



— BUREAU OF —
RECLAMATION

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

Alternatives Compilation Report



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

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

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

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Appendix A. Screening Matrix

Acronyms and Abbreviations

Full Phrase

CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CIPP	cure-in-place pipe
Ecology	Washington Department of Ecology
EIS	Environmental Impact Statement
ESA	Endangered Species Act of 1973
Forest Service	U.S. Forest Service
DAHP	Washington State Department of Archaeology and Historic Preservation
LNFH, Hatchery	Leavenworth National Fish Hatchery
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
pH	potential of hydrogen
PISMA	pipeline intake and sediment management area
Reclamation	U.S. Bureau of Reclamation
SWISP	Surface Water Intake Fish Screens and Fish Passage
TMDL	total maximum daily load
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VE	Value Engineering
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources

Chapter 1. Introduction

1.1 Purpose of the Alternatives Compilation Report

The Bureau of Reclamation (Reclamation) is preparing 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. The purpose of this report is to document the SWISP Project EIS alternatives development process.

The report provides a brief overview of the SWISP Project and explains the guiding principles for alternative development. It documents the alternative development process, including agency and public collaboration, development of the screening criteria, development of project components and elements, screening of project elements to develop action alternatives, and screening of potential action alternatives submitted during the public scoping process.

Action alternatives developed as a result of this process are analyzed in the SWISP Project EIS.

1.2 Project Information

Reclamation proposes to rehabilitate, replace, and modernize the LNFH intake and delivery system on Icicle Creek by constructing new intake headworks, installing compliant fish screens, building a roughened channel and fishway that conforms to fish passage guidelines, and replacing/lining the surface water conveyance pipeline to the Hatchery.

The Hatchery's primary point of diversion and water delivery system on Icicle Creek is nearly 80 years old and is reaching or exceeding its operational life. Currently, the intake facility does not comply with National Marine Fisheries Service (NMFS) criteria for anadromous salmonids and can result in take of Endangered Species Act (ESA) listed fish. The 2017 Biological Opinion (NMFS 2017) covering LNFH operations requires the LNFH to have a surface water intake and delivery system that complies with NMFS current screening and fish passage criteria for anadromous fish passage facilities in place and operating by May 2023.

1.3 Purpose of and Need for Action

The **need** for the SWISP Project is to comply with the NMFS 2017 Biological Opinion (NMFS 2017) and current screening and fish passage criteria for anadromous fish passage facilities, improve employee safety when operating and maintaining the intake and delivery structures, and increase reliability and longevity of the water delivery system.

The **purpose** of the SWISP Project is to minimize take of ESA-listed fish species, provide fish passage that complies with current regulatory criteria, and ensure safe, efficient, and reliable delivery of LNFH's full surface water rights from Icicle Creek.

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Chapter 2. Guiding Principles for Alternatives Development

The alternatives development process incorporates a number of guiding principles as provided by relevant laws and guidance, including the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA; 40 Code of Federal Regulations [CFR] Parts 1500–1508), U.S. Department of the Interior's NEPA Regulations (43 CFR Part 46), Reclamation's NEPA Handbook (Reclamation 2012), and Principles and Requirements for Federal Investments in Water Resources (CEQ 2013).

These regulations require agencies to:

- Rigorously explore all reasonable alternatives that meet the purpose of and need for the proposed action and, for alternatives that were eliminated from detailed study, briefly discuss the reasons for elimination
- Include the alternative of no action
- Identify the agency's preferred alternative or alternatives, if one or more exists, in the Draft EIS and identify such alternative in the Final EIS (40 CFR 1502.14; 43 CFR 46.415(b))

Interdisciplinary collaboration is a critical component of the alternative development process. Agencies should seek to achieve agreement from diverse interests on the goals, purposes, and needs for agency plans and activities as well as the methods anticipated to carry out those plans and activities (43 CFR 46.110(a)). Reclamation used public scoping to help identify issues and concerns that could be addressed through alternative actions. Additionally, Reclamation coordinated with cooperating and participating agencies in developing alternatives (see **Chapter 4**, Alternatives Screening).

Reclamation is also bound by the Principles and Requirements for Federal Investments in Water Resources (CEQ 2013), which lay out broad principles to guide water investments. The principals are based on the federal objective as set forth in the Water Resources Development Act of 2007. The objective specifies that federal water resources investments shall reflect national priorities, encourage economic development, and protect the environment by: (1) seeking to maximize sustainable economic development; (2) seeking to avoid the unwise use of floodplains and flood-prone areas and minimizing adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used; and (3) protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural systems. The objective and guiding principals were incorporated into the alternative development process.

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Chapter 3. Agency and Public Involvement

3.1 Overview

The SWISP Project alternatives development process has involved intensive collaboration with cooperating and participating agencies¹, Native American Tribes, other interested stakeholders, and the general public.

3.2 Internal Scoping

Reclamation held an alternatives screening criteria development workshop on April 14, 2020. At the workshop, participants from Reclamation and the U.S. Fish and Wildlife Service (USFWS) reviewed and refined the following:

- the draft purpose and need statement
- the no action alternative (description of the existing condition)
- the proposed screening criteria
- the draft project components and elements

Agency individuals invited, and those that attended, are listed in **Table 1** below. The screening criteria developed during the workshop are described in more detail in **Chapter 4**.

Table 1
Alternatives Screening Criteria Development Workshop Attendance

Name	Agency or Entity and Title	Invited	Attended
Christi Davis-Kernan	Reclamation, Technical Projects Program Manager	✓	
David Child	Reclamation, Project Manager	✓	✓
Jason Sutter	Reclamation, Environmental Specialist	✓	✓
Elizabeth Heather	Reclamation, Environmental Protection Specialist	✓	✓
Dan Church	Reclamation, Cartographer	✓	✓
Jim Craig	USFWS, Manager – Leavenworth Fishery Complex	✓	✓
Carlo Aguon	USFWS, Facilities Operations Specialist – Leavenworth Fishery Complex	✓	✓
Mat Maxey	USFWS, Hatchery Manager – LNFH	✓	✓

¹ The U.S. Fish and Wildlife Service (USFWS) and U.S. Army Corps of Engineers (USACE) agreed to be cooperating agencies under One Federal Decision (Executive Order 13807). Several federal, state, and local agencies are actively engaged as participating agencies, including Chelan County, NMFS, Department of Agriculture, Forest Service (Forest Service), Washington State Department of Archaeology and Historic Preservation (DAHP), Washington Department of Ecology (Ecology), Washington Department of Fish and Wildlife (WDFW), and the Washington Department of Natural Resources (WDNR). The Confederated Tribes and Bands of the Yakama Nation, and the Confederated Tribes of the Colville Reservation are also engaged as participating agencies.

