BUREAU OF RECLAMATION

Leavenworth National Fish Hatchery Surface Water Intake Fish Screens and Fish Passage Project Environmental Impact Statement

Water Resources Report

U.S. Department of the Interior
Bureau of Reclamation
Columbia-Pacific Northwest Regional Office
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Mission Statements

The Department of the Interior conserves and manages the Nation's natural resources and cultural heritage for the benefit and enjoyment of the American people, provides scientific and other information about natural resources and natural hazards to address societal challenges and create opportunities for the American people, and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities to help them prosper.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Executive Summary

The U.S. Department of the Interior, Bureau of Reclamation (Reclamation) has prepared an Environmental Impact Statement (EIS) for the Leavenworth National Fish Hatchery (hereafter, LNFH or Hatchery) Surface Water Intake Fish Screens and Fish Passage (SWISP) Project (**Map A-1** in **Appendix A**). The purpose of this specialist report is to provide a comprehensive environmental baseline and analysis of the potential impacts of the SWISP Project under four separate alternatives, including Alternative A, No Action.

For water resources (stream geomorphology and water quality), the Analysis Area is where proposed Project activities would occur along the Icicle Creek corridor. It stretches from the hydraulic drop approximately 230 feet upstream from the LNFH intake facilities to river mile (RM) 2.3 at the Washington Department of Ecology (Ecology) compliance point on Icicle Creek, downstream from the LNFH, and includes the Hatchery Channel and the Historical Channel (see **Map A-9** in **Appendix A**). The indicators for identifying impacts on water resources relative to the baseline conditions are the following:

- Changes to stream geomorphology
- Increase or decrease to water quality standards (for temperature, dissolved oxygen, potential of hydrogen (pH), and turbidity) outlined in Chapter 173-201A Washington Administrative Code (WAC).
- Compliance with the total maximum daily load (TMDL) at Ecology monitoring point at RM 2.3.

Affected Environment

The nearly 80-year-old LNFH surface water intake and delivery system is rapidly deteriorating and is reaching the end of its design life, creating excessive operation and maintenance problems for the LNFH. The current diversion system on Icicle Creek, at RM 4.5, consists of a concrete rubble dam and modified intake. Upgrades have been retrofitted into the existing older system. Operation of the system is complicated by large accumulations of silt and sediment during spring runoff. In addition, during harsh winter conditions, intake water can be cut off or reduced due to massive frazil, and anchor ice builds up on the existing intake racks. The removal of this ice is required to maintain proper water supply to the LNFH (Reclamation 2020a).

The current diversion system is in a confined canyon and channel width is limited. A rapid exists about 1,000 feet upstream of the diversion pool that creates a natural break in the extent of the backwater pool. Immediately downstream of the existing low-head diversion dam, a natural boulder drop of about 2 to 3 feet is present with a deep 3-foot scour hole formed from the hydraulic drop over the boulders. The channel profile consists of numerous runs and riffles with occasional shallow pools. The channel bed consists of large boulders and bedrock armor with sand, gravel, and cobble

deposits. The hydrology and sediment characteristics of Icicle Creek are described in further detail in *Surface Water Intake Screening and Fish Passage 2D Hydraulic Modeling* and incorporated by reference (Reclamation 2020b).

The largest portion of the incoming sediment load to the diversion structure is estimated to be sand to fine gravel, with a small portion being larger gravels and cobbles. The channel bed is visibly composed of large cobbles and boulders in rapids, with sand and gravels present in pools and on sediment bars and low floodplain. Channel margins often contain pockets of fine sediment (silt and clay) and fine sand deposited in between the exposed boulders (Reclamation 2020b).

As described in the *Final Programmatic Environmental Impact Statement for the Icicle Creek Water Resource Management Strategy* (Chelan County and Ecology 2019), designated uses for various locations in Icicle Creek are aquatic life uses, recreational uses, water supply uses, and miscellaneous uses. Potential sources of water quality degradation include flow diversion, stormwater runoff from adjacent roads and developed areas, point-source discharges from water treatment plants and other facilities, non-point-source pollutants from septic systems, and recreational uses. Water quality parameters affected by pollutants from these sources include temperature, dissolved oxygen, pH, turbidity, nutrients, fecal coliform bacteria, and concentrations of various pollutants, including heavy metals and organic compounds (Chelan County and Ecology 2019).

Chapter 173-201A WAC contains water quality standards for surface waters of the state of Washington. Waters whose designated uses (listed in WAC Sections 173-201A-200, 173-201A-600, and 173-201A-602) that are impaired by pollutants are placed in the polluted water category (Category 5) of the water quality assessment (Ecology 2020a). The 303(d) list contains waters in the polluted water category. TMDLs or other approved water quality improvement projects are required for waterbodies with Category 5 impairments (Ecology 2020b). A TMDL is a numerical value that represents the highest amount of a pollutant a surface water body can receive and still meet the standards (Ecology 2020c).

Sections 303(d) and 305(b) of the Clean Water Act (CWA) require states to identify and characterize waters that do not meet, or are not expected to meet, applicable water quality standards. The Washington State water quality standards applicable to Icicle Creek are as follows (Reclamation and USFWS 2018):

- Temperature: 55 degrees Fahrenheit (13 degrees Celsius) from August 15 to July 15 and 61 degrees Fahrenheit (16 degrees Celsius) from July 15 to August 15[1].
- Turbidity: To protect core summer salmonid habitat, the maximum turbidity shall not exceed 5 nephelometric turbidity units (NTUs) over background when the background is 50 NTUs or less; or a 10 percent increase in turbidity when the background turbidity is more than the 50 NTUs.
- Ecology completed a TMDL for the Wenatchee River watershed, including Icicle Creek, for dissolved oxygen and pH, which was approved by the EPA on August 25, 2009.

[1] Natural water temperatures for Icicle Creek often exceed the limits set in the TMDL.

- Phosphorus: The TMDL allocates 5.7 micrograms per liter (maximum daily total phosphorus concentration) and 0.52 kilograms per day of total phosphorus maximum daily mass loading during the critical periods of March through May and July through October to the LNFH. Construction activities may need a separate NPDES permit than what the LNFH operates under. If needed, this would be obtained by the construction contractor.
- Dissolved oxygen: To protect core summer salmonid habitat, the 1-day minimum dissolved oxygen criterion is 9.5 milligrams per liter and should not fall below this concentration frequency more than once every 10 years on average.
- pH: pH shall be within the range of 6.5 to 8.5 standard units, with a human-caused variation within the above range of less than 0.2 units.

Environmental Consequences

Complete descriptions of the alternatives analyzed are found in **Section 1.2**. Also, proposed Project features are described in *Surface Water Intake Screening and Fish Passage 2D Hydraulic Modeling* which is incorporated by reference (Reclamation 2020b).

Alternative A – No Action Alternative

Under Alternative A, there would be no new proposed projects that would affect stream geomorphology or water quality. There would continue to be surface disturbances for operations and maintenance (O&M) within the 100-year floodplain and Icicle Creek affecting 0.03 acres under Alternative A. During cold weather, ice accumulation at the intake and subsequent alterations in water flow would continue, which would continue to affect stream geomorphology, such as through sedimentation. Throughout the year, sedimentation affects the intake and conveyance structures, which can reduce effective water delivery. Accumulation of sediment in the intake channel and associated O&M needs would continue. Sediment would continue to be removed from the creek, thereby removing it from its contribution to stream geomorphology and stream conditions. When needed, the outlet channel would continue to direct bypassed water and sluice material (sediment) from the gatehouse back to Icicle Creek. Because ongoing operations would continue with existing conditions, there would be no change in compliance with water quality standards (for temperature, dissolved oxygen, pH, and turbidity) outlined in Chapter 173-201A WAC.

Alternative B – Proposed Action

Surface disturbances within the 100-year floodplain and Icicle Creek would affect 0.73 acres under Alternative B (Reclamation GIS 2020), an increase of 0.7 acres compared with Alternative A because of construction activities. Only 0.25 acres would be permanent disturbances because of new infrastructure in the 100-year floodplain and Icicle Creek. None of the new infrastructure would be of a configuration or height that would alter water flow during a 100-year flood in such a manner as to threaten downstream conditions.

Temporary in-stream impacts would occur during the use of cofferdams. **Appendix B**, Best Management Practices (BMPs), contains BMPs that would be implemented to minimize impacts on stream geomorphology during construction.

Preparation of the streambed, placement, and removal of the cofferdams would mobilize sediments on the Icicle Creek streambed. This could increase turbidity in and downstream of the work area during and shortly after cofferdam placement or removal. Also, the cofferdams would confine surface water flow through a constricted portion of Icicle Creek during construction. Natural stream flow, excluding the temporary 40 cubic feet per second (cfs) diversion to the Hatchery, would be maintained within the greatest amount of natural streambed width as possible during the use of the cofferdams. A minimum depth of 0.8 feet would always be maintained within the greatest amount of the natural stream channel during the use of the cofferdams to facilitate fish passage.

The cofferdam design is estimated to be approximately 12-feet wide at the base with a tapered width as it rises to approximately 9-feet. The temporary cofferdams would likely consist of geo-bags, or non-woven geotextile bags. These are large bags made of synthetic materials, such as polyester, polypropylene, or polyethylene, which are filled with sand, rock, or other material, and fastened shut. Cofferdam configurations are modeled for a July through October construction timeframe in *Surface Water Intake Screening and Fish Passage 2D Hydraulic Modeling* and are incorporated here by reference (Reclamation 2020b). The hydraulic modeling informs height requirements to prevent overtopping and identifies high velocity areas that may require additional stabilization to prevent breaching failure from lateral erosion.

Cofferdams would be used between July 1 and November 15 for two separate construction seasons to complete Phase I construction. Typically, mean daily flows peak during snowmelt months in late spring (May to June) and can drop quite low for autumn months (September to December) (Reclamation 2020b). Changes to stream geomorphology from cofferdam use would be minimized during autumn months because of low flow conditions.

High flows generally occur in May and June, but winter months can have high flows or extensive snow and ice conditions. Occasionally peak annual floods have occurred in July and October, which may require adjustment to the start and completion date for a given construction year (Reclamation 2020b). As flow in the creek increases, more water is forced to flow through a constricted portion of Icicle Creek during construction. The rapid flow through a confined area can scour the creek bed or creekbank. Snow and ice can block water flow; this would be more likely to occur in confined areas.

Floods would also be a concern for inundating areas and overtopping a cofferdam. Geo-bag cofferdams would not be suitable for use in Icicle Creek during heavy or prolonged precipitation or rain-on-snow events that typically occur between November and April, or during typical flows resulting from spring runoff in May and June. The possibility of flash-flooding events in Icicle Creek is not speculative; analysis of long-term flow data indicates a 50 percent probability that mean daily flow rates can more than double during fall flash-flow events, and increase by a dramatic order of magnitude during certain spring runoff events (Reclamation 2020b). Cofferdams are proposed for use from July 1 to November 15 of each of the two Phase I construction seasons, thus there is the potential for overtopping in early November, depending on the precipitation events.

Both typical and unpredictable high-flow events would have the potential to dislodge or destroy geo-bag cofferdams. Further, cofferdam failure during high flows could release tons of sediment or rock into Icicle Creek. Depending on the volume and type of material released, there could be long-term changes to the Icicle Creek streambed, primarily by increasing the proportion of sands, gravels, and fine sediments. Further, cofferdam failure could expose uncured concrete to water in Icicle Creek. Concrete is highly alkaline (pH 12.5). If concrete were cast less than four days before cofferdam failure, the leaching of alkali from the uncured concrete would likely result in increases to both the pH and phosphorus levels in Icicle Creek, which could also lead to a violation of the pH and phosphorus TMDLs.

During construction, open trench work would occur next to Icicle Creek. This would involve removing trees adjacent to Icicle Creek during Phase I and Phase II. Activities that modify the amount of shade over streams have been associated with increases in water temperature. The loss of riparian vegetation can be directly linked to increased water temperatures due to the loss of shade. Also, the solubility of oxygen decreases as water temperature increases. The number of trees that would be removed is unknown, but tree removal under Alternative B could contribute to increasing water temperature and lower dissolved oxygen. To address this, Phase III would involve planting riparian trees. These impacts would persist until riparian trees matured.

During operation and maintenance, compared with Alternative A, the intake design would manage sediment deposition to prevent accumulation of sediment that would impede or bury the fish screens at the intake location. It would also manage debris including large logs that may be transported into the site and impact fish passage or intake operations. This would allow sediment and logs to remain in the creek and contribute to stream conditions and no longer affect intake operations.

Arrangement of bed materials would demonstrate similar channel complexity to the adjacent stream reaches. The cap of the existing low-head diversion dam would be removed or buried, and the channel would be recontoured to promote fish passage and the movement of sediment from above the intake to downstream areas, thereby improving stream flow and stream conditions. Also, because the site uses a constructed roughened channel, an annual (at a minimum) monitoring plan at least until after a 50-year stream flow event has occurred would be prepared and implemented. This would identify any stream geomorphology concerns, such as accumulation of sediment exceeding levels that cannot be managed by proposed intake and delivery system design. Such cases would be considered extraordinary maintenance, which would occur on a case-by-case basis as determined to be necessary by the Hatchery.

During construction, surface disturbances and equipment use in and adjacent to Icicle Creek could result in contaminants entering the creek and affecting the quality of the water. Construction would occur within the area isolated by the cofferdam and adjacent to the creek. This would involve the use of equipment containing lubricants, fuel, or other substances, that could contaminate creek water if, for example, these materials were deposited on the ground during construction work and carried to the creek by surface water runoff. Surface water runoff can also carry soil into the creek from areas where the soil surface is disturbed during construction work, thereby increasing turbidity downstream in the creek.

Under Alternative B, increases or decreases to water quality concentrations or limits as they relate to the state standards and construction permit limits would be addressed by complying with the following permits or approvals:

- CWA Section 401 from the Washington Department of Ecology (Ecology)
- CWA Section 404 from the U.S. Army Corps of Engineers (USACE)
- Hydraulic Project Approval from the Washington Department of Fish and Wildlife (WDFW)

To meet CWA Section 401 and 404 requirements, Ecology would issue a letter of verification[2] that the proposed project complies with the terms and conditions of the CWA requirements of the USACE 404 nationwide permits. To further address sediment, BMPs (see **Appendix B**) would be implemented to minimize the release of sediment into Icicle Creek during construction.

Water quality would continue to be monitored during construction at the LNFH by the U.S. Fish and Wildlife Service (USFWS). Compliance with TMDLs for the LNFH would be monitored at RM 2.3, Ecology's TMDL monitoring site, to verify that construction at the intake is not exceeding TMDL limitations; exceedance of the TMDLs are not expected to occur. Additionally, BMPs in **Appendix B** would be implemented to minimize impacts on water quality.

Cement is rich in calcium and also contains aluminum and iron. All three can readily bind phosphorus. The TMDL indicates phosphorus is the limiting nutrient in Icicle Creek, and the nutrient tied to pH levels. Concrete used for proposed in-water infrastructure would be cured in place behind cofferdams for at least four days before exposure to Icicle Creek water. Similarly, because work to break apart and remove large boulders from the intake construction area would be done behind cofferdams, freshly fractured rock would not be expected to contribute phosphorus to Icicle Creek water. This would guard against fresh concrete or broken rock increasing phosphorus in surface water, especially during the critical periods March to May and July to October.

Alternative C

The impacts under Alternative C on stream geomorphology and water quality would be similar to those under Alternative B, except Alternative C would remove fewer streamside trees that shade Icicle Creek. The potential for increased water temperature and lowered dissolved oxygen would be reduced compared to Alternative B. There would be no tree removal in the area adjacent to Icicle Creek associated with Phase II construction.

Alternative D

The nature and type of impacts on stream geomorphology and water quality under Alternative D would be the same as those described under Alternative B; however, under Alternative D, Phase I construction would span four in-water work windows as compared to two under Alternative B, because construction would be limited to 7:00 a.m. to 10:00 p.m. and the in-water work window would be two weeks shorter (July 1 to October 31). Phase I construction would start in 2022 and

[2] Based on Andrea Jedel's (Ecology) determination during attendance at the February 19, 2020 Endangered Species Act and Permitting meeting held in Ellensburg, Washington.

end in 2025. As such, temporary impacts to stream geomorphology and water quality would be experienced over a longer total duration than under Alternative B.

Installation and removal of cofferdams would be required for each of the four Phase I construction in-water work windows (July 1 to October 31). For comparison, under Alternative B, installation and removal of cofferdams would be required for only two Phase I construction in-water work windows (July 1 to November 15). The types of impacts from cofferdam use would be the same as those described under Alternative B, but they would span two more in-water construction seasons. Additionally, due to the shorter in-water work window, Alternative D would reduce the potential for geo-bag cofferdams to be dislodged or destroyed due to high-flow events potentially occurring in November.

