Alaska Energy Authority
Bradley Lake Hydroelectric Project
(FERC Project No. 8221)

Application for a Non-Capacity Amendment to the Bradley Lake Hydroelectric Project
Proposed Bradley Lake Expansion Project

FINAL LICENSE AMENDMENT APPLICATION

VOLUME I of VII

Volume I contains the following sections and exhibits as listed below.

- Initial Statement
- Exhibit A – Project Description
- Exhibit B – Project Operation and Resource Utilization
- Exhibit C – Construction History
- Exhibit F – General Design Drawings and Preliminary Supporting Design Report Parts I and II (List Only)
- Exhibit G – Project Boundary Maps

THE
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Bradley Lake Hydroelectric Project
FERC Project No. 8221

APPLICATION FOR AMENDMENT OF LICENSE
FOR A MAJOR WATER POWER PROJECT – EXISTING DAM
GREATER THAN 10 MEGAWATTS

INITIAL STATEMENT

Pursuant to Section 4.201 of the Federal Energy Regulatory Commission's regulations,[1] the Alaska Energy Authority, as licensee of the Bradley Lake Hydroelectric Project, states as follows:

1. The Alaska Energy Authority (hereinafter "AEA" or "Licensee" or "Applicant") applies to the Federal Energy Regulatory Commission (hereinafter "FERC" or "Commission") for an amendment to the Bradley Lake Hydroelectric Project License (FERC No. 8221) as described in the attached Exhibits.

2. The location of the Bradley Lake Hydroelectric Project is:

State:	Alaska
Borough/census area:	Kenai Peninsula Borough
Township/nearby Towns:	The city of Homer
Stream or other body of water:	Bradley River; Martin River

3. The exact name, business address, and telephone number of the Applicant are:

   Alaska Energy Authority
   813 West Northern Lights Blvd.
   Anchorage, AK 99503
   Telephone: 907-771-3000

4. The exact name, business address, and telephone number of each person authorized to act as agent for the Applicant in this application are:

   Mr. Curtis W. Thayer
   Executive Director
   Alaska Energy Authority

[1] 18 CFR § 4.201.

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Betsy McGregor
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5. The Applicant is:

   A public corporation of the State of Alaska, within the Department of Commerce and Economic Development, but with a separate legal existence, and is the Licensee for the water power project designated as FERC Project No. 8221, issued on December 31, 1985.

6. The proposed amendment of license and the reasons why the amendment is necessary:

   Through this non-capacity license amendment application, AEA is seeking approval to: 1) construct a new diversion dam (Dixon Diversion), headworks, and conveyance system to capture flow from the Dixon Glacier, located in the headwaters of the East Fork Martin River approximately 5.9 miles south of the existing Bradley Lake Hydroelectric Project (Bradley Lake Project) powerhouse, and divert that flow into Bradley Lake; 2) raise Bradley Lake's normal maximum operating elevation by 16 feet through a combination of raising the concrete spillway crest, adding spillway crest gates, and raising the dam embankment crest (Bradley Lake Pool Raise); and 3) install a 0.3-megawatt (MW) micro-hydro turbine in one of the Bradley Lake Dam fishwater release valves.

Together, these three components, referred to in this application as the Bradley Lake Expansion Project (Project), would significantly increase Bradley Lake Project generation.

Power generated at the Bradley Lake Project is provided to the Alaska Railbelt region, which serves approximately 75 percent of Alaska's population spanning 700 miles from Homer to Fairbanks. The Railbelt is currently facing an imminent energy crisis due to declining gas reserves in Cook Inlet. Currently, the Railbelt receives 70 percent of its electricity from natural gas, and shortfalls could begin as early as 2027. The proposed Project is a part of the solution to meet the short- and long-term need for power and diversify the Railbelt's generation mix.

The amendment would expand the FERC Project boundary by 295.0 acres to include lands necessary to construct and operate the proposed Project. Both the existing and proposed Project are wholly located on land owned by the State of Alaska. The FERC Project boundary would increase to 8,820.4 acres.

The installed capacity would increase from 119,700 kilowatts (kW) to 120,000 kW due to installation of the 300-kW micro-hydro turbine. AEA proposes to amend Article 49, in relevant part, as follows:

> Article 49. The Licensee shall pay the United States the following annual charges, effective the first day of the month in which this license is issued:
>
>> (a) For the purpose of reimbursing the United States for the cost of administration of Part I of the Federal Power Act, a reasonable amount as determined in accordance the provisions of the Commission's regulations in effect from time to time. The authorized installed capacity for that purpose is ~~119,700~~ 120,000 kilowatts.

The 16-foot pool raise and added water supply from the Dixon Diversion would increase the Bradley Lake Project's average annual power generation from 436,000 megawatt-hours (MWh) to 603,000 MWh, an increase of approximately 38 percent. The Bradley Lake Pool Raise would also increase the Bradley Lake Project's generating capacity by about 0.9 MW as a result of increased operating head (net head from 917 feet to 933 feet at full pool) provided by the pool raise.

Finally, due to Alaska's short construction season, the timing of the state's legislative session relative to its fiscal year, and state procurement procedures, AEA requests the

Commission approve construction to begin within 3 years of receiving FERC's authorization and be completed within 6 years of receiving FERC's authorization.

7. (i) The statutory or regulatory requirements of the State of Alaska in which the Bradley Lake Project is located, which would, assuming jurisdiction and applicability, affect the Bradley Lake Project as proposed with respect to bed and banks and the appropriation, diversion, and use of water for power purposes, and with respect to the right to engage in the business of developing, transmitting, and distributing power and in any other business necessary to accomplish the purposes of the license under the Federal Power Act are:

   (1) Water Rights Permit to Appropriate Public Waters (Alaska Statute [AS] 46.15): Alaska Department of Natural Resources (ADNR);
   (2) Fish Habitat Permit (AS 16.05.871-,901): Alaska Department of Fish and Game (ADF&G);
   (3) Cultural resources preservation (AS 41.35): State Historic Preservation Office (SHPO); and
   (4) Section 401 of the Clean Water Act (CWA) certification: Alaska Department of Environmental Conservation (ADEC); however, it is not the practice of ADEC to issue CWA Section 401 certifications for hydropower projects.

   In addition, AEA expects to file an application for the following federal permits:

   (5) U.S. Army Corps of Engineers (USACE) Section 404 CWA Permit; and
   (6) Bald and Golden Eagle Protection Act take permit (if applicable).

7. (ii) The steps that the Applicant has taken, or plans to take, to comply with each of the laws cited above are as follows:

   (1) AEA has engaged in a three-stage consultation process (18 Code of Federal Regulations § 4.38) following FERC requirements for a non-capacity license amendment that involves a new diversion. This process is described in detail in Exhibit E of this amendment application;
   (2) AEA submitted an application for Water Rights from the ADNR for 480,000 acre-feet per year from the Martin River (LAS 33602). The application was accepted with a provisional priority date of March 24, 2021. As this is a FERC-regulated hydroelectric project, the ADNR will adjudicate the water rights after FERC authorizes the Project and the Project becomes operational;
   (3) A Fish Habitat Permit would be obtained from ADF&G for instream work and the authorization for the Bradley Lake Project would be amended to include the

Dixon Diversion. AEA has consulted extensively with ADF&G during development of the amendment application, and ADF&G has actively participated in agency meetings and site visits;

(4) An evaluation of potential effects of the Bradley Lake Expansion Project on historical, archeological, and cultural resources has been developed and provided in Exhibit E of this amendment application. This evaluation has been submitted to the SHPO and potentially affected Tribes for their review and comment; and

(5) A Section 404 permit would be obtained from USACE to discharge dredge or fill materials into waters of the U.S. and wetlands. Any necessary construction conditions or wetland mitigation requirements would be determined during the permitting process. USACE wetland delineation forms have been completed in consultation with USACE to support the permit application.

