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RECLAMATION

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

Noise and Vibration Resource Report



**U.S. Department of the Interior
Bureau of Reclamation
Columbia-Pacific Northwest Regional Office
1150 N. Curtis Road
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Mission Statements

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

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

Executive Summary

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

The Analysis Area stretches from the U.S. Department of Agriculture Forest Service (Forest Service) kiosk on Icicle Creek Road to the U.S. Fish and Wildlife Service (USFWS) property, including the LNFH grounds (see **Map A-9** in **Appendix A**). In addition, because sound waves that create noise propagate outward from their source, the Analysis Area also includes sensitive noise receptors on the lands surrounding the Project Area out to 0.25 miles (see **Map A-9** in **Appendix A**). The indicators for identifying impacts on noise and vibration are the following:

- Changes to ambient community sound level from construction machine and equipment noise
- Changes to ambient traffic sound level from construction traffic noise
- Changes to vibration

Affected Environment

Sound is measured in decibels (dB). Decibels A-weighted (dBA) is one of the most frequently used sound measurements because it best matches the range of human hearing. Low and very high frequencies are given less weight than on the standard decibel scale.

A sound-level meter is used to measure the decibel level. It is designed to respond in approximately the same way as the human ear and gives an objective assessment of sound pressure level (Ecology 2020).

Decibels are measured on a logarithmic scale, meaning a small change in the number of dB indicates a large change in the level of sound (Occupational Safety and Health Administration 2020). In general, to measure loudness, a sound must be increased by 10 dB to be perceived as twice as loud (Centers for Disease Control and Prevention 2020). If a sound is generated at a point source in an area with no walls or other obstructions, there will be a reduction by 6 dB each time the distance from the sound source is doubled. A soft whisper about 5 feet away is 40 dBA, a conversation about 3 feet away is about 60 dBA, a freight train 100 feet away is 80 dBA, a night club with music is 110 dBA, and operating heavy equipment is 120 dBA (Occupational Safety and Health Administration 2020).

In describing vibration in the ground and in structures, the motion of a particle (i.e., a point in or on the ground or structure) is used. The concepts of particle displacement, velocity, and acceleration are used to describe how the ground or structure responds to excitation. Although displacement is

generally easier to understand than velocity or acceleration, it is rarely used to describe ground and structure-borne vibration because most transducers used to measure vibration directly measure velocity or acceleration, not displacement. Accordingly, vibratory motion is commonly described by identifying the peak particle velocity or peak particle acceleration (California Department of Transportation 2013).

Washington Administrative Code (WAC) 173-60-030 defines environmental designation for noise abatement (EDNA) zones into three classifications (A, B, and C). Maximum permissible noise levels are established in WAC 173-60-040. The maximum allowed amount of noise coming into a property depends on property type (**Table ES-1**). For example, 55 dBA is the maximum allowed level of noise a Class A property can receive from another Class A property; 57 dBA is the maximum allowed level of noise a Class A property can receive from a Class B property; and 60 dBA is the maximum allowed level of noise a Class A property can receive from a Class C property (Ecology 2020). Between 10:00 p.m. and 7:00 a.m., the noise limitations in **Table ES-1** shall be reduced by 10 dBA for receiving property in Class A areas.

Table ES-1
Maximum Permissible Noise Levels for Nonexempt Activities

EDNA of Noise Source	EDNA of Class A Receiving Property (dBA)¹	EDNA of Class B Receiving Property (dBA)	EDNA of Class C Receiving Property (dBA)
Class A—Lands where humans reside and sleep, such as residential, recreational, entertainment, or community services	55	57	60
Class B—Lands with uses requiring protection against noise interference with speech, such as commercial, retail, or offices	57	60	65
Class C—Lands with economic activities of such a nature that higher noise levels than experienced in other areas is normally anticipated, such as industrial, warehouse, or agricultural	60	65	70

Source: Chapter 173-60-040 WAC

Notes:

Exemptions to WAC 173-60-040 are listed in WAC 173-60-050 and include construction noise generated between 7:00 a.m. and 10:00 p.m.

¹ Between the hours of 10:00 p.m. and 7:00 a.m. the noise limitations of the table above shall be reduced by 10 dBA for receiving property within Class A EDNAs.

The existing surface water intake and delivery system is found alongside and in Icicle Creek (**Map A-1 in Appendix A**). The predominant community noise sources involve sounds from rural residential activities, recreation, cultural events, and agricultural activities. Recreation sites and lodging and permanent and seasonal residences flank Icicle Creek, especially on the south side, west of the existing intake facilities, and on the north side of Icicle Creek, east of the existing intake facilities.

Sensitive noise receptors are individuals who would be affected by noise levels (**Map A-9 in Appendix A**). Examples are individuals recreating in the area for such activities as hiking, biking, fishing, rafting, snowshoeing, and cross-country skiing. They also include permanent and seasonal residents. The sensitive noise receptors in the Analysis Area belong to Class A EDNA areas, because they involve areas where humans reside, sleep, or recreate. In addition to residents, sensitive noise receptors are at the Snow Lakes Trail, Sleeping Lady Mountain Resort, Icicle Creek Center for the Arts, the Icicle River RV Resort, Icicle River Trails on USFWS property, and the spillway pool (where Tribal fishing takes place; see Section 3.10, Tribal Interests, in the EIS).

The predominant traffic noise sources in the Analysis Area are from Icicle Creek Road, Fish Hatchery Road, and East Leavenworth Road. There are also sparse, single lane, paved and unpaved roads used for residential, commercial, and recreation access within the Analysis Area. Proposed Project activities would take place along Icicle Creek Road, from the Forest Service kiosk to the LNFH (see **Map A-5** and **Map A-6 in Appendix A**). In addition, supplies and materials would be transported to the Project Area on Icicle Road from U.S. Highway 2.

During the week of August 3, 2020, Reclamation conducted an ambient noise study around the LNFH using devices calibrated by a Reclamation Industrial Hygienist prior to deployment (Christensen 2020). Nine locations were tested with noise dosimeters, and ten locations were tested with a sound level meter during the morning and evening. **Table ES-2, Ambient Noise Levels**, lists morning and evening ambient noise levels that were collected before and after the testing, the minimum and maximum ambient noise levels that were collected during the testing, and the equivalent sound level (Leq). Leq quantifies the noise environment to a single value of sound level for a certain duration. The testing occurred over approximately 6 hours and 15 minutes and approximately 10 hours, depending on ambient noise level point location. **Map A-9 in Appendix A** shows the locations of the ambient noise points listed in **Table ES-2** for the ambient noise study.

There are no sources of ongoing vibration in the Analysis Area. Occasional construction activities, however, may involve vibration, depending on the type of equipment, construction methods, and ground conditions. Vibrations can spread through the ground and will diminish in strength with distance from the source of the vibrations. Ground vibrations from construction activities can be audible and felt. Vibration can have a high amplitude and short duration, such as for impact pile driving or blasting. It can also have a low amplitude and long duration, such as for excavation equipment, tracked vehicles, or vibratory pile drivers.

**Table ES-2
Ambient Noise Levels**

Ambient Noise Point	Leq (dBA) Using Dosimeter	Maximum Noise Level (dBA) Using Dosimeter	Minimum Noise Level (dBA) Using Dosimeter	Before and After Noise Levels (dBA) at Ambient Noise Level Sampling Using Sound Level Meter
1	72	98	55	Morning: 60 Evening: 72
2	69	99	51	Morning: 60 Evening: 60
3	69	101	44	Morning: 48 Evening: 39
4	66	98	42	Morning: 46 Evening: 60
5	68	101	47	Morning: 60 Evening: 63
6	70	98	46	Morning: 49 Evening: 62
7	62	94	41	Morning: 42 Evening: 42
8	68	102	37	Morning: 54 Evening: 52
9	69	101	51	Morning: 57 Evening: 58
10	Not available	Not available	Not available	Morning: 55 Evening: 57

Environmental Consequences

Under Alternative A, there would be no new construction activity or Project components that would affect ambient sound levels. Sensitive noise receptors in the area would continue to experience community and traffic noise at, or about, the levels described above. There would continue to be noise and occasional vibration (such as from the use of heavy equipment during intake or pipeline repairs) associated with current operations and maintenance of the existing Project components. See the SWISP Project EIS **Biological Resources Report** for impacts on wildlife from noise and vibration.

Compared with Alternative A, ambient noise levels for sensitive receptors would increase above those listed in **Table ES-2** (which range from 62 dBA to 72 dBA) under Alternative B. The ambient noise levels would increase because of equipment and vehicle use associated with construction activities. The loudest expected equipment and vehicle noises and their attenuation distances¹ are listed in **Table ES-3**, **Table ES-4**, and **Table ES-5**, below.

¹ Distances that it takes for noise to lessen in magnitude

Table ES-3
Noise Attenuation Distances for Pneumatic Tool and Truck

Distance from Noise Source (Feet)	Noise Level of Pneumatic Tool at Intake Construction Area (dBA)	Noise Level of Truck Along Area Roads (dBA)
50	85	88
100	78.9	81.9
200	72.9	75.9
400	66.9	69.9
800	60.9	63.9
1,600	54.8	57.8
3,200	48.8	51.8
6,400	42.8	45.8
12,800	36.8	39.8

Table ES-4
Noise Attenuation Distances for Hot Air Blower

Distance from Noise Source (Feet)	Noise Level of Hot Air Blower at CUAs (dB)
5	115
10	108.9
20	102.9
40	96.9
80	90.9
160	84.8
320	78.8
640	72.8
1,280	66.8
2,560	60.8
5,120	54.7

Map A-10, Map A-12, Map A-14, and Map A-16 in **Appendix A** show the distances for the expected loudest noise levels to attenuate to Class A EDNA noise levels under Alternative B. A Class A EDNA of 55 dBA is the lowest daytime permissible noise level exposure listed in **Table ES-1**. A Class A EDNA of 45 dBA is the lowest nighttime permissible noise level exposure listed in **Table ES-1**. The sensitive noise receptors in the Analysis Area belong to Class A EDNA areas, which should experience noise levels of 55 dBA during daytime hours and 45 dBA during nighttime hours.

Table ES-5
Noise Attenuation Distances for Diesel Pumps

Distance from Noise Source (Feet)	Noise Level of Diesel Pumps at Temporary Hatchery Water Supply Pump Site (dB)
3.3	96.3
6.6	90.2
13	84.2
26	78.2
52	72.2
105	66.1
210	60.1
420	54.1
840	48.1
1,680	42.1

The ambient noise study characterized the ambient noise levels for these areas as already being elevated. Possible causes for the elevated ambient noise levels are any existing construction activities or the valley shape of the topography confining and redirecting sound waves. Noise generated by construction equipment and vehicle use under Alternative B would decrease to the elevated ambient noise levels, described above, before they would decrease to a Class A EDNA. See **Map A-10, Map A-12, Map A-14, and Map A-16 in Appendix A** for how noise levels would decrease over distance.

The temporary noise generated under Alternative B would occur during equipment and vehicle use associated with construction. The in-water work window for Alternative B is July 1 to November 15 (Phase I construction), and would occur up to 24 hours per day, up to 7 days per week. The Phase II construction work associated with cure-in-place pipe (CIPP) lining the conveyance pipeline would occur between April and May of 2023 and 2024, from 7:00 a.m. to 10:00 p.m. daily, up to 6 days per week. See Section 2.4.2 and Appendix C in the SWISP Project EIS for details on timing of construction activities.

To minimize impacts from construction, the following would occur:

- BMPs listed in Appendix B in the SWISP Project EIS.
- No pneumatic tool in excess of 30 pounds would be used without prior approval.

Construction equipment would be a source of vibration. The closest sensitive receptor to the intake construction area is approximately 0.2 miles away. The closest sensitive receptor to a contractor use area (CUA) is approximately 200 feet away. At these distances, vibration is not expected to damage property from the use of construction equipment. As the distance from the vibration source increases, the amount of vibration decreases.

The impacts under Alternative C would be similar to those described under Alternative B. Under Alternative C, however, Reclamation would line the entire upper segment of the conveyance pipeline

on USFWS property with CIPP instead of replacing it, as described under Alternative B. This could result in a slight increase in the duration of noise from use of the hot air blower to dry the uppermost part of the pipeline to prepare it for CIPP lining. **Map A-10 in Appendix A** shows the distances for the pneumatic tool to attenuate to a Class A EDNA of 45 dBA or less under Alternative C. **Map A-12 in Appendix A** shows the distances for the hot air blower noise levels to attenuate to a Class A EDNA of 55 dBA or less under Alternative C.

Under Alternative C, there would be fewer truck trips to access the intake construction area because less excavation of the conveyance pipeline would occur compared with Alternative B, resulting in less truck noise. **Map A-14 in Appendix A** shows the distances for truck noise levels to attenuate to a Class A EDNA of 45 dBA or less under Alternative C.

Map A-16 in Appendix A show the distances for the diesel pump noise levels to attenuate to a Class A EDNA of 45 dBA or less under Alternative C. This would be the same as described under Alternative B.

The impacts under Alternative D would be similar to those under Alternative B, except as described below. Under Alternative D, Phase I construction would occur from 7:00 a.m. to 10:00 p.m., up to 6 days per week, instead of up to 24 hours per day, up to 7 days per week as described under Alternative B. This would result in less nighttime noise at the intake construction area as compared with Alternative B. **Map A-11 in Appendix A** shows the distances for the pneumatic tool noise levels to attenuate to a Class A EDNA of 55 dBA or less under Alternative D. Also, the impacts associated with Phase I would span four construction seasons, instead of two construction seasons as described under Alternative B.

Under Alternate D, truck trips related to construction activities would occur between 7:00 a.m. and 10:00 p.m. 6 days per week, instead of 24 hours per day, 7 days per week as described under Alternative B. This would result in less nighttime noise along Icicle Creek Road as compared with Alternative B. **Map A-15 in Appendix A** shows the distances for the truck noise levels to attenuate to a Class A EDNA of 55 dBA or less under Alternative D.

Map A-13 and Map A-16 in Appendix A show the noise attenuation distances for the hot air blower and the diesel pumps associated with the temporary Hatchery water supply, respectively. The noise attenuation distances for these pieces of construction equipment would be the same as described under Alternatives B and C. The hot air blower would only be used between the hours of 7:00 a.m. and 10:00 p.m. **Map A-13 in Appendix A** shows the distances for the hot air blower to attenuate to a Class A EDNA of 55 dBA or less. The diesel pumps associated with the temporary Hatchery water supply for Phase I would operate 24 hours per day and 7 days per week (**Map A-16 in Appendix A**). Under Alternative D, the total duration of time the diesel pumps would operate would be approximately 8 months, instead of approximately 10 days under Alternative B (see Table 2-1 in the SWISP Project EIS). This would result in a longer duration of daytime noise and more nighttime noise as compared with Alternative B. **Map A-16 in Appendix A** shows the distances for the diesel pumps to attenuate to a Class A EDNA of 45 dBA or less.

