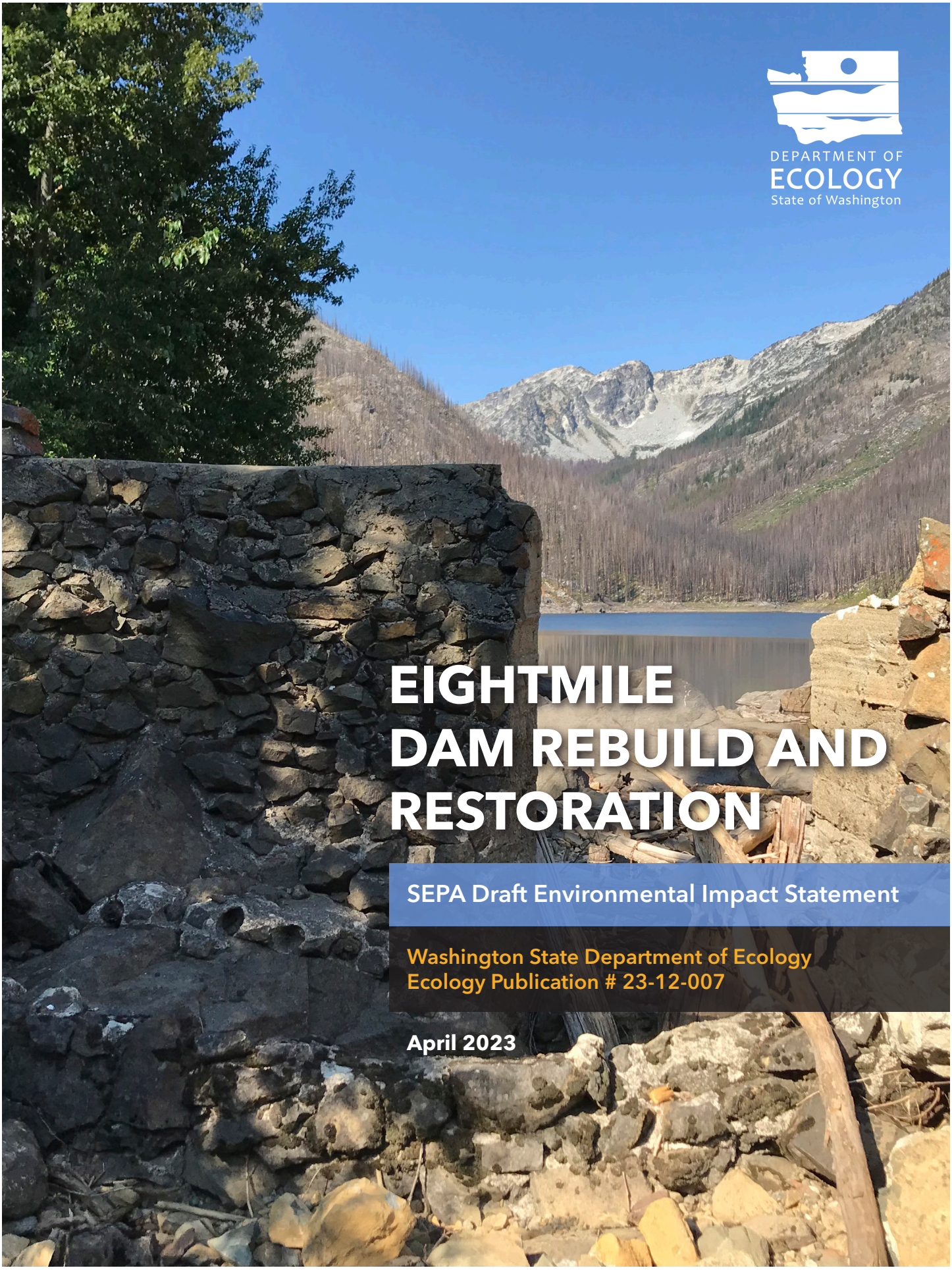


DEPARTMENT OF
ECOLOGY
State of Washington

EIGHTMILE DAM REBUILD AND RESTORATION

SEPA Draft Environmental Impact Statement

Washington State Department of Ecology
Ecology Publication # 23-12-007

April 2023

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Office of Columbia River
1250 West Alder St., Union Gap, WA 98903-0009 • 509-575-2490

April 19, 2023

RE: Eightmile Dam Restoration and Replacement Project Draft Environmental Impact Statement

Dear Interested Parties:

The Washington Department of Ecology (Ecology) Office of Columbia River (OCR) is requesting input on a draft environmental impact statement (Draft EIS) for rebuilding Eightmile Dam, a 90-year-old dam located in the Alpine Lakes Wilderness west of Leavenworth. The dam is owned and operated by the Icicle and Peshastin Irrigation Districts (IPID).

Eightmile Dam was damaged as a result of the 2017 Jack Creek fire. In spring 2018, the dam was assessed as being in an unsatisfactory condition, leading to emergency repairs. Repairs made in 2018 are temporary, and address the immediate threat of dam failure, but are not adequate under current dam safety requirements. In the meantime, IPID has undertaken preliminary analysis and planning toward bringing the dam into compliance. The dam needs to be rebuilt to current safety standards to protect human health and safety, downstream property and maintain reliable irrigation water supplies for area farmers.

As the dam owner, IPID has worked with Ecology to identify the environmental impacts of three action alternatives and a “no action” alternative (as required under the State Environmental Policy Act (SEPA)). The alternatives balance the priorities of protecting the integrity of the Alpine Lakes Wilderness, ensuring public safety by meeting current dam safety requirements, and providing durable solutions for water management and delivery.

- Alternative 1: Narrow spillway with gates
- Alternative 2: Wide spillway without gates
- Alternative 3: Narrow spillway without gates
- No Action Alternative: Operating the current dam with no changes

Reconstructing the aging dam structure at Eightmile Lake is crucial to protecting downstream residents, the water use of area irrigators and the natural shorelines and habitats of Icicle Creek near Leavenworth in Chelan County.

The EIS helps inform what conditions may be required when state and local jurisdictions consider permits. It is not a decision document and does not determine whether a project moves forward. Implementation of any of the action alternatives would require a number of permits and approvals from federal, state and local jurisdictions prior to construction.

Ecology is accepting comments on the Draft EIS through **June 5, 2023**. Submit comments through our online form at ecology.wa.gov/Eightmile, at one of the public meetings, or in writing to:

> Washington Department of Ecology, Office of Columbia River
> Attn: Eightmile Draft EIS
> 1250 W. Alder Street,
> Union Gap, WA 98903.

The public can learn more about the project, ask questions, and make verbal comments during three scheduled hearings (two virtual, May 1 and May 16, and one in person, May 11). Identical information will be shared at each meeting.

- **May 1st** - Virtual Public meeting starting at 6:00 pm- Zoom Registration link- https://www.zoomgov.com/webinar/register/WN_gVZQKKWFRJyOv8rnXaIg5w
- **May 11th** - In Person at the Chelan County Fire District #3, 228 Chumstick Hwy, Leavenworth. Presentation will start at 6:30. Registration link- https://forms.office.com/r/A4cpCV65Yu
- **May 16th** - Virtual Public meeting starting at 4:00 pm - Zoom Registration Link- https://www.zoomgov.com/webinar/register/WN_TmT6No0YSxeuopn5FO0g9g

Review the Draft EIS

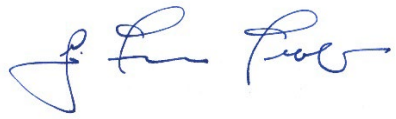
The Draft EIS is available for review at the following locations:

- Online at Ecology's project website: https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-supply-projects-EW/Icicle-Creek-strategy/Eightmile-Dam
- At the Leavenworth Public Library, 700 US Hwy 2, Leavenworth.
- At Department of Ecology, Central Region Office, 1250 W. Alder St., Union Gap. Call 509-575-2490 for an appointment.
- At Department of Ecology, Northwest Region Office, 15700 Dayton Ave. N., Shoreline WA 98133. Call 206-594-0000 for an appointment.

Ecology will consider comments received during the comment period when finalizing the EIS later this year. More information about the meetings and the project documents are on the project website (https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-supply-projects-EW/Icicle-Creek-strategy/Eightmile-Dam).

Thank you for your interest in the Eightmile Dam Rebuild and Restoration Project. We value public feedback throughout this process. It's important to Ecology that the final plan for the Eightmile Lake Dam Rebuild reflects the interests and addresses the concerns of the broad community of people who live, work, and play in the Icicle Creek subbasin and Wenatchee River Basin.

Sincerely,



G. Thomas Tebb, L.H.G, L.E.G.
Director, Office of Columbia River
Washington Department of Ecology

GT:jc (230312)

FACTSHEET

Project Name

Eightmile Dam Rebuild and Restoration

Proposed Action and Alternatives

Three action alternatives and a No Action Alternative are being evaluated in the EIS:

- No Action Alternative
- Alternative 1: Narrow Spillway with Gates (formerly Alternative 1A)
- Alternative 2: Wide Spillway without Gates
- Alternative 3: Narrow Spillway without Gates

Location

Eightmile Dam is located in the Alpine Lakes Wilderness, approximately 10 miles southwest of Leavenworth, WA, in Chelan County.

Project Proponent

Icicle and Peshastin Irrigation Districts (IPID)

SEPA Lead Agency

Washington State Department of Ecology (Ecology)

SEPA Responsible Official

G. Thomas Tebb, LG, LHG, LEG, Director, Office of Columbia River
Washington State Department of Ecology

Contact Information

Melissa Downes
Office of Columbia River
Washington State Department of Ecology
1250 West Alder Street
Union Gap, WA 98903
(509) 454-4259

Date of Draft EIS Issuance

April 19, 2023

Public Comment and Hearing on the Draft EIS

This Draft Environmental Impact Statement (Draft EIS) will be available for a 45-day public comment period. Comments must be received or postmarked by June 5, 2023.

Agencies, affected tribes, and members of the public are invited to comment on the Draft EIS. An expanded comment period is being provided pursuant to the Washington Administrative Code (WAC) 197-11-455, and will include two virtual public hearings and one in-person hearing.

Meeting Information:

Virtually: May 1, 6:00 pm to 8:00 pm Zoom Registration link: https://www.zoomgov.com/webinar/register/WN_gVZQKKWFRJyOv8rnXaIg5w

May 16, 4:00 pm to 6:00 pm Zoom Registration Link- https://www.zoomgov.com/webinar/register/WN_TmT6No0YSxeuopn5FO0g9g,

In-person: May 11, 6:30 pm to 8:30 pm

Chelan County Fire District #3
228 Chumstick Hwy
Leavenworth, WA

In Person Registration link- https://forms.office.com/r/A4cpCV65Yu

Draft EIS Comment Period:

According to WAC 197-11-502, the public comment period shall be 30 days. Ecology is extending the comment period to 45 days in accordance with WAC 197-11-455(7). The comment period opens April 19, 2023. The deadline for submitting comments is June 5, 2023. Comments may be submitted orally at the public hearings or in writing.

Written comments may be submitted:

Online at https://ecology.wa.gov/eightmile

Via Email at: 8mile@ecy.wa.gov

By mail to:

Department of Ecology
Central Regional Office
Attn: Melissa Downes
1250 West Alder Street
Union Gap, WA 98903

Document Availability and Cost

The Draft EIS is available online at the Ecology webpage: https://ecology.wa.gov/eightmile.

Printed copies of the Draft EIS are available for review at no charge at:

Office of Columbia River
Washington Department of Ecology
1250 West Alder Street
Union Gap, WA 98903

Leavenworth Public Library
700 US-2
Leavenworth, WA 98826

Washington Department of Ecology
15700 Dayton Avenue N
Shoreline, WA 98133

For questions or to obtain a copy of the document:

Department of Ecology; Jessica Swift; Jessica.Swift@ecy.wa.gov; (509) 379-0702.

Permits, Licenses, and Approvals Likely Required for Proposal

Permit	Agency
NEPA Review	U.S. Forest Service
Forest Service Authorizations	U.S. Forest Service
Section 404	U.S. Army Corps of Engineers (Corps)
Endangered Species Act (ESA) Section 7 Concurrence	National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS)
Magnuson-Stevens Fishery Conservation and Management Act Concurrence	NMFS and USFWS
Fish and Wildlife Coordination Act Concurrence	NMFS and USFWS
National Historic Preservation Act (NHPA) Section 106 Concurrence, Archaeological Resources Protection Act Permit	Forest Service and Washington State Department of Historic Preservation (DAHP)
Section 401 Water Quality Certification	Ecology
Dam Construction Permit	Ecology
Water Right Transfer to State Trust Water Rights Program	Ecology
Hydraulic Project Approval (HPA)	Washington Department of Fish and Wildlife (WDFW)
National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit	Ecology
Shoreline Substantial Development Permit	Chelan County
Critical Areas Ordinance Compliance	Chelan County
Fill and Grade, Building Permits	Chelan County

Authors and Contributors

A list of authors and contributors is provided in Chapter 19 of the Draft EIS.

Location of Background Materials

Project-related information can be reviewed on the project website at:
https://ecology.wa.gov/eightmile.

Proposed Date of Implementation

Project construction may begin as early as May 2024.

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ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
1-DMax	1-day maximum
4,4'-DDE	dichlorodiphenyldichloroethylene
7-DADMax	7-day average of daily maximum temperature
ACS	American Community Survey
AEDT	Aviation Environmental Design Tool
AEP	Annual Exceedance Probability
afy	acre-feet per year
AIRFA	American Indian Religious Freedom Act
ALIHD	Alpine Lakes Irrigation Historic District
ALWA	Alpine Lakes Wilderness Area
ARPA	Archaeological Resources Protection Act
BEA	Bureau of Economic Analysis
BGEPA	Bald and Golden Eagle Protection Act
bgs	below ground surface
BIA	Bureau of Indian Affairs
BMPs	best management practices
BP	years before present
CAA	Clean Air Act
CadnaA	Computer Aided Noise Abatement
CCC	Chelan County Code
CCNRD	Chelan County Natural Resources Department
CEMP	Chelan Emergency Action Plan
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CIG	Climate Impacts Group
CMP	corrugated metal pipe
COIC	Cascade Orchards Irrigation Company
Corps	U.S. Army Corps of Engineers
CPI	Consumer Price Index
CRA	Cultural Resources Assessment
CSZ	Cascadia Subduction Zone
CTCR	Confederated Tribes of the Colville Reservation
CWA	Clean Water Act
CWRE	Certified Water Rights Examiner
DAHP	Washington State Department of Archaeology
dBA	A-weighted decibels
DC	direct current
DEM	digital elevation model
DF	design factor
DO	dissolved oxygen
DSO	Washington State Department of Ecology Dam Safety Office

EA	Environmental Assessment
EAP	Emergency Action Plan
Ecology	Washington State Department of Ecology
EDT	Ecosystem Diagnosis and Treatment
EFH	Essential Fish Habitat
EHD	Environmental Health Disparities
EIM	Environmental Information Management
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ERU	Equivalent Residential Unit
ESA	Endangered Species Act
ESD	Washington Employment Security Department
ESSB	Engrossed Substitute Senate Bill
ESU	Evolutionarily Significant Unit
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FMR	fire-modified rock
FOS	factor of safety
FPEIS	Final Programmatic Environmental Impact Statement
FSR	U.S. Forest Service Road
ft^2/d	square feet per day
FTA	Federal Transit Administration
FTEC	fish tissue equivalent concentration
FWOD	Fish and Wildlife Habitat Conservation Areas Overlay District
GCM	Global Climate Model
GDP	gross domestic product
GEO	Governor's Executive Order
GIS	geographic information system
gpm	gallons per minute
GWIS	Geographic Water Rights Information System
H:V	horizontal to vertical
HDPE	high-density polyethylene
HEC-HMS	Hydrologic Modeling System
HPA	Hydraulic Project Approval
HPI	Historic Property Inventory
HUC	Hydrologic Unit Code
Hz	hertz
Icicle Strategy	Icicle Creek Water Resource Management Strategy
IDA	Incremental Damage Analysis
IDF	Inflow Design Flood
IDP	Inadvertent Discovery Plan
IIC	Icicle Irrigation Company
IID	Icicle Irrigation District
IPaC	Information for Planning and Consulting
IPID	Icicle and Peshastin Irrigation Districts

