



— BUREAU OF —
RECLAMATION

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

Geology and Soils Resource Report



**U.S. Department of the Interior
Bureau of Reclamation
Columbia-Pacific Northwest Regional Office
1150 N. Curtis Road
Boise, ID 83706**

November 2020

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.

The Analysis Area for geology and soils includes areas that would be directly impacted by ground disturbance from construction (**Map A-9** in **Appendix A**). The indicator for soils is the acres of soils disturbed by short- and long-term Project components. The indicator for geology is geologic issues, such as movement of natural materials (e.g. erosion) due to construction or Project design. The soils in the Analysis Area are primarily loamy sands, gravelly sandy loam, river-wash, and rock outcrop (no soil cover; USDA 2020). The Analysis Area is located on Mount Stuart batholith, a granodiorite batholith that is stable and cohesive (Tabor et al. 1987). Under the No Action alternative, no new impacts to geologic materials or soils would occur. Under the action alternatives, the construction of Project components, temporary access roads, storage and work areas, and the cut and cover replacement of sections of conveyance pipeline would result in short and long-term effects to soils and geology. Impacts to soils would include compaction and disturbance from roads and construction. Impacts to geology would include the movement of geologic materials from construction and intake operation. Under the action alternatives, approximately 0.18 acres of soils and geologic material would be permanently disturbed. Best Management Practices would reduce the intensity of impacts; however, the placement of permanent Project facilities would continue to result in the irretrievable commitment of soil resources in some areas under all action alternatives.

This page intentionally left blank.

Table of Contents

Chapter	Page
EXECUTIVE SUMMARY	ES-1
CHAPTER 1. GENERAL PROJECT INFORMATION.....	1
1.1 Project Area.....	1
1.2 Alternatives.....	1
1.2.1 Alternative A – No Action.....	1
1.2.2 Alternative B – Proposed Action.....	3
1.2.3 Alternative C.....	7
1.2.4 Alternative D.....	8
CHAPTER 2. RELEVANT LAWS, REGULATIONS, AND POLICY	11
2.1 Federal Laws, Regulations, Statutes, and Orders.....	11
2.2 State and Local Laws.....	11
CHAPTER 3. AFFECTED ENVIRONMENT.....	13
3.1 Analysis Area.....	13
3.2 Affected Environment.....	13
CHAPTER 4. ENVIRONMENTAL CONSEQUENCES	15
4.1 Methods.....	15
4.1.1 Analysis Indicators.....	15
4.1.2 Issue Statements.....	15
4.2 Alternative A – No Action Alternative.....	15
4.3 Alternative B – Proposed Action.....	15
4.4 Alternative C.....	16
4.5 Alternative D.....	16
4.6 Short-Term Uses and Long-Term Productivity.....	16
4.7 Unavoidable Adverse Impacts.....	17
4.8 Irreversible and Irretrievable Commitment of Resources.....	17
CHAPTER 5. GLOSSARY	19
CHAPTER 6. REFERENCES CITED	21

Figures

	Page
Figure 1. Geologic Map of the Leavenworth, Washington, Area.....	14

Appendices

Appendix A. Maps

Appendix B. Best Management Practices

Acronyms and Abbreviations

Full Phrase

BMP	Best Management Practice
cfs	cubic feet per second
CIPP	cure-in-place pipe
COIC	Cascade Orchard Irrigation Company
Ecology	Washington Department of Ecology
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
EIS	Environmental Impact Statement
Forest Service	U.S. Department of Agriculture, Forest Service
IO&MA	Intake Operations and Maintenance Area
LNFH, Hatchery	Leavenworth National Fish Hatchery
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
O&M	operations and maintenance
PISMA	pipeline intake and sediment management area
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
SWISP	Surface Water Intake Fish Screens and Fish Passage
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife

This page intentionally left blank.

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 headworks² 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 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

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.

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 construction³. 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.

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

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.

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.

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 cofferdams⁴ (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).
- Placement of new intake pipeline (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.

- 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).
- Supplying 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 pumps⁵ 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.

This page intentionally left blank.

Chapter 2. Relevant Laws, Regulations, and Policy

2.1 Federal Laws, Regulations, Statutes, and Orders

Clean Water Act, 33 United States Code 1251 et seq. – This act regulates discharges of dredged or fill material and pollutants into waters of the U.S.

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.

2.2 State and Local Laws

City of Leavenworth Comprehensive Plan, including the land use zoning map – This plan establishes requirements for building, fill, and grading permits.

Construction Stormwater General Permit and Stormwater Pollution Prevention Plan – This plan establishes standards for construction stormwater management and pollution prevention plans.

Washington State Department of Transportation, Temporary Erosion and Sediment Control Manual M 3109.02 – This manual establishes standards for temporary erosion and sediment control measures.

Washington State Department of Ecology’s Stormwater Management Manual for Western Washington – This manual establishes standards for stormwater management.

This page intentionally left blank.

Chapter 3. Affected Environment

3.1 Analysis Area

The Analysis Area for geology and soils includes areas that would be directly impacted by ground disturbance from construction (**Map A-9** in **Appendix A**). This area was chosen because impacts on soils and geology from the alternatives would be localized.

3.2 Affected Environment

Based on the United States Department of Agriculture soil survey mapping, the soils in the Analysis Area are primarily loamy sands, gravelly sandy loam, river-wash, and rock outcrop (no soil cover). The soil map resolution is insufficient for exact soil percentages in the Analysis Area (USDA 2020). These soils are well drained and not highly erodible. Soil depth in the Analysis Area is generally thin.

Desired conditions for soils are to preserve soil health and to prevent soil erosion; no trends for soils have been identified in the Analysis Area.

The entire Analysis Area is located on the Mount Stuart batholith, a granodiorite batholith⁶ that is stable and cohesive (Tabor et al. 1987). There are identified faults a few miles up and downstream of the Analysis Area, but Icicle Creek does not follow a fault. **Figure 1** depicts the geological setting in the region.

Levels of seismic activity in the Analysis Area are low (USGS 2020). Due to the steep terrain surrounding Icicle Creek, landslide risk does exist, but rock is generally cohesive⁷.

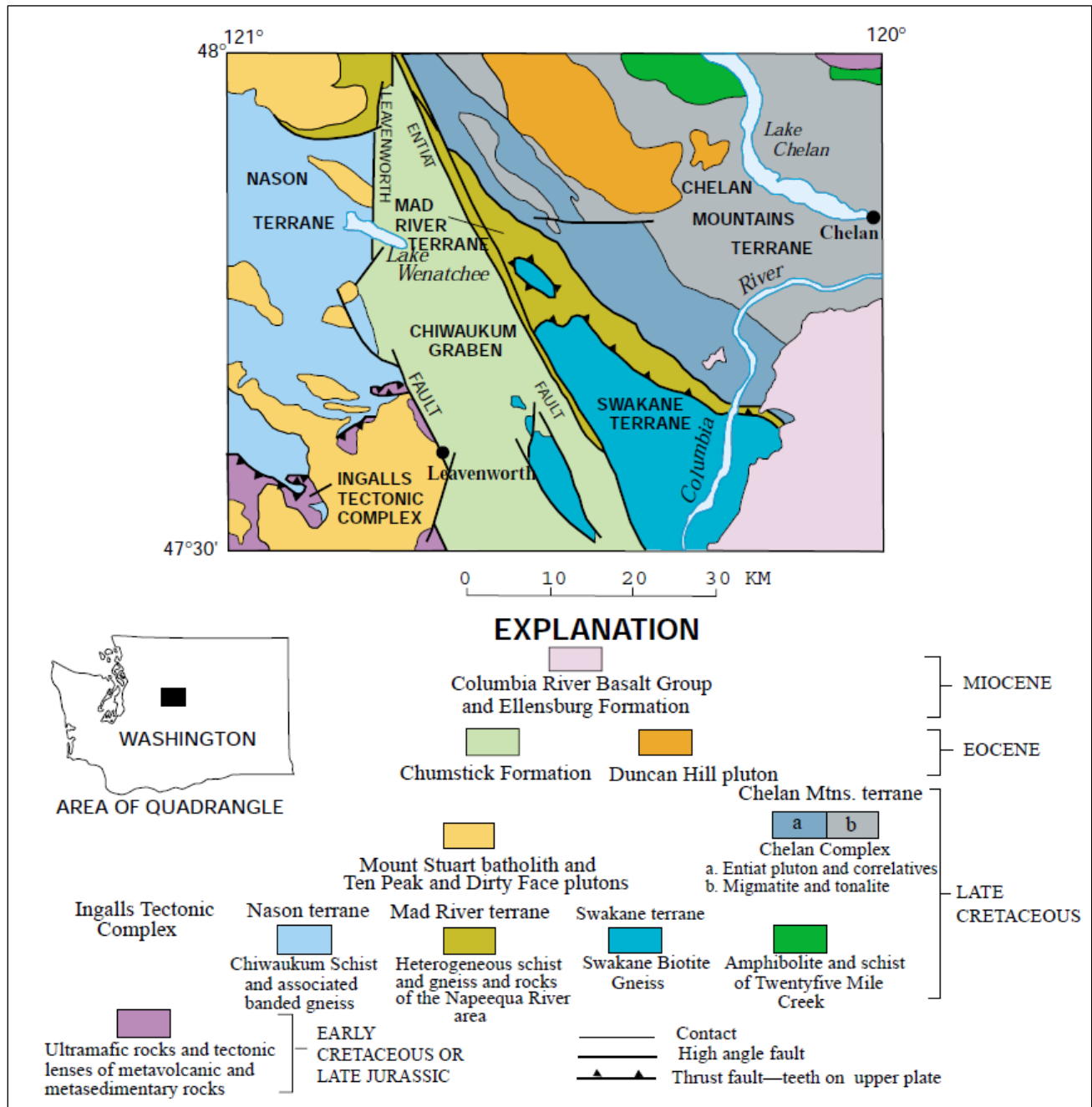
Preliminary investigation conducted by Reclamation has collected information on fractures and discontinuities in the area. Analysis of that information will be conducted to determine if fractures or discontinuities are likely to pose any issues during construction or long-term operation of Project components. These geologic investigations serve to inform engineers about geologic conditions in the Analysis Area (Reclamation 2020a, 2020b). As part of these studies and the permitting process for this Project, relevant organizations with input on the soils and geology, such as the Washington Department of Natural Resources, have been given the opportunity to provide input on the management of soils and geologic resources in the Project Area.