(6) AEA has consulted with USFWS regarding buffers around Bald and Golden eagle nests for blasting and other construction activities to avoid take and has conducted raptor nest surveys within 1-2 miles of proposed construction activities. AEA has developed flight paths that would be used to avoid harassment of eagles and will conduct nest surveys again prior to construction to determine the need for a take permit. If necessary, a permit would be obtained prior to construction.

BRADLEY LAKE HYDROELECTRIC PROJECT

FERC No. 8221

BRADLEY LAKE EXPANSION NON-CAPACITY LICENSE AMENDMENT

EXHIBIT A
PROJECT DESCRIPTION

https://www.ecfr.gov/current/title-18/part-4/subpart-F#p-4.51(b)

Prepared for:

Alaska Energy Authority
813 West Northern Lights Boulevard
Anchorage, Alaska 99503-2495

Prepared by:

Kleinschmidt Associates

June 2026

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ACRONYMS AND ABBREVIATIONS

A

AEA	Alaska Energy Authority

B

BLVD	Bradley Lake Vertical Datum
Bradley Lake Project	Bradley Lake Hydroelectric Project, FERC No. 8221

C

cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission

E

EFMR	East Fork Martin River
El.	Elevation

F

FERC	Federal Energy Regulatory Commission

M

MIF	minimum instream flow
MW	megawatt(s)
MWh	megawatt-hour(s)

P

Project	Bradley Lake Expansion Project (Dixon Diversion and Bradley Lake Pool Raise)

1.0 INTRODUCTION

1.1 Overview of the Bradley Lake Hydroelectric Project and Proposed Expansion

The Alaska Energy Authority (AEA), licensee and owner of the 119.7-megawatt (MW) Bradley Lake Hydroelectric Project (Bradley Lake Project; Federal Energy Regulatory Commission [FERC or Commission] No. 8221), is applying for a non-capacity FERC license amendment pursuant to the Commission's regulations at 18 Code of Federal Regulations 4.201.

The Bradley Lake Project, located near the head of Kachemak Bay on the south shore about 25 miles east-northeast of Homer, Alaska (Figure 1.1-1), commenced commercial operation in 1991. Access to the facility is limited to aircraft or marine craft due to the remote location and lack of connection to the state road system. Travel to the site is generally by air from Homer Airport.

Bradley Lake Project features include a 125-foot-high, 610-foot-long concrete-faced rockfill main dam at Bradley Lake (59.7553° North/150.8558° West), a separate concrete gravity spillway, and a 3.5-mile-long power tunnel that includes a 2,725-foot-long steel-lined tunnel leading to a 435-foot-long manifold section that contains the Y branch penstocks extending to the powerhouse. The Bradley Lake Project generates power from the waters of Bradley Lake, which includes water diverted to the lake from the Middle Fork Bradley River, Nuka Glacier, and Upper Battle Creek. Power is transmitted from the Bradley Lake Project powerhouse to the state's main grid at the Bradley Junction via two parallel, 20-mile-long, 115-kilovolt transmission lines. The Bradley Lake Project serves Alaska's Railbelt[1] from Homer to Fairbanks and easterly to the Delta Junction area and is operated by Homer Electric Association, which is under contract with AEA.

AEA proposes to build a new diversion dam (Dixon Diversion) to divert seasonal meltwater and surface flow coming from the Dixon Glacier, located at the headwaters of the East Fork Martin River (EFMR), into Bradley Lake, May through the end of October, and possibly into November, as conditions allow. AEA also proposes to raise the normal maximum

[1] The Railbelt in Alaska refers to the region served by the Alaska Railroad and the Railbelt electrical grid, which is responsible for providing electricity to approximately 75 percent of the state's population. This region extends from Fairbanks to Anchorage and includes the Kenai Peninsula.

operating pool elevation of Bradley Lake by about 16 feet (Bradley Lake Pool Raise) through a combination of raising the concrete spillway crest elevation, adding spillway crest gates, and raising the dam embankment crest. Lastly, AEA proposes installing a 0.3-MW micro-hydro turbine in one of the Bradley Lake Dam fishwater release valves. Together, these three components make up the Bradley Lake Expansion Project (or Project). Additionally, implementation of the Bradley Lake Pool Raise and added water from the Dixon Diversion would increase the Bradley Lake Project's average power generation from 436,000 megawatt-hours (MWh) to 603,000 MWh annually.

The proposed Project is described herein. Redline and clean versions of the most recent FERC-approved Exhibit A[2] will be filed as supplemental information to the Final Amendment Application.