Name	Agency or Entity and Title	Invited	Attended
Amy Lewis	EMPSi (Reclamation contractor), Project Manager	✓	✓
Morgan Trieger	EMPSi (Reclamation contractor), Assistant Project Manager	✓	✓

3.3 Project Design

Reclamation held numerous meetings with the cooperating and participating agencies throughout the Project design process. Cooperating and participating agency meetings were held at Project and permitting milestones and as needed. The purpose of these meetings was to inform and receive input from cooperating and participating agencies respective to their jurisdiction, special expertise, or interests. Meetings with the cooperating and participating agencies throughout the Project design process are summarized in **Table 2**.

Table 2
Project Design Meetings

Meeting	Date	Cooperating and Participating Agency Representation
Biweekly design meetings	Starting March 6, 2019	USFWS, Yakama Nation, Confederated Tribes of the Colville Reservation
30 percent Design, Permitting, and ESA Meeting	October 23, 2019	USFWS, Yakama Nation, Confederated Tribes of the Colville Reservation, NMFS, USACE, Ecology, WDFW, WDNR, Chelan County
Value Engineering Study	November 4-8, 2019	USFWS, WDFW
60 percent Design, Permitting, and ESA Meeting	February 19, 2020	USFWS, Yakama Nation, Confederated Tribes of the Colville Reservation, NMFS, USACE, Ecology, WDFW, WDNR, Chelan County
90 percent Design, Permitting, and ESA Meeting	May 5, 2020	USFWS, Yakama Nation, Confederated Tribes of the Colville Reservation, NMFS, USACE, Ecology, WDFW, WDNR, Chelan County
Resolve 90 percent design concerns focus calls	Starting May 21, 2020	USFWS, Yakama Nation, Confederated Tribes of the Colville Reservation, NMFS, USACE, WDFW
100 percent Design, Permitting, and ESA Meeting	September 9, 2020	USFWS, USACE, WDFW, Ecology, Yakama Nation, Chelan County, NMFS

3.4 Public Scoping

On April 24, 2020, Reclamation published the Notice of Intent (NOI) to prepare the EIS in the *Federal Register*, announcing the beginning of a public scoping period to solicit public comments and to identify issues. Reclamation solicited comments from cooperating and participating agencies, Tribes, other interested parties and the public through various meetings, including a web-based

virtual public meeting room that was available 24 hours a day during the public scoping period. The public scoping period ended on May 26, 2020. The description and outcomes of the scoping process are summarized in a scoping report (Reclamation 2020a), which was published on Reclamation’s SWISP Project website² in June 2020. Comments received related to alternatives and components of alternatives were carried forward into the alternative development workshop, as described in **Chapter 4**.

3.5 Agency Scoping Meeting

The Reclamation SWISP Project team met with the cooperating and participating agencies for an agency scoping meeting, on May 12, 2020. The meeting purpose was to identify issues of concern for the cooperating and participating agencies, potential data gaps/data needs, conservation measures/best management practices, and alternatives to the proposed action. Agency individuals invited, and those that attended, are listed in **Table 3** below.

Table 3
Agency Scoping Meeting Attendance

Name	Agency and Title	Invited	Attended
David Child	Reclamation, Project Manager	✓	✓
Jason Sutter	Reclamation, Environmental Specialist	✓	✓
Elizabeth Heether	Reclamation, Environmental Protection Specialist	✓	✓
Dan Church	Reclamation, Cartographer	✓	
Carlo Aguon	USFWS, Facilities Operations Specialist – Leavenworth Fishery Complex	✓	✓
Malenna Cappellini	USFWS, Environmental Compliance Specialist – LNFH	✓	✓
Cynthia Raekes	USFWS, Ecological Services	✓	
Cory Kamphaus	Yakama Nation, Northern Ceded Lands Production Supervisor	✓	✓
Kirk Truscott	Colville Tribes, Anadromous Division Program Manager	✓	✓
Cindy Preston	WDNR, Natural Resource Specialist	✓	
Amanda Barg	WDFW, Area Habitat Biologist	✓	✓
Jenni Novak	WDFW, Fish Screening and Fish Passage Biologist	✓	
Jeff Dengel	WDFW, Environmental Planner		✓
RJ Lott	Chelan County, Planning Manager	✓	
Dale Bambrick	NMFS, Chief, Columbia Basin Branch	✓	
Andrea Jedel	Ecology, Shorelines and Wetlands	✓	
Cole Provence	Ecology, Water Quality Specialist	✓	✓
Jess Jordan	USACE, Biologist	✓	✓

² The SWISP Project website can be accessed at: <https://www.usbr.gov/pn/programs/leavenworth/swisp/index.html>.

Name	Agency and Title	Invited	Attended
Jeff Rivera	Forest Service, District Ranger	✓	
Amy Lewis	EMPSi (Reclamation contractor), Project Manager	✓	✓
Morgan Trieger	EMPSi (Reclamation contractor), Assistant Project Manager	✓	✓

Chapter 4. Alternatives Screening

The goal of the alternative screening process is to provide an objective and repeatable method to identify a reasonable range of alternatives (see **Section 4.1**) with the potential to meet the purpose and need of the SWISP Project (see **Section 1.3**).

This section captures the process that Reclamation used to identify a reasonable range of alternatives. This process is described in more detail in the narrative that follows. In summary, Reclamation developed screening criteria, and assessed Project components and elements against these criteria. The major Project components are the Intake, Sediment Management, Fish Passage, Conveyance Pipeline, Temporary Hatchery Water Supply, and Access and Staging (see **Section 4.2.1** for further description).

The screening criteria are the filters used by Reclamation to screen the project elements and determine which ones would be carried forward for analysis in the Draft EIS or dismissed from further analysis. The screening criteria are described in more detail in **Section 4.2.2**. Finally, screening results were reviewed and discussed to ensure agreement among Reclamation and cooperating agencies regarding elements to be eliminated and those to be carried forward and combined into complete alternatives for analysis in the Draft EIS. This is described in more detail in **Section 4.2.3**.