No desired conditions or trends were identified for geologic resources.

⁶ Granodiorite is rock formed by silica-rich magma that cools in batholiths, or stocks, below the Earth's surface. It is usually only exposed at the surface after uplift and erosion have occurred.

⁷ Todd Maguire, Bureau of Reclamation geologist, phone call with Francis Craig and Alexis Kantor, EMPSi environmental planners, on April 15, 2020, regarding geologic hazards in the Project Area.

Figure 1. Geologic Map of the Leavenworth, Washington, Area



Source: Tabor et al. 1987

Chapter 4. Environmental Consequences

4.1 Methods

4.1.1 Analysis Indicators

- Geology: geologic issues, such as movement of natural materials (e.g. erosion) due to construction or Project design
- Soils: acres of soils temporarily and permanently disturbed by Project components

4.1.2 Issue Statements

Issues and public concern statements related to geology and soils identified during the scoping process include the following:

- Commenters recommended that robust BMPs for erosion control in permitting, specifically for the construction stormwater permit, be identified and included.
- Commenters requested that a qualified professional is hired to evaluate site geology, evaluate potential geological issues, and conduct the construction work proposed. Reclamation should consult with Washington Department of Natural Resources (<https://www.dnr.wa.gov/geology>), as they have geological expertise and are typically the responsible state agency for this topic.

4.2 Alternative A – No Action Alternative

Under Alternative A, no ground-disturbing activities would occur. As a result, there would be no new impacts to geology or soils such as erosion or soil disturbance under Alternative A in the Analysis Area. Sediment from upstream sources (approximately 3,900 to 5,900 cubic yards annually; Reclamation 2020c), predominantly natural processes, would continue to be diverted from the natural river channel into LNFH facilities where it would cause operation and maintenance issues including the need for sediment to be removed via the sand settling basin and storage of removed sediment on site. Permanent Project components such as buildings and the intake structure would continue to represent a disturbance to the soils they are constructed on.

4.3 Alternative B – Proposed Action

Under Alternative B, construction would occur to replace the existing intake facilities and all sections of the conveyance pipeline located on USFWS property. The rest of the conveyance pipeline would be lined using CIPP that would only require surface disturbance at specific access points (i.e., CUAs). Under this alternative, a total of approximately 0.18 acres (Reclamation GIS 2020) of soils and geologic materials would be permanently disturbed by the construction of new Project components. There would be approximately 1.02 acres of soils and geologic materials temporarily disturbed from construction activities. Construction areas such as access roads and excavation for pipeline access at CUAs would be reclaimed following completion of construction which would stabilize soils and reduce potential for erosion. BMPs for geology and soils would

include using existing roads where possible, minimizing new roads, and avoiding placing roads or trails across slopes greater than 30 percent (see **Appendix B**), and would reduce the risk of wind or water erosion on soils to minimize impacts. BMPs and sediment control measures would mitigate soil damage and reduce the risk of loss of soil to erosion. As part of the construction of the intake structure and roughened channel, rocks and streambanks would be moved from their original positions. However, changes in geomorphology and movement of materials in waterbodies are naturally occurring processes so these actions do not represent a significant geological impact compared to existing conditions. Construction of the PISMA would reduce sediment load to the sand settling basin compared to Alternative A, reducing the amount of maintenance required on the conveyance pipeline, and thus future disturbance to soils. Exact estimates of the volume reduction of sediment load are not available. Compared to Alternative A, more short-term disturbance of soils and geologic materials would occur under Alternative B. Long-term impacts would be similar to Alternative A because reclamation following construction would restore soils to original condition and long-term disturbance from permanent Project components would be similar to existing disturbance.

4.4 Alternative C

Under Alternative C, construction activities would occur as described under Alternative B for all components except the conveyance pipeline because the entire conveyance pipeline on USFWS property from the PISMA to the private parcels would be lined using CIPP. Under this alternative a total of approximately 0.18 acres (the same as under Alternative B; Reclamation GIS 2020) would be permanently disturbed; 0.89 acres would be temporarily disturbed by construction activities (a 0.13-acre reduction compared to Alternative B). Construction areas such as access roads and excavation for conveyance pipeline access at CUAs would be reclaimed and revegetated following completion of construction which would stabilize soils and reduce potential for erosion. Project BMPs for soils and geologic materials would be the same as described under Alternative B. Impacts on geomorphology and movement of materials in waterbodies would be the same as described under Alternative B. Compared to Alternative A, more short-term disturbance of soils and geologic materials would occur under Alternative C. Long-term impacts would be similar to Alternative A because reclamation following construction would restore soils to original condition and long-term disturbance from permanent Project components would be similar to existing disturbance.

4.5 Alternative D

Under Alternative D, construction activities would occur as described under Alternative B for all components. The amount of temporary and permanent disturbance would be the same as described for Alternative B.

4.6 Short-Term Uses and Long-Term Productivity

Under Alternative A, failing to repair degraded areas of the conveyance pipeline could result in greater impacts to geology and soil resources than the Action Alternatives, if a conveyance pipeline failure requires emergency repairs to keep the LNFH functional. Short-term impacts under the

action alternatives would likely reduce long-term impacts associated with maintenance required for the conveyance pipeline, surface water intake and other Project components compared to Alternative A, for example regularly clearing the sand settling basin or having to replace failed conveyance pipeline sections.

4.7 Unavoidable Adverse Impacts

Impacts to soils and geology that may occur under the action alternatives are expected to be avoidable by using BMPs. Long-term impacts that may occur such as soil compaction should be reversible as part of the reclamation and revegetation plans for disturbed areas.

4.8 Irreversible and Irretrievable Commitment of Resources

Irretrievable commitments of geologic and soil resources would occur in areas where surface disturbing activities take place under the action alternatives. Much of the irretrievable commitment would be short-term under the action alternatives, such as impacts to geology and soils from temporary access roads. Under all Alternatives in areas where permanent Project components are constructed or currently exist, irretrievable commitment of resources will last for the life of the facility. No irreversible commitments of geologic or soil resources are expected because of the Project.

This page intentionally left blank.

Chapter 5. Glossary

Batholith—A large mass of intrusive igneous rock, larger than 100 square kilometers (24,710 acres) in area, that forms from cooled magma deep in the Earth's crust.