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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 District
CUA	contractor use area
dB	decibel(s)
dBA	decibels A-weighted
Ecology	Washington Department of Ecology
EDNA	environmental designation for noise abatement
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
Forest Service	U.S. Department of Agriculture, Forest Service
IO&MA	Intake Operations and Maintenance Area
Leq	equivalent sound level
LNFH	Leavenworth National Fish Hatchery
LOS	level of service
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
O&M	operations and maintenance
PISMA	pipeline intake and sediment management area
PPV	peak particle velocity
RCW	Revised Code of Washington
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
RMS	root-mean-square
ROW	right-of-way
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife

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Chapter 1. General Project Information

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

1.1 Project Area

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

1.2 Alternatives

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

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

1.2.1 Alternative A – No Action

The No Action Alternative represents continuation of current operation and maintenance (O&M) of the LNFH surface water intake and delivery system on Icicle Creek and provides a basis for comparison to the action alternatives. The existing intake and delivery system, constructed in 1939 and 1940, would remain in its current degraded condition and likely continue to deteriorate. All existing features listed and summarized below and depicted in **Map A-2** and **Map A-3** in **Appendix**

A, would remain in place and would not be modified, improved, or rehabilitated under this alternative.

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

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

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

The aging 31- to 33-inch diameter buried concrete pipeline would continue to convey water up to 42 cubic feet per second (cfs) from the gatehouse to the Hatchery. No sections would be lined or replaced and introduced sediment would continue to be transported to the Hatchery. Transported sediments would continue to degrade the existing pipeline. Before water enters the Hatchery's rearing units it is either routed into the sand settling basin (normal operation) or directly to the inside or outside screen chamber. The sand settling basin would continue to trap sediment and minimize the amount of remaining sediment from entering fish production facilities. Sediment and entrained fish would continue to be periodically removed from the sand settling basin in accordance with existing biological opinions (USFWS 2011; NMFS 2017). From the sand settling basin, water can be directed to either the inside or outside screen chamber before entering the Hatchery's rearing units. The screens in the inside and outside screen chambers are composed of vertical static screen panels that filter fish and debris from the Hatchery's water supply. The screen chambers do not

meet National Marine Fisheries Service (NMFS) current screening criteria (NMFS 2011)¹. Screens must be manually cleaned, and entrained fish must be captured, removed, counted, and returned to Icicle Creek. LNFH reports the number and species of Endangered Species Act (ESA)-listed fish entrained in the intake and delivery system in their annual take report to NMFS and the USFWS.

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

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

1.2.2 Alternative B – Proposed Action

Reclamation proposes to rehabilitate the LNFH surface water intake and delivery system on Icicle Creek by constructing new 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 (ROW).

Construction

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

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

Phase I includes:

- Construction activities occurring up to 24 hours a day, up to 7 days a week.
- Construction occurring over two seasons primarily within the in-water work window of July 1 to November 15.
- Construction of intake access road (2022).
- Installation of temporary 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.

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Chapter 2. Relevant Laws, Regulations, and Policy

2.1 Federal Laws, Regulations, Statutes, and Orders

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

Under the Clean Air Act, the Environmental Protection Agency (EPA) administrator established the Office of Noise Abatement and Control. It carries out investigations and studies on noise and its effect on public health and welfare. Through Office of Noise Abatement and Control, the EPA coordinated all federal noise control activities, but in 1981 the Administration concluded that noise issues were best handled at the state and local level. As a result, the Office of Noise Abatement and Control was closed and the primary responsibility of addressing noise issues was transferred to state and local governments; however, the EPA retains authority to investigate and study noise and its effect, to disseminate information to the public regarding noise pollution and its adverse health effects, to respond to inquiries on matters related to noise, and to evaluate the effectiveness of existing regulations for protecting the public health and welfare. The EPA's authority is the Noise Control Act of 1972 and the Quiet Communities Act of 1978 (EPA 2020a). These acts were never rescinded by Congress and remain in effect, although they are essentially unfunded (EPA 2020b).

2.2 State and Local Laws

The state law for noise can be found in Chapter 70.107 Revised Code of Washington (RCW), Noise Control Act. In addition, Washington laws and rules related to noise are in the following RCW and Washington Administrative Code (WAC) (Ecology 2020):

- **Chapter 70.107 RCW—Noise control:** The purpose of this chapter is to provide authority for an expansion of efforts statewide directed toward the abatement and control of noise.
- **Chapter 173–58 WAC—Sound level measurement procedures:** The purpose of these rules is to establish standardized procedures for the measurement of sound levels of sources regulated by the Ecology.
- **Chapter 173–60 WAC—Maximum environmental noise levels:** These rules establish maximum noise levels permissible in identified environments.
- **Chapter 173–62 WAC—Motor vehicle noise performance standards:** The purpose of this chapter is the adoption of noise emission standards for new motor vehicles and noise emission standards for the operation of motor vehicles on public highways.

Chelan County regulates noise standards through Chelan County Code, Title 7 Public Safety and Morals, Chapter 7.35 Noise Control. Below are applicable excerpts relating to noise:

- 7.35.030 Public Disturbance Noises—It is unlawful for any person to unreasonably cause or make, or for any person in possession of property to allow to originate from the property, sound which is a public disturbance noise. Public disturbance noises include the creation of loud, raucous, frequent, repetitive or continuous sounds that exceed a reasonable person standard so as to disturb or interfere with the peace, comfort and repose of another (Res. 2012-36 (part), 4/30/12).
- 7.35.040 Exceptions—(3) Sounds from construction activity during the hours of seven a.m. [and] ten p.m. and any activity necessary for the preservation of the public health, safety and welfare (4) Sounds created in conjunction with public work projects or public work maintenance operations executed at the cost of federal, state, or local governments⁶.

WAC 173-60-030 defines environmental designation for noise abatement (EDNA) zones into three classifications (A, B, and C). Maximum permissible noise levels are established in WAC 173-60-040. The maximum allowed amount of noise coming into a property depends on property type (**Table 1**). For example, 55 decibels A-weighted (dBA) is the maximum allowed level of noise a Class A property can receive from another Class A property; 57 dBA is the maximum allowed level of noise a Class A property can receive from a Class B property; and 60 dBA is the maximum allowed level of noise a Class A property can receive from a Class C property (Ecology 2020). Between 10:00 p.m. and 7:00 a.m., the noise limitations in **Table 1** shall be reduced by 10 dBA for receiving property in Class A areas.

Table 1
Maximum Permissible Noise Levels for Nonexempt Activities

EDNA of Noise Source	EDNA of Class A Receiving Property (dBA)¹	EDNA of Class B Receiving Property (dBA)	EDNA of Class C Receiving Property (dBA)
Class A—Lands where humans reside and sleep, such as residential, recreational, entertainment, or community services	55	57	60
Class B—Lands with uses requiring protection against noise interference with speech, such as commercial, retail, or offices	57	60	65

⁶ Reclamation will engage Chelan County pursuant to this exception prior to Project construction, and as it pertains to a construction schedule of up to 24 hours per day, up to 7 days per week. It will also disclose this information to the public through the National Environmental Policy Act process.

EDNA of Noise Source	EDNA of Class A Receiving Property (dBA)¹	EDNA of Class B Receiving Property (dBA)	EDNA of Class C Receiving Property (dBA)
Class C—Lands with economic activities of such a nature that higher noise levels than experienced in other areas is normally anticipated, such as industrial, warehouse, or agricultural	60	65	70

Source: Chapter 173-60-040 WAC

Notes:

Exemptions to WAC 173-60-040 are listed in WAC 173-60-050 and include construction noise generated between 7:00 a.m. and 10:00 p.m.

¹ Between the hours of 10:00 p.m. and 7:00 a.m. the noise limitations of the table above shall be reduced by 10 dBA for receiving property within Class A EDNAs.

There are no regulations pertaining to vibration.

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Chapter 3. Affected Environment

Sound is measured in decibels (dB). Decibels A-weighted is one of the most frequently used sound measurements because it best matches the range of human hearing. Low and very high frequencies are given less weight than on the standard decibel scale.

A sound-level meter is used to measure the decibel level. It is designed to respond in approximately the same way as the human ear and gives an objective assessment of sound pressure level (Ecology 2020).

Decibels are measured on a logarithmic scale, meaning a small change in the number of dB indicates a large change in the level of sound (Occupational Safety and Health Administration 2020). In general, to measure loudness, a sound must be increased by 10 dB to be perceived as twice as loud (Centers for Disease Control and Prevention 2020). If a sound is generated at a point source in an area with no walls or other obstructions, there will be a reduction by 6 dB each time the distance from the sound source is doubled. A soft whisper about 5 feet away is 40 dBA, a conversation about 3 feet away is about 60 dBA, a freight train 100 feet away is 80 dBA, a night club with music is 110 dBA, and operating heavy equipment is 120 dBA (Occupational Safety and Health Administration 2020).

In describing vibration in the ground and in structures, the motion of a particle (i.e., a point in or on the ground or structure) is used. The concepts of particle displacement, velocity, and acceleration are used to describe how the ground or structure responds to excitation. Although displacement is generally easier to understand than velocity or acceleration, it is rarely used to describe ground and structure-borne vibration because most transducers used to measure vibration directly measure velocity or acceleration, not displacement. Accordingly, vibratory motion is commonly described by identifying the peak particle velocity or peak particle acceleration (California Department of Transportation 2013).

Peak particle velocity (PPV) is generally accepted as the most appropriate descriptor for evaluating the potential for building damage. For human response, however, an average vibration amplitude is more appropriate because it takes time for the human body to respond to the excitation (the human body responds to an average vibration amplitude, not a peak amplitude). Because the average particle velocity over time is zero, the root-mean-square (RMS) amplitude is typically used to assess human response. The RMS value is always positive and always less than PPV; for a single frequency condition, the RMS value is about 70 percent of the PPV (California Department of Transportation 2013).

3.1 Analysis Area

The Analysis Area stretches from the Forest Service kiosk on Icicle Creek Road to the USFWS property, including the LNFH grounds (see **Map A-9** in **Appendix A**). In addition, because sound waves that create noise propagate outward from their source, the Analysis Area also includes

sensitive noise receptors on the lands surrounding the Project Area out to 0.25 miles (see **Map A-9** in **Appendix A**).

3.2 Community Noise

The existing surface water intake and delivery system is found alongside and in Icicle Creek (**Map A-2** and **Map A-3** in **Appendix A**). The predominant community noise sources involve sounds from rural residential activities, recreation, cultural events, and agricultural activities. Recreation sites and lodging and permanent and seasonal residences flank Icicle Creek, especially on the south side, west of the existing intake facilities, and on the north side of Icicle Creek, east of the existing intake facilities.

Sensitive noise receptors are individuals who would be affected by noise levels (**Map A-9** in **Appendix A**). Examples are individuals recreating in the area for such activities as hiking, biking, fishing, rafting, snowshoeing, and cross-country skiing. They also include permanent and seasonal residents. The sensitive noise receptors in the Analysis Area belong to Class A EDNA areas, because they involve areas where humans reside, sleep, or recreate. In addition to residents, sensitive noise receptors are at the Snow Lakes Trail, Sleeping Lady Mountain Resort, Icicle Creek Center for the Arts, the Icicle River RV Resort, Icicle River Trails on USFWS property, and the spillway pool where Tribal fishing takes place (see Section 3.10, Tribal Interests, in the SWISP Project EIS).

The Snow Lakes Trail is a popular entry point to the Okanogan-Wenatchee National Forest and Alpine Lakes Wilderness Area. It begins at a trailhead on Icicle Creek Road approximately 0.8 miles upstream of the existing low-head diversion dam. The Snow Lakes Trail is designated for hiker-only use.

When the existing conveyance pipeline turns northward, away from Icicle Creek, it crosses underneath the Icicle River RV Resort. The resort provides accommodations on 50 acres for approximately 110 recreational vehicles, with an additional 8 cabins located on-site. Its location along Icicle Creek provides those staying at the resort with direct access to the creek (Icicle River RV Resort 2020). Sensitive noise receptors at the Icicle River RV Resort are the visitors and resort staff.

Continuing north, the conveyance pipeline next crosses underneath the Icicle Creek Center for the Arts, before turning northeastward. Sensitive noise receptors at the Icicle Creek Center for the Arts are its staff and individuals participating in or attending symphonies, camps, retreats, or workshops, some of which can involve overnight lodging.

After the conveyance pipeline leaves the Icicle Creek Center for the Arts property, it crosses beneath the Sleeping Lady Mountain Resort. This resort has lodging, fitness amenities, outdoor recreation, dining, and gift shops. Sensitive noise receptors at the Sleeping Lady Mountain Resort are the visitors and resort staff.

After leaving the Sleeping Lady Mountain Resort, the conveyance pipeline enters USFWS property before entering the LNFH grounds. Sensitive noise receptors in this area are employees and

residents (**Map A-9 in Appendix A**). There are also recreationists that use the Icicle River Trail system on Hatchery property.

The Confederated Tribes of the Colville Reservation and the Yakama Nation have legally defined fishing rights at the Wenatshapam Fishery on Icicle Creek (per *United States v. Confederated Tribes of the Colville Indian Reservation*, May 27, 2010). Tribal members conduct ceremonial and subsistence fishing in Icicle Creek, including fishing for Hatchery Spring Chinook Salmon in the spillway pool. In this location, the character of the river provides a relatively safe environment in which to instruct young Tribal members. Fishing in Icicle Creek is closely tied to the cultural traditions of the Wenatchi people (USFWS 2002). Tribal members fishing in Icicle Creek are sensitive noise receptors. Ceremonial and subsistence fishing, consisting of scaffolding repair, ceremonies, and fishing, typically occur between April and July. Scaffolding repairs typically occur in April each year, and ceremonies take place the first weekend in May. For more information on the Tribal fishery in Icicle Creek, see Section 3.10, Tribal Interests, in the EIS.