ISF	instream flow
IWG	Icicle Work Group
IWGEJ	Interagency Working Group on Environmental Justice & NEPA Committee
JARPA	Joint Aquatic Resources Permit Application
KVP	key viewpoint
L&I	Washington Labor and Industries
L1UBH	lacustrine, limnetic, unconsolidated bottom, permanently flooded
LEHD	Longitudinal Employer-Household Dynamics
Lmax	maximum sound level
LNFH	Leavenworth National Fish Hatchery
LODES	LEHD Origin-Destination Employment Statistics
mg/L	milligrams per liter
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSA	Metropolitan Statistical Area
mya	million years ago
NAGPRA	Native American Graves Protection and Repatriation Act
NAVD 88	North American Vertical Datum of 1988
NCAP	North Cascadia Adaptation Partnership
NEPA	National Environmental Policy Act
NHD	National Hydrography Dataset
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTU	Nephelometric turbidity unit
NWI	National Wetlands Inventory
O&M	Operation and Maintenance
OCPI	Overriding Consideration of Public Interest
OCR	Office of Columbia River
PCBs	polychlorinated biphenyls
PEIS	Programmatic Environmental Impact Statement
PGIS	pollution-generating impervious surface
PHS	Priority Habitats and Species
PID	Peshastin Irrigation District
POD	Point of Diversion
PUBH	palustrine, unconsolidated bottom, permanently flooded
Q	flow rate
QA	Annual Quantity
QI	Instantaneous Quantity
Qmin	minimum flow rate
R3UBH	riverine, upper perennial, unconsolidated bottom, permanently flooded
RCNM	Roadway Construction Noise Model
RCP	Relative Concentration Pathway
RCW	Revised Code of Washington
Reclamation	United States Bureau of Reclamation

RM	river mile
ROE	Report of Examination
SEPA	State Environmental Policy Act
SHPO	State Historic Preservation Office
SLS	State Listed Species
SMA	Shoreline Management Act
SMP	Shoreline Master Program
SNOTEL	Snow Telemetry
SPreAD	System for the Prediction of Acoustic Detectability
SU	Standard Unit (pH)
SWD	Special Warranty Deed
TCPs	Traditional Cultural Properties
TEK	Tribal Ecological Knowledge
THPO	Tribal Historic Preservation Office
TMDL	Total Maximum Daily Load
TRS	Township/Range/Section
Trust	State Trust Water Rights Program
TSS	total suspended solids
U.S.C.	United States Code
UCR	Upper Columbia River
UGA	Urban Growth Area
uPa	micro pascals
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WDOH	Washington Department of Health
WHR	Washington Heritage Register
WISAARD	Washington Information System for Architectural & Archaeological Records Data
WRIA	Water Resource Inventory Area
WROS	Wilderness Recreation Opportunity Spectrum
WRTS	Water Rights Tracking System
WSDOT	Washington State Department of Transportation
WSEL	Water Surface Elevation
WSP	Water System Plan
WSS	Web Soil Survey
WWTP	Wastewater Treatment Plant
ya	years ago

CHAPTER 1: INTRODUCTION AND BACKGROUND

1.1 Introduction

In January 2019, the Washington State Department of Ecology (Ecology) and Chelan County issued a Final Programmatic Environmental Impact Statement (FPEIS), evaluating the Icicle Creek Water Resource Management Strategy (Icicle Strategy). That FPEIS was the culmination of nearly 6 years of evaluating strategies within the Icicle Creek Subbasin to improve instream flows, improve sustainability of the Leavenworth National Fish Hatchery (LNFH), protect tribal and non-tribal fish harvest, improve municipal and domestic water supply and agricultural reliability, enhance habitat in Icicle Creek, and comply with state and federal law including the Wilderness Act. The FPEIS evaluated five program alternatives, and the State Environmental Policy Act (SEPA) non-project action was the adoption of the program called the Icicle Strategy. The Icicle Strategy is intended to provide a program of integrated long-term water resource management and habitat restoration actions to achieve reliable water supplies and improve instream flows.

The Eightmile Dam Rebuild and Restoration Project is one of several early actions to be implemented as part of the Icicle Strategy, and as such is the first project-level environmental impact statement (EIS) undertaken in this phased review process under SEPA. The project proponent is the Icicle and Peshastin Irrigation Districts (IPID). Over the years, wildfire, storm events, ice, and flooding have damaged the Eightmile Dam structure, raising safety concerns and reducing the reservoir's active storage capacity. The Eightmile dam infrastructure is more than 90 years old and requires substantial improvements to operate in a safe, reliable way. In 2017, the Jack Creek Fire and subsequent reclassification of the dam to an unsatisfactory condition has accelerated the need to rebuild the dam to current standards. As a result, IPID is proposing to rebuild the dam in the same location as the existing dam. Ecology's Office of Columbia River (OCR) has determined that this proposal to rebuild and restore the dam is likely to have a significant adverse impact on the environment, and accordingly, an EIS is required under Revised Code of Washington (RCW) 43.21C.030. Ecology OCR is the lead agency under SEPA and is leading the development of the EIS for the project in accordance with Washington Administrative Code (WAC) 197-11, SEPA Rules.

1.2 Project Background

Eightmile Lake is in the Icicle Creek Subbasin in Water Resource Inventory Area (WRIA) 45 (Wenatchee River Basin) in Eastern Washington. It is an alpine lake at an elevation of approximately 4,600 feet above sea level. The crest of the Cascades receives about 180 inches of precipitation annually, mostly in the form of snow, while lower elevations, near the City of Leavenworth at roughly elevation 1,170 feet, average 25 inches of precipitation a year. Water supply in the Icicle Creek Subbasin is heavily dependent on snowpack in the upper reaches. Eightmile Dam stands at the eastern end of Eightmile Lake. From the dam, Eightmile Creek flows east, joining Icicle Creek at river mile (RM) 9. Icicle Creek joins the Wenatchee River at RM 25.6, contributing 20 percent of the Wenatchee River's annual flow (**Figure 1-1**).

Eightmile Lake is a reservoir lake located in the Alpine Lakes Wilderness of the Okanogan-Wenatchee National Forest. The lake is approximately 10 miles southwest from the City of Leavenworth. Eightmile Lake is one of several alpine lakes in this area of the Cascade range. These lakes formed through previous mountain building and erosional glaciation. Eightmile Lake was altered to increase the storage capacity to provide irrigation water supply in 1929. In 1976, the area was designated by congress as the Alpine Lakes Wilderness because of the undeveloped natural beauty of the alpine lake complex.

Eightmile Lake is one of four lakes in the Wilderness managed by IPID for water storage. The IPID has an agreement with the U.S. Forest Service that grants IPID limited privileges, including the ability to maintain and repair its reservoirs within the Alpine Lakes Wilderness. In the 1990s, the IPID exchanged land that is now within the Alpine Lakes Wilderness for this deeded area. This area is called the Special Warranty Deed Area, which includes two parcels on which IPID retains rights related to the Eightmile Dam (see Chapter 3, *Alpine Lakes Wilderness*) (**Figure 1-2**). Eightmile Creek and most of Icicle Creek are also within the Okanogan-Wenatchee National Forest. Land abutting Icicle Creek includes numerous private parcels, increasing in frequency closer to Leavenworth.

The project area is also adjacent to an Inventoried Roadless Area within the Okanogan-Wenatchee National Forest. Figure 1-2 illustrates the boundaries of the Inventoried Roadless Area, the Alpine Lakes Wilderness, and the Special Warranty Deed parcels.

Eightmile Dam consists of a small dam, low-level outlet pipe, and a slide gate at the outlet of Eightmile Lake that allow controlled release of stored water to supplement flows in Icicle Creek. These flows increase the natural water supply available during low-flow periods, typically occurring during the late summer months. Icicle Creek, a tributary to the Wenatchee River, provides water for agricultural irrigation, municipal and domestic use, aquatic habitat for wild and hatchery fish, and recreation. Because of the large size of the drainage basin relative to the storage volume in the lake, Eightmile Lake has a high potential for refill, even during dry years. As a result, Eightmile Lake, high in the Alpine Lakes Wilderness, is a major source of stored water supporting streamflows in Icicle Creek, benefiting these uses.

The dam was constructed in the 1920s and consists of a rock masonry and concrete wall structure with an earthen embankment section. It is more than 90 years old and requires improvements to operate in a safe, reliable way.

Following the 2017 Jack Creek Fire, Ecology's Dam Safety Office (DSO) determined the dam was in a deteriorating and unsatisfactory condition, with an estimated 150 downstream residences at risk if the existing dam were to fail, resulting in a High Hazard Classification. This hazard classification means that dam failure would threaten human lives and/or cause substantial economic or environmental damage. Because of these concerns, IPID and Chelan County declared an emergency at Eightmile Dam on March 13, 2018. The dam was repaired in 2018 to temporarily increase safety by widening and hardening the spillway and by replacing a segment of the low-level outlet pipe that had collapsed. While the repairs made it possible to lower the lake and provide additional spill capacity, the infrastructure does not currently meet DSO's requirements for dam safety or IPID's water supply needs. As a result of these ongoing safety concerns, DSO is requiring that the dam's outlet gate be kept open to reduce the volume of water stored and thus reduce risk of failure during the winter and early spring until permanent repairs can be made to the dam.

Figure 1-1. Project Vicinity

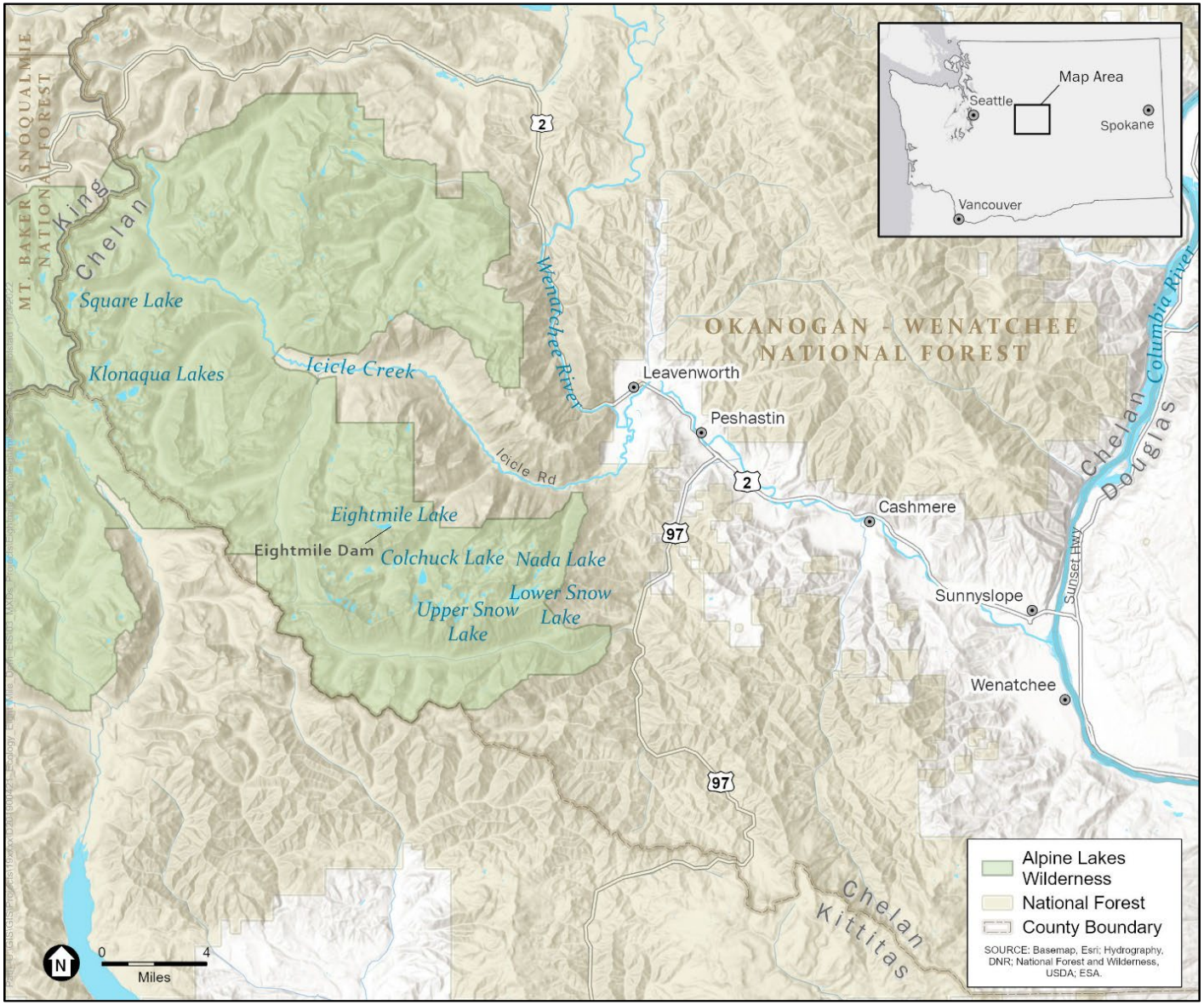


Figure 1-2. Project Area

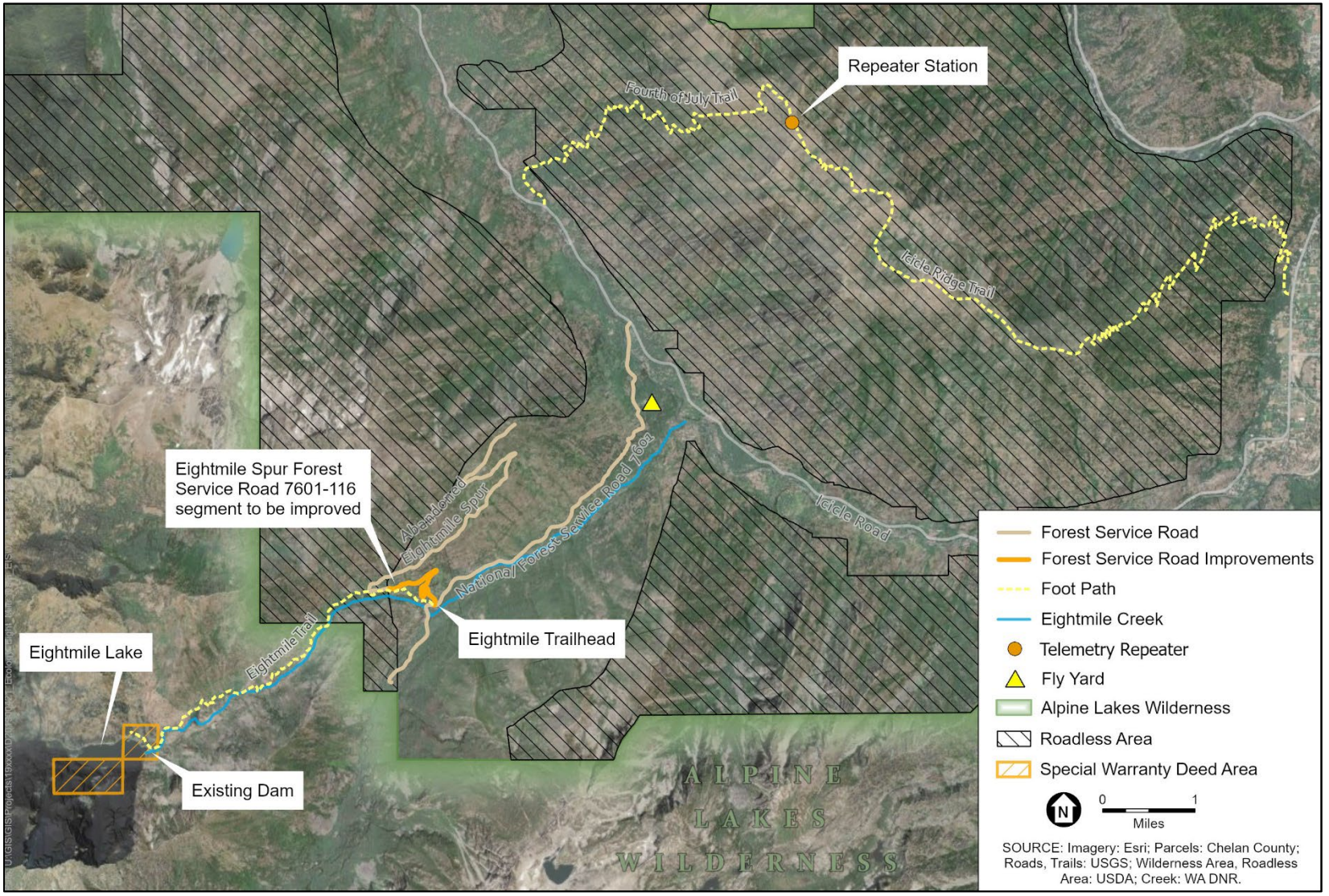


Table 1-1 shows a high-level history of the dam, leading up to this rebuild and restoration project.

Table 1-1. Eightmile Dam History

Activity	Year
Icicle Creek Adjudication	1929
Eightmile Dam Construction	1927–1929
Alpine Lakes Wilderness Designation	1976
Transfer to U.S. Forest Service (Special Warranty Deed)	1990
Erosion Events	Pre-1995
Most Recent Extreme Drought	2015
Jack Creek Fire	2017
Unsatisfactory Condition Determination by Ecology DSO	2018
Emergency Repair Work	2018
Icicle Strategy PFEIS	2019
Dam Rebuild Designs 0–30%	2020
Eightmile Dam Rebuild and Restoration EIS	2022

Ecology's DSO approves and permits dam construction and operation in Washington State. The following are the key concerns for Ecology's DSO and IPID for Eightmile Dam:

- Limited Spillway Capacity – The spillway overtopped and eroded the earthen embankment portion of the dam more than 25 years ago. This has limited IPID's ability to refill the lake to the historical spillway elevation and increased the potential for additional erosion and failure of the earthen embankment portion of the dam.
- Jack Creek Fire – The August 2017 Jack Creek Fire burned trees and vegetation within the Eightmile Lake watershed down to the shoreline of the lake. This created concerns of increased peak runoff into Eightmile Lake, which, combined with debris piling up on the dam, could increase the risk of dam failure.
- Low-Level Outlet Failure – The low-level outlet pipe at the lake is approximately 300 feet long and consists of pipe that varies in size and composition. The oldest section was replaced as part of emergency repairs completed in 2018. The pipe now functions adequately, but still requires replacement for long-term operations.