Granodiorite—Intrusive igneous rock similar to granite.

This page intentionally left blank.

Chapter 6. References Cited

- NMFS (National Marine Fisheries Service). 1997. Fish Screening Criteria for Anadromous Salmonids. National Marine Fisheries Service, Southwest Region, Long Beach, California.
- _____. 2011. Anadromous Salmonid Passage Facility Design. National Marine Fisheries Service, Northwest Region, Portland, Oregon.
- _____. 2017. 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.
- Reclamation (Bureau of Reclamation). 2020a. Geologic Data Package for Final Design of the Intake, Leavenworth National Fish Hatchery, Washington.
- _____. 2020b. Geologic Data Package for Final Design of the Surface Water Intake Pipeline, Leavenworth National Fish Hatchery, Washington.
- _____. 2020c. Surface Water Intake Screening and Fish Passage 2D Hydraulic Modeling Leavenworth National Fish Hatchery. July 2020.
- Reclamation GIS (Bureau of Reclamation Geographic Information Systems). 2020. GIS data from Reclamation, Columbia-Pacific Northwest Region, Columbia-Cascades Area Office, Technical Service Center, and Jacobs Engineering.
- Tabor, R.W., V. Frizzell, J. T. Whetten, R. B. Waitt, D. A. Swanson, G. R. Byerly, D. B. Booth, et al. 1987. Geologic map of the Chelan 30-minute by 60-minute quadrangle, Washington. Internet website: <https://pdfs.semanticscholar.org/1e9a/a9553631b25c2ceded63d1afa367c680bd9.pdf>.
- USDA (United States Department of Agriculture). 2020. Natural Resources Conservation Service Web Soil Survey. Internet website: <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>.
- USFWS (United States 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.
- USGS (United States Geological Survey). 2020. Search Earthquake Catalog. Internet website: <https://earthquake.usgs.gov/earthquakes/search/>.

This page intentionally left blank.

Appendix A

Maps

This page intentionally left blank.



BUREAU OF RECLAMATION

Map A-1 Project Area Overview

- Potential Temporary Disturbance Area
- Staging
- Temporary Pump

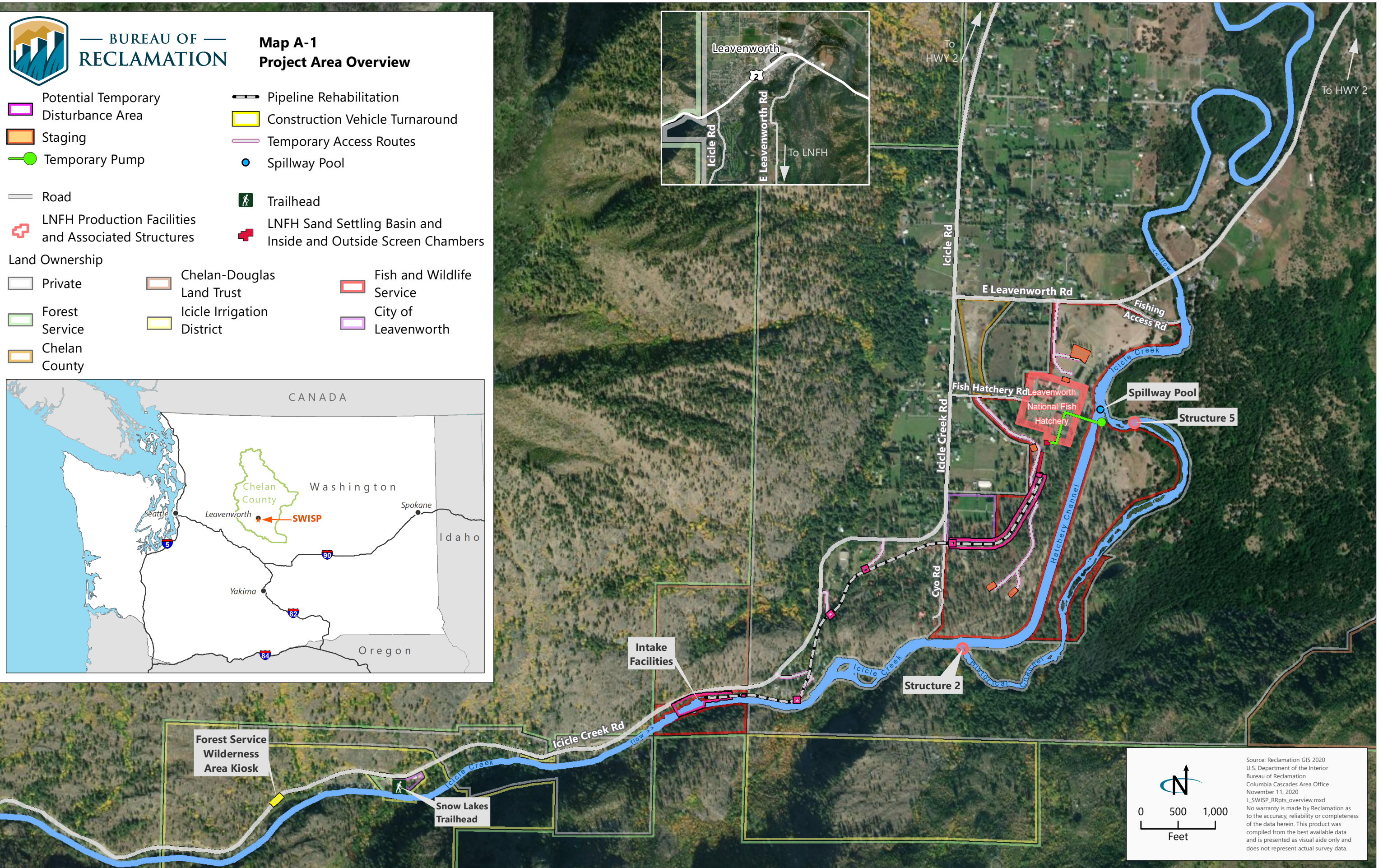
- Pipeline Rehabilitation
- Construction Vehicle Turnaround
- Temporary Access Routes
- Spillway Pool

- Road
- LNFH Production Facilities and Associated Structures

- Trailhead
- LNFH Sand Settling Basin and Inside and Outside Screen Chambers

Land Ownership

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











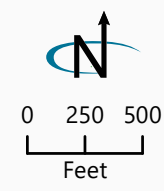
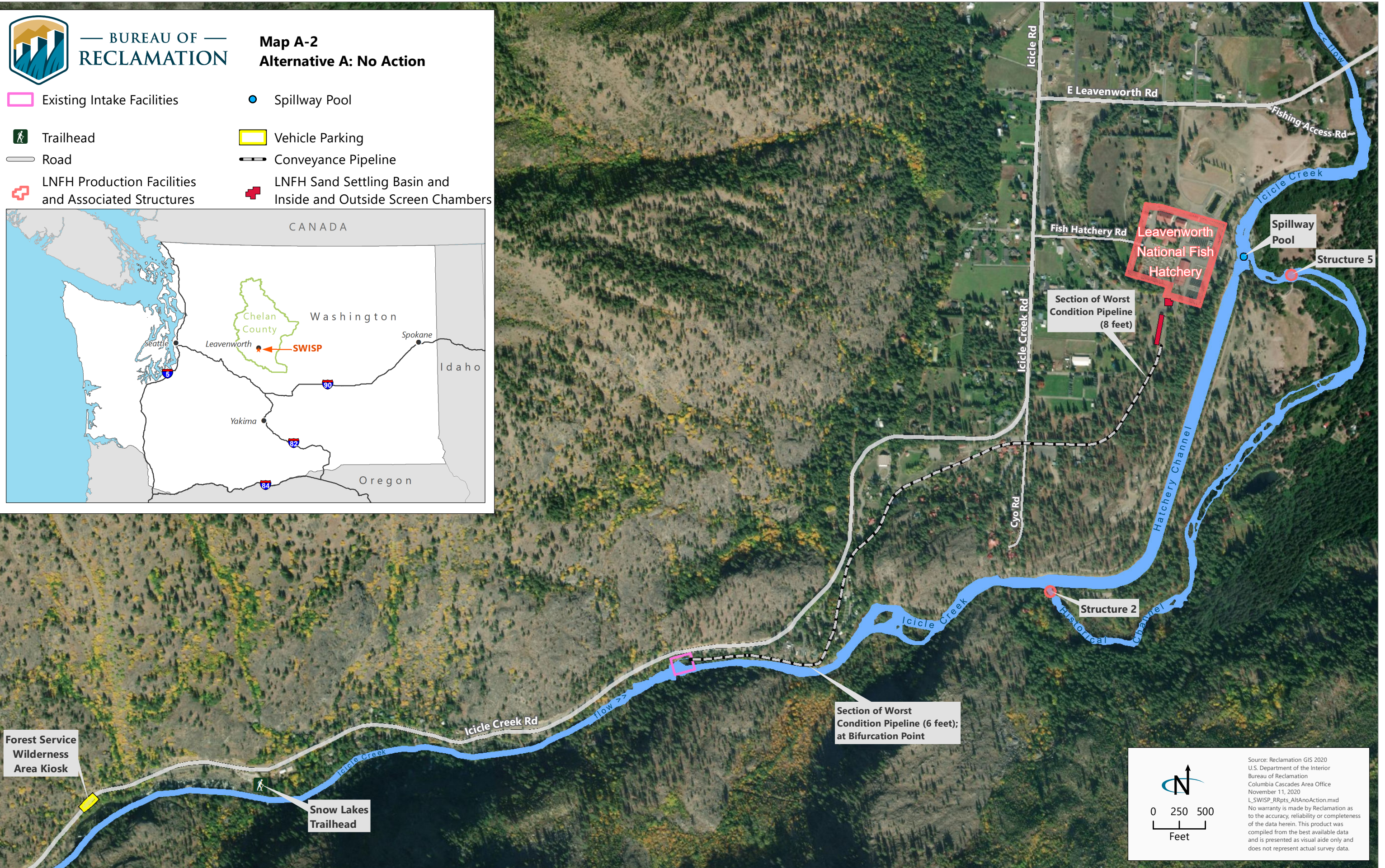
Source: Reclamation GIS 2020
 U.S. Department of the Interior
 Bureau of Reclamation
 Columbia Cascades Area Office
 November 11, 2020
 L_SWISP_RRpts_overview.mxd
 No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aid only and does not represent actual survey data.