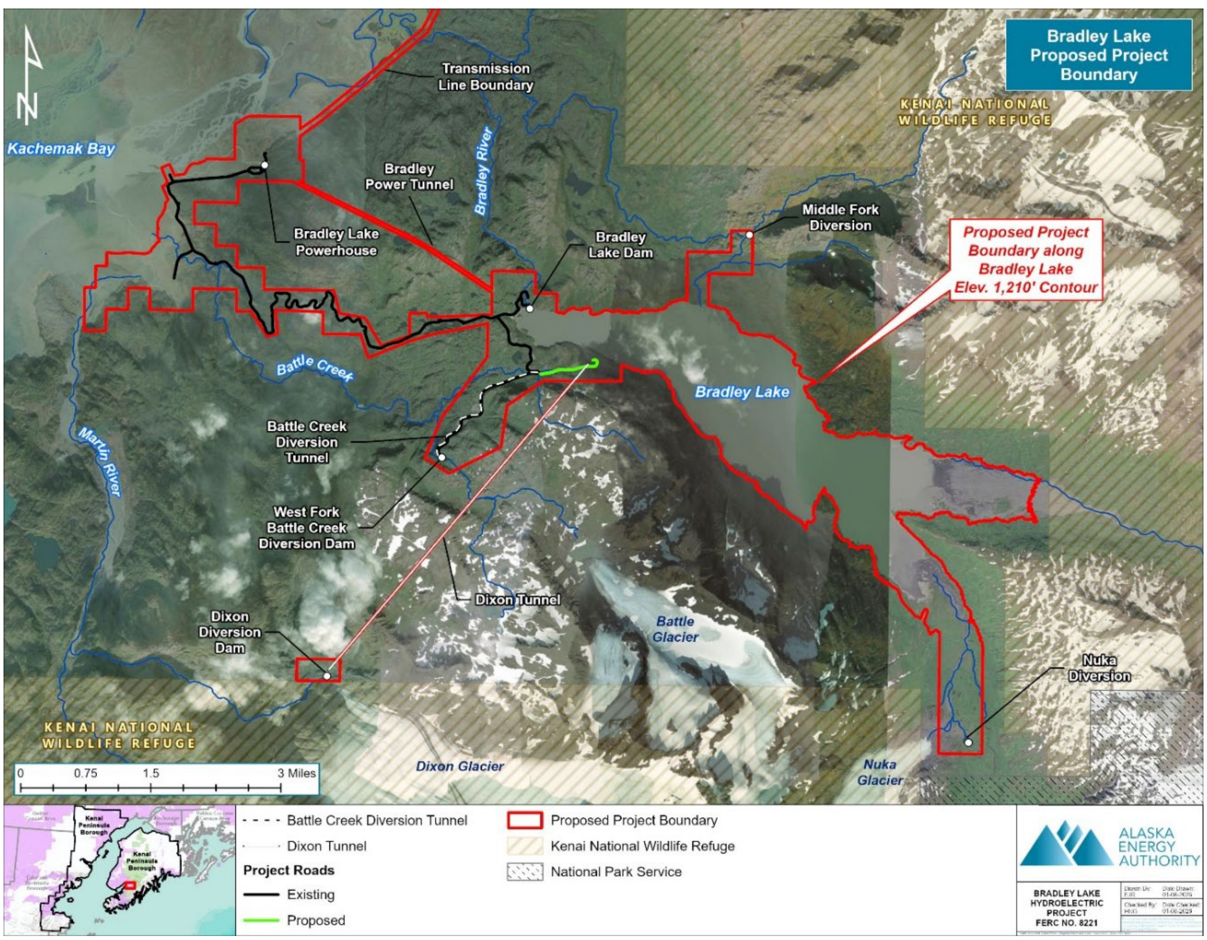


Figure 1.1-1 Location and features of the Bradley Lake Expansion Project near Kachemak Bay, Alaska.

[2] FERC Accession Number: 20210617-3085.

2.0 PROJECT DESCRIPTION OF PROPOSED FACILITIES

2.1 Dixon Diversion

AEA is proposing a new water diversion system (Dixon Diversion) to divert flows from Dixon Glacier, located at the headwaters of the East Fork Martin River (EFMR), to Bradley Lake via an underground tunnel conveyance system. The proposed Dixon Diversion development consists of a dike/sediment guide wall, diversion dam, a forebay berm, diversion tunnel intake, a tunnel discharge channel to Bradley Lake, and a new access road to the proposed tunnel exit. The Dixon Diversion would be operated from spring thaw until winter freeze (May through November) as flows allow after meeting the proposed EFMR minimum instream flow (MIF) releases and would have capacity to divert a maximum of 1,650 cubic feet per second (cfs) from the EFMR basin to Bradley Lake.

2.1.1 Diversion Dam, Head Works, and Conveyance Details

The Dixon Diversion dam (59.6932° North/ 150.9180° West) would be constructed on state-owned land near the terminus of the Dixon Glacier, approximately 5.9 miles south of the existing Bradley Lake Project powerhouse. AEA anticipates that the diversion dam would be a combination of a concrete weir wall approximately 21 feet high by 135 feet long, with two gated openings and a spillway crest of Elevation (El.) 1,276 feet (elevations reference the Bradley Lake Vertical Datum [BLVD], unless otherwise specified) (Figure 2.1-1).

Water control features of the Dixon Diversion include the following:

- A motor-operated slide gate (tentatively 6 feet wide by 6 feet high) to regulate minimum instream flow through the diversion.
- A motor-operated slide gate (tentatively 6 feet wide by 6 feet high) at the diversion dam to provide a low-level outlet to maintain flow through the diversion dam during maintenance operations.
- Two “overshot” crest gates (Obermeyer gates) approximately 33 feet wide by 21 feet tall.

A dike would be constructed at the upstream side of the facility, and a sediment guide wall would extend off the dike to direct flow and sediment toward the diversion and Obermeyer gates. The forebay berm with a crest elevation of El. 1,270 feet would be constructed to divide the diversion pool from the forebay pool that leads to the tunnel intake and preclude coarse sediment from entering the diversion tunnel.

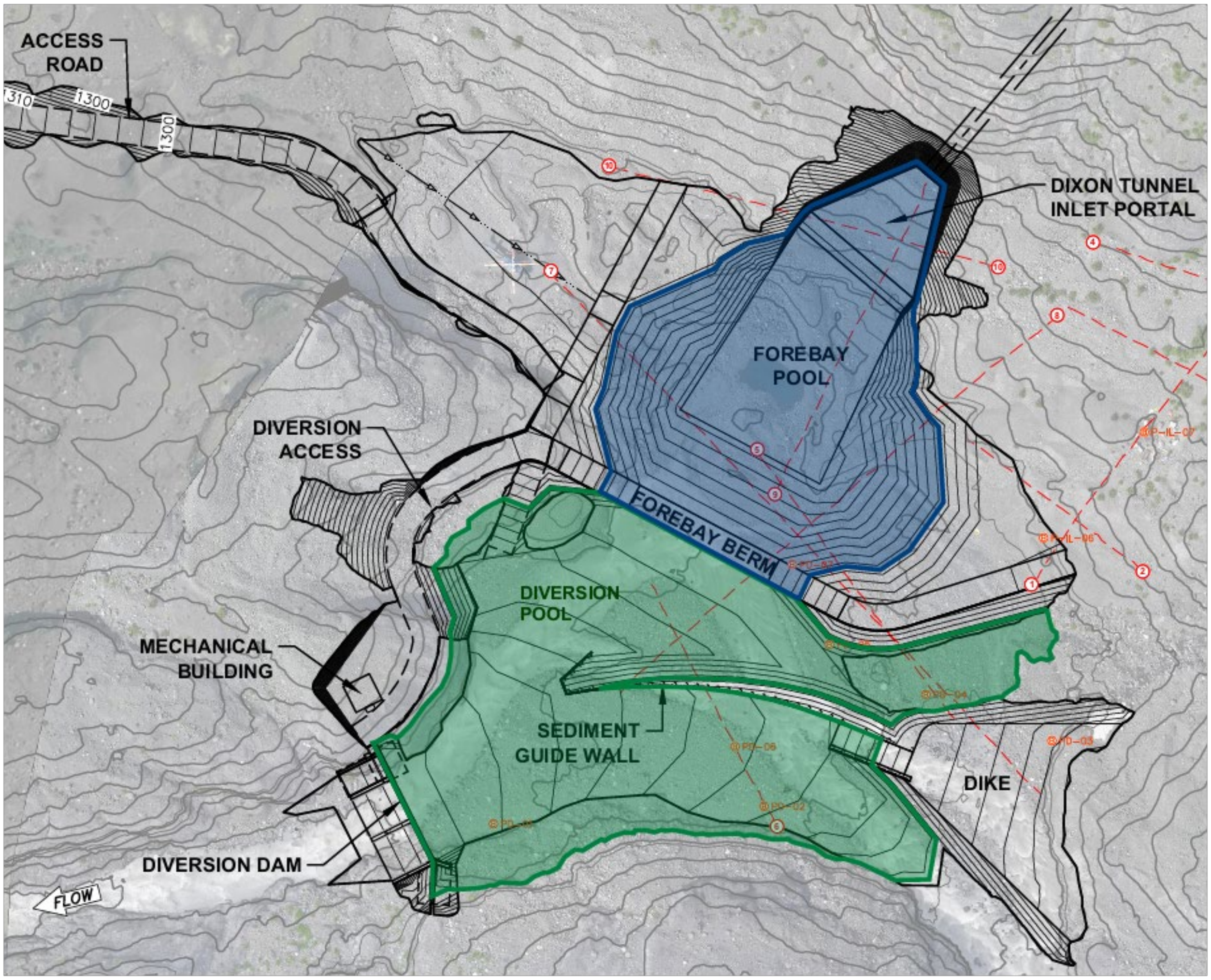


Figure 2.1-1 Schematic of proposed Dixon Diversion.