4.1 Reasonable Range of Alternatives

NEPA requires that an EIS evaluate a range of reasonable alternatives, including the no action alternative. NEPA regulations do not specify the number of alternatives that need to be considered in the EIS but indicate that a reasonable range of alternatives should be considered.

The CEQ defines reasonable alternatives as “those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant” (CEQ 1986). CEQ regulations require that reasonable alternatives to the proposed action, including no action, are evaluated, the reasons for eliminating alternatives are discussed, and that alternatives considered are limited to a reasonable number (40 CFR 1502.14, as updated July 16, 2020).

4.2 Alternatives Screening Steps

The alternatives screening development process for the SWISP Project was divided into three steps, as summarized below:

- During Step 1, Reclamation developed project components and elements.
- During Step 2, Reclamation developed screening criteria and screened individual project elements to ensure that they were reasonable and practicable. Elements determined not to be reasonable and/or practicable based on the criteria applied were eliminated from further detailed consideration.

- During Step 3, the results of the Step 2 screening were reviewed and Reclamation and cooperating agencies met to come to agreement regarding which elements would be eliminated and which would be carried forward to be combined into complete alternatives.

Descriptions of the screening steps are included below.

4.2.1 Step 1: Develop Project Components and Elements

Using existing documentation³, input from the Project design team, and professional judgement, Reclamation identified six major components of the SWISP Project:

- Intake
- Sediment Management
- Fish Passage
- 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*. Part of the alternative development process included identification of the different elements available for each component. For example, to address the temporary Hatchery water supply (a component) needed during construction, Reclamation assessed several elements, such as a gravity-fed surface water bypass at the existing intake facilities, pumping from additional groundwater wells, or pumping surface water from the spillway pool to meet this need.

Project elements reviewed and screened under each component are outlined below as bulleted items. Scores assigned to each element are depicted in the screening matrix in **Appendix A**. Elements identified in the SWISP Project Value Engineering (VE) studies or the *USFWS Leavenworth National Fish Hatchery Water Supply System Rehabilitation Final Environmental Assessment* (USFWS 2003) are noted in parenthesis.

Intake Component

- No Action Alternative/existing conditions (Leave existing intake facilities in place)
- Indoor fish screen (USFWS 2003)
- In-channel fish screen (VE Proposal 3)
- Instream fish screen (VE Proposal 1)
 - Fish screen structure
 - Retaining walls
 - Intake pipeline (intake channel filled in)

³ Alternatives, components, and elements identified and considered in the *Leavenworth National Fish Hatchery Surface Water Supply Value Engineering (VE) Study* (Reclamation and USFWS 2012), *SWISP Project VE Study* (Reclamation 2020b) and the *USFWS Leavenworth National Fish Hatchery Water Supply System Rehabilitation Final Environmental Assessment* (USFWS 2003) were also screened during this process.

- Intake Operations and Maintenance Are (IO&MA)
- All proposed screen options without trash protection feature
- Pipe-style trash protection feature (with all proposed screen options) (VE Proposal 3)
- Floating log boom trash protection feature (with all proposed screen options) (VE Proposal 3)
- All proposed screen options without intake access road
- Intake access road (with all proposed screen options)

Sediment Management Component

- No Action Alternative/existing condition (Sand settling basin only)
- Extended concrete apron with incorporated sediment ramp (on river side of screen structure) only
- Intake vertical access and air vent pipe (behind fish screens) only
- Pipeline intake/slucice management area (PISMA; in existing gatehouse footprint) only
 - Isolation valve
 - Intake-conveyance pipeline connection
 - Slucice valve and outlet pipe
 - Outlet channel
- Apron/ramp and vertical access pipe only
- Apron/ramp and PISMA only
- Vertical access pipe and PISMA only
- Apron/ramp, vertical access pipe, and PISMA

Fish Passage Component

- No Action Alternative/existing conditions (Existing fish ladder/sediment sluice and low-head diversion dam)
- New fishway incorporating existing fish ladder/sediment sluice and low-head diversion dam (VE Proposal 3)
- Roughened creek-width channel with low-flow fishway (VE Proposal 1) – low-flow fishway toward right bank
- Roughened creek-width channel with low flow fishway (VE Proposal 1) – low-flow fishway toward left bank
- Extended creek-width channel with low and high flow fishways on left bank and right bank, respectively (VE Proposal 1)

Conveyance Pipeline Component⁴

- No Action Alternative/existing conditions (Leave existing conveyance pipeline in place)
- Excavate and replace entire pipeline
- Excavate and replace pipeline on USFWS land (VE Proposal 4), and use cure-in-place pipe (CIPP) lining on private land
- Excavate and replace the two most deteriorated sections outlined in the LNFH April 2012 Intake Pipe Inspection Report (private and USFWS land) (VE Proposal 4); CIPP lining for remaining pipeline (private and USFWS land)
- Excavate and replace the two most deteriorated sections outlined in the LNFH April 2012 Intake Pipe Inspection Report (private and USFWS land) (VE Proposal 4) only
- CIPP lining (private land) (VE Proposal 4) only
- CIPP lining entire pipeline

Temporary Hatchery Water Supply

- Adding a gravity bypass flow conduit below the Cascade Orchard Irrigation Company screens (VE Proposal 3)
- Adding a gravity bypass flow conduit at existing intake site (above the diversion); connect to conveyance pipeline 200-300 feet below intake
- Adding a gravity bypass flow conduit at existing intake site (above the diversion) connect to conveyance pipeline at USFWS property boundary at presumed pipeline lining access point
- Full time pumping from stilling basin pool only during intake construction
- Full time pumping from groundwater wells only during intake construction
- Full time pumping from stilling basin pool only during pipeline construction when needed
- Full time pumping from groundwater wells only during pipeline construction
- Develop additional groundwater wells to pump additional water (USFWS 2003)

Access and Staging

- Construction vehicle turnaround at Snow Lake Trailhead
- Construction vehicle turnaround at Forest Service kiosk on Icicle Creek Road
- Construction vehicle turnaround on private land above the existing intake facilities
- Construction staging area in gravel parking lot near USFWS Mid-Columbia Fish and Wildlife Conservation Office
- Construction staging area in northern portion of LNFH property (open area adjacent to effluent ponds; adjacent to sand settling basin)
- Construction staging area on LNFH grounds (other locations on undeveloped LNFH 'recreation' areas)

⁴ Pipeline from gatehouse to sand settling basin: 6,250-foot length; ingress/egress access points (includes contractor use areas; private land) would be included in any CIPP-lining option

4.2.2 Step 2: Develop Screening Criteria and Screen Elements

Reclamation and the USFWS met on April 14, 2020 to review the draft Project purpose and need statement, begin development of the alternatives screening criteria, and discuss the Project components and elements that would ultimately be screened.