1.2.1 Icicle Creek Water Resource Management Strategy

Adequate streamflow has long been a problem in Icicle Creek. In 1983, Ecology adopted the Wenatchee River Basin Instream Flow Rule (Chapter 173-545 WAC), which protects flows in Icicle Creek and other rivers and streams in the Wenatchee River Basin. Water supply in the Icicle Creek Subbasin is heavily dependent on snowpack in the upper reaches of the watershed. Combined with storage water from reservoirs in the upper watershed, snowmelt is crucial for summer flows and providing water for out-of-stream uses. The storage in the upper watershed occurs in seven reservoirs within the Alpine Lakes Wilderness. Four of these reservoirs (Colchuck, Eightmile, Klonaqua, and Square) have dams that were built in the 1920s to 1940s by IPID.

To find solutions for water management within the Icicle Creek Subbasin, the Chelan County Natural Resource Department (Chelan County, County) and Ecology OCR co-convened the Icicle Work Group (IWG, Work Group) in December 2012. The IWG comprises a diverse set of stakeholders representing local, state, and federal agencies; tribes; irrigation and agricultural interests; municipal/domestic water managers; and environmental organizations.

The IWG seeks collaborative solutions for water management within the Icicle Creek Subbasin. This includes balancing out-of-stream water uses, such as domestic and agricultural uses, with instream uses, such as fish habitat, recreation, and ecosystem processes, while protecting treaty and non-treaty fishing interests. The IWG's purpose is to develop a comprehensive Icicle Creek Water Resource Management Strategy (Icicle Strategy) that uses best available science to identify and support water management solutions that lead to implementation of high-priority water resource projects within the Icicle Creek Subbasin. The Icicle Strategy is a comprehensive water resource management plan designed to balance and meet out-of-stream and instream water demand and resolve habitat and fisheries issues in the Icicle Creek Subbasin.

Icicle Strategy Guiding Principles

In December 2012, the IWG developed the Guiding Principles, which are a set of objectives that all members of the IWG agreed were in their mutual best interest to collaborate on and achieve as they develop a strategy to meet the needs of the various stakeholders in the subbasin. The Guiding Principles strive for:

1) Streamflow that:
    a. Provides passage,
    b. Provides healthy habitat,
    c. Serves channel formation function,
    d. Meets aesthetic and water quality objectives, and
    e. Is resilient to climate change.
2) Sustainable hatchery that:
    a. Provides healthy fish in adequate numbers,
    b. Is resource efficient,
    c. Significantly reduces phosphorus loading,
    d. Has appropriately screened diversion(s), and
    e. Does not impede fish passage.
3) Tribal treaty and federally protected fishing/harvest rights are met at all times.
4) Provide additional water to meet municipal and domestic demand.
5) Improved agricultural reliability that:
    a. Is operational,
    b. Is flexible,
    c. Decreases risk of drought impacts, and
    d. Is economically sustainable.
6) Improve ecosystem health including protection and enhancement of aquatic and terrestrial habitat.
7) Comply with state and federal law.

8) Protect Non-Treaty Harvest.
9) Comply with the Wilderness Act of 1964, the Alpine Lakes Wilderness Act of 1976, and the Alpine Lakes Wilderness Management Plan.

1.3 Regulatory Context

The proposed project, including access to the site from the intersection of Forest Service Road (FSR) 7601 with Icicle Road, is entirely on lands managed by the U.S. Forest Service. The following federal, state, and local regulations and policies apply specifically to land uses within the project area. Regulations applicable to specific resources are described in Chapters 3 through 16.

- Federal Wilderness Act
- National Forest Management Act
- State Shoreline Management Act
- State Growth Management Act
- Chelan County Comprehensive Plan
- Chelan County Critical Areas Ordinance

1.4 Project Objectives

As described above, IPID is proposing to rebuild the dam to comply with DSO safety standards. IPID's proposed rebuild and restoration of the Eightmile Dam has three objectives:

- Restore the storage capacity of Eightmile Lake so that it meets IPID's irrigation and storage needs under its existing water rights.
- Comply with DSO regulations for a High Hazard Dam.
- Provide additional water to enhance instream flow volumes in Icicle Creek and to the extent possible, time dam outflows to meet fish utilization needs.

IPID holds a state water right that authorizes it to store water at Eightmile Lake. Downstream public safety is a paramount concern and high priority. Erosion of the earthen embankment portion of the dam structure has reduced the active storage available for release by gravity without pumping or siphoning to less than 1,400 acre-feet under current conditions. Rebuilding the dam would restore the storage capacity to meet IPID's existing irrigation needs and could provide additional water to enhance instream flows.

Eightmile Dam would be one of the first of several projects implemented under the Icicle Creek Water Resource Management Strategy at the direction of the IWG. The proposed Eightmile Dam Rebuild and Restoration Project helps meet the Guiding Principles of the Icicle Strategy.

Three dam design alternatives are evaluated in this EIS. The alternatives, along with operational considerations, are described in Chapter 2. After considering stakeholder input and other factors, proposals that extended outside the Special Warranty Deed Area have been eliminated from consideration in the EIS.

1.5 Scoping Process and Public Comment

Scoping is one of the initial steps in the EIS process and was conducted to solicit stakeholder input on the range of issues and potential alternatives to be addressed in the EIS. A Notice of Application, Issuance of Determination of Significance, and Request for Comments on the Scope of the EIS for the Eightmile Dam Rebuild and Restoration Project were initially issued by Ecology on December 18, 2020. All comments received were considered in the development of the scope of the Draft EIS. The scoping comment period is the first of two formal opportunities in the SEPA process for the public to provide comments. The public will also have an opportunity after the publication of the Draft EIS.

Scoping comments included written comments submitted via an online comment form, hardcopy letters sent via mail, emails, and oral comments provided at two online scoping meetings held in January 2021. All correspondence (referred herein as "submissions") was reviewed and bracketed by theme. Over the 47-day scoping period between December 18, 2020 and February 1, 2021, Ecology received 17,624 comments in 4,894 submissions. Of these, 121 were unique submissions and 4,773 were form letter submissions. Unique submissions were submitted by federal, state, and local agencies; organizations; and individual members of the public. Some organizations and individuals provided more than one submission.

Water-related topics were the most common type of scoping comment. People commented on water rights, water conservation, irrigation, water quantity, and water quality. Many commenters were concerned about construction and operation of the dam in the Wilderness. Comments on the SEPA/National Environmental Policy Act (NEPA) process were also a common topic. Many commenters requested that a joint SEPA/NEPA document be prepared. More details on comments received can be found in Scoping Summary Report, Ecology Publication No. 21-12-008 (Ecology 2021d), available at: https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-supply-projects-EW/Icicle-Creek-strategy/Eightmile-Dam.

Public comments were used to inform the development of the alternatives and identification of elements of the environment to be included in this Draft EIS. As provided by SEPA (WAC 197-11-440(6)(a)), elements of the environment that are not significantly affected do not need to be included in an EIS. The following broad areas of environmental review are evaluated in this Draft EIS:

- Alpine Lakes Wilderness
- Surface Water Resources
- Groundwater
- Water Rights
- Geology
- Plants and Animals
- Noise
- Recreation
- Visual Resources
- Public Safety
- Historic and Cultural Resources
- Tribal Resources
- Economics

- Environmental Justice

The following broad areas of environmental review are not evaluated in this Draft EIS as they are not anticipated to be significantly affected:

- Air
- Energy
- Transportation
- Public Services

1.6 SEPA Review Process for the Draft EIS

This Draft EIS was prepared pursuant to the SEPA, RCW 43.21C, and the state SEPA Rules, WAC 197-11. This project-level Draft EIS describes potential adverse environmental impacts of each alternative and identifies potential mitigation measures to reduce adverse impacts. The SEPA process is designed to inform decision-makers and the public regarding reasonable alternatives, potential adverse environmental impacts, and reasonable mitigation measures associated with a proposal. This EIS document is not an authorization for an action, nor does it constitute a decision or a recommendation for an action.

Following issuance of the Draft EIS, there will be an extended 45-day comment period when comments on the document can be submitted to Ecology in accordance WAC 197-11-455(7). The public is encouraged to comment on the Draft EIS; the Final EIS will respond to comments received on the Draft EIS.

1.7 Alternatives Evaluated in the Draft EIS

Four alternatives are analyzed in this Draft EIS:

- No Action Alternative
- Alternative 1: Narrow Spillway with Gates
- Alternative 2: Wide Spillway without Gates
- Alternative 3: Narrow Spillway without Gates

Refer to Chapter 2 for detailed descriptions of each of these alternatives.

1.8 Benefits and Disadvantages of Delaying the Proposal

The EIS must discuss the benefits and disadvantages of delaying implementation of the proposal (WAC 197-11-440(5)(c)(vii)). If Ecology delays the Eightmile Dam Rebuild and Restoration Project, potential benefits would include the following:

- Delaying construction of the dam would reduce impacts and perhaps avoid conflicts with other construction projects.

The disadvantages of delaying the rebuild and restoration project include the following:

- Delay would leave the dam vulnerable to failure, which would threaten human lives downstream and create economic hardship for the IPID. Should a dam failure occur, residences, public infrastructure, and wilderness habitat would be damaged or destroyed.
- Currently, the DSO requires IPID to leave the low-level outlet gate open during the winter and early spring. The operation of the dam in this manner is not consistent with DSO regulations, does not meet the DSO's safety requirements for a High Hazard Dam, and would ultimately result in enforcement action by the DSO.
- Delay would not meet IPID's irrigation and storage needs.
- Additional water would not be available to enhance instream flows in Icicle Creek during the summer months.

1.9 Project Finance

While the IPID is responsible to pay for their proposed action and project construction, IPID is applying to receive grants to defray some costs. The IPID has applied for US Bureau of Reclamation WaterSMART federal grants, Federal Emergency Management Agency (FEMA) grants, and the Office of Columbia River grants. IPID will also be contributing in-kind and financial resources to construct the project.

The 2018 emergency repairs were paid for using a combination of funds from Ecology and the IPID.

1.10 Issues to be Resolved

1.10.1 Water Rights

IPID's water right (Certificate No. 1228) authorizes the storage of a maximum instantaneous quantity of 25 cubic feet per second (cfs), and while the certificate does not specify any maximum annual quantity, it is IPID's position that its right authorizes the storage of a maximum annual quantity of 2,500 acre-feet per year. In recent years prior to the Jack Creek Fire, the physical component of active storage has been limited to approximately 1,151 acre-feet due to damage to the dam. In the last few years after the fire, compliance requirements from Ecology's DSO (Aspect 2022a) related to High Hazard Dam status have resulted in flash boards remaining out of the control notch, the gate remaining open, and an associated temporary reduction in physical storage. If applicable, Ecology will ascertain an annual quantity through a future IPID trust water right donation of this water right, should IPID donate a portion of this water right for instream flow purposes. As this donation action has not yet occurred, the physical minimum storage (1,151 acre-feet with flash boards in place) and proposed physical maximum storage (2,000 acre-feet as dictated by the proposed design alternatives) volumes have been used for the evaluation in this Draft EIS. This range of water storage and release volumes will provide a range of potential impacts, which will encompass the specific water right. For more information, refer to Chapter 6, *Water Right*s.

1.11 Forest Service and the National Environmental Policy Act

The Forest Service has reviewed the proposed action to determine its responsibilities under NEPA. The Forest Service has determined that NEPA applies based on the Council on Environmental

Quality's (CEQ) revised regulations at 40 Code of Federal Regulations (CFR) 1501.1 and regulations at 36 CFR 220.4(a).

As authorized by the CEQ regulations, the Forest Service can cooperate with the State of Washington on environmental analysis and may use elements of the environmental review prepared under SEPA for NEPA analysis (40 CFR 1506.2(b)). The Forest Service will incorporate applicable sections of this SEPA Draft EIS into a NEPA Environmental Assessment (EA).

CHAPTER 2: PROJECT ALTERNATIVES

Three action alternatives and the No Action Alternative are evaluated in this EIS. The alternatives are described below, and Table 2-1 provides a comparison between alternatives.

2.1 Alternative Development

The August 2017 Jack Creek Fire created additional concern for the dam related to increased peak runoff into Eightmile Lake. The DSO conducted a preliminary analysis of homes that could be impacted by a potential failure and sent a letter to IPID in March 2018 that outlined measures to safely manage the situation, as well as elevate the hazard classification of the Eightmile Dam to a high hazard classification (Appendix A). Because the dam had already experienced maintenance issues, IPID began development of alternatives to replace the dam. Initially, IPID developed several conceptual alternative design configurations for consideration by DSO. Through several discussions with DSO, IPID carried two alternatives forward to roughly 30 percent design level: the Narrow Spillway with Gates (Alternative 1) and the Wide Spillway without Gates (Alternative 2). As a result of the EIS scoping process (as described in Section 1.5), a third action alternative was added for analysis in the EIS: the Narrow Spillway without Gates (Alternative 3).

2.2 No Action Alternative

The No Action Alternative serves as the baseline condition against which the action alternatives are evaluated and compared and illustrates the most likely scenario if the project is not implemented. Analysis of the No Action Alternative is required under SEPA (WAC 197-11-440 (5)(b)(ii)).

Under the No Action Alternative, the existing dam would be left as is (Figure 2-1), and it would continue to operate in its current state and manner, with a primary spillway elevation of 4,667 feet and an outlet pipe that allows drawdown of the lake to a water surface elevation (WSEL) of approximately 4,640 feet without pumping (Figures 2-2 and 2-3). The invert elevation of the low-level outlet pipe is 4,648.7 feet, but additional drawdown occurs after the lake WSEL has reached the elevation of the low-level outlet pipe due to seepage through the landslide deposits that underlie the dam. Seepage can draw the lake down to a WSEL of 4,640 feet without pumping. The DSO considers the dam vulnerable in the event of a large storm due to changed conditions in the watershed both upstream and downstream of the dam, as well as to the condition of the dam itself. The Jack Creek Fire in 2017 burned a significant forested area in the watershed, creating conditions that generate higher peak runoff rates to the lake.

Operation of the dam under existing conditions is not consistent with DSO regulations and does not meet the DSO's safety requirements for a High Hazard Dam. The DSO would eventually exercise enforcement actions in accordance with WAC 173-175-620 (3). However, it is not possible to predict with certainty what that action or its effects would be. DSO currently requires IPID to leave the low-level outlet open during the winter and early spring to reduce the risk of a dam failure. Consequently, for purposes of this EIS analysis, it is assumed that the existing state of the dam and its operation remain unchanged.

The No Action Alternative does not meet IPID objectives for water storage capacity for operations and irrigation water delivery. It would not contribute to the IWG Guiding Principle 1 related to streamflow improvements. The dam is currently operating in a deteriorating and unsatisfactory condition. An estimated 150 downstream residences are at risk if the existing dam were to fail, resulting in a High Hazard Classification.