2.1.2 Flood Flow Capacity of Diversion

Control to Bradley Lake would consist of maintaining MIF releases to the EFMR canyon through the MIF bypass gate, with the remaining flow, up to the tunnel capacity, diverted to Bradley Lake. Excess flow greater than the capacity of the tunnel would spill over the gates to the EFMR canyon. The diversion pool is currently estimated to have a storage capacity of approximately 37 acre-feet at El. 1,276 feet (top of gate and overflow section crest elevation) with a surface area of approximately 3.5 acres.

The diversion dam and tunnel inlet are designed to operate passively such that at headwater levels up to the spillway crest (El. 1,276 feet), the tunnel headworks would capture all flows except for the MIF release. The capacity of the tunnel is 1,650 cfs at headwater levels at and above El. 1,275.5 feet. When the headwater level exceeds El. 1,276 feet, the portion of the flow greater than the capacity of the tunnel would pass over the top of the overshot gates and/or the diversion gates would be lowered.

2.1.3 Dixon Diversion Tunnel

A tunnel would be bored to convey water northeast from the diversion to Bradley Lake. As proposed, diverted water would flow from the diversion pool through a 4.6-mile-long underground concrete-lined tunnel with an inside diameter of 14 feet. The tunnel would be constructed using a tunnel boring machine advancing from the downstream portal to the upstream portal near the proposed diversion dam. A segmental concrete system is proposed for the finished tunnel lining. Tunnel muck would be removed from the downstream end and disposed of in several areas near the tunnel outlet as shown in Exhibit E, ranging from 40-50 acres. When completed, water from the diversion would exit from this tunnel into a new tunnel discharge channel and flow into Bradley Lake. The invert of the tunnel entrance would be approximately at El. 1,262.0 feet, and the invert at the outlet would be at approximately El. 1,185.0 feet.

2.1.4 Diversion Tunnel Exit Portal Features

Diverted water would flow from the tunnel through a channel to Bradley Lake. The channel would be approximately 1,250 feet long and would transition through several different sectional geometries. The initial 500 feet of channel would be trapezoidal with a bottom width of 20 feet and side slopes of 0.25H:1V[3] excavated through rock; above the rock elevation, the excavation slope would transition to 2H:1V. From approximately 500 feet to 850 feet, the diverted water would flow through an existing pond feature and then into a steep, narrow canyon section that flows directly into Bradley Lake.

2.1.5 Exit Portal Access Road

A new 16-foot-wide gravel access road would be constructed, extending approximately 1 mile from the existing Battle Creek Diversion Access Road to the Dixon Diversion tunnel exit portal, partially located on top of the tunnel muck spoil disposal area.

[3] 0.25 units of horizontal distance: 1 unit of vertical distance.

2.1.6 Appurtenant Facilities

An equipment storage building would be constructed at the Dixon Diversion site. The equipment storage building would be a Quonset hut-style metal building on a concrete slab foundation, approximately 75 feet long by 30 feet wide, and separated into two primary areas: an equipment garage and a crew lounge. Additionally, a small, prefabricated building, with dimensions of approximately 20 feet by 20 feet, would be set at the right abutment of the Dixon Diversion dam to house the mechanical equipment and instrumentation to operate the Obermeyer gates.

2.2 Bradley Lake Pool Raise

Major elements of the existing Bradley Lake Project include a concrete-faced rockfill dam, an ungated spillway having a discharge capacity of 23,800 cfs; a diversion tunnel that also serves as a low level outlet; a submerged intake leading to the power tunnel that, including the vertical shaft, is 19,152 feet long; a surface powerhouse located on the shore of Kachemak Bay; and a tailrace channel into the bay.

Bradley Lake Dam currently impounds Bradley Lake to a full pool elevation of El. 1,180 feet with a surface area of 3,802 acres and a usable storage capacity of approximately 280,000 acre-feet. Under the Bradley Lake Pool Raise, the lake level of Bradley Lake would be increased by 16 feet to El. 1,196 feet. This would result in an increase in the total surface area to 4,033 surface acres and an increase in usable storage capacity to approximately 342,000 acre-feet. The pool raise would be achieved through a combination of raising the concrete spillway crest elevation, adding spillway crest gates, and raising the embankment dam crest. The dam crest would be raised approximately 13 feet through a combination of increased rockfill, extending the upstream concrete facing, and reconstruction of the concrete parapet wall. The operating net head of the Bradley Lake Project, which is currently 917 feet, would increase to 933 feet with the Bradley Lake Pool Raise.

2.2.1 Modifications to Bradley Lake Dam

Modifications to Bradley Lake Dam would include demolition of the existing concrete crest and parapet wall, placing rockfill on the downstream slope to raise the embankment crest to El. 1,202.9 feet, extending the concrete face to match the existing slope, a targeted grouting program near the dam abutments, including the spillway, and reconstructing a new 4-foot parapet wall (top of wall El. 1,206.9 feet) and cap at the dam crest (Figure 2.2-1). Rockfill would be initially placed at the downstream toe of the embankment and built in lifts extending to the new top of dam. Approximately 4 feet of freeboard is proposed above the estimated preliminary Probable Maximum Flood (PMF) elevation (El. 1,202.9 feet) to the top of the parapet.

Earthfill would be placed on the left abutment to maintain continuity of the top of dam elevation to the exposed rock outcrop on the left abutment. The design would accommodate vehicle access to the dam crest, downstream toe, and the existing control buildings for the power tunnel and diversion works. It was assumed that the concrete parapet wall would be extended across the left side and be buried into the embankment access ramp on the far edge of the left abutment up to the rock face to create a hydraulic barrier that is continuous from the concrete face of the embankment to the left abutment. The length of the dam would increase by 230 feet to a total of 840 feet.

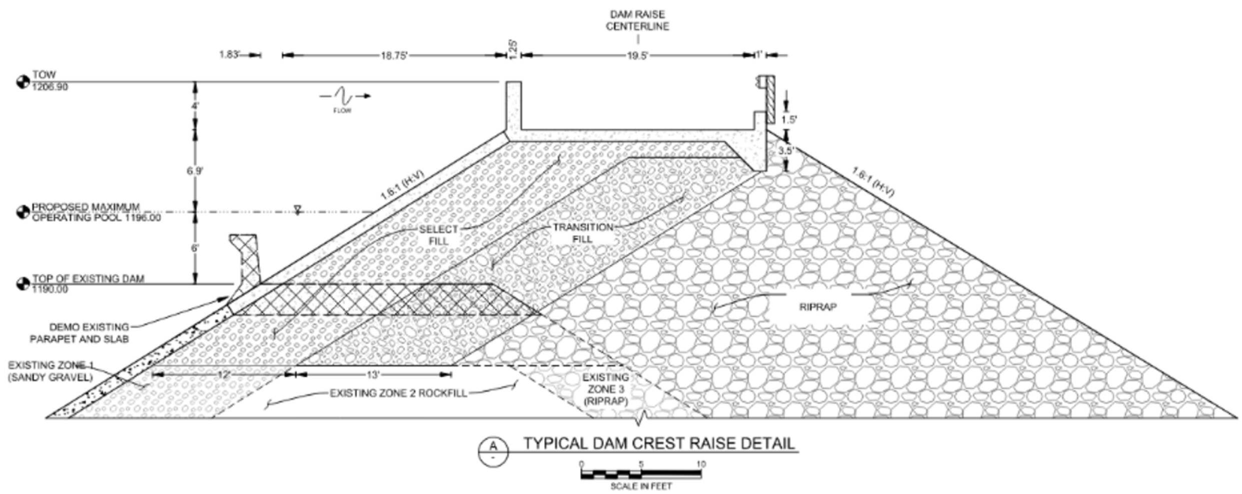


Figure 2.2-1 Schematic of proposed dam embankment for Bradley Lake Pool Raise.

