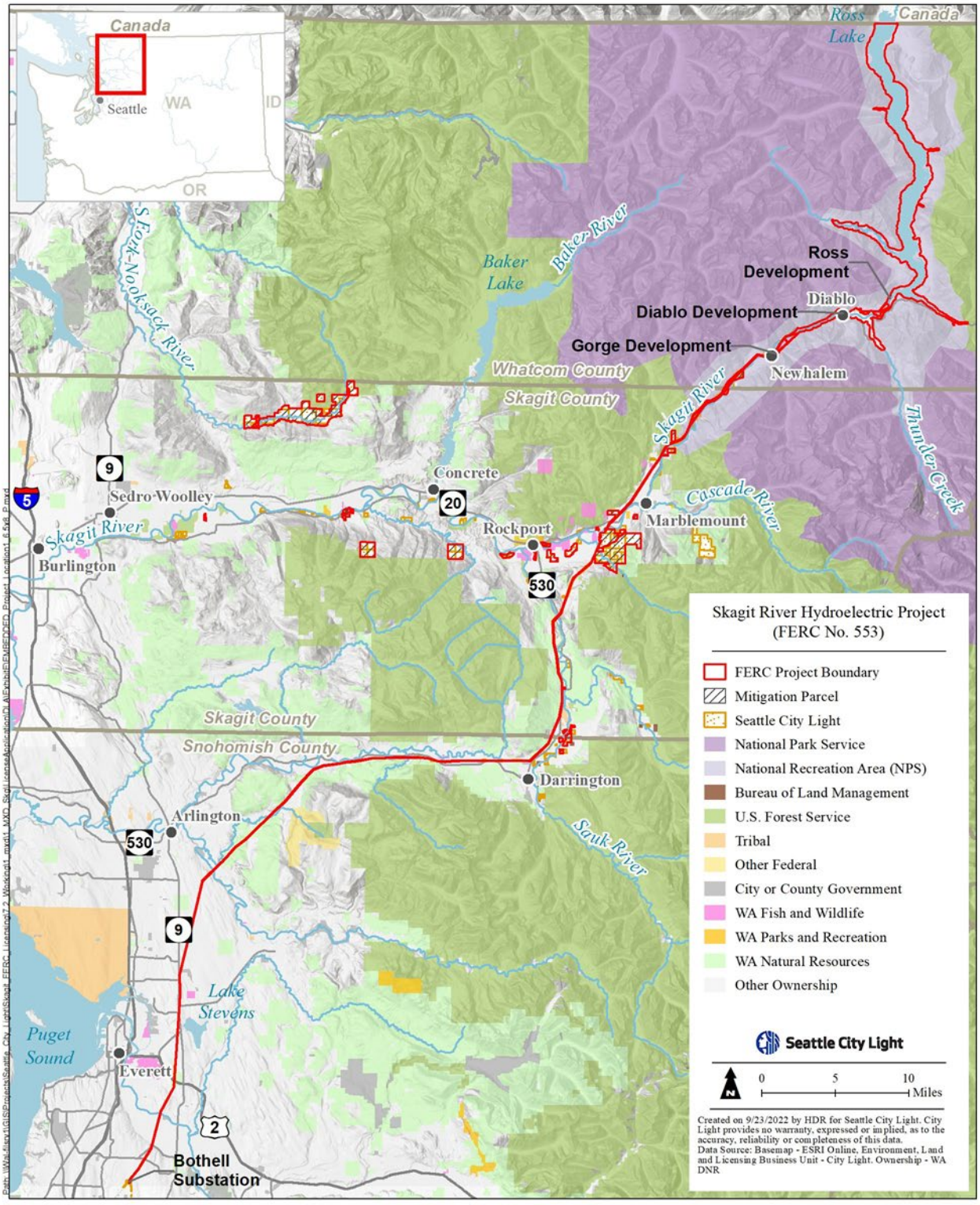

Figure 2.0-1. Location map of the Skagit River Project.

3.0 PROJECT LANDS

The current Skagit River Project Boundary is located in the traditional territory of several Indian Tribes and Canadian First Nations and encompasses 32,773 acres and includes all Project facilities, including the dams, powerhouses, reservoirs, power tunnels, switchyards, transmission lines, and the towns of Newhalem and Diablo, as well as all fish and wildlife mitigation lands and Project recreation sites (Figure 3.0-1).[3] It terminates in Washington State, at the U.S.-Canada border, and thus does not include the lands and waters around and within Ross Lake in Canada. Most of the City Light-owned fish and wildlife mitigation lands, as well as the U.S. Forest Service (USFS)-managed Marblemount and Sauk River boat launches, are non-continuous features within the Project Boundary and are mapped as "islands".

Under the current license, 19,233.51 acres of the Skagit River Project are on federal lands administered by the NPS and USFS – 19,007.01 acres that are non-transmission related, and 226.5 acres in the transmission line right-of-way (ROW).[4]

The Project Boundary along Diablo and Gorge lakes extends about 200 feet (horizontal measurement) beyond the normal maximum water surface elevation. For Ross Lake, the Project Boundary was established to accommodate potential future development subject to the High Ross Treaty. As a result, the Project Boundary around Ross Lake extends significantly up several of the major tributaries, including Big Beaver, Little Beaver, Lightning, and Ruby creeks. While included within the Project Boundary, lands associated with the inundation zone of High Ross (5,213.78 acres)[5] are not impacted by Project operations.

Of the 32,773 acres of land within the current Project Boundary, the Federal government manages approximately 59 percent – NPS 58.7 percent and USFS 0.1 percent. City Light owns approximately 35 percent. The remaining 6 percent of land is owned by private, state, county, and other city entities (see Exhibit G of this FLA for the current Project Boundary).

As part of the relicensing, City Light proposes to modify the Project Boundary to include or exclude certain parcels that are or are not needed for Project purposes. Of the 31,360 acres of land within the proposed Project Boundary, the Federal government manages approximately 57 percent – NPS 56.8 percent and USFS 0.1 percent. City Light owns approximately 38 percent. The remaining 5 percent of land is owned by private, state, county, and other city entities (see Exhibit G of this FLA for the proposed Project Boundary).

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[3] Study plans and their respective reports, as reflected in Exhibit E of this FLA, are based on the existing Project Boundary in Exhibit K of the current license. In contrast, the acreages presented in Exhibit A of the FLA are based on the updated depiction of the Project Boundary in Exhibit G of this FLA. As such, Exhibit E and its attachments may present acreage values that differ slightly from those values presented in Exhibits A and G. In addition, the Project Boundary shown on maps of Exhibit A is the existing Project Boundary. For the location of the proposed Project Boundary, see Exhibit G of this FLA.

[4] In response to FERC's May 21, 2020 Additional Information Request, City Light submitted revised Exhibits K and M, which include updated federal lands values. Federal land acreage values presented herein are those approved by the February 2, 2021 Order Amending License, Approving Revised Exhibits K and M, and Revising Annual Charges (174 FERC ¶ 62,066).

[5] Per February 2, 2021 Order Amending License, Approving Revised Exhibits K and M, and Revising Annual Charges (174 FERC ¶ 62,066).

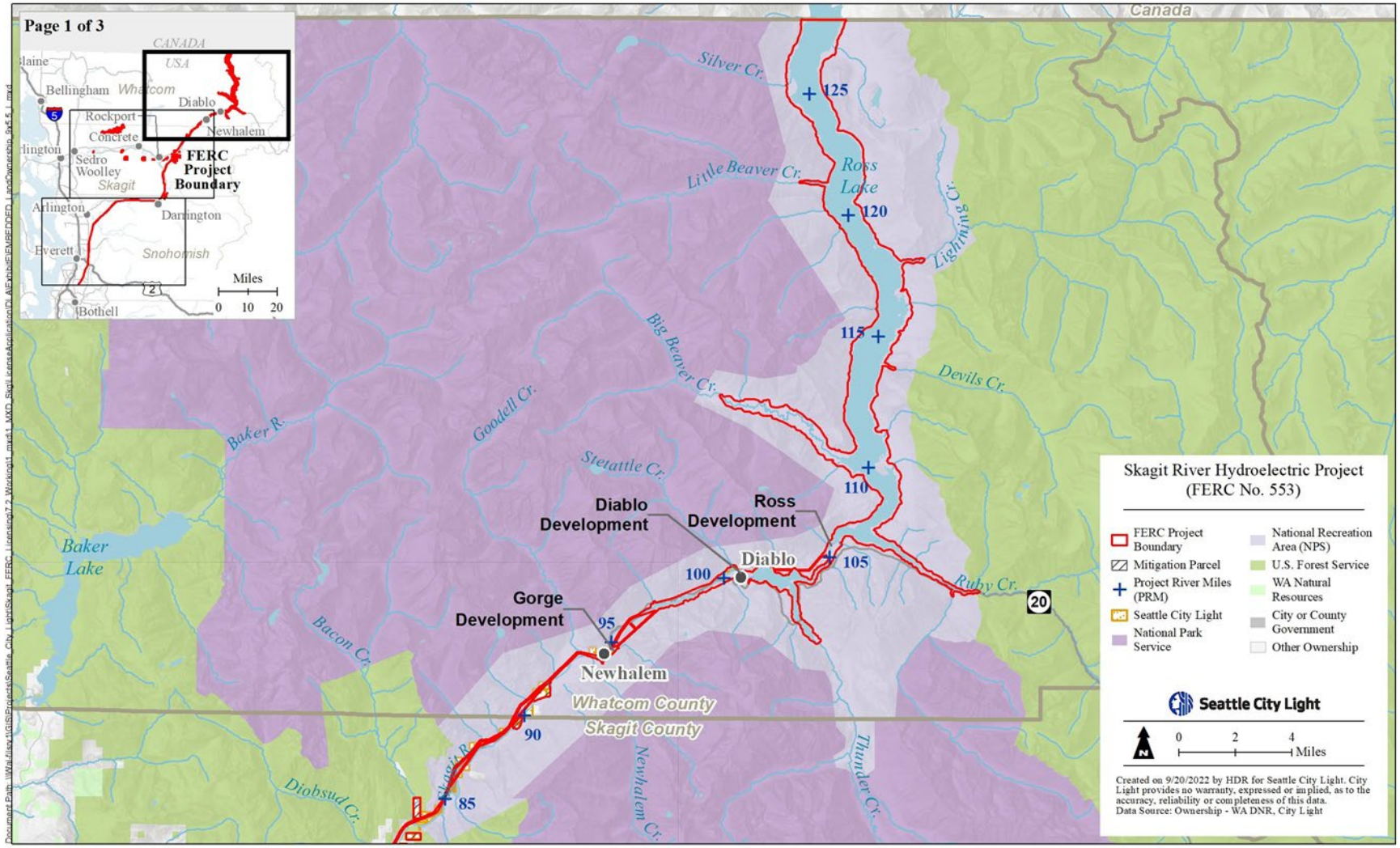

Figure 3.0-1. Skagit River Project vicinity land ownership (page 1 of 3).

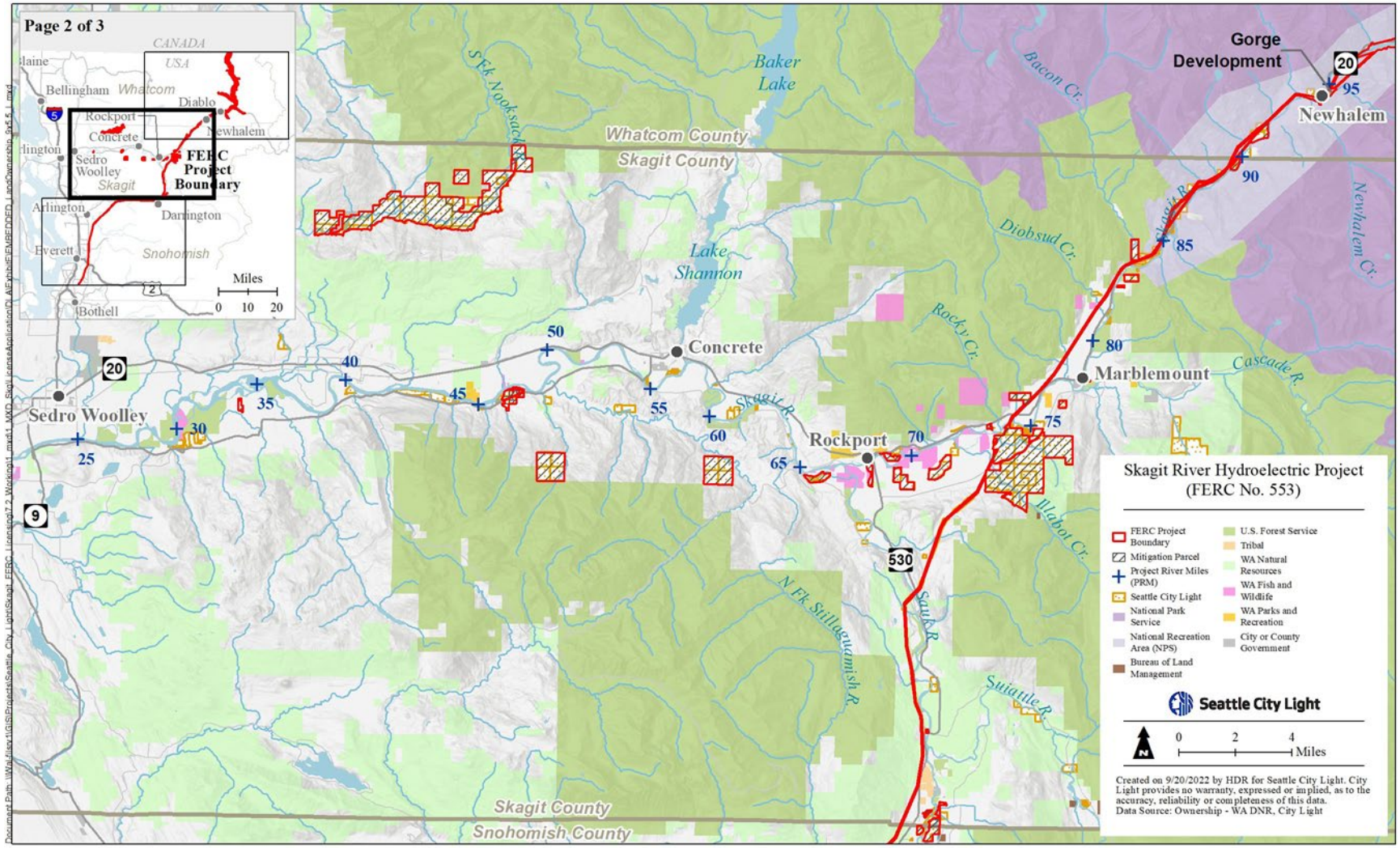

Figure 3.0-1. Skagit River Project vicinity land ownership (page 2 of 3).

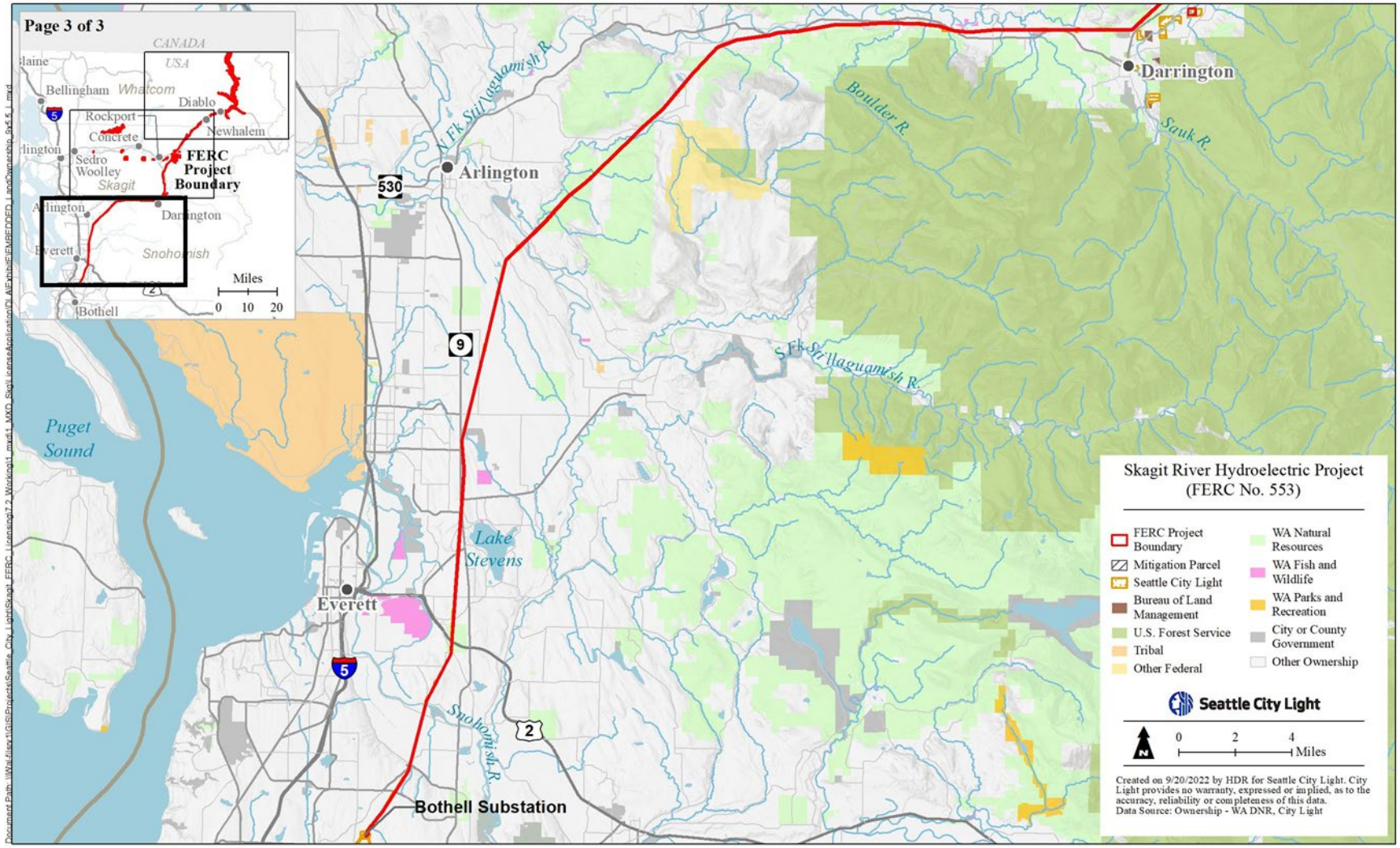

Figure 3.0-1. Skagit River Project vicinity land ownership (page 3 of 3).

4.0 LICENSE REQUIREMENTS

4.1 License Articles

The current Project license consists of 21 articles related to generation operations, as well as measures for mitigating effects on natural and cultural resources. The articles included in the license, as modified by the 1996 Rehearing Order, are summarized in Table 4.1-1. The current license is also subject to the standard articles set forth in Form L-5, "*Terms and Conditions of License for Constructed Major Project Affecting Navigable Waters of the United States and Lands of the United States*" (54 FPC 1832 (1975)).

Table 4.1-1. Current license articles for the Skagit River Project.

Article	Description
201[1]	Sets authorized installed capacity and acreage for annual charges requiring reimbursement to the U.S. Treasury for Project occupancy, use, and enjoyment of federal lands and cost of administration of Part I of the Federal Power Act. *Modified by the July 17, 2013 Order Amending the License and Revising Annual Charges for Project 553 (144 FERC ¶ 62,044); and subsequently, by February 2, 2021 Order Amending License, Approving Revised Exhibits K and M, and Revising Annual Charges (174 FERC ¶ 62,066).*
202	Provides City Light 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 without FERC's prior approval.
301	Establishes storage requirements and flood control operations for Ross Reservoir from October 1 through March 15.
302	Requires compliance with requests for flood control operational changes by the Corps of Engineers.
303	Requires filing of Exhibits M, describing Project as-builts, with FERC within 90 days of license issuance.
401	Requires filing of a Project Fishery Resources Plan to minimize Project impacts on fish resources, including spawning ground and habitat, within 180 days of license issuance.
402	Requires City Light to host an annual meeting of agencies, tribes, interested parties, and FERC staff to facilitate coordination of implementation of the license articles, as per Section 2.4.2 of the Fisheries Settlement Agreement (FSA).
403	Establishes fill conditions for Ross Lake: Fill Ross Lake as early and as full as possible after April 15 each year in accordance with FSA Section 4.1. Achieve full pool by July 31 each year and maintain through Labor Day weekend subject to adequate runoff, anadromous fish protection flows downstream of the Project, flood protection, spill minimization, and firm power generation needs. In an overdraft year, bring Ross Lake to the Variable Energy Content Curve no later than March 31, subject to above constraints.
404	Requires providing flows for protecting anadromous fish resources in the mainstem river downstream of Gorge Powerhouse in accordance with FSA Section 6.0.
405	Requires releasing water from the Gorge Development to provide suitable habitat conditions for salmon and steelhead in the river during years or seasons of exceptionally low flows in accordance with FSA Section 6.4. *Modified in the Order on Rehearing (June 26, 1996) to include the full definition of flow insufficiency and circumstances that limit City Light's ability to react or control flows as determined in FSA Sections 6.4 and 6.5.*

Article	Description
406	Requires filing Project power planning reports and scheduling procedures in accordance with FSA Section 6.6 and developed in consultation with the Parties to the FSA. Report malfunctions of instruments affecting fish flow requirements for a period longer than 24 hours immediately to the FSA signatories and within 10 days to FERC. *Modified in the Order on Rehearing to change FSA signatories to FCC signatories.*
407	Requires verifying the Effective Spawning Habitat Model and Temperature Unit Model in accordance with FSA Section 6.7.1, conduct field monitoring studies and surveys in accordance with FSA Section 6.7.2 and compliance monitoring in accordance with FSA Section 6.7.3, and filing semi-annual flow reports.
408	Requires developing measures to address residual impacts and habitat losses for fishery resources due to operation of the Project. Make available to the WDFW and Indian Tribes a maximum of $6,320,000 to implement non-flow measures at per FSA Section 7. File an annual report for each non-flow program in accordance with FSA Section 7.2. *Modified in the Order on Rehearing to include USFS as a funding recipient.*
409	Requires filing a Project Soil Erosion Control Plan with FERC within 180 days of license issuance. Plan is to implement provisions included in the Settlement Agreement concerning erosion control and the Erosion Control Plan filed on April 30, 1991, for the 37 project-related recreation sites and 18 project-related roads. Includes development of a greenhouse facility. *Modified in the Order on Rehearing to correct a typo ("Erosion Control Plan" instead of "Recreation Plan").*
410	Requires filing a plan within 180 days of license issuance that implements those portions of the Settlement Agreement concerning wildlife and the Wildlife Habitat Protection and Management Plan filed on April 30, 1991. *Modified in the Order on Rehearing to include all elements of the Wildlife Settlement Agreement (payments to NPS for wildlife monitoring; payments to the North Cascades Institute (NCI) for wildlife education programming at the ELC; payments to USFS for bald eagle monitoring; and to file a plan to implement the land acquisition, habitat enhancement, and cultural resource evaluations sections).*
411	Requires filing a Project Aviation Marker Plan with FERC within 180 days of license issuance to install powerline identifiers to protect bald eagles at the Project. *Modified in the Order on Rehearing to include USFS as a reviewer of the Marker Plan.*
412	Requires files a Project Recreation Plan with FERC within 180 days of license issuance implementing provisions for continuing, mitigative, and enhancement measures as included in Sections 3.3, 3.4, and 3.5 of the Settlement Agreement on Recreation and Aesthetics. *Modified in the Order on Rehearing to incorporate all enhancement measures included in Section 3.5 of the Settlement Agreement on Recreation Resources.*
413	Requires filing a Project Visual Quality Plan with FERC within 180 days of license issuance implementing provisions in Section 4.2 of the Settlement Agreement on Recreation and Aesthetics and the Report on Aesthetics filed on April 30, 1991. *Modified in the Order on Rehearing to exclude development of a new greenhouse for the Project (duplicate of Article 409) and to include vegetation management prescriptions as one way to manage visual quality along Projects rights-of-way.*

Article	Description
414	Requires implementing provisions of the Memorandum of Agreement (MOA) By and Among FERC, Washington State Historic Preservation Officer (SHPO), Advisory Council on Historic Preservation (ACHP), U.S. Federally-recognized Sauk-Suiattle Tribe, Swinomish Tribal Community, and Upper Skagit Tribe, the Nlaka'pamux Nation, and City of Seattle Regarding the Skagit River Hydroelectric Project. Provide $1,817,000 to the three U.S. tribes and the Nlaka'pamux Nation as per the Settlement Agreements with these parties. *Modified in the Order on Rehearing to require that City Light file a plan for FERC approval to provide the funds to the tribes and First Nation.*
415	Requires filing an Annual Project Expenditures Plan for FERC approval on or before October 1 that shows the amount of funding provided for expenditures under the license for the following year. File an annual Project Expenditures Statement with FERC by April 1 of each year reporting funds expended under the License for the previous year.
416	Requires filing revised Exhibits F and K within 90 days of license issuance for FERC approval, including a showing of the acreage of federal lands within the Project boundary and any off-site Project islands. *Modified in the Order on Rehearing to require that City Light include all off-site Project islands as referenced in Articles 410 and 412 and as shown on Figure 3-1 of the Settlement Agreement on Recreation and Aesthetics.*

1 Article revised by the July 17, 2013 Order Amending the License and Revising Annual Charges for Project 553 (144 FERC ¶ 62,044); and subsequently, by February 2, 2021 Order Amending License, Approving Revised Exhibits K and M, and Revising Annual Charges (174 FERC ¶ 62,066).

4.2 Additional FERC Orders

There have been only three FERC Orders issued since 1995 that resulted in significant changes to the Project license:

Order Amending the License and Revising Annual Charges for Project 553.[6] Gorge Second Tunnel, July 2013.

This Order was in response to an application for a non-capacity amendment to the Project license filed by City Light on July 12, 2011 to:

- Construct a second power tunnel between Gorge Dam and Gorge Powerhouse.
- Incorporate four modified flow measures to better protect downstream fisheries that City Light had been voluntarily implementing since 1995.
- Adjust a small section of the Skagit River Project Boundary at Gorge Powerhouse and another near the intake at Gorge Dam.

As part of the amendment process, City Light decided to update the 1991 FSA to include the voluntary flow measures (as described in Exhibit B, Section 2.6 of this FLA). In addition, FERC's proposed issuance of a license amendment triggered consultation under Section 7 of the Endangered Species Act (ESA) between FERC and both the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). Between the time of the original license in 1995 and the application for an amendment, three fish species found in the Skagit River and/or the Project reservoirs had been federally listed as threatened (i.e., Chinook

6 144 FERC ¶ 62,044.