Table 2-1. Alternative Comparison

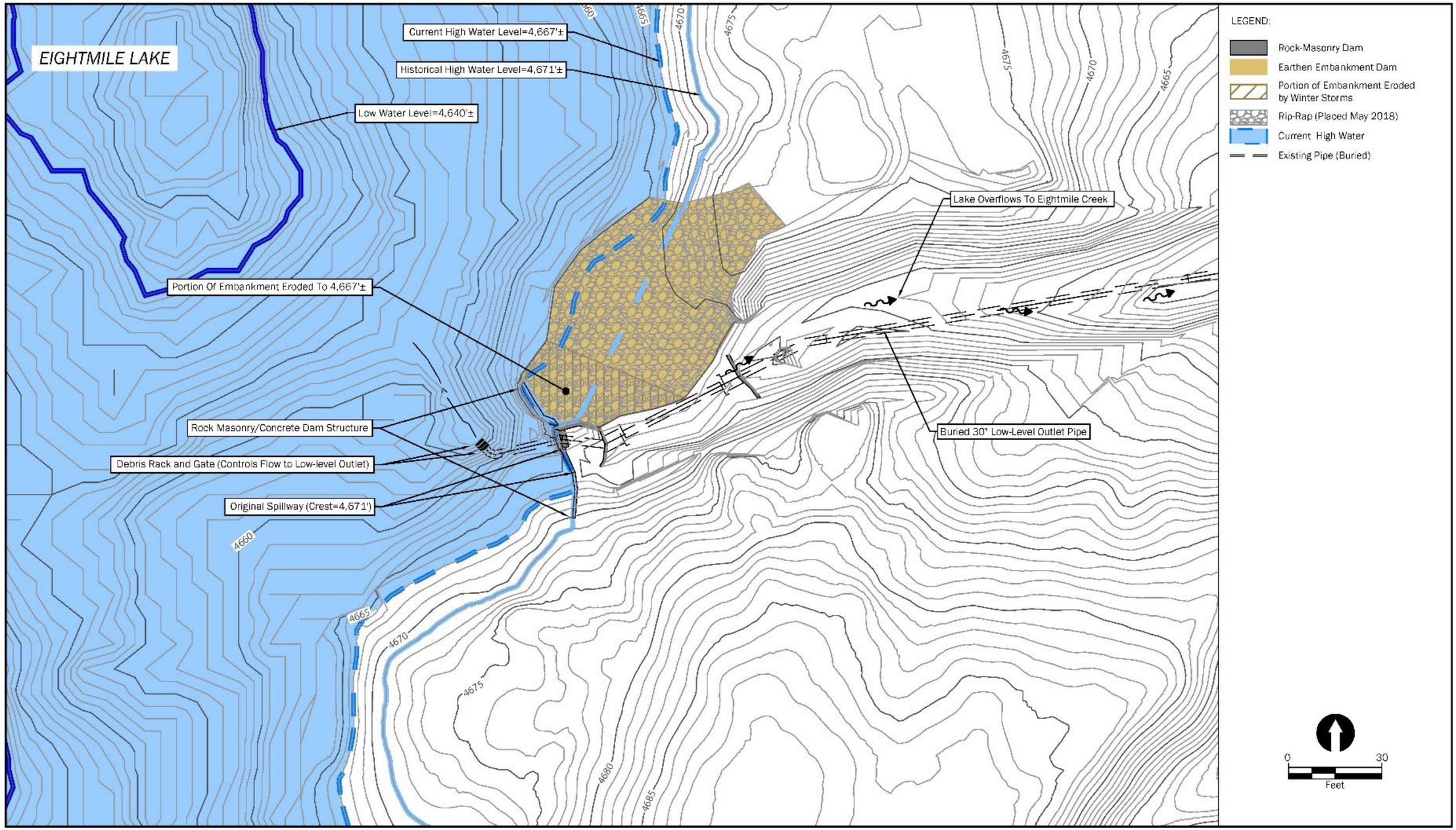
	Existing Conditions / No Action Alternative	Alternative 1: Narrow Spillway with Gates[2]	Alternative 2: Wide Spillway without Gates[2]	Alternative 3: Narrow Spillway without Gates[2]
Lake Full WSEL (feet)[1]	4,667	4,671	4,671	4,667
Total Lake Area at Maximum WSEL (acres)	76.6	81.4	81.4	76.6
Total Lake Volume at Maximum WSEL (acre-feet)	2,698	3,010	3,010	2,698
Active Storage Volume (acre-feet)	~1,151	2,000	2,000	1,698
Primary Spillway Length (feet)	65	60	180	60
Primary Spillway Elevation (feet)	4,667	4,667 (4,671 with gate up)	4,671	4,667
Intermediate Spillway	No	Yes	No	Yes
Secondary Spillway Length (feet)	12	24	24	24
Secondary Spillway Elevation (feet)	4,671	4,673	4,673	4,673
Low WSEL Without Pumping[3] (feet)	~4,640	4,636	4,636	4,636
Total Lake Area at Low WSEL (acres)	~41.2	38.7	38.7	38.7
Total Lake Volume at Low WSEL (acre-feet)	~1,158	1,010	1,010	1,010
Invert Elevation at Pipe Intake in Lake (feet)	4,648.65	4,632.0	4,632.0	4,632.0

WSEL = Water Surface Elevation.

1. Historical Lake Full WSEL is approximately 4,671 feet.
2. To comply with DSO requirements, all action alternatives require automated equipment and permanent monitoring equipment. All action alternatives have an automated low-level outlet pipe.
3. This elevation represents the lowest drawdown that would occur without pumping. Under existing conditions, the lake is typically drawn down to the low-level outlet pipe invert elevation (4,648.7 feet) during the late summer. The lake level continues to drop during the late summer due to seepage through the landslide deposits that underlie the dam until precipitation begins to refill the lake. The lowest observed drawdown in recent years is estimated to be approximately 4,640 feet. Under each of the action alternatives, IPID will monitor and manage the lake WSEL and drawdown so that the lake WSEL does not fall lower than 4,636 feet, as shown in the table.

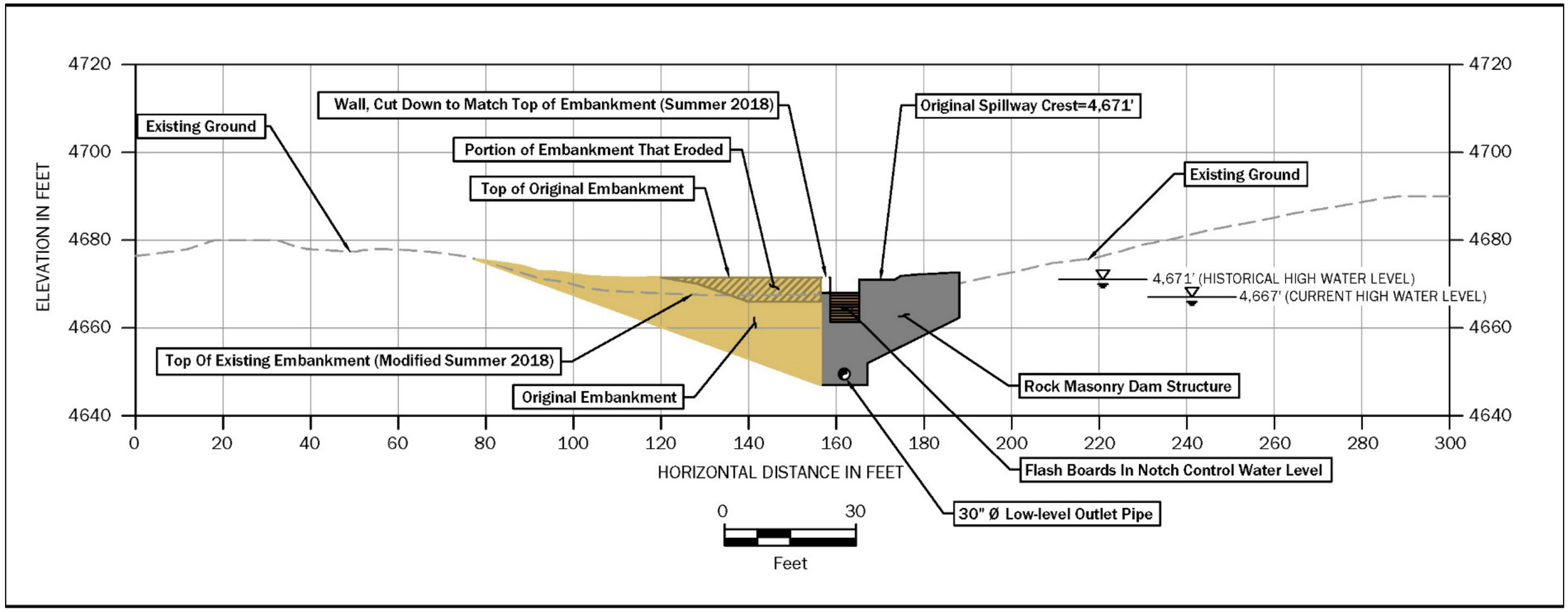
Figure 2-1. Existing Dam

Figure 2-2. Existing Dam / No Action Alternative



Source: Prepared by Anchor QEA

Figure 2-3. Existing Dam / No Action Alternative – Profile



Source: Prepared by Anchor QEA

2.3 Alternative 1: Narrow Spillway with Gates (formerly Alternative 1A)

2.3.1 Dam Design

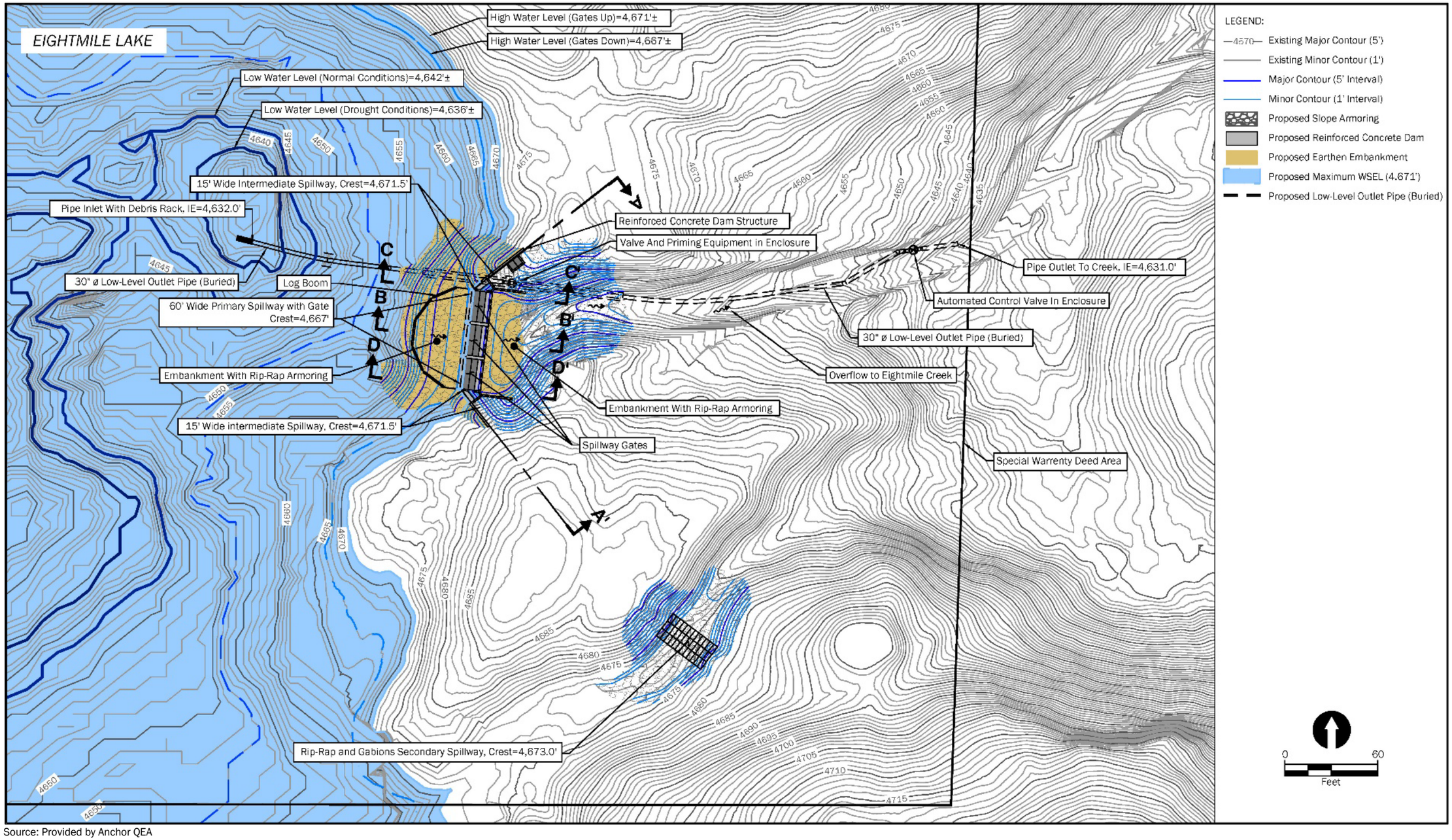
Alternative 1 includes replacement of the existing dam with an earthen embankment and reinforced concrete dam structure equipped with automated control gates over the primary spillway. Three 4-foot-high, 20-foot-long automatic level control gates would be installed on top of the primary spillway, which would have a hard crest elevation of 4,667 feet (Figures 2-4 and 2-5). The gates would allow IPID to control the water level within the top 4 feet of the lake (see Table 2-1 for a comparison between alternatives). When additional water supply is needed, IPID would raise the gates in the late spring or early summer to raise the lake to elevation 4,671 feet prior to releasing the water in the late summer. The gates would automatically lower if the lake level gets too high to protect the dam and prevent overtopping. For example, if a storm occurs when the gates are up and the lake is full, the gates would automatically lower to pass peak flows generated by the storm. This design would allow for a narrow primary spillway (60 feet wide) and therefore a smaller dam footprint compared to the Wide Spillway Alternative (Alternative 2).

During extreme storm events, the lake would continue to rise above the primary spillway. Two 15-foot-wide intermediate spillways on either side of the primary spillway would provide 30 feet of additional spillway width at an elevation of 4,671.5 feet (Figure 2-4). A secondary spillway would be created in a low spot south of the main dam structure by using rock and riprap to harden an existing channel. The secondary spillway would have a crest elevation of 4,673 feet. The spillways would provide capacity to pass the design storm event required by DSO (a storm that has the probability of occurring once in 1,000,000 years) while maintaining the freeboard (the vertical distance of the crest of the dam above the maximum lake water level) in the lake required by DSO.

Water would be released from the lake through a new 30-inch diameter low-level outlet pipe/siphon. The low-level outlet pipe/siphon would extend from an inlet submerged in the lake approximately 150 feet west of the new dam structure to an outlet in the Eightmile Creek channel approximately 314 feet downstream of the new dam structure. This would allow the lake to be drawn down to a low-water surface elevation of 4,636 feet, which would allow access to stored water without pumping. The low-level outlet pipe would be located entirely within the Special Warranty Deed Area. IPID would release water during the late summer to maintain the water supply available for irrigation use and instream flows in Icicle Creek. Releases through the low-level outlet pipe would be controlled by an automated plug valve at the downstream end of the pipe. IPID would have the ability to adjust the valve remotely to release the flows needed to meet downstream IPID water supply needs and instream flow needs.

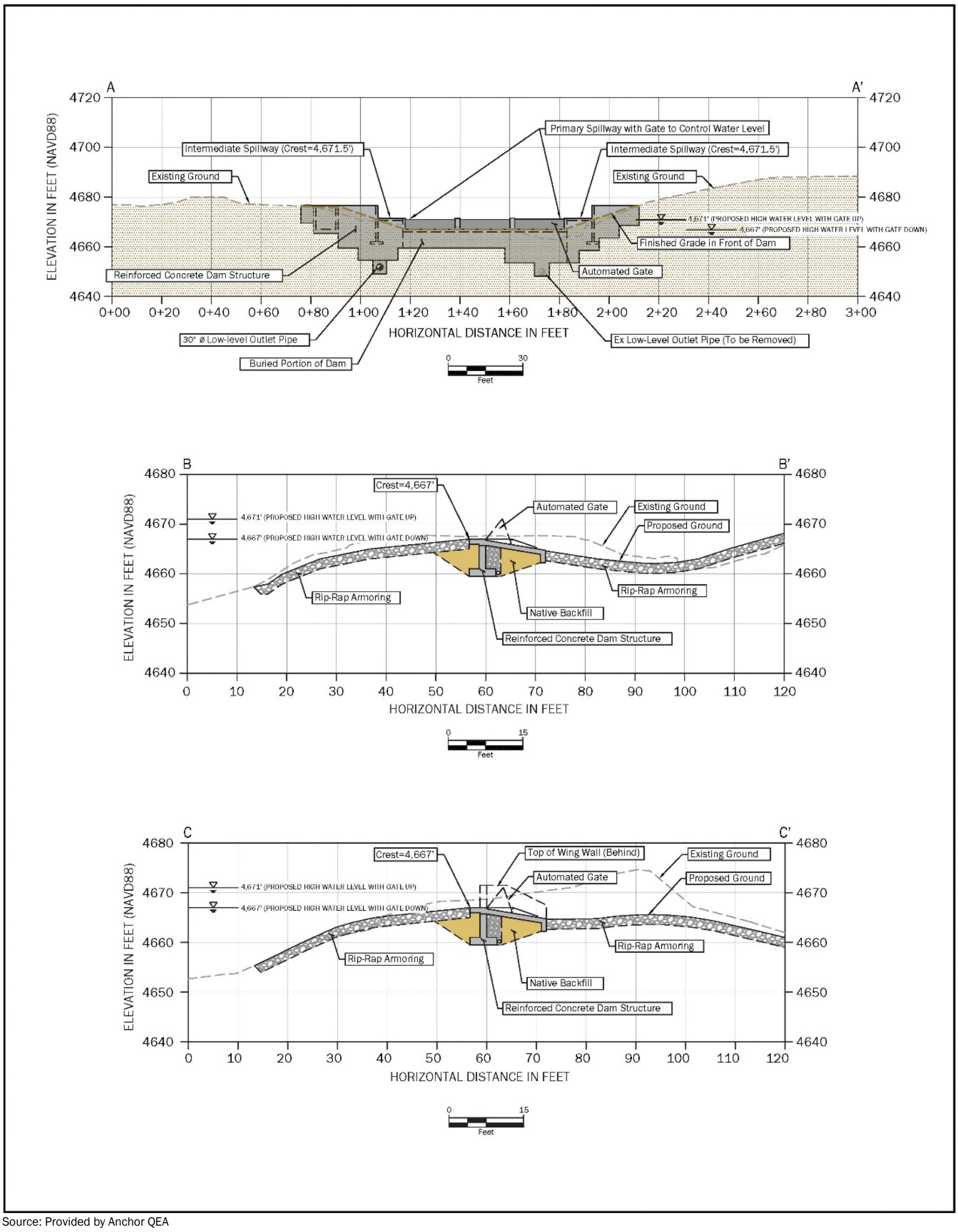
The primary spillway gates and low-level outlet valve at the lake would be powered by batteries charged by a solar panel. Lake levels, gate and valve positions, and other controls would be monitored remotely, and the equipment would be operated via radio signal requiring an antenna, which would be located at the dam site. The controls and monitoring equipment would be concealed as much as possible.