BUREAU OF RECLAMATION

Map A-2
Alternative A: No Action

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



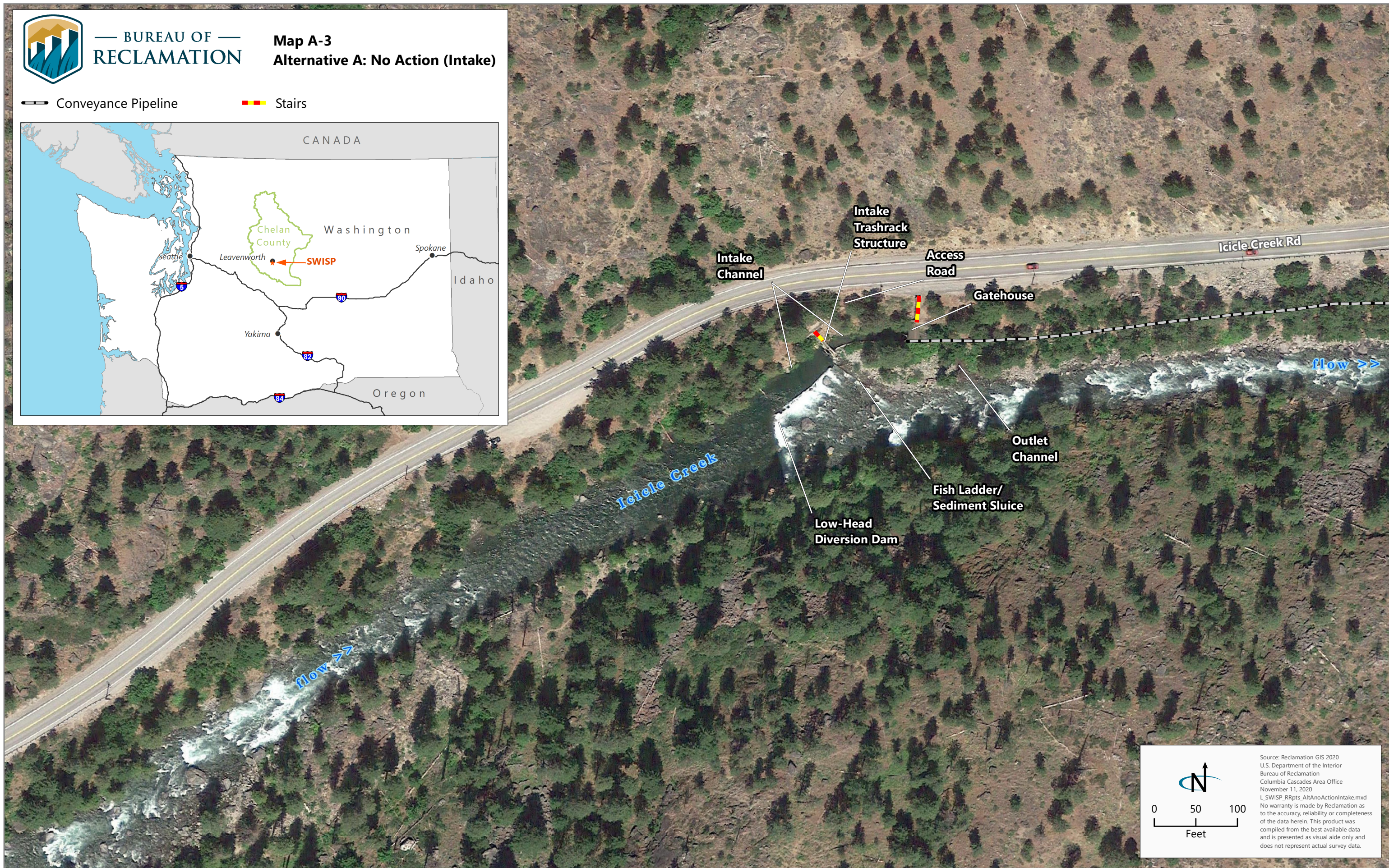
Source: Reclamation GIS 2020
 U.S. Department of the Interior
 Bureau of Reclamation
 Columbia Cascades Area Office
 November 11, 2020
 L_SWISP_RRpts_AltAnoAction.mxd
 No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aid only and does not represent actual survey data.