Salmon, steelhead, and Bull Trout), as had one additional mammal species (i.e., Canada lynx). NMFS issued its Biological Opinion for Chinook Salmon and steelhead on November 21, 2012, and USFWS issued its Biological Opinion for Bull Trout on February 12, 2013. Both Biological Opinions concluded that continued operation of the Project as proposed was not likely to jeopardize listed species or designated critical habitat. The USFWS issued a letter on December 30, 2011 concurring with FERC that Project operations would have no effect on federally listed wildlife species.

On July 17, 2013, FERC issued an Order Amending the License and Revising Annual Charges for Project 553.[7] Most of the provisions in the 2013 Amendment related to construction of the Gorge second tunnel and defined the plans and submittals required prior to and after the construction process. To date, this project has not been undertaken. In addition to provisions regarding the Gorge second tunnel, there were several other significant changes and additions made to the 1995 Project license through the license amendment process. These are summarized below:

- Added the reasonable and prudent measures and terms and conditions of the Biological Opinion filed on November 21, 2012, and supplemented on March 1, 2013, by NMFS.
- Added the reasonable and prudent measure and terms and conditions of the Biological Opinion filed by USFWS on February 12, 2013.
- Revised Article 404 of the 1995 license to incorporate the four voluntary downstream fish protection measures, as provided by Section 6.0 of the Revised FSA.
- Required that the Project Fishery Resources Plan be revised to incorporate the provisions of the Revised FSA (2011) and filed with FERC within 90 days.
- Revised the Project Boundary to include the adjustments needed for the second tunnel, the fish and wildlife habitat mitigation lands acquired to date (1995-2009) under License Articles 408 and 410, and the additional federal lands occupied by three Project recreational facilities completed under License Article 412. These included two boat launches constructed on USFS lands, and the portion of the ELC campus beyond 200 feet (horizontal measurement) from the normal maximum water surface elevation of Diablo Lake.

Order Amending License, Approving Revised Exhibits K and M, and Revising Annual Charges, February 2021

This Order updated the installed generator capacity from 650,250 kilowatts (kW) to 700,270 kW and revised the Project Boundary from 31,451 acres to 32,773 acres. It also revised the total acreage in Article 201 subject to annual charges for the use of federal lands. The change in Article 201 reflected the exclusion of approximately 5,214 acres in the inundation zone for High Ross Dam, which remains unconstructed, as well as the resolution of a few other minor discrepancies in the Exhibit K drawings.

[7] *Id*.

Order Modifying and Approving Construction of Replacement Fuel Dock at Diablo Lake, November 18, 2021

This Order approved, with modifications, a replacement dock on Diablo Lake for fueling boats needed for Project operations. A subsequent Order (June 13, 2022) deleted the initial Order's requirements for turbidity monitoring and fish stranding plans during project construction. The revised restoration plan for the area disturbed during construction was approved by an Order issued on August 28, 2022.

There have been two FERC Orders since 1995 that authorized changes to installed capacity at the Project developments as licensed in 1995. License Order Article 201 originally authorized a combined installed capacity at the Project of 689.4 MW. This was subsequently revised to 650.25 MW by changes to Exhibit M submitted by City Light, and FERC issued an Order Approving Revised Exhibit M and Revising Annual Charges on July 23, 1997. In August 2020, City Light again submitted a revised Exhibit M to reflect additional generator and turbine upgrades that have occurred since 1997, along with a revised Exhibit K that updated the Project Boundary. FERC issued an Order Approving Revised Exhibits K and M and Revising Annual Charges on February 2, 2021. This Order authorized a combined installed capacity at the Project of 700.27 MW. Additionally, it revised the annual charges for occupied federal lands, as requested by City Light, to exclude the acres in the High Ross Inundation Zone. The revised Exhibit K drawings of the Project Boundary, which reflected parcels acquired or disposed of since 2010, were also approved by the Order (and were included with Exhibit G of the DLA).

Most FERC Orders issued since 1995 were to accept and approve various license-required submittals, including dam safety inspection reports, annual expenditure statements and plans, and resource reports (on a semi-annual, annual, bi-annual, and five-year basis, depending on the resource program). Others were issued to approve resource management, implementation, and monitoring plans developed for the Project license or changed post-license (Table 4.2-1). For example, several projects included in the original Recreation Resources Management Plan were deemed infeasible or not necessary by NPS or USFS as recreational uses shifted over time. With FERC notification and/or approval, funding was reallocated to other projects identified by the agencies as high priority needs and comparable in scope and budget to projects in the original management plan. Similarly, some funds for the steelhead program in the FSA were shifted to the Chinook program in 2002 with the approval of the Non-Flow Coordinating Committee (NCC) and a notification letter to FERC (March 7, 2002).

Table 4.2-1. Post-license FERC Orders related to resource management for the Skagit River Project.

Date	FERC Order/Receipt
01/22/1996	Order Approving Bald Eagle Monitoring Plan
04/02/1996	Order Modifying and Approving Wildlife Resources Management Plan
05/15/1996	Order Modifying and Approving Soil Erosion Control Plan
07/30/1996	Order Modifying and Approving Fishery Resources Plan
11/19/1996	Order Approving an Interim Recreation Resources Management Plan
12/10/1996	Order Approving Visual Quality Plan
03/18/1997	Order Amending Approved Soil Erosion Control Plan
03/27/1997	Order Approving Amended Wildlife Resources Plan
10/23/1997	Order Amending Recreation Resources Management Plan
07/06/1998	Order Amending Approved Soil Erosion Control Plan
07/13/1998	Order Approving Aviation Marker Plan
06/29/2001	Order Modifying and Approving Final Bald Eagle/Transmission Line Interactions Report
03/28/2008	Order Amending Recreation Resources Management Plan
06/07/2011	Receipt of Filing an Archaeological Resources Mitigation and Management Plan (ARMMP) for the Upper Skagit River Valley Archaeological District (confidential document; no Order on file with FERC eLibrary)
02/05/2014	Receipt of Filing an Amended ARMMP for the Upper Skagit River Valley Archaeological District (confidential document; no Order on file with FERC eLibrary)
04/24/2014	Order Approving Revised Fisheries Resources Plan (per 2013 License Amendment)
07/14/2014	Order Modifying and Approving Puget Sound Chinook Salmon and Steelhead Monitoring Plan (per 2013 License Amendment)
10/17/2018	Order Amending Recreation Resources Management Plan
01/27/2020	Order Approving Land Acquisition and Disposition Pursuant to Articles 408 and 410
07/09/2021	Order Amending Visual Quality Management Plan Pursuant to Article 413

4.3 Other Licenses/Permits

The Project is in the Upper Skagit River Water Resources Inventory Area (WRIA) 4, which has an Instream Resources Protection Program rule (Washington Administrative Code [WAC] 173-503), often referred to as the Skagit instream flow rule, effective as of April 14, 2001. The instream flow rule protects minimum flows in the Skagit River thereby maintaining a healthy aquatic ecosystem. This rule, required by state law (Revised Code of Washington [RCW] 90.54), applies to the entire upper Skagit River basin, and new water uses that could impact the Skagit River must be mitigated to prevent impairment of instream flows. Water uses established after the rule are interruptible when the river's minimum flows are not met, i.e., junior water rights can be forced to shut off until the river's senior water rights are fulfilled.

With the exception of two rights held by other government agencies and one private water right, City Light holds the only water right certificates in the upper Skagit River in the vicinity of the Project, all of which are senior to the Skagit Instream Flow rule. City Light has three pending water right applications currently on file with Washington State Department of Ecology (Ecology): (1) 6,500 cubic feet per second (cfs) power discharge at Ross Dam, which will bring the full discharge

into alignment with the full turbine capacity of 16,000 cfs; and (2) de facto change of use from Happy Creek (S1-*04465CWRIS) to the Ross Dam power intake for the existing domestic supply at Ross Dam. Both these rights are for non-consumptive uses. The third pending water right application is for a 0.55 cfs diversion from the penstock immediately upstream of Gorge Powerhouse for irrigation of Ladder Creek Gardens. This 1998 application is no longer needed and is planned for withdrawal.

Currently City Light does not anticipate applying for new consumptive uses of surface water or groundwater during the new license term. In 2019, City Light authorized the Washington Water Trust to apply for and be the holder of a water right permit for secondary use of 362 acre-feet per year of water released from Gorge Lake. City Light's storage in Gorge Lake (under Record R1-*13081CWRIS) is the primary use of the water release. The secondary use certificate (S1-28885), issued by Ecology on September 16, 2021, authorizes beneficial use of the water release for Skagit River instream flow augmentation and mitigation purposes, and is based on 0.5 cfs continuous discharge diverted from the penstock immediately upstream of Gorge Powerhouse. By agreement between Ecology, City Light, and the Washington Water Trust, the 362-acre-feet per year water release was placed in the State’s Trust Water Rights Program in perpetuity after one year of use (perfection). Water rights in the vicinity of the Project, on file with Ecology’s Water Resources Section, are shown in Table 4.3-1.

Table 4.3-1. Water rights in the vicinity of the Skagit River Hydroelectric Project, on file with Ecology's Water Resources Section (cfs = cubic feet per second; gpm = gallons per minute; ac-ft/yr = acre-feet per year).

Water Rights						Amount of Appropriation			
Record Number	Location/ Development	Water Right Holder/Applicant	Priority Date	Purposes	Consumptive	Instantaneous	Q_a	Status	Source
S1-*00433CWRIS	Gorge	City Light	06/07/1920	Power	No	3,500 cfs	--	Active	Skagit River
S1-*00632CWRIS	Gorge	City Light	07/21/1920	Domestic Supply	Yes	20 cfs		Active	Ladder Creek
S1-27994[1]	Newhalem	City Light	08/20/1998	Domestic/Irrig	No	0.55 cfs	--	Application Pending	Ladder Creek
S1-*02644CWRIS	Gorge	City Light	07/20/1929	Power	No	1,000 cfs	--	Active	Skagit River
G1-00489CWRIS	Newhalem	City Light	12/13/1971	Domestic Supply	Yes	600 gpm	312	Active	Groundwater
G1-23722CWRIS	Newhalem	City Light	11/26/1980	Domestic Supply	Yes	200/600 gpm	21/312	Active	Groundwater
S1-*02645CCWRIS	Diablo	City Light	07/20/1929	Power	No	4,200 cfs	--	Active	Skagit River
S1-*03987CWRIS	Diablo	City Light	06/16/1934	Domestic Multiple	Yes	1.78 cfs	--	Active	Pyramid Creek
S1-*16925CWRIS	Diablo	City Light	09/25/1961	Power	No	3,000 cfs	--	Active	Skagit River
S1-*16926CWRIS	Gorge	City Light	09/25/1961	Power	No	3,000 cfs	--	Active	Skagit River
G1-00490ALCWRIS	Diablo	City Light	12/13/1971	Domestic Multiple	Yes	300 gpm	90	Active	Groundwater
S1-00742CWRIS	Ross	City Light	06/07/1920	Power	No	3,500 cfs	--	Active	Ross Lake
S1-*04465CWRIS	Ross	City Light	09/17/1937	Domestic Multiple	Yes	5 cfs	--	Change of Use Pending	Happy Creek
S1-00741CWRIS	Ross	City Light	09/25/1961	Power	No	6,000 cfs	--	Active	Ross Lake
S1-27546	Ross	City Light	10/04/1994	Power	No	6,500 cfs	--	Application Pending	Skagit River
S1-27751	Ross	City Light	07/11/1996	Municipal	No	0.08 cfs	55	Application / Subject to Pending CS1-*04465CWRIS	Ross Lake

Water Rights						Amount of Appropriation			
Record Number	Location/ Development	Water Right Holder/Applicant	Priority Date	Purposes	Consumptive	Instantaneous	Q_a	Status	Source
CS1-*04465CWRIS	Ross	City Light	05/27/2016	Domestic	Yes	0.5 cfs	10	Application Change of Use Pending	Ross Lake
S1-*00394CWRIS	Newhalem Creek	City Light	03/10/1920	Power	No	75 cfs	--	Active	Newhalem Creek
S1-*18374CWRIS	Avalanche Creek	U.S. Forest Service Mount Baker	03/04/1964	Domestic Multiple	Yes	0.1 cfs	--	Active	Avalanche Creek
S1-047905CL	Hozomeen Creek	WA State Department of Game	Not Indicated	Domestic General	No	4 gpm	1	Active	Hozomeen Creek
S1-*00532CWRIS	Stetattle Creek	Davis F E	11/22/1920	Domestic Single/ Power/ Irrigation	Yes/No/Yes	5.5 cfs	--	Active	Stetattle Creek
Reservoir Storage Rights									
R1-*13081CWRIS	Gorge	City Light	08/17/1954	Reservoir Storage (Gorge)	No	--	8,350	Active	Skagit River
R1-*01592AWCWRIS	Diablo	City Light	01/12/1926	Reservoir Storage (Diablo)	No	--	90,000	Active	Ruby Creek[2], Thunder Creek, Skagit River[2]
R1-135	Ross	City Light	11/06/1926	Reservoir Storage (Ross)	No	--	3,800,000 [3]	Active	Skagit River

1 City Light plans to withdraw this water right.
2 When this water right was issued in 1926, Ruby Creek and the Skagit River were still sources for Diablo Lake because Ross Dam did not exist.
3 The current gross storage capacity of Ross Lake is 1,432,000 acre-feet; City Light is precluded from expanding the reservoir to a capacity of the permitted 3,800,000 acre-feet by the High Ross Treaty.

5.0 PROJECT FACILITIES

The Skagit River Project facilities included under the current license are described in this section. Each of the three Project developments, Gorge, Diablo and Ross, includes a dam, powerhouse, and reservoir, operations of which are hydraulically coordinated. The general layout of the developments relative to each other and components of each are shown in Figures 2.0-1 and 5.0-1 through 5.0-4. The Project powerhouses and dams and many associated structures are listed on the National Register of Historic Places (NRHP). Specifications for each development are summarized in Table 5.0-1 and described in detail below. Individual facility drawings are provided in Exhibit F and locations of existing facilities are shown in Exhibit G of this FLA. Proposed new facilities or modifications to existing facilities are described under the respective sections.

Figure 5.0-1. Aerial view of Ross Development and associated facilities.

Figure 5.0-2. **Aerial view of Diablo Development and associated facilities (not visible in photo: intake on right bank and valve house on face of the dam).**

Figure 5.0-3. **Aerial view of Gorge Development and associated facilities (not visible on photo: log chute on face of dam).**

Figure 5.0-4. Aerial view of downstream end of Gorge Development and associated facilities.

Table 5.0-1. Specifications for the three developments of the Skagit River Project.[8]

Project Component	Development		
	Gorge	**Diablo**	**Ross**
Dam			
Composition and configuration	concrete arch gravity diversion	concrete arch	concrete arch
Structural height of dam	300 feet (ft)	389 ft	540 ft
Length of crest (including spillways)	670 ft	1,180 ft	1,300 ft
Dam thickness at base	170 ft	146 ft	208 ft
Dam thickness at roadway	70 ft	16 ft	33 ft
Elevation of crest of dam (at roadway)	886.8 ft NAVD 88[1] (880.5 ft CoSD)	1,224.65 ft NAVD 88 (1,218 ft CoSD)	1,621.2 ft NAVD 88 (1,615 ft CoSD)
Concrete volume:	Unknown	350,000 cubic/yards	909,214 cubic/yards
Spillway			
Number of spillways	1	2	2
Spillway gates: Number Type Dimensions	 2 Fixed wheel 50 ft high by 47 ft wide	 19 Radial Tainter 19 ft high by 20 ft wide	 12 Radial Tainter 20 ft high[2] by 19.5 ft wide

[8] As filed by City Light (August 19, 2020) and approved by FERC in Order Amending License, Approving Revised Exhibits K and M, and Revising Annual Charges, 174 FERC ¶ 62,066 (February 2, 2021) with minor modifications to a few values and addition of NAVD 88 values for elevations; effectively replacing the Pre-Application Document (PAD), Table 3.4-1 (April 27, 2020).

Project Component	Development		
	Gorge	**Diablo**	**Ross**
Spillway crest elevation	831.3 ft NAVD 88 (825 ft CoSD)	1,193.65 ft NAVD 88 (1,187 ft CoSD)	1,588.2 ft NAVD 88 (1,582 ft CoSD)
Maximum spillway capacity (at normal maximum water surface elevation)	120,000 cfs	98,500 cfs	124,800 cfs
Reservoir			
Normal maximum water surface elevation	881.51 ft NAVD 88 (875 ft CoSD)	1,211.36 ft NAVD 88 (1,205 ft CoSD)	1,608.76 ft NAVD 88 (1,602.5 ft CoSD)
Normal operating minimum water surface elevation (authorized by current Project license or due to other constraints)[3]	873.51 ft NAVD 88 (867 ft CoSD)	1,204.36 ft NAVD 88 (1,198 ft CoSD)	1,480.76 ft NAVD 88 (1,474.5 ft CoSD)
Length of reservoir	4.5 miles	4.5 miles	24 miles[4]
Surface area at normal maximum water surface elevation	235 acres	905 acres	11,725 acres[4]
Shoreline length at normal maximum water surface elevation[5]	11 miles	20 miles	84 miles[6]
Gross storage	8,200 acre-ft	88,800 acre-ft	1,432,000 acre-ft[7]
Usable storage	1,600 acre-ft	6,200 acre-ft	1,063,000 acre-ft
Intake			
Intake structure[8]	1 bifurcated intake with 2 openings, each 20 ft wide and 88.9 ft long (4:1 vertical:horizontal incline)	2 bifurcated intakes with 4 openings, each 16.75 to 18.75 ft wide and 153.17 ft long (approximate 2.6:1 vertical:horizontal incline)	2 bifurcated intakes with 4 openings, each 20 ft wide and 198.13 ft long (4:1 vertical:horizontal incline)
Trash rack opening	3.5 inches by 2 ft and 2.5 inches	2.5 inches by 2 ft and 0.3 inches	3.5 inches by 2 ft and 1 inch for three rows per panel and 3.5 inches by 2 ft and 5.5 inches for one row per panel
Intake ("power") tunnel:			
Number	1[8]	1	2
Invert elevation	801.3 ft NAVD 88 (795 ft CoSD)	1,086.65 ft NAVD 88 (1,080 ft CoSD)	1,429.2 ft NAVD 88 (1,423 ft CoSD)
Length of concrete-lined section (gate slot to steel liner)	11,000 ft	1,800 ft	1,800 ft/1,634 ft
Length of steel-lined section	N/A	190 ft	N/A
Diameter of concrete-line section	20.5 ft	19.5 ft	24.5 ft
Diameter of steel-lined section	N/A	19.5 ft	N/A
Penstocks:			
Number	4	3	4
Length	1,600 ft	290 ft	350 ft
Diameter of turbine inlet	10 ft (Units 21, 22, 23); 15 ft (Unit 24)	15 ft (Units 31, 32); 5 ft (Units 35, 36)	16 ft (all units)
Penstock centerline elevation at turbine inlet	503.21 ft NAVD 88 (497 ft CoSD)	887.38 ft NAVD 88 (881 ft CoSD)	1,217.65 ft NAVD 88 (1,211.5 ft CoSD)

Project Component	Development		
	Gorge	Diablo	Ross
Powerhouse			
Total plant capability[9]	207.58 MW	182.4 MW	450 MW
	839.98 MW total		
Total authorized installed capacity[9,10,11]	189.3 MW	158.47 MW	352.5 MW
	700.27 MW total		
Annual capacity factor	52%	48%	13%
Normal tailwater elevation at dam	501.34 ft NAVD 88 (495 ft CoSD)	881.26 ft NAVD 88 (875 ft CoSD)	1,210.96 ft NAVD 88 (1,205 ft CoSD)
Normal gross head	380 ft	330 ft	397.5 ft
Turbines:			
Turbine type	Francis vertical	Francis vertical	Francis vertical
Number of units	4	4	4
Ratings (hp=horsepower; RPM=rotations per minute)	Units 21, 22: 51,850 hp at 325 ft net head, 257 RPM Unit 23: 45,000 hp at 325 ft net head, 257 RPM Unit 24: 147,500 hp at 354 ft net head, 163.7 RPM	Units 31, 32: 117,200 hp at 318 ft net head, 171.5 RPM Units 35, 36: 2,200 hp at 306 ft net head, 720 RPM	120,000 hp at 355 ft net head, 150 RPM
Governors	Woodward	ASEA	Woodward
Hydraulic capacity (at maximum plant output)[12]	7,440 cfs	8,250 cfs	16,000 cfs
Hydraulic capacity (minimum output with one unit generating and estimated leakage for other units)	170 cfs	70 cfs	130 cfs
Generators:			
Generator manufacturer	Westinghouse	Westinghouse	Westinghouse
Ratings	U21 36.86 MW U22 36.86 MW U23 36.86 MW U24 97.00 MW	U31 90 MW U32 90 MW U35 1.2 MW U36 1.2 MW	U41 112.5 MW U42 112.5 MW U43 112.5 MW U44 112.5 MW
Plant factor (average)	107.59 MW	87.53 MW	60.10 MW

Source: Power System Engineering Information 2019 (City Light 2019); Table M-1 and General Description of Mechanical, Electrical and Transmission Equipment of Exhibit M, as approved by FERC by order dated February 2, 2021, with relevant recent updates.

1 All elevations in the table are North American Vertical Datum 1988 (NAVD 88) w/ City of Seattle datum (CoSD) value in parentheses.

2 2.5-feet risers installed on top of each gate to increase storage capacity by 30,000 acre-feet and annual energy capability by 10,700 megawatt hours (MWh).

3 Normal operating minimum water surface elevation is defined in the Environmental Assessment (EA) for the 1995 License Order for Ross Lake. For Diablo Lake, the maximum operating drawdown is based on constraints related to the boathouse; for Gorge it is based on fish stranding potential, as determined by City Light fisheries biologists. These elevations may be exceeded for maintenance purposes with appropriate authorization.

4 Approximately 23 miles and 11,225 acres in the U.S. and 1 mile and 500 acres in Canada.
5 Shoreline length calculated from Light Detection and Ranging (LiDAR) data collected in 2018 that is in NAVD 88 datum.
6 Approximately 369,315 ft (69.9 miles) in U.S. and 75,742 ft (14.3 miles) in Canada. Shoreline length in Canada includes small channels and inlets with shallow water.
7 USGS uses 1,440,700 acre-feet as the capacity of Ross Lake.
8 FERC has authorized a second power tunnel at Gorge which has not yet been constructed but could potentially be developed in the new license term.
9 There are two bifurcated intakes at Diablo Dam but only one is in use; the second intake was for planned future expansion of the powerhouse and a second tunnel, which were never constructed.
10 Generating capacity is limited to 173 MW at Gorge by head loss from tunnel capacity. In addition, Units 21, 22, and 23 at Gorge are restricted to a combined maximum of 96 MW due to water and generator bus limitations.
11 The small "house" units (35 and 36) at Diablo are used primarily to provide power to the town of Diablo, the powerhouse, and the North Cascades ELC on the north shore of Diablo Lake.
12 Maximum output at Ross is limited to 9,500 cfs and 7,200 cfs at Diablo, consistent with existing water rights for power production. An application for an additional 6,500 cfs at Ross is pending; the need for additional water rights at Diablo is being evaluated. The value previously cited for in relicensing documents for Diablo was 7,130 cfs.

5.1 Ross Development

The Ross Development is the furthest upstream of the three Skagit River Project developments; the powerhouse and nearby dam are about 11 miles north of Newhalem. Most of the water used for Skagit River Project power generation originates in high mountain basins surrounding Ross Lake and upstream along the Skagit River in British Columbia, Canada. The Ross Development is relatively inaccessible, especially by vehicle. The powerhouse is typically accessed by boat from Diablo Lake. An approximately 1.5-mile-long gravel road (aka Haul Road) connects the powerhouse to the dam and reservoir and is used by vehicles barged up Diablo Lake by City Light. The powerhouse, dam and reservoir are also accessible by foot via several trails:

- Ross Dam Trail, which is one mile long and drops 700 feet from a parking lot along State Route (SR) 20 at milepost (MP) 134 to the Haul Road, which then connects to the powerhouse, dam, and reservoir;
- Happy Panther Trail, which starts from the East Bank Trailhead along SR 20 at MP 138 and runs for 6 miles along Ruby Arm to the Ross Dam Trail and Haul Road; and
- Diablo Lake Trail, which starts at the parking lot near the ELC, runs for nearly 4 miles along the north side of the lake, crosses a suspension bridge, and ends near Ross Powerhouse and the start of the Haul Road.

The three trails and the Haul Road are open to pedestrian access by the public. The only access (other than the Haul Road) to the reservoir is via a 40-mile-long gravel road from Hope, British Columbia, to Hozomeen at the very north end of the reservoir. The boat ramps at Hozomeen provide the only public launches for motorized boats.

Ross Powerhouse is about 1,100 feet downstream of Ross Dam, on the left bank at the eastern end of Diablo Lake. There are four Westinghouse generating units (Units 41, 42, 43, and 44), each with a nameplate rating of 112.5 MW. Units 42, 43, and 44 each have an authorized installed capacity of 91.875 MW, and Unit 41 has an authorized installed capacity of 76.875 MW, for a total authorized installed capacity of 352.5 MW at the development. Two concrete-lined power

tunnels deliver water from the reservoir to four penstocks and into the powerhouse. There is no surge tank. Diablo Lake backs up to the base of Ross Dam and there is no bypass reach or section of free-flowing river between the two developments.

Ross Dam is immediately upstream of Ross Powerhouse at PRM 105.7 (USGS RM 105.1). At 540 feet from bedrock to crest, it is the highest of the three Project dams. The intake structure is on the left side of the dam (facing downstream). The dam has two spillways—one on each side and each with six gates operated by an electric hoist. Two of the spillway gates can be controlled remotely; the others are operated locally at the dam. In addition to the spillways, Ross Dam has two concrete-lined power tunnel intake structures, two butterfly valves at the 1,346.2-foot NAVD 88 (1,340-foot CoSD)[9] level and two hollow jet valves near the right bank at 1,275.2 and 1,260.2 feet NAVD 88 (1,269 and 1,254 feet CoSD). The two sets of valves can be opened to evacuate the reservoir once water levels drop below the level of the spillway gates. On the top of the dam, a shed houses two hoists, one for each of the broome gates that close off the six-foot-diameter water supply pipes to the hollow jet valve. There is also a gantry crane used to raise and lower the broome gates that isolate the six-foot conduits for the butterfly valves. The road on top of the dam is used by City Light and NPS vehicles and is open to pedestrian use by the public.