Figure 2-4. Alternative 1: Narrow Spillway with Gates



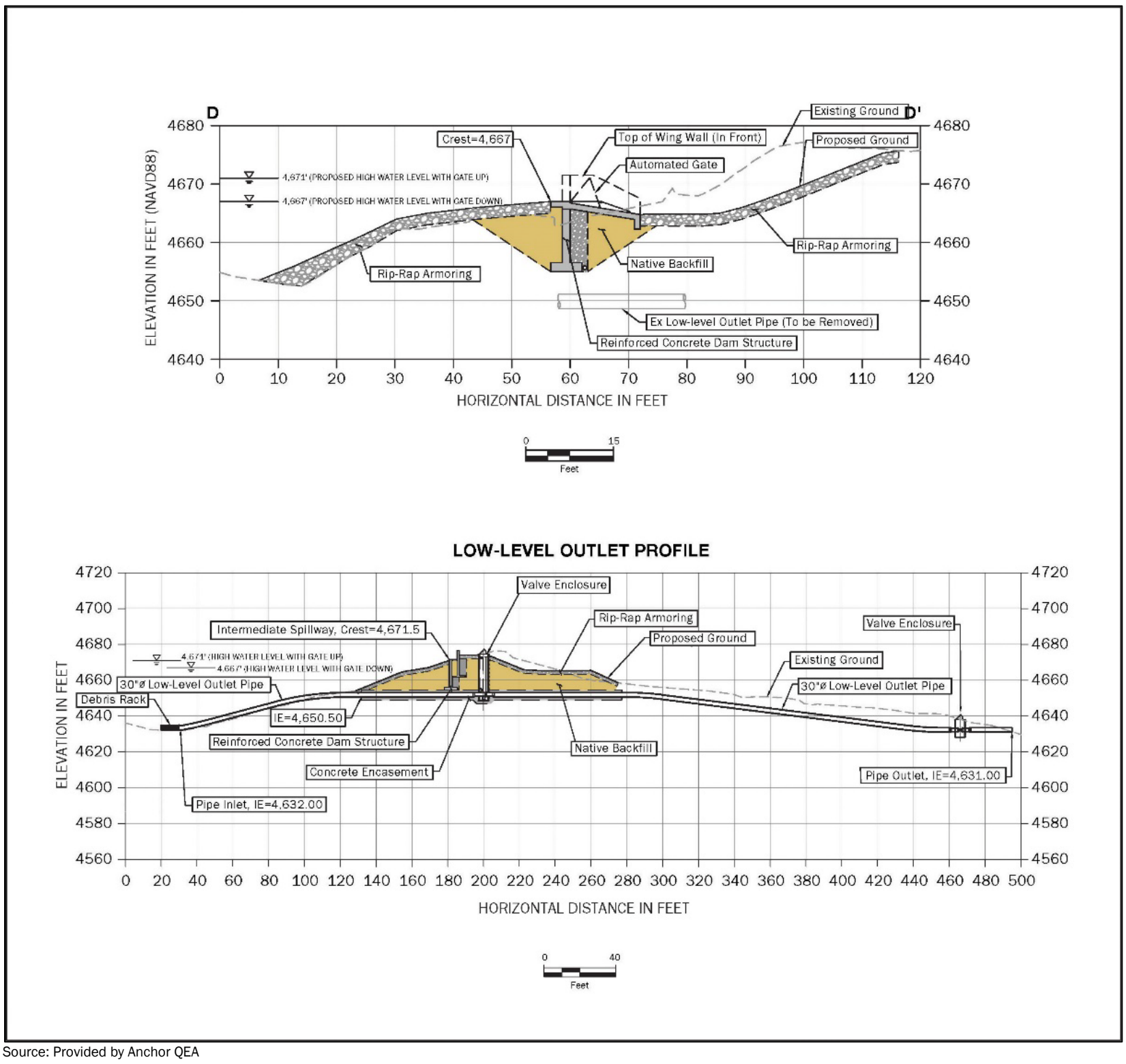
Source: Provided by Anchor QEA

Figure 2-5. Alternative 1: Narrow Spillway with Gates – Profile



Source: Provided by Anchor QEA

Figure 2-5. Alternative 1: Narrow Spillway with Gates – Profile (continued)



Source: Provided by Anchor QEA

2.4 Alternative 2: Wide Spillway without Gates

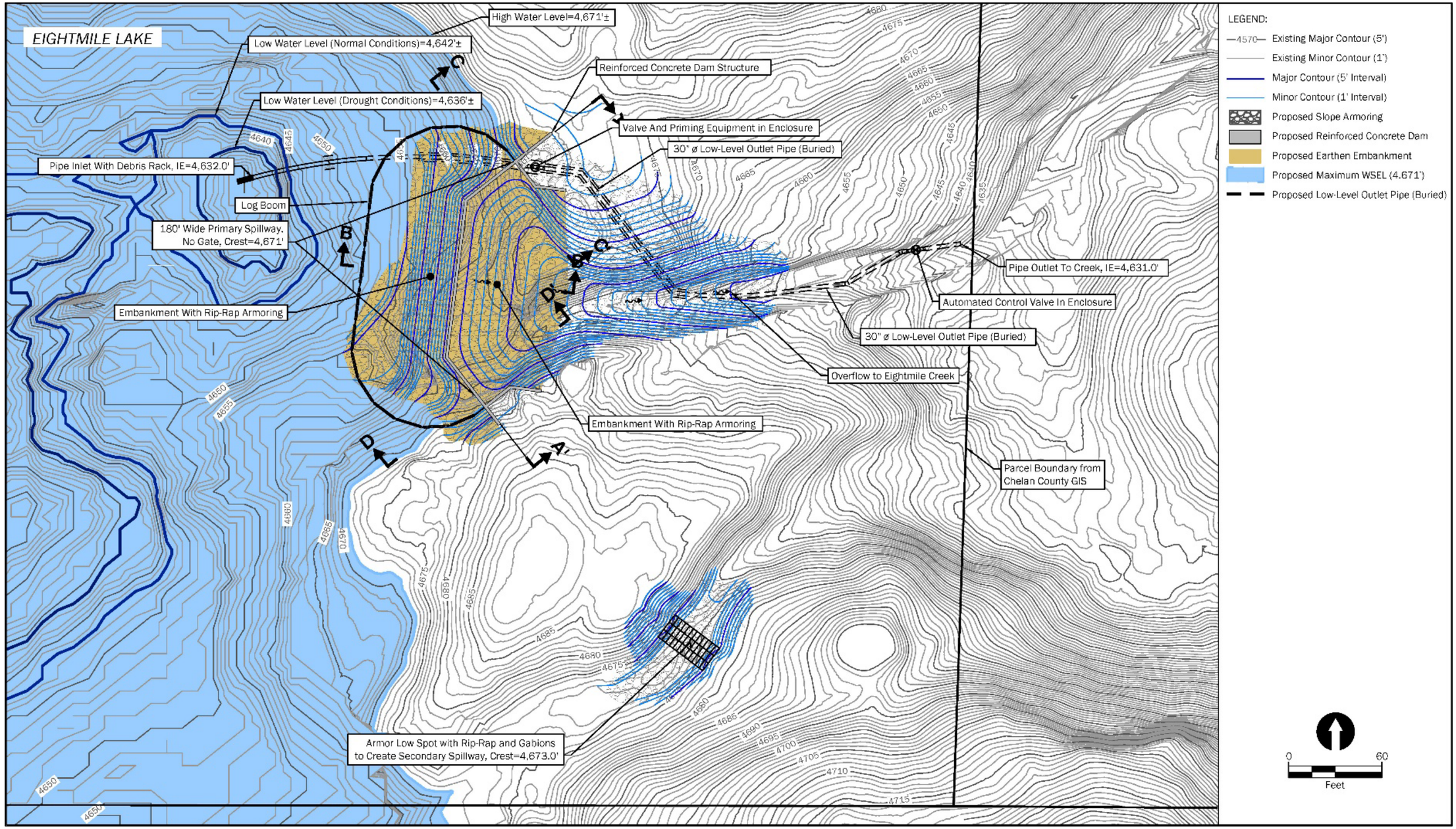
Alternative 2 includes replacement of the existing dam with an earthen embankment and reinforced concrete dam with a primary spillway length of 180 feet (Figures 2-6 and 2-7). The primary spillway would be fixed and completely passive. No gates or automated equipment would control the spillway or adjust the spillway crest elevation. This would result in a wider spillway and a larger footprint than the Narrow Spillway Alternative (Alternative 1). See Table 2-1 for a comparison between alternatives. There would be no intermediate spillways. The primary spillway would have a hard spillway crest at an elevation of 4,671.0 feet.

During extreme storm events, the lake would flow over the entire length of the primary spillway. A secondary spillway, the same as the Narrow Spillway Alternative, would be created in a low spot south of the main dam structure by hardening an existing channel with rock and riprap. The secondary spillway would have a crest elevation of 4,673.0 feet. The spillways would provide enough capacity to pass the design storm event while maintaining the freeboard in the lake required by DSO.

As with the Narrow Spillway Alternative, water would be released from the lake through a new 30-inch diameter low-level outlet pipe/siphon. The operation and configuration of the low-level outlet pipe would be the same described for the Narrow Spillway Alternative, with the low-level outlet pipe located entirely within the Special Warranty Deed Area.

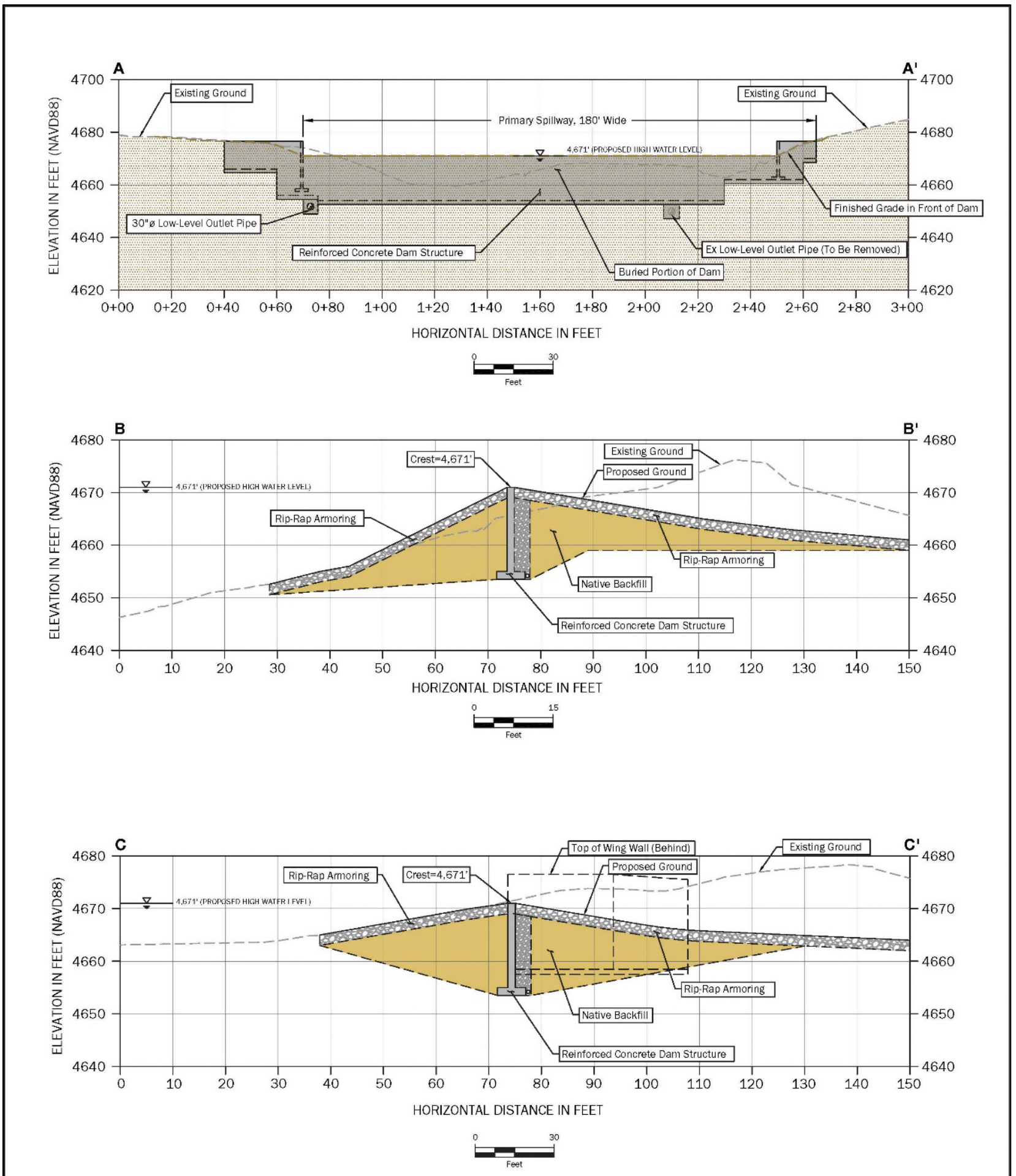
As with Alternative 1, the low-level outlet valve at the lake would be powered by batteries charged by a solar panel. Lake levels, valve positions, and other controls would be monitored remotely, and the equipment would be operated via radio signal requiring an antenna, which would be located at the dam site. The controls and monitoring equipment would be concealed as much as possible.

Figure 2-6. Alternative 2: Wide Spillway without Gates



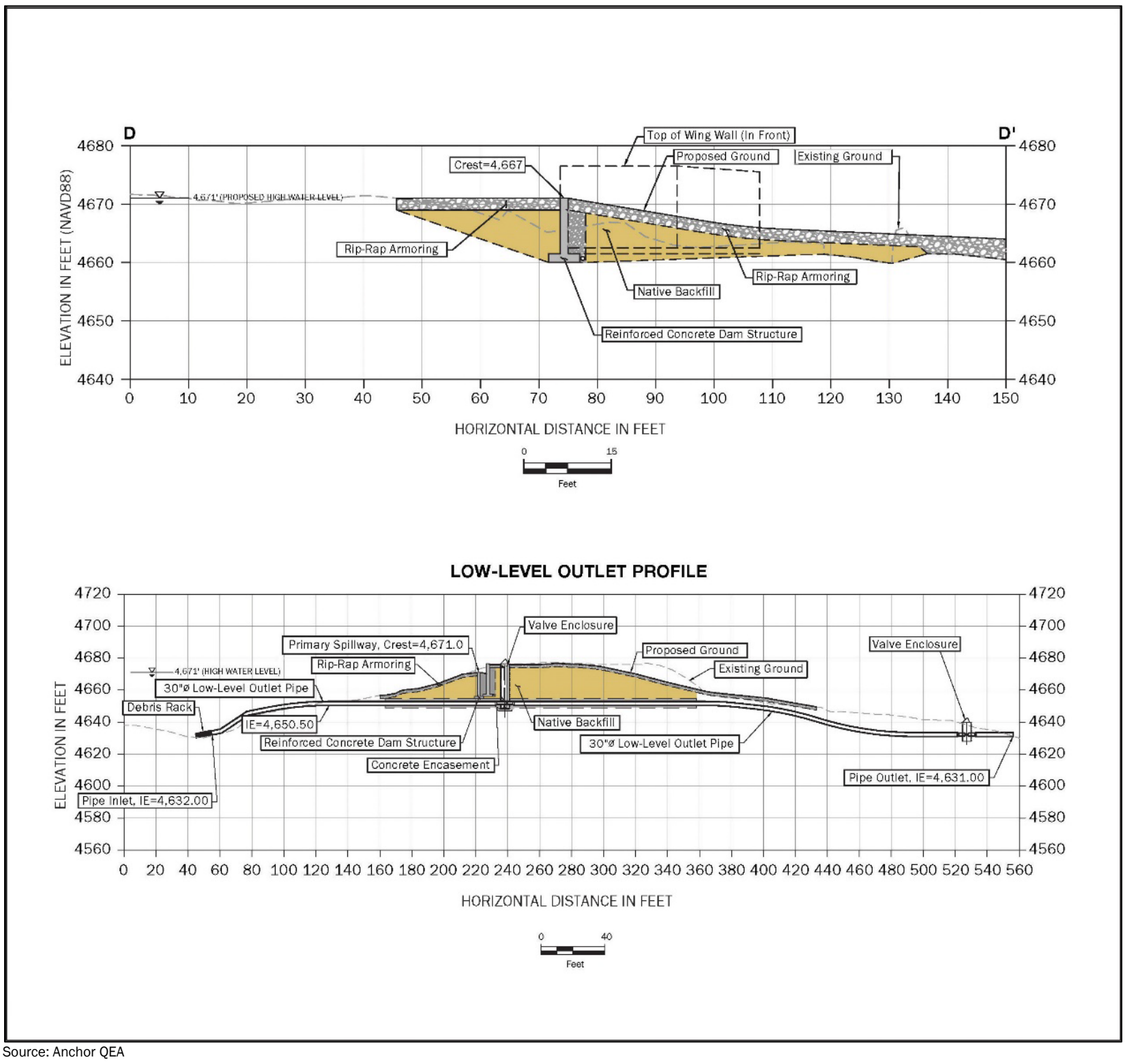
Source: Anchor QEA

Figure 2-7. Alternative 2: Wide Spillway without Gates – Profile



Source: Anchor QEA

Figure 2-7. Alternative 2: Wide Spillway without Gates – Profile (continued)