3.3 Traffic Noise

The predominant traffic noise sources in the Analysis Area are from Icicle Creek Road, Fish Hatchery Road, and East Leavenworth Road. There are also sparse, single lane, paved and unpaved roads used for residential, commercial, and recreation access within the Analysis Area. Proposed Project activities would take place along Icicle Creek Road, from the Forest Service kiosk to the LNFH (see **Map A-5** and **Map A-6 in Appendix A**). In addition, supplies and materials would be transported to the Project Area on Icicle Road from U.S. Highway 2.

For the approximately 2-mile segment of Icicle Road south of U.S. Highway 2, observed average daily traffic during the non-peak recreation season is 1,979 to 3,498 (see **Table 2**) with the highest count near the U.S. Highway 2 and Icicle Road intersection at Milepost 0.10⁷. It is important to note that these counts were measured outside the peak recreation season, and traffic counts are usually higher on Icicle Road during peak recreation season.

Table 2
Average Daily Traffic Counts on Icicle Road

Mile Post	Average Daily Traffic	Date Measured
0.10	3,498	5/1/2017
0.72	1,994	4/9/2018
0.92	2,635	5/1/2017
1.44	2,175	5/1/2017
2.01	1,979	5/1/2017

Source: Andrew Brunner, Chelan County Public Works Department, email to Elizabeth Heether, Bureau of Reclamation, on May 20, 2020, regarding "L-SWISP: Transportation—Level of Service (LOS) Data Request."

⁷ Andrew Brunner, Chelan County Public Works Department, email to Elizabeth Heether, Bureau of Reclamation, on May 20, 2020, regarding "L-SWISP: Transportation—Level of Service (LOS) Data Request."

To measure traffic during the peak recreation season, the Forest Service had a traffic counter on Icicle Creek Road east of the Snow Lakes Trailhead entrance. The traffic counts include data for 11.4 active days in May (starting on May 20, 2020), 30.0 active days in June, and 30.6 active days in July (see **Table 3**) for 2020 (Forest Service 2020). Active days represent the amount of time each month that the traffic counter was on and recording data. The days with the highest traffic counts occurred between June 6, 2020 and July 25, 2020 from 12:00 p.m. to 4:00 p.m. (Forest Service 2020).

Table 3
2020 Traffic Counts on Icicle Creek Road before the Snow Lakes Trailhead Entrance

Month	Active Days	Total Count	Average Day ¹	Average Weekdays ¹	Average Weekends ¹
May	11.4	12,277	1,073.4	4,233.3	2,990.0
June	30.0	48,533	1,617.8	5,868.4	5,678.0
July	30.6	59,692	1,952	6,654.8	5,646.5

Source: Forest Service 2020

¹Average day is the average daily traffic count for the period of active days; average weekdays is the average daily traffic count on weekdays for the period of active days; and average weekends is the average daily traffic count on weekends for the period of active days.

3.4 Ambient Noise Levels

During the week of August 3, 2020, Reclamation conducted an ambient noise study around the LNFH using devices calibrated by a Reclamation Industrial Hygienist prior to deployment (Christensen 2020). Nine locations were tested with noise dosimeters, and ten locations were tested with a sound level meter during the morning and evening. **Table 4**, Ambient Noise Levels, lists morning and evening ambient noise levels that were collected before and after the testing, the minimum and maximum ambient noise levels that were collected during the testing, and the equivalent sound level (Leq). Leq quantifies the noise environment to a single value of sound level for a certain duration. The testing occurred over approximately 6 hours and 15 minutes and approximately 10 hours, depending on ambient noise level point location. **Map A-9** in **Appendix A** shows the locations of the ambient noise points listed in **Table 4** for the ambient noise study.

3.5 Vibration

There are no sources of ongoing vibration in the Analysis Area. Occasional construction activities, however, may involve vibration, depending on the type of equipment, construction methods, and ground conditions. Vibrations can spread through the ground and will diminish in strength with distance from the source of the vibrations. Ground vibrations from construction activities can be audible and felt. Vibration can have a high amplitude and short duration, such as for impact pile driving or blasting. It can also have a low amplitude and long duration, such as for excavation equipment, tracked vehicles, or vibratory pile drivers.

Table 4
Ambient Noise Levels

Ambient Noise Point	Leq (dBA) Using Dosimeter	Maximum Noise Level (dBA) Using Dosimeter	Minimum Noise Level (dBA) Using Dosimeter	Before and After Noise Levels (dBA) at Ambient Noise Level Sampling Using Sound Level Meter
1	72	98	55	Morning: 60 Evening: 72
2	69	99	51	Morning: 60 Evening: 60
3	69	101	44	Morning: 48 Evening: 39
4	66	98	42	Morning: 46 Evening: 60
5	68	101	47	Morning: 60 Evening: 63
6	70	98	46	Morning: 49 Evening: 62
7	62	94	41	Morning: 42 Evening: 42
8	68	102	37	Morning: 54 Evening: 52
9	69	101	51	Morning: 57 Evening: 58
10	Not available	Not available	Not available	Morning: 55 Evening: 57

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Chapter 4. Environmental Consequences

4.1 Methods

4.1.1 Analysis Indicators

The indicators for identifying impacts on noise and vibration are the following:

- Changes to ambient community sound level from construction machine and equipment noise
- Changes to ambient traffic sound level from construction traffic noise
- Changes to vibration

4.1.2 Issue Statements

Issues and public concern statements related to noise and vibration identified during the scoping process include the following:

- Commenters noted that consideration should be given to noise reduction to avoid negative impacts to Tribal fishermen participating in the Tribal fisheries or otherwise participating in cultural, ceremonial and subsistence activities.

4.1.3 Assumptions

In identifying impacts on indicators, the following analysis assumptions were used:

- For every doubling of distance, the sound level reduces by 6 dBA.
- A 3 dBA increase in sound level is barely noticeable to the human ear. A raise in sound level by 5 dBA would be needed before most listeners report a change. It takes a 10 dBA increase before the average listener hears double the sound.
- A free field⁸ is used in calculating the reduction of sound levels. A “free field” is defined as a flat surface without obstructions. Also, equipment would be used sequentially rather than at the same time.
- Example noise levels from typical construction equipment that may be used are listed in **Table 5**. Of the example construction noise levels listed in Table 5, the pneumatic tool, usually attached to heavy equipment, is expected to be the loudest piece of equipment used during Phase I construction (i.e., at the intake construction area).

⁸ The free field assumption gives Reclamation the ability to disclose, to the public, sound attenuation over distance as it pertains to impacts on sensitive receptors (such as residents) in the Analysis Area. More complex modelling of sound attenuation is not currently possible since the types and timing of equipment used to construct the proposed project are normally at the contractor’s discretion (but within the bounds of the analysis and proposed mitigations of the EIS).

Table 5
Example Construction Equipment Noise Levels

Equipment	Typical Noise Level (dBA) 50 feet from Source
Air compressor	81
Backhoe	80
Compactor	82
Concrete mixer	85
Concrete pump	82
Concrete vibrator	76
Crane derrick	88
Dozer	85
Generator	81
Grader	85
Jack hammer	88
Loader	85
Pneumatic tool	85
Rail saw	90
Rock drill	98
Truck	88

Source: Federal Highway Administration 2006

- Hot air blowers can use a heated element or gas to warm air before blowing the heated air. Hot air blowers to completely dry out the existing pipeline prior to lining with CIPP are expected to be the loudest piece of equipment used at the Phase II construction areas (i.e., CUAs) and are assumed to be 115 dB at five feet⁹.
- Example construction noise levels from a truck are listed in Table 5. In-bound and out-bound tractor trailers or dump trucks are expected to be the loudest mobile source of noise along area roads.
- A 150-horsepower diesel engine for a 16-inch pump is assumed to have a noise level of 93.3 dB at 3.28 feet. Two diesel pumps operating at the same time would have a noise level of 96.3 dB at 3.28 feet¹⁰. Two diesel pumps would operate at the same time at the temporary Hatchery water supply pump site.
- Leq is used for analyzing impacts because it is commonly used to describe sound levels that vary over time.
- Environmental conditions, such as weather, ground surfaces, or vegetation, are not accounted for in the propagation of noise.
- Vehicle speed is not accounted for in the propagation of noise.
- There would be no pile driving for cofferdam installation or blasting.

⁹ Personal communication from Juddson Sechrist, Reclamation to Derek Holmgren, EMPSi. Subject: Re: [EXTERNAL] RE: L-SWISP - Noise Comments. September 4, 2020.

¹⁰ Personal communication from Crisafulli Sludge Removal Systems to Derek Holmgren, EMPSi. Subject: Crisafulli. October 5, 2020.

- The maximum allowed level of noise an EDNA Class A property can receive from an EDNA Class A property during the daytime (between 7:00 a.m. and 10:00 p.m.) is 55 dBA. The maximum allowed level of noise an EDNA Class A property can receive from an EDNA Class A property during the nighttime (between 10:00 p.m. and 7:00 a.m.) is 45 dBA. See Section 2.4.2 in the EIS and Appendix C in the EIS for details on timing of construction activities.

Using the expected loudest noise levels (from a pneumatic tool, hot air blower, truck, and diesel pumps) and the other analysis assumptions, **Table 6**, **Table 7**, and **Table 8** list the noise attenuation distances¹¹ relevant to Class A EDNA areas. Additional assumptions used in the analysis are described in Appendix C in the SWISP Project EIS. **Map A-10** through **Map A-16** in **Appendix A** show the noise attenuation distances for these stationary noise sources.

Table 6
Noise Attenuation Distances for Pneumatic Tool and Truck

Distance from Noise Source (Feet)	Noise Level of Pneumatic Tool at Intake Construction Area (dBA)	Noise Level of Truck Along Area Roads (dBA)
50	85	88
100	78.9	81.9
200	72.9	75.9
400	66.9	69.9
800	60.9	63.9
1,600	54.8	57.8
3,200	48.8	51.8
6,400	42.8	45.8
12,800	36.8	39.8

Table 7
Noise Attenuation Distances for Hot Air Blower

Distance from Noise Source (Feet)	Noise Level of Hot Air Blower at CUAs (dB)
5	115
10	108.9
20	102.9
40	96.9
80	90.9
160	84.8
320	78.8
640	72.8
1,280	66.8
2,560	60.8
5,120	54.7

¹¹ Distances that it takes for noise to lessen in magnitude

Table 8
Noise Attenuation Distances for Diesel Pumps

Distance from Noise Source (Feet)	Noise Level of Diesel Pumps at Temporary Hatchery Water Supply Pump Site (dB)
3.3	96.3
6.6	90.2
13	84.2
26	78.2
52	72.2
105	66.1
210	60.1
420	54.1
840	48.1
1,680	42.1

4.2 Alternative A – No Action Alternative

Under Alternative A, there would be no new construction activity or Project components that would affect ambient sound levels. Sensitive noise receptors in the area would continue to experience community and traffic noise at, or about, the levels described above in **Chapter 3**. There would continue to be noise and occasional vibration (such as from the use of heavy equipment during intake or pipeline repairs) associated with current operations and maintenance of the existing Project components. See the SWISP Project EIS **Biological Resources Report** for impacts on wildlife from noise and vibration.

4.3 Alternative B – Proposed Action

Compared with Alternative A, ambient noise levels for sensitive receptors would increase above those listed in **Table 4** (which range from 62 dBA to 72 dBA) under Alternative B. The ambient noise levels would increase because of equipment and vehicle use associated with construction activities. The loudest expected equipment and vehicle noises and their attenuation distances are listed in **Table 6**, **Table 7**, and **Table 8**, above.

Map A-10, **Map A-12**, **Map A-14**, and **Map A-16** in **Appendix A** show the distances for the expected loudest noise levels to attenuate to Class A EDNA noise levels under Alternative B. A Class A EDNA of 55 dBA is the lowest daytime permissible noise level exposure listed in **Table 3**. A Class A EDNA of 45 dBA is the lowest nighttime permissible noise level exposure listed in **Table 3**. The sensitive noise receptors in the Analysis Area belong to Class A EDNA areas, which should experience noise levels of 55 dBA during daytime hours and 45 dBA during nighttime hours.

The ambient noise study characterized the ambient noise levels for these areas as already being elevated. Possible causes for the elevated ambient noise levels are any existing construction activities or the valley shape of the topography confining and redirecting sound waves. Noise generated by construction equipment and vehicle use under Alternative B would decrease to the elevated ambient noise levels, described above, before they would decrease to a Class A EDNA. See **Map A-10**, **Map A-12**, **Map A-14**, and **Map A-16** in **Appendix A** for how noise levels would decrease over distance.

The temporary noise generated under Alternative B would occur during equipment and vehicle use associated with construction. The in-water work window for Alternative B is July 1 to November 15 (Phase I construction), and would occur up to 24 hours per day, up to 7 days per week. The Phase II construction work associated with lining the conveyance pipeline with CIPP would occur between April and May of 2023 and 2024, from 7:00 a.m. to 10:00 p.m. daily, up to 6 days per week. See Section 2.4.2 and Appendix C in the EIS for details on timing of construction activities.

To minimize impacts from construction, the following would occur:

- BMPs listed in **Appendix B**.
- No pneumatic tool in excess of 30 pounds would be used without prior approval.

Construction equipment would be a source of vibration. The closest sensitive receptor to the intake construction area is approximately 0.2 miles away. The closest sensitive receptor to a CUA is approximately 200 feet away. At these distances, vibration is not expected to damage property from the use of construction equipment. As the distance from the vibration source increases, the amount of vibration decreases.

4.4 Alternative C

The impacts under Alternative C would be similar to those described under Alternative B. Under Alternative C, however, Reclamation would line the entire upper segment of the conveyance pipeline on USFWS property with CIPP instead of replacing it, as described under Alternative B. This could result in a slight increase in the duration of noise from use of the hot air blower to dry the uppermost part of the pipeline to prepare it for CIPP lining. **Map A-10** in **Appendix A** shows the distances for the pneumatic tool to attenuate to a Class A EDNA of 45 dBA or less under Alternative C. **Map A-12** in **Appendix A** shows the distances for the hot air blower noise levels to attenuate to a Class A EDNA of 55 dBA or less under Alternative C.

Under Alternative C, there would be fewer truck trips to access the intake construction area because less excavation of the conveyance pipeline would occur compared with Alternative B, resulting in less truck noise. **Map A-14** in **Appendix A** shows the distances for truck noise levels to attenuate to a Class A EDNA of 45 dBA or less under Alternative C.

Map A-16 in **Appendix A** show the distances for the diesel pump noise levels to attenuate to a Class A EDNA of 45 dBA or less under Alternative C. This would be the same as described under Alternative B.