Screening Criteria

Screening criteria were based on/assigned to three categories as summarized in **Table 4**. The criteria are described in further detail following the table. The criteria categories are:

- Purpose and Need
- Technological and Socioeconomic Feasibility and Practicability, and
- Regulatory

Table 4
Element Screening Criteria

Purpose and Need¹	Technological and Socioeconomic Feasibility and Practicability²	Regulatory³
Avoid and/or minimize impacts on threatened and endangered fish species	Minimize capital costs	Avoid and/or minimize impacts on terrestrial threatened and endangered species (plants and wildlife)
Ability to provide fish passage that complies with NMFS regulatory criteria	Minimize operations and maintenance costs	Maintain fish production to meet Tribal obligations (<i>U.S. v. Oregon</i>)
Ensure safe, efficient, and reliable delivery of LNFH's full surface water rights from Icicle Creek	Certainty of technological performance	Avoid and/or minimize impacts on Waters of the US
Ensure timely project completion per 2017 NMFS Biological Opinion	Private landowner and/or recreationist disturbance acceptability	Ability to provide TMDL and Water Quality Standard-compliant management

Notes

¹ Purpose and Need criteria are based on the Project purpose and need, including the need to construct a compliant surface water intake and delivery system by May 2023.

² Technological and Socioeconomic Feasibility and Practicability criteria are based on the need for efficient and acceptable Project design and construction.

³ Regulatory criteria are based on laws and regulations that are most applicable to the purpose and need. Per CEQ (1986), a potential conflict with local or federal law does not necessarily render an alternative unreasonable, although such conflicts must be considered. Requirements in the NMFS 2017 Biological Opinion are not included in this category because they are inherent in the Purpose and Need criteria.

Based on existing data and the professional judgment and experience of the interdisciplinary team, Reclamation scored project elements on a scale of 0 to 3 for each applicable criterion⁵. A score of 1 means the element is likely to satisfy the criterion, with major concerns. A score of 2 means the element is likely to satisfy the criterion with minor concerns; a score of 2 may also be interpreted as satisfying the criterion more fully than a score of 1, but less so than a score of 3. A score of 3 means the element satisfies the criterion.

Scores were recorded on the accompanying screening matrix (**Appendix A**). Elements that received a score of 0 on any criterion did not satisfy that criterion and were eliminated from further consideration. No further screens were applied once an element was eliminated. Average scores across criteria were calculated and were used to help identify which elements best meet criteria, and thus which elements were brought forward into the analysis in the Draft EIS.

Elements that were determined not to be reasonable and/or practicable based on the criteria applied were eliminated from detailed consideration. Elements were screened at a coarse level during this step, primarily using a relative scale rather than quantified thresholds.

At the completion of Step 2 screening, elements determined to satisfy criteria were combined as needed, into complete alternatives using the element screening score, any synergies exhibited between multiple elements, and professional judgment. An example of this is combination of the instream fish screen element (intake component) with the apron/ramp, vertical access pipe, and PISMA element (sediment management component) and the extended creek-width channel with low and high flow fishways on left bank and right bank, respectively, element (fish passage component), as a complete alternative. When combined, these elements would better satisfy criteria than an alternative lacking one or more of these elements.

Purpose and Need Criteria

Avoid and/or minimize impacts on threatened and endangered fish species. This criterion examined how well Project elements would meet NMFS regulatory criteria for fish screening for anadromous salmonids (NMFS 2011) including, but not limited to structure placement, approach velocity, exposure time, and sweeping velocity, which serve to avoid or minimize impacts on fish species listed as threatened or endangered under the ESA. When assessing the elements against this criterion, Reclamation considered potential impacts, both negative and positive, over the lifetime of the Project, including those that are construction-related and operation and maintenance-related. Reclamation also considered if an element would provide a long-term net benefit to listed fish species. Elements that avoid or minimize detrimental impacts to the greatest degree, or provide the greatest potential benefit in the long-term, were scored the highest. Elements that may cause the most detrimental impacts or provide little-to-no long-term benefit were scored the lowest.

Ability to provide fish passage that complies with NMFS regulatory criteria. This criterion examined how well elements would comply with NMFS regulatory criteria for fish passage including, but not limited to, length of fishway, channel slope, and water depth and velocity, as described in the current fish passage criteria for anadromous fish passage facilities (NMFS 2011).

⁵ Not all criteria are applicable to a specific element. In these cases, non-applicable criteria are noted as “N/A” in the accompanying screening matrix (**Appendix A**) and are not assigned a score.

Elements that would provide fish passage in compliance with regulatory criteria were scored the highest, while elements scored lower if regulatory criteria would be more difficult to meet for that element. Elements that would not meet regulatory criteria were eliminated from further consideration.

Ensure safe, efficient, and reliable delivery of LNFH's full surface water rights from Icicle Creek. This criterion assessed the probability that an element would facilitate the safe, efficient, and reliable delivery of LNFH's full surface water rights from Icicle Creek. Safety is a primary concern due to periodic frazil ice conditions in Icicle Creek. Elements that would allow USFWS staff to safely operate and maintain the surface water delivery system during all environmental conditions were scored higher than those that would not allow this. Efficiency refers primarily to ease of access to water delivery system elements, both for construction and operations and maintenance. Finally, reliability refers to the likelihood that elements would perform their intended function satisfactorily; proven technologies would be more reliable than experimental or unproven ones. Reclamation considered safety, efficiency, and reliability in combination when assessing elements under this criterion; elements that would facilitate safer, more efficient, and more reliable surface water delivery were scored higher than elements with anticipated reductions in safety, efficiency, and/or reliability.