Source: Anchor QEA

2.5 Alternative 3: Narrow Spillway Without Gates

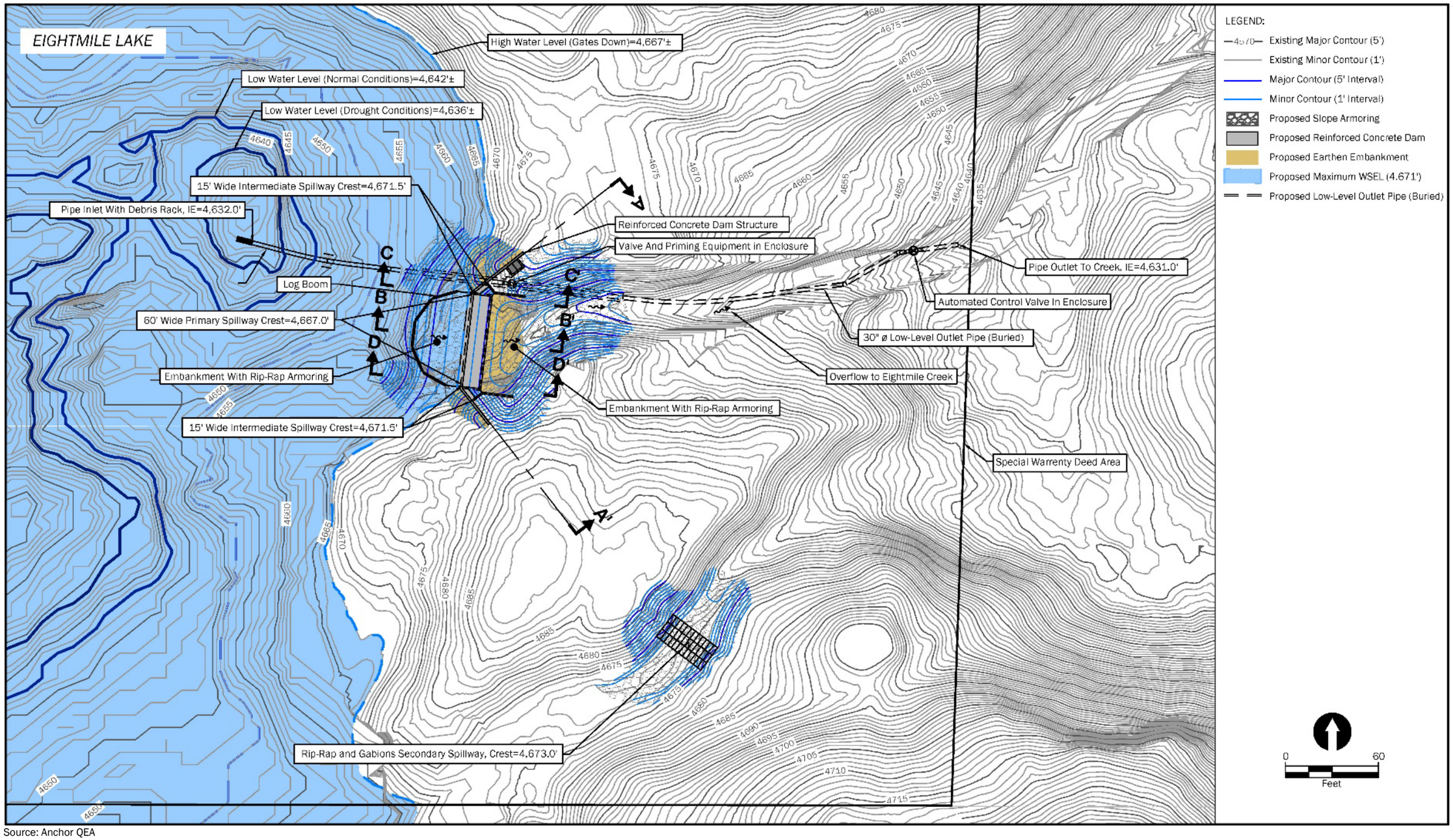
Alternative 3 was developed as a result of comments received during scoping that suggested that the EIS should include an alternative dam design that matches the existing spillway elevation of 4,667 feet.

Under Alternative 3, the dam type and configuration would be almost identical to that of Alternative 1, having a narrow spillway and a concrete spillway apron, but with no mechanical gates. The mechanical gates that are included as part of Alternative 1 would allow IPID to store up to a maximum water surface elevation of 4,671 feet with the gates activated (Figures 2-8 and 2-9). Alternative 3 would have no gates and would be designed to store water only up to a maximum water surface elevation of 4,667 feet. This alternative would have the same footprint as Alternative 1. Because Alternative 3 would not have mechanical gates, the primary spillway would include one continuous 60-foot-wide primary spillway section with a crest elevation of 4,667 feet (Table 2-1). The intermediate and secondary spillways for Alternative 3 would be identical to that described for both Alternatives 1 and 2.

The maximum volume of water that could be stored for release by the dam would be less with Alternative 3 than for the other two action alternatives. Alternative 3 would not meet all of IPID's objectives because there would be less potential water storage available for release to ensure against drought conditions. Because there would be less potential water available during drought conditions, this alternative may require pumping to access more than 1,698 acre-feet of water storage.

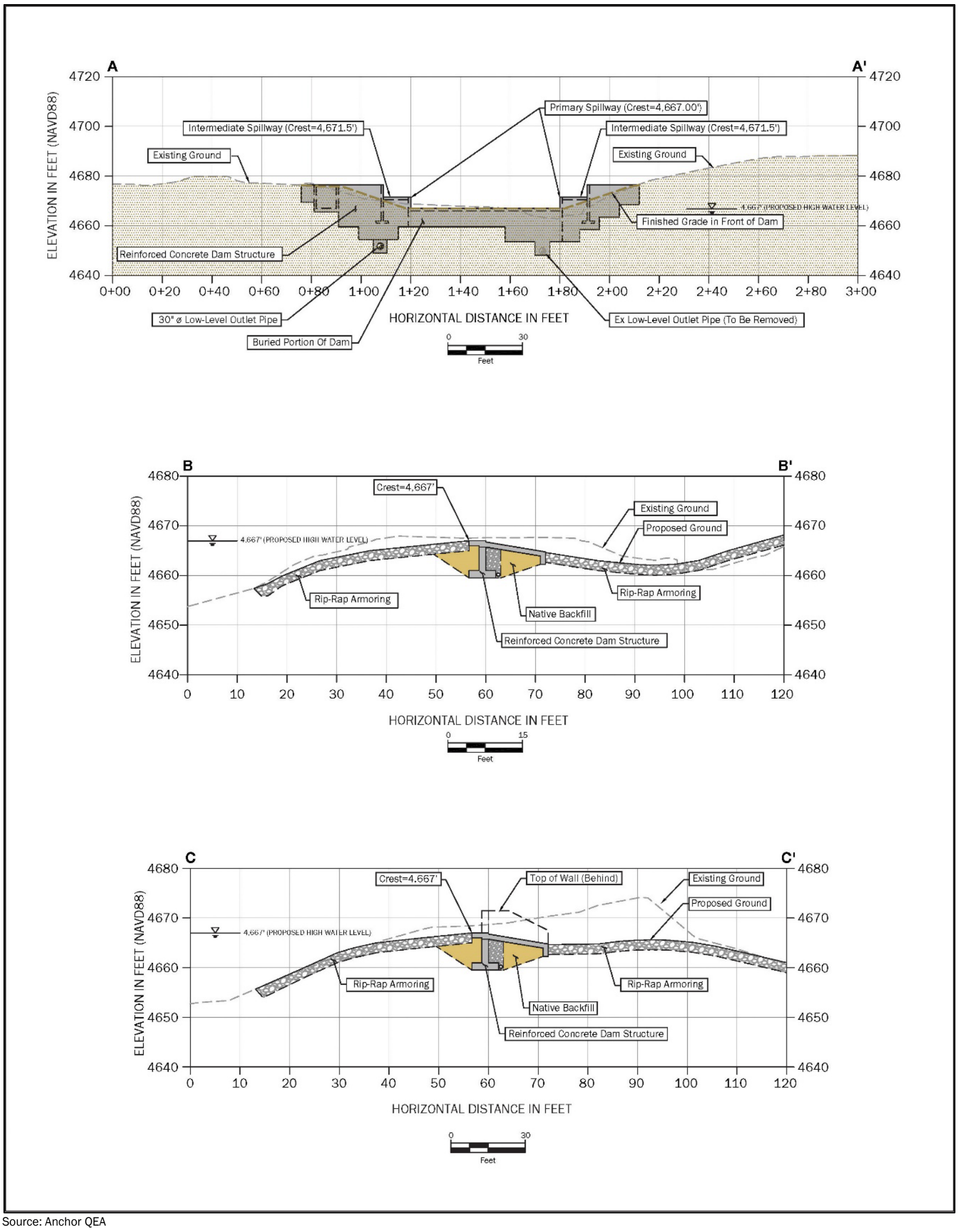
As with Alternatives 1 and 2, the low-level outlet valve at the lake would be powered by batteries charged by a solar panel. Lake levels, valve positions, and other controls would be monitored remotely, and the equipment would be operated via radio signal requiring an antenna, which would be located at the dam site.

Figure 2-8. Alternative 3: Narrow Spillway without Gates



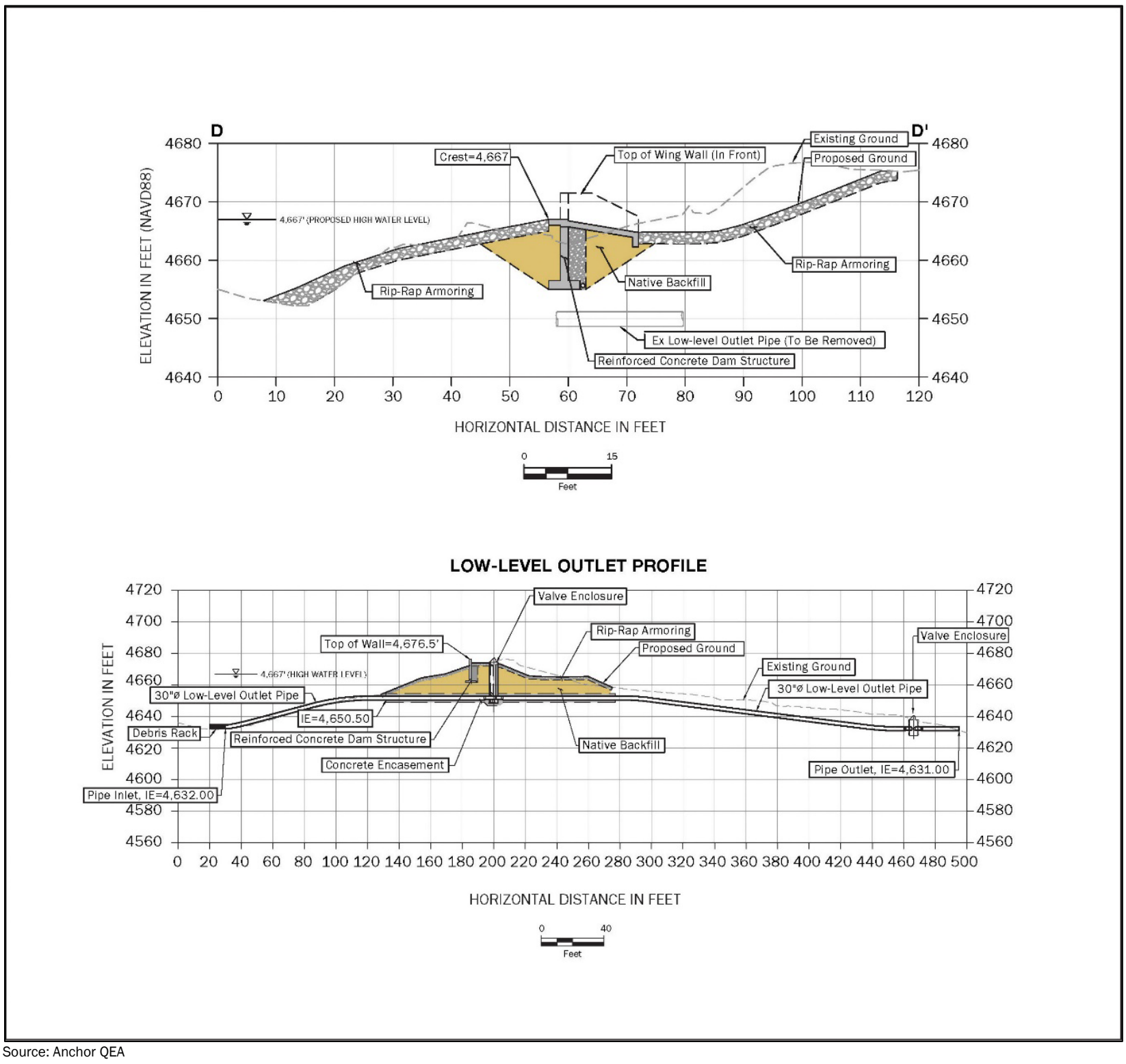
Source: Anchor QEA

Figure 2-9. Alternative 3: Narrow Spillway without Gates – Profile



Source: Anchor QEA

Figure 2-9. Alternative 3: Narrow Spillway without Gates – Profile (continued)



Source: Anchor QEA

2.6 Dam Operation

In general, operation of Eightmile Dam would be as follows under all action alternatives:

- The lake would be allowed to fill annually through early- to late-July each year. The timing of the fill period would depend on inflows and downstream irrigation needs.
- IPID would then open the valve remotely via automation on the low-level outlet to start releasing water, as needed to meet downstream needs.
- IPID would close the valve on the low-level outlet pipe at the end of the irrigation season.
- The lake would refill through the winter and spring.

Under Alternatives 1 and 2, lake drawdown would be to a minimum elevation of 4,636 feet. The maximum drawdown would result in an annual release of up to 2,000 acre-feet of actively stored water from Eightmile Lake (and up to 1,698 acre-feet with Alternative 3). Some continuing seepage loss is anticipated through the landslide deposits that underlie the dam. However, IPID would monitor lake levels and outflows and would regulate the lake so that the annual active storage and release does not exceed the limits of the IPID water right.[1]

IPID will likely turn over control of the release of up to 600 acre-feet of stored water from the lake for augmentation of instream flows for Alternatives 1, 2, and 3, with releases scheduled based on coordination with IWG members, co-conveners, and fishery co-managers through a separate process including a decision support tool being developed through the IWG. Ecology would set the release schedules and quantities at its discretion (within limits of the water right) based on the decision support tool and input from IWG, Washington State Department of Fish and Wildlife (WDFW), and other fishery co-managers. Alternative 3 and the No Action Alternative would result in less releasable water for instream flows than Alternatives 1 and 2.

Under Alternative 1: Narrow Spillway with Gates, the water surface elevation would typically be held at WSEL 4,667 feet. In the late spring and early summer, IPID would raise the gates over the primary spillway to capture additional runoff and raise the lake to a maximum WSEL of 4,671 feet. IPID would typically raise the gates in May or June and begin to draw down the lake in July. The gates would be lowered once the lake level is below the bottom of the gates (elevation 4,667 feet). Under Alternative 1, if the gates are raised and the lake fills, the gates would automatically lower to prevent the lake level from rising above 4,671 feet. During a storm, the gates would lower to provide additional spillway capacity to pass peak storm flows.

Under Alternative 2: Wide Spillway without Gates, there would be no gates or other adjustable controls. The lake would flow over the primary spillway when the lake fills to an elevation above 4,671 feet.

Alternative 3: Narrow Spillway without Gates would be passive like Alternative 2, but the maximum WSEL would be lower, set to 4,667 feet.

[1] This will be accomplished through the development of an Ecology-approved monitoring plan in which IPID will monitor and report to Ecology the total annual volume of water actively stored in the reservoir and the total annual volumes released for both instream flows and for IPID's irrigation use. The annual monitoring plan will be in place prior to storage and release of water from a repaired dam and reservoir.