On the right abutment, between the embankment and spillway, a combination of earthfill and concrete retaining walls would be constructed to maintain the proposed dam-crest elevation. A vehicle turnaround area and a ramp to the existing outlet works control building would be maintained. Near the downstream toe of the dam, a new access road would be constructed to extend across the embankment to provide access to the diversion tunnel outlet portal building and toe of the dam. To avoid covering the outlet portal building, a retaining wall would be constructed to retain the embankment fill and provide access to the building.

An extended staircase to the new crest elevation would provide access to the downstream side of the spillway and gallery. An extension of the existing grout curtain is planned to occur across the area between the spillway and the embankment.

For the raised embankment, approximately 100,000 cubic yards of rockfill material is estimated. The raised section would also include filter (transition) materials placed behind the reinforced concrete face with a similar gradation to the existing materials. A drill and blast rock quarry would be developed in several borrow areas identified close to the dam site to generate the required fill materials for constructing the embankment raise.

2.2.2 Modifications to Bradley Lake Spillway

Modifications to the Bradley Lake spillway include adding 8.5 feet of fixed concrete crest to El. 1,188.5 feet with a 7.5-foot-high crest gate on top to El. 1,196.0 feet as shown in Figure 2.2-2. The spillway mass would be expanded downstream to meet FERC stability requirements. The non-overflow abutments are proposed to be raised 8 feet to contain the current PMF pool elevation with an additional 4-foot parapet wall. This approach would maintain the current centerline for continuity with the adjacent embankment (that would also be raised).

The spillway geometry is planned to maintain a 3H:10V upstream face and an 8H:10V downstream face. Spillway discharge at the preliminary PMF would be approximately 42,500 cfs at a lake level of El 1,202.9 feet. It was assumed that the expanded spillway would be reinforced on the downstream face, with the downstream rebar drilled and grouted into the rock. This includes a new grout curtain installed under the proposed heel of the spillway and redrilling of the existing foundation drains.

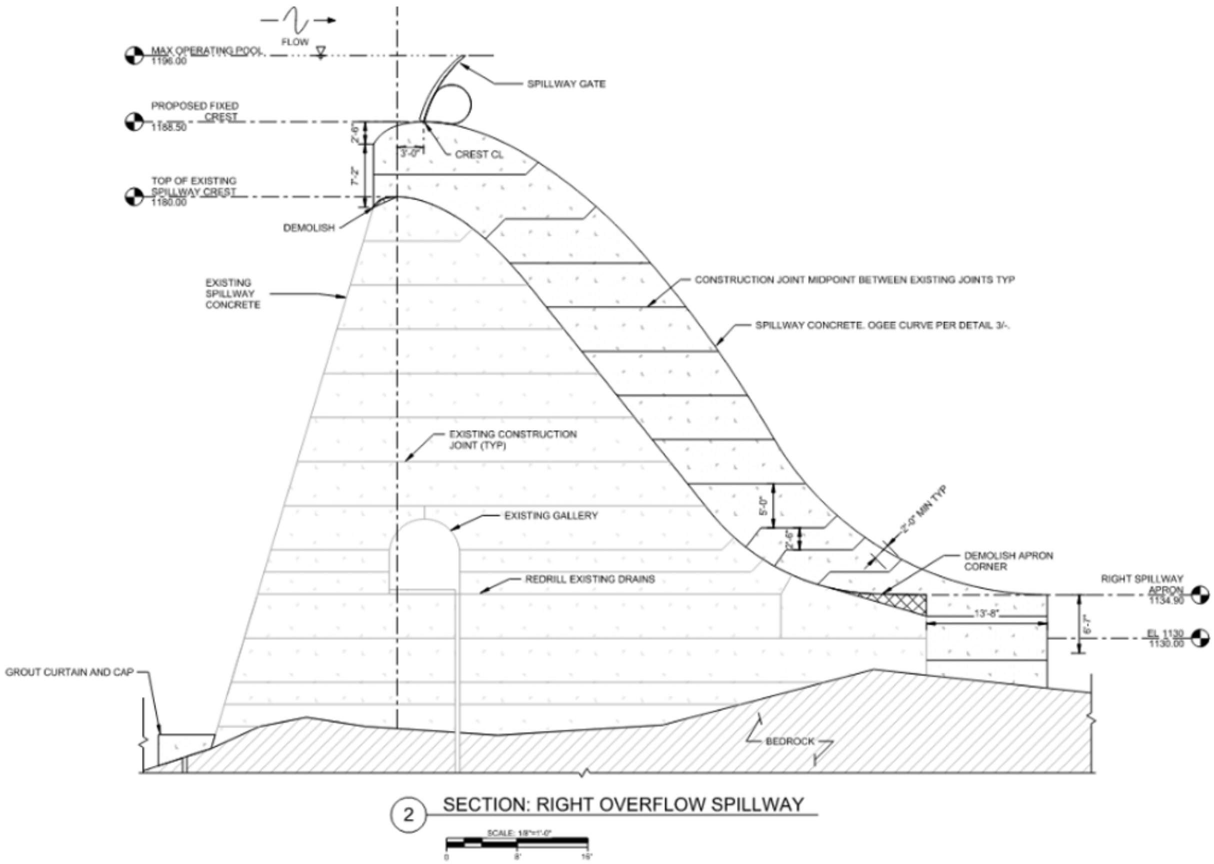
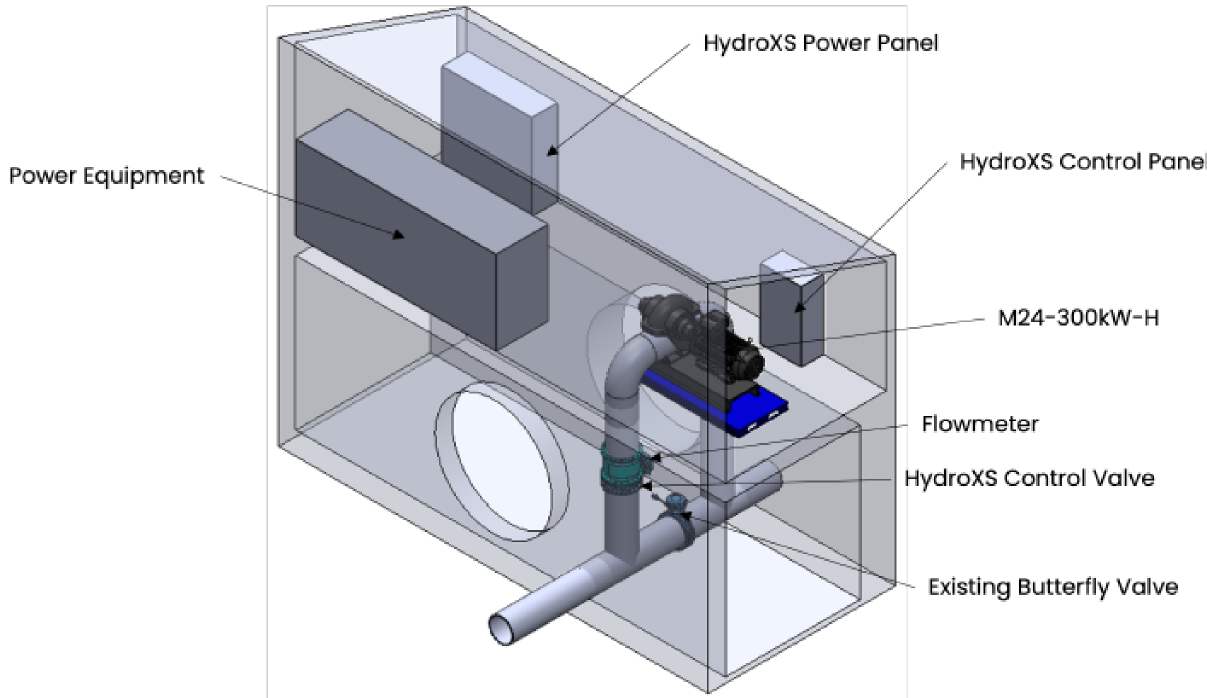