At nearly 23 miles long, Ross Lake is the largest reservoir in western Washington. It extends into Canada approximately another mile (24 miles total), with about 500 acres in British Columbia. The reservoir has a surface area of 11,725 acres and storage volume of 1,432,000 acre-feet at the normal maximum water surface elevation of 1,608.76 feet NAVD 88 (1,602.5 feet CoSD). There are several sets of debris booms upstream of the dam to keep floating wood and boats out of the forebay and away from the intake (Figure 5.1-1).

See Exhibit F, drawings F-10 through 13 for plan, elevation, and sections of the Ross Dam, Power Plant, and Powerhouse, and Exhibit G, map pages G-56 through G-61 for location of the various components of the existing Ross Development.

[9] City Light is in the process of converting Project information from its older vertical elevation datum (CoSD) to the more current and standardized elevation datum (NAVD 88). As such, elevations are provided relative to both data throughout this FLA. The conversion factor between CoSD and NAVD 88 varies depending on location. A table converting elevation values of common benchmarks, staff gages, and key Project features from CoSD to NAVD 88 and a map of the same features are appended to this FLA (Appendix C in Exhibit E), both of which have been updated since first being provided in the PAD.

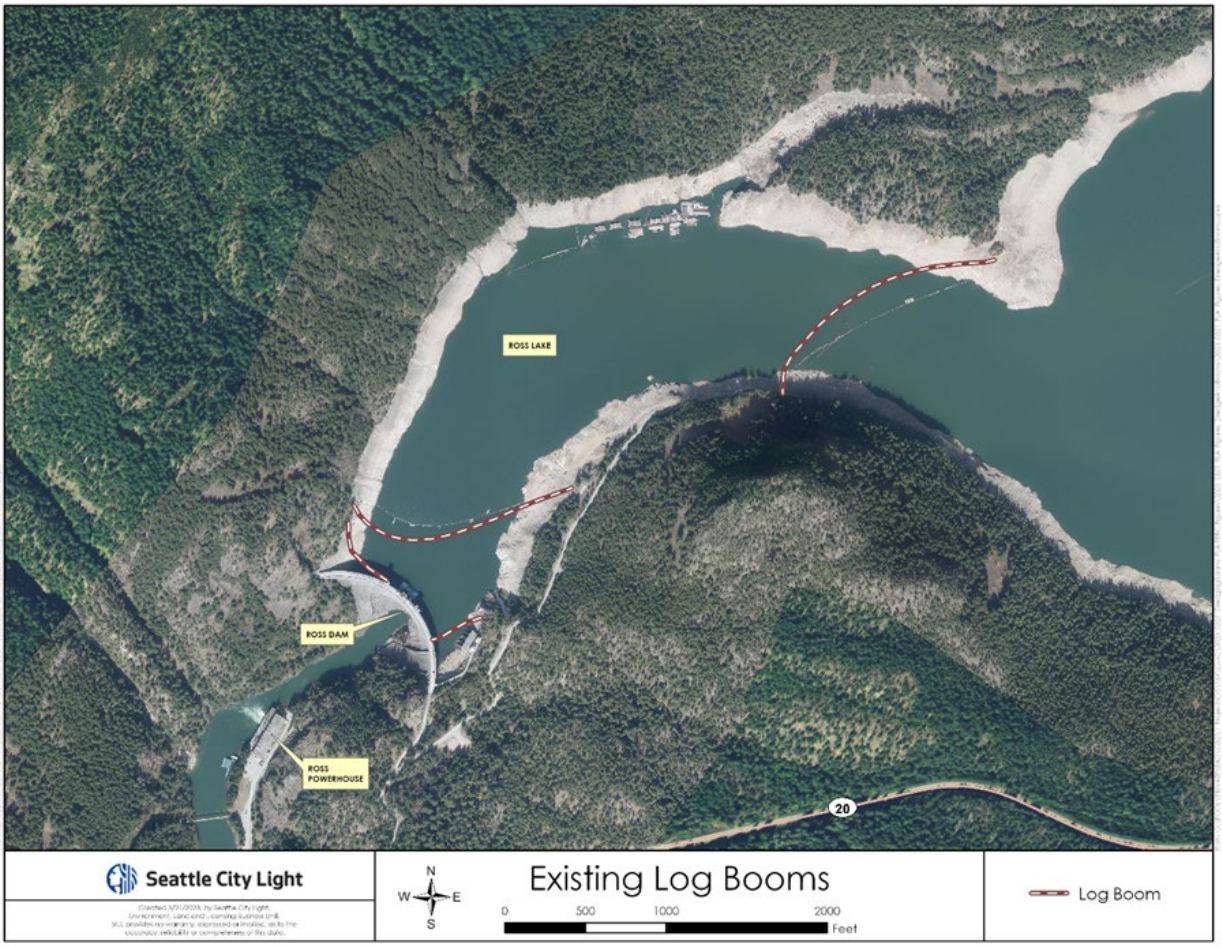

Figure 5.1-1. Existing log booms on Ross Lake.

Several major maintenance/rehabilitation/upgrade projects are anticipated at the Ross Development over the new license period. Projects proposed as part of the Proposed Action include:

- Rewind generator and replace/upgrade turbine runners.
- Projects at the powerhouse to address major maintenance needs, building code revisions and impacts from climate change, including but not limited to, upgrades to the heating, ventilation, and air conditioning (HVAC) system to handle extreme heat events and smoke; roof replacement; and seismic reinforcement.
- Improve, upgrade, replace, and add debris booms and anchorages.
- Continue to remove floating woody debris from Ross Lake.

  Removal of floating woody debris is necessary for safe dam operations, compliance with the FERC Part 12D Dam Safety Program, and recreational and marine vessel safety. Ross Lake woody debris can be removed from the Ross Haul Road on the south end of Ross Lake, or at the East Landing on the north end of the lake. Woody debris may be stored and processed to reduce the volume of material at the East Landing before transporting offsite for recycling into

a different use. The East Landing is an existing gravel pad, adjacent to Ross Lake, approximately 2 miles south of the Canadian border.

- Upgrade, maintain, or decommission the low-level outlets at Ross Dam.

  This project includes rehabilitation, replacement, or decommissioning of the two low-level outlet valves at Ross Dam or re-use of the water conduits for pumping water back into Ross Lake to allow for water re-use. These are the lower set of outlets and do not discharge directly from the dam but downstream of the dam at the lower valve house. The valves are served by an intake on the right side of the dam that connect into two separate steel penstocks such that each valve is connected to its own penstock. The intakes are located at approximately elevations 1,271.2 feet and 1,281.2 feet NAVD 88 (1,265 feet and 1,275 feet CoSD) and discharge at approximately elevation 1,221.2 feet NAVD 88 (1,215 feet CoSD) at the right side of the channel. The intakes can be individually blocked off using broome gates placed in the tracks at the broome gate house. The intake structure is a steel structure at the top (above elevation 1,481.2 feet NAVD 88 [1,475 feet CoSD]) and concrete below that elevation. The penstocks exit the right abutment and are enclosed in a larger tunnel that is accessible from the lower valve house.

- Replace low-level and mid-level outlet intake debris screens.

  City Light plans to replace the Irving screens at the mid-level and low-level outlet hoist ways on the upstream face of Ross Dam. There are two mid-level outlets and two low-level outlets, controlled by butterfly valves at elevations 1,346.2 feet, 1,281.2 feet, and 1,271.2 feet NAVD 88 (1,340 feet, 1,275 feet, and 1,265 feet CoSD). The outlets are connected to an intake on the upstream side of the dam. The intake features removeable steel grating fitted into concrete slots, which are above a larger steel trash rack directly upstream of the inlets. The removable steel grating and structural steel supports are extremely corroded and deteriorated, particularly in the region within the normal operating range of the reservoir. The removable grating panels are positioned upstream of the broome gate slots and are intended to keep debris out of the broome gate guides.

  City Light proposes replacing the existing steel grating panels with new stainless-steel grating and panels. The panels must be removed one at a time, starting from the top and continuing downward. Reservoir debris will need to be removed from the slots as the panels are removed. This project is anticipated to be completed in the spring months when the reservoir level is still dropping. The panels above the water surface can be removed either as the reservoir goes down or by a rope-access crew. Divers would then be used to remove panels below the water level.

- Improve and upgrade dam monitoring instrumentation, as needed.

- Mitigate powerhouse and dam rockfall incidents, as needed.

  Because the Skagit Project dams and powerhouses are located in steep canyons, there is an on-going risk of rockfall damaging buildings, roads, equipment and/or harming people. This project will evaluate, prioritize, and implement rock stabilization projects. In the last 12 months, the Project has experienced rock fall problems at the Diablo Powerhouse and the Ross jeep tunnel.

- Maintain and upgrade spillway gate components, as needed.

  City Light is required to perform periodic maintenance and upgrades on spillway gates, valves,

and the associated operators and appurtenances. These maintenance and upgrades are necessary for compliance with the FERC Part 12D Dam Safety Program and for ensuring safe and reliable operation of the dams.

All dams:

- Painting and corrosion repair of gates and appurtenances.
- Gate seal replacements.
- Valve rehabilitations.
- Seismic retrofits, where necessary.
- Hoisting equipment and wire rope/chain, replacements, and upgrades.
- Maintenance and replacement of trunnions and gate rollers.
- Safety improvements to be able to safely access and maintain gates and valves.
- Replacement of electrical motors, power and communication lines, and associated components.
- Maintenance of penstock pipes supplying low-level outlets.

Ross Dam:

- Replacement of electrical conduits and motors.

- Upgrade, repair, and paint the Ross Dam spillway bridge, as needed.

  Spillway bridges are inspected every 2 to 5 years for safety and degradation and load rating analysis determines if they do not meet safety requirements. When the inspections/analysis determine deficiencies, repairs and upgrades are required. Repairs may include concrete repair, painting, structural strengthening, or repair of the roadway surface.

- Repair the spillway and training walls, as needed.

  As required by the FERC Part 12D Dam Safety Program, City Light is required to maintain spillways, including concrete and rock portions, and their training walls and plunge pools in safe and reliable condition. Periodic spillway repairs may consist of the following items:

  - Concrete joint repair.
  - Concrete crack and spall repair.
  - Replacement of damaged/missing concrete sections.
  - Dental infill concrete of eroded rock areas if required at Diablo Dam.
  - Rock block stabilization as required.

- Improve, repair, and upgrade dam structures, abutments, foundation, as needed.

  As required by the FERC Part 12D Dam Safety Program, City Light is required to maintain the dams, abutments, and foundations and their appurtenant structures such as spillways; intake structures, houses, platforms, trash racks, and head gates; valve houses; power tunnels; penstocks; turbine shutoff valves and relief valves; surge tanks; vehicular and personnel access

routes, etc. in a safe and reliable condition. Periodic maintenance and upgrades may consist of, but are not limited to, the following items:

- Removal of vegetation from dam faces, spillways, and abutments.
- Concrete repair including crack and spall repair, when necessary.
- Seismic retrofit of structures as needed.
- Foundation/abutment rock block stabilization as required for stability or to prevent damage at critical structures.
- Cleaning and jetting of drains (foundation and body drains) and galleries to ensure stability of the dams.
- Repair or replacement of trash racks and other structural steel members for power and low or mid-level intakes.
- Maintenance of structural steel members including painting and treating/repairing corrosion.
- Repair/modification and replacement of bulkheads and broome gates and appurtenances.
- Maintenance and replacements of personnel access ways such as ladders, walkways, handrails, stairs, fences, and gates necessary for dam safety inspections, instrumentation and monitoring readings, and/or operation of critical equipment such as gates and valves.
- Maintenance of access roads/routes to the dams to complete daily safety inspections.
- Repairs to penstocks, power tunnels, turbine shutoff valves, etc.

Equipment and materials used for maintenance/rehabilitation/upgrade projects at the Ross Development are transported via SR 20 to the Diablo Dam Access Road, then across the dam to West Barge Landing on Diablo Lake, and finally, barged up the lake. Occasionally, the required equipment exceeds the weight capacity or turning radius allowable for access across Diablo Dam. In the past, the beach adjacent to the Colonial Creek Campground has been used as an alternative lake access point. Use of this area is expected to be needed on a few occasions during the license period and may require some limited dredging for boat access and beach reconfiguration for vehicle access and equipment staging/laydown.

5.2 Diablo Development

The Diablo Development is between the Ross and Gorge developments and in addition to generating power it reregulates flows between the other two developments. The powerhouse is on the north side of the Skagit River in the town of Diablo, about 4,000 feet downstream from Diablo Dam. Water from the reservoir to the powerhouse is conveyed by a single concrete-lined tunnel, 1,900 feet long, that leads to three steel-lined penstocks. There is a surge tank located near the downstream end of the tunnel, uphill from the powerhouse. Diablo Powerhouse, Dam, and reservoir are all accessible by SR 20 and/or short access roads off this highway.

Diablo Powerhouse holds two Westinghouse generators (Units 31 and 32) and each has a nameplate rating of 90 MW and authorized installed capacity of 78.035 MW. There are also two smaller, house-unit generators (Units 35 and 36), each with nameplate ratings and authorized

installed capacities of 1.2 MW. Total authorized installed capacity at the development is 158.47 MW. A reinforced-concrete tailrace on the westerly edge of the powerhouse also serves to support transformers, a switching apparatus, and a crossing for a single-lane road.

Diablo Dam is located at PRM 101.6 (USGS RM 101.2), about 4.5 miles upstream of Gorge Dam and four miles downstream of Ross Dam. The concrete arch dam is 389 feet from bedrock to crest and has two spillways, one on each side, and a total of 19 spillway gates—7 on the south spillway and 12 on the north. The three southern-most gates are automated via an electric hoist that can be locally or remotely operated. The remaining 16 gates are controlled locally at the dam using the "mule," an electric motor-driven hydraulic hoist that consists of two hydraulic cylinders to open or close the associated spillway gate. The mule runs on rails along the road on top of the dam and is positioned over the desired gate, when needed. The lifting chains for the gates are accessed below the deck plates on the dam. A valve house on the face of the dam has four outlets—three butterfly valves that can evacuate water from the reservoir at levels below the spillway gates and one Larner-Johnson valve that is not used at elevation 1,050.65 feet NAVD 88 (1,044 feet CoSD). There are two bifurcated intakes on the right side of the dam but only one is in use, as the second intake was for planned future expansion of the powerhouse and a second tunnel, which were never constructed. The crest of the dam also serves as a road that provides access to a boat house and other marine facilities and the ELC. The road across the dam is open to the public from 7 a.m. to 5 p.m.

Diablo Lake has a surface area of about 905 acres and gross storage of 88,800 acre-feet at a normal maximum water surface elevation of 1,211.36 feet NAVD 88 (1,205 feet CoSD). Debris booms near the dam keep floating wood and boats away from the intakes and spillway gates; other booms delineate restricted boat use and operational areas on the reservoir (Figure 5.2-1).

There is no bypass reach or riverine section between Diablo Dam and Powerhouse. Hydraulic conditions in this area are controlled by the existence of a gravel/cobble bar located at the confluence of Stetattle Creek with Gorge Lake and by the orientation of Diablo Powerhouse outflows. Under normal operations the reach between Diablo Dam and Powerhouse is watered and hydraulically connected to the upper end of Gorge Lake.

See Exhibit F, drawings F-6 through 9 for plan, elevation, and sections of the Diablo Dam, Power Plant, and Powerhouse, and Exhibit G, map pages G-55 through G-57 for location of various components of the existing Diablo Development.

Figure 5.2-1. Existing log booms on Diablo Lake.

Major maintenance/rehabilitation/upgrade projects are anticipated at the Diablo Development over the new license period. Projects proposed as part of the Proposed Action include:

- Rewind generator and replace/upgrade turbine runners.
- Replace transformers.
- Replace governors.
- Projects at the powerhouse to address major maintenance needs, building code revisions and impacts from climate change, including but not limited to, upgrades to the HVAC system to handle extreme heat events and smoke; roof replacement; and seismic reinforcement.
- Improve, upgrade, replace, and add debris booms and anchorages.
- Continue to remove floating woody debris from Diablo Lake.

  Removal of floating woody debris is necessary for safe dam operations, compliance with the FERC Part 12D Dam Safety Program, and recreational and marine vessel safety. Diablo Lake woody debris is removed via an access road and beach area immediately west of the mouth of

Sourdough Creek.

- Upgrade, repair, and paint the bridge over the Diablo Powerhouse tailrace.

  The steel bridge requires inspection every two years and is located directly above the Diablo Powerhouse tailrace with the transformer deck immediately to the north and the switchyard deck to the south. Inspection requires a complete shutdown of the powerhouse to boat under the bridge. The project would create an access from above and an inspection platform. The bridge also needs to be painted and the platform would provide the necessary access.

- Rehabilitate or decommission the Larner-Johnson valve.

  This project includes rehabilitation, replacement, or decommissioning of the Larner-Johnson low-level outlet valve at Diablo Dam. This valve is adjacent to the three other outlets in the center of the dam. The valves are served by four individual inlets at the intake in the approximately center upstream portion of the arch dam. The intakes and valve centerlines are located at approximately elevation 1,050.38 feet NAVD 88 (1,044 feet CoSD). The intakes can be individually blocked off using broome gates placed in the tracks at the broome gate platform. The intake structure is a steel structure at the top (above elevation 1,481.38 feet NAVD 88 [1,475 feet CoSD]) and concrete below that elevation.

  The Larner-Johnson valve has not been operated since approximately 2013. Some types of Larner-Johnson valves have had operational safety concerns in some cases leading to operation personnel fatalities. Thus, City Light is evaluating options to address potential safety concerns.

- Rehabilitate/reinstall the automated trash rack cleaning system at the dam.

  This project will install an automated rack so that debris, such as logs and vegetation, can be removed frequently from the 150-tall trash rack without the need for divers and/or cranes.

- Improve and upgrade dam monitoring instrumentation, as needed.

- Mitigate powerhouse and dam rockfall incidents, as needed. *(same details as in Section 5.1 of this Exhibit A)*

- Maintain and upgrade spillway gate components, as needed. *(same details for all dams as in Section 5.1 of this Exhibit A)*

  Diablo Dam:

  - Modification and/or replacement of the mobile hoist ("Diablo Mule") and the tracks, as needed.
  - Upgrade of select gates to be operated by a fixed electric motor instead of mobile hoist.

- Upgrade, repair, and paint the Diablo Dam spillway bridge, as needed. *(same details as in Section 5.1 of this Exhibit A)*

- Repair the spillway and training walls, as needed. *(same details as in Section 5.1 of this Exhibit A)*

- Improve, repair, and upgrade dam structures, abutments, foundation, as needed. *(same details as in Section 5.1 of this Exhibit A)*

- Restore generating capacity at Diablo Powerhouse and access to the walkways to generator scroll cases (see Exhibit B, Section 5.3, of this FLA for more detail).

5.3 Gorge Development

Gorge Powerhouse is on the left bank (facing downstream) of the Skagit River just upstream of the town of Newhalem and can be reached via SR 20 by vehicle bridge across the river or by a nearby suspension foot bridge. Both bridges are open to pedestrian access by the public. There are four Westinghouse generating units (Units 21, 22, 23, and 24). Units 21 and 22 each have a nameplate rating of 36.86 MW and authorized installed capacity of 31.5 MW; Unit 23 has a nameplate rating of 36.86 MW and authorized installed capacity of 30.2 MW. Unit 24 is significantly larger, with a nameplate rating of 97 MW and an authorized installed capacity of 96.1 MW. Total authorized installed capacity at the development is 189.3 MW.

In addition to generating power, Gorge Powerhouse is responsible for regulating flows to the river downstream of the Project for fish protection, as stipulated by the current Project license. Units 21, 22, and 23 are each connected to steel-lined penstocks through 10-foot-diameter, biplane-type butterfly valves equipped with relief valves, which will discharge a maximum of 65 percent of the turbine flow at full-load rejection. Equipment has also been installed to allow these valves to open and stay open for any required period to maintain fish flows after a plant load rejection/shutdown. Unit 24 is connected to the steel-lined penstock through a 15-foot-diameter butterfly valve.

Water from Gorge Lake is conveyed via an intake structure in Gorge Dam into an 11,000-foot-long concrete-lined power tunnel to the powerhouse. The power tunnel passes through the solid rock slope that is adjacent to the Skagit River and then splits into four penstocks. A surge tank and riser with restricted orifice is located at the lower end of the tunnel. There are also two adits that provide access to the power tunnel—one about halfway at Devil's Elbow and the other near Gorge Powerhouse. The current Skagit River Project license includes a second power tunnel at the Gorge Development which has not yet been constructed.

Gorge Dam, located at PRM 97.2 (USGS RM 96.6), is about 2.5 miles upstream of Gorge Powerhouse and 4.5 miles downstream from Diablo Dam near Gorge Creek. It is accessed by a short gravel road off SR 20 and not open to public vehicles. The dam is a combination concrete arch and gravity structure that rises 300 feet from bedrock to crest; the intake is on the left side. There are two spillways with gates that are operated by an electric hoist on top of the dam. One gate can be remotely controlled to a limited height; the other must be opened and closed locally at the dam. The spillway gates can also be overtopped by up to 5 feet of water if the reservoir elevation were to go up to 886.51 feet NAVD 88 (880 feet CoSD). Training walls on either side of the spillway direct water into the river channel downstream. Two low-level outlets on the face of the dam at elevation 770.3 feet NAVD 88 (764 feet CoSD) can be used to evacuate water from Gorge Lake below the spillway gate level. Debris booms are positioned to keep floating wood and boats away from the dam (Figure 5.3-1). A log chute allows floating woody debris to be passed downstream of the Project in a controlled manner, when needed.

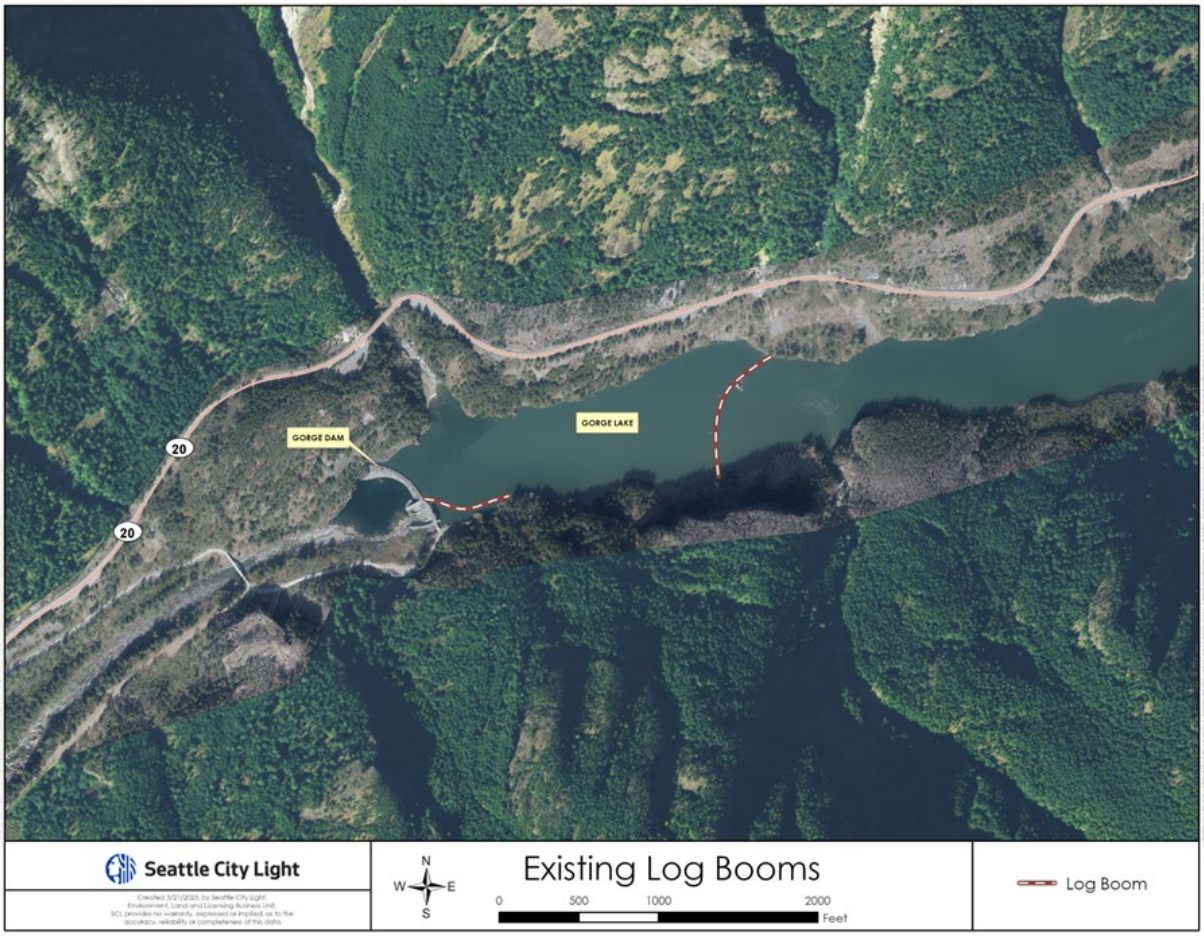

Figure 5.3-1. Existing log booms on Gorge Lake.

Gorge Lake is 4.5 miles long and extends upstream to the base of Diablo Dam. At the normal maximum water surface elevation of 881.51 feet NAVD 88 (875 feet CoSD), the lake has a surface area of 235 acres and gross storage of 8,200 acre-feet. During normal operations, water from Gorge Dam is conveyed to the powerhouse via the 11,000-foot-long power tunnel, creating a 2.5-mile-long bypass reach of the Skagit River between the dam and the powerhouse. This reach serves as the active spillway for Gorge Dam. Almost the entire bypass reach and the reservoir are bordered by SR 20.

See Exhibit F, drawings F-2 through 5 for plan, elevation, and sections of the Gorge Dam, Power Plant, and Powerhouse, and Exhibit G, map pages G-52 through G-56 for location of various components of the existing Gorge Development.

Major maintenance/rehabilitation/upgrade projects are anticipated at the Gorge Development over the new license period. Projects proposed as part of the Proposed Action include:

- Rewind generator and replace/upgrade turbine runners.
- Replace transformers.
- Replace governors.