BUREAU OF RECLAMATION

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

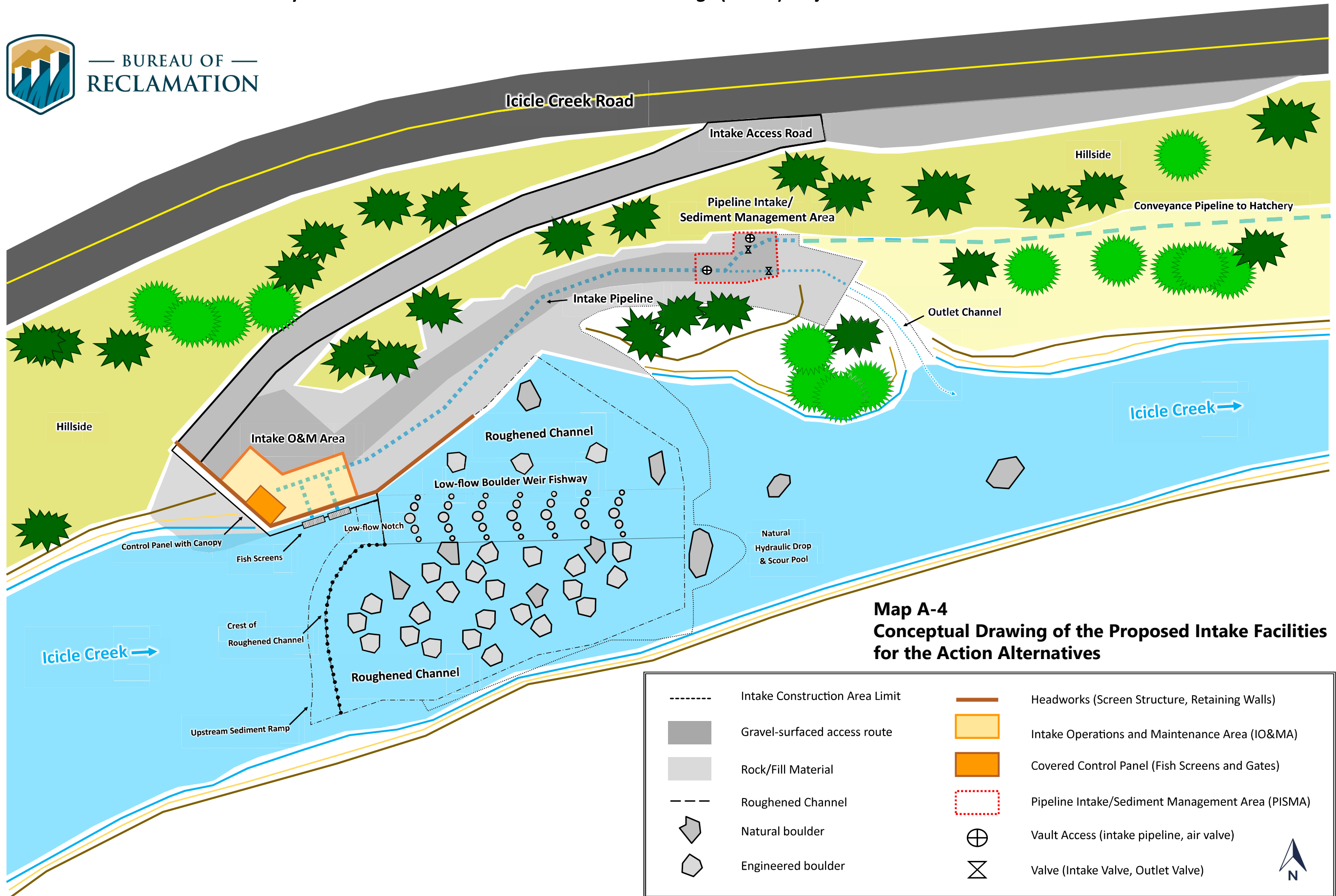
Conveyance Pipeline Stairs



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_AltAnoActionIntake.mxd
No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aid only and does not represent actual survey data.

Leavenworth National Fish Hatchery Surface Water Intake Fish Screens and Fish Passage (SWISP) Project





BUREAU OF RECLAMATION

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

Phase I

Intake Facilities

Phase II

Construction Area

Contractor Use Area (CUA)

Temporary Pump and Pipeline

Temporary Access Route

Phase I and II

Staging and Storage Site for Construction Equipment and Materials, and Construction Staff Administration

Road

Spillway Pool

Trailhead

Temporary Access Route

Conveyance Pipeline lined with Cure-in-Place Pipe (approximately 4,000 feet)

Pipeline Replacement

Access Routes

Construction Vehicle Turnaround/ Vehicle Parking

LNFH Production Facilities and Associated Structures

LNFH Sand Settling Basin and Inside and Outside Screen Chambers

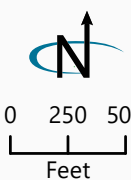


Forest Service Wilderness Area Kiosk

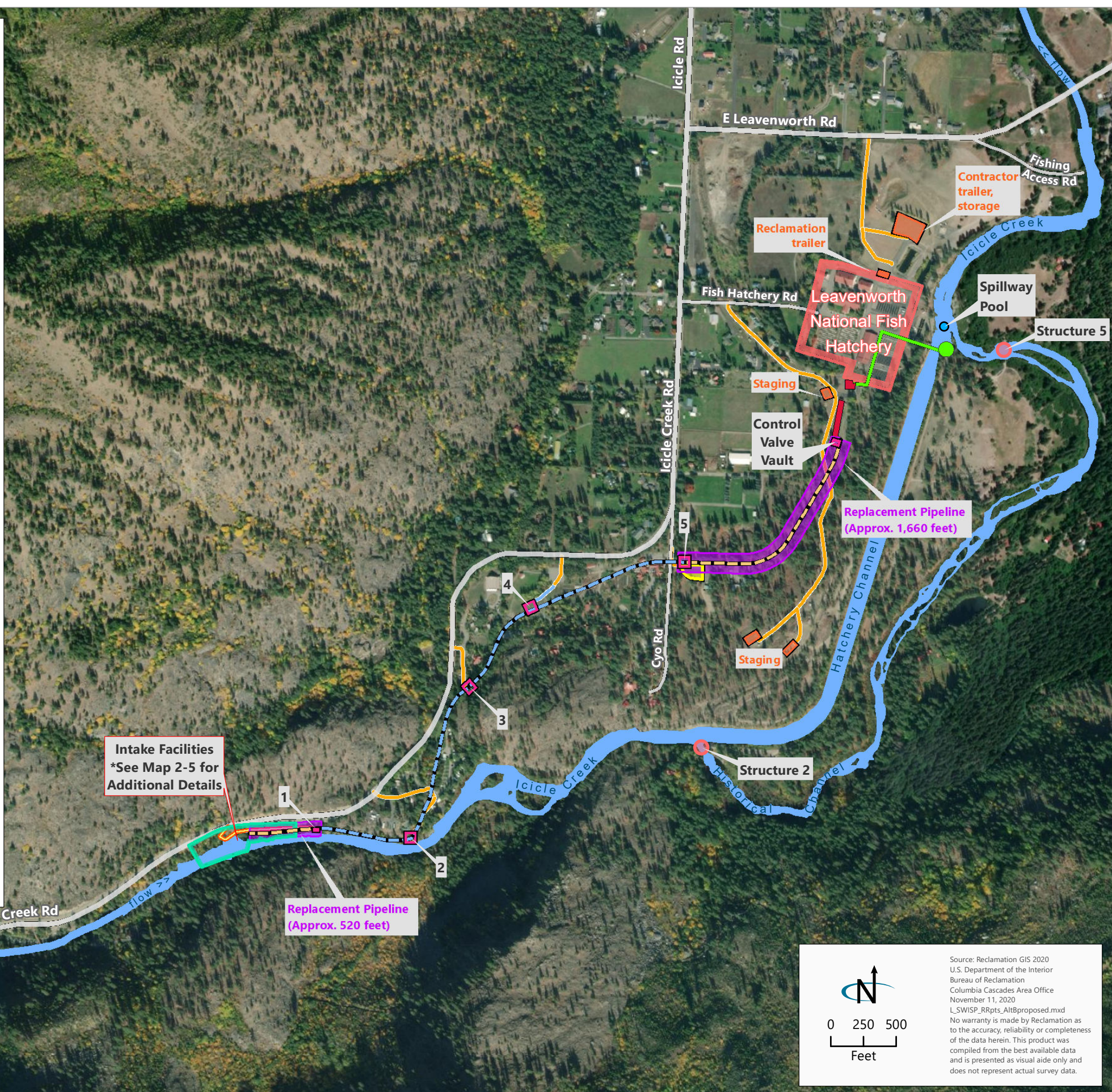
Snow Lakes Trailhead

Intake Facilities
*See Map 2-5 for Additional Details

Replacement Pipeline
(Approx. 520 feet)



Source: Reclamation GIS 2020
U.S. Department of the Interior
Bureau of Reclamation
Columbia Cascades Area Office
November 11, 2020
L_SWISP_RRpts_AltBproposed.mxd
No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aid only and does not represent actual survey data.