Figure 2.2-2 Schematic of proposed spillway for Bradley Lake Pool Raise with Obermeyer gates.

2.3 Micro-Hydro Turbine

AEA is proposing to install a 0.3-MW micro-hydro turbine on one of the Bradley Lake Dam fishwater release valves (Figure 2.3-1). Developed by InPipe Energy, Inc., the HydroXS is a modular, turnkey, digitally enabled energy recovery system that replicates the functionality of control valves and manages and controls flow and pressure in a pipeline to efficiently generate electricity from the pressure without impacting the delivery of water. The system would be installed in a bypass at Bradley Lake's eastern fishwater release valve manifold. The housing would be situated at approximately El. 1,075 feet, located 12 feet above the fishwater release valve site (El. 1,063 feet). The micro-hydro turbine would be variable speed and is designed to continuously adjust rotational speed to maintain constant downstream pressure, optimizing turbine efficiency across changing flows. The turbine's minimum operating head pressure is 15 pounds per square inch differential. Under conditions where Bradley Lake elevation falls below the operative head pressure level (approximately mid-April to the end of June), the micro-hydro turbine would be offline; this would not impact required minimum flow releases from Bradley Lake to the Bradley River.



Source: InPipe Energy, Inc. (2026).

Figure 2.3-1 HydroXS design concept.

2.4 Increase in Generation Capacity

The Bradley Lake Dam fishwater micro-hydro turbine would add an additional 0.3 MW of installed capacity, increasing the Bradley Lake Project's total installed capacity from 119.7 MW to 120.0 MW.

Based on results from a turbine and generator study (see Appendix A1), the generating capacity of the Bradley Lake Project would increase by an additional 0.9 MW due to higher head pressure associated with the 16-foot pool raise (from net head 917 feet to 933 feet) (Voith Hydro 2026).

3.0 LAND OWNERSHIP

3.1 Land Ownership and Project Boundary Description

The proposed Bradley Lake Expansion Project would occupy no lands or interests in lands of the United States. The State of Alaska owns all the land within the existing Bradley Lake Project boundary as well as the 295.0 acres of land to be added to the FERC Project boundary as part of this amendment. The legal description of the lands that would be added to the Project boundary are provided in Table 3.1-1 and displayed in Exhibit G. The total proposed FERC Project boundary would encompass 8,820.4 acres.

Table 3.1-1 New lands to be added to the Bradley Lake Project lands by the proposed license amendment.

Township	Range	Section	Exhibit G Plate	Project Acres
T005S	R008W	19	G-3	6.6
		20	G-3	9.6
		29	G-3	2.8
		30	G-3	9.5
T005S	R009W	31	G-3	11.1
		8	G-2	0.8
		9	G-2	5.7
		10	G-2	8.0
		11	G-2	0.8
		14	G-3	3.7
		15	G-2	6.5
		16	G-2	41.9
		17	G-2	1.9
		19	G-2	1.3
		20	G-2	2.6
		22	G-2	6.9
		23	G-3	6.7
		24	G-3	5.4
		25	G-3	16.6
		26	G-3	3.3
		30	G-4	3.2
T005S	R010W	36	G-3	2.8
		11	G-1	13.2
		12	G-1	37.6
		25	G-4	1.0
		35	G-4	39.9
		36	G-4	45.7
Total Acreage				**295.0**

4.0 REFERENCES

InPipe Energy, Inc. 2026. Proposal: The HydroXS with Variable Speed Control. Prepared for Alaska Energy Authority. May 2026.

Voith Hydro. 2026. Hydraulic Technical Description: Vertical Pelton Turbines. Extrapolation of Model Efficiency Curves and Estimation of increased Turbine Power. Bradley Lake. Prepared for Alaska Energy Authority. June 2026.

Appendix A1

Hydraulic Technical Description

Bradley Lake	
Hydraulic Technical Description Vertical Pelton Turbine	 Revision -

Hydraulic Technical Description
Vertical Pelton Turbines

Extrapolation of Model Efficiency Curves and Estimation of increased Turbine Power

Bradley Lake

Rev.	Page	Description	Created by	Approved by	Date
A					
B					
C					
D					
E					
F					

Executing OU	Created by		Checked by		Approved by		Issue Date
VHV	Name Neumann	MiNe	Name Goetz	GoetMar	Name Atzmueller	AtzmAl	2026-06-16

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For Bradley Lake Hydro Power Project there is a consideration of increasing the dam height by 16ft. This will also increase the operation head of the turbine by approx. the same amount. Voith Hydro received model efficiency curves of the existing turbine and was asked to estimate the model turbine efficiency for the increased operation height. Later the additional request was placed to derive the expected increased power.

2 Received Data

The data received of the existing turbine consists of model efficiency curves of the original runner delivery from the 1980’s and curves of upgraded VATECH runners. Please see **Enclosure A**.

3 Task

The task of the service provided by Voith Hydro was the estimation of the efficiency level at the new maximum operation head considering an increase of 16ft. In addition, the expected increased power shall be estimated.

4 Procedure of Model Data Extrapolation

The received diagrams (Enclosure A) show the hydraulic model efficiency (EtahM) over the model discharge (QM) at different ku1 values. Considering ku1 is the symbol for the unitless speed factor it can be calculated as following.

$$k_{u1} = \frac{\pi \cdot n \cdot D_1}{\sqrt{2 \cdot g \cdot H}}$$

while:
n = rotational speed in 1/s
D1 = pitch diameter in m
g = gravity constant in m/s²
H = net head in m

As a first step the received curves (Enclosure A) were digitalized and shown as numerical table. Please see below Table 4-1.

QM	etahM	ku1
m³/s	%	-
0.051	0.895	0.497
0.06	0.901	0.497
0.07	0.905	0.497
0.08	0.9075	0.497
0.09	0.9085	0.497
0.1	0.9073	0.497
0.11	0.90415	0.497
0.12	0.8992	0.497
0.1265	0.895	0.497
0.051	0.892	0.445
0.06	0.897	0.445
0.07	0.9013	0.445
0.08	0.9035	0.445
0.09	0.9044	0.445
0.1	0.9038	0.445
0.11	0.9016	0.445
0.12	0.8997	0.445
0.1265	0.8985	0.445
0.051	0.895	0.455
0.06	0.9005	0.455
0.07	0.905	0.455
0.08	0.9066	0.455
0.09	0.9074	0.455
0.1	0.9073	0.455
0.11	0.9057	0.455
0.12	0.9025	0.455
0.1265	0.9	0.455
0.051	0.898	0.47
0.06	0.9029	0.47
0.07	0.9075	0.47
0.08	0.90991	0.47
0.09	0.91015	0.47
0.1	0.909	0.47
0.11	0.9072	0.47
0.12	0.904	0.47
0.1265	0.90185	0.47
0.051	0.8973	0.483
0.06	0.9032	0.483
0.07	0.908	0.483

0.08	0.9105	0.483
0.09	0.9106	0.483
0.1	0.9092	0.483
0.11	0.9065	0.483
0.12	0.903	0.483
0.1265	0.9	0.483

Table 4-1 – Table of digitalized model data

This table allowed the creation of a hill chart with iso lines of constant model efficiency in % as shown in Figure 4.1.