From November 1, 2022 to June 30, 2023, the Hatchery's surface water would be supplied by pumping from the spillway pool. Two high-capacity pumps would be used to provide 40 cfs of water to the Hatchery, with an additional back-up pump on site. Although long-term reliable delivery of water and the ability to meet Hatchery production goals would be improved under this alternative; there would be a risk of temporary impacts to Hatchery production from relying on pumps operating continuously for 8 months from 2022-2023. Pumping water from the spillway pool would recirculate Hatchery effluent water, as the pool is the location of the Hatchery's main discharge point. Over time, without water treatment, water quality reaching the Hatchery would be decreased.

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Acronyms and Abbreviations

	Full Phrase
BMPs	Best Management Practices
CFR	Code of Federal Regulations
cfs	cubic feet per second
CIPP	cure-in-place pipe
COIC	Cascade Orchard Irrigation District
CUA	contractor use area
CWA	Clean Water Act
Ecology	Washington Department of Ecology
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
Forest Service	U.S. Department of Agriculture, Forest Service
HPA	Hydraulic Project Approval
IO&MA	intake operations and maintenance area
LNFH	Leavenworth National Fish Hatchery
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NTU	nephelometric turbidity unit
O&M	operations and maintenance
pH	potential of hydrogen
RCW	Revised Code of Washington
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
RM	river mile
ROW	right-of-way
SWISP	Surface Water Intake Fish Screens and Fish Passage
TMDL	total maximum daily load
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife

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Chapter 1. General Project Information

The U.S. Department of the Interior, Bureau of Reclamation (Reclamation) has prepared an Environmental Impact Statement (EIS) for the Leavenworth National Fish Hatchery (hereafter, LNFH or Hatchery) Surface Water Intake Fish Screens and Fish Passage (SWISP) Project (**Map A-1** in **Appendix A**). The purpose of this specialist report is to provide a comprehensive environmental baseline and analysis of the potential impacts of the SWISP Project under four separate alternatives, including Alternative A, No Action.

1.1 Project Area

The Project Area is on and near the LNFH, near the City of Leavenworth in Chelan County, Washington. The Project Area includes the LNFH's surface water intake and primary point of diversion on Icicle Creek, and conveyance pipeline to the Hatchery. The surface water intake is on U.S. Fish and Wildlife Service (USFWS) property, while the conveyance pipeline crosses several private parcels before re-entering USFWS property. Access to private parcels is via existing easement agreements between the landowner and federal government. The Project Area also includes approximately 1.25 miles of Icicle Creek Road, from the surface water intake to a U.S. Department of Agriculture, Forest Service (Forest Service) kiosk to the west, as well as access roads and staging areas on the USFWS property. The Project Area is depicted on **Map A-1** in **Appendix A**.

1.2 Alternatives

Reclamation identified a reasonable range of alternatives for analysis in the EIS through the development of screening criteria, the assessment of Project *components* and *elements* against these criteria, and the consideration of scoping comments received. The major Project components are Intake, Fish Passage, Sediment Management, Conveyance Pipeline, Temporary Hatchery Water Supply, and Access and Staging. Each *component* has technical and operational requirements; generally, there are different techniques to meet these requirements. These different techniques are termed *elements*.

Chapter 2 of the EIS describes the No Action Alternative and three action alternatives in detail, along with a summary comparison of the differences and common impacts between the alternatives. A summary of the alternatives and component elements considered but eliminated from detailed study is also provided. **Map A-2** through **Map A-8** in **Appendix A** depict the alternatives in detail.

1.2.1 Alternative A – No Action

The No Action Alternative represents continuation of current operation and maintenance (O&M) of the LNFH surface water intake and delivery system on Icicle Creek and provides a basis for comparison to the action alternatives. The existing intake and delivery system, constructed in 1939

and 1940, would remain in its current degraded condition and likely continue to deteriorate. All existing features listed and summarized below and depicted in **Map A-2** and **Map A-3** in **Appendix A**, would remain in place and would not be modified, improved, or rehabilitated under this alternative.

- Low-head diversion dam
- Intake channel
- Intake trashrack structure
- Access road
- Fish ladder/Sediment sluice
- Gatehouse
- Outlet channel
- Conveyance pipeline
- Sand settling basin
- Inside and outside screen chambers

The diversion dam would continue to divert water from Icicle Creek to the intake channel, through an unscreened diversion. The start of the intake system would remain at the intake trashrack structure. The excavated intake channel above the intake trashrack structure and concrete intake channel below would continue to convey water through gravity flow to the gatehouse. The channel would remain unscreened. The intake trashrack structure at the entrance to the concrete intake channel would remain in operation. The trashrack's 6-inch bar spacing would continue to prevent large debris from entering the concrete intake channel. The road would not be modified or extended and would continue to provide access to the stairs leading to the intake trashrack structure. The existing fish ladder would not be modified to alter flow or enhance fish passage.

The existing gatehouse serves to transition surface water from the open intake channel to the enclosed conveyance pipeline. It houses a fine rack with 1.5-inch bar spacing and an overflow spill and sediment sluicing sections separated by a bulkhead. The fine rack limits the size of objects that enter the pipeline. A gate valve can be opened to flush sediment; however, it does not function reliably. The gatehouse would remain in place, and the outlet channel would continue to direct bypassed water and sluice material (sediment) from the gatehouse back to Icicle Creek.

The aging 31- to 33-inch diameter buried concrete pipeline would continue to convey water up to 42 cubic feet per second (cfs) from the gatehouse to the Hatchery. No sections would be lined or replaced and introduced sediment would continue to be transported to the Hatchery. Transported sediments would continue to degrade the existing pipeline. Before water enters the Hatchery's rearing units it is either routed into the sand settling basin (normal operation) or directly to the inside or outside screen chamber. The sand settling basin would continue to trap sediment and minimize the amount of remaining sediment from entering fish production facilities. Sediment and entrained fish would continue to be periodically removed from the sand settling basin in accordance with existing biological opinions (USFWS 2011; NMFS 2017). From the sand settling basin, water can be directed to either the inside or outside screen chamber before entering the Hatchery's rearing

units. The screens in the inside and outside screen chambers are composed of vertical static screen panels that filter fish and debris from the Hatchery's water supply. The screen chambers do not meet National Marine Fisheries Service (NMFS) current screening criteria (NMFS 2011) [1]. Screens must be manually cleaned, and entrained fish must be captured, removed, counted, and returned to Icicle Creek. LNFH reports the number and species of Endangered Species Act (ESA)-listed fish entrained in the intake and delivery system in their annual take report to NMFS and the USFWS.

Hatchery O&M is subject to both the National Pollution Discharge Elimination System (NPDES) permit from U.S. Environmental Protection Agency (EPA) and O&M consultations under the ESA Section 7 with NMFS and USFWS (USFWS 2011; NMFS 2017). Extraordinary maintenance would continue to be handled on a case-by-case basis as determined to be necessary by the Hatchery. ESA Section 7 consultation has been reinitiated with the USFWS for O&M of the Hatchery.

The Cascade Orchard Irrigation Company (COIC) is expected to relocate its point of diversion on Icicle Creek downstream of the Hatchery. Once the new point of diversion is constructed, COIC would no longer divert water at the current intake location.

1.2.2 Alternative B – Proposed Action

Reclamation proposes to rehabilitate the LNFH surface water intake and delivery system on Icicle Creek by constructing new headworks[2] and a creek-width roughened channel and replacing and lining the surface water conveyance pipeline to the Hatchery. In addition, the current access road would be modified and extended to provide better entry to an expanded Intake Operations and Maintenance Area (IO&MA). A conceptual drawing of the proposed intake facilities is included as **Map A-4** in **Appendix A**. See **Map A-5** and **Map A-6** in **Appendix A** showing activities proposed under Alternative B.

Intake and Fish Passage

Construction of the headworks and roughened channel would incorporate the existing low-head diversion dam and intake channel. The roughened channel would incorporate a portion of the fish ladder/sediment sluice; the unincorporated portion would be removed. Two self-cleaning, cylindrical, screens would be installed at the diversion headworks to comply with NMFS fish screening criteria, provide redundancy in case of screen maintenance, and to facilitate the Hatchery's ability to meet future water conservation goals. A low-flow boulder weir fishway would be integrated into the roughened channel to provide NMFS-compliant fish passage during typical low flows, and a portion of the roughened channel would be extended upstream of the diversion dam to facilitate fish passage overall and at higher flows in particular. The intake trashrack structure would be removed, and a new pipeline would be placed in the intake channel to connect the headworks to the conveyance pipeline. The intake channel would be filled to cover the pipeline and create the

[1] The existing inside and outside screen chambers meet NMFS standards for fish screening (NMFS 1997), but not current criteria (NMFS 2011). Even if the screen chambers were upgraded to NMFS current criteria, take would still occur. This is because take occurs at the point of entrainment, at the existing intake facilities on Icicle Creek. The screen chambers are at the distal end of the conveyance pipeline, approximately 6,300 feet from the existing intake facilities on Icicle Creek.

[2] Headworks means any dam, weir, barrage, or reservoir and all works appurtenant thereto, used for or in connection with the storage, control, conveyance, or distribution of water. For the SWISP Project, the headworks includes the combined intake structure elements, such as the intake structure, gates, and retaining walls.

IO&MA to enable Hatchery personnel to safely and efficiently access, operate, and maintain the intake facilities. The existing stairway from the access road to the intake channel would be removed as this area would become part of the IO&MA. See **Map A-4** in **Appendix A** for a conceptual drawing of the proposed intake facilities.

Sediment Management

Elements to manage sediment accumulated at the intake include a ramp on the upstream side of the roughened channel to help mobilize sediment over the feature, a vertical access pipe incorporated into the IO&MA behind the screens to enable a submersible pump to draw in screened water and force it through a hose and nozzle to mobilize sediment through propulsion, and a series of pipes, valves, and outlet channel at the pipeline intake and sediment management area (PISMA) to flush sediment through the intake pipeline back to Icicle Creek (as needed). Components of the PISMA would be placed at the former gatehouse location. See **Map A-4** in **Appendix A** for a conceptual drawing of the proposed intake facilities.

Conveyance Pipeline

Under Alternative B, approximately 2,180 feet of the conveyance pipeline would be replaced using cut and cover trenching on USFWS property and approximately 4,000 feet of conveyance pipeline would be lined with cure-in-place pipe (CIPP) on private parcels (**Map A-5** in **Appendix A**). Construction of several temporary access points (contractor use areas [CUAs]) along the existing conveyance pipeline alignment would be installed to provide ingress and egress for pipe lining on private lands. These areas would be restored to pre-construction conditions following lining activities.

The uppermost segment of the existing concrete cylinder pipeline on USFWS property would be removed and replaced with 520 feet of new 42-inch high-density polyethylene pipe in the same location. The 1,660 feet of the lower segment of pipeline on USFWS property would be constructed parallel to the existing concrete cylinder pipeline. The current control valve system at the sand settling basin on USFWS property would be replaced with a new control valve vault to allow safe pipe filling operations. After control valve connections are made, this segment of the existing pipeline would be decommissioned and abandoned-in-place. All rehabilitation, replacement, and modernization of the LNFH intake and delivery facilities would conclude at the control valve system; the sand settling basin and inside and outside screen chambers would remain unaltered.

Temporary Hatchery Water Supply

Temporary Hatchery water would primarily be supplied by a gravity-fed diversion. A 40 cfs water supply to LNFH would be maintained during Phase I construction[3]. Temporary pumping from the spillway pool would supply water while the gravity-fed bypass pipeline and outlet are installed and connected to the existing conveyance pipeline approximately 200-300 feet below the intake construction area. This would occur over an approximately 1-week period. It is likely that multiple pumps would be needed to supply this water.

[3] During Phase I construction, the LNFH has agreed to a 40 cfs temporary Hatchery water supply, which is different than the LNFH's full surface water right of 42 cfs.

A 20 cfs water supply to LNFH would be maintained during Phase II construction between April 17 to May 20. This would be needed when pipeline replacement, lining with CIPP, and pipeline interconnections were underway, and would occur through pumping from the spillway pool adjacent to LNFH (**Map A-5** in **Appendix A**).

Access and Staging

Staging and storage sites for construction equipment and materials, and construction staff administration and vehicle parking would be located at various places on LNFH grounds (see **Map A-5** and **Map A-6** in **Appendix A**). Trucks hauling construction equipment and containing construction materials would be required to turn around approximately 1.25 miles southwest of the intake access road, at the Forest Service and Alpine Lakes Wilderness Area kiosk on Icicle Creek Road. Construction access to the conveyance pipeline would use existing roads, temporary access routes, and the pipeline right-of-way (ROW).

Construction

Construction of the SWISP Project would occur in three phases. Phase I would include construction of the intake access road and rehabilitation of the intake structures and facilities (e.g., fish screens, fish passage). Phase II would include replacement and lining of the conveyance pipeline. There would likely be temporal overlap between parts of Phase I and Phase II construction. For instance, in July 2022, it is likely that construction of the proposed intake facilities may overlap with pipeline replacement on the Hatchery grounds (see **Appendix C** in the SWISP Project EIS for additional assumptions). Phase III would include revegetation of upland and riparian areas that are proposed to be disturbed.

Phase I construction activities would occur up to 24 hours per day, 6 days per week, and up to 7 days per week. In addition, the in-water work window would be from July 1 to November 15 each year. Phase II construction activities and Phase III revegetation activities would not include any in-water work and would be limited to workday hours of 7:00 a.m. to 10:00 p.m., 5 days per week, and up to 6 days per week.

Phase I includes:

- Construction activities occurring up to 24 hours a day, up to 7 days a week.
- Construction occurring over two seasons primarily within the in-water work window of July 1 to November 15.
- Construction of intake access road (2022).
- Installation of temporary cofferdams[4] (2022 and 2023).
- Demolition of existing intake trashrack structure (complete), existing gatehouse (complete) and fish ladder/sediment sluice (partial) (2022).
- Construction of headworks, including the intake structure, retaining walls, and vertical access pipe for sediment management tools (2022).

[4] Temporary cofferdams would likely consist of geo-bags, or non-woven geotextile bags. These are large bags made of synthetic materials, such as polyester, polypropylene, or polyethylene, which are filled with sand, rock, or other material, fastened shut, and used to protect structures or riverbanks from erosion or scour.

- Placement of new intake pipeline (2022).
- Construction of IO&MA over the headworks, retaining walls, and intake pipeline (2022).
- Placement of guiderails, hydraulic equipment, NMFS-compliant fish screens, slide gates, covered control panel, and safety guardrails around the IO&MA (2022).
- Construction of the PISMA at former gatehouse location (2022).
- Rehabilitation of the outlet channel (2022).
- Construction of roughened channel, including upstream sediment ramp and low-flow boulder weir fishway (2023).
- Suppling LNFH with a temporary water supply of 40 cfs using a temporary above-ground, gravity-fed bypass pipeline connected to the conveyance pipeline or pumping from the spillway pool when necessary (2022).
- Post-construction seeding of disturbed areas that do not have a surface treatment (e.g., gravel) with an upland or riparian seed mix, as appropriate (2023).

Phase II includes:

- Construction activities occurring during workday hours of 7:00 a.m. to 10:00 p.m., 5 days per week, and up to 6 days per week.
- The majority of pipeline lining construction occurring over three seasons during a 4- to 5-week period between April and May.
- Pipeline replacement construction occurring year-round where practicable.
- Replacing conveyance pipeline segments on USFWS property (2022, 2023, and 2024).
- Utilizing existing roads and temporary access routes to gain access to CUAs, as coordinated with private landowners. No improvements are needed to existing roads and access routes.
- CIPP lining of the conveyance pipeline on private parcels from CUAs.
- Temporarily pumping Hatchery water out of the spillway pool during pipeline replacement, lining with CIPP, and pipeline interconnections. Pumping would take place between April 17 and May 20 during the Phase II construction period (2022, 2023, and 2024).
- Constructing new control valve vault and system on USFWS property (2022 and 2023).
- Post-construction seeding of disturbed upland areas (2022, 2023, and 2024).

Phase III includes:

- Planting of riparian tree cuttings in the riparian zone within the Phase I construction area (2024).
- Planting of containerized upland shrubs and trees in uplands within the Phase I construction area (2024).

Best Management Practices

Reclamation would implement practices to protect water quality and other resources and promote soil conservation during Project construction and O&M activities. While these measures are often called Best Management Practices (BMPs), they are conservation measures used to reduce project

impacts on resources and resource uses, including, but not limited to, fisheries and aquatic resources, Tribal interests, public health and safety, and recreation. BMPs can be a 'thing' installed on-the-ground (e.g., silt fence, ground cover vegetation) or a 'process' used to plan and conduct an activity (e.g., marking stream buffers). The comprehensive list of BMPs is included in this report as **Appendix B**.