BUREAU OF RECLAMATION

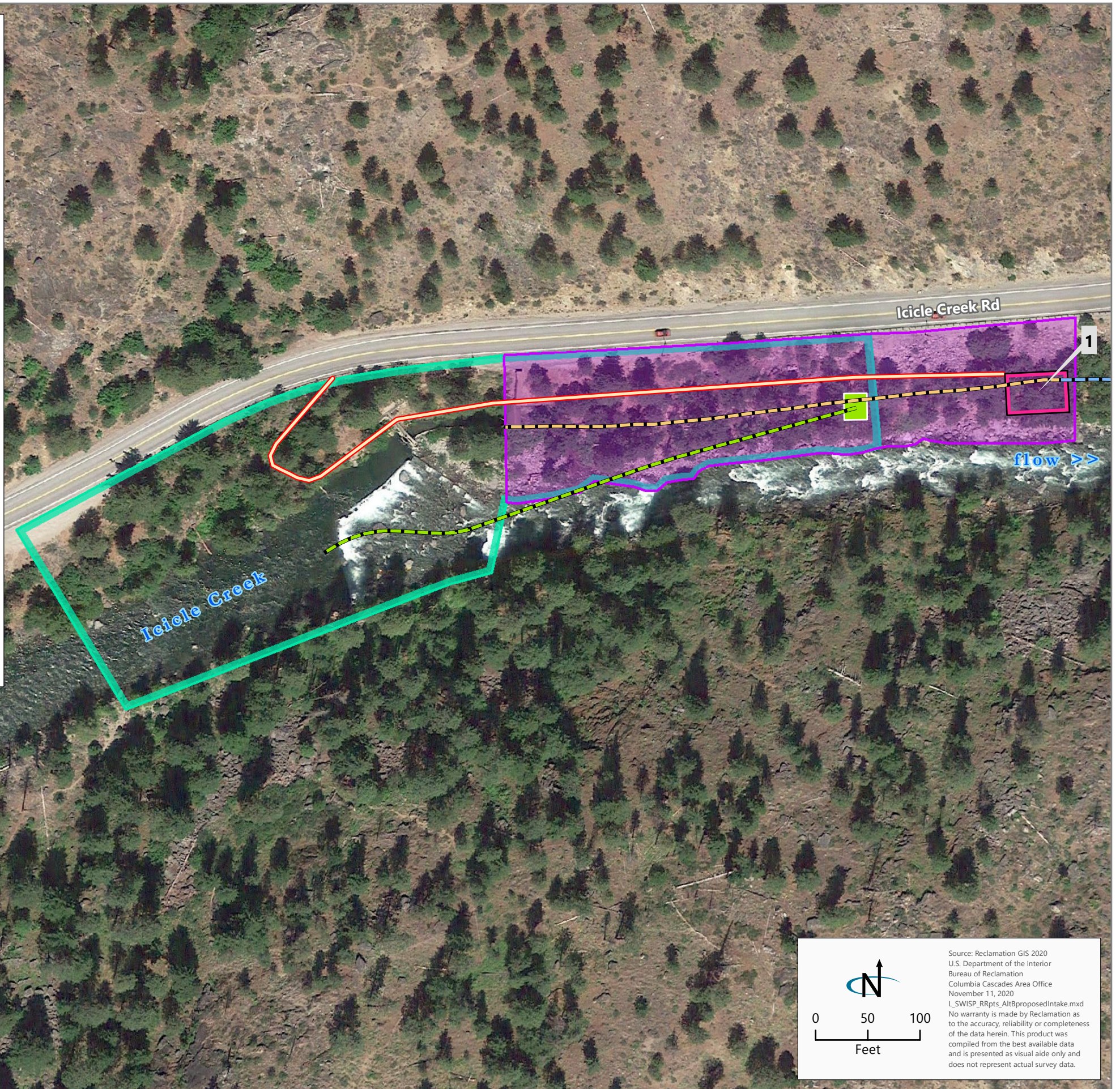
Map A-6 Alternative B (Proposed Action) and Alternative D: Intake

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)



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_AltBproposedIntake.mxd
No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aid only and does not represent actual survey data.



BUREAU OF RECLAMATION

Map A-7 Alternative C

Phase I

Intake Facilities

Phase II

Construction Area

Contractor Use Area (CUA)

Temporary Pump and Pipeline

Temporary Access Route

Phase I and II

Staging and Storage Site for Construction Equipment and Materials, and Construction Staff Administration

Road

Spillway Pool

Trailhead

Temporary Access Route

Conveyance Pipeline lined with Cure-in-Place Pipe (approximately 4,520 feet)

Pipeline Replacement

Access Routes

Construction Vehicle Turnaround/ Vehicle Parking

LNFH Production Facilities and Associated Structures

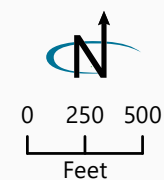
LNFH Sand Settling Basin and Inside and Outside Screen Chambers



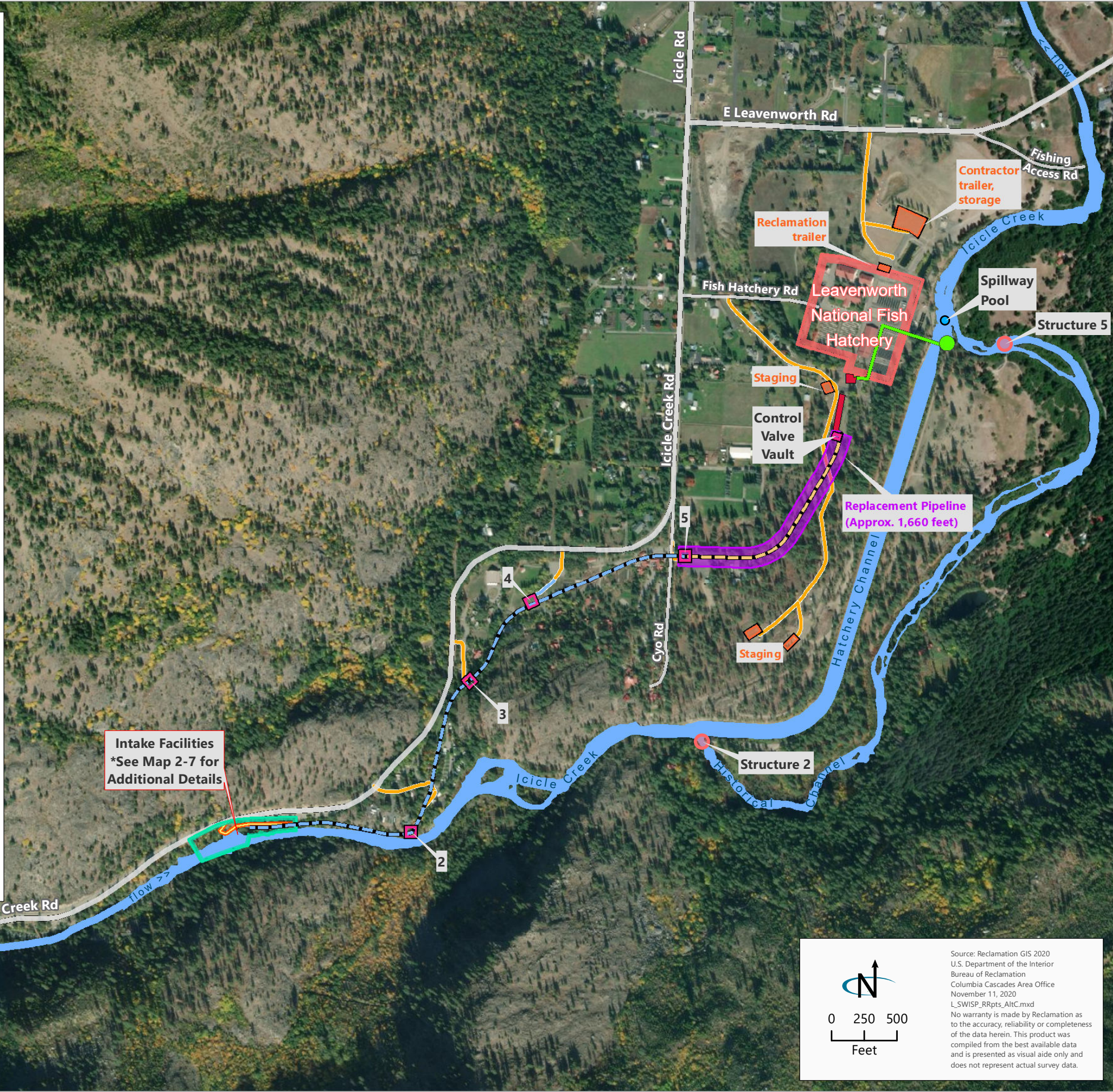
Forest Service Wilderness Area Kiosk

Snow Lakes Trailhead

Intake Facilities
*See Map 2-7 for Additional Details



Source: Reclamation GIS 2020
 U.S. Department of the Interior
 Bureau of Reclamation
 Columbia Cascades Area Office
 November 11, 2020
 L_SWISP_RRpts_AltC.mxd
 No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aid only and does not represent actual survey data.