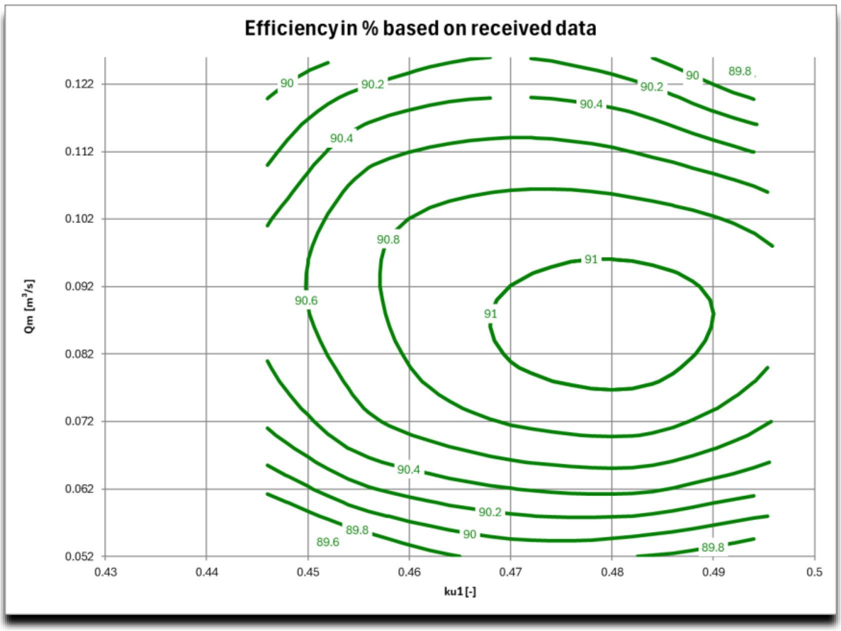

Figure 4.1 – Hill Chart with iso lines of model efficiency

Figure 4.1 represents the existing status.
For the extrapolation of the hill chart towards higher heads the following assumptions are made / simplifications are applied:

- Considering the above-mentioned formula for ku1 the smallest ku1 value of 0.445 is assumed to represent the maximum head.
- A head increase at the dam results roughly in the same increase in net heads for turbine operation.

If the head increases by 16ft from old maximum net head $H_{net,max,A}$ = 1150ft to increased maximum net head $H_{net,max,B}$ = 1166 ft it results in a ku1-factor of $\frac{\sqrt{Hnet,max,A}}{\sqrt{Hnet,max,B}} = \frac{\sqrt{1150\,ft}}{\sqrt{1166\,ft}} = 0.993$. Hence the new minimum ku1 results in 0.442

For this new ku1 value an extrapolation of the numerical table was done. In addition, checking the plausibility of the extrapolation a further extrapolation step for ku1 = 0.439 was performed; please see the below updated Table 4-2. The graphical presentation is shown in Figure 4.2.

QM	etahM	ku1
m³/s	**%**	**-**
0.051	0.895	0.497
0.06	0.901	0.497
0.07	0.905	0.497
0.08	0.9075	0.497
0.09	0.9085	0.497
0.1	0.9073	0.497
0.11	0.90415	0.497
0.12	0.8992	0.497
0.1265	0.895	0.497
0.051	0.892	0.445
0.06	0.897	0.445
0.07	0.9013	0.445
0.08	0.9035	0.445
0.09	0.9044	0.445
0.1	0.9038	0.445
0.11	0.9016	0.445
0.12	0.8997	0.445
0.1265	0.8985	0.445
0.051	0.895	0.455
0.06	0.9005	0.455
0.07	0.905	0.455
0.08	0.9066	0.455
0.09	0.9074	0.455
0.1	0.9073	0.455
0.11	0.9057	0.455
0.12	0.9025	0.455
0.1265	0.9	0.455
0.051	0.898	0.47
0.06	0.9029	0.47
0.07	0.9075	0.47
0.08	0.90991	0.47

0.09	0.91015	0.47
0.1	0.909	0.47
0.11	0.9072	0.47
0.12	0.904	0.47
0.1265	0.90185	0.47
0.051	0.8973	0.483
0.06	0.9032	0.483
0.07	0.908	0.483
0.08	0.9105	0.483
0.09	0.9106	0.483
0.1	0.9092	0.483
0.11	0.9065	0.483
0.12	0.903	0.483
0.1265	0.9	0.483
0.051	0.8916	0.442
0.06	0.8960	0.442
0.07	0.9000	0.442
0.08	0.9023	0.442
0.09	0.9032	0.442
0.1	0.9026	0.442
0.11	0.9007	0.442
0.12	0.8990	0.442
0.1265	0.8980	0.442
0.051	0.8912	0.439
0.06	0.8950	0.439
0.07	0.8987	0.439
0.08	0.9010	0.439
0.09	0.9019	0.439
0.1	0.9014	0.439
0.11	0.8999	0.439
0.12	0.8984	0.439
0.1265	0.8974	0.439