Permitting

Because Alternative B would include work within Icicle Creek, several federal and state regulatory permit approvals would be required before construction begins. Reclamation would obtain all required regulatory permits prior to construction implementation. Reclamation would use the Washington State Joint Aquatic Resources Permit Application form to apply for applicable permits. Permits that would be obtained include:

- U.S. Army Corps of Engineers (USACE) Section 404 Nationwide Permits
- Washington Department of Ecology (Ecology) Section 401 Water Quality Certification
- Washington Department of Fish and Wildlife (WDFW) Hydraulic Project Approval

Alternative B would also include the use of Icicle Creek Road on National Forest System lands, between the Snow Lakes Trailhead and the Forest Service and Alpine Lakes Wilderness Area kiosk. As a result, Reclamation would secure the required road use approval from the Forest Service, most likely under a special use permit. The kiosk is approximately 1.25 miles southwest of the intake facilities.

Operations and Maintenance

O&M activities would periodically occur on an as-needed basis as determined by Hatchery staff, including daily visual inspections of the proposed intake facilities. Periodic maintenance of the fish screens would be facilitated by construction of the proposed IO&MA, while O&M of the conveyance pipeline would be facilitated by the PISMA and the new control valve system at the sand settling basin.

Hatchery O&M is subject to both the NPDES permit from the EPA and O&M consultations under the ESA Section 7 with NMFS and USFWS (USFWS 2011; NMFS 2017). Extraordinary maintenance is handled on a case-by-case basis as determined to be necessary by the Hatchery.

1.2.3 Alternative C

Under Alternative C, Reclamation would rehabilitate the LNFH surface water intake and delivery system on Icicle Creek as described under Alternative B. However, under Alternative C, Reclamation would line the entire upper segment (520 feet) of the conveyance pipeline on USFWS property with CIPP instead of replacing it, as described under Alternative B (**Map A-7** and **Map A-8** in **Appendix A**). As a result, the mature trees in the Icicle Creek riparian zone found in this conveyance pipeline segment would not be removed. Under Alternative C, the length of the conveyance pipeline, from the PISMA to CUA 5 (4,520 feet), would be lined with CIPP. The remaining segments lined with CIPP on private parcels and replaced on the Hatchery grounds proper would be the same as described under Alternative B (see **Map A-7** in **Appendix A**). A conceptual drawing of the proposed intake facilities is included as **Map A-4** in **Appendix A**.

A 20 cfs water supply to LNFH would be maintained during Phase II construction between April 17 and May 20, as described under Alternative B. No temporary pumping would be necessary for pipeline replacement during Phase II construction because the upper segment of the conveyance pipeline on USFWS property would be lined with CIPP instead. As discussed under Alternative B, temporary pumping would be needed while the conveyance pipeline is lined with CIPP, and when pipeline interconnections were underway.

Hatchery O&M is subject to both the NPDES permit from the EPA and O&M consultations under the ESA Section 7 with NMFS and USFWS (USFWS 2011; NMFS 2017). Extraordinary maintenance is handled on a case-by-case basis as determined to be necessary by the Hatchery.

1.2.4 Alternative D

Under Alternative D, Reclamation would rehabilitate the LNFH surface water intake and delivery system on Icicle Creek as described under Alternative B but with the following differences. Phase I construction activities would be same as Alternative B but would be limited to workday hours of 7:00 a.m. to 10:00 p.m., 5 days per week, and up to 6 days per week. In addition, the in-water work window would be limited to July 1 to October 31 each year. Alternative D was developed to minimize the effects of 24 hours a day construction and reduce the overlap of cofferdam use with a period of greater high-flow risk. Phase II construction activities and schedule would be the same as described under Alternative B. Phase III revegetation efforts would be the same as described under Alternative B except would occur a year later (2025).

The components and elements of the surface water intake facilities and construction activities would be the same as described for Alternative B during Phase I; however, because construction would be limited to workday hours of 7:00 a.m. to 10:00 p.m. and the in-water work window would be two weeks shorter than under Alternative B, construction of Phase I under Alternative D would require four years (i.e., four in-water work windows from 2022 to 2025) to complete. The sequence of Phase I construction activities would be very similar to those listed for Alternative B but would extend through two additional in-water work windows during two additional years (2024 and 2025). Initial mobilization, construction of the intake access road, temporary Hatchery water supply during the in-water work window, access and staging, BMPs, permitting, and O&M would be unchanged from Alternative B. Details of the Phase I construction schedule for intake and fish passage and temporary Hatchery water supply components for Alternative D are provided below.

During the first in-water work window in 2022, preparation for and installation of cofferdams and the gravity bypass pipeline and gravity bypass outlet, demolition of the intake trashrack structure, gatehouse, fish ladder/sediment sluice (partial), and construction of the PISMA and outlet channel, would be the same as Alternative B (**Map A-6** in **Appendix A**). However, because of the shorter workdays and shorter in-water work window, construction of the intake structure would be limited to excavation, preparation and construction of the concrete slab foundation, and partial construction of the intake headworks. At the end of the 2022 in-water work window, the intake structure would be approximately 35 percent completed. Although the full extent of the intake headworks foundation would be in place, the area of the partially constructed intake headworks would be inundated between the 2022 and 2023 in-water work windows after cofferdam removal.

Demobilization of construction equipment in 2022 would leave the constructed elements of the intake structure in this condition until July 2023 when re-mobilization occurs.

From November 1, 2022 to June 30, 2023, the Hatchery's surface water would be supplied by pumping from the spillway pool on Icicle Creek adjacent to LNFH (**Map A-5** in **Appendix A**). Two high capacity pumps[5] would provide 40 cfs of water to the Hatchery during this period. An operational third pump would be on site as a backup. The pumps would operate 24 hours per day for the 8-month period; as a result, they would require 24 hour per day, 7 day per week monitoring by the construction contractor.

During the second in-water work window in 2023, preparation for and installation of cofferdams and the gravity bypass pipeline and gravity bypass outlet again would occur as described under Alternative B. The remaining 65 percent of construction of the intake structure components and elements would be completed before cofferdam removal. By the end of the 2023 in-water work window, fish screens would be in place and fully operational, and the temporary gravity bypass pipeline and gravity bypass outlet would be removed. In addition, the transition to the new intake structure would be completed by connecting intake facilities to the conveyance pipeline to deliver the LNFH surface water supply by October 31, 2023. Because the intake structure would be fully operational at the end of this in-water work window, there would be no need to supply temporary water to the Hatchery during the remainder of Phase I construction.

During the third in-water work window in 2024, mobilization similar to previous Phase I in-water work window construction seasons would be required before construction of the low-flow boulder weir fishway and the left bank portion of the roughened channel could occur. Construction of the low-flow boulder weir fishway and the left bank portion of the roughened channel would include placement of cofferdams, dewatering of the construction area, regrading of the stream channel bottom, construction of the low-flow boulder weir fishway and the left bank portion of the roughened channel and finally, removal of the cofferdam.

During the fourth in-water work window in 2025, mobilization similar to previous Phase I in-water work window construction seasons would be required before construction on the remaining portion (right bank) of the roughened channel could occur. Construction of the remaining portion of the roughened channel would include placement of cofferdams, dewatering of the construction area, regrading of the stream channel bottom, construction of the roughened channel and finally, removal of the cofferdam. Once the entire roughened channel is complete and all cofferdams have been removed, the intake facilities would undergo final testing and commissioning to ensure proper operation and compliance with NMFS current screening and fish passage criteria for anadromous fish passage facilities (NMFS 2011), which would occur by October 31, 2025.

[5] Pumps are assumed to be high-lift, 16-inch, trailer-mounted with 150 horsepower diesel engines.

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Chapter 2. Relevant Laws, Regulations, and Policy

2.1 Federal Laws, Regulations, Statutes, and Orders

Columbia Basin Project Act of March 1943 (57 Stat. 14, Public Law 78-8) – This act reauthorized the Columbia Basin Project, bringing it under the provisions of the Reclamation Project Act of 1939.

The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Under the CWA, the EPA has implemented pollution control programs, such as setting wastewater standards for industry. The EPA has also developed national water quality criteria recommendations for pollutants in surface waters. The CWA made it unlawful to discharge any pollutant from a point source into navigable waters unless a permit was obtained. The EPA's NPDES permit program controls discharges. Point sources are discrete conveyances such as pipes or human-made ditches. Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters (EPA 2020a).

Section 303(d) of the CWA requires states to identify waters where current pollution control technologies alone cannot meet the water quality standards set for that waterbody. These waters are called impaired waters. Every 2 years, states are required to submit a list of impaired waters plus any that may soon become impaired to the EPA for approval. The list is called the 303(d) list. States must establish the total maximum daily load(s) (TMDL) of the pollutant(s) in the waterbody for impaired waters on their list. The impaired waters are prioritized based on the severity of the pollution and the designated use of the waterbody (EPA 2020b). Designated uses are sometimes called "beneficial uses" or "designated beneficial uses." Designated uses mentioned in the CWA include public water supply; protection of fish, shellfish, and wildlife; recreation; and navigation.

States have also adopted other designated uses, such as agriculture, industry, and aesthetics. The Water Quality Standards Regulation (40 Code of Federal Regulations [CFR] 131) establishes the requirements for states and Tribes to review, revise, and adopt water quality standards. It also establishes the procedures for the EPA to review, approve, disapprove, and promulgate water quality standards pursuant to Section 303 (c) of the CWA (EPA 2020c). The National Toxics Rule (40 CFR 131.36) describes the chemical-specific, numeric criteria for priority toxic pollutants. This was necessary to bring all states into compliance with the requirements of Section 303(c)(2)(B) of the CWA (EPA 2020d).

Under Section 401 of the CWA a federal agency may not issue a permit or license to conduct any activity that may result in any discharge into waters of the United States unless a state or authorized

tribe where the discharge would originate issues a CWA Section 401 water quality certification verifying compliance with existing water quality requirements or waives the certification requirement. CWA Section 401 certification is required before a CWA Section 404 permit can be issued (EPA 2020h).

Section 404 of the CWA establishes a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Activities in waters of the United States regulated under this program include fill for development, water resource projects (such as dams and levees), and infrastructure development. For most discharges that will have only minimal adverse effects, a general permit may be suitable. General permits are issued on a nationwide, regional, or state basis for particular categories of activities. The USACE enforces CWA Section 404 permit provisions (EPA 2020i).

2.2 State and Local Laws

Under the CWA, states perform water quality assessments and track the cleanliness of rivers, lakes, and marine waters. Assessed waters are placed in one of the following five categories that describe the water quality status (Ecology 2020a, 2020b):

- Category 1: Meets tested standards for clean waters
- Category 2: Waters of concern
- Category 3: Insufficient data
- Category 4: Impaired waters that do not require a TMDL
- Category 5: Polluted waters that require a water improvement project

Chapter 173-201A Washington Administrative Code (WAC) contains water quality standards for surface waters of the state of Washington. Waters whose designated uses (listed in WAC Sections 173-201A-200, 173-201A-600, and 173-201A-602) that are impaired by pollutants are placed in the polluted water category (Category 5) of the water quality assessment (Ecology 2020a). The 303(d) list contains waters in the polluted water category. TMDLs or other approved water quality improvement projects are required for waterbodies with Category 5 impairments (Ecology 2020b). A TMDL is a numerical value that represents the highest amount of a pollutant a surface water body can receive and still meet the standards (Ecology 2020c).

Sections 303(d) and 305(b) of the CWA require states to identify and characterize waters that do not meet, or are not expected to meet, applicable water quality standards. The Washington State water quality standards applicable to Icicle Creek are as follows (Reclamation and USFWS 2018):

- Temperature: 55 degrees Fahrenheit (13 degrees Celsius) from August 15 to July 15 and 61 degrees Fahrenheit (16 degrees Celsius) from July 15 to August 15[6].
- Turbidity: To protect core summer salmonid habitat, the maximum turbidity shall not exceed 5 nephelometric turbidity units (NTUs) over background when the background is 50

[6] Natural water temperatures for Icicle Creek often exceed the limits set in the TMDL.

NTUs or less; or a 10 percent increase in turbidity when the background turbidity is more than the 50 NTUs.

- Ecology completed a TMDL for the Wenatchee River watershed, including Icicle Creek, for dissolved oxygen and pH, which was approved by the EPA on August 25, 2009.
  - Phosphorus: The TMDL allocates 5.7 micrograms per liter (maximum daily total phosphorus concentration) and 0.52 kilograms per day of total phosphorus maximum daily mass loading during the critical periods of March through May and July through October to the LNFH. Construction activities may need a separate NPDES permit than what the LNFH operates under. If needed, this would be obtained by the construction contractor.
  - Dissolved oxygen: To protect core summer salmonid habitat, the 1-day minimum dissolved oxygen criterion is 9.5 milligrams per liter and should not fall below this concentration frequency more than once every 10 years on average.
  - pH: pH shall be within the range of 6.5 to 8.5 standard units, with a human-caused variation within the above range of less than 0.2 units.

Washington law (Chapter 77.55 Revised Code of Washington [RCW]) requires people planning hydraulic projects in or near state waters to get a Hydraulic Project Approval (HPA) from the Washington Department of Fish and Wildlife. This includes most marine and fresh waters. An HPA ensures that construction is done in a manner that protects fish and their aquatic habitats. A hydraulic project is construction or other work activities conducted in or near state waters that will use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh waters of the state. The state's Hydraulic Code Rules (Chapter 220-660 WAC) identify projects and activities that require an individual HPA (Washington Department of Fish and Wildlife 2020).

2.3 Other

The *Final Programmatic Environmental Impact Statement for the Icicle Creek Water Resource Management Strategy (Icicle Strategy)*, prepared jointly by Chelan County and Ecology (2019), is important to consider in this action. Although it is not a part of the regulatory framework, it evaluates the potential environmental impacts of implementing a comprehensive water resource management strategy in the Icicle Creek subbasin (see Figure 1-1 in Chelan County and Ecology 2019). Accordingly, any water resource management plan that develops as a result of their work will influence water use for the LNFH.

The *Icicle Strategy* is a comprehensive water resource management plan designed to balance and meet out-of-stream and instream water demand and resolve habitat and fisheries issues in the Icicle Creek subbasin. The strategy builds on guiding principles adopted by the Icicle Work Group to take a holistic approach to watershed management. The work group comprises a diverse set of stakeholders representing local, state, and federal agencies, Tribes, irrigation and agricultural interests, and environmental organizations. The guiding principles are as follows:

- **Improve Instream Flow—**This principle seeks to improve and enhance instream flows in the Icicle Creek Historical Channel. The goal is to modulate the flow in a way that enhances

fish passage and fish utilization and promotes healthy habitats, serves channel formation function, meets aesthetic and water quality objectives, and is resilient to climate change. The metric (guiding principle flow target) calls for a minimum flow of 60 cfs in the Historical Channel of Icicle Creek in drought years. The average drought-year low flow over the last 20 years is 20 cfs; therefore, to meet the drought-year target, an additional 40 cfs in project flow benefit will be needed. The short-term goal for non-drought years is 100 cfs, with a long-term goal set at 250 cfs. The average non-drought year low flow over the last 20 years is 45 cfs; therefore, to meet the non-drought year goal in the short term, again approximately 40 cfs additional flow will be needed. A maximum flow of 2,600 cfs can pass through LNFH's Structure 2 at River Mile (RM) 3.9 and is used to divert flows into the LNFH's Hatchery Channel. Based on work conducted by the Icicle Work Group's Instream Flow Subcommittee, this flow maximum will remain in place.

- **Improve Sustainability of LNFH—**This principle aims to enhance and maintain a healthy, sustainable LNFH that produces fish in adequate numbers to meet *U.S. v. Oregon* (*Sohappy v. Smith*, "Belloni Decision," Case 899, July 8, 1969), which specifies fish production requirements. It also aims to produce diverse source availability to maximize fish health. An additional goal of the *Icicle Strategy* is to implement water conservation and other measures at the Hatchery that would reduce surface water use and improve access to groundwater. These include consideration of water reuse, groundwater augmentation, and a pump back that would allow for changing operations at Structure 2 and the division of water between the Historical and Hatchery Channels (Ecology and Chelan County 2019). These measures would facilitate a reduction in surface-water diversions to the Hatchery of 20 cfs, which would be used to enhance instream flow in Icicle Creek.