4.5 Alternative D

The impacts under Alternative D would be similar to those under Alternative B, except as described below. Under Alternative D, Phase I construction would occur from 7:00 a.m. to 10:00 p.m., up to 6 days per week, instead of up to 24 hours per day, up to 7 days per week as described under Alternative B. This would result in less nighttime noise at the intake construction area as compared with Alternative B.

Map A-11 in Appendix A shows the distances for the pneumatic tool noise levels to attenuate to a Class A EDNA of 55 dBA or less. Also, the impacts associated with Phase I would span four construction seasons, instead of two construction seasons as described under Alternative B.

Under Alternate D, truck trips related to construction activities would occur between 7:00 a.m. and 10:00 p.m. 6 days per week, instead of 24 hours per day, 7 days per week as described under Alternative B. This would result in less nighttime noise along Icicle Creek Road as compared with Alternative B. **Map A-15 in Appendix A** shows the distances for the truck noise levels to attenuate to a Class A EDNA of 55 dBA or less.

Map A-13 and Map A-16 in Appendix A show the noise attenuation distances for the hot air blower and the diesel pumps associated with the temporary Hatchery water supply, respectively. The noise attenuation distances for these pieces of construction equipment would be the same as described under Alternatives B and C. The hot air blower would only be used between the hours of 7:00 a.m. and 10:00 p.m. **Map A-13 in Appendix A** shows the distances for the hot air blower to attenuate to a Class A EDNA of 55 dBA or less. The diesel pumps associated with the temporary Hatchery water supply for Phase I would operate 24 hours per day and 7 days per week (**Map A-16 in Appendix A**). Under Alternative D, the total duration of time the diesel pumps would operate would be approximately 8 months, instead of approximately 10 days under Alternative B (Table 2-1 in the EIS). This would result in a longer duration of daytime noise and more nighttime noise as compared with Alternative B. **Map A-16 in Appendix A** shows the distances for the diesel pumps to attenuate to a Class A EDNA of 45 dBA or less.

4.6 Short-Term Uses and Long-Term Productivity

Short-term uses related to implementation of the action alternatives would include construction activities resulting in temporary impacts such as increased noise. The impacts would occur during multiple construction periods.

4.7 Unavoidable Adverse Impacts

Unavoidable adverse impacts from noise or vibration would occur during Project construction to varying degrees depending on the action alternative. Ambient noise levels for sensitive receptors would intermittently experience temporary increases due to construction vehicle and equipment use.

4.8 Irreversible and Irretrievable Commitment of Resources

There would be no irreversible and irretrievable commitment of resources associated with noise or vibration.

Chapter 5. Glossary

environmental designation for noise abatement (EDNA): An area or zone (environment) within which maximum permissible noise levels are established (Chapter 173-60-020 WAC).

noise: The intensity, duration, and character of sounds, from any and all sources (Chapter 173-60-020 WAC).

noise dosimeter: a specialized sound level meter intended specifically to measure the noise exposure of a person integrated over a period of time; usually to comply with Health and Safety regulations.

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Chapter 6. References Cited

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Appendix A

Maps

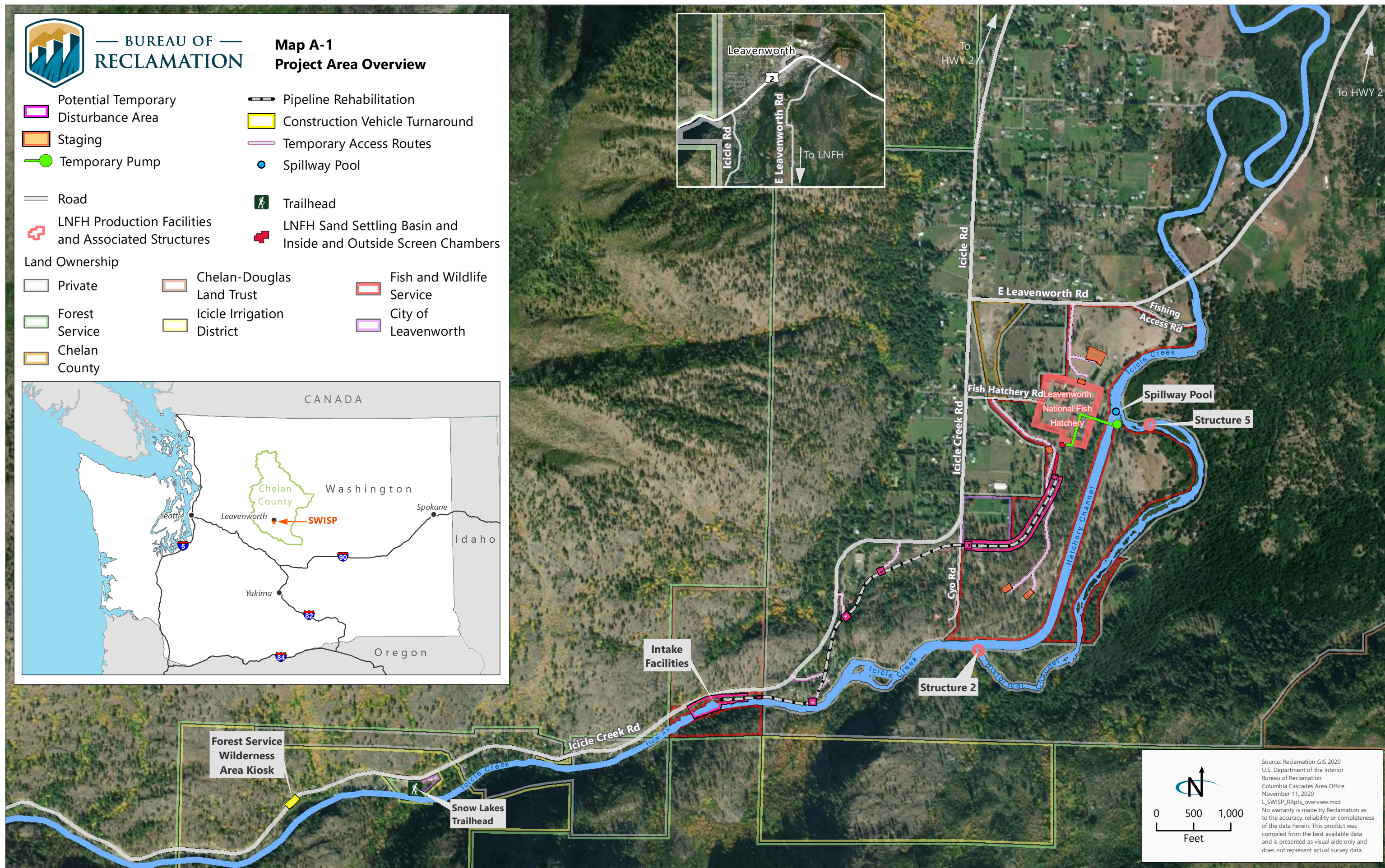
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Map A-1 Project Area Overview

- Potential Temporary Disturbance Area
 - Staging
 - Temporary Pump
 - Pipeline Rehabilitation
 - Construction Vehicle Turnaround
 - Temporary Access Routes
 - Spillway Pool
 - Trailhead
 - LNFH Production Facilities and Associated Structures
 - LNFH Sand Settling Basin and Inside and Outside Screen Chambers
- Land Ownership
- Private
 - Forest Service
 - Chelan-Douglas Land Trust
 - Icicle Irrigation District
 - Fish and Wildlife Service
 - City of Leavenworth
 - Chelan County



0 500 1,000
Feet

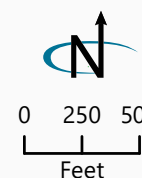
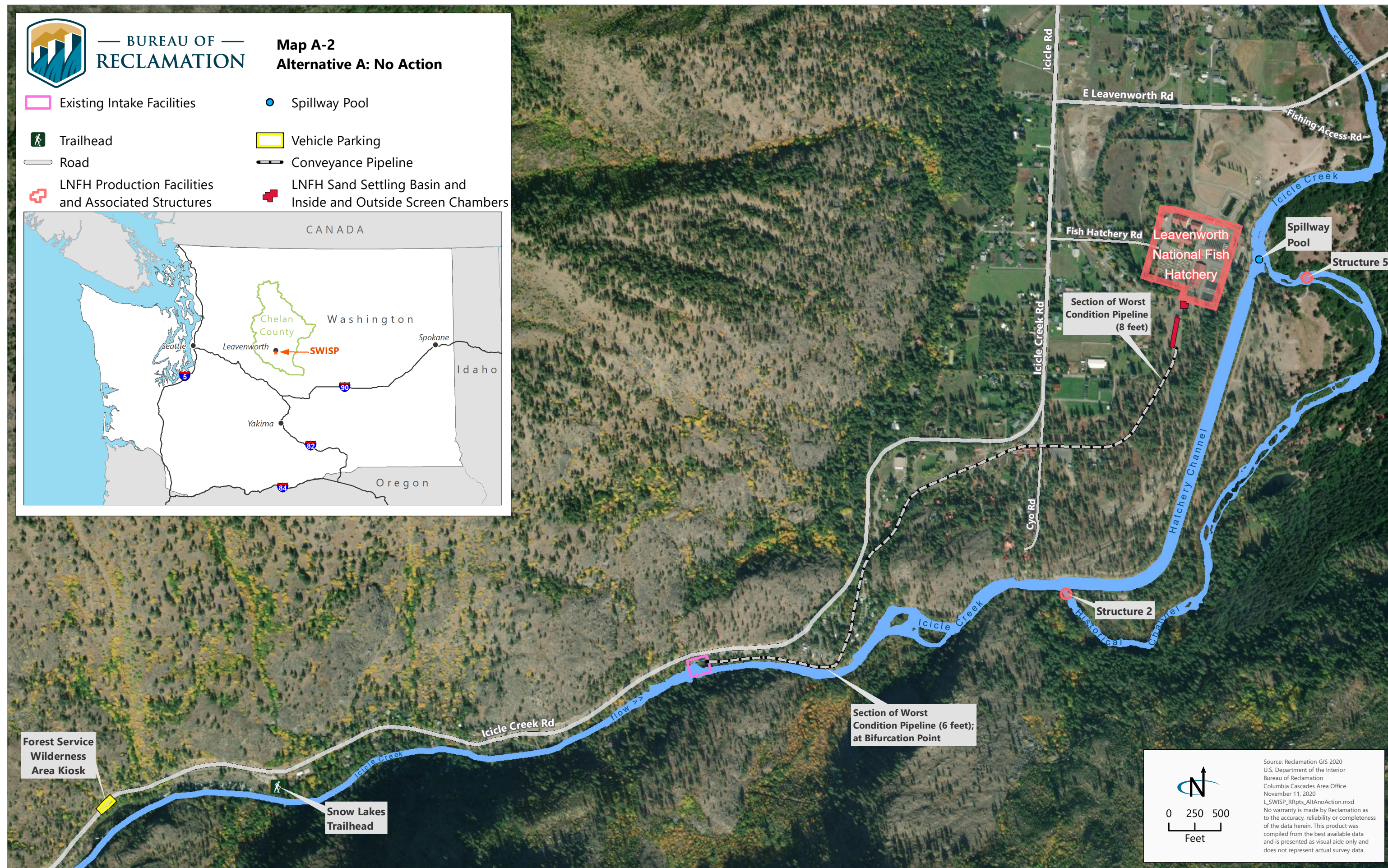
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Map A-2
Alternative A: No Action

- 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



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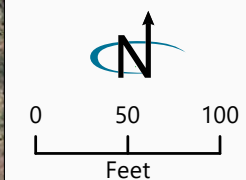
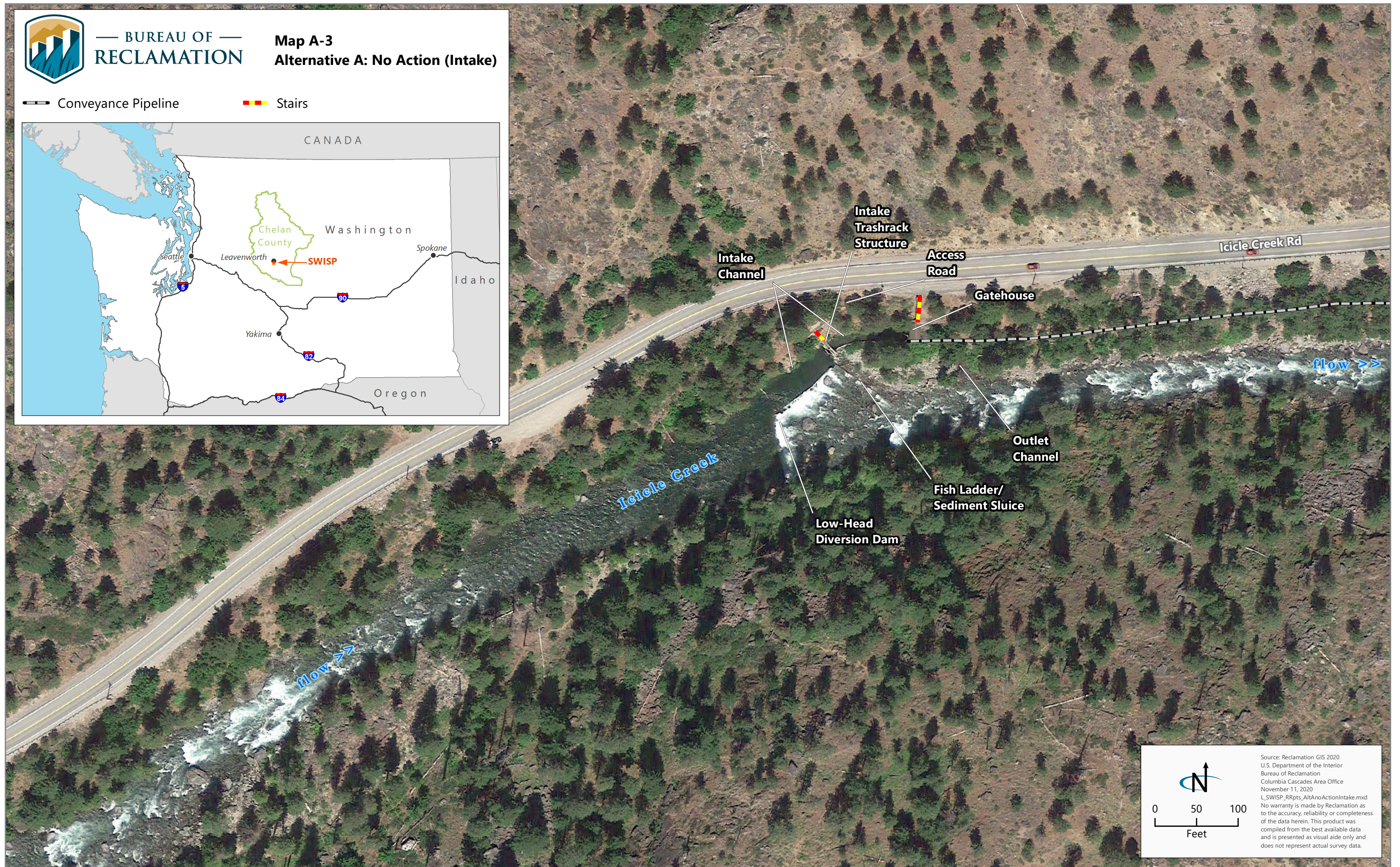