Ensure timely project completion per 2017 NMFS Biological Opinion. This criterion evaluated the ability of an element to facilitate timely completion of the Project in order to meet the May 2023 construction deadline set out in the 2017 ESA Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Leavenworth National Fish Hatchery Spring Chinook Salmon Program (2017 Biological Opinion; NMFS 2017). Factors that would contribute to timely completion include minimizing the risk of legal challenge, construction complexity, and anticipated time needed to obtain permits and other approvals, and maximizing the use of proven technologies. Necessary permits and approvals may include but are not limited to: USACE Nationwide Permit(s), USFWS biological opinion, Ecology Water Quality Certification, and WDFW Hydraulic Project Approval. When assessing this criterion, Reclamation assigned relative scores; elements that would facilitate timely construction completion scored higher than elements that may increase risk of litigation, increase regulatory permitting complexity, and/or delay the construction timeline.

Technological and Socioeconomic Feasibility and Practicability Criteria

Minimize capital costs. Under the Principles and Requirements for Federal Investments in Water Resources (CEQ 2013), Reclamation is directed to consider efficiency in evaluating alternatives. In this context, efficiency is defined as the extent to which an element alleviates the specified problems and realizes the specified opportunities at the least cost. As such, this criterion considered the initial costs of all materials and labor associated with Project design and construction. It also considered potentially interrelated costs. For example, constructing the intake operations and maintenance area would reduce potential capital costs associated with future improvements or modifications to the intake area infrastructure, if required, because of the increased ease of construction access. Reclamation did not consider as a capital cost the potential legal expenses that may result from taking no action and/or not meeting the May 2023 construction deadline in the 2017 Biological Opinion. When assessing this criterion, Reclamation assigned relative scores; elements that would decrease capital costs scored higher than elements that may increase capital costs.

Minimize operations and maintenance costs. Under the Principles and Requirements for Federal Investments in Water Resources (CEQ 2013), Reclamation is directed to consider efficiency in evaluating alternatives; this concept is defined under the criterion **Minimize Capital Costs**, above. This criterion considered the ongoing costs of operating and maintaining the Project. Reclamation considered the implications from constructing certain elements that may minimize operations and maintenance costs for other elements; for example, constructing trash protection features would reduce anticipated operations and maintenance costs for fish screen repair, because these features would prevent or minimize screen damage from trash or other debris. When assessing this criterion, Reclamation assigned relative scores; elements with higher anticipated operations and maintenance costs scored lower than elements with lower anticipated operations and maintenance costs. Elements that would lead to significantly higher anticipated operations and maintenance costs than other comparable elements were eliminated from consideration.

Certainty of technological performance. This criterion evaluated the certainty of technological performance by evaluating an elements' complexity of technology, whether the technology is known or proven versus emerging or untested, and the potential risk of element failure. Reclamation considered these factors in combination when assessing elements under this criterion. Elements with a higher overall certainty of technological performance were given a higher ranking than elements with a lower overall certainty of technological performance.

Private landowner and/or recreationist disturbance acceptability. Under the Principles and Requirements for Federal Investments in Water Resources (CEQ 2013), Reclamation is directed to consider acceptability in evaluating alternatives. In this context, acceptability is defined as the viability and appropriateness of an alternative from the perspective of the general public and consistency with existing federal laws, authorities, and public policies. For the purposes of this project, public acceptability also refers to how well the element addresses public concerns over the type (such as visual, noise, or traffic), intensity (such as decibel level or traffic-related delay time), and duration (such as daily hours or seasons) of construction-related disturbance to private landowners adjacent to the Project, and recreationists in the Project vicinity. Reclamation considered these factors in combination when assessing elements under this criterion. Elements with lower anticipated levels of construction-related disturbance to private landowners and recreationists were given a higher ranking than elements with higher levels of anticipated disturbance. Reclamation did not consider the acceptability of the construction activity or method itself (for example, the different construction methods to replace or rehabilitate the conveyance pipeline) under this criterion, rather, Reclamation considered the level and type of disturbance associated with the activity.

Regulatory Criteria

Avoid and/or minimize impacts on terrestrial threatened and endangered species (plants and wildlife). This criterion examined how well elements would avoid or minimize impacts on terrestrial wildlife and plant species listed as threatened or endangered under the ESA based on existing information. This criterion addressed impacts only on terrestrial wildlife and plant species since impacts on aquatic threatened and endangered species were addressed under the Purpose and Need criterion **Avoid and/or minimize impacts on threatened and endangered fish species**, above. When assessing the elements against this criterion, Reclamation considered potential impacts over the lifetime of the Project, including those that are construction-related and operation and

maintenance-related. Elements that avoid or minimize detrimental impacts, such as habitat loss or noise, to the greatest degree scored the highest. Elements that would be sited within or near habitat for threatened or endangered terrestrial species are presumed to impact the species and scored the lowest under this criterion.

Maintain fish production to meet Tribal obligations (*U.S. v. Oregon*)⁶. This criterion evaluated the elements' contribution to the likelihood that LNFH fish production will be maintained to meet Tribal obligations. A major consideration in meeting production obligations is the LNFH's ability to receive a reliable supply of surface water from Icicle Creek during all environmental conditions, during all phases of project construction, and during project operations. Elements that would increase the reliability of surface water delivery received a higher score than elements that would not increase reliability of surface water delivery. If an element was anticipated to preclude reliable surface water delivery for any period of time, it was dismissed from further consideration.

Avoid and/or minimize impacts on waters of the U.S. The complete definition of waters of the U.S. is found in 40 CFR 230.3(s)⁷. In summary, waters of the U.S. include, but are not limited to, interstate or intrastate waters used in interstate or foreign commerce, impoundments of waters otherwise defined as waters of the U.S., tributaries of waters of the U.S., territorial seas, and wetlands adjacent to waters of the U.S. Elements that would avoid or minimize both temporary (construction related) and permanent placement of fill in Icicle Creek, a waters of the U.S., scored the highest under this criterion, while elements with greater amounts of temporary and/or permanent fill scored the lowest. When assessing this criterion, Reclamation also considered the element's ability to offset, or mitigate, impacts to waters of the U.S. For example, while placement of the temporary cofferdams and construction of the extended creek-width roughened channel would involve greater amounts of temporary and permanent fill than some other elements, scores for this element were increased because the element was anticipated to facilitate long-term improvements in the function of waters of the U.S., such as improved sediment transport.