Even with this reduction in surface-water use, improved access to groundwater, water reuse, and other measures would allow the Hatchery a dependable long-term supply of 57 cfs. The strategy also includes using appropriately screened diversions and minimizing unintended barriers to fish passage. An additional principle of the strategy is to protect treaty/non-treaty harvest. Treaty harvest by the Yakama Nation, the Confederated Tribes of the Colville Reservation, and non-treaty fishing are important parts of the Icicle Creek subbasin. This principle maintains that Tribal and non-Tribal, federally protected fishing and harvest rights must be met at all times, regardless of season or drought conditions. It aims to improve the catch per unit effort and maintain multispecies harvest opportunities.

- **Improve Domestic Supply—**As the population inside the Icicle Creek subbasin grows, more water will be needed by the City of Leavenworth and surrounding areas in Chelan County. This principle calls for 1,750 acre-feet of reliable year-round water supply to the city, with 3 to 6 cfs on average and 6 to 12 cfs during peak flows, to provide for projected growth through 2050. Additionally, this principle aims to improve domestic reliability for rural water users in the Icicle Creek subbasin who depend on domestic wells to supply their drinking water.
- **Improve Agricultural Reliability—**With agriculture vital to the health and prosperity of the region, this principle calls for project proponents to improve agricultural reliability that are operational and flexible, that decrease the risk of drought impacts, and that are

economically sustainable. It seeks to ensure that current "interruptible agricultural users" have a firm supply in average water years. An interruptible agricultural user is one whose water right is junior to the 1983 instream flow rule.

- **Enhance Icicle Creek Habitat—**This principle seeks to improve ecosystem health by protecting and enhancing aquatic and terrestrial habitat in the Icicle Creek subbasin. This includes investing in physical habitat improvements that consider high-flow habitat and low-flow refuge, along with minimizing impediments to fish passage and improving limiting factors for spawning/rearing. It also offsets project-related terrestrial impacts with land acquisitions and easements.
- **Comply with State and Federal Law and Wilderness Acts—**Projects developed under the *Icicle Strategy* must comply with both Washington State and federal laws, including The Wilderness Act of 1964, the Alpine Lakes Wilderness Act of 1976, and the Alpine Lakes Wilderness Management Plan of 1981. The Icicle Work Group engaged regulators in the process of creating the approaches and projects for the *Icicle Strategy*.

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Chapter 3. Affected Environment

3.1 Analysis Area

For water resources (stream geomorphology and water quality), the Analysis Area is where proposed Project activities would occur along the Icicle Creek corridor. It stretches from the hydraulic drop approximately 230 feet upstream from the LNFH intake facilities to RM 2.3 at the Ecology compliance point on Icicle Creek, downstream from the LNFH, and includes the Hatchery Channel and the Historical Channel (see **Map A-9** in **Appendix A**).

3.2 Stream Conditions

As described in the *Icicle Strategy*, the Icicle Creek subbasin is the largest subbasin in the Wenatchee River Watershed. Mainstream Icicle Creek is approximately 32 miles long. It begins in the Alpine Lakes Wilderness at Josephine Lake and discharges into the Wenatchee River at the City of Leavenworth (see Figure 1-1 in Chelan County and Ecology 2019). Flows peak in June, with a steady decline throughout the rest of the summer. Low flows typically occur in September and remain low through early October. Streamflow then begins to increase in response to autumn precipitation and remains steady through winter. When snow begins melting in spring, streamflow increases until its summer peak (Chelan County and Ecology 2019).

Surface flows for Icicle Creek are continuously measured at the U.S. Geological Survey gauging station (No. 12458000) located at RM 5.8. This gauging station is located above all water withdrawal operations in the watershed. This is the only relatively consistently monitored flow data available for Icicle Creek prior to 2007. The annual mean flow of Icicle Creek at the gauging station is 630 cfs. In general, lowest daily flow is experienced during September and October, although daily mean flow of less than 100 cfs has occurred September through February. Most high-flow events occur in May and June during snowmelt. During drought conditions in Icicle Creek, streamflow has been as low as 50 cfs for short periods (Reclamation and USFWS 2018). Water flow is described in further detail in the *Icicle Strategy* (Chelan County and Ecology 2019, pp. 3-10–3-15) and Snow Lake Water Release Control Valve Replacement Finding of No Significant Impact and Final Environmental Assessment (Reclamation and USFWS 2018, pp. 43–49); they are incorporated by reference.

As described in *Icicle Creek Restoration Project Final Environmental Impact Statement*, since construction of the LNFH in 1941, Icicle Creek has been split into two distinct channels at a point just upstream of the LNFH (**Map A-9** in **Appendix A**). At the upper end of the Historical Channel, a headgate controls flow into an artificially excavated canal (i.e., Hatchery Channel) or the Historical Channel, or both. At high flows, most of the flow goes through the Hatchery channel. At low flows, most of the water flows in the Historical Channel. Over time, the historical Icicle Creek has evolved from a riverine system to a wetland as sediment has accumulated and vegetation has encroached because of

reduced flows. Stream dynamics are described in further detail in the Icicle Creek Restoration Project Final Environmental Impact Statement and are incorporated by reference (USFWS 2002, p. 3-4).

Unconsolidated glacial and alluvial deposits overlie the bedrock along the Icicle Creek drainage and its tributaries. These unconsolidated deposits are laterally discontinuous in the Icicle Creek drainage above the LNFH, where the bedrock-bound valleys are narrow. Adjacent to and below the LNFH, the Icicle Creek drainage broadens as it approaches the Wenatchee River (Chelan County and Ecology 2019).

Icicle Creek transitions from a narrow, bedrock-dominated valley to a broader valley with more extensive, unconsolidated glacial and alluvial deposits immediately upstream of the LNFH at approximately RM 4. The upstream edge of this area is also near the location of a surface water diversion on Icicle Creek shared by the LNFH and COIC at RM 4.5 (see Figure 1-1 in Chelan County and Ecology 2019). Another diversion, operated by Icicle-Peshastin Irrigation District, is located farther upstream. The LNFH also operates the Hatchery Channel, a human-made canal constructed between the LNFH grounds and Icicle Creek that has a high seepage rate and therefore is used to recharge the local aquifer periodically (Chelan County and Ecology 2019).

As described in the *Icicle Strategy*, the timing and volume of flows along Icicle Creek influence the potential for localized flooding and erosion. In general, the Icicle Creek subbasin is adapted to a range of flow rates, with higher flows in the winter and spring, and lower flows in the late summer and early fall. Under typical conditions, minor streambank erosion occurs in a manner typical to stream systems with peak spring flows resulting in increased stream turbidity. Because diversion facilities are typically operated to manage flows and water supply in the late summer, their operation does not have as much impact on peak flow rates in Icicle Creek, which typically occur during the winter or spring (Chelan County and Ecology 2019). During years when precipitation is higher than average, increased creek flows may contribute to increased localized flooding, erosion, and stream turbidity. Areas with a higher risk of flooding include areas along the banks and floodplain of Icicle Creek from the boulder field at RM 5.6 to the City of Leavenworth (Chelan County and Ecology 2019).

The nearly 80-year-old LNFH surface water intake and delivery system is rapidly deteriorating and is reaching the end of its design life, creating excessive operation and maintenance problems for the LNFH. The current diversion system on Icicle Creek, at RM 4.5, consists of a concrete rubble dam and modified intake. Upgrades have been retrofitted into the existing older system. Operation of the system is complicated by large accumulations of silt and sediment during spring runoff. In addition, during harsh winter conditions, intake water can be cut off or reduced due to massive frazil, and anchor ice builds up on the existing intake racks. The removal of this ice is required to maintain proper water supply to the LNFH (Reclamation 2020a).

The current diversion system is in a confined canyon and channel width is limited. A rapid exists about 1,000 feet upstream of the diversion pool that creates a natural break in the extent of the backwater pool. Immediately downstream of the existing low-head diversion dam, a natural boulder drop of about 2 to 3 feet is present with a deep 3-foot scour hole formed from the hydraulic drop

over the boulders. The channel profile consists of numerous runs and riffles with occasional shallow pools. The channel bed consists of large boulders and bedrock armor with sand, gravel, and cobble deposits. The hydrology and sediment characteristics of Icicle Creek are described in further detail in *Surface Water Intake Screening and Fish Passage 2D Hydraulic Modeling* and incorporated by reference (Reclamation 2020b).

The largest portion of the incoming sediment load to the diversion structure is estimated to be sand to fine gravel, with a small portion being larger gravels and cobbles. The channel bed is visibly composed of large cobbles and boulders in rapids, with sand and gravels present in pools and on sediment bars and low floodplain. Channel margins often contain pockets of fine sediment (silt and clay) and fine sand deposited in between the exposed boulders (Reclamation 2020b).

3.3 Water Quality

As described in the *Icicle Strategy* (Chelan County and Ecology 2019), designated uses for various locations in Icicle Creek are aquatic life uses, recreational uses, water supply uses, and miscellaneous uses (**Table 1**). Potential sources of water quality degradation include flow diversion, stormwater runoff from adjacent roads and developed areas, point-source discharges from water treatment plants and other facilities, non-point-source pollutants from septic systems, and recreational uses. Water quality parameters affected by pollutants from these sources include temperature, dissolved oxygen, pH, turbidity, nutrients, fecal coliform bacteria, and concentrations of various pollutants, including heavy metals and organic compounds (Chelan County and Ecology 2019).

On Ecology's current water quality assessment, Icicle Creek has several Category 4a listings (already have an EPA-approved TMDL plan in place and implemented) for temperature, dissolved oxygen, and pH. The Category 4a temperature listings occur at various locations in Icicle Creek, including downstream of Snow Creek, downstream of the East Leavenworth Road Bridge, and upstream of the Icicle Creek confluence with the Wenatchee River (see Figure 1-1 in Chelan County and Ecology 2019). The temperature listings are being addressed by Ecology's Wenatchee River Watershed Temperature TMDL Water Quality Improvement Report (July 2007; Chelan County and Ecology 2019). The maximum allowable effluent temperature wasteload allocation for the LNFH is 18 degrees Celsius (Ecology 2007).

The Category 4a listings for dissolved oxygen and pH occur downstream of the East Leavenworth Road Bridge and upstream of Icicle Creek's confluence with the Wenatchee River. The Icicle Creek LNFH diversion channel is also listed as a Category 4a water for dissolved oxygen. These impairments are being addressed under Ecology's Wenatchee River Watershed Dissolved Oxygen and pH TMDL Water Quality Improvement Report (Revised August 2009) and its associated addendum (March 2012; Chelan County and Ecology 2019).

A portion of Icicle Creek also has a Category 4c listing (impaired by causes that cannot be addressed through a TMDL plan) for instream flow impairment. These conditions are attributed to upstream consumptive uses of water, including streamflow diversions for irrigation, municipal water supply for the City of Leavenworth, and process water supply for the LNFH (Chelan County and Ecology 2019).

Table 1
Icicle Creek Designated Uses

Waterbody	Aquatic Life Use: Char Spawning/Rearing	Aquatic Life Use: Core Summer Habitat	Aquatic Life Use: Spawning/Rearing	Aquatic Life Use: Rearing/Migration Only	Aquatic Life Use: Redband Trout	Aquatic Life Use: Warm Water Species	Recreation Use: Extraordinary Primary	Recreation Use: Primary Contact	Recreation Use: Secondary Contact	Water Supply Use: Domestic Water	Water Supply Use: Industrial Water	Water Supply Use: Agricultural Water	Water Supply Use: Stock Water	Miscellaneous Use: Wildlife Habitat	Miscellaneous Use: Harvesting	Miscellaneous Use: Commerce/Navigation	Miscellaneous Use: Boating	Miscellaneous Use: Aesthetics
Icicle Creek (including tributaries) from the mouth to the National Forest boundary (includes the Project Area)		X						X		X	X	X	X	X	X	X	X	X
Icicle Creek (including tributaries) from the National Forest boundary to the confluence with Jack Creek		X					X			X	X	X	X	X	X	X	X	X
Icicle Creek above and including Jack Creek (including all tributaries)	X						X			X	X	X	X	X	X	X	X	X

Source: Chelan County and Ecology 2019

There are multiple Category 2 (some evidence of a water quality problem, but not enough to show persistent impairment) listings for Icicle Creek. Two Category 2 listings for temperature occur in locations both immediately upstream of and within the LNFH Hatchery Channel. There are seven Category 2 listings for dissolved oxygen, upstream and within the LNFH Hatchery Channel and upstream of the East Leavenworth Road Bridge. As with the Category 4a listings, areas of low dissolved oxygen are being addressed under Ecology's Wenatchee River Watershed Dissolved Oxygen and pH TMDL Water Quality Improvement Report (Revised August 2009) and its associated addendum (March 2012; Chelan County and Ecology 2019).

Water quality is described in further detail in the *Icicle Strategy* (Chelan County and Ecology 2019, pp. 3-30–3-33) and *Snow Lake Water Release Control Valve Replacement Finding of No Significant Impact and Final Environmental Assessment* (Reclamation and USFWS 2018, pp. 51–53) and is incorporated by reference.

The LNFH has an NPDES permit to discharge wastewater from the Hatchery into Icicle Creek (NPDES Permit WA0001902). The Hatchery outfall is located at RM 2.7 (Chelan County and Ecology 2019). The EPA's effluent charts on the Enforcement and Compliance History Online website presents dynamic charts and tables of permitted limits, reported releases (discharge monitoring reports), and violations over time for CWA wastewater discharge permits issued under the NPDES (EPA 2020e). Effluent discharge violations over the past 3 years are presented in **Table 2**. In particular, the violation severity has been "Significant/Category 1 noncompliance" for total phosphorus each of the past 3 years. Facilities identified in Category 1 noncompliance are typically those facilities with the most serious violations of their permit effluent limits in terms of duration, frequency, and magnitude; other permit requirements; or enforcement order (EPA 2020f).

Table 2
Effluent Discharge Violations for NPDES Permit WA0001902
(May 2017 to May 2020)

Date Range	Pollutant	Outfall	Compliance Status
May 29, 2017 – May 29, 2018	Solids, total suspended	001 and 005	Violation identified
May 29, 2017 – May 29, 2018	Phosphorus, total	001 and 002	Significant/Category 1 noncompliance
May 29, 2017 – May 29, 2018	Phosphorus, total	005	Violation identified
May 29, 2018 – May 29, 2019	Phosphorus, total	001 and 002	Significant/Category 1 noncompliance
May 29, 2018 – May 29, 2019	Phosphorus, total	005	Violation identified
May 29, 2019 – May 29, 2020	Phosphorus, total	001 and 002	Significant/Category 1 noncompliance

Source: EPA 2020g

Icicle Creek is very sensitive to any addition of nutrients, especially phosphorus. Although phosphorus levels are relatively low, they are consistently too high to meet the pH water quality

standards. Nutrients (nitrogen and phosphorus) are necessary for algal growth of periphyton, and phosphorus is often the most limiting nutrient for algal growth in natural freshwater. Operational changes at the LNFH have taken place; compared with the 2002 concentrations, a decrease in phosphorus concentration in the discharge was observed in 2007. The final mass-loading effluent limit for total phosphorus, on all outfalls at the LNFH, comes directly from the wasteload allocation assigned to the LNFH in Ecology's Wenatchee River Watershed Dissolved Oxygen and pH TMDL Water Quality Improvement Report (Revised August 2009) and its associated addendum (March 2012). The maximum daily total phosphorus limit is 1.15 pounds (0.52 kilograms) per day and applies March 1 to May 31 and July 1 to October 31 each year (Reclamation and USFWS 2018).

Air temperatures are projected to continue to increase in the region, along with small increases in precipitation, shifts in the seasonality of precipitation, and increased high precipitation events. These changes could result in the Wenatchee River Watershed transitioning from a snow-dominant watershed to a rain/snowmelt transient watershed by the 2040s. There would be lower snowpack, earlier run off, and more precipitation falling as rain (Tohver 2016). Water temperature is assumed to increase as water input from snowmelt decreases.

Chapter 4. Environmental Consequences

Actions associated with the alternatives are described in **Section 1.2**, Alternatives. Also, proposed Project features are described in *Surface Water Intake Screening and Fish Passage 2D Hydraulic Modeling* and are incorporated by reference (Reclamation 2020b).

4.1 Methods

For the purposes of this analysis, impact duration is defined as follows:

- Temporary: impacts that would only occur during construction.
- Short-term: impacts that would be less than 3 years in duration.
- Long-term: impacts that would be 3 years or greater in duration.

4.1.1 Analysis Indicators

The indicators for identifying impacts on water resources relative to the baseline conditions are the following:

- Changes to stream geomorphology
- Increase or decrease to water quality standards (for temperature, dissolved oxygen, pH, and turbidity) outlined in Chapter 173-201A WAC.
- Compliance with the TMDL at Ecology monitoring point at RM 2.3.