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Map A-3
Alternative A: No Action (Intake)

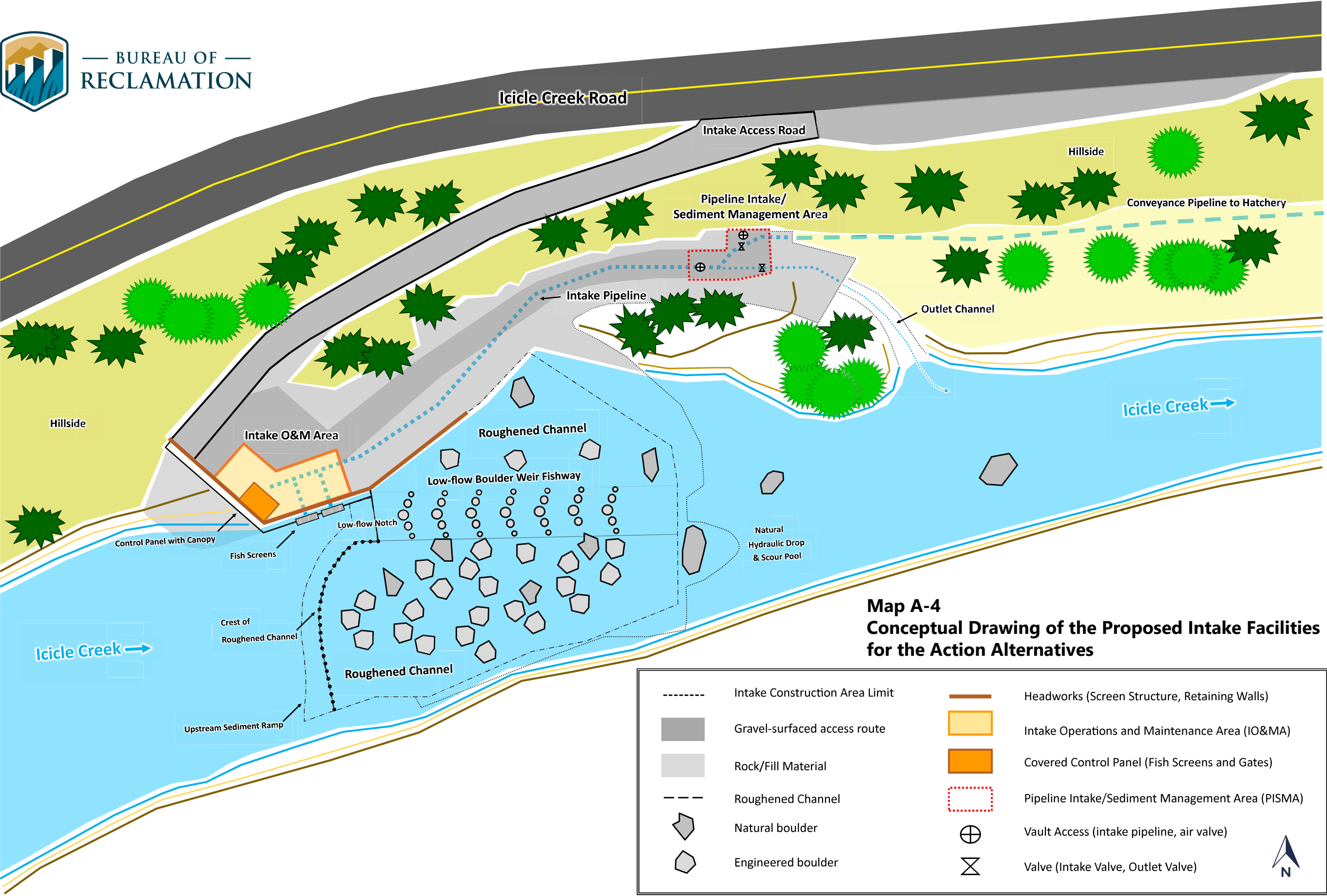
Conveyance Pipeline

Stairs

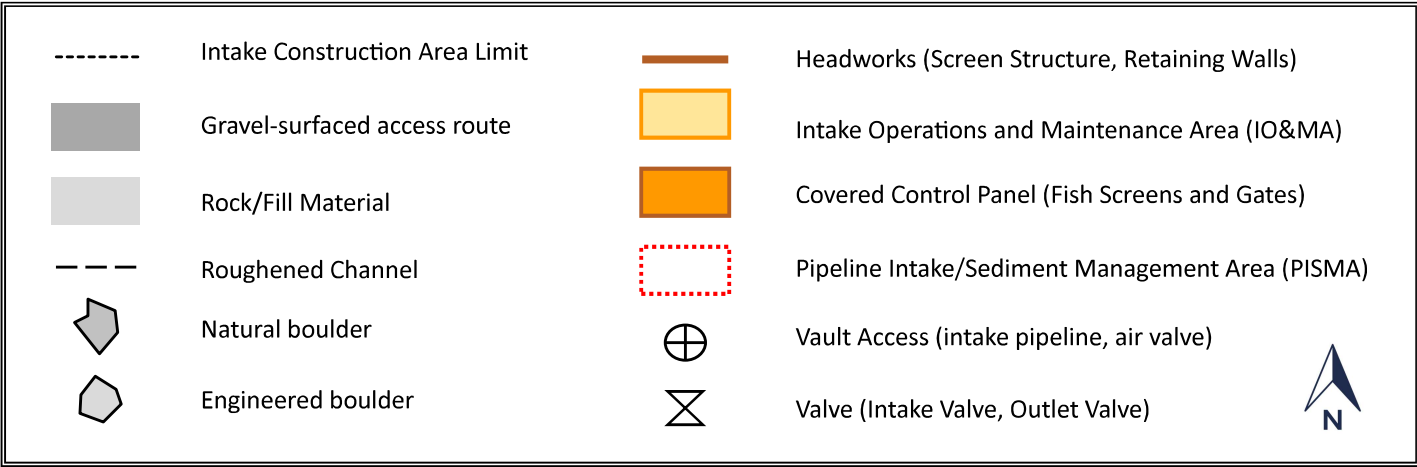


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Leavenworth National Fish Hatchery Surface Water Intake Fish Screens and Fish Passage (SWISP) Project



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





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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

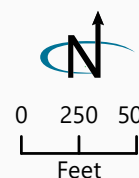


Forest Service
Wilderness
Area Kiosk

Snow Lakes
Trailhead

Intake Facilities
*See Map 2-5 for
Additional Details

Replacement Pipeline
(Approx. 520 feet)



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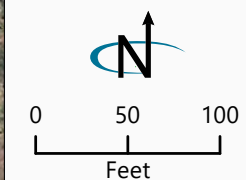
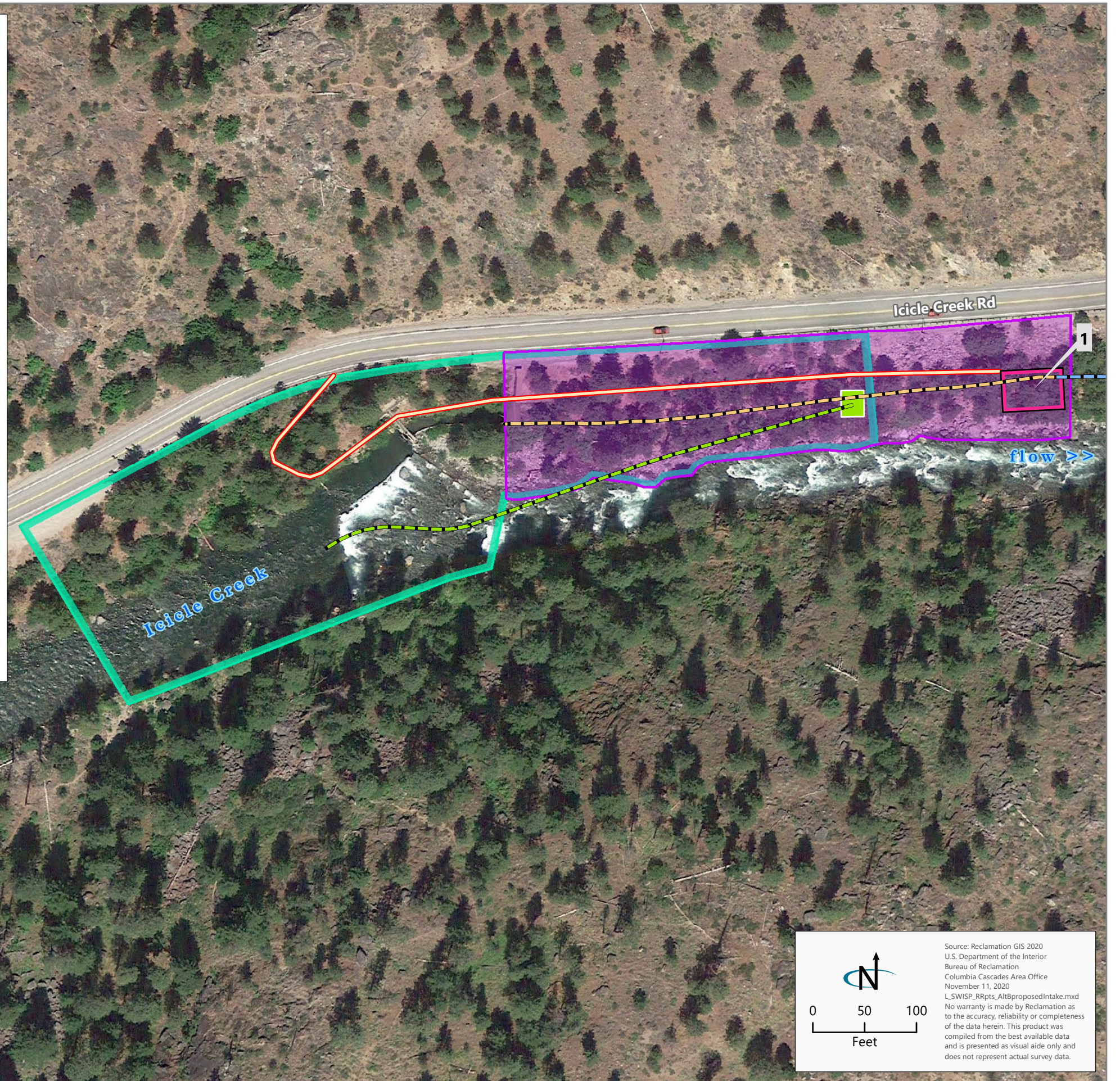
Map A-6
Alternative B (Proposed Action)
and Alternative D: Intake

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)



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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

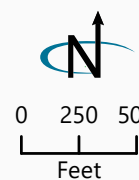
LNFH Sand Settling Basin and
Inside and Outside Screen Chambers



Forest Service
Wilderness
Area Kiosk

Snow Lakes
Trailhead

Intake Facilities
*See Map 2-7 for
Additional Details



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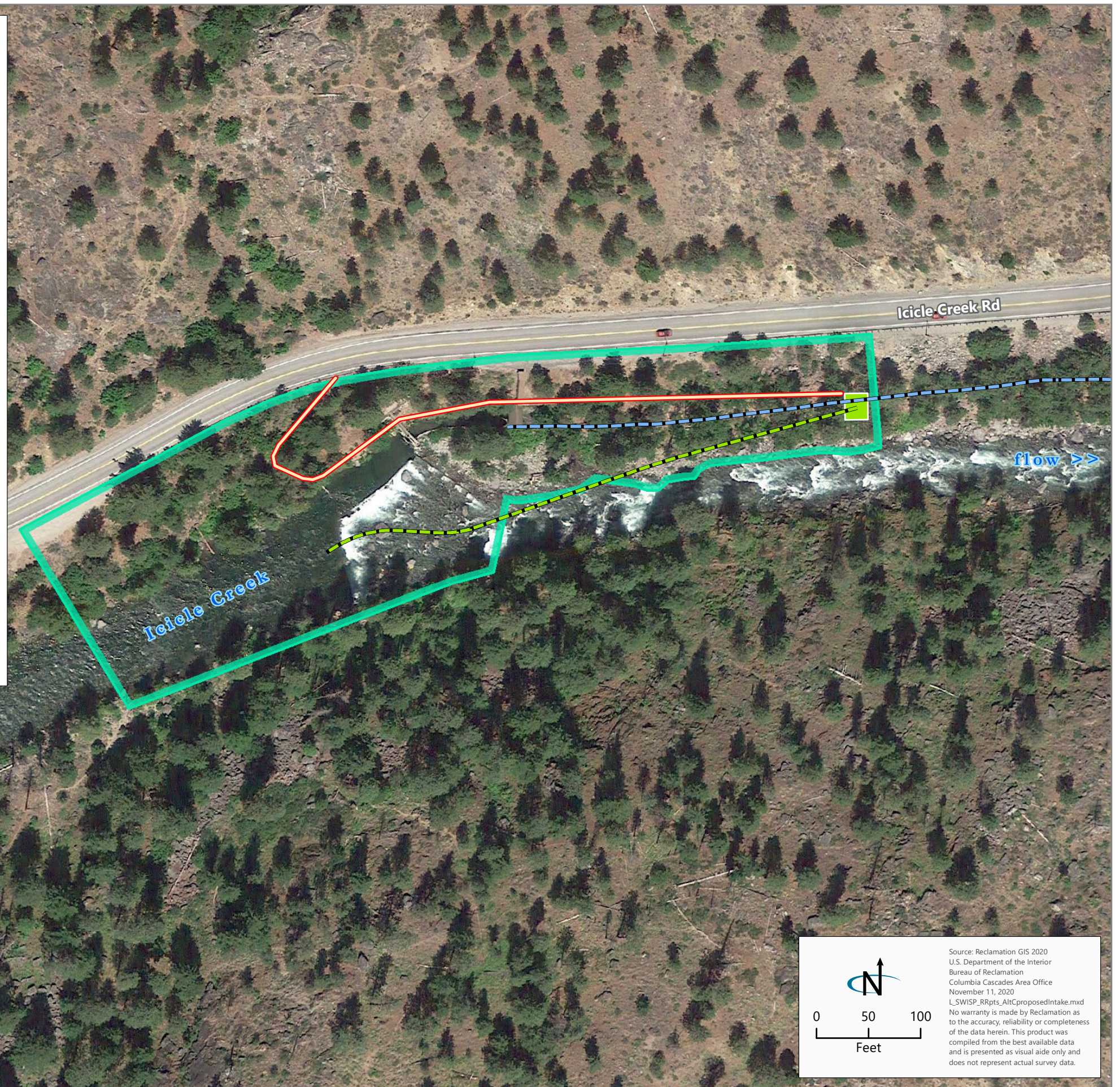
Map A-8 Alternative C (Intake)