BUREAU OF RECLAMATION

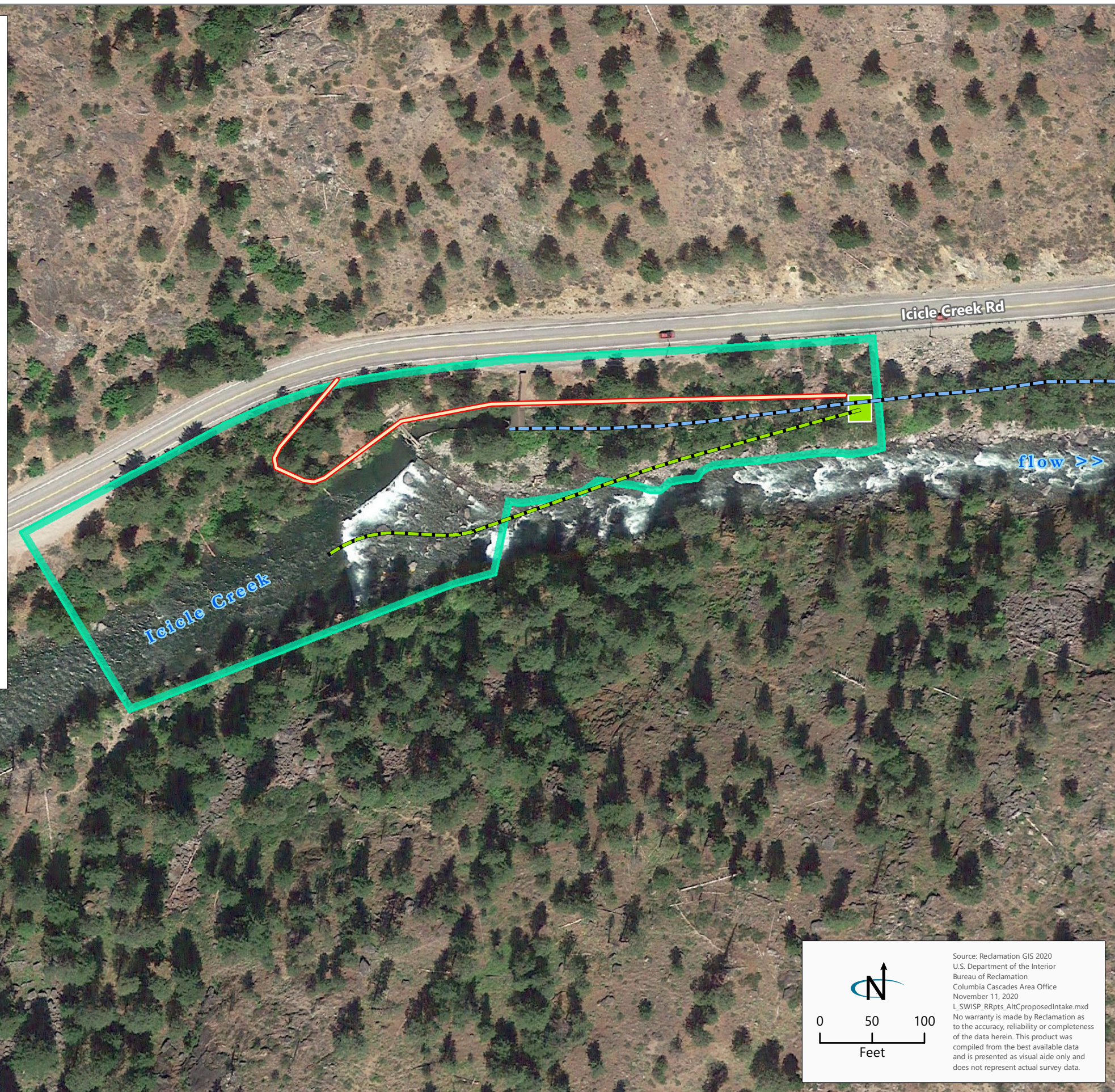
Map A-8 Alternative C (Intake)


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

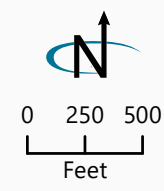
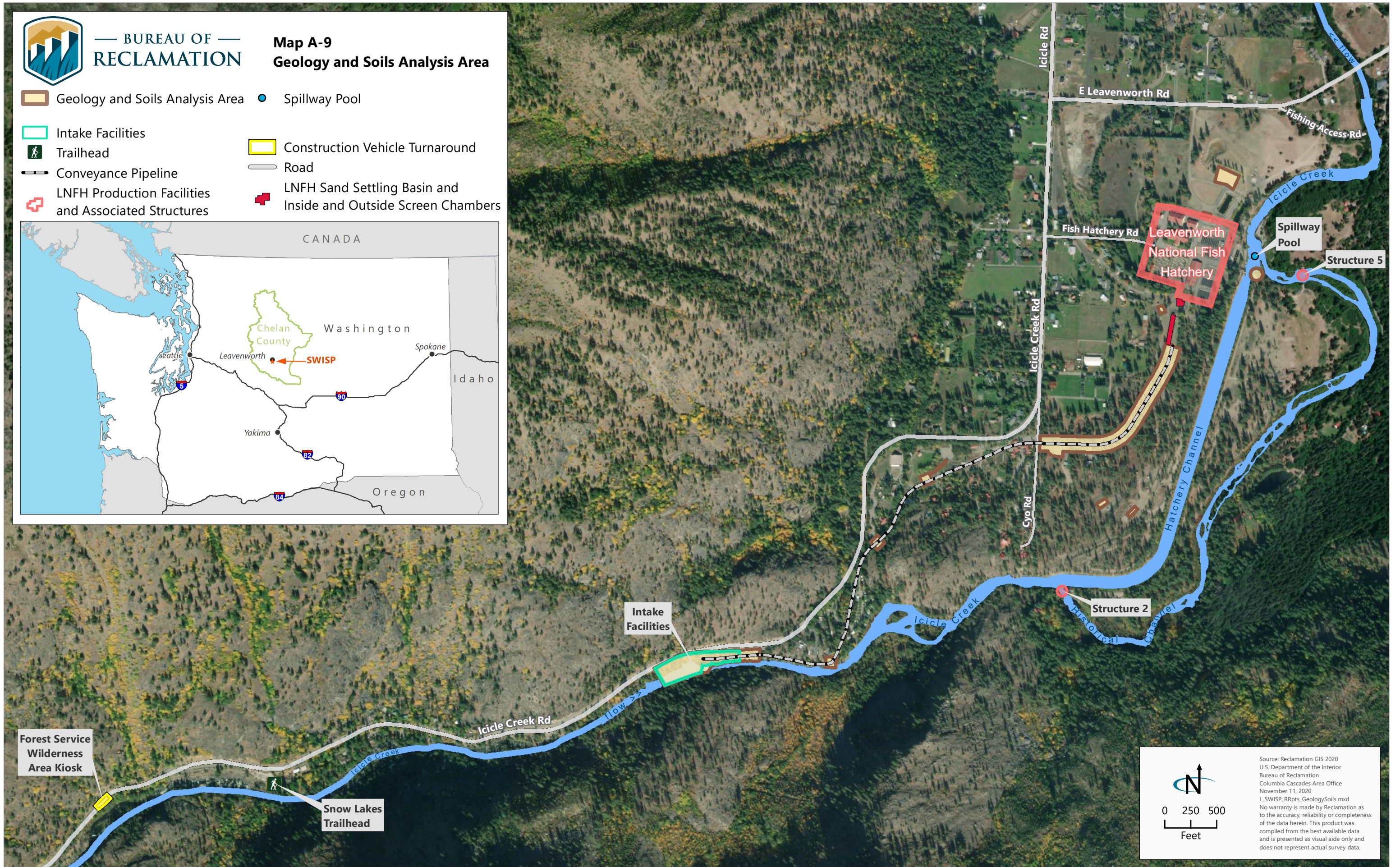
Source: Reclamation GIS 2020
U.S. Department of the Interior
Bureau of Reclamation
Columbia Cascades Area Office
November 11, 2020
L_SWISP_RRpts_AltCproposedIntake.mxd
No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aid only and does not represent actual survey data.



BUREAU OF RECLAMATION

Map A-9 Geology and Soils Analysis Area

- Geology and Soils Analysis Area
- Spillway Pool
- Intake Facilities
- Trailhead
- Conveyance Pipeline
- Construction Vehicle Turnaround
- Road
- LNFH Production Facilities and Associated Structures
- LNFH Sand Settling Basin and Inside and Outside Screen Chambers



Source: Reclamation GIS 2020
 U.S. Department of the Interior
 Bureau of Reclamation
 Columbia Cascades Area Office
 November 11, 2020
 L_SWISP_RRpts_GeologySoils.mxd
 No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aid only and does not represent actual survey data.

This page intentionally left blank.