- Projects at the powerhouse to address major maintenance needs, building code revisions and climate change impacts, including but not limited to, upgrades to the HVAC system to handle extreme heat events and smoke; roof replacement; and seismic reinforcement.
- Improve, upgrade, replace, and add debris booms and anchorages.
- Continue to remove floating woody debris from Gorge Lake.

  Removal of floating woody debris is necessary for safe dam operations, compliance with the FERC Part 12D Dam Safety Program, and recreational and marine vessel safety. Woody debris on Gorge Lake is removed via the log chute.
- Rehabilitate/reinstall the automated trash rack cleaning system at the dam.

  This project will modify/replace the aging, existing power-operated trash rake on the Gorge Dam intake.
- Seismic retrofit of the Gorge spillway gate structure and gate piers.

  The Gorge Dam spill gates are approximately 40 feet wide by 50 feet tall and thus are opened and supported by the hoist superstructure above the dam. This superstructure is anchored to spillway piers. Based on the most recent Part 12 Independent Consultant Report, there is uncertainty in the ability of the gates, piers, and superstructure to withstand seismic loads during certain extreme events. Updated seismic analyses are currently underway to inform the stability of these structures during extreme seismic events. Based on the results of these studies, City Light may be required to perform seismic retrofit of the gate structure. In this case, construction will likely consist of structural reinforcements and/or modifications to the structure, such as structure steel bracing.
- Gorge Dam low flow control structure.

  City Light proposes to evaluate, design, and install a minimum flow control structure at Gorge Dam to release water directly downstream of the dam to the Gorge bypass reach. A flow control structure will be installed capable of providing continuous flow releases ranging from approximately zero cubic feet per second (cfs) to 1,500 cfs. Initial feasibility rejected use of existing appurtenances due to potential for fatigue and cavitation related failure and identified a preferred gate modification concept for reliable and continuous flow control. A summary of the initial feasibility is provided in Appendix B of this Exhibit A.

  This alternative examined the preliminary sizing and configuration of modifying one or both of two existing 47.0-foot-by-50.5-foot spillway gates, which would be modified with a new additional slide gate to accommodate the specified range of flow. The design flow through each gate would be 750 cfs. This results in a preliminary square gate size of 5 feet, 6 inches by 5 feet, 6 inches with a gate centerline elevation of approximately 850.01 feet NAVD 88 (843.5 feet CoSD). It was assumed that a standard slide gate with an electric actuator could be used in this location. A portion of the existing spillway gates will need to be modified to allow for the new gate opening and additional reinforcement will need to be provided to maintain the structural integrity of the gate.

  Appendix B includes a figure of the conceptual gate arrangement based on the preliminary gate sizing described above. It is assumed that the gates could be operated in the same location as the existing spillway gates.

Subject to further investigation, final configuration (i.e., multiple smaller gates or a rectangular gate mounting the gate upstream versus downstream of the existing spillway gate) and potential automation to maintain the required flow based on reservoir level will be explored. Construction access to the gates is assumed to be provided by temporarily lowering the water surface level of Gorge Lake so that construction may take place without use of a cofferdam or other dewatering methods.

- Improve and upgrade dam monitoring instrumentation, as needed.
- Mitigate powerhouse and dam rockfall incidents, as needed. *(same details as in Section 5.1 of this Exhibit A)*
- Maintain and upgrade spillway gate components, as needed. *(same details for all dams as in Section 5.1 of this Exhibit A)*

  Gorge Dam:

  - Periodic, full-open testing required by FERC Part 12D Program requires Gorge Lake drawdown of approximately 50 feet to the gate sills (below elevation 831.3 feet NAVD 88 [825 feet CoSD]).
  - Maintenance/upgrades on the upstream side of the gates may require drawdown of approximately 50 feet to the gate sills (below elevation 831.3 feet NAVD 88 [825 feet CoSD])
- Upgrade, repair, and paint the Gorge Dam spillway bridge, as needed. *(same details as in Section 5.1 of this Exhibit A)*
- Repair the spillway and training walls, as needed. *(same details as in Section 5.1 of this Exhibit A)*
- Improve, repair, and upgrade dam structures, abutments, foundation, as needed. *(same details as in Section 5.1 of this Exhibit A)*
- Dredge portions of upper reservoir to improve operational flexibility and reduce fish stranding risk during Gorge Lake drawdowns (see Exhibit B, Section 5.3, of this FLA for more detail).

5.4 Townsites

The Skagit River Project is in a remote location and includes two small towns, Newhalem and Diablo, that provide the facilities and support services needed for Project operations and maintenance (O&M)(see Exhibit G, map pages G-52 and G-55, respectively, for locations). Both towns were originally built to provide housing and services to the workers constructing the Project, which numbered in the hundreds, depending on the year. As of July 2022, 32 of the 92 full-time employees who currently work at the Skagit River Project live in the two towns. Some of the houses are used as temporary lodging for contractors and City Light staff who normally work elsewhere and seasonal workers; others are rented to staff working for NPS and the NCI and the Whatcom County Sheriff's Office. Most of the buildings remaining in the two towns are listed in the NRHP as part of a historic district. Both towns have emergency sirens.

Newhalem is located between SR 20 and the Skagit River, just downstream of Gorge Powerhouse (Figures 2.0-1 and 5.4-1). The northern portion of the town is occupied by Gorge Switchyard and a large maintenance yard with warehouses, storage buildings, shops, and a water tower. The

remainder of the town includes 28 houses, a variety of other lodging facilities, garages, administrative offices, a meeting hall, a dining hall, a playground, a firehouse, a wastewater treatment plant, a general store, an information center, parking lots, and public restrooms. Heading from west to east on SR 20, Newhalem is the last town for 60 miles and a frequent stop for travelers and visitors to the RLNRA. In addition, two popular recreation sites are accessed from Newhalem—Trail of the Cedars and Ladder Creek Gardens. During the current Project license, a variety of visitor services have been added in Newhalem, including expanded restrooms, an information center, parking, electric vehicle charging stations, and interpretive signs. All land occupied by Newhalem is owned by City Light.

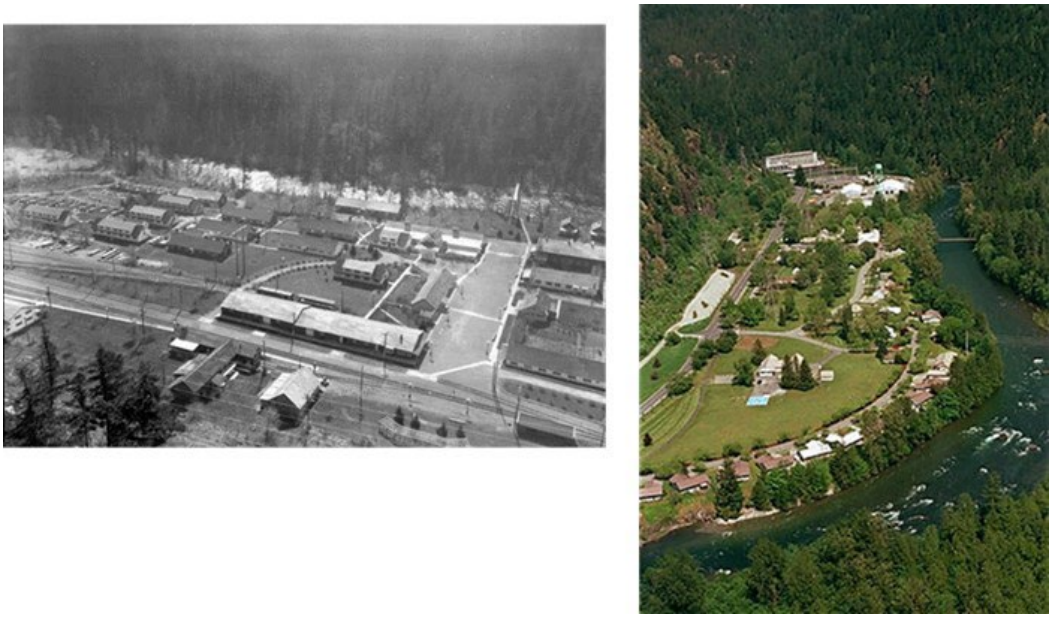

Figure 5.4-1. Newhalem, circa 1928 and circa 2022.

As a historic town, facilities in Newhalem are in near constant need of rehabilitation and maintenance. Significant projects anticipated over the new license period include:

Proposed as part of the Proposed Action:

- Major maintenance of the Newhalem water tower.

  Water towers require inspection every 10 years. The Newhalem water tower is a 75,000-gallon welded steel tank erected in 1962, manufactured by Caldwell tanks. The most recent condition assessment found the exterior coating in good condition, the interior water tank coating was also in good condition. Appurtenant access and safety protections need significant maintenance but not expected to require full structural replacement at this time. A condition assessment will be conducted and major maintenance performed, as needed.

- Repairs to, and possible replacement of, the town water main.

  This project will repair or replace several miles of water mains that serve Diablo and Newhalem. The water pipes are over 70 years old and have a leakage rate that exceeds the standards set by Ecology.

- Major maintenance of the wastewater treatment plant.

The Newhalem Wastewater Treatment Plant is due for a major overhaul of equipment and buildings.

- Demolition and reconstruction of the Newhalem Lineman's Warehouse and remediation of contamination. The project will be done as part of the proposed Newhalem Materials Storage Area (Figure 5.4-2; see Section 5.12 of this Exhibit A for details).
- Rehabilitation of and energy upgrades to Newhalem lodging facilities, including apartments, houses, bunkhouses and hotel.

  This project will provide additional power sources, energy efficiencies (e.g., insulation), and improved privacy (e.g., adding bathrooms to reach 1:1 ratio) and increase heating and air conditioning.

Under consideration; not part of the Proposed Action, rather, included for informational purposes only:

- Rehabilitation and upgrades to Currier Hall.

  This project will renovate the existing kitchen and restroom areas as well as upgrading the overall finish.
- Renovations and upgrades as needed to repurpose unoccupied facilities.

Figure 5.4-2. Lineman's Warehouse location.

Diablo is about six miles north of Newhalem and one mile off SR 20. Diablo Powerhouse and Switchyard are in the middle of the town (Figure 2.0-1), dividing it into two sections—one known as Hollywood and the other as Reflector Bar (Figure 5.4-3). City Light owns the Hollywood area, which is primarily residential, consisting of 23 houses, nearly all built in the 1950s. It also includes a firehouse and Ross Lodge, a restored historic building that is used by City Light and available to NPS and NCI for meetings and small conferences. In addition, there are two NPS trailheads in the Hollywood area; one for Sourdough Mountain and the other for Stetattle Creek. Wastewater treatment for the Hollywood area is provided by a large onsite septic system.

Reflector Bar is located on federal lands managed by NPS. Reflector Bar formerly had 12 houses, also built in the 1950s, but these were removed in 2022 because they were in poor condition and no longer needed. The land in the housing area is being restored to native habitat in coordination with NPS. Remaining structures in Reflector Bar include a warehouse, several buildings used for administrative and maintenance purposes, and a water tower. An incline lift, which was used to carry workers, visitors, and train cars full of equipment from Diablo up the steep slope to the elevation of Diablo Lake, is immediately adjacent to Reflector Bar and is no longer operable. Wastewater treatment for Reflector Bar is provided by an onsite septic system.

Figure 5.4-3. Reflector Bar area of Diablo, circa 1935 and circa 2015.

Like Newhalem, Diablo is a historic town with multiple major maintenance/rehabilitation/upgrade projects planned over the new license period, including the following:

<u>Proposed as part of the Proposed Action:</u>

- Replacement of the Diablo water tower.

  Based on a Tank Industry Consultants' inspection report from January 2010, City Light proposes to replace the Diablo water tower unless a cost benefit analysis concludes tank rehabilitation is the preferred option. Replacement (or major refurbishment) will be a significant project requiring an extended modification to the town water supply and temporary provision of fire-fighting capacity. The 50,000-gallon elevated riveted steel tank in the town of Diablo was erected in mid 1930s and last painted (interior and exterior) in the 1970s. Several significant defects were noted in the last condition report and replacement is anticipated to be

the least impactful and most efficient action to ensure reliable and sanitary operations. As part of the replacement project, City Light will conduct consultation under the National Historic Preservation Act (NHPA) regarding the replacement structure.

- Replacement of the water main. *(same details as for Newhalem project above)*
- Rehabilitation of existing houses in the Hollywood area, as needed. *(same details as for Newhalem project above)*
- Make-safe stabilization of the Diablo Incline Lift.

  This project will reduce the potential energy hazard associated with the lift and counter-weight and other hazards to the public.

Under consideration; not part of the Proposed Action, rather, included for informational purposes only:

- Demolition of the garages near Sourdough Trailhead.
- Rehabilitation, decommissioning, or modifications to the Diablo Incline Lift.

  The incline lift is not fit or safe to be operated. Once an operational decision is made the lift will either be permanently decommissioned or put back into service.
- Rehabilitation/upgrades to the Reflector Bar buildings used for administrative purposes (Commissary/Community Hall/Post Office/First Aid Station, and Incline Lift Waiting Station).

5.5 Transmission

The Project Boundary includes 312.93 circuit miles of primary transmission lines connecting the Project to the bulk electrical grid (see Exhibit G, map pages G-2 through G-37, and G-39 through G-56 for location). The lines terminate at Bothell Substation, just north of Seattle, in Snohomish County; the substation is located partially within the Project Boundary (see Exhibit G, map page G-2 for location). The other substation associated with the lines is North Mountain, outside of the town of Darrington, which is jointly owned by City Light and Snohomish Public Utility District and began operations in 1991. This substation gives City Light the ability to interconnect with other utilities to balance regional supply and demand, if needed. The North Mountain Substation is not a Project facility and is not within the current Project Boundary. City Light is proposing to adjust the Project Boundary to include a spur and point of interconnection at the North Mountain Substation. (see Exhibit G, map page G-27 for location).

The Project transmission lines are primarily on double-circuit steel lattice towers, although a few towers have been replaced with monopoles. From Ross Powerhouse to Bothell Substation, the ROW is approximately 100 miles long and ranges from 150 to 400 feet wide. The various components of this system are described below and shown in the single-line diagram included with Exhibit F of this FLA (F-14 through F-19).

- From Ross Powerhouse, two 230-kV transmission lines (R1 and R2) run for 3.84 and 3.78 miles, respectively, along the west side of Diablo Lake, down the hillside past Diablo Dam to Diablo Switchyard (see Exhibit G, map pages G-55 and G-56 for location).
- The 230-kV Diablo Switchyard is adjacent to Diablo Powerhouse and serves to connect the Ross, Diablo, and Gorge developments into the Skagit transmission system (Figure 5.5-1). The

R1 and R2 lines from Ross terminate at the switchyard (see Exhibit G, map page G-55 for location).

- From Diablo Switchyard, one 230-kV line (D4) runs for 5.81 miles and terminates at Gorge Switchyard, located just across the river from Gorge Powerhouse (see Exhibit G, map pages G-52 through G-55 for location). The other three lines (D1, D2, and D3) run 87.58, 87.61, and 87.54 miles, respectively, to the Bothell Switching Substation (see Exhibit G, map pages G-2 through G-37, and G-39 through G-55 for location).
- From the Gorge Switchyard, a single 230-kV line (GO-NM) runs 36.77 miles to the North Mountain Substation (see Exhibit G, map pages G-27 through G-37, and G-39 through G-52 for location).

Figure 5.5-1. Diablo switchyard.

From Gorge Switchyard to North Mountain Substation, the D1, D2, D3, and GO-NM lines are mostly within the same ROW, although there are a few sections where the ROW splits, with two lines in each, due to topographical constraints.

5.6 Appurtenant Facilities

The Project includes a diverse array of appurtenant facilities, many of which are associated with the powerhouses, dams, and Newhalem and Diablo towns and described in Sections 5.1-5.5 and 5.7-5.9 in this Exhibit A. Each powerhouse has a control room, storage areas, and shop space. Other notable accessory equipment at each development is described below.

5.6.1 Ross Development

The Ross Plant has two main transformer banks, each with three single-phase 90 megavolt-amperes (MVA) transformers with ratios of 13.8-kV to 242-kV, and manufactured by ABB. One main bank connects the 13.8-kV generator Bus 1 to the 230kV Ross #1 transmission line. The second connects the 13.8-kV generator Bus 2 to the 230-kV Ross #2 transmission line. There is no tie between the two 13.8-kV generator buses. Fire protection for the transformer banks is a water deluge system.

Both transformer banks are forced-oil cooled with forced-water cooling of the circulating oil (OFWF). The transformer banks are on a concrete deck over the tailrace and tied into a transformer

oil containment system. This system consists of a 10-inch wall that surrounds the entire deck and a series of pipes that connect each transformer to an oil containment sump. The spare transformer, which is stored at the side of the powerhouse, has its own concrete containment sump.

There are three station service banks at Ross Powerhouse. One bank, 3.75/5 MVA is fed directly from the 13.8-kV generator Bus 1 to the 4.16-kV station service bus. A second bank, 5 MVA, is fed directly from the 13.8 kV generator Bus 2 to the 4.16-kV station service bus. A third bank, 3 MVA, ties the station service bus to the 26-kV tie line to Diablo station service, providing alternative power supplies to both the Ross and Diablo plants. Emergency back-up power to the Ross Plant is provided by a diesel fuel generator.

The Ross generators are enclosed and ventilated with water-cooled forced air. They also have a carbon dioxide fire protection system. Draft tubes from each generating unit collect water and drain into one of the three sumps equipped with skimmers to remove any oil before the water is discharged to the tailrace.

Ross Powerhouse has three cranes in service: a 340-ton rotor crane, 170-ton service crane, and a 60-ton semi-gantry crane. The two larger cranes are inside the powerhouse and were manufactured by Star Corporation; both are top-running bridge cranes with variable speeds and lift distances of 77 feet. The 340-ton crane has two main hooks, each with a lift capacity of 170 tons; there is a single auxiliary hook with a capacity of 30 tons. The 170-ton crane has a main hook and an auxiliary hook with capacities of 170 and 20 tons, respectively. The top running semi-gantry crane is for use on the turbine shut-off valves and was manufactured by Judson Pacific-Murphy Corporation. It is an outdoor crane with a capacity of 60 tons and a lift distance of 50 feet.

5.6.2 Diablo Development

There are two main transformer banks at the Diablo Plant, each consisting of three single-phase 60/80/100 MVA transformers with ratios of 13.8-kV to 242-kV and manufactured by Coemsa Ansaldo. Both banks connect to the Diablo Ring Bus along with Ross #1 and Ross #2 transmission lines and the four Diablo transmission lines. There is no tie between the two 13.8-kV generator buses. Fire protection for the transformer banks is a water deluge system.

Both transformer banks are oil cooled with natural air or forced air cooling of the circulating oil (ONAN/ONAF1/ONAF2). The transformer banks are in front of the powerhouse, on a concrete deck over the tailrace. The deck is surrounded by a curb and there is a corrugated metal wall on the downstream side to prevent any oil from entering the tailrace. Any oil, deluge water and storm water within the curbing drains to an oil water separator located under the parking area near the northwest corner of the powerhouse.

House Units 35 and 36 power the Diablo 2.4 kV station service bus directly, which is also connected through an outdoor 3 MVA, dry type, 3-phase transformer bank to a 26 kV tie line from Ross Powerhouse. The overhead tie line is 3.5 miles long, 4/0, aluminum-conductor steel-reinforced cable (ACSR). At Ross Powerhouse the 26 kV tie line is transferred to the station service 4.16 kV bus via a 3 MVA transformer bank. This enables the Diablo house units to supply power to both the Ross and Diablo station service systems. Ross Powerhouse can also supply the Diablo station service system, as necessary. Emergency back-up power to the Diablo Plant is provided by a diesel fuel generator.

The two main Diablo generators are totally enclosed and ventilated with water-cooled forced air (TEWAC). The two small house units are open-frame and air-cooled. Fire protection for the main generators is provided by a Vortex Hybrid fire protection system (water mist and nitrogen gas). Oil containment in the powerhouse is accomplished with floor drains that connect to an oil-separating sump adjacent to the main sump.

Diablo Powerhouse has a P&H crane manufactured by Harnischfeger Corporation with a main capacity of 300 tons and an auxiliary capacity of 25 tons. The two main hooks each have a capacity of 150 tons and a lift distance of 49 feet. The two auxiliary hooks have a capacity of 25 tons each and a lift distance of 70 feet. The bridge speed is < 1 miles per hour at full load.

5.6.3 Gorge Development

The Gorge Plant has one bank of three single-phase, 21/28/35 MVA step-up transformers that serves the three older generators (Units 21, 22, and 23) and has a step-up transformer ratio of 11-kV to 242-kV. Another bank of three single phase, 21/28/35 MVA transformers serves the newer Unit 24 and also has a transformer ratio of 11-kV to 242-kV. The transformers were all manufactured by the Hico Hysung Corporation. Fire protection for the transformer banks is a water deluge system.

The Gorge transformer banks are on a concrete deck over the tailrace for Unit 24. Both transformer banks are oil cooled with natural air or forced air cooling of the circulating oil (ONAN/ONAF1/ONAF2). Each transformer bank drains to a central sump located beneath the transformer deck. Under normal conditions storm water entering the sump flows through the outlet pipe near the bottom of the sump. There is a butterfly valve on the outlet pipe that is held open with compressed air. When the oil sensor in the sump detects oil, the flow of air is shut off and the valve closes.

Station service from the Gorge Plant supplies power to the town of Newhalem as well as the powerhouse. Two 3-MVA transformer banks tie the 11-kV generator bus of the three older units to the 7.2-kV station service and local distribution system bus. These two banks are outside the powerhouse, on the right side (facing upstream), and surrounded by fencing. The concrete pads beneath the transformers drain to a lined, gravel-filled sump. The sump drains to a manhole equipped with an oil stop valve.

The Gorge generators are totally enclosed and ventilated with water-cooled forced air (TEWAC). They also have a carbon dioxide fire protection system. For oil containment within the powerhouse, floor drains connect to either the old powerhouse sump (located near Unit 23) or the new powerhouse sump (located near Unit 24). The old sump drains into the new sump. This sump is equipped with an oil detection sensor and oil skimmer.

Gorge Powerhouse has two cranes. The Shaw Crane, manufactured by Manning, Maxwell & Moore, Inc., was installed in 1922. It has a main hoist with a 150-ton capacity and a lift distance of 50 feet. The auxiliary hoist has a capacity of 15 tons and a lift distance of 55 feet. The bridge speed is 100 ft/minute with a full load. The Cyclops Crane was manufactured by the Cyclops Iron Works and installed in the powerhouse addition for Unit 24 in approximately 1951. Capacities of the main and auxiliary hoists are 150 and 15 tons, respectively; list distances are 50 feet and 55 feet, respectively. The bridge speed is approximately 125 ft/minute at full load.

5.7 Transportation Infrastructure

Current transportation infrastructure at the Project includes roads, facilities, and helipads. The marine facilities and helipads are displayed in Figure 5.7-1. The railway that was constructed for the Project was dismantled in 1954. The incline lift that carried rail cars, equipment, and personnel from Diablo (Reflector Bar) up the hillside to Diablo Lake still exists but is not currently functional.

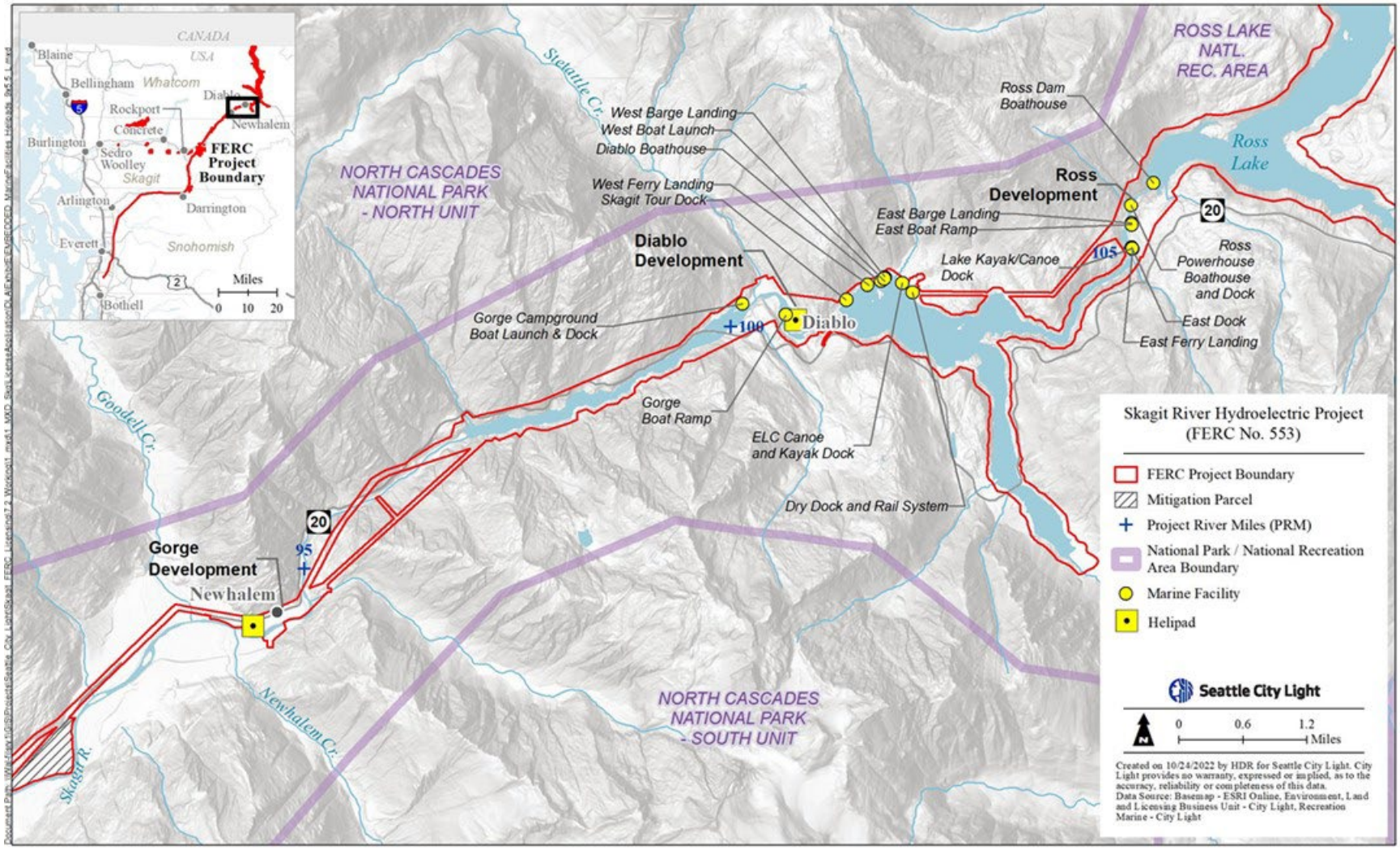

Figure 5.7-1. Helipads and marine facilities for the Skagit River Project.