Phase I

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

Phase II

- Conveyance Pipeline lined with Cure-in-Place Pipe



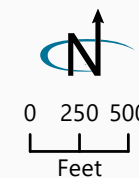
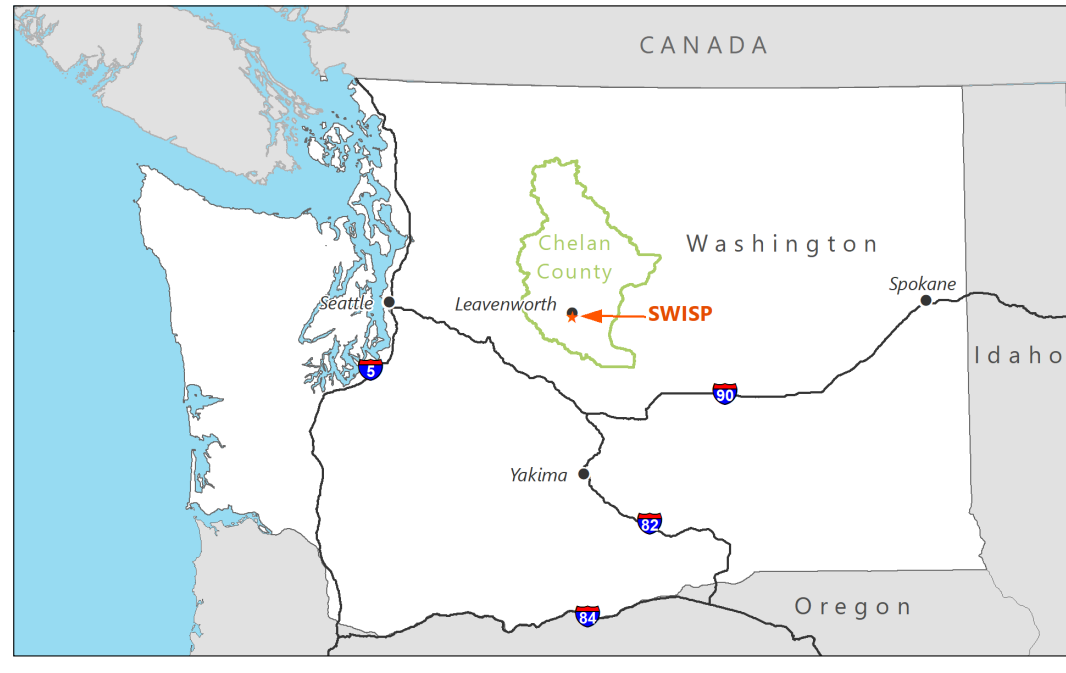
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Map A-9 Noise and Vibration Analysis Area

- Noise and Vibration Analysis Area
- *Houses, farms, and other occupied buildings within the Visual Analysis Area are also sensitive noise receptors.
- Intake Facilities
- Conveyance Pipeline
- LNPH Production Facilities
- Ambient Noise Point
- Sensitive Noise Receptor
- Contractor Use Area (CUA)
- Road
- LNPH Sand Settling Basin and Inside and Outside Screen Chambers



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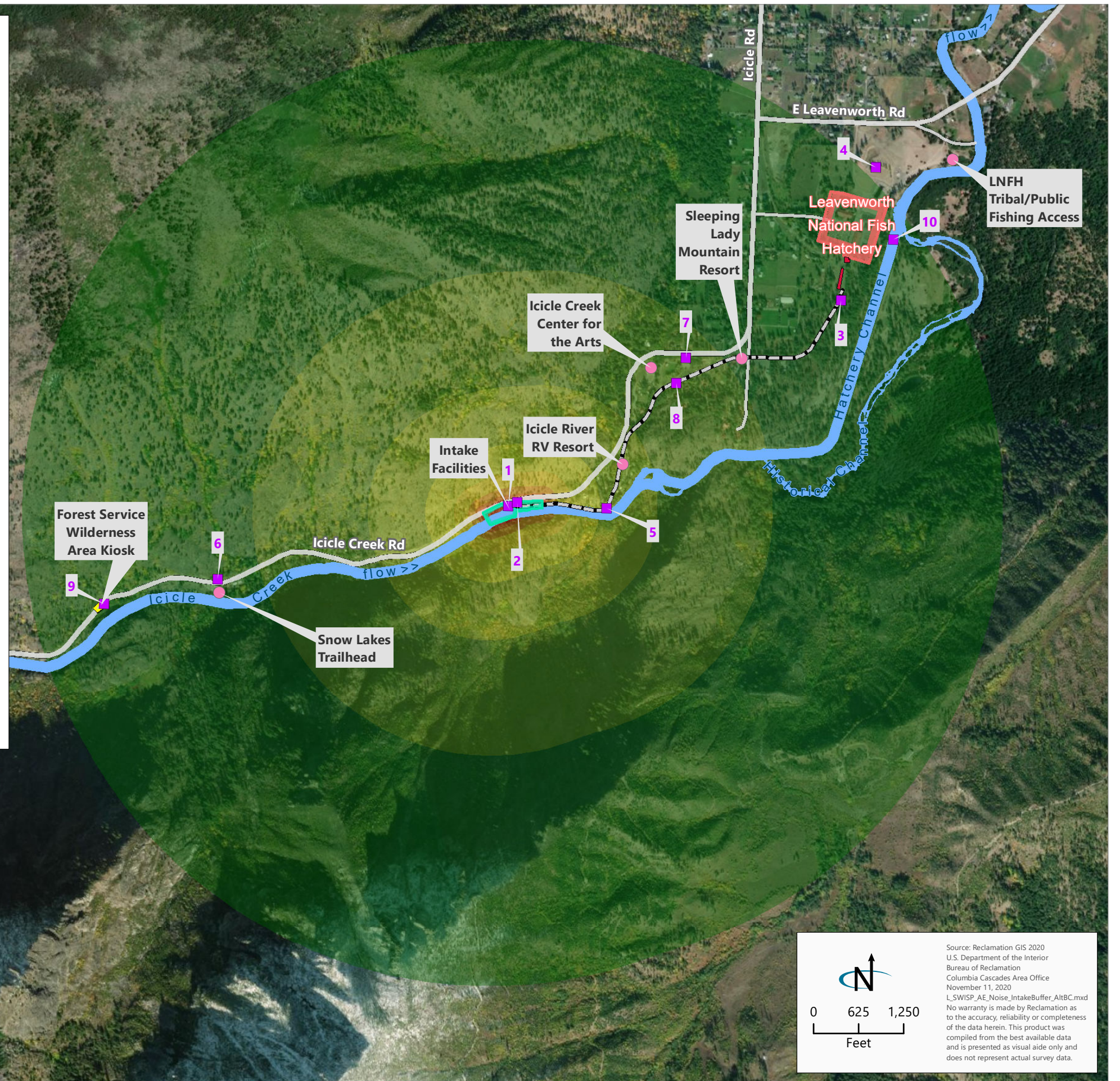
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Map A-10 Noise Attenuation Distances for Pneumatic Tool at Intake Construction Area - Alternatives B and C

Noise Level

- 50 ft. - 85 dBA
- 100 ft. - 79 dBA
- 200 ft. - 73 dBA
- 400 ft. - 67 dBA
- 800 ft. - 61 dBA
- 1,600 ft. - 55 dBA
- 3,200 ft. - 49 dBA
- 6,400 ft. - 43 dBA

- Ambient Noise Point
- Sensitive Noise Receptor
- Intake Facilities
- Construction Vehicle Turnaround
- Conveyance Pipeline
- Road
- LNHF Production Facilities
- LNHF Sand Settling Basin and Inside and Outside Screen Chambers



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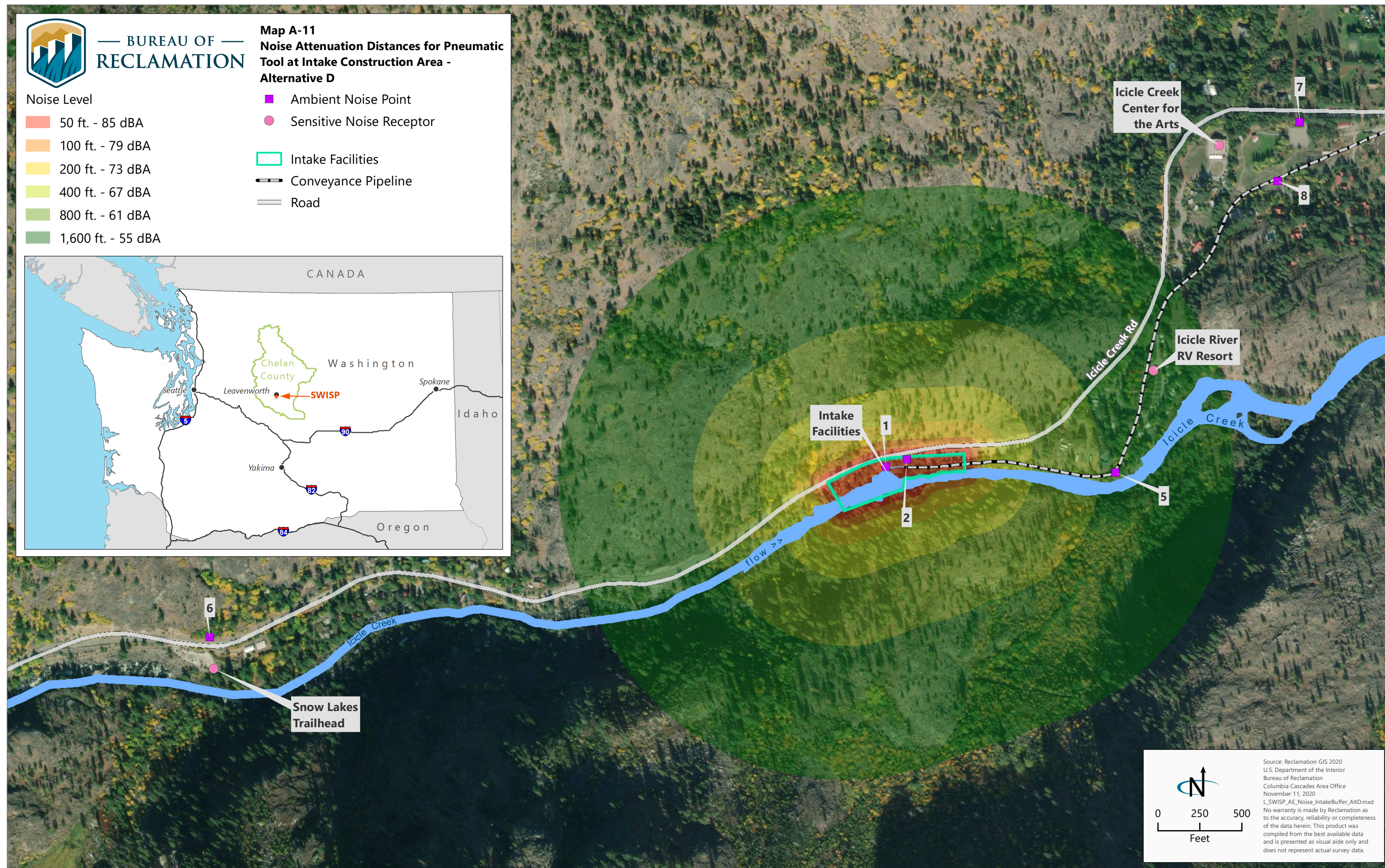
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Map A-11
Noise Attenuation Distances for Pneumatic
Tool at Intake Construction Area -
Alternative D

Noise Level

- 50 ft. - 85 dBA
- 100 ft. - 79 dBA
- 200 ft. - 73 dBA
- 400 ft. - 67 dBA
- 800 ft. - 61 dBA
- 1,600 ft. - 55 dBA

- Ambient Noise Point
- Sensitive Noise Receptor
- Intake Facilities
- Conveyance Pipeline
- Road



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Map A-12
Noise Attenuation Distances for Hot
Air Blower at Contractor Use Areas -
Alternatives B and D

Noise Level

- 5 ft. - 115 dB
- 10 ft. - 109 dB
- 20 ft. - 103 dB
- 40 ft. - 97 dB
- 80 ft. - 91 dB
- 160 ft. - 85 dB
- 320 ft. - 79 dB
- 640 ft. - 73 dB
- 1,280 ft. - 67 dB
- 2,560 ft. - 61 dB
- 5,120 ft. - 55 dB