Ability to provide TMDL and Water Quality Standard-compliant management. Sections 303(d) and 305(b) of the federal Clean Water Act require states to identify and characterize waters that do not meet, or are not expected to meet, applicable water quality standards. The act requires that a Total Maximum Daily Load (TMDL) be developed for water bodies on the state 303(d) list of impaired and threatened waters. The TMDL identifies pollution problems in the watershed and specifies how much pollutant loading needs to be reduced or eliminated to achieve clean water. Icicle Creek is on the Washington State 303(d) list for not meeting temperature and dissolved oxygen standards (Ecology 2016). Icicle Creek has a TMDL for temperature, dissolved oxygen, and potential of hydrogen (pH) (Ecology 2009), while the lower Wenatchee River has TMDLs for dissolved oxygen, pH, polychlorinated biphenyls, and temperature (Ecology 2007). Water Quality Standards are defined in Washington Administrative Code 173-201A-200, *Freshwater Designated Uses and Criteria*, and include: temperature, dissolved oxygen, pH, turbidity, and total dissolved gas. This criterion assessed whether a particular element would facilitate the ability to manage for one or more of the TMDLs and water quality standards. Assessing this criterion helped determine if an element would increase or reduce the relative risk of not being able to manage for TMDLs and water quality

⁶ *U.S. v. Oregon*. 2009. 2008-2017 *U.S. v. Oregon* Management Agreement (modified January 23, 2009). Portland, Oregon.

⁷ <https://www.epa.gov/cwa-404/cwa-section-404b1-guidelines-40-cfr-230>

standards. Elements that would reduce this risk scored higher, while elements that would increase risk scored lower. Reclamation determined that this criterion was applicable only to the Sediment Management and Temporary Hatchery Water Supply components so only elements under these components were assessed against this criterion. When assessing this criterion, Reclamation weighed all TMDLs and water quality standards equally.

4.2.3 Step 3: Carry Forward Elements and Develop Alternatives

During Step 3, the results of the Step 2 screening were reviewed and discussed during an alternatives development workshop to ensure agreement among Reclamation and cooperating agencies regarding elements to be eliminated and those to be carried forward and combined into complete alternatives. More detail is included below.

Additional suggestions for alternatives received during scoping were also reviewed to determine whether they should be brought forward for analysis. These are fully described in Section 2.5, Alternatives and Alternative Elements Considered but Eliminated from Detailed Study, of the Draft EIS.

Alternatives Development Workshop

During the alternatives development workshop on June 17, 2020, the Reclamation SWISP Project team met with the cooperating agencies to review the results of element screening. Participants came to agreement on which elements would be eliminated from further analysis; these are the elements scored as 0 or 1 in the screening matrix (see **Appendix A**). Rationale is provided in the screening matrix for any element that is scored as 0 as to why the element would not meet the criterion. Analysis assumptions are also included in the screening matrix for certain criteria to help document the decision-making process and discussion that occurred during the workshop. Participants also reviewed alternatives suggested by commenters during the public scoping period and evaluated whether any would be carried forward for additional analysis. Elements to be carried forward into alternatives in the EIS were agreed on by the group and are summarized in **Table 5**.

Table 5
Elements Carried Forward for Analysis in the Environmental Impact Statement

Component	Element
Intake Component	Instream fish screen (fish screen structure, retaining walls, intake pipeline [intake channel filled in], and Intake Operations and Maintenance Are [IO&MA])
Intake Component	Intake access road
Sediment Management Component	Apron/ramp, vertical access pipe, and PISMA
Fish Passage Component	Extended creek-width channel with low and high flow fishways on left bank and right bank, respectively
Conveyance Pipeline Component	Excavate and replace pipeline on USFWS land, and use cure-in-place pipe (CIPP) lining on private land

Component	Element
Temporary Hatchery Water Supply Component	Adding a gravity bypass flow conduit at existing intake site (above the diversion); connect to conveyance pipeline 200-300 feet below intake
Access and Staging	Construction vehicle turnaround at Forest Service kiosk on Icicle Creek Road

Agency individuals invited, and those that attended the June 17, 2020 alternatives development workshop, are listed in **Table 6**.

Table 6
Alternatives Development Workshop Attendance

Name	Agency or Entity and Title	Invited	Attended
David Child	Reclamation, Project Manager	✓	✓
Jason Sutter	Reclamation, Environmental Specialist	✓	✓
Elizabeth Heether	Reclamation, Environmental Protection Specialist	✓	✓
Dan Church	Reclamation, Cartographer	✓	✓
Rebecca Thompson	Reclamation, Tribal Interests	✓	✓
Jim Craig	USFWS, Manager– Leavenworth Fishery Complex	✓	✓
Carlo Aguon	USFWS, Facilities Operations Specialist – Leavenworth Fishery Complex	✓	✓
Malenna Cappellini	USFWS, Environmental Compliance Specialist – LNFH	✓	✓
Mat Maxey	USFWS, Hatchery Manager – LNFH	✓	✓
Jess Jordan	USACE, Biologist	✓	
Amy Lewis	EMPSi (Reclamation contractor), Project Manager	✓	✓
Morgan Trieger	EMPSi (Reclamation contractor), Assistant Project Manager	✓	✓