5.7.1 Access Routes

The three Project developments were accessible only by rail until the early 1940s when the USFS constructed a dirt road to Newhalem. City Light gradually improved the road starting in 1954 and eventually extended it to Diablo. Today, the main Project access is via SR 20, the northern-most, cross-state highway, which was completed in 1972. This road, which is maintained by the Washington State Department of Transportation (WSDOT), is closed in the winter (usually from November through mid-April) on both the west and east sides of the Cascades due to heavy snow and avalanches. The typical closure site on the west side is at the trailhead to Ross Lake (MP 134), but there are also gates at the bridge over Thunder Arm and at Newhalem. In most years, avalanches result in temporary closure of the section of highway between Newhalem and Diablo at least once or twice.

The only vehicle access to the north end of Ross Lake is via the Silver-Skagit Road, a gravel road which starts in Hope, British Columbia, and extends for approximately 40 miles until it terminates at the U.S.-Canada border. The Silver-Skagit Road provides access to recreational facilities in Skagit Valley Provincial Park and transitions into an unnamed road network at Hozomeen within the RLNRA which is used by recreationists, the NPS, and City Light crews. The Silver-Skagit Road is closed from November through April of each year. Flooding in 2021 destroyed large sections of this road and it was closed to the public through 2023 with the scheduled repairs to occur in 2023.

Most of the roads associated with the generation facilities and townsites were constructed and are maintained by City Light. These include the following:

- All roads within the towns of Newhalem and Diablo (paved);
- The roads to Gorge Powerhouse (paved, gated) and Dam (gravel/dirt surface, gated) from SR 20;
- Diablo Dam Road (paved, gated but open for public access 7 a.m. – 4 p.m.) from SR 20 to the ELC;
- A short spur road from Diablo Dam Road to the Diablo Lake shoreline west of Sourdough Creek (gravel);
- A spur road from Diablo Dam Road to the top of the Incline Lift (paved);
- The road to Babcock Communications Tower (gravel/dirt surface, gated) from SR 20;
- The road from Ross Powerhouse to Ross Lake (aka the "Ross Haul Road," gravel surface) and associated tunnel;
- Two spur roads off the road to Ross Lake – one to a ferry landing and the other to Ross Dam (gravel surfaces); and
- Road from SR 20 to the Aggregate Storage Facility near the Newhalem Ponds (aka "Agg Ponds") and associated spur roads to ponds and river (gravel/dirt surface, gated).

Although City Light uses all these roads for Project operations, most are also used by other parties, including recreationists and NPS and NCI staff. Diablo Dam Road and portions of the Ross Haul Road, in particular, receive substantial use by Ross Lake Resort and the public to access water-

based recreation and NPS trailheads. Babcock Creek Road, in addition to providing access to City Light microwave and radio systems, is also used by five other entities with communication equipment on Babcock ridge. City Light also constructed and maintains some roads to access the transmission lines.

City Light conducted a roads and trails ("routes") inventory in 2022 and 2023 to review and document all routes used to access the Project, including those through the transmission line ROW. As part of this effort, City Light distinguished between routes considered "Project Routes" (maintained by City Light and exclusively used by City Light for Project purposes), and "Non-Project Routes" (may or may not be maintained by City Light and not exclusively used by City Light [i.e., shared use]). The detailed information gathered as part of the inventory is presented in Exhibit E, Section 4.2.6 of this FLA.

As part of the Proposed Action, City Light proposes Project Boundary adjustments to include all Project routes not already contained within the current Project Boundary (see Exhibit G, map pages throughout, for locations).

Several major rehabilitation/replacement/upgrades are anticipated for Project roads and bridges over the new license period. Projects proposed as part of the Proposed Action include:

- Replacements and repairs to Diablo roads and associated storm water upgrades.

  The roadways in Newhalem are in various levels of disrepair and require resurfacing, full depth repair or reconstruction, and storm drainage improvements. Ladder Creek Lane is failing and drains directly into the Skagit River and other roads and parking areas are gravel creating large amounts of dust in the summer.

- Reconstruction of Newhalem townsite roads.

  This project will repair and maintain the 70-year-old asphalt roadways in the Diablo area. Depending on evaluations it may include resurfacing, full depth repair and reconstruction, storm drainage improvements and safety and pedestrian improvements.

- Upgrades to, repairs of, and painting of bridges as needed, including the Ladder Creek pedestrian bridge and the bridges over Happy Creek, Stetattle Creek, Windy Gap, and Olsen Creek.

- Reconstruction of the road between Diablo Dam and the ELC and improvements for pedestrian safety.

  This project will reconstruct the roadway from the Diablo Dam to the ELC to maintain the integrity of the roadway. It will likely include stormwater management and pedestrian upgrades.

- Installation of an appropriately-sized, vented ford at Sourdough Creek.

  The current vented ford is insufficient for water passage from Sourdough Creek. Sourdough Creek passes more water and debris than when the previous vented ford was designed and implemented. A fluvial geomorphology study will need to be conducted to determine the correct size of this water crossing. The water crossing will be designed for both the size and large woody debris that are currently observed, but at a minimum will be designed to current design guidelines by the resource agencies.

- Installation of new abutments and approaches to the bridge over Babcock Creek.

  The existing bridge is a prefabricated structure erected on temporary abutments after a flood took out the original culvert crossing. The bridge accesses a critical communication tower. This project would be to build permanent bridge approaches and abutments and re-use the existing prefabricated bridge structure and deck.

5.7.2 Helipads

There are two helipads at the Project—one in Newhalem and the other on Reflector Bar in Diablo (Figure 5.7-1, and see Exhibit G, map pages G-52 and G-55). The Newhalem helipad is used by a contractor to conduct a survey in late March-early April of snowpack depth and water content at the remote snow telemetry (SNOTEL) stations. During times when SR 20 is closed at Newhalem, helicopters shuttle staff and supplies from Newhalem to Diablo where they can then be transported to Ross Lake or other upriver facilities as needed. There is also a designated helicopter landing area in a cleared area near Ross Dam, but minor modifications will be needed to make this site usable for emergencies. City Light is considering a project under the new license to grade the existing area near Ross Dam to meet Federal Aviation Administration requirements for landing areas. This is not being proposed as part of the Proposed Action, rather, is included for informational purposes only.

5.7.3 Marine Facilities

Given the relatively limited vehicle access to the Project reservoirs, a variety of boats and associated docks, landings and storage structures/areas are required to support generation operations. The locations of marine facilities are shown in Figure 5.7-1 (and Exhibit G, map pages G-55 through G-57).

The bulk of City Light marine facilities are located on Diablo Lake because it is the primary means of accessing the Ross Development. All materials, vehicles, and staff needed at Ross Powerhouse or Dam travel by boat. In addition, the current Project license requires that City Light provide a ferry service for public access to Ross Lake. The marine facilities on Diablo Lake are clustered in two locations (Figure 5.7-1):

- North shoreline at the west end of Diablo Lake and accessed by Diablo Dam Road:
  - Skagit Tour Dock – Used to support public boat tours of Diablo Lake offered by City Light during the summer months.
  - West Ferry Landing – Provides public access via a ferry to the east end of Diablo Lake, typically from mid-June through October.
  - Diablo Boathouse – Provides covered slips and dock moorage for City Light's boats on Diablo Lake which include one to three tugboats, two crew boats, a ferry boat, and a tour boat. This structure also contains the offices for the boat crews and space for maintenance and storage. There is also an adjacent fueling dock that is scheduled for replacement in 2023 and 2024, which has been approved by FERC under the current license.
  - West Barge Landing – Used to load and unload barges of materials going to/from Ross Powerhouse and Dam. A project to reconfigure the West Barge Landing to better accommodate the flexifloat barge is under consideration for the new license period. It is

not proposed as part of the Proposed Action, rather, is included for informational purposes only.

- West Boat Launch – Used to launch and take out smaller boats. There are plans under consideration to extend this ramp to facilitate launching of larger boats; it would be combined with the work on the West Barge Landing and also address parking lot drainage issues. It is not proposed as part of the Proposed Action, rather, is included for informational purposes only.
- ELC Canoe and Kayak Dock – For the exclusive use of ELC program participants.
- Dry Dock and Rail System – Used to take boats out of the water for storage and maintenance. The aging shelter/storge structure was removed in 2022 due to structural deficiencies; the rails and gear box remain. Under the current license, the winch house is being reconstructed to protect the equipment. City Light proposed as part of the Proposed Action to construct a new dry dock sized to meet the largest vessel of the current fleet. Design standards will also include containment measures to prevent any site contamination.

- South shoreline at the east end of the reservoir near Ross Powerhouse:
  - Ross Powerhouse Boathouse and Dock – Provides covered storage and docking space for crew boats and a dock for the tour boat.
  - East Barge Landing – Terminus/return of materials and equipment arriving by barge.
  - East Boat Ramp – Used to get smaller, trailered boats on and off Diablo Lake and to/from Ross Lake.
  - East Ferry Landing – Loading/unloading dock for visitors travelling to and from Ross Lake. Visitors can walk to/from the reservoir or be transported via a shuttle run by Ross Lake Resort, which is privately-owned and operated under a NPS Concession Contract. The resort provides the only lodging on Ross Lake.
  - Lake Kayak/Canoe Dock – Next to the Ferry Dock; used mostly by visitors needing to shuttle non-motorized craft to Ross Lake.
  - East Dock – Built by City Light for NPS to temporarily moor small boats used to patrol Diablo Lake.

Other marine facilities on Diablo Lake are operated and maintained by NPS; these include a boat ramp and dock at Colonial Creek Campground and a nearby boathouse.

Access to Ross and Gorge lakes is not routinely needed by City Light staff and is generally limited to crews managing wood on these lakes, performing inspection and maintenance of the dams and appurtenances, or engaged in scientific data collection. On Gorge Lake there is a paved boat ramp and dock in Gorge Campground that is primarily used by the public. There is also a primitive boat ramp in the Reflector Bar section of Diablo that is used by City Light only if the water level in Gorge Lake is too low to use the launch at the campground.

On the southern end of Ross Lake, City Light built and maintains a boathouse on the face of the dam that floats up and down with reservoir elevation (Figure 5.7-2). This facility is accessed via a

locked gate and stairs from the top of Ross Dam. The boathouse, which is shared with NPS and U.S. Customs and Border Patrol, has two covered docks/slips and an external dock on each side. There is also a boat launch and dock on the east side of Ross Lake just upstream of Ross Dam. Use of this boat launch and dock is shared by City Light, NPS, and Ross Lake Resort. The only fueling dock on the reservoir is at Ross Lake Resort. City Light purchases fuel for its boats used on Ross Lake at this facility. NPS has a boat ramp and dock at the northern end of Ross Lake which is used by City Light when needed.

Figure 5.7-2. Ross Lake boathouse.

City Light is considering a project under the new license to replace all existing tug boats and ferries. This is not being proposed as part of the Proposed Action, rather, is included for informational purposes only.

5.8 Recreation Facilities

City Light operates and maintains a number of recreation, interpretive, and visitor service facilities at the Project, several of which are Project recreation facilities as listed below (Figure 5.8-1 and see Exhibit G, map pages G-52, G-53, and G-55 through G-57 for locations; see Exhibit E, Section 4.2.6 of this FLA for detailed descriptions of each facility):

(1) North Cascades Environmental Learning Center;

(2) Skagit Tour Dock;

(3) Diablo Dam Parking Area;

(4) West Ferry Landing;

(5) East Ferry Landing;

(6) Ross Lodge Picnic Shelter;

(7) Gorge Lake Boat Launch;

(8) Ladder Creek Falls Trail and Gardens;

(9) Trail of the Cedars;

(10) Gorge Powerhouse Visitor Gallery;

(11) Gorge Powerhouse Parking Area;

(12) Skagit Information Center and restrooms;

(13) Gorge Inn Museum;

(14) Newhalem Picnic Sites;

(15) Newhalem Parking Areas and complimentary vehicle charging station;

(16) Newhalem Interpretive Displays; and

(17) Newhalem Playgrounds.

As part of the Proposed Action, City Light proposes a Project Boundary adjustment to include the water tank associated with the ELC that is not already contained within the current Project Boundary (see Exhibit G, map page G-56 for location).

Several major maintenance/rehabilitation/upgrade projects are anticipated at City Light recreation facilities over the new license period. The recreation facility measures proposed as part of the Proposed Action include: general visitor information and education signage improvements; accessibility improvements; parking area re-organization, improvements and expansions; installation of permanent restroom facilities at select facilities; and general rehabilitation of existing facilities. Exhibit E, Section 4.2.6.3, of this FLA provides additional information on the proposed measures.

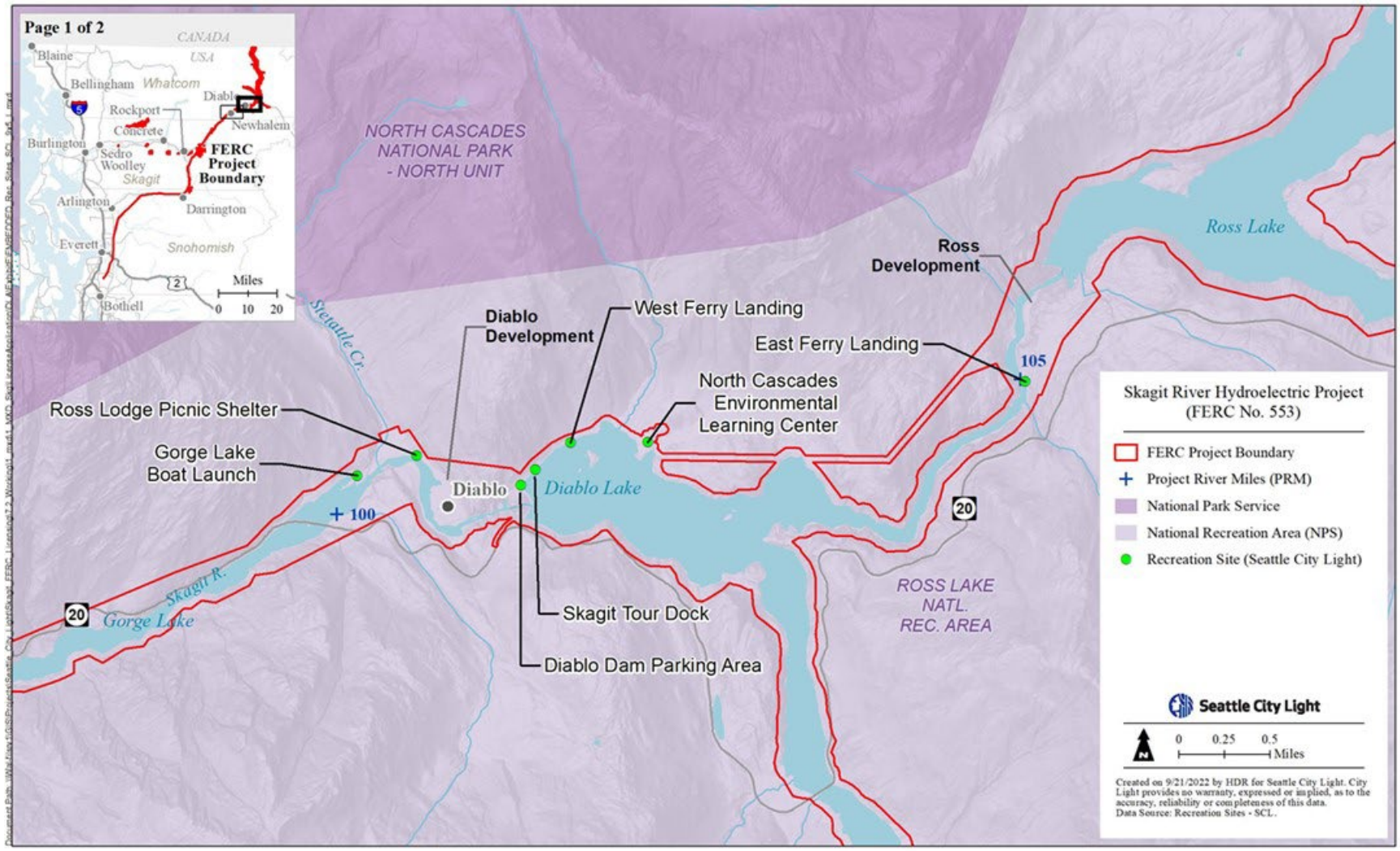

Figure 5.8-1. City Light recreation facilities of the Skagit River Project (page 1 of 2).

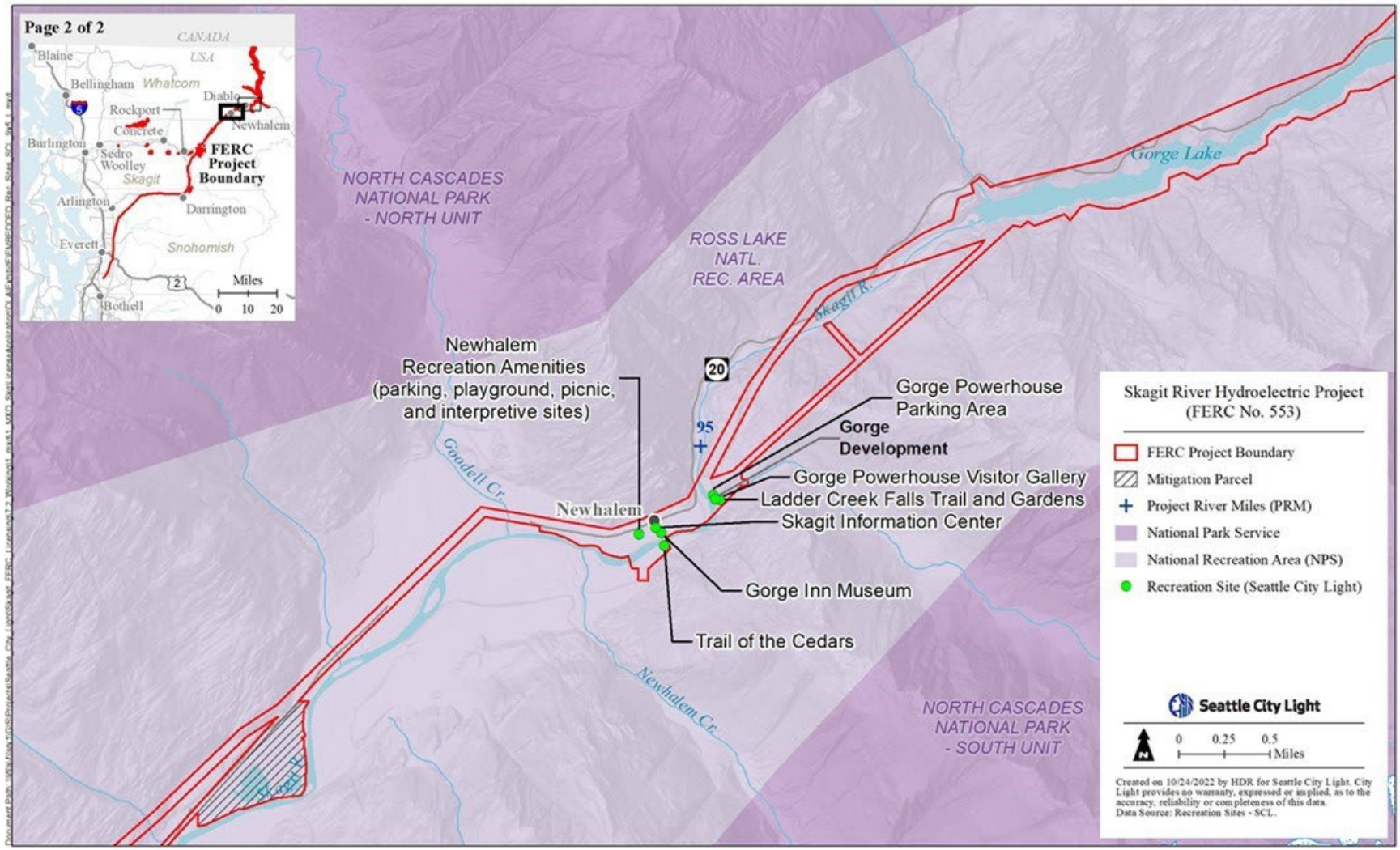

Figure 5.8-1. City Light recreation facilities of the Skagit River Project (page 2 of 2).

5.9 Other Facilities

City Light owns and/or maintains a number of other auxiliary facilities, including:

- A trailer/bunkhouse and storage building at Hozomeen Camp at the northern end of Ross Lake and a lake access point used for operational purposes (see Exhibit G, map page G-61 for location);
- A primitive boat ramp on the Skagit River near Newhalem Ponds, just south of Newhalem (see Exhibit G, map pages G-50 and G-51 for location);
- A storage yard for aggregate materials, including wood, rock, and soil near Newhalem Ponds, just south of Newhalem (Aggregate Storage Facility)(see Exhibit G, map page G-51 for location);
- The Happy Creek Diversion, which diverts Happy Creek into Ross Lake from its original outfall downstream of Ross Powerhouse (see Exhibit G, map pages G-56 and G-57 for location);
- The Babcock Communications Site, which consists of a shelter and 120-foot-tall communications tower on Babcock ridge. City Light facilities at this site include: a portion of a microwave link to Seattle (Newhalem-Babcock-Segelsen-Eagle Ridge-Bothell); a repeater site for an 800-megahertz (MHz) radio system; and a remote base site for a 37-MHz radio system. Non-Project facilities at this site include: Whatcom County Sheriff's Office UHF repeater; Skagit County Fire and HEAR VHF remote base; WSDOT 700/800 MHz repeaters; Verizon Wireless cell equipment (shelter and stand-by generator); and AT&T mobility cell equipment (located on the roof of City Light's shelter). Both cell carriers have panel and microwave antennas mounted on City Light's tower. A fiber optic cable from the Babcock Communication Tower to Newhalem is mounted on the distribution lines that provide power to the site. As part of the Proposed Action, City Light proposes a Project Boundary adjustment to include the Babcock Communication Site that is not already contained within the current Project Boundary (see Exhibit G, map page G-51, for location);
- Various other communication and fiber optic cables mounted on transmission line towers and/or distribution poles or underwater;
- Stream gages to measure inflows to Ross Lake and Diablo Lake and flows in the Skagit River downstream of the Project (see Exhibit G, map pages G-45, G-47, G-52, and G-55 through G-59, for locations). Under an agreement with City Light, USGS installed and maintains eight gages in the U.S. The gages for Ross Lake are on Big Beaver and Ruby creeks; the Diablo gage is on Thunder Creek. The downstream gages are on the Skagit River at Newhalem, near the bridge to Trail of the Cedars; Newhalem Creek, upstream of the diversion for the Newhalem Creek Hydroelectric Project; Bacon Creek below Oakes Creek; the Cascade River at Marblemount; and the Skagit River at Marblemount, just upstream of the confluence with the Cascade River. Another gage was recently installed on the Skagit River several miles upstream of Ross Lake in British Columbia. It is maintained by Environment and Climate Change Canada under an agreement with City Light; and
- Various survey station pedestals and associated structures on and near the dams.

New fiber optic cables and upgrades to other communication equipment are anticipated over the course of the new license to improve safety or meet new industry standards. In addition, new emergency sirens will be installed at Colonial Creek Campground and in the Gorge bypass reach (see Exhibit H, Section 3.1.4, of this FLA for details), which are proposed as part of the Proposed Action. Stream gages will continue to be maintained and others may be installed, as needed.

5.10 Off-channel Fish Habitat Sites

Under Article 401 of the current Project license, City Light developed six sites to provide off-channel spawning and rearing habitat for Chum Salmon (Figure 5.10-1). These include:

- Newhalem Ponds and County Line Ponds – Originally formed in two areas along the river south of Newhalem that were used to mine gravel for Project construction. City Light ensures that the connections between the ponds and the river are maintained at both sites (see Exhibit G, map pages G-50 and G-51 for location).
- Park Slough – Originally developed by the Department of Fisheries on land managed by NPS and maintained by NPS (see Exhibit G, map page G-51 for location).
- Taylor Spawning Channel – Developed on USFS property upstream of the town of Marblemount (see Exhibit G, map pages G-45 and G-46 for location).
- Powerline Spawning Channel – Developed within the transmission line ROW on the City Light's Illabot North wildlife mitigation parcel (see Exhibit G, map page G-42 for location).
- Illabot Spawning Channel – Developed on City Light's Illabot North wildlife mitigation parcel about one-quarter mile downstream of the Powerline Spawning Channel (see Exhibit G, map page G-42 for location).

City Light plans to continue maintaining these sites over the new license period. As such, as part of the Proposed Action, City Light proposes a Project Boundary adjustment to include the two sites, Park Slough and Taylor Spawning Channel, that are not already contained within the current Project Boundary. Exhibit E, Section 4.2.3.3, of this FLA provides additional information on the proposed measures.