Changes to aquifer recharge is not an indicator. Any seepage from the existing conveyance pipeline that could recharge the aquifer would be quite low. Also, LNFH personnel address any seepage from the conveyance pipeline, including seepage on private parcels where infrastructure may be affected. Furthermore, there are no plans to change the water diversion rate at the surface water intake, thereby maintaining current water supplies in Icicle Creek that contribute to aquifer recharge[7]. Therefore, there would be no opportunities to influence aquifer recharge associated with the proposed Project.

Changes to flooding is not an indicator. The top of the intake structure is set at an elevation of 1,207 feet. The modeled water surface elevation at the 100-year flood is between 1,205 and 1,206 feet at the upstream side of the intake structure. The water surface elevation drops to 1,204 ft near the intake fish screens. Modeled water surface elevation for the 100-year flood (13,300 cfs) for existing conditions ranges between 1,201 to 1,202 feet, which indicates this project would likely increase the diversion pool elevation by 4 to 5 feet during the 100-year flood. However, change in the extent of

[7] David Child, Bureau of Reclamation, Columbia-Cascades Area Office, professional email communication to Elizabeth Heether, Bureau of Reclamation environmental protection specialist, on April 17, 2020 regarding water supply in Icicle Creek.

inundation is small due to the steep slope of the upstream rapid (Reclamation 2020b). Construction would not occur during typical flooding periods. Proposed Project features would be designed to withstand a 100-year flood. There would be no opportunities to change flooding conditions under the proposed Project.

Changes to the toxic substances polychlorinated biphenyls and dichloro-diphenyl-ethane concentrations is not an indicator. Toxics standards are different than conventional water quality standards such as pH, temperature, and dissolved oxygen. Toxics standards contain criteria for chemicals and compounds such as metals, pesticides, and other organic compounds found in the environment (Ecology 2020d). Reclamation sampled behind the low-head diversion dam in August 2020. Results showed that polycyclic aromatic hydrocarbons concentrations were below EPA regulatory levels (Analytical Laboratories 2020). Construction and operation of the proposed Project do not involve the use of these substances. The presence of these substances in Icicle Creek would not increase because of the proposed project and its associated earthwork during construction. Also, materials used during the proposed construction cannot create a violation or exceedance of the National Toxics Rule standards, 40 CFR 131.36.

Changes to water rights is not an indicator. LNFH water rights would not change under the proposed Project. The point of water diversion, place of water use, and location of water return to Icicle Creek for the LNFH would not change under the proposed Project. Also, the proposed Project would not change water availability or timing in Icicle Creek. Therefore, there would be no change to the water rights of others.

Impacts on fish from changes to stream and water conditions are addressed in the SWISP Project EIS **Biological Resources Report**.

4.1.2 Issue Statements

Issues and public concern statements related to water resources identified during the scoping process include the following:

Water Resources

- Commenters noted that construction stormwater is an immediate concern for impacts in the project area and should be addressed in the EIS.
- Commenters stated that the EIS should address potential impacts to surface water quality and quantity because of periodic/annual maintenance activities associated with the surface water intake.
- Commenters requested that the EIS identify and disclose if the 100-year floodplain would be altered as a result of the Intake Operations and Maintenance Area fill or any additional fill going into Icicle Creek.
- Commenters recommended that the EIS consider accumulated sediments and how they move through the system, and that a sediment management plan and maintenance plan will likely be needed by Reclamation for permitting.

Water Resources — Hydrology and Hydraulics

- Commenters requested that the EIS identify and disclose any impacts on the flow of the bed load within the project area after construction.

Water Resources — Surface Water

- Commenters requested that the EIS evaluate the overall public and private needs for water flow, quantity, and intake and delivery from Icicle Creek and provide a comparison to the needs for this project. The public and private water needs from Icicle Creek should be evaluated against the needs to support and maintain at risk salmonids and other fish species during the seasonal variability in water availability, demand, and use. The water from Icicle Creek supplies a variety of needs, including domestic water supply (e.g., City of Leavenworth and rural Chelan County residents at RM 5.5), agricultural irrigation (e.g., Icicle-Peshastin Irrigation District at RM 5.7 and COIC at RM 4.5), artificial aquatic habitat for Hatchery fish raised at the LNFH, natural aquatic habitat for wild (non-Hatchery) fish, and recreation. Taken together, water needs in the Icicle Creek subbasin are often greater than the available supply. The Forest Service manages Icicle Creek as a Tier 1 key watershed under the Northwest Forest Plan. Therefore, public lands in the drainage are managed for at-risk salmonids and other fish species.
- Commenters would like the EIS to address potential impacts to surface water quality and quantity as a result of periodic/annual maintenance activities associated with intake. Water supply to LNFH must remain compliant with LNFH Flow Index, Density Index and water quality criteria. Maintenance activities should be designed to avoid interruptions to surface water supply that may negatively impact water volume and water quality required to meet the LNFH flow and density indices and fish health objectives throughout the construction phases and throughout long-term operation of the head-works and water conveyance systems.

Water Resources — Water Quality

- Commenters expressed concern that the proposed construction within Icicle Creek must not exceed the State Water Quality Standards for Surface Waters, Chapter 173-201A WAC. The Water Quality Standards allow for a turbidity mixing zone after all available BMPs have been implemented to meet water quality standards. The project site must not exceed the Aquatic Life turbidity criteria found in WAC 173-201A- 200(1)(e). The EIS should describe the effects on sediment loading into Icicle Creek, including sediment characteristics and locations, transport of sediment throughout the affected watershed.
- Commenters requested that any water intake and construction activities associated with this Project avoid and minimize impacts to water quality of Icicle Creek. BMPs, mitigation measures, and monitoring activities should be identified and implemented to ensure adequate protection of water quality.
- Commenters noted that the EIS should disclose relevant water quality standards, including the State of Washington's numeric standards, narrative standards, designated uses and antidegradation provisions. In addition to this, Reclamation should identify and disclose the current water quality of Icicle Creek, the nature of the potential impacts, and the specific discharges and pollutants.

- Commenters would like an analysis of the potential effects of current and proposed system operations and maintenance on surface water temperatures, total dissolved gas, pH, dissolved oxygen, sediment quantity (sediment transport throughout the basin) and quality, nuisance algae and related parameters and the potential for the alteration to the fate and transport of toxics to be included in the EIS.
- Commenters stated that the EIS should identify waterbodies potentially affected by the Project that are listed as impaired on the State of Washington's most current EPA-approved 303(d) list. Certain reaches of Icicle Creek may be impaired for certain water quality standards. If additional pollutant loading is predicted to occur from the project, then the EIS should include measures to control existing sources of pollution to offset additional loading.
- Commenters requested that the EIS describe any relevant TMDLs allocations for Icicle Creek, and associated water quality standards and pollutants of concern. Certain reaches of Icicle Creek with approved TMDLs should be identified. The EIS should describe existing restoration and enhancement efforts for those impaired waters, how the proposed project will coordinate with ongoing protection efforts, and any mitigation measures that will be implemented to avoid further degradation of impaired waters.
- Commenters suggested that the EIS discuss whether and how the CWA anti-degradation requirements would be met and achieved during Project construction and operations. In certain state-designated high-quality waters, the anti-degradation provisions of the CWA require that the level of water quality necessary to protect existing uses of a waterbody be maintained and protected (40 CFR Section 131.12). The anti-degradation policy of a state's Water Quality Standards represents a three-tiered approach to protecting and maintaining current water quality and uses into the future (40 CFR 131.12).
- Commenters recommended that the EIS analyze the effects of current water intake/withdrawal system operation on temperature regimes and include alternatives that allow for the exploration of different water intake/withdrawal operations and maintenance scenarios and their effects on current and predicted future water temperature in the Icicle Creek watershed.
- Commenters expressed concern that, within the water temperature analysis, the EIS should address how water intake/withdrawal can affect surface water temperature gradients, such as significantly reducing the flow rate, thereby causing juvenile fish migrants to be exposed to potentially higher temperatures for a much longer time than they would under a natural flow regime.
- Commenters requested that the EIS should consider impacts of a changing climate on stream temperature for Icicle Creek.

4.1.3 Assumptions

The following analysis assumptions were used in the water resources analysis:

- An application for a water right is not needed for this Project, nor will there be a change in the point of diversion, and no water rights held for the LNFH or its neighbors will be impacted by any action under the alternatives.

Additional Project assumptions used in the analysis are described in the SWISP Project EIS Appendix C, SWISP Project EIS Analysis Assumptions.

4.2 Alternative A – No Action Alternative

Under Alternative A, there would be no new proposed projects that would affect stream geomorphology or water quality. There would continue to be surface disturbances for O&M within the 100-year floodplain and Icicle Creek affecting 0.03 acres under Alternative A. During cold weather, ice accumulation at the intake and subsequent alterations in water flow would continue, which would continue to affect stream geomorphology, such as through sedimentation. Throughout the year, sedimentation affects the intake and conveyance structures, which can reduce effective water delivery. Accumulation of sediment in the intake channel and associated O&M needs would continue. Sediment would continue to be removed from the creek, thereby removing it from its contribution to stream geomorphology and stream conditions. When needed, the outlet channel would continue to direct bypassed water and sluice material (sediment) from the gatehouse back to Icicle Creek. Because ongoing operations would continue with existing conditions, there would be no change in compliance with water quality standards (for temperature, dissolved oxygen, pH, and turbidity) outlined in Chapter 173-201A WAC.

4.3 Alternative B – Proposed Action

Under Alternative B, changes to stream geomorphology would be limited to the 100-year floodplain and Icicle Creek. The construction activities for the intake, for fish passage, and for sediment management that would change stream geomorphology are described in **Section 1.2**, Alternatives. Also, the design of the intake structure, roughened channel, and low-flow boulder weir fishway is described in *Surface Water Intake Screening and Fish Passage 2D Hydraulic Modeling* and is incorporated by reference (Reclamation 2020b).

Surface disturbances within the 100-year floodplain and Icicle Creek would affect 0.73 acres under Alternative B (Reclamation GIS 2020), an increase of 0.7 acres compared with Alternative A because of construction activities. Only 0.25 acres would be long-term disturbances because of new infrastructure in the 100-year floodplain and Icicle Creek. None of the new infrastructure would be of a configuration or height that would alter water flow during a 100-year flood in such a manner as to threaten downstream conditions.

Temporary in-stream impacts would occur during the use of cofferdams. **Appendix B**, Best Management Practices, contains BMPs that would be implemented to minimize impacts on stream geomorphology during construction.

Preparation of the streambed, placement, and removal of the cofferdams would mobilize sediments on the Icicle Creek streambed. This could increase turbidity in and downstream of the work area during and shortly after cofferdam placement or removal. Also, the cofferdams would confine surface water flow through a constricted portion of Icicle Creek during construction. Natural stream flow, excluding the temporary 40 cfs diversion to the Hatchery, would be maintained within the

greatest amount of natural streambed width as possible during the use of the cofferdams. A minimum depth of 0.8 feet would always be maintained within the greatest amount of the natural stream channel during the use of the cofferdams to facilitate fish passage.

The cofferdam design is estimated to be approximately 12-feet wide at the base with a tapered width as it rises to approximately 9-feet. The temporary cofferdams would likely consist of geo-bags, or non-woven geotextile bags. These are large bags made of synthetic materials, such as polyester, polypropylene, or polyethylene, which are filled with sand, rock, or other material, and fastened shut. Cofferdam configurations are modeled for a July through October construction timeframe in *Surface Water Intake Screening and Fish Passage 2D Hydraulic Modeling* and are incorporated here by reference (Reclamation 2020b). The hydraulic modeling informs height requirements to prevent overtopping and identifies high velocity areas that may require additional stabilization to prevent breaching failure from lateral erosion.

Cofferdams would be used between July 1 and November 15 for two separate construction seasons to complete Phase I construction. Typically, mean daily flows peak during snowmelt months in late spring (May to June) and can drop quite low for autumn months (September to December) (Reclamation 2020b). Changes to stream geomorphology from cofferdam use would be minimized during autumn months because of low flow conditions.

High flows generally occur in May and June, but winter months can have high flows or extensive snow and ice conditions. Occasionally peak annual floods have occurred in July and October, which may require adjustment to the start and completion date for a given construction year (Reclamation 2020b). As flow in the creek increases, more water is forced to flow through a constricted portion of Icicle Creek during construction. The rapid flow through a confined area can scour the creek bed or creekbank. Snow and ice can block water flow; this would be more likely to occur in confined areas.

Floods would also be a concern for inundating areas and overtopping a cofferdam. Geo-bag cofferdams would not be suitable for use in Icicle Creek during heavy or prolonged precipitation or rain-on-snow events that typically occur between November and April, or during typical flows resulting from spring runoff in May and June. The possibility of flash-flooding events in Icicle Creek is not speculative; analysis of long-term flow data indicates a 50 percent probability that mean daily flow rates can more than double during fall flash-flow events, and increase by a dramatic order of magnitude during certain spring runoff events (Reclamation 2020b). Cofferdams are proposed for use from July 1 to November 15 of each of the two Phase I construction seasons, thus there is the potential for overtopping in early November, depending on the precipitation events.

Both typical and unpredictable high-flow events would have the potential to dislodge or destroy geo-bag cofferdams. Further, cofferdam failure during high flows could release tons of sediment or rock into Icicle Creek. Depending on the volume and type of material released, there could be long-term changes to the Icicle Creek streambed, primarily by increasing the proportion of sands, gravels, and fine sediments. Further, cofferdam failure could expose uncured concrete to water in Icicle Creek. Concrete is highly alkaline (pH 12.5). If concrete were cast less than four days before cofferdam failure, the leaching of alkali from the uncured concrete would likely result in increases to both the

pH and phosphorus levels in Icicle Creek, which could also lead to a violation of the pH and phosphorus TMDLs.

Arrangement of bed materials would demonstrate similar channel complexity to the adjacent stream reaches. The cap of the existing low-head diversion dam would be removed or buried, and the channel would be recontoured to promote fish passage and the movement of sediment from above the intake to downstream areas, thereby improving stream flow and stream conditions. Also, because the site uses a constructed roughened channel, an annual (at a minimum) monitoring plan at least until after a 50-year stream flow event has occurred would be prepared and implemented. This would identify any stream geomorphology concerns, such as accumulation of sediment exceeding levels that cannot be managed by proposed intake and delivery system design. Such cases would be considered extraordinary maintenance, which would occur on a case-by-case basis as determined to be necessary by the Hatchery.

During construction, open trench work would occur next to Icicle Creek. This would involve removing trees adjacent to Icicle Creek during Phase I and Phase II. Activities that modify the amount of shade over streams have been associated with increases in water temperature. The loss of riparian vegetation can be directly linked to increased water temperatures due to the loss of shade (Larson and Larson 1996). Also, the solubility of oxygen decreases as water temperature increases. The number of trees that would be removed is unknown, but tree removal under Alternative B could contribute to increasing water temperature and lower dissolved oxygen. To address this, Phase III would involve planting riparian trees. These impacts would persist until riparian trees matured.

During construction, surface disturbances and equipment use in and adjacent to Icicle Creek could result in contaminants entering the creek and affecting the quality of the water. Construction would occur within the area isolated by the cofferdam and adjacent to the creek. This would involve the use of equipment containing lubricants, fuel, or other substances, that could contaminate creek water if, for example, these materials were deposited on the ground during construction work and carried to the creek by surface water runoff. Surface water runoff can also carry soil into the creek from areas where the soil surface is disturbed during construction work, thereby increasing turbidity downstream in the creek.

During operation and maintenance, compared with Alternative A, the intake design would manage sediment deposition to prevent accumulation of sediment that would impede or bury the fish screens at the intake location. It would also manage debris including large logs that may be transported into the site and impact fish passage or intake operations. This would allow sediment and logs to remain in the creek and contribute to stream conditions and no longer affect intake operations.

Water quality would continue to be monitored during operation and maintenance at the LNFH by USFWS. The operation of the proposed intake and roughened channel would not change water quality. During operation and maintenance (such as clearing accumulated sediment from screens), sediment would not be physically removed from the water column, but rather dispersed throughout the water column through the use of a high-powered water jet wand allowing the sediment to flow downstream.

Under Alternative B, increases or decreases to water quality concentrations or limits as they relate to the state standards and construction permit limits would be addressed by complying with the following permits or approvals:

- CWA Section 401 from Ecology
- CWA Section 404 from the USACE
- Hydraulic Project Approval from WDFW

To meet CWA Section 401 and 404 requirements, Ecology would issue a letter of verification[8] that the proposed Project complies with the terms and conditions of the CWA requirements of the USACE's 404 permits for the nationwide permits 27 (Aquatic Habitat Restoration, Enhancement, and Establishment Activities) and 33 (Temporary Construction, Access, and Watering). To further address sediment, BMPs (see **Appendix B**, Best Management Practices) would be implemented to minimize the release of sediment into Icicle Creek during construction.