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Appendix A

Screening Matrix

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COMPONENT: INTAKE												
Element	Purpose and Need				NEPA-based Screening Criteria				Regulatory			
	Avoid and/or minimize impacts on threatened and endangered fish species	Ability to provide fish passage that complies with NOAA Fisheries regulatory criteria	Ensure safe, efficient, and reliable delivery of LNFF's full surface water rights from Iocle Creek	Ensure timely project completion per 2017 NMFS Biological Opinion	Minimize capital costs	Minimize operations and maintenance costs	Certainty of technological performance	Private landowner and/or recreationist disturbance acceptability	Avoid and/or minimize impacts on terrestrial threatened and endangered species (plants and wildlife)	Maintain fish production to meet Tribal obligations (US v Oregon)	Avoid and/or minimize impacts on Waters of the US	Ability to provide TMDL and Water Quality Standard-compliant management
No Action Alternative/existing conditions	0	N/A	0	N/A	3	1	3	3	3	2	3	N/A
Indoor fish screen	1	N/A	1	1	2	1	1	3	2	2	2	N/A
In-channel fish screen [VE Proposal 3]	0	N/A	1	2	2	2	3	2	2	2	2	N/A
Instream fish screen (Proposed Action)												
fish screen structure retaining walls	3	N/A	3	2	1	2	3	2	2	3	1	N/A
Intake pipeline (intake channel filled in)												
Intake Operations and Maintenance Area (IO&MA)												
All new screen options without trash protection feature	N/A	N/A	1	3	3	1	3	3	N/A	1	3	N/A
Pipe-style trash protection features [VE Proposal 3] (with all proposed screen options)	N/A	N/A	2	2	1	3	2	2	N/A	2	2	N/A
Floating log boom trash protection features [VE Proposal 3] (with all proposed screen options)	N/A	N/A	3	3	2	2	2	3	N/A	2	3	N/A
All proposed screen options without intake access road upgrade	N/A	N/A	1	1	1	2	3	3	3	N/A	N/A	N/A
Intake access road upgrade (with all proposed screen options)	N/A	N/A	3	3	2	3	3	2	2	N/A	N/A	N/A
Rationale:	As outlined in the 2017 BiOp, the existing surface water intake facility does not avoid or minimize impacts on threatened and endangered fish species. Sufficient sweeping velocity may not be attainable for an in-channel fish screen, which may result in fish impingement on the screen.	As outlined in the 2017 BiOp, the existing surface water intake facility does not comply with current NOAA Fisheries regulatory criteria.	The LNFF's primary point of diversion and water delivery system on Iocle Creek is reaching or exceeding its operational life, so efficient and reliable delivery of the full surface water rights from Iocle Creek cannot be ensured. Retaining the existing gatehouse presents safety and efficiency issues. An indoor fish screen would not be efficient due to electrical costs and complexity of de-icing solutions. Trash protection features were ranked based on their proximity to screens. Closer proximity warranted a lower score due to increased potential for screen damage.									
Analysis Assumptions:							Ranking of trash protection features is based on certainty of performance of the element.					Design of the Intake Component itself will not affect compliance with TMDLs (this is most relevant in the Sediment Management component).

COMPONENT: SEDIMENT MANAGEMENT												
Element	Purpose and Need				NEPA-based Screening Criteria Technological and Socioeconomic Feasibility and Practicability				Regulatory			
	Avoid and/or minimize impacts on threatened and endangered fish species	Ability to provide fish passage that complies with NOAA Fisheries regulatory criteria	Ensure safe, efficient, and reliable delivery of LNFF's full surface water rights from Icicle Creek	Ensure timely project completion per 2017 NMFS Biological Opinion	Minimize capital costs	Minimize operations and maintenance costs	Certainty of technological performance	Private landowner and/or recreationist disturbance acceptability	Avoid and/or minimize impacts on terrestrial threatened and endangered species (plants and wildlife)	Maintain fish production to meet Tribal obligations (US v Oregon)	Avoid and/or minimize impacts on Waters of the US	Ability to provide TMDL and Water Quality Standard-compliant management
Sand settling basin (No Action Alternative/Existing Condition)	0	N/A	1	N/A	3	1	3	N/A	3	3	3	3
Extended concrete apron with incorporated sediment ramp (on river side of screen structure) only	2	N/A	2	2	2	3	1	N/A	3	2	2	3
Intake vertical access and air vent pipe (behind fish screens) only	3	N/A	2	3	3	2	1	N/A	3	2	3	1
Pipeline Intake/Sluice Management Area (PISMA; in existing gatehouse footprint) only (Proposed Action) - Isolation valve - Intake-Conveyance Pipeline Connection - Sluice valve and outlet pipe - Outlet channel	2	N/A	3	2	1	2	3	N/A	2	3	3	3
Apron/ramp and vertical access pipe only	2	N/A	2	3	2	2	1	N/A	3	2	2	1
Apron/ramp and PISMA only	2	N/A	3	2	1	2	3	N/A	2	3	2	3
Vertical access pipe and PISMA only	2	N/A	2	2	1	2	3	N/A	2	3	3	1
Apron/ramp, vertical access pipe, and PISMA	2	N/A	3	2	1	2	3	N/A	2	3	2	1
Rationale:	Listed fish that become entrained in the water delivery system are rescued from the sand settling basin, resulting in take of these species.			Maintenance of the existing sand settling basin is not a requirement of, and would not be in compliance with, the 2017 BiOp.								
Analysis Assumptions:					Operations and maintenance costs include labor, heavy equipment, and heavy equipment operations and maintenance costs. Apron/ramp assumes no operations and maintenance costs for the element. Function of this element as intended is captured in Certainty of Technology Criteria.		Reclamation did not consider construction activity acceptability under this criterion.	Construction-related effects were assessed.				Reclamation assessed the TMDLs in combination; the lowest-ranking element was used to score the combination.

COMPONENT: FISH PASSAGE												
Element	Purpose and Need				NEPA-based Screening Criteria				Regulatory			
	Avoid and/or minimize impacts on threatened and endangered fish species	Ability to provide fish passage that complies with NOAA Fisheries regulatory criteria	Ensure safe, efficient, and reliable delivery of LNFF's full surface water rights from Ice Creek	Ensure timely project completion per 2017 NMFS Biological Opinion	Minimize capital costs	Minimize operations and maintenance costs	Certainty of technological performance	Private landowner and/or recreationist disturbance acceptability	Avoid and/or minimize impacts on terrestrial threatened and endangered species (plants and wildlife)	Maintain fish production to meet Tribal obligations (US v Oregon)	Avoid and/or minimize impacts on Waters of the US	Ability to provide TMDL and Water Quality Standard-compliant management
No Action Alternative/existing conditions (Existing fish ladder/sediment sluice and low-head diversion dam)	1	0	3	N/A	3	2	1	3	3	N/A	3	N/A
New fishway incorporating existing fish ladder/sediment sluice and low-head diversion dam [VE Proposal 3]	1	1	3	3	2	2	2	2	2	N/A	2	N/A
Roughened creek-width channel with low flow fishway [VE Proposal 1] – low flow fishway toward right bank	2	2	3	2	1	3	2	1	2	N/A	1	N/A
Roughened creek-width channel with low flow fishway [VE Proposal 1] – low flow fishway toward left bank	2	2	3	2	1	3	3	1	2	N/A	1	N/A
Extended creek-width channel with low and high flow fishways on left bank and right bank, respectively [VE Proposal 1] (Proposed Action)	3	3	3	2	1	3	3	1	2	N/A	1	N/A
Rationale:		The existing fish ladder/sediment sluice and low-head diversion dam are not compliant with current NOAA Fisheries regulatory criteria. A new fishway incorporating the existing fish ladder/sediment sluice would have fish attraction issues due to its outlet location. A low-flow fishway on the right bank may not meet criteria as it would be outside of the stream thalweg. Ranking is relative to each option.		Maintenance of the existing fish ladder/sediment sluice and low-head diversion dam is not a requirement of, and would not be in compliance with, the 2017 BiOp. Scores take into consideration the number of cofferdams and placement that would be required under each element.								
Analysis Assumptions:	Scores represent a balance of detrimental and beneficial effects.		Scores reflect the ability of each element to maintain sufficient hydraulic head to ensure surface water delivery.		Includes construction and material costs and assumes extended roughened channel costs are not significantly different from the other roughened channel options.		Relative ranking between the options. A low-flow fishway on the right bank may not perform sufficiently as it would be outside of the stream thalweg.	Noise during construction may affect private landowners and/or recreationist.	Noise during construction may affect wildlife.	Providing fish passage at the Intake site would not affect LNFF production.	Construction would result in fill of waters of the US and loss of natural streambed.	