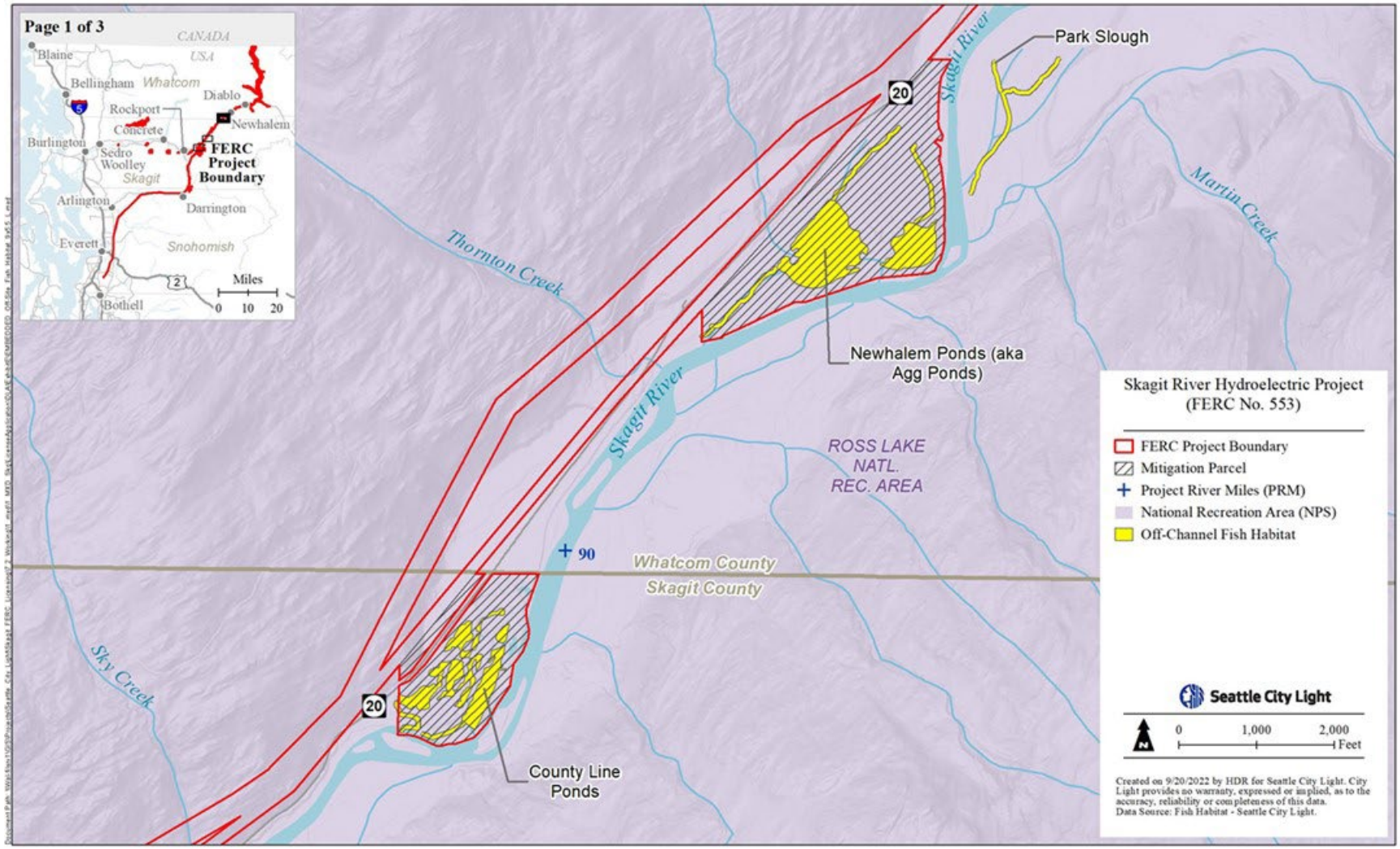

Figure 5.10-1. Off-site fish habitat sites of the Skagit River Project (page 1 of 3).

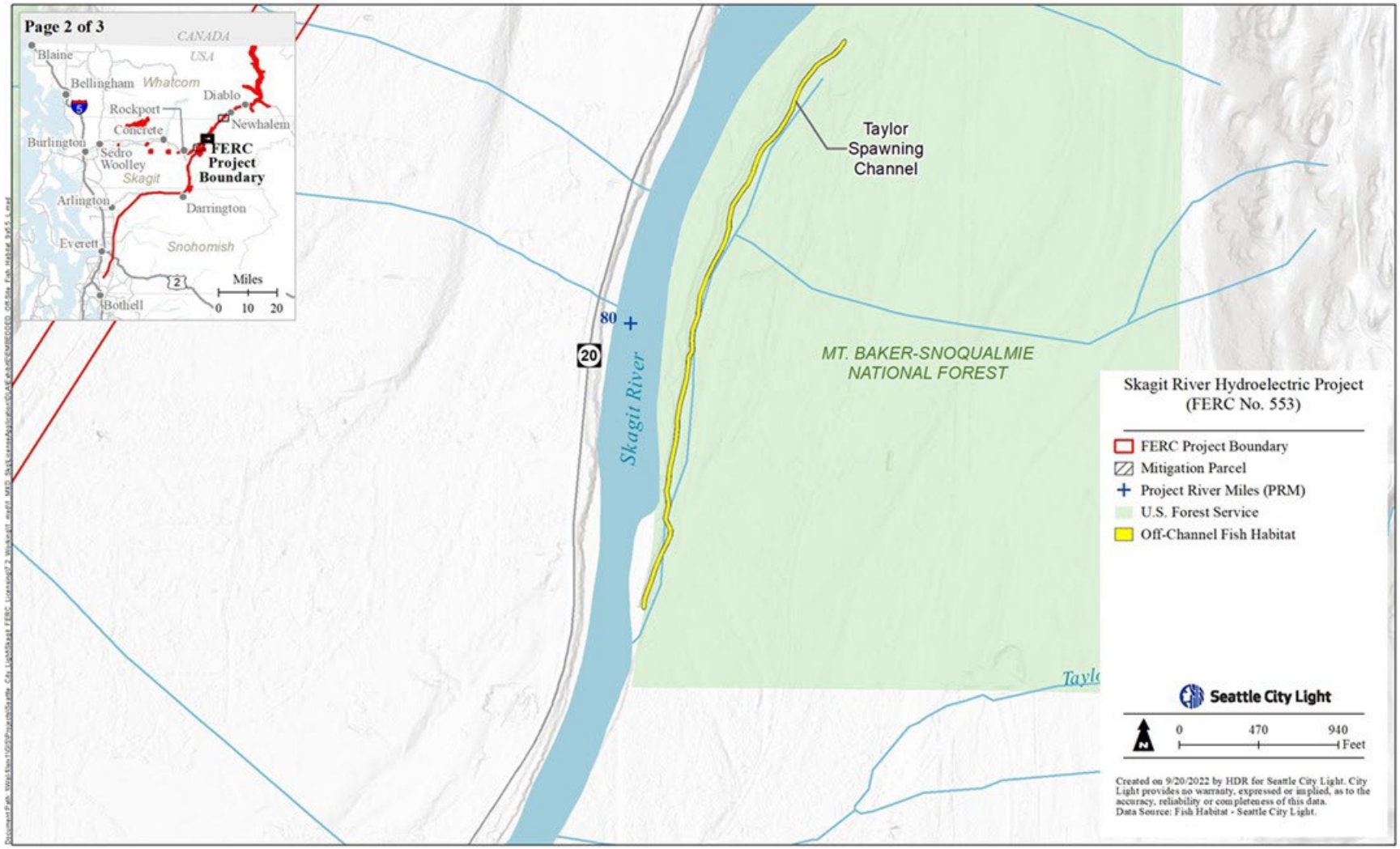

Figure 5.10-1. Off-site fish habitat sites of the Skagit River Project (page 2 of 3).

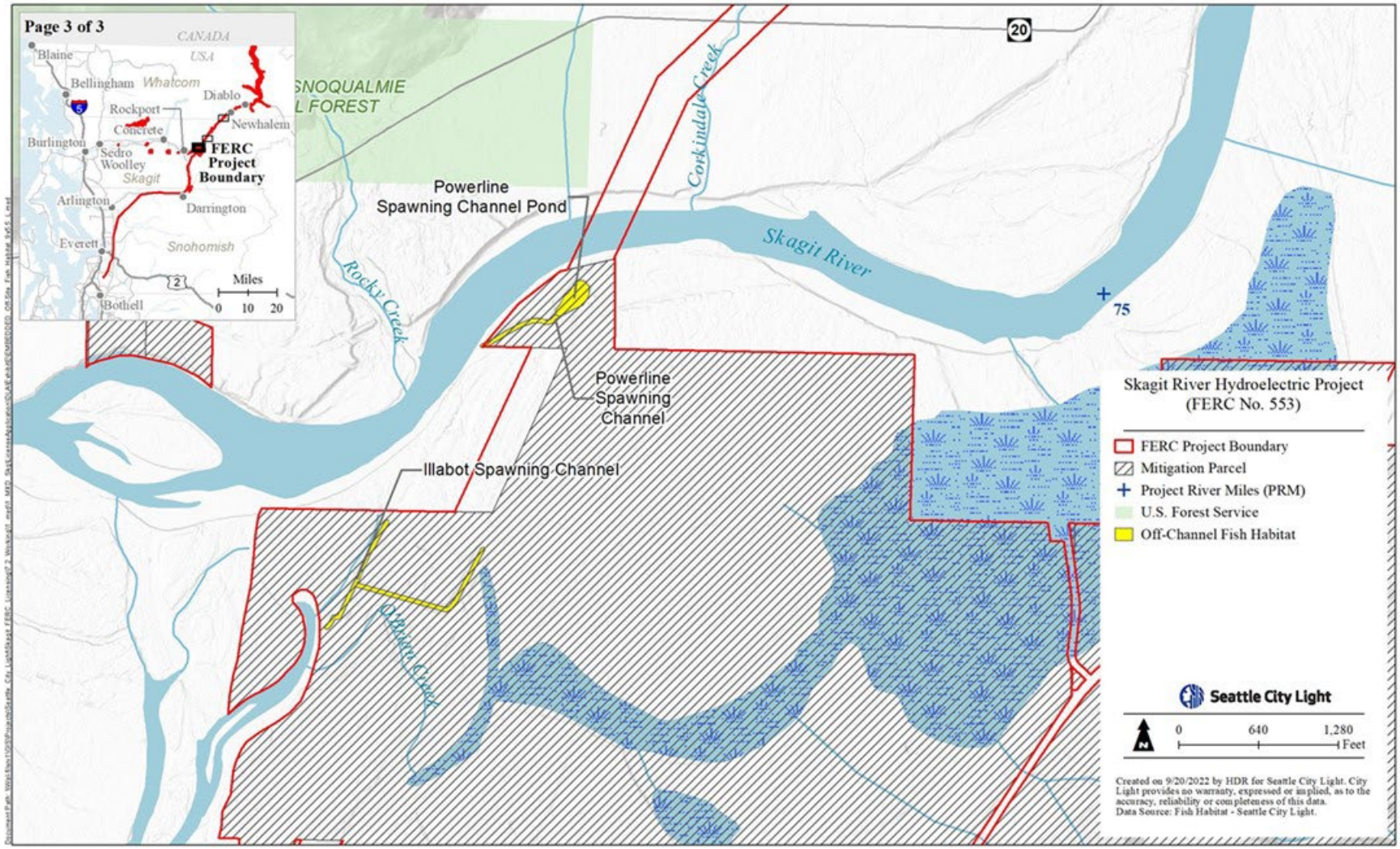

Figure 5.10-1. Off-site fish habitat sites of the Skagit River Project (page 3 of 3)

5.11 Fish and Wildlife Mitigation Lands

City Light owns multiple parcels of lands in the Skagit, Sauk, and South Fork Nooksack watersheds managed for wildlife and fish habitat (including for benefit of tribal resources), totaling approximately 10,804 acres (Table 5.11-1). All the fish and wildlife mitigation lands are within the current Project Boundary (Figure 5.11-1, and see Exhibit G, map pages G-29 through G-31, G-38 through G-44, G-46 through G-48, G-50, G-51, and G-62 through G-64 for locations) and City Light plans to continue to manage these lands under the new license for habitat values.[10]

Table 5.11-1. Skagit River Project fish and wildlife mitigation lands.

Property Name	Fish or Wildlife Program	Acres
North Sauk	Wildlife	45.6
Dan Creek	Wildlife	42.1
Everett Creek	Wildlife	38.5
North Everett Creek	Wildlife	173.8
Sauk Island	Wildlife	21.3
Nooksack – Main	Wildlife	3,627.4
Nooksack West	Wildlife	388.9
Nooksack – Olivine Ends	Wildlife	226.7
Bear Lake	Wildlife	154.9
Savage Slough[1]	Fish and Wildlife	211.1
Pressentin	Wildlife	637.0
Finney Creek	Wildlife	641.5
McLeod Slough	Wildlife	126.0
Napoleon Slough	Wildlife	61.6
False Lucas Slough	Wildlife	203.6
Barnaby Slough	Wildlife	225.5
O'Brien Slough	Wildlife	47.2
Illabot North	Wildlife	725.9
Illabot South	Wildlife	2,521.8
South Marble 40	Wildlife	41.1
B&W Road 2	Wildlife	10.9
B&W Road 1	Wildlife	79.4
Bacon Creek	Wildlife	118.8
Corkindale Creek	Wildlife	142.6
County Line Ponds	Fish	56.3
Newhalem Ponds	Fish	111.1 [1]
Bogert and Tam	Fish	16.9
Johnson Slough	Fish	67.5
Day Creek Slough	Fish	38.4
	Total:	**10,803.4**

1 Acreage includes approximately 4-acre storage area that is dedicated to Project operations.

[10] In 2020, City Light amended the Project Boundary to include additional fish and wildlife mitigation lands that were recently acquired under ongoing implementation of the current license (April 1, 2020 request to amend Exhibit K, as modified in its August 19, 2020 Response to FERC's May 21, 2020 Additional Information Request). Project Boundary acreage values presented herein are those approved by the February 2, 2021 Order Amending License, Approving Revised Exhibits K and M, and Revising Annual Charges (174 FERC ¶ 62,066).

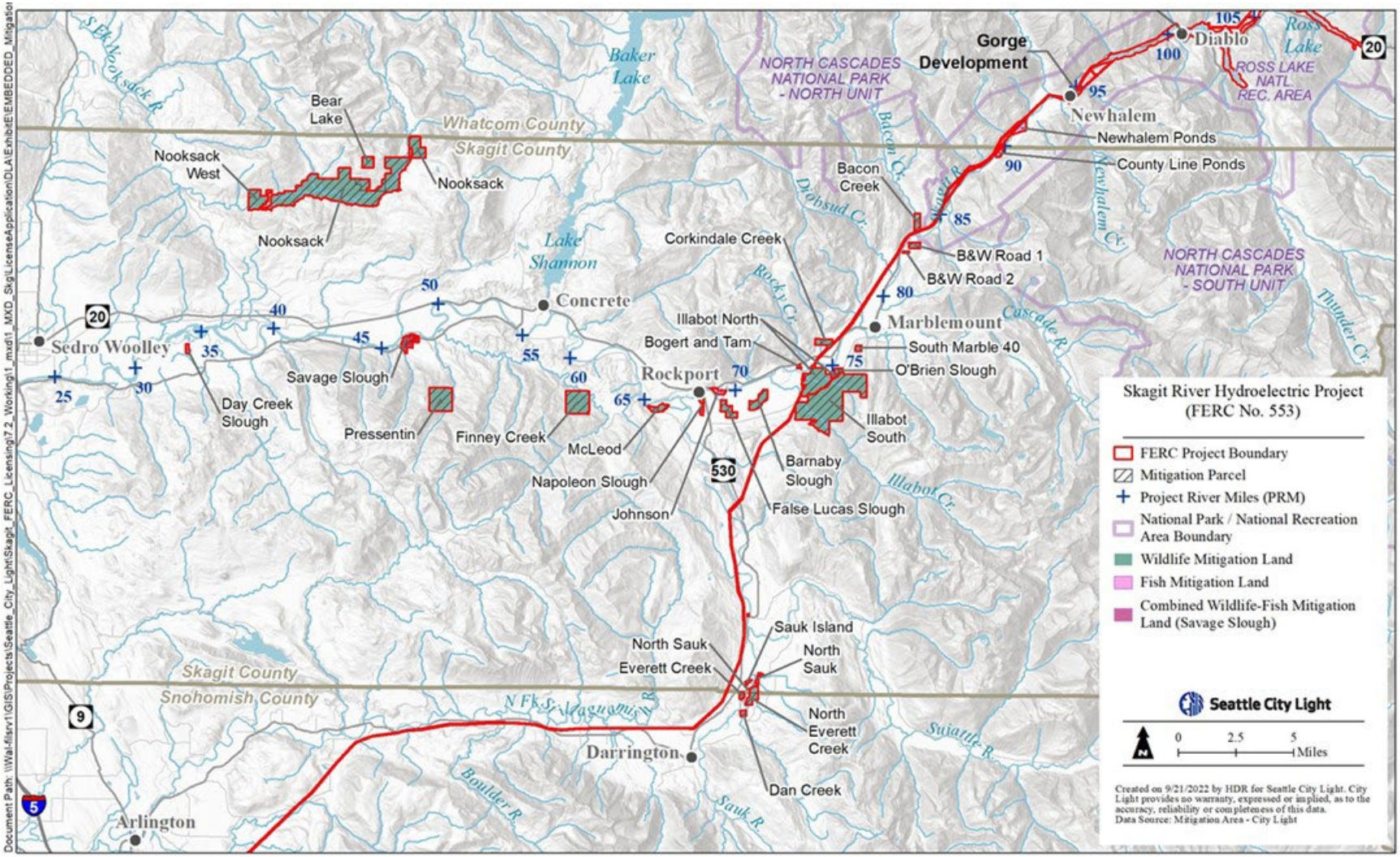

Figure 5.11-1. Fish and wildlife mitigation lands of the Skagit River Project.

5.12 Proposed New Facilities

The purpose of Skagit River Project facilities is to ensure efficient power generation operations, facilitate employee engagement, and support public visitation and education. City Light is proposing nine new facilities to be included in the new license as part of the Proposed Action. These nine proposed new facilities are intended to: (1) enhance employee/public safety; (2) improve emergency communications and response capabilities; or (3) comply with either a City of Seattle mandate or previous mitigation commitments. These include:

- Ross Powerhouse Concrete Pad for Spare Transformer – A spare transformer is currently being stored directly in front of Ross Powerhouse, which is a historic structure. In an agreement with the Washington Department of Archaeology and Historic Preservation (DAHP), City Light agreed to construct a containment pad for the transformer at a new, not yet identified, site that is away from the line of sight of the powerhouse yet still easily accessible. The project will require a new concrete pad, spill containment and possibly, a roof.
- Diablo Lake Tour Dock – The existing Diablo Lake Tour Dock for Skagit Tours is approximately 0.5-miles from the ELC, which is currently, and will likely remain, the check-in site for the Skagit Tours. Tour participants either walk along a narrow road or take a shuttle bus. This project would involve construction of a new tour dock on the shoreline of Diablo Lake near the ELC. A new dock near the ELC would improve the tour experience for the elderly and participants with disabilities by improving access and safety. The existing tour dock would be removed, and the site repurposed for NPS use, potentially for a new boathouse/dock, or otherwise restored.
- Diablo Lake Ferry Kiosk – This small structure would be installed in the parking area for the Diablo Lake Ferry to provide a place to post information on scheduled run times and other updates.
- Diablo Firehouse – This project would involve building a new firehouse, built to modern standards, outside the residential area in Hollywood. Like the Newhalem Firehouse, this facility will be critical to emergency response and fire control in the area.
- Newhalem Firehouse – This project would relocate the firehouse to an area outside the Newhalem residential area, possibly to the site of the existing Quonset Hut that currently serves as a basketball court. The new facility would be built to modern firehouse standards. The basketball court would be relocated to the Newhalem Operations Building.
- Newhalem Radio/Microwave Base Station – This project would improve 911 call transfer and fire and other emergency communications.
- Newhalem Materials Storage Area – This project would redevelop approximately 3 acres of land west of SR 20 for materials and equipment that are currently stored at the Aggregate Storage Facility south of Newhalem. Moving aggregate storage to the west side of SR 20 would protect a sensitive riparian habitat area and be closer to Newhalem operations. The area proposed for redevelopment is near WSDOT's aggregate storage yard and currently includes the sandblast building, the Lineman's Warehouse, and old garages.
- EV Charging Stations – The City of Seattle has mandated that all City departments, including City Light, transition to an all-electric fleet. Meeting this mandate will require installation of additional EV charging stations at Project facilities. While the number and locations have not

yet been determined, likely sites include the powerhouses, Newhalem Service Yard, Diablo warehouse, and Diablo Lake and Ross Powerhouse boat houses. Additional chargers for public use may be installed as well.

- Ross Lake Access Road – NPS Comments on the Draft License Application (February 27, 2023) included the following request:

  > Section 5.12 Proposed New Facilities: [C]onstructing a new access road to Ross Reservoir from State Route 20 . . . could obviate the need for additional shoreline development adjacent to Diablo Reservoir. . . Construction of an access road to Ross Reservoir could eliminate/reduce need of the crew transport vessel use to access Ross Dam and Powerhouse and the need to transport materials and equipment with a barge on Diablo Reservoir. This in turn would reduce the congestion around the Diablo marine facilities improving the visitor experience and maintaining undeveloped riparian habitat around Diablo Reservoir.

  In addition, a new access road from SR 20 to the Ross Haul Road will be required to construct and operate a fish passage facility at the Ross Development.

  In response to the NPS request, the implementation of a study is proposed to evaluate the feasibility of developing an access road suitable to serve the primary operations and maintenance access route to the Ross Development. Approximately 4-6 miles of new road (and several miles of redeveloped road) is required to be constructed from SR 20 to the Ross Haul Road, as well as major redevelopment of Ross Haul Road, reservoir access road, and road tunnel to bring those facilities up to a minimum standard for the proposed uses. A conceptual road alignment is shown in Figure 5.12-1 and a preliminary engineering memo regarding the project is provided in Appendix C of this Exhibit A.

  City Light understands that FERC maintains jurisdiction "in lands and waters within the Skagit River Hydroelectric Project, FERC Project 553." Public Law 90-544, Sec.505 as amended by Public Law 100-668, Sec. 202 dated 16 November 1988. This requested road would extend beyond the existing FERC Project Boundary and cross heavily forested RLNRA lands with significant recreational and scenic resources and values, and potentially significant cultural resources. As such, an additional study is needed prior to moving forward with the requested road.

  This study will entail the following actions:

  - NHPA Section 106 and cultural resources consultations;
  - Evaluate potential impairment to scenic and wilderness values of the RLNRA;
  - Topographic survey of mountainous 170+ acre site;
  - Bulldozing a pioneer road and logging of forested areas in order to access exploration sites for geotechnical and geological investigations along three (3) potential alignments, including boring and rock drilling activities;
  - Preliminary engineering evaluations:
    - Roadway alignments – assume minimum of three (3) draft alignments with ~ 1,800-feet elevation change and targeting 5 percent road slope;

- Geotechnical evaluations and rock slope/steep slope stability/mitigation evaluation;
- Preliminary retaining wall, culvert, and/or bridge design analysis;
- Widening and improvement options analysis to the existing tunnel on Ross Haul Road;
- Assess impacts to transmission towers based on tunnel and road alignments;
- Preliminary sediment and stormwater management options; and
- Environmental and cultural resources impacts and mitigation.

Within one year of completing the Feasibility Study, City Light will, in consultation with the Skagit Resource Coordinating Committee (SRCC), submit a Feasibility Study Report to NPS and FERC. The Feasibility Study Report will include: (1) a summary of the results of the Feasibility Study; (2) recommendations for road development, design, construction, and implementation; and (3) recommendations regarding changes to Project license requirements that would necessitate a FERC license amendment.

Within six months after submitting the Feasibility Study Report, City Light will file with the Commission, for approval, an implementation plan for the construction, operation, and maintenance of the NPS-requested road from SR 20 to the Ross facility, unless such road is determined not warranted or feasible. City Light will also file an application for a non-capacity license amendment if determined necessary to implement the plan.

Additionally, City Light may construct a second tunnel for the Gorge Development. This project, which would not use any additional water, has already undergone environmental review and consultation. It has been approved by FERC and is part of the current Project license.

Figure 5.12-1. Ross Lake Access Road, preliminary conceptual alignment.

5.13 New Facilities Under Consideration

Several new facilities are under consideration during the new license term that would enhance operational efficiency or facilitate employee engagement. Most of the projects are only conceptual and will need additional design, cost/benefit analysis, and environmental and NHPA Section 106 review and consultation. These projects are not proposed as part of the Proposed Action and are included for the Commission's informational purposes only. Projects that proceed to the design/development phase would be proposed for FERC approval, as needed, and executed during the new license term.

- Newhalem Operations Building – This project would involve construction of a new, two-story building on the site of the exiting Sickler Building in the Newhalem Service Yard. This would consolidate the administrative offices, communications, shops, and warehouses in one area and improve operational and energy efficiency. In addition, it would lower greenhouse gas emissions associated with Project operations by reducing vehicle trips between the existing Administration Building and the Service Yard. It would also free up other buildings (a house currently used by Communications and Cambridge House, now used as offices) for other uses.
- Newhalem Recreational Vehicle (RV)/Boat Storage – This project would involve developing an area west of SR 20 to store employee-owned RVs, boats, and large trucks to reduce clutter in the townsites and improve aesthetics. The site would be secured with fencing and screened with vegetation.
- Newhalem Service Yard Employee Parking Area – This project would create an employee parking area near the microwave building adjacent to the Service Yard. This new parking area would improve safety and create more space in the Service Yard for heavy equipment and large trucks.
- Gorge Dam Bypass Flow Generator – This project under consideration examines the preliminary sizing of a single turbine within a powerhouse located at the base of the dam below the two existing low-level outlet conduits. A summary of the initial feasibility for this project is provided in Appendix D of this Exhibit A.

  A single turbine would be capable of efficiently discharging over a range of flows from 600 cfs to 1,725 cfs. Proposed seasonal and instream flows will be less than 600 cfs necessitating the installation of a low flow control structure (see Section 5.3 of this Exhibit A) to maintain continuous flow downstream during periods of low flows and planned and unplanned outages. Selection of the number and size of turbine/generator units and bypass arrangements will be dependent on the range of instream flows required. A vertical Francis unit is assumed most suitable for the purpose of this Phase 1 assessment, though other unit technologies may be feasible and would be evaluated further examination.

  The conceptual powerhouse configuration and arrangement for one unit is presented in Appendix D. The powerhouse is assumed to be situated as close as possible to the existing low-level outlet while still being able to discharge into the Gorge bypass reach yet not be adversely impacted by spillway discharge. The powerhouse is assumed to be located on a concrete foundation extending from the downstream face of the dam. Preliminary calculations indicate the turbine runner centerline would be at or slightly above tailwater. A turbine shutoff valve would be included. Once water exits the turbine, it would be discharged into the Gorge bypass reach. The powerhouse would include a bridge crane for lifting heavy rotating

equipment into place. The powerhouse would include a transformer and other necessary transmission equipment. The intake is anticipated to include a coarse steel trash rack and modifications to the existing low-level outlet gate and vent configuration may be necessary.

6.0 LANDS OF THE UNITED STATES

Lands of the U.S. Government under use by the Project as shown on the Exhibit G Project Boundary drawings are tabulated below (Table 6.0-1 existing; Table 6.0-2 proposed).

Table 6.0-1. Tabulation of federal lands within the existing Skagit River Project Boundary, by township, range, and section.