Water quality would continue to be monitored during construction at the LNFH by the USFWS. Compliance with TMDLs for the LNFH would be monitored at RM 2.3, Ecology's TMDL monitoring site, to verify that construction at the intake is not exceeding TMDL limitations; exceedance of the TMDLs are not expected to occur. Additionally, BMPs in **Appendix B** would be implemented to minimize impacts on water quality.

Nutrients, such as phosphorus, are essential for plant and animal nourishment and growth, but the overabundance of certain nutrients in water can cause adverse ecological effects. When there is too much phosphorus in water, it can induce excessive growth of algae, resulting in oxygen depletion of the waterbody (USGS 2020) resulting in an algal bloom that may or may not be toxic in nature. The TMDL indicates phosphorus is the limiting nutrient in Icicle Creek.

Cement is rich in calcium and contains aluminum and iron also. All three can readily bind phosphorus. The TMDL indicates phosphorus is the limiting nutrient in Icicle Creek, and the nutrient tied to pH levels. Concrete used for proposed in-water infrastructure would be cured in place behind cofferdams for at least four days before exposure to Icicle Creek water. Similarly, because work to break apart and remove large boulders from the intake construction area would be done behind cofferdams, freshly fractured rock would not be expected to contribute phosphorus to Icicle Creek water. This would guard against fresh concrete or broken rock increasing phosphorus in surface water, especially during the critical periods March to May and July to October.

In addition to Alternative B, other plans and projects in or near the Analysis Area would benefit water resources in the long term. These include the Trout Unlimited Icicle Creek Boulder Field Fish Habitat Improvement Project, continued implementation of the Recovery Plan for Upper Columbia River Spring Chinook Salmon and Steelhead and the USFWS Bull Trout Recovery Plan, relocating and replacing the City of Leavenworth water supply pipeline and fish screen, replacing and relocating the Icicle and Peshastin Irrigation District's fish screens, and improving fish passage at the Icicle and Peshastin Irrigation District and City of Leavenworth diversion dam. These projects

[8] Based on Andrea Jedel's (Ecology) determination during attendance at the February 19, 2020 Endangered Species Act and Permitting meeting held in Ellensburg, Washington.

would improve stream geomorphology and water quality parameters for Icicle Creek. Also, water temperature is assumed to increase as water input from snowmelt decreases due to climate change.

4.4 Alternative C

The impacts under Alternative C on stream geomorphology and water quality would be similar to those under Alternative B, except Alternative C would remove fewer streamside trees that shade Icicle Creek. The potential for increased water temperature and lowered dissolved oxygen would be reduced compared to Alternative B. There would be no tree removal in the area adjacent to Icicle Creek associated with Phase II construction.

4.5 Alternative D

The nature and type of impacts on stream geomorphology and water quality under Alternative D would be the same as those described under Alternative B; however, under Alternative D, Phase I construction would span four in-water work windows as compared to two under Alternative B, because construction would be limited to 7:00 a.m. to 10:00 p.m. and the in-water work window would be two weeks shorter (July 1 to October 31). Phase I construction would start in 2022 and end in 2025. As such, temporary impacts to stream geomorphology and water quality would be experienced over a longer total duration than under Alternative B.

Installation and removal of cofferdams would be required for each of the four Phase I construction in-water work windows (July 1 to October 31). For comparison, under Alternative B, installation and removal of cofferdams would be required for only two Phase I construction in-water work windows (July 1 to November 15). The types of impacts from cofferdam use would be the same as those described under Alternative B, but they would span two more in-water construction seasons. Additionally, due to the shorter in-water work window, Alternative D would reduce the potential for geo-bag cofferdams to be dislodged or destroyed due to high-flow events potentially occurring in November.

From November 1, 2022 to June 30, 2023, the Hatchery's surface water would be supplied by pumping from the spillway pool. Two high-capacity pumps would be used to provide 40 cfs of water to the Hatchery, with an additional back-up pump on site. Although long-term reliable delivery of water and the ability to meet Hatchery production goals would be improved under this alternative; there would be a risk of temporary impacts to Hatchery production from relying on pumps operating continuously for 8 months from 2022-2023. Pumping water from the spillway pool would recirculate Hatchery effluent water, as the pool is the location of the Hatchery's main discharge point. Over time, without water treatment, water quality reaching the Hatchery would be decreased.

4.6 Short-Term Uses and Long-Term Productivity

This section compares the potential temporary effects of the actions analyzed in this report on the environment with the potential effects on its long-term productivity. Reclamation must consider the degree to which the alternatives could impact various resource or environmental values in the long term, for some temporary value to a project proponent or the public. Specific impacts vary in kind, intensity, and duration according to the activities occurring at any given time.

The temporary installation of cofferdams to isolate the instream work area would confine surface water flow through a constricted portion of Icicle Creek during construction. This impact would be balanced through the implementation of BMPs listed in **Appendix B**, as applicable. This short-term use of the creek would improve infrastructure, resulting in the long-term enhancement of stream conditions and water quality. The revegetation plan associated with Phase III would increase the structural diversity and species composition of upland and riparian vegetation near the intake construction area, which could improve the long-term productivity of water quality.

4.7 Unavoidable Adverse Impacts

Preparation of the streambed, placement, and removal of the cofferdams would mobilize sediments on the Icicle Creek streambed. This could increase turbidity in and downstream of the work area during and shortly after cofferdam placement or removal. The temporary installation of cofferdams to isolate the instream work area would confine surface water flow through a constricted portion of Icicle Creek during construction.

4.8 Irreversible and Irretrievable Commitment of Resources

There would be no irreversible and irretrievable commitment of water resources.

Chapter 5. Glossary

No glossary terms are defined.

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Appendix A

Maps

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BUREAU OF RECLAMATION

Map A-1
Project Area Overview

- Potential Temporary Disturbance Area
- Staging
- Temporary Pump
- Road
- LNFH Production Facilities and Associated Structures
- Pipeline Rehabilitation
- Construction Vehicle Turnaround
- Temporary Access Routes
- Spillway Pool
- Trailhead
- LNFH Sand Settling Basin and Inside and Outside Screen Chambers

Land Ownership

- Private
- Chelan-Douglas Land Trust
- Fish and Wildlife Service
- Forest Service
- Icicle Irrigation District
- City of Leavenworth
- Chelan County

To HWY 2

To HWY 2

Icicle Rd

E Leavenworth Rd

Fishing Access Rd

Icicle Creek

Fish Hatchery Rd

Leavenworth National Fish Hatchery

Spillway Pool

Structure 5

Icicle Creek Rd

Hatchery Channel

Cyo Rd

Intake Facilities

Structure 2

Historical Channel

Icicle Creek Rd

Forest Service Wilderness Area Kiosk

Snow Lakes Trailhead

Source: Reclamation GIS 2020
U.S. Department of the Interior
Bureau of Reclamation
Columbia Cascades Area Office
November 11, 2020
L_SWISP_RRpts_overview.mxd
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N

0 500 1,000

Feet

BUREAU OF RECLAMATION

Map A-2
Alternative A: No Action

- Existing Intake Facilities
- Spillway Pool
- Trailhead
- Vehicle Parking
- Road
- Conveyance Pipeline
- LNFH Production Facilities and Associated Structures
- LNFH Sand Settling Basin and Inside and Outside Screen Chambers

Icicle Rd
E Leavenworth Rd
Fishing Access Rd
Icicle Creek
Fish Hatchery Rd
Leavenworth National Fish Hatchery
Spillway Pool
Structure 5
Section of Worst Condition Pipeline (8 feet)
Icicle Creek Rd
Cyo Rd
Hatchery Channel
Structure 2
Historical Channel
Section of Worst Condition Pipeline (6 feet); at Bifurcation Point
Forest Service Wilderness Area Kiosk
Snow Lakes Trailhead
flow >>

N

0 250 500
Feet

Source: Reclamation GIS 2020
U.S. Department of the Interior
Bureau of Reclamation
Columbia Cascades Area Office
November 11, 2020
L_SWISP_RRpts_AltAnoAction.mxd

BUREAU OF RECLAMATION

Map A-3
Alternative A: No Action (Intake)

Conveyance Pipeline

Stairs

Intake Trashrack Structure

Intake Channel

Access Road

Icicle Creek Rd

Gatehouse

flow >>

Outlet Channel

Fish Ladder/ Sediment Sluice

Low-Head Diversion Dam

Icicle Creek

flow >>

N

0 50 100

Feet

Source: Reclamation GIS 2020
U.S. Department of the Interior
Bureau of Reclamation
Columbia Cascades Area Office
November 11, 2020
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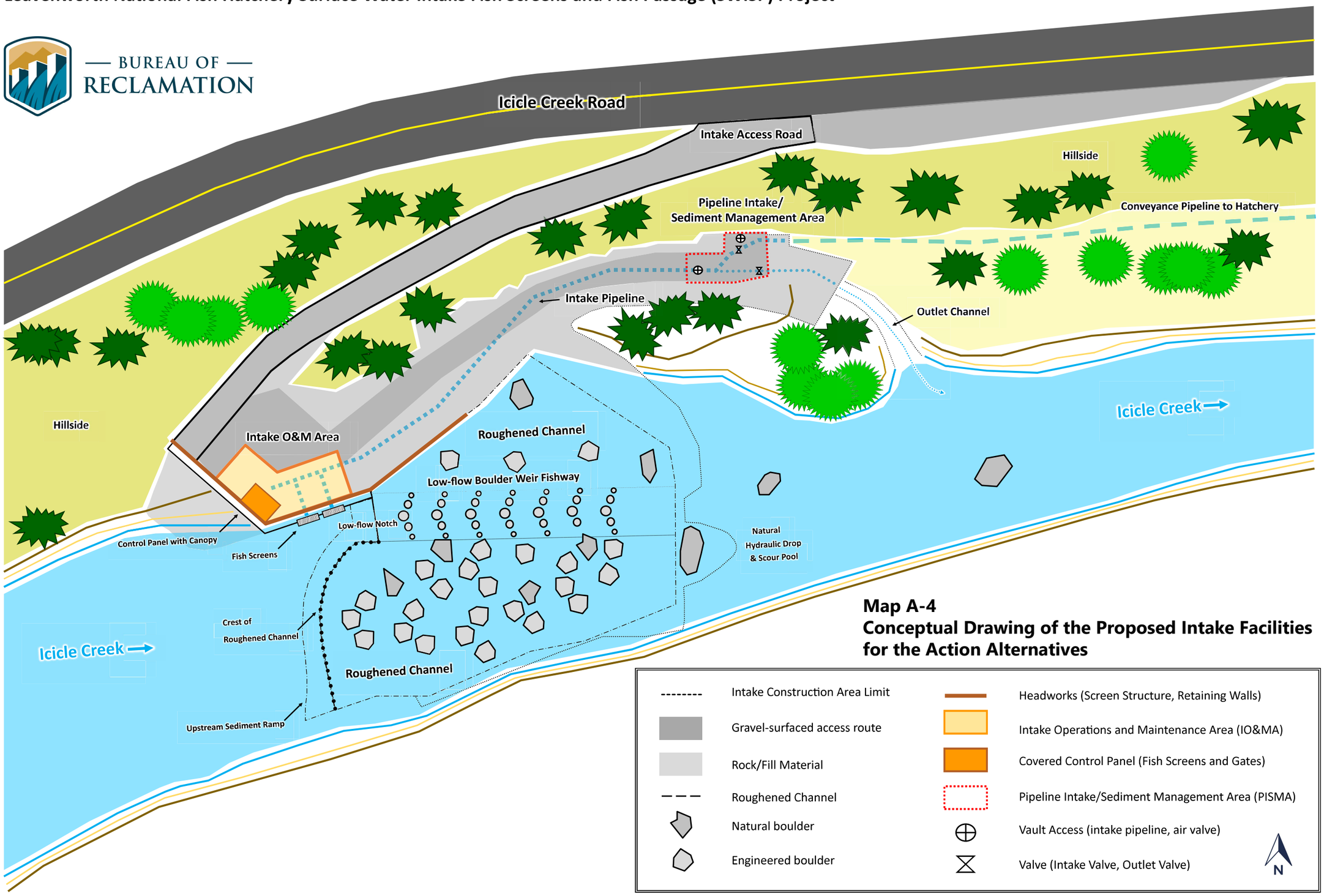
Leavenworth National Fish Hatchery Surface Water Intake Fish Screens and Fish Passage (SWISP) Project

BUREAU OF RECLAMATION



Map A-4
Conceptual Drawing of the Proposed Intake Facilities for the Action Alternatives

--------	Intake Construction Area Limit		Headworks (Screen Structure, Retaining Walls)
	Gravel-surfaced access route		Intake Operations and Maintenance Area (IO&MA)
	Rock/Fill Material		Covered Control Panel (Fish Screens and Gates)
— — —	Roughened Channel		Pipeline Intake/Sediment Management Area (PISMA)
	Natural boulder	⊕	Vault Access (intake pipeline, air valve)
	Engineered boulder	⧖	Valve (Intake Valve, Outlet Valve)

N

BUREAU OF RECLAMATION

Map A-5
Alternative B (Proposed Action) and Alternative D

Phase I

- Intake Facilities
- Temporary Access Route

Phase II

- Construction Area
- Contractor Use Area (CUA)
- Temporary Pump and Pipeline
- Temporary Access Route
- Conveyance Pipeline lined with Cure-in-Place Pipe (approximately 4,000 feet)
- Pipeline Replacement
- Access Routes

Phase I and II

- Staging and Storage Site for Construction Equipment and Materials, and Construction Staff Administration
- Construction Vehicle Turnaround/ Vehicle Parking
- Road
- Spillway Pool
- Trailhead
- LNFH Production Facilities and Associated Structures
- LNFH Sand Settling Basin and Inside and Outside Screen Chambers

Icicle Rd
E Leavenworth Rd
Fishing Access Rd
Contractor trailer, storage
Reclamation trailer
Icicle Creek
Fish Hatchery Rd
Leavenworth National Fish Hatchery
Spillway Pool
Structure 5
Staging
Control Valve Vault
Icicle Creek Rd
5
Replacement Pipeline (Approx. 1,660 feet)
4
Cyo Rd
Staging
Hatchery Channel
3
Intake Facilities *See Map 2-5 for Additional Details
1
Icicle Creek
Historical
Structure 2
2
Replacement Pipeline (Approx. 520 feet)
flow >>
Icicle Creek Rd
Forest Service Wilderness Area Kiosk
Icicle Creek
Snow Lakes Trailhead

N

0 250 500
Feet

Source: Reclamation GIS 2020
U.S. Department of the Interior
Bureau of Reclamation
Columbia Cascades Area Office
November 11, 2020
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BUREAU OF RECLAMATION

Map A-6
Alternative B (Proposed Action) and Alternative D: Intake

Phase I
- Intake Facilities
- Gravity Bypass Outlet
- Gravity Bypass Pipeline
- Temporary Access Route

Phase II
- Conveyance Pipeline lined with Cure-in-Place Pipe
- Pipeline Replacement
- Construction Area
- Contractor Use Area (CUA)

N

0 50 100
Feet

Source: Reclamation GIS 2020
U.S. Department of the Interior
Bureau of Reclamation
Columbia Cascades Area Office
November 11, 2020
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BUREAU OF RECLAMATION

Map A-7
Alternative C

Phase I

- Intake Facilities
- Temporary Access Route

Phase II

- Construction Area
- Contractor Use Area (CUA)
- Temporary Pump and Pipeline
- Temporary Access Route
- Conveyance Pipeline lined with Cure-in-Place Pipe (approximately 4,520 feet)
- Pipeline Replacement
- Access Routes

Phase I and II

- Staging and Storage Site for Construction Equipment and Materials, and Construction Staff Administration
- Construction Vehicle Turnaround/ Vehicle Parking
- Road
- Spillway Pool
- Trailhead
- LNFH Production Facilities and Associated Structures
- LNFH Sand Settling Basin and Inside and Outside Screen Chambers

Icicle Rd
E Leavenworth Rd
Fishing Access Rd
Contractor trailer, storage
Reclamation trailer
Icicle Creek
Fish Hatchery Rd
Leavenworth National Fish Hatchery
Spillway Pool
Structure 5
Staging
Control Valve Vault
Icicle Creek Rd
5
Replacement Pipeline (Approx. 1,660 feet)
4
Cyo Rd
Staging
Hatchery Channel
3
Intake Facilities
*See Map 2-7 for Additional Details
Icicle Creek
Historical
Structure 2
2
flow >>
Icicle Creek Rd
Forest Service Wilderness Area Kiosk
Icicle Creek
Snow Lakes Trailhead