COMPONENT: CONVEYANCE PIPELINE AND ACCESS POINTS												
Element	Purpose and Need				NEPA-based Screening Criteria				Regulatory			
	Avoid and/or minimize impacts on threatened and endangered fish species	Ability to provide fish passage that complies with NOAA Fisheries regulatory criteria	Ensure safe, efficient, and reliable delivery of LNFH's full surface water rights from Icicle Creek	Ensure timely project completion per 2017 NMFS Biological Opinion	Technological and Socioeconomic Feasibility and Practicability				Regulatory			Ability to provide TMDL and Water Quality Standard-compliant management
					Minimize capital costs	Minimize operations and maintenance costs	Certainty of technological performance	Private landowner and/or recreationist disturbance acceptability	Avoid and/or minimize impacts on terrestrial threatened and endangered species (plants and wildlife)	Maintain fish production to meet Tribal obligations (US v Oregon)	Avoid and/or minimize impacts on Waters of the US	
No Action Alternative/Existing Conditions (Leave existing conveyance pipeline in place)	N/A	N/A	1	N/A	3	1	1	3	3	1	N/A	N/A
Excavate and replace entire pipeline	N/A	N/A	3	N/A	2	3	3	1	1	3	N/A	N/A
Excavate and replace pipeline (FWS land) [VE Proposal 4]; Cure-in-place (CIPP) lining (Private land) (Proposed Action)	N/A	N/A	3	N/A	2	3	2	2	2	3	N/A	N/A
Excavate and replace the two most deteriorated sections outlined in the LNFH April 2012 Intake Pipe Inspection Report (Private and FWS land) [VE Proposal 4]; CIPP lining for remaining pipeline (Private and FWS land)	N/A	N/A	2	N/A	2	2	2	2	2	2	N/A	N/A
Excavate and replace only the two most deteriorated sections outlined in the LNFH April 2012 Intake Pipe Inspection Report (Private and FWS land) [VE Proposal 4] only	N/A	N/A	1	N/A	3	1	1	2	3	1	N/A	N/A
CIPP lining (Private land) [VE Proposal 4] only	N/A	N/A	2	N/A	2	2	2	2	2	2	N/A	N/A
CIPP lining entire pipeline	N/A	N/A	3	N/A	1	3	2	2	2	3	N/A	N/A
Rationale:												
Analysis Assumptions:					Rankings are relative between options.							

COMPONENT: TEMPORARY HATCHERY WATER SUPPLY												
Element	Purpose and Need				NEPA-based Screening Criteria				Regulatory			
	Avoid and/or minimize impacts on threatened and endangered fish species	Ability to provide fish passage that complies with NOAA Fisheries regulatory criteria	Ensure safe, efficient, and reliable delivery of LNFFH's full surface water rights from Icicle Creek	Ensure timely project completion per 2017 NMFS Biological Opinion	Minimize capital costs	Minimize operations and maintenance costs	Certainty of technological performance	Private landowner and/or recreationist disturbance acceptability	Avoid and/or minimize impacts on terrestrial threatened and endangered species (plants and wildlife)	Maintain fish production to meet Tribal obligations (US v Oregon)	Avoid and/or minimize impacts on Waters of the US	Ability to provide TMDL and Water Quality Standard-compliant management
Adding a gravity bypass flow conduit below the Cascade Orchards Irrigation Company screens [VE Proposal 3] *	2	N/A	3	2	2	2	2	2	2	3	2	2
Adding a gravity bypass flow conduit at existing intake site (above the diversion); connect to conveyance pipeline 200-300 feet below intake (Proposed Action)*	2	N/A	3	2	3	2	2	3	2	3	2	2
Adding a gravity bypass flow conduit at existing intake site (above the diversion) connect to conveyance pipeline at USFWS property boundary at presumed Pipeline Lining Access point *	2	N/A	3	2	3	2	2	3	2	3	2	2
Full time pumping from stilling basin pool only during intake construction	3	N/A	3	3	1	2	3	2	2	2	3	2
Full time pumping from groundwater wells only during intake construction	2	N/A	0	0	2	2	0	3	3	0	2	2
Full time pumping from stilling basin pool only during pipeline construction when needed	3	N/A	3	N/A	2	2	3	2	2	2	3	2
Full time pumping from groundwater wells only during pipeline construction	2	N/A	0	N/A	2	2	0	3	3	0	2	2
Rationale:			Full time pumping from groundwater wells only would not ensure delivery of LNFFH's full water rights.	Not enough groundwater to make this technically feasible	COIC bypass includes additional construction area (Row 5); pumping from stilling basin only would not be sufficient (would also need groundwater)		Pumping from groundwater wells only would not ensure delivery of water meeting production standards. Zero scores were more related to availability than technology			Pumping from groundwater wells only would not ensure delivery of water meeting production standards. There are concerns that pumping from the stilling basin would not ensure delivery of water meeting water quality production standards.		
Analysis Assumptions:	Pumping options assume a NMFS-compliant screened pump would be used. Impacts of pumping groundwater due to hydrologic connection between groundwater and Icicle Creek.			Scores reflect the time needed to construct the gravity-fed bypass versus to set up pumps.		Operations and maintenance costs are assessed for the feature providing temporary water.						