2.6.1 Telemetry

Under existing conditions, IPID staff hike to Eightmile Lake to manually release water using dam infrastructure. Under Alternatives 2 and 3, an automated release valve would be opened, adjusted, and closed remotely, thereby reducing the need for IPID personnel hiking to and from the site. Under Alternative 1, the dam would also have gates that would be raised remotely and would automatically lower in the event of water rising over the elevation of 4671 feet. Automation would allow for improved control of water releases without hiking to the lake. Automation would require telemetry equipment at Eightmile Lake and a repeater station in a separate and appropriate location on Icicle Ridge.

At Eightmile Lake, telemetry equipment would be located on the northeast side of the dam within the Special Warranty Deed Area; the exact location has not yet been determined. Telemetry and batteries would likely need replacement between every 5 and 10 years. Lithium batteries would likely be used to get a longer lifespan.

The proposed repeater station would be co-located with the Forest Service's local repeater station (Figures 2-10 and 2-11). The proposed repeater station would be located on National Forest System lands on Icicle Ridge. A final decision on the type of telemetry equipment (antenna or solar panel) has not been determined yet, but would be similar in scale to the Forest Service's existing repeater station. Telemetry equipment and installation materials would be flown in by helicopter. The equipment would be bolted down and secured with guyed wires. Installation is anticipated to take 1 to 3 days.

Figure 2-10. Forest Service Icicle Repeater Station

2.6.2 Maintenance

IPID has an agreement with the Forest Service that grants IPID limited privileges, including the ability to maintain and repair its reservoirs within the Alpine Lakes Wilderness. IPID currently inspects and maintains the dam in accordance with Ecology DSO requirements. Currently, IPID staff hike to the dam during summer months for inspections and to adjust the flow during release periods. During the summer months (approximately June to October), the site is visited at least one time per month. When equipment is needed, helicopters are used to land at the site. Small planes are used to fly over for visual inspections typically 1 to 2 times per month beginning in April. During the winter months, the site is not inspected because the lake is frozen over.

2.7 Construction

Construction of the improvements to the dam at Eightmile Lake will involve the transport of equipment, materials, and personnel to the site, and various construction activities.

Construction of the dam improvements will include the following:

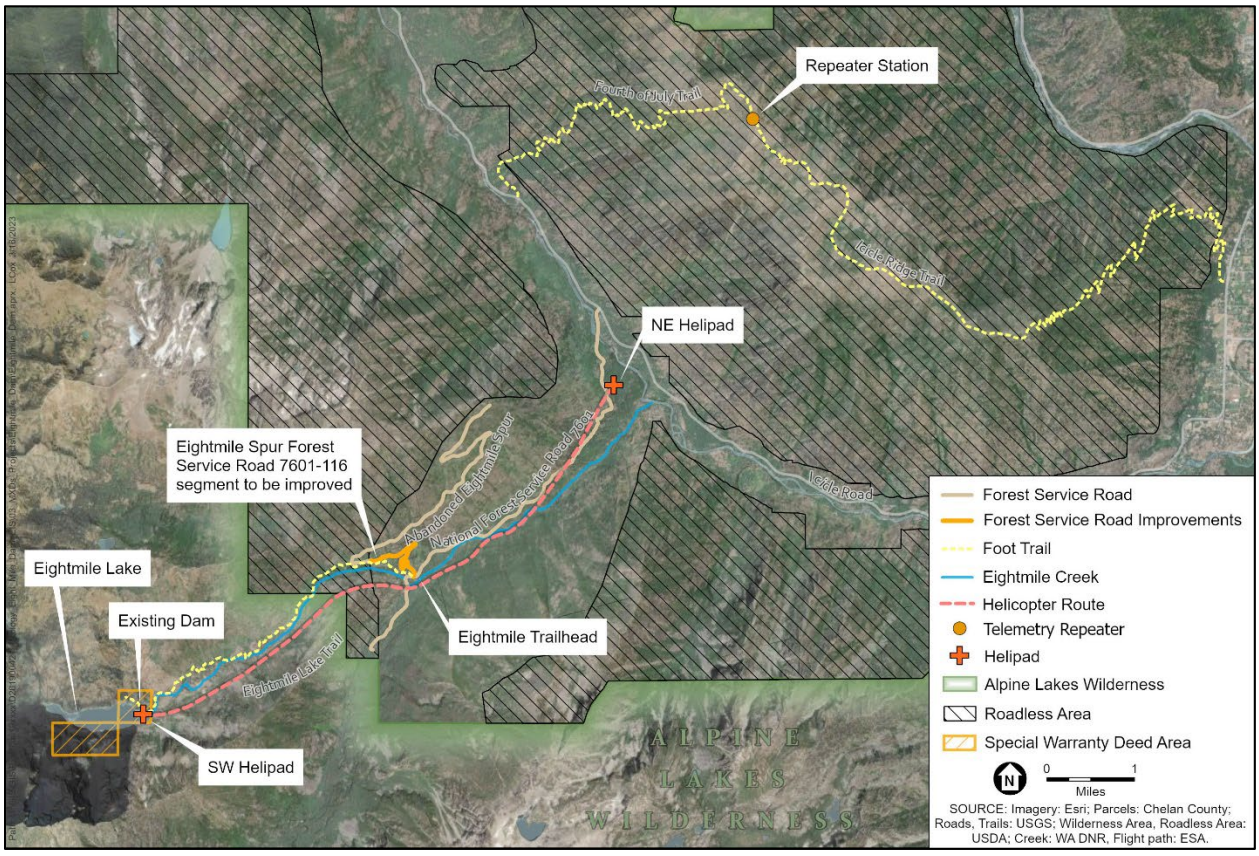
- Transport of equipment, materials, and personnel to the site.
- Clearing and grading for the staging area (8,500 to 10,000 square feet; Table 2-2).
- Demolition of the existing dam.
- Decommissioning of the existing outlet pipe by removing sections and filling other sections.
- Excavation for the new outlet pipe and dam structure.
- Installation of a new outlet pipe.
- Construction of a new concrete dam structure including secondary spillway.
- Regrading after dam construction.
- Riprap armoring of the primary and secondary spillway area, including areas that will convey water upstream and downstream of each spillway.
- Installation of monitoring and control equipment.
- Site restoration.
- Transport of equipment and waste materials away from the site.
- Temporary ‘housing/camping’ for construction personnel.

2.7.1 Transportation of Equipment and Materials

The project would require access by construction personnel and the transport of gear, food and provisions, hand tools, larger mechanical equipment (including an excavator; a small, tracked loader; equipment for mechanically sorting on-site materials; and concrete mixing equipment), cement, pipe, valves, generators, dewatering pumps, trench protection equipment, debris rack, portable latrine, and other construction materials. Rock and earthen material would be sourced from excavations associated with the new dam and piping.

Construction of the dam would require the transport of equipment and materials into and out of the Special Warranty Deed lands within the Alpine Lakes Wilderness. There are no roads that directly access Eightmile Lake. The lake can be accessed on-foot via the Eightmile Lake Trail (Forest Service Trail #1552), which IPID uses for routine maintenance at the dam. The trailhead is accessible from Leavenworth by vehicle following Icicle Road and FSR 7601-116. The distance from the trailhead to the lake is approximately 4 miles. An estimated 4 to 6 construction personnel per week will likely use the upper portion of this trail for access to the site on foot, although some may choose to hike from the trailhead. As described further below, IPID proposes to improve and reopen a portion of a currently closed road located outside of the Alpine Lakes Wilderness for administrative use to bring vehicles closer to the project site. IPID also proposes the use of helicopters. **Figure 2-11** shows the proposed transportation routes for site access.

Figure 2-11. Transportation Routes



Helicopters would be used to move all equipment and the majority of materials to and from the site on Special Warranty Deed land. The primary determinant of the type of helicopter to be used is the maximum weight that needs to be transported. The largest payload would be the excavator, which could be partially disassembled to aid in transport and reassembled on-site.

Two types of helicopters would be used: a heavy-lift helicopter (e.g., Columbia Chinook CH-47D, or similar) with a 20,000-pound payload capacity, and a small helicopter (e.g., Bell UH-1 Huey or similar) with a 5,000-pound payload capacity (**Figure 2-12**). The size of the helicopter would determine the size of each load and also affects the number of trips needed. The larger helicopter is necessary for transporting the excavator (a 120-size or larger excavator). Because it carries a much larger payload, the larger helicopter can also reduce the number of trips carrying materials to the site. The anticipated flight path for helicopter transport is depicted in **Figure 2-11**.

Figure 2-12. Helicopter Types

Chinook CH-47

Bell UH-1 Huey

Two approaches to helicopter use are being considered. Option 1 would use the larger helicopter to transport nearly all equipment and material to the site at the beginning of the project, followed by a limited number of additional trips using the smaller helicopter to bring materials that were not anticipated initially. Option 2 would involve the limited use of the large helicopter to move only the heavy equipment and a portion of the material, followed by periodic delivery of materials as needed throughout the construction, using the smaller helicopter. Under both options, the large helicopter would be used for 1 to 2 days to remove equipment and any remaining materials at the end of construction. It is anticipated that the majority of the helicopter trips would occur on weekdays; however, some weekend flights may be necessary. Table 2-2 shows a comparison of the two construction options.

Table 2-2. Construction Options

	Option 1. Heavy-lift Helicopter with Limited Use of Small Helicopter Throughout Construction	Option 2. Limited Use of Heavy-lift Helicopter with Small Helicopter Use for the Majority of Materials
With a Heavy-lift Helicopter	Approximately 70 to 105 trips over 3 to 5 days at the beginning of the project, and 11 trips at the end of the project.	Approximately 20 trips over 2 days at the beginning of the project, and 11 trips at the end of the project.
Number of Trips with a Small Helicopter	Approximately 20 trips periodically during construction, as needed for unanticipated supplies.	Approximately 245 trips throughout the project.
Size of Staging Area	Approximately 10,000 square feet.	Approximately 8,500 square feet (Approximately 15% smaller).

Equipment would be staged at the "fly yard" for transport to the project site and staging area within the Special Warranty Deed Area by helicopter (Figure 2-11). The fly yard is an existing improved site adjacent to Icicle Road on National Forest System lands; the fly yard is used by IPID. Helicopters would sling-load material, equipment, and supplies but not touch down at the Eightmile Dam site, except for emergencies and drop off of personnel. The initial drop zone would be on the spillway of the dam; once the staging area is graded, equipment and materials would be dropped at the staging area (Figure 2-13). The helicopter would land at the fish hatchery or at the fly yard (Fromm Field) (Figure 2-11) to fuel and stop for the day.

IPID proposes to work with the Forest Service to repair and improve an approximately three-quarter mile section of currently closed (locked gate) road (FSR 7601-116) to allow vehicular traffic for

administrative use only associated with the project; the road would not be available for use by the general public and would remain locked at all times except for authorized entry. Temporarily repairing and improving this section of road would allow vehicles to bring personnel and supplies closer to the site, cutting off roughly 0.75 mile and roughly 500 feet of elevation gain as compared to using the Eightmile Lake Trail. Vehicles would travel up FSR 7601 to the Eightmile Lake Trailhead parking lot, where they would continue approximately 0.75 mile up FSR 7601-116 to the end of the repaired and improved portion of the road, east of the wilderness boundary and the Inventoried Roadless Area boundary (**Figure 2-11**). From this point, personnel would travel by foot to join the Eightmile Lake Trail for the remainder of the route to the dam. Repairing and improving the road would involve some heavy equipment to remove fallen trees and vegetation rooted in the roadway, as well as minor road repair. Approximately 10 feet of the existing roughly 24-foot-wide road would be cleared for access. The full 24-foot width will be cleared for the last 100-feet to allow for parking, and the last 30 feet of the road will be widened to roughly 30 feet to allow for vehicle turnaround. Following construction, the road would remain locked and closed to public entry, but would be available for occasional use by IPID.

An option involving overland transport of equipment and materials into the Alpine Lakes Wilderness to the dam is no longer being considered, see Section 2.8*, Alternatives Considered but Not Carried Forward*.

As described, two approaches to helicopter use are being considered due to helicopter cost and availability, as well as to evaluate the anticipated number of trips and potential noise generated. The two options for construction access are described in more detail below.

Option 1: Heavy-lift Helicopter with Limited Use of Small Helicopter Throughout Construction

This option would use a heavy-lift helicopter to transport the excavator, other equipment, and supplies to the site on Special Warranty Deed land at the beginning of the construction period. It would require a staging area of approximately 10,000 square feet. Dam Alternatives 1 and 3 would require approximately 70 trips using the heavy-lift helicopter, and Alternative 2 would require approximately 105 trips. The location and size of the staging area vary with the dam alternatives as described below in Section 2.7.2. The drop zone at the lake for materials and equipment would be on the existing spillway of the dam.

The administrative use-only portion of FSR 7601-116 would be used to bring additional supplies and personnel closer to the boundary of the wilderness, and terminates near the boundary of the Inventoried Roadless Area. Supplies would be transported the remainder of the way on foot. A small helicopter would be used on an as-needed basis to bring in heavy materials that were not anticipated. This could require approximately 20 trips with the small helicopter. Flights by the smaller helicopter would be on an as-needed basis and would likely take place between the hours of 7:00 a.m. and 6:00 p.m.

At the end of construction, approximately 11 trips using the heavy-lift helicopter would be required to remove equipment and waste materials.

Option 2: Limited Use of Heavy-lift Helicopter with Small Helicopter Use for the Majority of Materials.

This option would be to use a heavy-lift helicopter to transport the excavator, other equipment, and a portion of the supplies to the site at the beginning of the construction period. This would take approximately 20 trips over 2 days. After the initial trips with the heavy-lift helicopter, the smaller helicopter would make approximately 245 trips to deliver other supplies over the duration of the project construction. Helicopter flights would likely take place between the hours of 7:00 a.m. and

6:00 p.m. during weekdays. This option would allow the staging area to be approximately 15 percent smaller than the other option (roughly 8,500 square feet), because materials would be brought in as needed rather than all at once at the outset.

The administrative use-only portion of restored FSR 7601-116 would be used to bring additional supplies and personnel closer to the boundary of the wilderness. They would be transported the remainder of the way on-foot.

At the end of construction, approximately 11 trips using the heavy-lift helicopter would be required to remove equipment and waste materials.

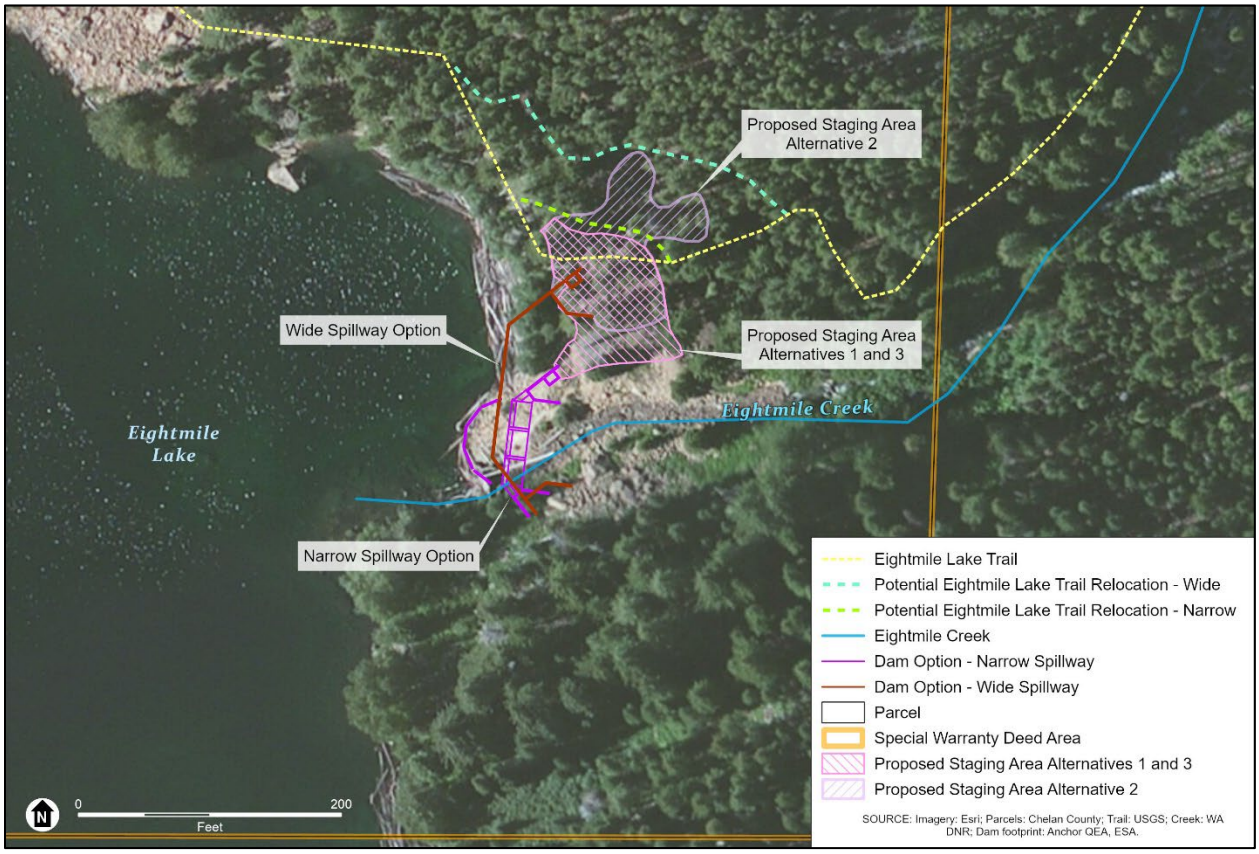
2.7.2 Dam Construction

All construction activities would occur within the Special Warranty Deed Area, including camping by personnel. Preparation of the site for dam construction would begin in mid-June or as soon as the snow conditions allow. Site preparation would include the installation of temporary erosion controls, clearing (including removal of up to 30 trees), leveling of the staging area using the existing excavator on-site, and removal of wood and debris from the lake edge within the work area. Trees would be felled using a chainsaw; the larger felled trees would be used to support and level the staging and work area. Excess limbs, trees, and wood debris would be burned on-site in accordance with Forest Service protocols, as is currently done with logs and debris that collect at the dam each year. The size of the staging area would vary by alternative, with Alternative 2 requiring the largest volume of materials to be stored on-site and therefore the largest staging area. An approximate 150- to 300-foot segment of the Eightmile Lake Trail located on the Special Warranty Deed parcel would be temporarily re-routed around the active construction and staging area to ensure hiker safety near the active construction zone. Figure 2-13 shows the staging area and possible trail relocation alignments.