Entry No.	Description	Section/ Township/Range	Right-of-Way Acreage	Non Right-of-Way Acreage		Exhibit K Sheet
				Outside High Ross Inundation Zone	Within High Ross Inundation Zone	
1	Ptn Gov Lot 6	Sec 17 T33N R10E	4.24			31, 32, 33
2	Ptn. NW NE	Sec 12 T35N R10E	0.93			44, 45
3	Ptn. NW SW	Sec 29 T36N R11E	0.60			46, 48
4	Ptn. Gov. Lot 3	Sec 20 T36N R 11E	10.69			48
5	Ptn. SW NE	Sec 21 T36N R11E	0.05			48, 49
6	Ptn. NE NE	Sec 21 T36N R11E	2.02			48, 49
7	Ptn. NW SW, Gov. Lot 7	Sec 15 T36N R11E	13.52			48, 49
8	Ptn. Gov. Lot 2	Sec 15 T36N R11E	13.11			49, 50
9	Ptn. Gov. Lot 3	Sec 15 T36N R11E	0.66			49
10	Ptn. SE NE	Sec 10, 11 T36N R11E	0.85			50
11	Ptn. SW SE, NE SE, Lot 1	Sec 2 T36N R11E	29.26			50, 51, 52
12	Ptn. Gov. Lot 12, 14, 15	Sec 1 T36N R11E	20.18			51, 52
13	Ptn. Gov. Lot 1 NE SW, SW NE, SE SW, SE NE, NE NE	Sec 36 T37N R11E	40.37			51, 52, 53
14	Ptn. Gov. Lot 1, 2, SE SW	Sec 36 T37N R11E	15.92			51, 52, 53
15	Ptn. Gov. Lot 7	Sec 30 T37N R12E	3.53			52, 53
16	Ptn. Gov. Lot 5	Sec 30 T37N R12E	24.82			52, 53
17	Ptn. Gov. Lot 2, 3	Sec 20, 29 T37N R12E	44.97			52, 53, 54
18	Newhalem NE SW	Sec 21 T37N R12E	0.77			54
19	Newhalem Gov Lot 9, 11	Sec 21 T37N R12E		13.51		54
20	Newhalem NE NW	Sec 28 T37N R12E		2.32		54
21	Newhalem Gov Lot 4, 5, 12	Sec 21 T37N R12E		36.16		54, 55
22	Sauk River Boat Launch (USFS)	Sec 17 T33N R10E		5.57		31, 32, 33
23	Marblemount Boat Launch (USFS)	Sec 18 T35N R11E		3.32		44, 45
24		Sec 11, 12, 14, 15, 22 T37N R12E		Area included in Entry #32		54, 55, 56, 57, 58
25		Sec 2, 3, 4, 5, 6, 7, 8, 9, 10, 14, 15, 22, 23 T37N R13E		Area included in Entry #32		56, 57, 58, 59

Entry No.	Description	Section/ Township/Range	Right-of-Way Acreage	Non Right-of-Way Acreage		Exhibit K Sheet
				Outside High Ross Inundation Zone	Within High Ross Inundation Zone	
26		Sec 4, 5, 6, 9 T37N R14E		Area included in Entry #32		58, 59
27		Sec 1, 12, 13, 14, 23, 24, 25, 35, 36 T38N R13E		Area included in Entry #32		58, 59, 60, 61
28		Sec 6, 7, 18, 19, 20, 29, 30, 31, 32 T38N R14E		Area included in Entry #32		58, 59, 60, 61
29		Sec 1, 2, 12, 13, 25, 36 T39N R13E		Area included in Entry #32		60, 61, 62
30		Sec 7, 8, 17, 18, 19, 20, 29, 30, 31 T39N R14E		Area included in Entry #32		60, 61, 62
31		Sec 2, 3, 4, 9,10,11, 14, 15, 22, 23, 24, 25, 26, 34, 35, 36 T40N R13E		Area included in Entry #32		62, 63
32		Sec 34, 35 T41N R13E		13,732.35		63
33		Sec 4, 5, 6, 9, 10 T37N R14E			Area included in Entry #39	58, 59
34		Sec 1, 3, 4, 5, 6, 7, 8, 9 10, 11, 12, 13, 14, 15, 23, 24, 25, 35, 36 T38N R13E			Area included in Entry #39	58, 59, 60, 61
35		Sec 6, 7, 18, 19, 20, 29, 30, 31, 32 T38N R14E			Area included in Entry #39	58, 59, 60, 61
36		Sec 1, 2, 11, 12, 13, 25, 36 T39N R13E			Area included in Entry #39	60, 61, 62
37		Sec 6, 7, 8, 17, 18, 19, 20, 29, 30, 31 T39N R14E			Area included in Entry #39	60, 61, 62
38		Sec 2, 3, 4, 9, 10, 11, 14, 15, 16, 22, 23, 24, 25, 26, 34, 35, 36 T40N R13E			Area included in Entry #39	62, 63
39		Sec 34, 35 T41N R13E			5,213.78	63
	Sub-total		226.50	13,793.23	5,213.78	
				19,007.01		
	Total existing acreage of federal land		**19,233.51**			

Table 6.0-2. Tabulation of federal lands within the proposed Skagit River Project Boundary, by township, range, and section.

Entry No.	Section/ Township/Range	Right-of-Way Acreage		Non Right-of-Way Acreage			
				Outside High Ross Inundation Zone		Within High Ross Inundation Zone	
		USFS	NPS	USFS	NPS	USFS	NPS
1	Sec 17 T33N R10E	4.24					
2	Sec 12 T35N R10E	0.93					
3	Sec 1 T36N R11E		20.67				
4	Sec 2 T36N R11E		35.31				
5	Sec 10 T36N R11E		5.99				
6	Sec 11 T36N R11E		24.79				
7	Sec 15 T36N R11E		12.53				
8	Sec 20 T36N R11E	10.69					
9	Sec 21 T36N R11E		2.27				
10	Sec 29 T36N R11E	0.60					
11	Sec 36 T37N R11E		56.48				
12	Sec 20 T37N R12E		30.25				
13	Sec 21 T37N R12E		0.77				
14	Sec 29 T37N R12E		14.72				
15	Sec 30 T37N R12E		28.99				
16	Sec 6 T35N R11E			5.98			
17	Sec 18 T35N R11E			3.32			
18	Sec 11, 12, 14, 15, 21, 22, 28, 30, 31 T37N R12E				522.37		
19	Sec 2, 3, 4, 5, 6, 7, 8, 9, 10, 14, 15, 22, 23 T37N R13E				1,648.91		
20	Sec 4, 5, 6, 9, 10 T37N R14E				85.16		
21	Sec 1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 13, 14, 15, 18, 19, 23, 24, 25, 30, 33, 34, 35, 36 T38N R13E				9,109.27		
22	Sec 6, 7, 20, 29, 31, 32 T38N R14E				178.01		
23	Sec 2, 13, 25 T39N R13E				482.42		
24	Sec 6, 7, 8, 17, 20, 29, 31 T39N R14E				632.32		
25	Sec 2, 4, 9, 11, 14, 22, 24, 26, 34, 36 T40N R13E				1,113.54		
26	Sec 4, 5, 6, 9, 10 T37N R14E						177.32
27	Sec 10, 11 T37N R14E					3.92	

Entry No.	Section/ Township/Range	Right-of-Way Acreage		Non Right-of-Way Acreage			
				Outside High Ross Inundation Zone		Within High Ross Inundation Zone	
		USFS	NPS	USFS	NPS	USFS	NPS
28	Sec 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 19, 23, 24, 25, 30, 33, 34, 35, 36 T38N R13E						2,592.22
29	Sec 6, 7, 20, 29, 31, 32 T38N R14E						2.33.18
30	Sec 2, 13, 25 T39N R13E						87.30
31	Sec 6, 7, 8, 9, 17, 20, 29, 31 T39N R14E						309.23
32	Sec 2, 4, 9, 11, 14, 16, 22, 24, 26, 34, 36 T40N R13E						389.02
	Sub-total (agency)	16.46	232.78	9.32	13,772.00	3.92	3,788.27
	Sub-total (non-HRIZ / HRIZ)			13,781.32		3,792.19	
	Sub-total (ROW / non-ROW)	249.24		17,573.51			
	Total existing acreage of federal land	**17,822.75**					

7.0 PROPOSED MODIFICATIONS AND ENHANCEMENTS

Descriptions of modifications and enhancements to Project facilities proposed as part of relicensing or under consideration during the new license term are included with the description of the existing Project in Sections 5.1 through 5.13 of this Exhibit A. Details regarding proposed modifications to Project operations and facility enhancements under the new license are provided in Exhibits B and E of this FLA. A full list of protection, mitigation, and enhancement (PME) measures being proposed by City Light for the new license is provided in Appendix A of this Exhibit A and described in Exhibit E of this FLA.

Many of these PME measures have been developed in coordination with licensing participants (LPs). City Light continues to engage LPs regarding the operational proposal and PME measures that will ultimately be included in the new license. This engagement will continue following submission of this FLA. In the event this engagement results in revisions to the Proposed Action, City Light will supplement its FLA at a later date to incorporate revisions.

8.0 REFERENCES

Seattle City Light (City Light). 2011. Biological Evaluation Skagit River Hydroelectric Project License (FERC No. 553) Amendment: Addition of a Second Power Tunnel at the Gorge Development. June 2011.

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FINAL LICENSE APPLICATION
EXHIBIT A

APPENDICES

FINAL LICENSE APPLICATION
EXHIBIT A

APPENDIX A

SUMMARY OF IMPLEMENTATION SCHEDULE ASSOCIATED WITH PROPOSED OPERATIONS AND PME MEASURES

Summary of Implementation Schedule Associated with Proposed Operations and PME Measures

Proposed PME	Anticipated Timeframe
PROJECT OPERATIONAL MEASURES (FLOW REGIME / RESERVOIR LEVELS)	
• Ross Lake operations: o Summer Variable Reservoir Operations Zone	Implement Starting Year 1 After License Issuance
o Modifications to Flood Risk Management Operations	Implement Starting Year 2 After License Issuance (upon FERC approval of the Flood Risk Management Operations Implementation Plan)
• Side and Off-Channel Connectivity and Process Flows *(as part of the Skagit River Riverscape Ecosystem Plan [REP], Flow Management Program [FMP] below)*	Implement Starting Year 1 of License Issuance
• Minimum Instream Flows in the Gorge Bypass Reach	Implement Starting Year 3 of License Issuance (upon completion of low flow control structure)
GEOLOGY AND SOILS	
• Develop and implement a Reservoir Erosion Management and Monitoring Plan. As part of the Plan:	Complete Within 1 Year of License Issuance; Implement Thereafter
o Annual reporting, meetings, and trainings	Annually Throughout Life of the License
o Monitor shoreline retreat rate sites	Every 2 Years Throughout Life of the License
o Monitor erosion control measures	Every 2 Years Throughout Life of the License
o Monitor Ross drawdown zone (stump) transects	Every 5 Years Throughout Life of the License
o Re-inventory/monitor shoreline erosion along entire shoreline of Ross, Diablo, and Gorge lakes	Every 10 Years Throughout Life of the License
o File report with FERC (following consultation with the Skagit Resource Coordinating Committee [SRCC]) summarizing erosion measures and monitoring	Every 10 Years Throughout Life of the License
o Baseline vegetation mapping and site inventory at Ross, Diablo, and Gorge lakes	Year 1 After License Issuance

Proposed PME	Anticipated Timeframe
o Assess and prioritize sites for treatment and monitoring	Year 2 After License Issuance
o Assess selected sites for natural system design and develop designs for individual locations	Year 2 After License Issuance
o Plant propagation for use at treatment sites	Annually Throughout Life of the License
o Engineering and implementation (e.g., construction or planting) at treatment sites	Complete Year 8 After License Issuance
o Maintain treatment sites (construction)	Annually Starting Year 5 After License Issuance
• Develop and implement a Roads, Trails, and Transmission Line ROW Erosion Management Plan. As part of the Plan:	Complete Within 1 Year of License Issuance; Implement Thereafter
o Annual reporting, meetings, and trainings	Annually Throughout Life of the License
o Treatment site prioritization and planning	Complete Between Years 1 and 3 After License Issuance
o Road and route decommissioning prioritization and planning	Complete Between Years 1 and 3 After License Issuance
o Inventory of road conditions and associated drainage features	Every 5 Years Throughout Life of the License
o Assess removal of bank hardening, site assessment, design	Year 1 After License Issuance
o Monitor new construction projects	Every 7 Years Between Years 7 and 35 After License Issuance
o Monitor stream crossings and hydrologically connected areas following storm events	Every 10 Years Between Years 1 and 30 After License Issuance
o Monitoring of riparian erosion sites	Annually Throughout Life of the License
o Road and culvert O&M	Annually Throughout Life of the License
o Bank hardening remediation or removal (construction)	Year 5 After License Issuance
o Maintain treated bank hardening and riparian treatment sites	Annually Throughout Life of the License
o Soil bioengineering/erosion controls/plantings installation at riparian erosion sites	Complete Between Years 2 and 50 After License Issuance

Proposed PME	Anticipated Timeframe
o Road and culvert improvements	Complete Between Years 10 and 30 After License Issuance
o Road decommissioning	Year 10 After License Issuance
WATER RESOURCES	
• Develop and implement a Water Quality Monitoring and Data Management Plan (WQMMP). As part of the Plan:	Complete Within 1 Year of License Issuance; Implement Thereafter
o Monitoring temperature	Continuously Throughout Life of the License
o Monitoring total dissolved gas	Opportunistically Throughout Life of the License
o Monitoring dissolved oxygen	Monthly June-October Years 1-5 After License Issuance; for 3 years after any operational modifications thereafter
o Monitoring nutrients and productivity	Monthly May-September Years 1-5 After License Issuance; for 3 years after any operational modifications thereafter
o Monitoring turbidity and TSS	Ross tributaries: Continuously Years 1-3 After License Issuance Ross Lake: Monthly April-October Years 1-3 After License Issuance
o Monitoring benthic macroinvertebrate sampling	Ross Lake: Every 6 Weeks May-October Years 3, 6, and 9 After License Issuance Skagit River: June and September Years 5, 10, and 15 After License Issuance
o Database development and application user portal	Complete Between Years 1 and 3 After License Issuance
o Database maintenance	Annually Starting Year 4 After License Issuance

Proposed PME	Anticipated Timeframe
FISH AND AQUATIC RESOURCES	
• Fish Passage Program (Phases 1 and 2)	
o Studies and planning	Complete Between Years 1 and 15 After License Issuance
• Ecosystem Monitoring and Adaptive Management Program (EMAMP)	
o Adaptive Management Research Fund	Annually Through Life of License
o Structured-Decision Making (SDM) process	Annually Years 1 through 3 After License Issuance
o Escapement monitoring	Annually Years 1 through 6 After License Issuance
o Smolt traps	Annually Through Life of License
• Develop and implement a Skagit River Riverscape Ecosystem Plan (REP). As part of the Plan:	Complete Within 1 Year of License Issuance; Implement Thereafter
o Flow Management Program (FMP)	See Operational Measures Above
o Aquatic Habitat (Non-Flow) Program	
- Mainstem habitat measures – Park Slough subreach	Complete Between Years 1 and 10 After License Issuance
- Mainstem habitat measures – Newhalem Ponds subreach	Complete Between Years 1 and 10 After License Issuance
- Mainstem habitat measures – County Line Ponds subreach	Complete Between Years 1 and 10 After License Issuance
- Mainstem habitat measures – Taylor Side Channel subreach	Complete Between Years 1 and 10 After License Issuance
- Mainstem habitat measures – Illabot and Powerline sites	Complete Between Years 1 and 10 After License Issuance
- Quantitative modeling support for mainstem habitat improvement actions	Annually Years 1 through 10 After License Issuance
- Mainstem habitat measures – Review additional restoration opportunities, outreach, and planning	Year 10 After License Issuance
- Mainstem habitat measures – Periodic review of additional restoration opportunities, outreach, and planning	Every 5 Years Starting Year 15 After License Issuance

Proposed PME	Anticipated Timeframe
- Mainstem habitat measure monitoring	Annually Years 1 through 11 After License Issuance
- Implementation of additional restoration opportunities (Estuary and Watershed Aquatic Habitat Enhancement Accounts)	Complete Between Years 15 and 50 After License Issuance
- Transmission line ROW habitat measures – Additional fieldwork for prioritization to build upon desktop analysis	Complete Between Years 1 and 5 After License Issuance
- Transmission line ROW habitat measures – Implementation of fish passage improvement actions for Groups A and B culverts	Complete Between Years 2 and 12 After License Issuance
- Transmission line ROW habitat measures – Implementation of fish passage improvement actions for Group C culverts	Complete Between Years 13 and 50 After License Issuance
- Transmission line ROW habitat measures – Monitoring of fish passage improvement actions	Annually Throughout Life of the License
- Wood augmentation in transmission line ROW	Annually Years 12 through 23 After License Issuance
- Channel migration areas near infrastructure initial project design, protocol development, and implementation	Complete Between Years 1 and 5 After License Issuance
- Ongoing monitoring and planning in the channel migration areas near infrastructure	Every 5 Years Throughout Life of the License
• Develop and implement a Reservoir Fisheries Management Plan (RFMP). As part of the Plan:	Complete Within 1 Year of License Issuance; Implement Thereafter
o Fish population monitoring	
- Develop Reservoir Fisheries Monitoring Study Plan	Year 2 After License Issuance
- Conduct fish population monitoring activities	Annually Years 2 and 12 After License Issuance
- Develop Fish Population Monitoring Report	Year 13 After License Issuance
- Ongoing implementation of recommendations based on Fish Population Monitoring Report	Complete Between Years 14 and 50 After License Issuance
- Quantitative modeling support	Annually Years 1 through 10 After License Issuance
o Fish Stranding and Trapping Program	
- Conduct stranding and trapping surveys on Gorge and Diablo lakes and two annual surveys during the drawdown cycle on Ross Lake	Annually Years 1 through 3 After License Issuance

Proposed PME	Anticipated Timeframe
- Develop Stranding and Trapping Report	Year 4 After License Issuance
- Ongoing implementation of recommendations based on Stranding and Trapping Report	Complete Between Years 5 and 50 After License Issuance
o Reservoir Tributary Access Program – Survey tributary mouths	Annually Years 1 through 5 After License Issuance
o Rainbow Trout Broodstock Program – Evaluation	Complete Between Years 1 and 13 After License Issuance
• Develop and implement an Aquatic Invasive Species Management Plan. As part of the Plan:	Complete Within 1 Year of License Issuance; Implement Thereafter
o Risk assessment, annual coordination, reporting, meetings	Annually Throughout Life of the License
o Information and education outreach	Annually Throughout Life of the License
o Annual training for Project staff and contractors	Annually Throughout Life of the License
o AIS Unit support and supplemental sampling	Starting Year 1 After License Issuance and 2 Additional Times Thereafter
o Artificial substrate installation and quarterly monitoring	Annually Throughout Life of the License
o Shoreline inspections	Annually Throughout Life of the License
o Operations of watercraft inspection and cleaning stations	Annually Throughout Life of the License
o Establish wash station in Newhalem	Complete Between Years 1 and 10 After License Issuance
BOTANICAL RESOURCES	
• Develop and implement an Invasive Plants Management Plan. As part of the Plan:	Complete Within 1 Year of License Issuance; Implement Thereafter
o Annual reporting, meetings, and trainings	Annually Throughout Life of the License

Proposed PME	Anticipated Timeframe
o Survey prioritized areas, update database and maps	Every 5 Years Throughout Life of the License
o Treat management areas for invasive plants	Every 5 Years Starting Year 1 After License Issuance
o Monitor treatment, seeded, or planted areas for effectiveness	Every 2 Years Throughout Life of the License
• Develop and implement a Vegetation Management Plan. As part of the Plan:	Complete Within 1 Year of License Issuance; Implement Thereafter
o Establish baseline vegetation structure and composition in transmission line ROW	Annually Years 1 through 3 After License Issuance
o Vegetation management in the transmission line ROW related to avian and wildlife habitat enhancements	Complete Between Years 1 and 15 After License Issuance
o Measure changes to vegetation structure and composition in habitat enhancement areas within the transmission line ROW	Every 5 Years Throughout Life of the License
o Routine operations and maintenance, including maintenance of habitat enhancement areas	Annually Throughout Life of the License
• Ross Lake wetland habitat enhancement	Implement Every 3 Years Starting Year 2 After License Issuance
WILDLIFE RESOURCES	
• Develop and implement a Wildlife Protection and Enhancement Plan. As part of the Plan:	Complete Within 1 Year of License Issuance; Implement Thereafter
o Annual consulting and reporting, including necropsy communication with NPS	Annually Throughout Life of the License
o Annual training for staff and contractors	Annually Throughout Life of the License
o Maintain and update study result and incidental observation database and GIS maps	Annually Throughout Life of the License
o Collaborative decision regarding bat surveys or monitoring of structure use	Year 1 After License Issuance
o Update location data for Priority Habitats and Species (PHS) and State Wildlife Action Plan (SWAP) species, and NPS Management Priority Species	Every 5 Years Between Years 1 and 20 After License Issuance

Proposed PME	Anticipated Timeframe
o Develop ungulate and forest carnivore movement monitoring methods and locations	Annually Years 1 through 10 After License Issuance; Every 5 Years Thereafter
o Develop methods and locations to monitor wildlife habitat enhancements within the transmission line ROW	Complete Between Years 1 and 3 After License issuance
o Develop monitoring protocol and locations for special-status amphibians	Year 1 After License Issuance
o Implement ungulate and forest carnivore monitoring	Every 5 Years Starting Year 1 After License Issuance
o Monitor wildlife use at habitat enhancements within the transmission line ROW	Every 3 Years Throughout Life of the License
o Monitor spotted frog and western toad	Every 3 Years Throughout Life of the License
• Develop and implement an Avian Species Protection Plan. As part of the Plan:	Complete Within 1 Year of License Issuance; Implement Thereafter
o Bird exclusion measures at facilities or structures	Every 5 Years Throughout Life of the License
o Update avian safety measures on electrical lines	Every 25 Years Starting Year 1 After License Issuance
o Update maps and database, report to NPS, annual consultation	Annually Throughout Life of the License
o File five-year report with FERC	Every 5 Years Throughout Life of the License
o Update GIS maps of potentially suitable habitat for northern spotted owl, marbled murrelet, and northern goshawk	Every 15 Years Throughout Life of the License
o Assess condition and location of avian safety measures	Annually Throughout Life of the License
o Monitoring of bald eagle, osprey, and peregrine falcon nest sites	Annually Throughout Life of the License
o Surveys for northern spotted owl, marbled murrelet, and northern goshawk	Every 5 Years Throughout Life of the License
o Assess northern spotted owl and marbled murrelet habitat and species presence in select locations near facilities	Every 5 Years Throughout Life of the License

Proposed PME	Anticipated Timeframe
o Develop methods and locations to monitor avian habitat enhancements within the transmission line ROW	Every 5 Years Starting Year 1 After License Issuance
o Monitor avian use at habitat enhancements within the transmission line ROW	Every 3 Years Throughout Life of the License
o Conduct annual trainings for employees and contractors on avian protection BMPs	Annually Throughout Life of the License
o Provide signage or informational brochures to educate visitors minimize effects to birds	Annually Throughout Life of the License
• Develop and implement a Fish and Wildlife Mitigation Lands Management Plan. As part of the Plan:	Complete Within 1 Year of License Issuance; Implement Thereafter
o Potential restoration projects	Complete Between Years 2 and 15 After License issuance
o Collect baseline data and fill data gaps by which to evaluate opportunities for protection and enhancements at mitigation lands	Complete Between Years 1 and 3 After License issuance
o Provide GIS access routes for mitigation lands to Indian Tribes and Canadian First Nations and update throughout the license as necessary	Every 10 Years Throughout Life of the License
o Annual consultation and reporting to SRCC	Annually Throughout Life of the License
o Collaborative determination of property-specific protections and enhancements	Annually Between Years 1 and 5 After License Issuance
o Monitoring of wildlife protection and enhancement implementation actions	Every 3 Years Throughout Life of the License
o Ecosystem-based management collaboration efforts	Every 10 Years Throughout Life of the License
o Forest habitat assessments at Nooksack, Illabot, Barnaby, and Corkindale properties	Every 5 Years Starting Year 2 After License Issuance
o Forest Management – ungulate habitat and forest health	Every 5 Years Throughout Life of the License
o Planning and design of meadow restoration at McLeod, Corkindale and Savage Slough properties	Year 3 After License Issuance
o Implementation of meadow restoration at McLeod, Corkindale and Savage Slough properties	Annually Throughout Life of the License
o Treatment and restoration of areas infested with invasive plants	Annually Throughout Life of the License

Proposed PME	Anticipated Timeframe
o Monitor land use access to determine specific security issues and locations and implement security precautions to prevent detrimental actions	Annually Throughout Life of the License
• Wildlife Research and Monitoring Program (*component of EMAMP above)*	Annually Starting Year 2 After License Issuance
RECREATION AND LAND USE	
• Develop and implement a Recreation Management Plan that encompasses all recreation-related PMEs. As part of the Plan:	Complete Within 1 Year of License Issuance; Implement Thereafter
o Diablo Lake	
- Facility improvements/rehab – Diablo Dam Parking Area	Improvements: Complete Between Years 5 and 10 After License Issuance; Rehabilitation: Throughout Life of License
- Facility improvements/rehab –Skagit Tour Dock	Improvements: Complete Between Years 5 and 10 After License Issuance; Rehabilitation: Throughout Life of License
- Facility improvements/rehab –West Ferry Landing	Improvements: Complete Between Years 5 and 10 After License Issuance; Rehabilitation: Throughout Life of License
- Facility improvements/rehab –East Ferry Landing	Improvements: Complete Between Years 5 and 10 After License Issuance; Rehabilitation: Throughout Life of License
- Facility improvements/rehab – Environmental Learning Center shoreline parking area	Improvements: Complete Between Years 5 and 10 After License Issuance; Rehabilitation: Throughout Life of License
- O&M – Diablo Dam Parking Area	Annually Throughout Life of the License
- O&M – Skagit Tour Dock	Annually Throughout Life of the License
- O&M – West Ferry Landing	Annually Throughout Life of the License