N

0 250 500
Feet

Source: Reclamation GIS 2020
U.S. Department of the Interior
Bureau of Reclamation
Columbia Cascades Area Office
November 11, 2020
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BUREAU OF RECLAMATION

Map A-8
Alternative C (Intake)

Phase I

- Intake Facilities
- Gravity Bypass Outlet
- Gravity Bypass Pipeline
- Temporary Access Route

Phase II

- Conveyance Pipeline lined with Cure-in-Place Pipe

0 50 100
Feet

Source: Reclamation GIS 2020
U.S. Department of the Interior
Bureau of Reclamation
Columbia Cascades Area Office
November 11, 2020
L_SWISP_RRpts_AltCproposedIntake.mxd

BUREAU OF RECLAMATION

Map A-9
Fisheries, Aquatic Ecosystems, and Water Resources Analysis Area

- Fisheries, Aquatic Ecosystems, and Water Resources Analysis Area
- Intake Facilities
- Trailhead
- Conveyance Pipeline
- LNFH Production Facilities and Associated Structures
- Boulder Field
- Ecology Compliance Point
- Spillway Pool
- Construction Vehicle Turnaround
- Temporary Pump
- Road
- LNFH Sand Settling Basin and Inside and Outside Screen Chambers

Icicle Rd
E Leavenworth Rd
Ecology Compliance Point
Flow
Fishing Access Rd
Icicle Creek
Fish Hatchery Rd
Leavenworth National Fish Hatchery
Spillway Pool
Structure 5
Icicle Creek Rd
Hatchery Channel
Cyo Rd
Intake Facilities
Structure 2
Historical Channel
Forest Service Wilderness Area Kiosk
Boulder Field
Snow Lakes Trailhead

N

0 250 500
Feet

Source: Reclamation GIS 2020
U.S. Department of the Interior
Bureau of Reclamation
Columbia Cascades Area Office
November 11, 2020
L_SWISP_RRpts_FishWildlife.mxd
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Appendix B

Best Management Practices

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Appendix B. Best Management Practices

B.1 Best Management Practices

To minimize impacts on resources from the Proposed Action, the Best Management Practices (BMPs) described in **Table B-1** would be implemented. BMPs are drawn from the following sources:

- Biological opinions for LNFH operations, issued by the USFWS (addressing threatened Bull Trout; USFWS 2011) and by the NMFS (addressing endangered spring Chinook Salmon and threatened Steelhead; NMFS 2015, NMFS 2017a).
- General Conservation Measures (GCMs) for ESA-listed salmonids in the programmatic biological opinion for USACE permitting of fish passage and restoration actions in Washington State (FPRPIII; NMFS 2017a).
- GCMs for Bull Trout and other ESA-listed salmonids in the programmatic biological opinion for the Washington State fish passage and habitat enhancement and restoration program (NMFS and USFWS 2008)[1].
- Measures described in the construction specifications, including measures associated with site layout, temporary access, staging and stockpile areas, equipment use, erosion control, dust abatement, timing of in-water work and worksite isolation, and spill prevention and control.

Reclamation would also obtain required regulatory permits and implement terms and conditions contained therein. If permit requirements, BMPs, or other measures contradict each other, the contract specification requires that the contractor abide by the most stringent of requirements. A list of general, applicable permit conditions is included following **Table B-1**.

[1] This combined agency programmatic biological opinion expired on December 31, 2013. The USACE and NMFS reinitiated consultation and NMFS has issued subsequent biological opinions for the nationwide permit program. However, the USACE has been operating under consultation extensions from USFWS, with the most recent extension expiring June 30, 2020. Reclamation anticipates that ESA Section 7 consultation with the USFWS for the SWISP Project will result in similar conservation measures as those contained in the expired programmatic biological opinion.

Table B-1. Best Management Practices

Resource Topic	Best Management Practice
General	• Heavy equipment use will be limited to that with the least adverse effects on the environment (e.g. minimally-sized, low ground pressure equipment, use of matting, etc.; NMFS 2017a). • Conduct operations to prevent unnecessary destruction, scarring, or defacing of natural surroundings in the vicinity of the work.
Air Quality and Climate	• Dust control and abatement measures will be implemented during construction. • Vehicle traffic on unpaved surfaces would be limited to 10 miles per hour to minimize dust generation. • Vehicle traffic on government rights-of-way, dirt roads, and paved roads through LNFH property would be limited to 10 miles per hour. • Prevent, control, and abate dust pollution on government rights-of-way. • Provide labor, equipment, and materials, and use efficient methods wherever and whenever required to prevent dust nuisance or damage to persons, property, or activities. • Provide means for eliminating atmospheric discharges of dust during mixing, handling, and storing of cement, pozzolan, and concrete aggregate. • Use reasonably available methods and devices to prevent, control, and otherwise minimize atmospheric emissions or discharges of air contaminants. • Do not operate equipment and vehicles that show excessive exhaust gas emissions until corrective repairs or adjustments reduce such emissions to acceptable levels.
Geology and Soils	• The number of temporary access roads will be minimized, and roads will be designed to avoid adverse effects like creating excessive erosion (NMFS 2017a). • Temporary roads and trails across slopes greater than 30 percent will be avoided when feasible (NMFS 2017a). • Existing roadways or travel paths will be used whenever possible (NMFS 2017a).
Water Resources (Stream Conditions)	• Coffer dam placement will maintain natural stream flow, minus the 40 cfs diversion to the hatchery, within the greatest amount of natural streambed width as possible. • Additional flow outage shall require the prior written approval of the COR, and of appropriate Federal and State water quality control agencies.

Resource Topic	Best Management Practice
Water Resources (Water Quality)	**General** • Perform construction activities by methods that will prevent entrance, or accidental spillage, of solid matter, contaminants, debris, or other pollutants or wastes into streams, flowing or dry watercourses, lakes, wetlands, reservoirs, or underground water sources. • Measures shall be taken to ensure that no petroleum products, hydraulic fluid, fresh cement, sediments, sediment-laden water, chemicals, or any other toxic or deleterious materials are allowed to enter or leach into waters of the U.S. (NMFS 2017a). • The use of acids for cleaning or preparing concrete surfaces for repair will not be permitted. **In-water work** • Prepare a Work Area Isolation Plan for all work below the bankfull elevation requiring flow diversion or isolation. Include the sequencing and schedule of dewatering and rewatering activities, plan view of all isolation elements, as well as a list of equipment and materials to adequately provide appropriate redundancy of all key plan functions (e.g., an operational, properly sized backup pump and/or generator) (NMFS 2017a). • Use of rapidly deployable prefabricated cofferdam systems would minimize impacts to subgrade and surrounding water. • When conducting in-water or bank work, machine hydraulic lines will be filled with vegetable oil for the duration of the Project to minimize impacts of potential spills and leaks. • Spill prevention and clean-up kits will be on site when heavy equipment is operating within 25 feet of the water (NMFS 2017a). • To the extent feasible, work requiring use of heavy equipment will be completed by working from the top of the bank (i.e. landward of the OHWM or extreme high tide line) (NMFS 2017a). • Equipment shall be checked daily for leaks and any necessary repairs shall be completed prior to commencing work activities around the water (NMFS 2017a). • Equipment will cross the stream in-water only under the following conditions: (NMFS 2017a). o A. Equipment is free of external petroleum-based products, soil and debris has been removed from the drive mechanisms and undercarriage; and o B. The substrate is bedrock or coarse rock and gravel; or o C. Mats or logs are used in soft bottom situations to minimize compaction while driving across streams; and

Resource Topic	Best Management Practice
Water Resources (Water Quality, continued)	○ D. Stream crossings will be performed at right angles (90 degrees) to the bank if possible; and ○ E. No stream crossings will be performed at spawning sites when spawners of ESA listed fishes are present or eggs or juvenile fish could be in the gravel; and ○ F. The number of crossings will be minimized. • Project operations will cease under high flow conditions that could inundate the Project Area, except as necessary to avoid or minimize resource damage (NMFS 2017a). • If high flow or high tide conditions that may cause siltation are encountered during the Project, work shall stop until the flow subsides or the tide falls (NMFS 2017a). • Where practicable, a turbidity and/or debris containment device shall be installed prior to commencing in-water work (NMFS 2017a). • When working in-water, some turbidity monitoring may be required, subject to the Corps permit requirements or CWA section 401 certification. Turbidity monitoring generally is required when working in streams with more than 40 percent fines (silt/clay) in the substrate. Turbidity will be monitored only when turbidity generating work takes place, for example, installation of coffer dams, pulling the culvert in-water, reintroducing water. The applicant will measure the duration and extent of the turbidity plume (visible turbidity above background) generated. The data will be submitted to the Corps, NMFS, and the USFWS immediately following Project construction. Turbidity measurements will be taken in NTUs and are used by project proponents to develop procedures to minimize turbidity and estimate take for future projects (NMFS 2017a). • Equipment used in the instream channel will have containment methods to address possible fuel and oil leaks. **Erosion and spill prevention and control** • A Temporary Erosion and Sediment Control plan and a Spill Prevention Control and Containment plan, commensurate with the size of the Project, must be prepared and carried out to prevent pollution caused by surveying or construction operations (NMFS 2017a). • A Spill Prevention, Control, and Clean-Up plan will be prepared prior to construction for every project that utilizes motorized equipment or vehicles (NMFS 2017a). • A spill prevention and countermeasures plan (SPCC) in accordance with 40 CFR, Part 112 is required where release of oil and oil products could reasonably be expected to enter into or upon navigable waters of the United States or adjoining shorelines in quantities that may be harmful (40 CFR, Part 110), and aggregate on site oil storage capacity is over 1,320 gallons. Only containers with capacity of 55 gallons and greater are included in determining on site aggregate storage capacity.

Resource Topic	Best Management Practice
Water Resources (Water Quality, continued)	**Erosion and spill prevention and control, continued** o Prevent, stop, and control spills or leaks during construction activities: o Stop source of spill or leak. o Stop migration of spill or leak. o Place berm of sorbent material around perimeter of spill. o Solidify free standing oil. • A supply of emergency erosion control materials will be on hand and temporary erosion controls will be installed and maintained in place until site restoration is complete (NMFS 2017a). • Landward erosion control methods shall be used to prevent silt-laden water from entering waters of the U.S. These may include, but are not limited to, filter fabric, temporary sediment ponds, check dams of pea gravel-filled burlap bags or other material, and/or immediate mulching of exposed areas (NMFS 2017a). • Control pollutants by use of sediment and erosion controls, wastewater and stormwater management controls, construction site management practices, and other controls including State and local control requirements. • Sediment and Erosion Controls: o Establish methods for controlling sediment and erosion which address vegetative practices, structural control, silt fences, straw dikes, sediment controls, and operator controls as appropriate. o Institute stormwater management measures as required, including velocity dissipators, and solid waste controls which address controls for building materials and offsite tracking of sediment. • Pollution Prevention Measures: o Use methods of dewatering, unwatering, excavating, or stockpiling earth and rock materials which include prevention measures to control silting and erosion, and which will intercept and settle any runoff of sediment-laden waters. o Prevent wastewater from general construction activities such as drainwater collection, aggregate processing, concrete batching, drilling, grouting, or other construction operations, from entering flowing or dry watercourses without the use of approved turbidity control methods. o Divert stormwater runoff from upslope areas away from disturbed areas.

Resource Topic	Best Management Practice

Water Resources
(Water Quality, continued)
	Erosion and spill prevention and control, continued
	• Turbidity Prevention Measures:
	  o Use methods for prevention of excess turbidity which include, but are not restricted to, intercepting ditches, settling ponds, gravel filter entrapment dikes, flocculating processes, recirculation, combinations thereof, or other approved methods that are not harmful to aquatic life.
	  o Wastewaters discharged into surface waters shall meet conditions of Clean Water Act section 402, the National Pollutant Discharge Elimination System (NPDES) permit.
	  o Do not operate mechanized equipment in waterbodies without having first obtained a Clean Water Act section 404 permit, and then only as necessary to construct crossings or perform the required construction.
	• Clean up spills or leaks in a manner that complies with applicable Federal, State, and local laws and regulations.
	• Dispose of spilled or leaked materials:
	  o Handle and dispose of spilled or leaked materials contaminated with 50 ppm or greater polychlorinated biphenyls.
	  o Handle and dispose of spilled or leaked materials not contaminated or contaminated with less than 50 ppm polychlorinated biphenyls in accordance with applicable Federal, State, and local regulations.
	Discharge water and wastes
	• All discharge water created by construction (e.g. concrete washout, pumping for work area isolation, vehicle wash water, drilling fluids) will be treated to avoid negative water quality and quantity impacts. Removal of fines may be accomplished with bioswales; concrete washout water with an altered pH, may be infiltrated (NMFS 2017a).
	• Wastewater from Project activities and water removed from within the work area shall be routed to an upland disposal site (landward of the OHWM or extreme high tide line) to allow removal of fine sediment and other contaminants prior to being discharged to the waters of the U.S. (NMFS 2017a).
	• All waste material such as construction debris, silt, excess dirt or overburden resulting from the Project will generally be deposited above the limits of flood water in an upland disposal site. However, material from pushup dikes may be used to restore microtopography (e.g., filling drainage channels) (NMFS 2017a).

Resource Topic	Best Management Practice
Water Resources (Water Quality, continued)	**Storage and staging** • When not in use, vehicles and equipment containing oil, fuel, and/or chemicals will be stored in a staging area located at least 150 feet from the Corps' jurisdictional boundary of wetlands and waterbodies. If possible, staging will be located at least 300 feet away from the Corps' jurisdictional boundary of wetlands and waterbodies, and on impervious surfaces to prevent spills from reaching ground water. If moving equipment between the staging area and the worksite would create unacceptable levels of disturbance (for example, requiring multiple stream crossings, multiple passes over sensitive vegetation), a closer staging location with an adequate spill prevention plan may be proposed (NMFS 2017a). • Equipment will not be stored overnight in the instream channel. • Do not stockpile or deposit excavated materials or other construction materials, near or on, stream banks, lake shorelines, or other watercourse perimeters where they can be washed away by high water or storm runoff or can in any way encroach upon the watercourse. • Petroleum Product Storage Tanks Management. o Place oil or other petroleum product storage tanks at least 20 feet from streams, flowing or dry watercourses, lakes, wetlands, reservoirs, and any other water source. o Do not use underground storage tanks. o Construct storage area dikes at least 12 inches high or graded and sloped to permit safe containment of leaks and spills equal to storage tank capacity located in the area plus sufficient freeboard to contain the 25-year rainstorm. Line diked areas with an impermeable barrier at least 50 mils thick. o Areas for refueling operations: Lined with impermeable barrier at least 40 mils thick covered with 2 to 4 inches of soil. **Reclamation of temporary disturbance** • All temporary access will be removed (including gravel surfaces) and planted after Project completion (NMFS 2017a). • Within 7 calendar days from Project completion, any disturbed bank and riparian areas shall be protected using native vegetation or other erosion control measures as appropriate. For erosion control, sterile grasses may be used in lieu of native seed mixes. Alternative methods (e.g. spreading timber harvest slash) may be used for erosion control if approved by the Corps (NMFS 2017a).

Resource Topic	Best Management Practice
Water Resources (Water Rights)	• A total of 40 cfs shall be continuously provided to the LNFH during Phase I construction. • A total of 20 cfs shall be continuously provided to the LNFH during Phase II construction activities taking place from April 17 to May 20.
Biological Resources (Vegetation)	• Preserve natural landscape and preserve and protect existing vegetation not required or otherwise authorized to be removed. • Protect vegetation from damage or injury caused by construction operations, personnel, or equipment by the use of protective barriers or other approved methods. • Minimize, to the greatest extent practicable, clearings and cuts through vegetation. • Do not use trees for anchorages except in emergency cases or as approved by Reclamation. Where approved, wrap the trunk with a sufficient thickness of approved protective material before rope, cable, or wire is placed. • Use safety ropes where tree climbing is necessary; do not use climbing spurs. • Before bringing construction equipment on site, clean it to remove dirt, vegetation, and other organic material to prevent introduction of noxious weeds, and invasive plant and animal species. • Contractor cleaning procedures shall result in equipment being cleaned as well or better than the procedures described in Reclamation Cleaning Manual (Reclamation 2010). Reclamation will inspect construction equipment following procedures described in Reclamation Cleaning Manual before allowing the equipment onsite. • Restore contractor use areas to pre-construction condition. • Areas of temporary disturbance must be re-seeded according to a revegetation plan.