Excavation work to install the new outlet pipe would begin when the lake level is below elevation 4,661 feet, at which point Eightmile Creek would be dry. For the construction year, the low-level outlet pipe will be left open at the lake so that the water level draws down as early in the summer as possible to facilitate construction. Once the lake elevation drops below 4,650 feet, the new outlet pipe would be installed. Water would exit the lake via the newly installed outlet pipe throughout construction. Once the new outlet pipe is installed, cofferdams would be installed, and the existing dam structure and outlet pipe would be removed. Pumps would be used to dewater work areas as needed. Cofferdams would be constructed using large bulk bags, which will also be used to ferry items up to the lake.

Construction of the dam would take approximately 4 to 5 months depending on the alternative and weather conditions. Dam construction methods will depend on the contractor and alternative but generally entail excavation for footings, pouring of concrete for the dam structures including the core wall, backfilling and placement of riprap, and installing gates, if applicable.

Figure 2-13. Dam Construction Staging Area



Based on geologic information collected to date, blasting with explosives is not expected to be needed for the project. However, because there is still a possibility of encountering rock that is larger than the excavator can move or break up, blasting is being covered in this EIS as a contingency. "Boulder Busters" are anticipated for use to break up smaller rocks, if needed. A Boulder Buster is a small cartridge-type tool that can be used safely to break the rocks into manageable sizes. If larger boulders are encountered, other more powerful blasting methods using explosives would be needed. Blasting with explosives is not anticipated but may be needed as part of construction if rocks larger than 10 feet in diameter are encountered. Blasting with explosives, if necessary, would likely occur over 1 or 2 days and involve a temporary trail closure, and generate a high level of noise for a brief period during the day of blasting. A blasting contractor would be called in, and would make the final determination on safety measures. The Forest Service would be notified, and safety measures would be put in place to prevent wilderness users from being injured by blasting. Safety measures would include excluding users from the area near the construction, and use of blasting mats to prevent flyrock, and limit noise and dust. Blasting with explosives is an allowed use in a wilderness. IPID has identified the following measures that would be implemented if blasting with explosives is required:

- Advance notice of 1 week would be provided to the Forest Service, and IPID would assist with descriptions of any required closure dates and times.
- IPID would establish a safety zone, which is not expected to exceed a 750-foot radius around the work site.
- Temporary trail closure would be required during the blast window, which would occur only on weekdays between 11 a.m. and 3 p.m. Blasting would be scheduled for mid-week (Tuesday–Thursday), if feasible.

- IPID would provide personnel at the trailhead, Caroline Lake Trail junction, and the camping area on the north side of Eightmile Lake.
- During closure of the safety zone, the lower portion of Eightmile Lake Trail would remain open to the Caroline Lake Trail junction, and the camping area, latrine area, and trail uphill from the camping area would also remain open.
- IPID would assist the Forest Service with project description and schedule information to be distributed in January preceding construction for people participating in the lottery for campsite permits.

When dam construction work begins, up to six construction workers would be needed. Construction workers would camp at the site during the work week. In addition, periodic visits would be made by inspectors, Forest Service personnel, and others overseeing the project.

Timing Restrictions

Typically, the lake is drawn down beginning July 1, when IPID releases water to maintain irrigation water supply. However, during the year that the improvements are constructed, IPID will need to manage its other reservoirs to allow for early drawdown of Eightmile Lake. The drawdown will still be constrained by the natural hydrologic cycle. If there is above-average snowpack and cool spring weather, the lake may still be capturing natural runoff well into late June or early July even after releases from the dam have started.

Because of the location and elevation of Eightmile Lake, snow often begins to fall in October, although substantial snow accumulation typically does not occur until November. Freezing weather may occur much earlier in the fall. In addition, October rain can impact the lake level and the ability to keep the site dry for construction. Construction would need to be managed so that the project is substantially complete before significant snow accumulation or extended freezing weather occurs.

Work to improve and restore FSR 7601-116 may take place somewhat earlier in the year since the improvements would occur at a lower elevation and the snow melts earlier in the year, allowing access to the road for improvements.

Overwintering

Every effort would be made to complete the dam construction in one season. If construction could not be completed in one season, actions would be taken to secure the dam for overwintering. Areas that could be overtopped would be secured and stabilized (hardened) with rock. All equipment would be stored on-site or removed if feasible. The outlet pipe would be in working order, and the lake would be held at the lowest level (elevation 4,632 feet) for the winter.

Should it be needed, a contingency plan for overwintering will be developed by IPID and reviewed by DSO. The following requirements are anticipated:

- The low-level outlet pipeline/siphon would be constructed first and remain open through construction (including through the winter if construction requires more than one season). The outlet pipe will not be sized to convey the full winter/spring discharge rate from the lake, so the lake would fill through the winter/spring up to wherever the dam crest is when construction is paused for the winter and would need to have a safe path to spill downstream.
- Backfill would be placed to the top elevation of whatever portion of the dam has been constructed by the time the work is paused for the winter.

- Rock armoring would be placed over all disturbed areas, including any portion of the flow path/stream channel downstream of the dam. Armoring will be at least 18 inches thick, or as determined by the dam design engineer, similar to the way it would be over the finished surface of the dam.
- Stockpiled materials would be moved to a staging area well above the crest of the unfinished dam (within the footprint depicted on Figure 2-13) and covered with plastic/secured for the winter.
- Cofferdams would remain in place, and perhaps be supplemented to keep water out of the work area as much as possible.

Project Closeout and Restoration

After construction is completed, all supplies, construction waste, and equipment, including the existing excavator at the site, would be removed with a heavy-lift helicopter. The area around the site disturbed by the work, or used for construction staging, and the temporary trail reroute would be restored. The staging area would be regraded to a more natural terrain, and the logs used for staging would be burned on-site in accordance with Forest Service protocols, as is currently done with material that collects at the dam each year.

Native vegetation would be replanted in disturbed areas as appropriate, following a plan approved by the Forest Service. Vegetation management would include the removal and monitoring of noxious weeds disturbed by the project.

2.8 Alternatives Considered but Not Carried Forward

As part of the dam design development, several dam alternative configurations and construction methodologies were initially considered and then removed from further consideration, as discussed below.

2.8.1 Alternative Dam Configurations

The design of improvements to the dam and related infrastructure at Eightmile Lake has considered a wide range of potential configurations. Four alternatives, as described in Sections 2.2 through 2.5, are considered as part of this EIS. Other alternatives that were considered during different stages of design development but were removed from further consideration in this EIS include the following:

- Appraisal Study Options 1 through 4: The original improvement concepts considered by the *Eightmile Lake Storage Restoration Appraisal Study* (Aspect Consulting and Anchor QEA 2015) included the following:
    - Option 1 – This option involved replacing the existing dam with a rock-faced concrete structure with a spillway elevation of 4,671 feet. The existing low-level outlet pipe would have been replaced with a siphon designed to draw the lake down to an elevation of 4,636 feet. This option was designed to increase the useable storage capacity of Eightmile Lake to 2,000 acre-feet.
    - Option 2 – This option involved replacing the existing dam with a rock-faced concrete structure with a spillway elevation of 4,671 feet. The existing low-level outlet pipe would have been replaced with a siphon designed to draw the lake

down to an elevation of 4,621 feet. This option was designed to increase the useable storage capacity of Eightmile Lake to 2,500 acre-feet.

- **Option 3** – This option involved replacing the existing dam with a rock-faced concrete structure with a spillway elevation of 4,672 feet, which is 1 foot higher than the historical spillway elevation. The existing low-level outlet pipe would have been replaced with a siphon designed to draw the lake down to an elevation of 4,625 feet. This option was designed to increase the useable storage capacity of Eightmile Lake to 2,500 acre-feet.
- **Option 4** – This option involved replacing the existing dam with a rock-faced concrete structure with a spillway elevation of 4,682 feet, which is 11 feet higher than the historical spillway elevation. The existing low-level outlet pipe would have been replaced with a siphon designed to draw the lake down to an elevation of 4,619 feet. This option was designed to increase the useable storage capacity of Eightmile Lake to 3,500 acre-feet.

These options were developed only to the concept level for the Appraisal Study and were not reviewed for technical feasibility as part of that study, nor were they sent to DSO for review. These options were removed from consideration or replaced with revised alternatives as design development progressed. Options 3 and 4, which would have raised the spillway elevation at Eightmile Lake, were determined through additional study to not likely be feasible and were removed from further consideration. The general concepts introduced as part of Options 1 and 2 were revised as the design progressed and evaluated further as part of the *Eightmile Lake Storage Restoration Feasibility Study* (Anchor QEA 2018a).

- **Feasibility Study Alternatives Considered –** The Eightmile Lake Storage Restoration Feasibility Study included more detailed design evaluations, hydraulic calculations, and spillway sizing to refine and develop the concepts introduced during the Appraisal Study. Two different design configurations were considered and preliminary designs were developed for a preferred alternative, as follows:
  - **Gabion Baskets** – During the development of the Feasibility Study, an alternative configuration was considered that consisted entirely of gabion baskets with an upstream geomembrane liner, rather than relying on concrete as an impermeable layer within the dam.
  - **Feasibility Study Design** – Ultimately, a design configuration was provided with the Feasibility Study that included a concrete core wall with gabion baskets included to harden the spillway downstream of the concrete wall. No gates were considered, although a notch with stoplog control was included, similar to the notch in the existing dam. This alternative involved replacing the existing dam with a concrete and gabion structure with a spillway elevation of 4,671 feet. The existing low-level outlet pipe would have been replaced with a siphon designed to draw the lake down to an elevation of 4,621 feet, with a useable storage capacity of 2,500 acre-feet.
- **Preliminary (30 percent Complete) Design Alternatives** – The preferred alternative from the Feasibility Study was reviewed with DSO. Additional analyses were performed to refine the design based on input from DSO and updated information collected to support the design. This effort resulted in development of Preliminary (30 percent complete) Design Drawings that reflected a preferred design alternative and two additional alternatives. The alternatives considered in this EIS represent variations on these alternatives:

- **Preferred Alternative** – The preferred design configuration developed to the preliminary (30 percent complete) level included an early version of the Narrow Spillway with Gates Alternative (Alternative 1) considered in this EIS. The alternative included a narrow spillway with hard spillway crest elevation of 4,667 feet and automatic gates that would enable the WSEL to be raised to an elevation of 4,671 feet. The primary difference between this alternative and Alternative 1 considered in this EIS is that it would have replaced the low-level outlet pipe with a siphon designed to draw the lake down to an elevation of 4,621 feet. This would have resulted in a useable storage capacity of 2,500 acre-feet, but the siphon pipeline would have extended beyond the boundary of the Special Warranty Deed Area.
- **Alternative 2A** – This was developed as an alternative to the preferred alternative without gates to control flow over the spillway and represents an early version of the Wide Spillway without Gates Alternative (Alternative 2) considered in this EIS. The alternative included a wide spillway with a crest elevation of 4,671 feet. The primary difference between this alternative and Alternative 2 considered in this EIS is that it would have replaced the low-level outlet pipe with a siphon designed to draw the lake down to an elevation of 4,621 feet. This would have resulted in a useable storage capacity of 2,500 acre-feet, but the siphon pipeline would have extended beyond the boundary of the Special Warranty Deed Area.
- **Alternative 2B** – This was developed as a variation on Alternative 2A to answer the question of how the sizing of the dam would be impacted if the spillway elevation were lowered 2 feet. This alternative included a concrete structure with a 100-foot-wide primary spillway with a crest elevation of 4,669 feet. No gates would be provided to control flow over the spillway. The low-level outlet pipe with a siphon was designed to draw the lake down to an elevation of 4,621 feet. This would have resulted in a useable storage capacity of 2,344 acre-feet, but the siphon pipeline would have extended beyond the boundary of the Special Warranty Deed Area.

- **Other Design Alternatives Considered**
  - **Gate Options** – Several different automatic gate options were considered for inclusion in the Narrow Spillway with Gates Alternative (Alternative 1) considered in this EIS. Those options included a custom-designed metal gate with hinges powered by a motor with cables and pulleys, a fabricated gate that would be operated with mechanical hoists with cables, and hydraulically operated gates. The current option being considered for this alternative would include steel gates that are pneumatically controlled by air-filled bladders operated with a compressor based on the water level in the lake. Other options may be viable but are not included because of cost or technical feasibility. DSO has expressed concern about a custom-designed gate that does not have a proven track record of automatic operation to control water levels.
  - **Dam Removal** – Comments received in response to scoping suggested evaluation of an alternative that would include complete removal of the dam. As noted previously, if no action were taken to improve the dam to meet DSO's requirements for dam safety, DSO would eventually exercise enforcement actions in accordance with WAC 173-175-620(3). It is not possible at this time to predict with more certainty what that action(s) or its effects would be. However, such potential actions could require heavy equipment and work similar in magnitude to what would be required to replace the existing dam. It is possible that the

> action could result in the lake WSEL being permanently lowered to the elevation of the existing low-level outlet (~4,648 feet). Depending upon the [potential action, the lake may no longer be useable as storage for IPID and would not meet IPID's operational and water delivery needs.

2.8.2 Overland Vehicle Transport

Motorized transport over land through the Alpine Lakes Wilderness was initially considered but is not analyzed in the EIS because IPID acknowledged that air transport would be preferable to both wilderness users and proponents. As a result of comments received during scoping, this construction method has been removed from further consideration. Should helicopter transport be infeasible due to an unanticipated need for additional, heavy materials (such as rocks) or heavy equipment, IPID would need to reconsider using overland transport through the wilderness area. Should overland transport be needed, additional environmental review and approval from the Forest Service would be needed beyond what is being conducted as part of this EIS.

2.8.3 Pack Animals

Transportation of materials and equipment using pack animals to the dam site was considered, but determined infeasible due to the amount, weight, and elevation gain to the dam site. Pack animals could not transport nor take an excavator or other heavy equipment to the site, so the on-site excavator would be the only piece of heavy construction equipment available. Because of its limited size and lifting capacity, use of this excavator would entail blasting and a slower work process on the dam, likely extending the construction work to two seasons and closing trails for extended periods of time.

Delivering 332 to 545 cubic yards of premixed concrete in 80-pound bags would require 7,500–12,250 trips (2 sacks/160 lbs. per animal per trip). In addition, several tons of steel rebar, pipe, and other supplies would be required. Moving the concrete up to the dam site alone would take 208–340 days with two teams working (36 animal roundtrips per day), which would extend construction to multiple seasons. Increasing the number of teams would create congestion on the trail, and result in destruction and erosion to the trail. Animal waste would need to be collected and removed from the wilderness.

Approximately 465–490 feet of 24- and 30-inch diameter high density polyethylene (HDPE) pipe would have to be cut in short enough sections to allow transport by animals, which would require additional time and materials to butt-fuse the pipe together at the site. Concrete mixing would have to be conducted by hand unless a small mixer could be towed up by the pack animals.

The use of pack animals to transport materials to the site is not practical, and the use of pack animals has been removed from further consideration in the EIS.

2.8.4 Municipal Supply

The City of Leavenworth has been seeking to increase its continuous, or uninterruptible, water rights, primarily through a lawsuit against Ecology concerning the interpretation of historical water rights allotments (*City of Leavenworth v. Department of Ecology*, pending before the Washington Court of Appeals). Ecology considered the possibility of transferring some portion of water available from the rebuild of Eightmile Dam to the city to resolve this lawsuit. This would occur through releasing some stored water to augment instream flows for

mitigation of new out-of-stream uses, including for municipal water supply purposes by the City of Leavenworth. During the scoping process, several comments were received expressing concern over water from the Alpine Lakes Wilderness being used for municipal supply purposes. Based on such comments, Ecology has determined that water will not be made available for instream flow purposes for the mitigation of new out-of-stream uses, including municipal water supply use.