Appendix B

Best Management Practices

This page intentionally left blank.

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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • Cofferdam 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)	<p data-bbox="617 253 716 279">General</p> <ul data-bbox="665 289 1892 529" style="list-style-type: none"> <li data-bbox="665 289 1892 386">• 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. <li data-bbox="665 396 1892 493">• 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). <li data-bbox="665 503 1780 529">• The use of acids for cleaning or preparing concrete surfaces for repair will not be permitted. <p data-bbox="617 553 793 579">In-water work</p> <ul data-bbox="665 589 1892 1317" style="list-style-type: none"> <li data-bbox="665 589 1892 751">• 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). <li data-bbox="665 761 1892 826">• Use of rapidly deployable prefabricated cofferdam systems would minimize impacts to subgrade and surrounding water. <li data-bbox="665 836 1892 901">• 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. <li data-bbox="665 911 1892 976">• Spill prevention and clean-up kits will be on site when heavy equipment is operating within 25 feet of the water (NMFS 2017a). <li data-bbox="665 985 1892 1050">• 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). <li data-bbox="665 1060 1892 1125">• Equipment shall be checked daily for leaks and any necessary repairs shall be completed prior to commencing work activities around the water (NMFS 2017a). <li data-bbox="665 1135 1892 1317">• Equipment will cross the stream in-water only under the following conditions: (NMFS 2017a). <ul data-bbox="714 1144 1892 1317" style="list-style-type: none"> <li data-bbox="714 1144 1892 1209">○ A. Equipment is free of external petroleum-based products, soil and debris has been removed from the drive mechanisms and undercarriage; and <li data-bbox="714 1219 1415 1245">○ B. The substrate is bedrock or coarse rock and gravel; or <li data-bbox="714 1255 1892 1317">○ 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)	<ul style="list-style-type: none"> ○ 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.
	<p>Erosion and spill prevention and control</p>
	<ul style="list-style-type: none"> • 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)	<p data-bbox="617 253 1255 279">Erosion and spill prevention and control, continued</p> <ul style="list-style-type: none"> <li data-bbox="709 289 1570 315">○ Prevent, stop, and control spills or leaks during construction activities: <li data-bbox="709 324 1016 350">○ Stop source of spill or leak. <li data-bbox="709 360 1108 386">○ Stop migration of spill or leak. <li data-bbox="709 396 1415 422">○ Place berm of sorbent material around perimeter of spill. <li data-bbox="709 431 1045 457">○ Solidify free standing oil. <li data-bbox="663 467 1885 526">● 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). <li data-bbox="663 535 1885 669">● 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). <li data-bbox="663 678 1856 776">● 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. <li data-bbox="663 786 1885 987">● Sediment and Erosion Controls: <ul style="list-style-type: none"> <li data-bbox="709 818 1822 915">○ Establish methods for controlling sediment and erosion which address vegetative practices, structural control, silt fences, straw dikes, sediment controls, and operator controls as appropriate. <li data-bbox="709 925 1885 987">○ Institute stormwater management measures as required, including velocity dissipators, and solid waste controls which address controls for building materials and offsite tracking of sediment. <li data-bbox="663 997 1885 1268">● Pollution Prevention Measures: <ul style="list-style-type: none"> <li data-bbox="709 1029 1856 1127">○ 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. <li data-bbox="709 1136 1885 1234">○ 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. <li data-bbox="709 1243 1604 1268">○ Divert stormwater runoff from upslope areas away from disturbed areas.

Resource Topic	Best Management Practice
Water Resources (Water Quality, continued)	<p data-bbox="617 253 1255 279">Erosion and spill prevention and control, continued</p> <ul data-bbox="667 289 1881 915" style="list-style-type: none"> <li data-bbox="667 289 1075 315">• Turbidity Prevention Measures: <ul data-bbox="718 324 1881 633" style="list-style-type: none"> <li data-bbox="718 324 1881 454">○ 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. <li data-bbox="718 464 1881 529">○ Wastewaters discharged into surface waters shall meet conditions of Clean Water Act section 402, the National Pollutant Discharge Elimination System (NPDES) permit. <li data-bbox="718 539 1881 633">○ 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. <li data-bbox="667 643 1881 708">• Clean up spills or leaks in a manner that complies with applicable Federal, State, and local laws and regulations. <li data-bbox="667 717 1150 743">• Dispose of spilled or leaked materials: <ul data-bbox="718 753 1881 915" style="list-style-type: none"> <li data-bbox="718 753 1881 818">○ Handle and dispose of spilled or leaked materials contaminated with 50 ppm or greater polychlorinated biphenyls. <li data-bbox="718 828 1881 915">○ 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. <p data-bbox="617 938 961 964">Discharge water and wastes</p> <ul data-bbox="667 974 1881 1352" style="list-style-type: none"> <li data-bbox="667 974 1881 1104">• 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). <li data-bbox="667 1114 1881 1211">• 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). <li data-bbox="667 1221 1881 1352">• 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)	<p data-bbox="617 253 869 279">Storage and staging</p> <ul data-bbox="667 289 1892 1055" style="list-style-type: none"> <li data-bbox="667 289 1892 561">• 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). <li data-bbox="667 571 1457 597">• Equipment will not be stored overnight in the instream channel. <li data-bbox="667 607 1864 704">• 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. <li data-bbox="667 714 1892 1055">• Petroleum Product Storage Tanks Management. <ul data-bbox="718 747 1892 1055" style="list-style-type: none"> <li data-bbox="718 747 1871 812">○ 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. <li data-bbox="718 821 1222 847">○ Do not use underground storage tanks. <li data-bbox="718 857 1871 987">○ 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. <li data-bbox="718 997 1892 1055">○ Areas for refueling operations: Lined with impermeable barrier at least 40 mils thick covered with 2 to 4 inches of soil. <p data-bbox="617 1081 1096 1107">Reclamation of temporary disturbance</p> <ul data-bbox="667 1117 1892 1317" style="list-style-type: none"> <li data-bbox="667 1117 1755 1182">• All temporary access will be removed (including gravel surfaces) and planted after Project completion (NMFS 2017a). <li data-bbox="667 1192 1892 1317">• 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)	<ul style="list-style-type: none">• 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)	<ul style="list-style-type: none">• 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)	<p data-bbox="617 253 793 279">Riparian areas</p> <ul data-bbox="663 289 1892 915" style="list-style-type: none"> <li data-bbox="663 289 1625 315">• The removal of riparian vegetation for access will be minimized (NMFS 2017a). <li data-bbox="663 324 1829 383">• All native, non-invasive organic material (large and small wood) cleared from the action area for access will remain on site (NMFS 2017a). <li data-bbox="663 393 1877 451">• 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). <li data-bbox="663 461 1892 737">• 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). <li data-bbox="663 747 1864 805">• 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. <li data-bbox="663 815 1871 915">• 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)	<p data-bbox="617 269 978 293">Fisheries and aquatic wildlife</p> <ul data-bbox="667 305 1892 1284" style="list-style-type: none"> <li data-bbox="667 305 1367 329">• Instream work is limited to July 1 through November 15. <li data-bbox="667 337 1892 578">• 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. <li data-bbox="667 586 1892 751">• 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). <li data-bbox="667 760 1797 824">• 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). <li data-bbox="667 833 1850 898">• 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). <li data-bbox="667 906 1829 971">• 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). <li data-bbox="667 979 1797 1003">• Post-construction monitoring of the low-flow fishway would be done to ensure effectiveness. <li data-bbox="667 1011 1892 1141">• 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). <li data-bbox="667 1149 1881 1214">• 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). <li data-bbox="667 1222 1839 1284">• 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)	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • As required by the Washington State Historic Preservation Officer, the <i>Plan and Procedures for the Inadvertent Discovery of Cultural Resources and Human Remains</i> (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	<ul style="list-style-type: none"> • Restore contractor use areas to pre-construction condition.

Resource Topic	Best Management Practice
Transportation	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Do not use jackhammers in excess of 30 pounds without Reclamation approval. Blasting is not permitted.
Recreation	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> ○ Dispose by removal from jobsite. ○ Recycle hazardous waste whenever possible. ○ Dispose of hazardous waste materials that are not recycled at appropriately permitted treatment or disposal facilities. ○ 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	<ul style="list-style-type: none"><li data-bbox="663 253 1860 457">• 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 NWP

- **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.

This page intentionally left blank.