Resource Topic	Best Management Practice
Biological Resources (Fisheries and Aquatic Ecosystems)	**Riparian areas** • The removal of riparian vegetation for access will be minimized (NMFS 2017a). • All native, non-invasive organic material (large and small wood) cleared from the action area for access will remain on site (NMFS 2017a). • Boundaries of clearing limits associated with site access and construction will be marked to avoid or minimize disturbance of riparian vegetation, wetlands, and other sensitive sites (NMFS 2017a). • If native riparian vegetation is disturbed it will be replanted with native herbaceous and/or woody vegetation after Project completion. Planting will be completed between October 1 and April 15 of the year following construction. Plantings will be maintained as necessary for 3 years to ensure 50 percent herbaceous and/or 70 percent woody cover in year 3, whatever is applicable. For riparian impact areas greater than 0.5 of an acre, a final monitoring report will be submitted to the Corps in year 3. Failure to achieve the 50 percent herbaceous and 70 percent woody cover in year 3 will require the permittee to submit a plan with contingency measures to achieve standards or reasons to modify standards (NMFS 2017a). • Per NWP 27, post-planting monitoring may be required for up to 10 years in order to ensure an 80 percent planting survival rate is met. • Fencing will be installed as necessary to prevent access to revegetated sites by livestock, beavers or unauthorized persons. Beaver fencing will be installed around individual plants where necessary (NMFS 2017a).

Resource Topic	Best Management Practice
Biological Resources (Fisheries and Aquatic Ecosystems, continued)	**Fisheries and aquatic wildlife** • Instream work is limited to July 1 through November 15. • A minimum depth of 0.8 ft shall be maintained within the greatest amount of the natural stream channel width at all times with placement of cofferdams to facilitate fish passage. Fish passage criteria in Icicle Creek Fish Passage Evaluation for the Leavenworth National Fish Hatchery (Anglin et al. 2013, p. 26-28) should be consulted for minimum depth and maximum velocity criteria. The maximum velocity criteria on pages 26-28 are conservative, but attempts should be made to provide fish passage to the greatest extent practical across the natural stream channel width and hydrograph. • Work site dewatering will follow the Dewatering and Fish Capture Protocol in Appendix D (NMFS and USFWS 2008). Fish removal from dewatered work sites would be overseen by a fisheries biologist. Electrofishing for fish relocation/work area isolation must follow the most recent NMFS guidelines (NMFS 2017a). Record all incidents of listed fish being observed, captured, handled, and released (USFWS 2011). • Re-watering of the construction site occurs at such a rate as to minimize loss of surface water downstream as the construction site streambed absorbs water (NMFS and USFWS 2008). • The design of passage structures will follow the appropriate design standards in the most current version of the NMFS Anadromous Salmonid Fish Facility Design manual (NMFS and USFWS 2008). • Roughened channels will be designed to standards contained in the most current version of the NMFS Anadromous Salmonid Fish Facility Design manual (NMFS and USFWS 2008). • Post-construction monitoring of the low-flow fishway would be done to ensure effectiveness. • Boulder weirs will be low in relation to channel dimensions so that they are completely overtopped during channel-forming, bankfull flow events. Boulder weirs will be placed diagonally across the channel or in more traditional upstream pointing "V" or "U" configurations with the apex oriented upstream (NMFS and USFWS 2008). • Boulder weirs will be constructed to allow upstream and downstream passage of all native listed fish species and life stages that occur in the stream at all flows (NMFS and USFWS 2008). • Boulder weirs shall be designed and inspected by a multidisciplinary team (including a salmon or trout biologist) that has experience with these types of structures (NMFS and USFWS 2008).

Resource Topic	Best Management Practice
Biological Resources (Fisheries and Aquatic Ecosystems, continued)	• Screens, including screens installed in temporary pump intakes, will be designed to meet standards in the most current version of the NMFS Anadromous Salmonid Passage Facility Design manual (NMFS and USFWS 2008). • Pumps used to dewater the work isolation area or supply temporary hatchery water during construction, will have a fish screen installed, operated and maintained according to NMFS' fish screen criteria (NMFS 2017a). • All fish screens will be sized to match the water users documented or estimated historic water use or legal water right, whichever is less. Water diversion rates shall not exceed the design capacity of the screen, as calculated by following NMFS Anadromous Salmonid Passage Facility Design manual (NMFS and USFWS 2008). • Irrigation diversion intake and return points will be designed (to the greatest degree possible) to prevent all native fish life stages from swimming or being entrained into the irrigation system (NMFS and USFWS 2008). • Do not use jackhammers in excess of 30 pounds without Reclamation approval. Blasting is not permitted. • Monitor, capture, and release listed fish species in the sand settling basin in accordance with applicable protocol in NMFS (2017a), USFWS (2011), and as identified through consultation for the Project's Biological Assessment. • Schedule annual intake maintenance to avoid the Bull Trout upstream migration period (USFWS 2011). • Disturbing natural-origin spawning salmon and Steelhead during hatchery maintenance activities of diversions and instream structures shall be avoided, as shall disturbing salmon and Steelhead redds (NMFS 2017b).

Resource Topic	Best Management Practice
Biological Resources (Terrestrial Wildlife)	• Schedule all necessary vegetation removal, trimming, and grading of vegetated areas outside of the bird breeding season (generally March 1 to August 31) to the maximum extent practicable. • Avoid construction activities during the bird breeding season to the extent practicable. When Project activities cannot occur outside the bird nesting season (March 1 to August 31), conduct surveys prior to scheduled activity to determine if active nests are present within the Wildlife Analysis Area and buffer any active nesting locations found during surveys. Surveys should be conducted by a qualified biologist no more than seven days prior to disturbance activities. If active nests are detected during these surveys a no-activity buffer zone around the nest will be established by a qualified biologist based on species, Project disturbance level, topography, existing disturbance levels, and habitat type until fledging has occurred. During ongoing Project activities if a bird establishes a new nest the nest vegetation will not be removed or modified but no buffer zone will be required. If there is a pause in Project activities greater than seven days an additional nesting bird survey would be needed. • Reclamation would minimize the highest construction noise disturbance to avoid or minimize impacts on mule deer and mountain goat during sensitive periods to the extent practicable. This is between mid-spring to early fall (May 1-September 30).
Cultural Resources	• As required by the Washington State Historic Preservation Officer, the *Plan and Procedures for the Inadvertent Discovery of Cultural Resources and Human Remains* (Inadvertent Discovery Plan) will be followed in the case of inadvertent discovery of cultural resources or human remains during construction. • A professional archaeological monitor will be present during ground-disturbing activities.
Land Use	• Restore contractor use areas to pre-construction condition.

Resource Topic	Best Management Practice
Transportation	• Perform work on rights-of-way established by the government as necessary to construct and maintain any roads, bridges, or drainage structures required for establishment and use of haul routes for construction operations. • Use existing available public highways, roads, or bridges as haul routes subject to applicable local regulations. • Minimize interference with or congestion of local traffic. • Provide barricades, flaggers, and other necessary precautions for safety of the public where haul routes cross public highways or roads. • Maintain roadways, parking areas, and haul routes in a sound, smooth condition. • Promptly repair ruts, broken pavement, potholes, low areas with standing water, and other deficiencies to maintain road surfacing and drainage in original or specified condition. • Meet requirements of the Manual on Uniform Traffic Control Devices for Streets and Highways, Part 6 (Temporary traffic control; https://mutcd.fhwa.dot.gov/) and WAC 296-155-305 (Signaling and flaggers). • Provide cones, delineators, concrete safety barriers, barricades, flasher lights, danger signals, signs, and other temporary traffic control devices as required to protect work and public safety. • Provide flaggers and guards as required to prevent accidents and damage or injury to passing traffic. • Do not begin work along public or private roads until traffic control devices for warning, channeling, and protecting motorists are in place in accordance with approved traffic control plan. • Provide unobstructed, smooth, and dustless passageway for one lane of traffic through construction operations except at times when vehicles will be turning around at the USFS kiosk or backing onto the Intake Access Road. • Provide unobstructed, smooth, and dustless passageway for one lane of traffic through construction operations. • Maintain convenient access to driveways and buildings along line of work. • Protect roads closed to traffic with effective barricades and warning signs. Illuminate barricades and obstructions from sunset to sunrise. • Remove traffic control devices when no longer needed.
Noise	• Do not use jackhammers in excess of 30 pounds without Reclamation approval. Blasting is not permitted.
Recreation	• There are no construction activities (such as parking, storage, or vehicle turnaround) allowed in the Forest Service Snow Lakes Trailhead parking lot.

Resource Topic	Best Management Practice
Visual Resources	• Minimize, to the greatest extent practicable, clearings and cuts through vegetation. Irregularly shape authorized clearings and cuts to soften undesirable aesthetic impacts.
Socioeconomics and Environmental Justice	• Reclamation policy is to avoid impacts on Indian sacred sites whenever possible. Continued coordination with affected Tribes may result in future identification of sacred sites. If this occurs, Reclamation would further evaluate impacts on these resources. Consultation with the Yakama Nation and Confederated Tribes of the Colville Reservation would identify how to protect sacred sites if they were identified and how to provide continued access if any such sites were affected by Project construction. • In-water work would not occur in the spillway pool during the Tribal fishing preparations or season.
Utilities	• A locate for underground utilities would be coordinated with the Washington Utility Notification Center (http://www.callbeforeyoudig.org/washington/index.asp) prior to construction.
Hazardous Materials and Public Health and Safety	• Vehicle traffic on government rights-of-way, dirt roads, and paved roads through LNFH property would be limited to 10 miles per hour. • Nuisance flows from seepage and leakage through the cofferdams will be managed to maintain a safe working environment. • Hazardous Waste Disposal: o Dispose by removal from jobsite. o Recycle hazardous waste whenever possible. o Dispose of hazardous waste materials that are not recycled at appropriately permitted treatment or disposal facilities. o Transport hazardous waste in accordance with 49 CFR 171-179. • Provide protection for personnel and existing facilities from harm due to demolition activities. • Arrange protective installations to permit operation of existing equipment and facilities by the government while work is in progress. • Inadvertent discovery of hazardous wastes or materials will be reported to Reclamation and Ecology within 24 hours of discovery. Construction in the vicinity of the discovery would cease until the appropriate disposal procedures were identified and carried out in coordination with Reclamation and Ecology.

Resource Topic	Best Management Practice
Tribal Interests	• Reclamation policy is to avoid impacts on Indian sacred sites whenever possible. Continued coordination with affected Tribes may result in future identification of sacred sites. If this occurs, Reclamation would further evaluate impacts on these resources. Consultation with the Yakama Nation and Confederated Tribes of the Colville Reservation would identify how to protect sacred sites if they were identified and how to provide continued access if any such sites were affected by Project construction.

Sources: As noted in table.

B.2 Regulatory Permit Terms and Conditions

Reclamation will obtain required regulatory permits and comply with the general, regional, and permit-specific terms and conditions contained therein. A general list of anticipated terms and conditions is included below. Regulating agencies may also impose additional conditions on a project-by-project basis.

B.1.1 U.S. Army Corps of Engineers Section 404 Nationwide Permits

USACE General Conditions for all NWPs

- Aquatic Life Movements. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species.
- Spawning Areas. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable.
- Suitable Material. Material used for construction or discharged must be free from toxic pollutants in toxic amounts.
- Fills Within 100-Year Floodplains. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.
- Soil Erosion and Sediment Controls. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.
- Removal of Temporary Fills. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.
- Proper Maintenance. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.
- Tribal Rights. No NWP activity may cause more than minimal adverse effects on tribal rights (including treaty rights), protected tribal resources, or tribal lands.
- Endangered Species. (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless ESA section 7 consultation addressing the effects of the proposed activity has been completed.
- Endangered Species. (d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific permit conditions to the NWPs.

- Migratory Birds and Bald and Golden Eagles. The permittee is responsible for ensuring their action complies with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.
- Historic Properties. (a) In cases where the district engineer determines that the activity may have the potential to cause effects to properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.
- Discovery of Previously Unknown Remains and Artifacts. If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed.
- Water Quality. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)).
- Regional and Case-By-Case Conditions. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification.

USACE Seattle District NWP Regional Conditions

- Construction Boundaries: Permittees must clearly mark all construction area boundaries before beginning work on projects that involve grading or placement of fill. Boundary markers and/or construction fencing must be maintained and clearly visible for the duration of construction. Permittees should avoid and minimize removal of native vegetation (including submerged aquatic vegetation) to the maximum extent possible.
- Temporary Impacts and Site Restoration: Native soils removed from waters of the U.S. for project construction should be stockpiled and used for site restoration. Restoration of temporarily disturbed areas must include returning the area to pre-project ground surface contours. If native soil is not available from the project site for restoration, suitable clean soil of the same textural class may be used. The permittee must revegetate disturbed areas with native plant species sufficient in number, spacing, and diversity to restore affected functions. Revegetation must begin as soon as site conditions allow within the same growing season as the disturbance. Temporary erosion and sediment control measures must be removed as soon as the area has established vegetation sufficient to control erosion and sediment.

NWP 27 (Aquatic Habitat Restoration, Enhancement, and Establishment Activities) Conditions

- Only native plant species should be planted at the site.

NWP 33 (Temporary Construction, Access, and Dewatering) Conditions

- Appropriate measures must be taken to maintain near normal downstream flows and to minimize flooding.
- Fill must consist of materials, and be placed in a manner, that will not be eroded by expected high flows.

- The use of dredged material may be allowed if the district engineer determines that it will not cause more than minimal adverse environmental effects. Following completion of construction, temporary fill must be entirely removed to an area that has no waters of the United States, dredged material must be returned to its original location, and the affected areas must be restored to pre-construction elevations. The affected areas must also be revegetated, as appropriate.

B.1.2 Ecology Section 401 Water Quality Certification

General Conditions

- Stormwater pollution prevention: All projects that involve land disturbance or impervious surfaces must implement stormwater pollution prevention or control measures to avoid discharge of pollutants in stormwater runoff to waters of the State.
  - For land disturbances during construction, the applicant must obtain and implement permits (e.g., Construction Stormwater General Permit) where required and follow Ecology's current stormwater manual.
  - Following construction, prevention or treatment of on-going stormwater runoff from impervious surfaces shall be provided.

B.3 Potential Contractor Plan Submittals

The list of plans that would need to be prepared before Project construction could begin may include, but are not limited to the following:

- Land Use and Landscape Rehabilitation Plan
- Traffic Control Plan
- Pollution Prevention Plan
- Spill Prevention, Control, and Countermeasure Plan
- Tree and Plant Protection Plan
- Waste Production and Disposal Plan
- Waste Handling and Disposal Plan
- Demolition Plan
- Concrete Removal and Disposal Plan
- Water Control Plan
- Cofferdam Construction Plan
- Seeding Plan
- Work Area Isolation Plan
- Temporary Erosion and Sediment Control Plan
- Inadvertent Discovery Plan

B.4 References

Anglin, D. R., J. J. Skalicky, D. Hines, and N. Jones. 2013. Icicle Creek Fish Passage Evaluation for The Leavenworth National Fish Hatchery. U.S. Fish and Wildlife Service, Columbia River Fisheries Program Office, Vancouver, Washington.

NMFS (National Marine Fisheries Service). 2015. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Consultation; Leavenworth National Fish Hatchery spring Chinook Salmon Program. National Marine Fisheries Service, West Coast Region, Portland, Oregon.

_____. 2017a. Programmatic Endangered Species Act Section 7(a)(2) Biological Opinion, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Seattle District Corps of Engineers Permitting of Fish Passage and Restoration Action in Washington State (FPRP III). West Coast Region, Portland, Oregon.

_____. 2017b. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Consultation, Leavenworth National Fish Hatchery Spring Chinook Salmon Program (Reinitiation 2016). National Marine Fisheries Service, West Coast Region, Portland, Oregon.

NMFS and USFWS (National Marine Fisheries Service and U.S. Fish and Wildlife Service). 2008. Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Washington State Fish Passage and Habitat Enhancement Restoration Programmatic. NMFS Tracking No. 2008/03598, USFWS No. 13410-2008-FWS#F-0209. Lacey, Washington.

Reclamation (U.S. Bureau of Reclamation). 2010. Technical Memorandum No. 86-68220-07-05: Inspection and Cleaning Manual for Equipment and Vehicles to Prevent the Spread of Invasive Species, 2010 Edition. Denver, Colorado.

USFWS (U.S. Fish and Wildlife Service). 2011. Biological Opinion for the operations and maintenance (O&M) of the LNFH and effects on the threatened bull trout (*Salvelinus confluentus)* and its designated critical habitat. USFWS Reference No. 13260-2011-F-0048 and 13260-2011-P-0002. Wenatchee, Washington.

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