Proposed PME	Anticipated Timeframe
- O&M – East Ferry Landing	Annually Throughout Life of the License
- O&M – Environmental Learning Center shoreline parking area	Annually Throughout Life of the License
- Monitoring – Diablo Dam Parking Area	Every 12 Years Throughout Life of the License
- Monitoring – Skagit Tour Dock	Every 12 Years Throughout Life of the License
- Monitoring – West Ferry Landing	Every 12 Years Throughout Life of the License
- Monitoring – East Ferry Landing	Every 12 Years Throughout Life of the License
- Monitoring – Environmental Learning Center shoreline parking area	Every 12 Years Throughout Life of the License
o Gorge Lake	
- Facility improvements/rehab – Gorge Lake Boat Launch	Improvements: Complete Between Years 8 and 10 After License Issuance; Rehabilitation: Throughout Life of License
- Facility improvements/rehab – Ross Lodge Picnic Shelter	Improvements: Complete Between Years 8 and 10 After License Issuance; Rehabilitation: Throughout Life of License
- O&M – Gorge Lake Boat Launch	Annually Throughout Life of the License
- O&M – Ross Lodge Picnic Shelter	Annually Throughout Life of the License
- Monitoring – Gorge Lake Boat Launch	Every 12 Years Throughout Life of the License
- Monitoring – Ross Lodge Picnic Shelter	Every 12 Years Throughout Life of the License

Proposed PME	Anticipated Timeframe
o Newhalem	
- Facility improvements/rehab – Newhalem SR 20 Parking Area	Improvements: Complete Between Years 3 and 10 After License Issuance; Rehabilitation: Throughout Life of License
- Facility improvements/rehab – Newhalem Main Street	Improvements: Complete Between Years 3 and 10 After License Issuance; Rehabilitation: Throughout Life of License
- Facility improvements/rehab – Gorge Powerhouse Parking Area	Improvements: Complete Between Years 3 and 10 After License Issuance; Rehabilitation: Throughout Life of License
- Facility improvements/rehab – Ladder Creek Falls Trail and Garden	Improvements: Complete Between Years 3 and 10 After License Issuance; Rehabilitation: Throughout Life of License
- Facility improvements/rehab – Trail of the Cedars	Improvements: Complete Between Years 3 and10 After License Issuance; Rehabilitation: Throughout Life of License
- Facility improvements/rehab – Skagit Information Center	Improvements: Complete Between Years 3 and 10 After License Issuance; Rehabilitation: Throughout Life of License
- Facility improvements/rehab – Gorge Inn Museum	Improvements: Complete Between Years 3 and 10 After License Issuance; Rehabilitation: Throughout Life of License
- O&M – Newhalem SR 20 Parking Area	Annually Throughout Life of the License
- O&M – Newhalem Main Street	Annually Throughout Life of the License
- O&M – Gorge Powerhouse Parking Area	Annually Throughout Life of the License

Proposed PME	Anticipated Timeframe
- O&M – Ladder Creek Falls Trail and Garden	Annually Throughout Life of the License
- O&M – Trail of the Cedars	Annually Throughout Life of the License
- O&M – Skagit Information Center	Annually Throughout Life of the License
- O&M – Gorge Inn Museum	Year 1 After License Issuance
- Monitoring – Newhalem SR 20 Parking Area	Every 12 Years Throughout Life of the License
- Monitoring – Newhalem Main Street	Every 12 Years Throughout Life of the License
- Monitoring – Gorge Powerhouse Parking Area	Every 12 Years Throughout Life of the License
- Monitoring – Ladder Creek Falls Trail and Garden	Every 12 Years Throughout Life of the License
- Monitoring – Trail of the Cedars	Every 12 Years Throughout Life of the License
- Monitoring – Skagit Information Center	Every 12 Years Throughout Life of the License
- Monitoring – Gorge Inn Museum	Every 12 Years Throughout Life of the License
• Develop and implement an Environmental Learning Center Management Plan. As part of the plan:	Complete Within 1 Year of License Issuance; Implement Thereafter
o Programming	Annually Throughout Life of the License
o ELC facility maintenance	Annually Throughout Life of the License
o Major maintenance	Ongoing (Years 1 through 50)

Proposed PME	Anticipated Timeframe
AESTHETIC RESOURCES	
• Develop and implement a Lighting Management Plan. As part of the Plan:	Complete Within 1 Year of License Issuance; Implement Thereafter
o Lighting BMP retrofit	Complete Between Years 2 and 5 After License Issuance
o Lighting BMP replacement	Every 5 Years Throughout Life of the License
o Project lighting engineer assessment	Year 1 After License Issuance
o Project lighting engineer monitoring assessment	Every 15 Years Throughout Life of the License
o Lighting guidance document development	Complete Between Years 1 and 2 After License Issuance
o Lighting guidance document update	Every 5 Years Throughout Life of the License
o Periodic inspections	Every 5 Years Starting Year 6 After License Issuance
o Plan review and update	Every 5 Years Throughout Life of the License
• Sound protection BMPs	See Wildlife Protection and Enhancement Plan Above
CULTURAL RESOURCES	
• Develop and implement a Historic Properties Management Plan (HPMP) to guide treatment of historic properties; identify procedures for future potential discoveries.	Complete Within 1 Year of License Issuance; Implement Thereafter
o Annual reporting, meetings, and trainings	Annually Throughout Life of the License
o Monitoring	Every 3 Years Starting Year 1 After License Issuance
o Cultural resources steward	Annually Throughout Life of the License

Proposed PME	Anticipated Timeframe
○ Survey	Twice/Year for Years 1 through 10 After License Issuance; Annually Starting Year 11 Throughout Life of the License
○ NRHP evaluations	Ten Times/Year for Years 1 through 10 After License Issuance; Three Times/Year Starting Year 11 Throughout Life of the License
○ DT00212 NR form update	Every 10 Years Throughout Life of the License
○ DT00066 NR form update	Every 10 Years Throughout Life of the License
○ Adverse effects mitigation	Ten Times/Year for Years 1 through 10 After License Issuance; Annually Starting Year 11 Throughout Life of the License
○ TCP management	Annually Throughout Life of the License
○ Public information and program	Construction: Complete Between Years 1 and 5 After License Issuance; O&M: Annually Thereafter
○ HPMP updates and reviews	Every 10 Years Throughout Life of the License
○ General implementation protocols (i.e., emergency response, inadvertent discovery, etc.)	Annually Throughout Life of the License
TRIBAL RESOURCES	
• Addressed by measures of other resource areas	See Above
SOCIOECONOMICS	
• Addressed by measures of other resource areas	See Above
ENVIRONMENTAL JUSTICE	
• Addressed by measures of other resource areas	See Above

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APPENDIX B

GORGE DAM LOW FLOW CONTROL STRUCTURE
ENGINEERING SUMMARY

Gorge Dam Low Flow Control Structure

In anticipation of potential instream flow release requirements in the Gorge bypass reach, City Light proposes to evaluate, design, and install a minimum flow release valve at Gorge Dam to release water directly downstream of the dam to the Gorge bypass reach. A flow control structure will be installed capable of providing continuous flow releases ranging from approximately zero cubic feet per second (cfs) to 1,500 cfs. Initial feasibility comprised a high-level assessment to identify and complete an initial screening evaluation of three potential alternative concepts for reliable and continuous flow control.

The alternatives considered included:

- Alternative 1: Retrofit the existing low-level outlet conduit(s) to include regulating valve(s) at the exit(s).
- Alternative 2: Retrofit the existing low-level outlet conduit(s) with an option to include a powerhouse at the toe of the dam and immediately below the low-level outlet exits.
- Alternative 3: Retrofit the existing spillway gates to include smaller gates that can supply a smaller range of flow than the spillway gates typically are designed to let pass.

The assessment included:

- Estimation of component size or features based on an assumed high flow of 1,500 cfs. It was assumed that lower flows could be achieved by scaling down the concepts.
- Development of a preliminary general arrangement sketch for each alternative.
- Qualitative assessment of potential construction and operational challenges.

Based on the assessment of the existing facilities described above, the following summarizes the feasibility of using the existing low-level outlet facilities to provide continuous and reliable flow control:

- The existing low-level outlets in their current configuration do not presently appear suitable for continuous and reliable flow control:
    - The hydraulically operated wheel gates and hoists are not designed for continuous operation with partial gate openings.
    - The high-flow velocity in the conduit would significantly accelerate the erosion of the concrete due to abrasion.
- The existing low-level outlets could be used to provide continuous and reliable flow control if modified as suggested below:
    - Modify the low-level outlets to provide downstream flow control
    - Limit flow velocities in the conduit to approximately 15 fps if conduit remains unlined, or greater if steel lined, to mitigate concrete erosion.
    - Extend the existing 18-inch-diameter air vent to an elevation equal to approximately the top of the dam since the conduits and air vent will be pressurized to approximately the elevation of Gorge Lake. Verify that the existing gate chamber is watertight and make any necessary modifications if it is not.
    - Keep the existing wheel gates and bulkhead gates in service as isolation and emergency closure gates for inspection and repair of the conduits.
- Alternatively, the existing spill gates could be modified to include a smaller gate installed within the existing gate. One or more existing structural members would likely need to be cut but stiffeners around the opening could be added to maintain structural integrity of the gate.

Alternative 3 has been preliminarily selected for further investigation. City Light proposes to reserve evaluation and potential development of Alternative 2 depending on other considerations related to potential fish passage infrastructure.

General Construction Logistics and Site Improvements

Construction logistics and site-effects are expected to be approximately comparable for all alternatives. Since the Gorge bypass reach is typically dry, no dewatering is expected to be needed on the downstream side of the low-level outlet tunnel. On the upstream end of the low-level outlet, the existing gate and bulkhead should be sufficient to dewater the area.

To install the trash racks upstream of the bulkhead, it is assumed that the trash racks would be prefabricated and then installed by divers so that no dewatering upstream of the dam is required.

Construction laydown, office areas, equipment, and material storage areas have not been specifically identified but are assumed to be available within reasonable distance from the project site. No excavation or backfill is expected to be needed for any alternative. Concrete volumes are expected to be approximately 25 cubic yards (CY), and it may be reasonable to expect a small batch plant installed on shore near the construction area, using cement and aggregate premix delivered by truck and mixed water from the reservoir. Other construction materials and equipment are expected to be driven to the site via truck. A mobile crane with an approximate capacity of 30 to 50 tons is expected. The heaviest lifts are likely the valves and actuators. A crane capacity significantly larger than the valve weight is required to account for the counterbalance needed to extend over the dam. Temporary power for construction is assumed to be provided either by generators or by temporary connections to the spillway gate power supply.

Modified Spillway Gate(s) – preliminarily preferred alternative.

This alternative examined the preliminary sizing and configuration of modifying the two existing 47.0-foot-by-50.5-foot spillway gates to accommodate the range of flow specified above. The study assumed that both spillway gates would be modified with a new additional slide gate. The design flow through each gate would be 750 cfs. This results in a preliminary square gate size of 5 feet, 6 inches by 5 feet, 6 inches with a gate centerline elevation of approximately 849.8 feet North American Vertical Datum of 1988 (NAVD 88; 843.5 feet City of Seattle datum [CoSD]). It was assumed that a standard slide gate with an electric actuator could be used in this location. A portion of the existing spillway gates will need to be modified to allow for the new gate opening and additional reinforcement will need to be provided to maintain the structural integrity of the gate. The reinforcement will be determined at a later phase of design. Alternatively, only one spillway gate could be modified rather than both.

Configuration/Arrangement Description

Figure 1 presents the conceptual gate arrangement based on the preliminary gate sizing described above. It was assumed that the gates could be operated in the same location as the existing spillway gates. An opening would be cut into the existing spillway gates, including the skin plate and as few horizontal girders as needed. The opening created by cutting through structural members would be reinforced to redistribute loads on the gate without reducing the original factors of safety. New slide gates would be mounted on the opening in a manner that would not interfere with operation of each spillway gate. A downstream gate with an upstream seal was assumed to facilitate a gate actuator operating in the dry.

Subject to further investigation, multiple smaller gates or a rectangular gate could be used instead of one square gate to reduce modifications to the horizontal stiffeners on the spillway gates. This would

need to be refined during later phases of design. Mounting the gate upstream versus downstream of the existing spillway gate would also need to be evaluated during later phases of design. The new instream flow gates will be capable of regulating flow and can be automated to maintain the required flow based on reservoir level. This will be evaluated in the next phase of development. Discharge from each gate will impact the concrete spillway chute. Over time this will likely cause abrasion and eventual exposure of rebar in the ogee crest if left unprotected. Measures to protect against abrasion are possible and will be evaluated in the next phase. Cavitation of the spillway chute concrete is not a concern since the flow impacting the spillway will not create the required sub-atmospheric pressures.

Construction access to the gates was assumed to be provided by temporarily lowering the water surface level of Gorge Lake so that construction may take place without use of a cofferdam or other dewatering methods

NOTE: Per guidance from the Federal Energy Regulatory Commission (FERC), project facility conceptual design drawings contain Critical Energy Infrastructure Information (CEII) and have therefore, been omitted from general distribution in the Final License Application. This information has been filed with FERC with a CEII designation. Procedures for obtaining access to CEII may be found at 18 Code of Federal Regulations (CFR) § 388.113. Requests for access to CEII should be made to the Commission's CEII coordinator.

Figure 1. Conceptual gate arrangement.

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APPENDIX C

ROSS LAKE ACCESS ROAD
PRELIMINARY ENGINEERING ANALYSIS MEMORANDUM

Seattle City Light

MEMO

APRIL 28, 2023

MEMORANDUM

SUBJECT
Ross Lake Access Road

PURPOSE

Seattle City Light (City Light) owns and operates Ross Dam and its powerhouse as part of its Skagit Hydroelectric Project, Federal Energy Regulatory Commission (FERC) No. P-553 (Project). The Project is licensed by FERC, which maintains jurisdiction in the lands and waters within the Project. Public Law 90-544, Sec.505, as amended by Public Law 100-668, Sec. 202, dated 16 November 1988. The dam and powerhouse are located along the Skagit River at the base of Ruby Mountain and within the Ross Lake National Recreation Area. This area is managed by the National Park Service (NPS) as part of the North Cascades National Park Complex.

NPS Comments on the Draft License Application (February 27, 2023) included the following request:

> Section 5.12 Proposed New Facilities: [C]onstructing a new access road to Ross Reservoir from State Route 20 . . . could obviate the need for additional shoreline development adjacent to Diablo Reservoir. . . Construction of an access road to Ross Reservoir could eliminate/reduce need of the crew transport vessel use to access Ross Dam and Powerhouse and the need to transport materials and equipment with a barge on Diablo Reservoir. This in turn would reduce the congestion around the Diablo marine facilities improving the visitor experience and maintaining undeveloped riparian habitat around Diablo Reservoir.

In addition, a new access road from State Route 20 to the Ross Haul Road will be required to construct and operate a fish passage facility at Ross development.

City Light's Engineering and Operations Work Unit has prepared this Preliminary Engineering Memorandum in response to the request by NPS. This memo will review the challenges and technical feasibility of constructing roadway access to Ross Dam and Powerhouse.

PROJECT SITE AND USE

The crest of Ross Dam is on the Skagit River at 1,615 feet (City of Seattle datum [CoSD]). The powerhouse is located approximately 1,000 feet downstream of Ross Dam, along the left bank of the river at approximate elevation 1,200 feet CoSD. There is currently no direct road access to either Ross Dam or the powerhouse. The powerhouse can be accessed via boat or barge from Diablo Lake. Vehicles and equipment are brought to the site via barge. The Project site can be accessed by a hiking trail beginning from State Route 20. The trail is approximately 0.8 mile in length. There is a parking lot for the trailhead located alongside State Route 20 at 2,130 feet elevation (approximately 515 feet above the top of the

dam). There is an access road between the top of the dam and the powerhouse named the "Ross Haul Road." Ross Haul Road was constructed as part of the original dam construction, is approximately 15 feet wide, includes sections with a roadway grade steeper than 10 percent, and passes through a tunnel with a maximum height of 14 feet. The Project site is shown in Figure 1.

Figure 1: Location Map

BACKGROUND

The logistics of the construction of a roadway to Ross Dam has been evaluated by City Light in the past. Five (5) preliminary routes were evaluated for the construction of an access road to the top of Ross Dam along the right bank of the Skagit River in June 1948. Additionally, preliminary plans were prepared for an access road from State Route 20 to the top of Ross Dam from the left bank in 1978. These plans called for a 20-foot wide, superelevated, compacted dirt road which would connect to and utilize Ross Haul Road to access the powerhouse. These plans were all preliminary and not constructed.

DESIGN CRITERIA

Ross Powerhouse utilizes 90 megavolt amperes (MVA) transformers for power production and any future access road to either the Ross Dam or powerhouse will need to be constructed with the replacement of

these transformers in mind. The transformers and other larger equipment are replaced about every 30 years. In the past, these approximately 160,000-pound transformers have been trucked to the Project aboard Goldhofer trailers, shipped via a modular barge across Diablo Lake while still loaded on the trailer to the powerhouse boat ramp, trucked from the boat ramp to the powerhouse entrance, and finally lifted into position by the powerhouse bridge crane. Although Goldhofer trailers are proprietary equipment and may not be used in future transformer replacement projects, for the purposes of this study the trailer's minimum and maximum technical features such as turning radius, width, and length will be used as the basis for determining the parameters of the future access road. Currently, limited dredging and upland grading at Colonial Creek Boat Ramp is necessary to land and load the barges when the transformers are replaced.

PROPOSED ROADWAY

A preliminary roadway alignment has been prepared and is included in Figure 1. Due to the limited timeframe available for the preparation of this memo and design, the proposed road connects to Ross Haul Road near the top of Ross Dam. Additional improvements will need to be made to Ross Haul Road in order to establish access to the Ross Powerhouse by large trucks carrying transformers, trucks associated with fish passage construction and operation, and other heavy equipment. LiDAR data was used to understand the grades on the slope and a proposed road was designed using Civil 3D. The proposed roadway is a 20-foot-wide pavement section with a maximum vertical slope of 8 percent. Additionally, this alignment is exploratory, and its purpose is to assist in the determination of the feasibility of building a road to Ross Dam and powerhouse, the impacts of the construction, and a rough order of magnitude cost. The preliminary plans in the appendix are not for construction. Future designs should consider a lesser maximum grade in order to accommodate year-round operations of the fish passage facilities including during the winter with snow and ice conditions.

CONSTRUCTION CONSIDERATIONS

The proposed roadway alignment begins at the existing parking lot for the Ross Dam hiking trail. Utilizing this parking lot will avoid the need for constructing a new, separate access to (the state-owned) State Route 20, and the parking lot can potentially be used as a staging area for future projects. If a new access point is needed from State Route 20, then a road approach permit will need to be obtained from the Washington State Department of Transportation (WSDOT).

A security gate would be installed at the beginning of the road to restrict access to the road to only City Light personnel for the operation and maintenance of the facilities. NPS staff may also be permitted to use the roadway for access to Ross and Diablo reservoirs. The proposed road would not be open to public vehicles. City Light will need to determine whether to allow pedestrians to hike the paved roadway to access Ross Dam. NPS would also likely need to be consulted about the realignment of the existing hiking trail.

Construction of a road will require sufficient grading along the hillside between State Route 20 and Ross Haul Road. Many sections of the roadway will require high retaining walls on the uphill side of the roadway with some sections of these walls needing to be over 20-feet high. These walls will not only need to be designed to withstand the forces upslope but also the surcharge from heavy vehicle loads utilizing the road.

Other sections of the road will require large amounts of fill or construction of an elevated roadway. The Project site is located at the base of Ruby Mountain and it is anticipated that the forested slope is underlain with bedrock. Conventional grading techniques may not be feasible if the roadway needs to be constructed below the existing grade of the slope. If bedrock is encountered, specialized grading techniques such as rock drilling or blasting may be needed. Grading activities should also try to preserve natural drainage patterns to prevent erosion at and downstream of discharge locations.

Construction of a new road will trigger requirements of the Stormwater Management Manual for Western Washington. Portions of the road may be able to disperse or infiltrate stormwater, depending on the surrounding grades, but the majority of the stormwater runoff generated from the new roadway will need to be captured and treated onsite. This could be accomplished by collecting and conveying the stormwater to a series of detention ponds or structures. These facilities will need to be sized based on the incoming flow and sited above the groundwater table.

The roadway pavement will need to be designed with severe loading conditions in mind. A geotechnical engineer will need to perform an investigation of the in situ soils to determine an appropriate pavement section. Additionally, a geotechnical engineer will need to work with a structural engineer to develop an appropriate foundation design for the needed retaining walls.

The grades along Ross Haul Road are steeper than desirable for the proposed access road. This existing road will need to be rerouted to lower the longitudinal grade to allow for heavy traffic to traverse the roadway. Ross Haul Road will also need to be widened to accommodate wider vehicles.

Ross Haul Road switchbacks across the terrain in order to gain approximately 400 feet in elevation and to circumnavigate a near vertical rock slope immediately to the west of the powerhouse. This slope is approximately 110-to-120 feet high and consists of exposed gneissic bedrock with some sparse vegetation. This slope has experienced some rockfall events since the installation of the powerhouse and some "blocks" along the slope have been identified as potential dangers to the powerhouse. A complete assessment of the stability of this slope will need to be completed to ensure that construction activities associated with road work will not cause any rocks to fall.

Ross Haul Road also passes through a 160-foot-long tunnel approximately 1,200 feet south of the powerhouse. This tunnel is built into the slope of the mountainside and is neither tall nor wide enough to allow for the passage of a new transformer on a trailer. This tunnel will need to either be widened or removed as part of the new access road. The available drawings for this tunnel do not indicate the geology surrounding or above the tunnel and, therefore, a geotechnical engineer will need to investigate the tunnel and provide recommendations.

Electricity generated at the powerhouse is transmitted along a series of steel transmission towers first to the Diablo Switchyard, then to the Bothell Substation. One of these steel towers is located approximately 150 linear feet east of Ross Haul Road tunnel along the slope. The base of this tower is situated at approximate 1,390 feet elevation and from this tower the electrical lines cross over the Skagit River. Widening or removal of the tunnel may disrupt the foundation or operation of this tower. Moving or

reinforcing this tower would add considerable cost to the Project and require the powerhouse to be offline and not generating until work involving this tower is completed.

Construction of the access road will require removal of trees, grading, and other site disturbing activities along the left bank of the Skagit River between the river and State Route 20. These activities would impact cultural, recreational, environmental, and scenic resources. The potential effects from either construction of or having a permanent roadway have not been investigated. Environmental review, permitting, and approval would be required.

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APPENDIX D

GORGE BYPASS POWERHOUSE ENGINEERING SUMMARY

Gorge Bypass Powerhouse

This project under consideration examines the preliminary sizing of a single turbine within a powerhouse located at the base of the dam below the two existing low-level outlet conduits. This configuration would need coarse trash racks and steel conduits grouted into the two existing conduits. The preliminary design flow through the turbine is 1,500 cubic feet per second (cfs). The gross head differential is assumed to be 142 feet, corresponding to a water surface elevation (Gorge Lake) of 881.51 feet North American Vertical Datum of 1988 (NAVD 88; 875 feet City of Seattle datum [CoSD]) and a tailwater elevation of 739.34 feet NAVD 88 (733 feet CoSD).

A single turbine would be capable of efficiently discharging over a range of flows generally from 15 percent greater than the turbine's rated discharge to as low as 30 percent of rated discharge. For example, a turbine with a rated discharge of 1,500 cfs could operate over a range of flows from 600 cfs to 1,725 cfs. If any of the seasonal instream flows will be less than 600 cfs, then a bypass pipe and a second turbine/generator unit sized to discharge the lowest instream flow up to about 600 cfs should be considered. A synchronous bypass pipe would likely be installed regardless of the size and number of units for purposes of maintaining continuous flow downstream during periods of planned and unplanned outages.

Ultimately, selection of the number and size of turbine/generator units and the synchronous bypass will be dependent on the range of seasonal instream flows eventually agreed upon. The wider the range of instream flows, the more likely multiple units will be needed. Also, due to hydraulic limitations of the two existing low-level outlets, this alternative would need to be supplemented with other physical measures if the highest seasonal instream flow will be much greater than about 1,500 cfs.

Preliminary Turbine Selection and Performance Characteristics

Turbine selection, and estimation of performance characteristics were based on reviewing turbine types and technologies that would appropriately capture the flow and head requirements. A vertical Francis unit was assumed most suitable for the purpose of this Phase 1 assessment, though other unit technologies may be feasible and would be evaluated further examination.

The turbine technology review was based on the following assumptions:

- Maximum conveyance velocity of approximately 15 feet per second in the concrete lined section of the outlets
- Water level range in Gorge reservoir as listed in Table 1-1
- Gross head of 142 feet and a net head (*H*) of 135 feet
- A single-unit arrangement.

Powerhouse Configuration and Arrangement

The conceptual powerhouse configuration and arrangement for one unit is presented in Figure 1 based on the preliminary turbine selection described above. The powerhouse was assumed to be situated as close as possible to the existing low-level outlet while still being able to discharge into the Gorge bypass reach yet not be adversely impacted by spillway discharge. The turbine penstock would be connected to new steel-lined conduits that would be installed within the existing low-level outlet conduits. Access to the powerhouse will be determined during the next phase of development, but preliminarily it is assumed that vehicle access would be improved to the left bank and dam crest and a combination of metal stairs/handrails plus a tram would be constructed on the downstream face of the dam to the roof of the powerhouse where personnel would enter. An outdoor crane would be installed on the roof and one or two roof hatches would be removed to raise and lower heavy materials

and equipment to the generator floor. The powerhouse was assumed to be located on a concrete foundation extending from the downstream face of the dam. Preliminary calculations indicate the turbine runner centerline would be at or slightly above tailwater. This estimate would be refined during later phases of design. The footprint of the powerhouse was based on estimated minimum clearance between the turbine and wall, taking account for open floor space for assembly and maintenance of parts for the rotating equipment. A turbine shutoff valve would be included, which is expected to be part of the equipment supply contract. Once water exits the turbine, it would be discharged into the Gorge bypass reach. The powerhouse would include a bridge crane for lifting heavy rotating equipment into place. The powerhouse would include a transformer and other necessary transmission equipment. The intake is anticipated to include a coarse steel trash rack and modifications to the existing low-level outlet gate and vent configuration may be necessary.

Preliminary Constructability Review

Construction Logistics and Site Improvements

No modifications to the existing low-level outlet gate and bulkhead are assumed to be necessary to provide a working area in the dry. Trash racks upstream of the bulkhead are assumed to be installed by divers, as described above. Concrete volumes are expected to be approximately 1100 cubic yards (CY), and it may be reasonable to expect a small batch plant installed near the construction area, using cement and aggregate premix delivered by truck and mixed water from the reservoir. Other construction materials and equipment would be driven to site. The steel pipelines are assumed to be grouted into the existing low-level outlet conduits. Temporary power for construction is assumed to be provided either by generators or by temporary connections to the spillway gate power supply. A mobile crane with an approximate capacity of 30 to 50 tons is expected.

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Figure 1. Conceptual powerhouse configuration.