● Sensitive Noise Receptor

Intake Facilities

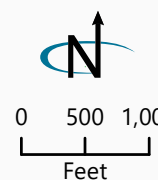
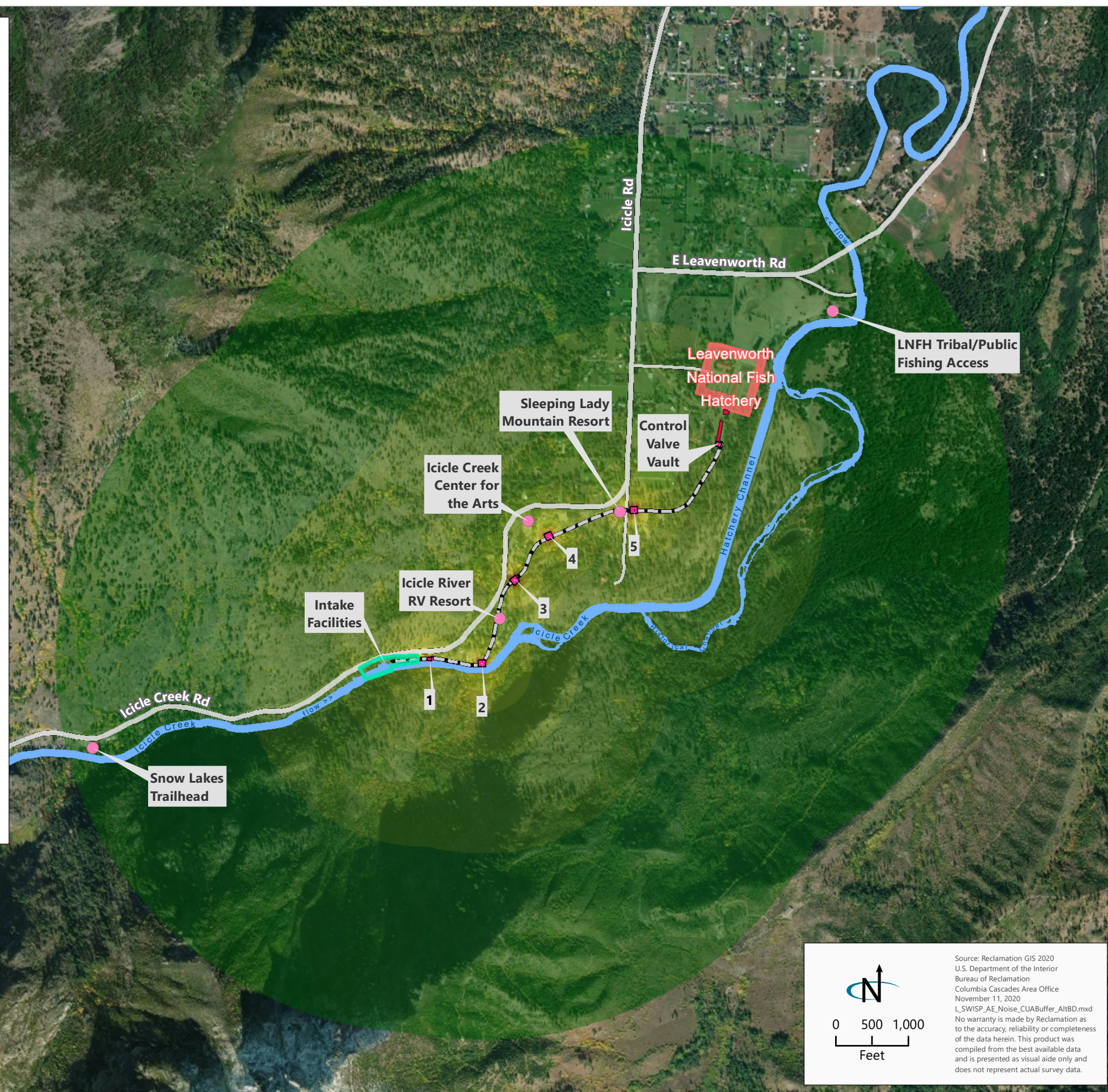
Contractor Use Area (CUA)

Conveyance pipeline

Road

LNFH Production Facilities

LNFH Sand Settling Basin and
Inside and Outside Screen Chambers



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Columbia Cascades Area Office
November 11, 2020
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does not represent actual survey data.



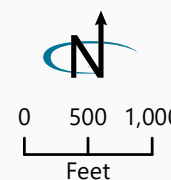
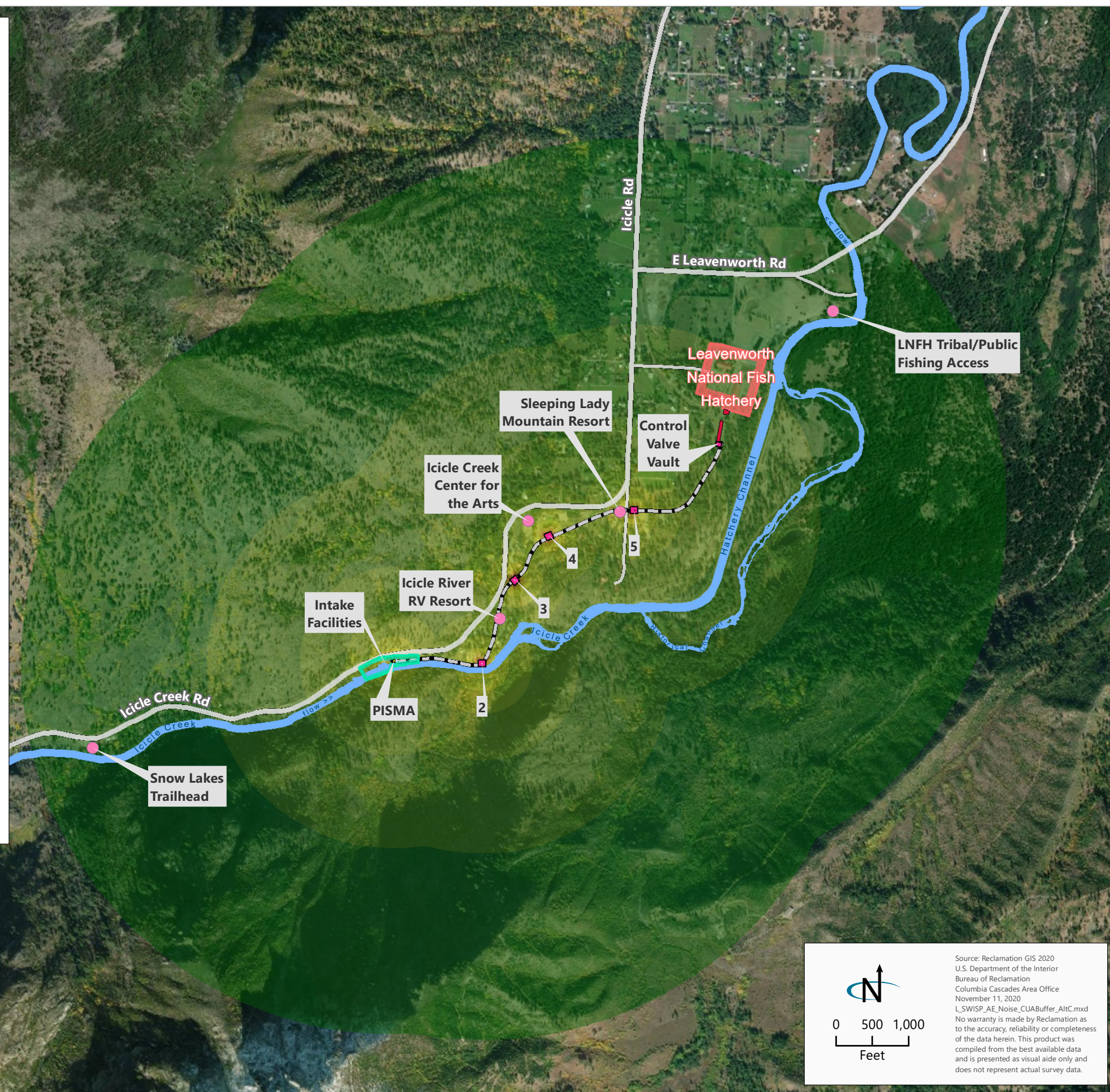
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Map A-13
Noise Attenuation Distances for Hot
Air Blower at Contractor Use Areas -
Alternative C

Noise Level

- 5 ft. - 115 dB
- 10 ft. - 109 dB
- 20 ft. - 103 dB
- 40 ft. - 97 dB
- 80 ft. - 91 dB
- 160 ft. - 85 dB
- 320 ft. - 79 dB
- 640 ft. - 73 dB
- 1,280 ft. - 67 dB
- 2,560 ft. - 61 dB
- 5,120 ft. - 55 dB

- Sensitive Noise Receptor
- Pipeline Intake/ Sluice Management Area (PISMA)
- Intake Facilities
- Contractor Use Area (CUA)
- Conveyance pipeline
- Road
- LNFH Production Facilities
- 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_AE_Noise_CUABuffer_AltC.mxd
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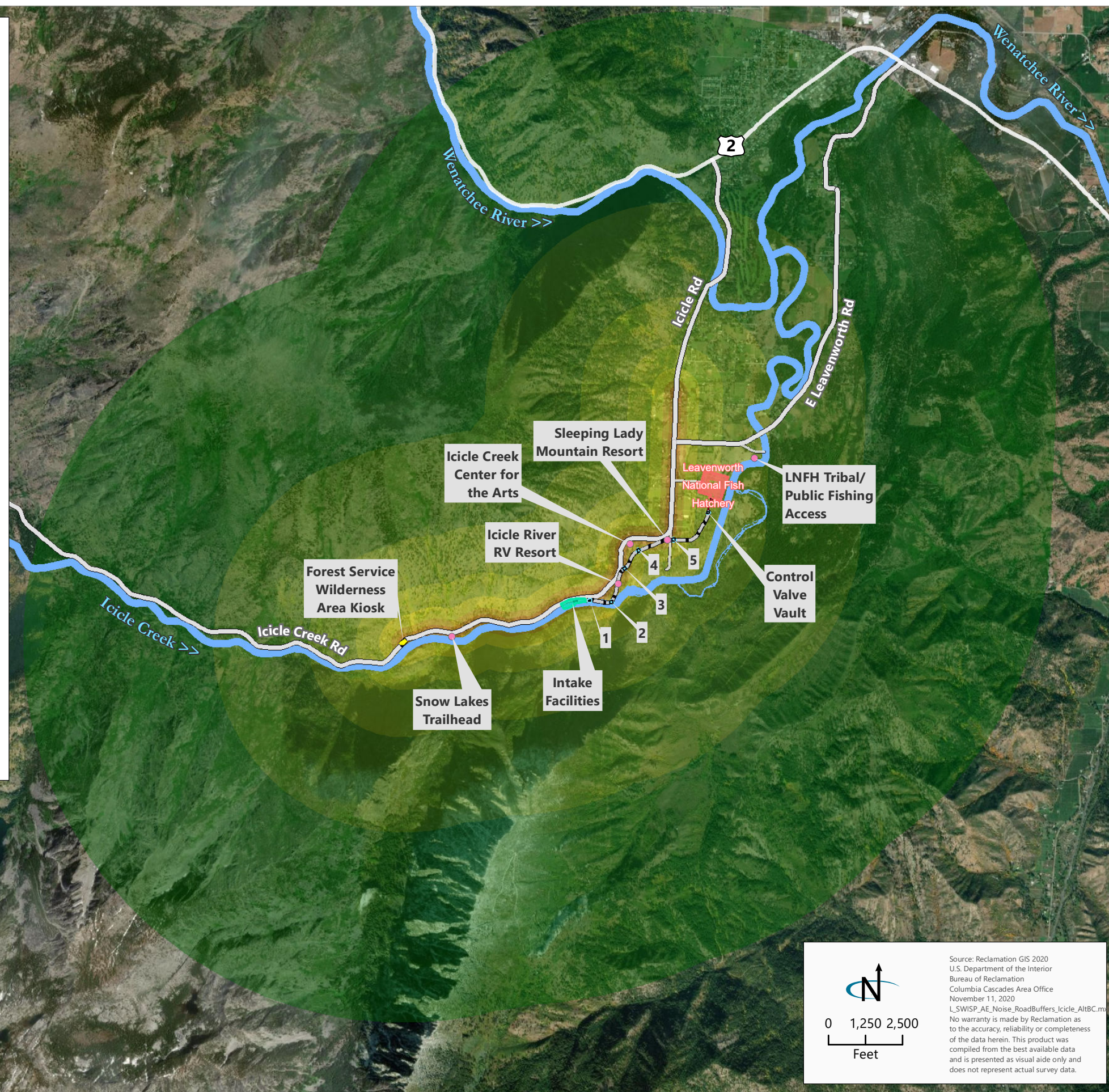
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Noise Level

- 50 ft. - 88 dBA
- 100 ft. - 82 dBA
- 200 ft. - 76 dBA
- 400 ft. - 70 dBA
- 800 ft. - 64 dBA
- 1,600 ft. - 58 dBA
- 3,200 ft. - 52 dBA
- 6,400 ft. - 46 dBA
- 12,800 ft. - 40 dBA

Map A-14
Noise Attenuation Distances for a
Truck along Icicle Road and Icicle
Creek Road - Alternatives B and C

- Sensitive Noise Receptor
- Intake Facilities
- Contractor Use Area (CUA)
- Construction Vehicle Turnaround
- Conveyance Pipeline
- Road
- LNFH Production Facilities
- 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_AE_Noise_RoadBuffers_Icicle_AltBC.mxd
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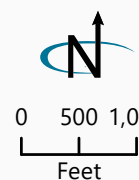
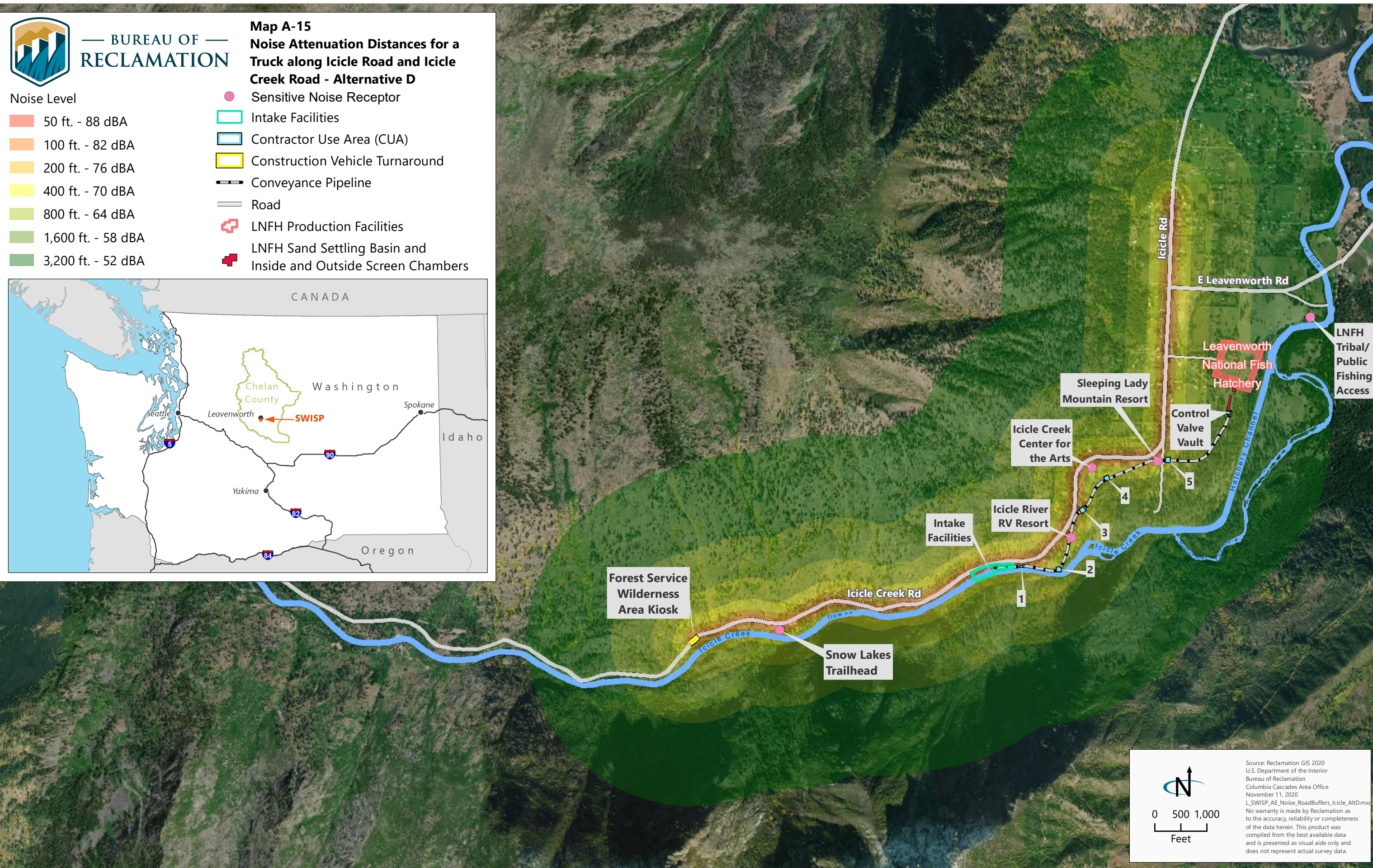
BUREAU OF
RECLAMATION

Noise Level

- 50 ft. - 88 dBA
- 100 ft. - 82 dBA
- 200 ft. - 76 dBA
- 400 ft. - 70 dBA
- 800 ft. - 64 dBA
- 1,600 ft. - 58 dBA
- 3,200 ft. - 52 dBA

Map A-15
Noise Attenuation Distances for a
Truck along Icicle Road and Icicle
Creek Road - Alternative D

- Sensitive Noise Receptor
- Intake Facilities
- Contractor Use Area (CUA)
- Construction Vehicle Turnaround
- Conveyance Pipeline
- Road
- LNFH Production Facilities
- 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_AE_Noise_RoadBuffers_Icicle_AltD.mxd
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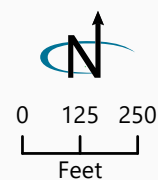
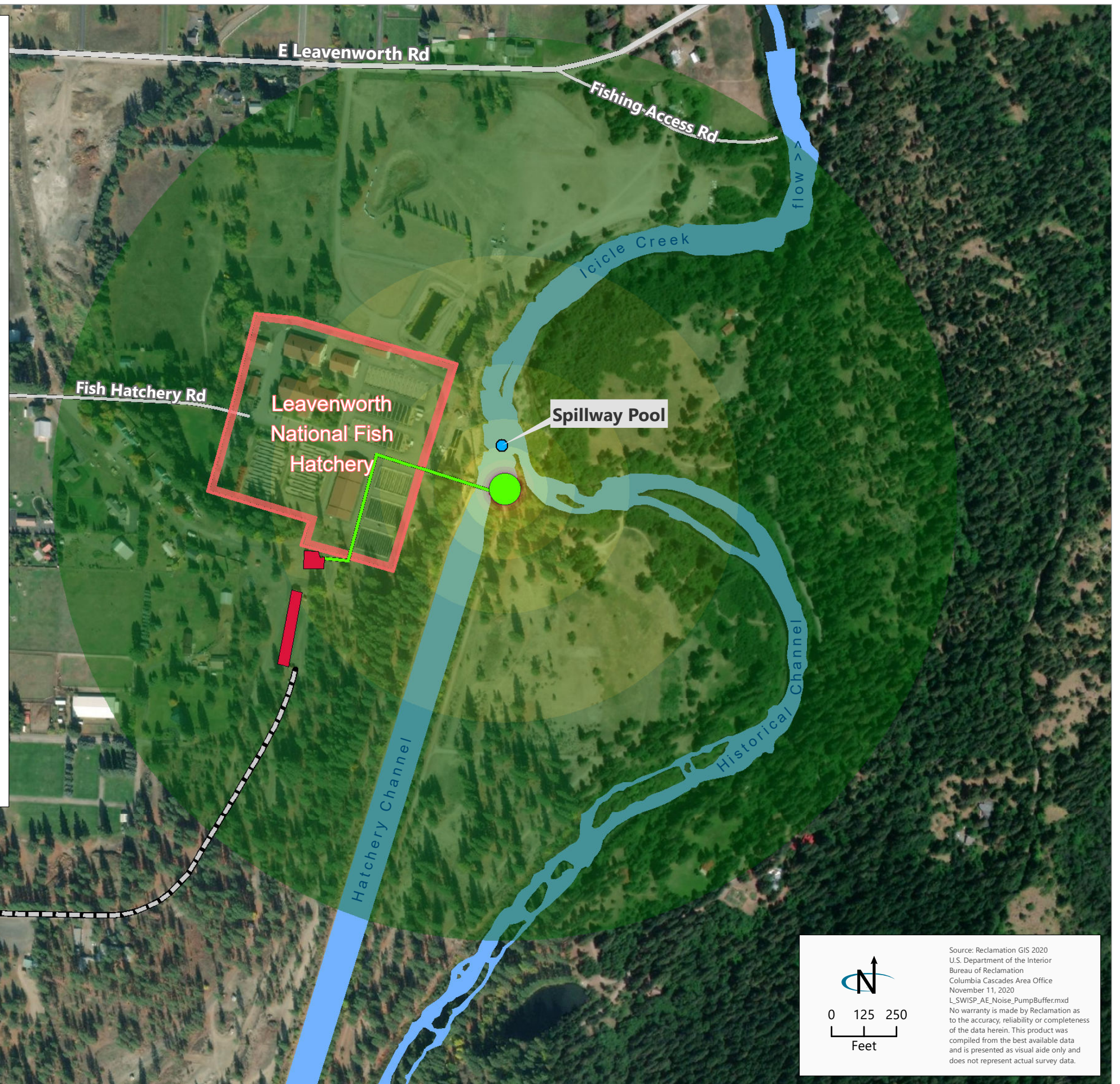
BUREAU OF
RECLAMATION

Map A-16
Noise Attenuation Distances for Diesel
Pumps at Temporary Hatchery Water
Supply Pump Site - Action Alternatives

Noise Level

- 3.3 ft. - 96 dB
- 6.6 ft. - 90 dB
- 13 ft. - 84 dB
- 26 ft. - 78 dB
- 52 ft. - 72 dB
- 105 ft. - 66 dB
- 210 ft. - 60 dB
- 420 ft. - 54 dB
- 840 ft. - 48 dB
- 1,680 ft. - 42 dB

- Temporary Pump and Pipeline
- Spillway Pool
- Conveyance Pipeline
- Road
- LNFH Production Facilities
- 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_AE_Noise_PumpBuffer.mxd
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Appendix B

Best Management Practices

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Appendix B. Best Management Practices

B.1 Best Management Practices

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

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

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

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

Table B-1. Best Management Practices

Resource Topic	Best Management Practice
General	<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>General</p> <ul style="list-style-type: none"> • Perform construction activities by methods that will prevent entrance, or accidental spillage, of solid matter, contaminants, debris, or other pollutants or wastes into streams, flowing or dry watercourses, lakes, wetlands, reservoirs, or underground water sources. • Measures shall be taken to ensure that no petroleum products, hydraulic fluid, fresh cement, sediments, sediment-laden water, chemicals, or any other toxic or deleterious materials are allowed to enter or leach into waters of the U.S. (NMFS 2017a). • The use of acids for cleaning or preparing concrete surfaces for repair will not be permitted. <p>In-water work</p> <ul style="list-style-type: none"> • Prepare a Work Area Isolation Plan for all work below the bankfull elevation requiring flow diversion or isolation. Include the sequencing and schedule of dewatering and rewatering activities, plan view of all isolation elements, as well as a list of equipment and materials to adequately provide appropriate redundancy of all key plan functions (e.g., an operational, properly sized backup pump and/or generator) (NMFS 2017a). • Use of rapidly deployable prefabricated cofferdam systems would minimize impacts to subgrade and surrounding water. • When conducting in-water or bank work, machine hydraulic lines will be filled with vegetable oil for the duration of the Project to minimize impacts of potential spills and leaks. • Spill prevention and clean-up kits will be on site when heavy equipment is operating within 25 feet of the water (NMFS 2017a). • To the extent feasible, work requiring use of heavy equipment will be completed by working from the top of the bank (i.e. landward of the OHWM or extreme high tide line) (NMFS 2017a). • Equipment shall be checked daily for leaks and any necessary repairs shall be completed prior to commencing work activities around the water (NMFS 2017a). • Equipment will cross the stream in-water only under the following conditions: (NMFS 2017a). <ul style="list-style-type: none"> ○ A. Equipment is free of external petroleum-based products, soil and debris has been removed from the drive mechanisms and undercarriage; and ○ B. The substrate is bedrock or coarse rock and gravel; or ○ 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>Erosion and spill prevention and control, continued</p> <ul style="list-style-type: none"> ○ Prevent, stop, and control spills or leaks during construction activities: ○ Stop source of spill or leak. ○ Stop migration of spill or leak. ○ Place berm of sorbent material around perimeter of spill. ○ Solidify free standing oil. • A supply of emergency erosion control materials will be on hand and temporary erosion controls will be installed and maintained in place until site restoration is complete (NMFS 2017a). • Landward erosion control methods shall be used to prevent silt-laden water from entering waters of the U.S. These may include, but are not limited to, filter fabric, temporary sediment ponds, check dams of pea gravel-filled burlap bags or other material, and/or immediate mulching of exposed areas (NMFS 2017a). • Control pollutants by use of sediment and erosion controls, wastewater and stormwater management controls, construction site management practices, and other controls including State and local control requirements. • Sediment and Erosion Controls: <ul style="list-style-type: none"> ○ Establish methods for controlling sediment and erosion which address vegetative practices, structural control, silt fences, straw dikes, sediment controls, and operator controls as appropriate. ○ Institute stormwater management measures as required, including velocity dissipators, and solid waste controls which address controls for building materials and offsite tracking of sediment. • Pollution Prevention Measures: <ul style="list-style-type: none"> ○ 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. ○ 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. ○ Divert stormwater runoff from upslope areas away from disturbed areas.

Resource Topic	Best Management Practice
Water Resources (Water Quality, continued)	<p data-bbox="617 250 1251 276">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 1881 630">• Turbidity Prevention Measures: <ul data-bbox="718 321 1881 630" style="list-style-type: none"> <li data-bbox="718 321 1881 461">○ 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="718 467 1881 526">○ 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="718 532 1881 630">○ 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="667 636 1881 701">• Clean up spills or leaks in a manner that complies with applicable Federal, State, and local laws and regulations. <li data-bbox="667 708 1881 915">• Dispose of spilled or leaked materials: <ul data-bbox="718 740 1881 915" style="list-style-type: none"> <li data-bbox="718 740 1881 805">○ Handle and dispose of spilled or leaked materials contaminated with 50 ppm or greater polychlorinated biphenyls. <li data-bbox="718 812 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="667 977 1881 1354" style="list-style-type: none"> <li data-bbox="667 977 1881 1107">• 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 1218 1881 1354">• 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>Storage and staging</p> <ul style="list-style-type: none"> When not in use, vehicles and equipment containing oil, fuel, and/or chemicals will be stored in a staging area located at least 150 feet from the Corps' jurisdictional boundary of wetlands and waterbodies. If possible, staging will be located at least 300 feet away from the Corps' jurisdictional boundary of wetlands and waterbodies, and on impervious surfaces to prevent spills from reaching ground water. If moving equipment between the staging area and the worksite would create unacceptable levels of disturbance (for example, requiring multiple stream crossings, multiple passes over sensitive vegetation), a closer staging location with an adequate spill prevention plan may be proposed (NMFS 2017a). Equipment will not be stored overnight in the instream channel. Do not stockpile or deposit excavated materials or other construction materials, near or on, stream banks, lake shorelines, or other watercourse perimeters where they can be washed away by high water or storm runoff or can in any way encroach upon the watercourse. Petroleum Product Storage Tanks Management. <ul style="list-style-type: none"> 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. Do not use underground storage tanks. 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. Areas for refueling operations: Lined with impermeable barrier at least 40 mils thick covered with 2 to 4 inches of soil. <p>Reclamation of temporary disturbance</p> <ul style="list-style-type: none"> All temporary access will be removed (including gravel surfaces) and planted after Project completion (NMFS 2017a). Within 7 calendar days from Project completion, any disturbed bank and riparian areas shall be protected using native vegetation or other erosion control measures as appropriate. For erosion control, sterile grasses may be used in lieu of native seed mixes. Alternative methods (e.g. spreading timber harvest slash) may be used for erosion control if approved by the Corps (NMFS 2017a).

Resource Topic	Best Management Practice
Water Resources (Water Rights)	<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="617 250 793 276">Riparian areas</p> <ul data-bbox="667 289 1892 915" style="list-style-type: none"> <li data-bbox="667 289 1625 315">• The removal of riparian vegetation for access will be minimized (NMFS 2017a). <li data-bbox="667 321 1829 386">• 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="667 393 1877 457">• 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="667 464 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="667 743 1864 808">• 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="667 815 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="617 269 978 295">Fisheries and aquatic wildlife</p> <ul data-bbox="667 305 1890 1284" style="list-style-type: none"> <li data-bbox="667 305 1367 331">• Instream work is limited to July 1 through November 15. <li data-bbox="667 337 1890 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="667 584 1890 753">• 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="667 831 1850 896">• 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="667 902 1829 967">• 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="667 974 1797 1000">• Post-construction monitoring of the low-flow fishway would be done to ensure effectiveness. <li data-bbox="667 1006 1890 1143">• 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 1221 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">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.

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