Table 4-2 – Extrapolated table of model data

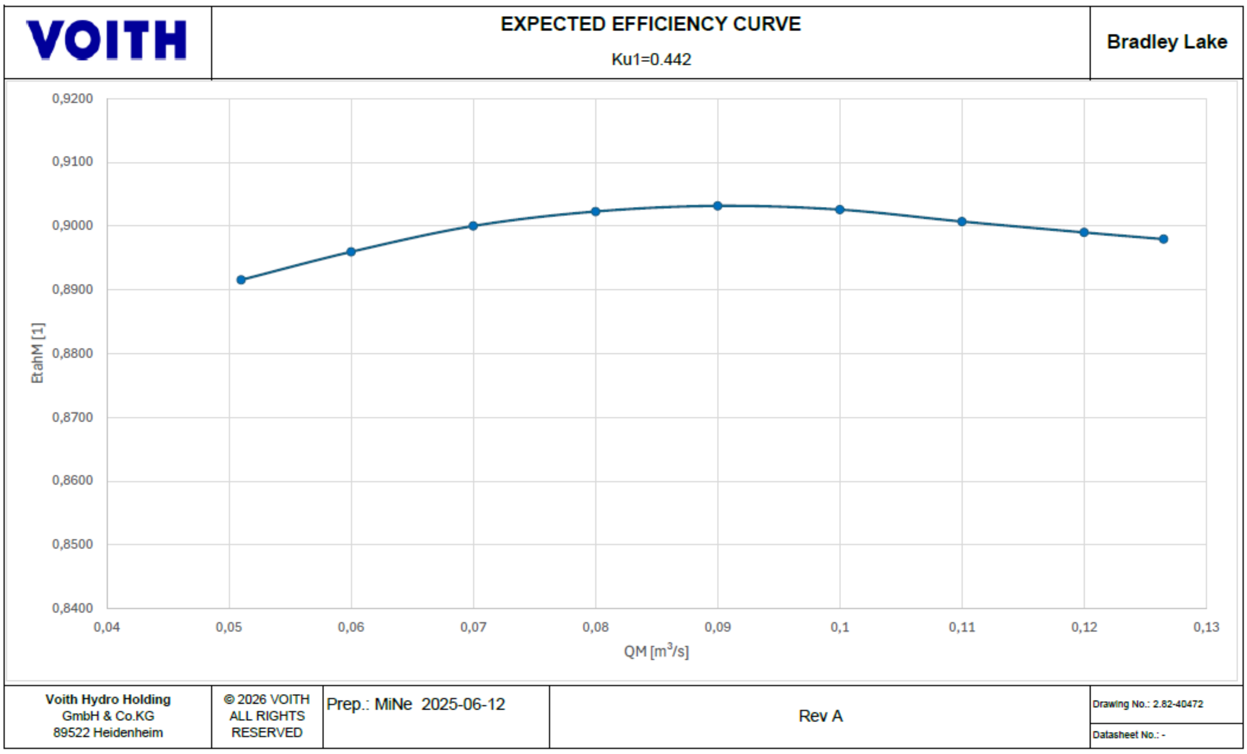

Figure 4.2 – extrapolated model efficiency at ku1 = 0.442

For a visual double-check again a hill chart with model efficiency iso-lines was created with the extrapolated table. Please see the diagram in Figure 4.3.

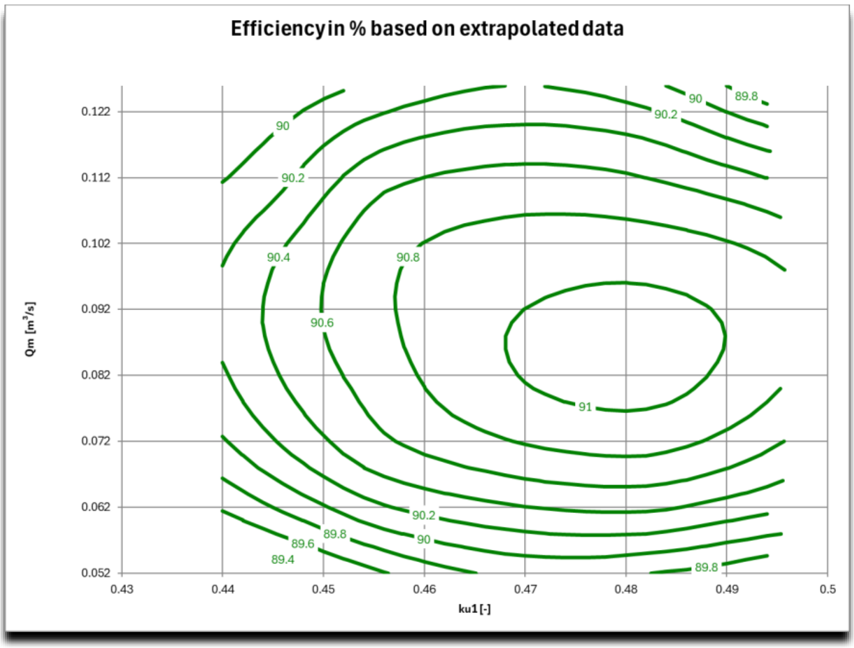

Figure 4.3 – Hill Chart with extrapolated iso lines of model efficiency

The iso lines have a smooth shape and look reasonable. Therefore, the updated data are taken to estimate the increase of protype power by the increase of the dam height and head water level.

5 Estimation of Expected Power by increased Dam Height

In general, it is assumed that all turbine components and water ways of the existing plant are suitable to safely operate an increased head by 16 ft.

For the estimation of the expected new power unfortunately the direct deriving from the model curves to the prototype cannot be applied, because not all model data are available. The received model curves include information about runner size and test head, but there is no information about the speed of the machine nor of the rated discharge at model.

Anyhow Voith Hydro received data of the prototype performance shown in the machine name plate. Please see Figure 5.1. It shows the performance data of the original machine delivery in 1989.

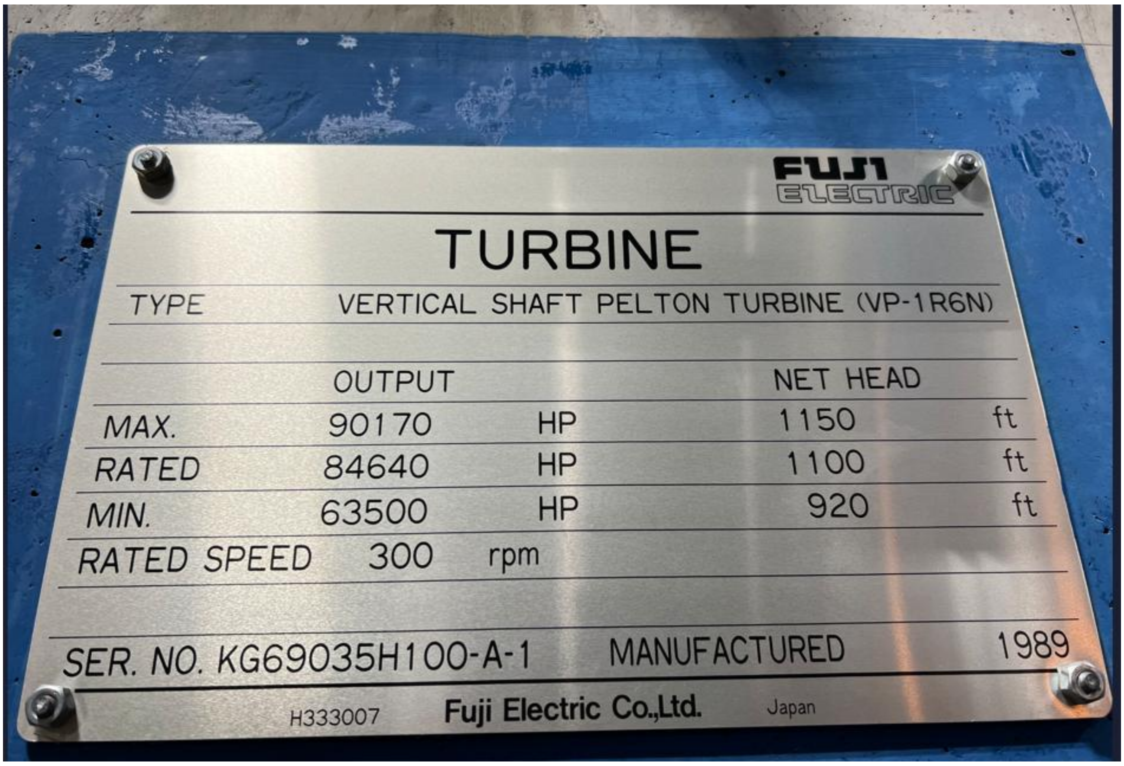

Figure 5.1 – Turbine name plate with performance data of original delivery in 1989

In general, the prototype power can be calculated with the following equation:

$$P = roh \cdot g \cdot H \cdot Q \cdot eta$$

while:

P = Power

roh = density of water in kg/m³

g = gravity constant in m/s²

H = net head in m

Q = discharge in m³/s

eta = efficiency in %

The density and gravity will stay constant at the same location and site condition. The discharge is assumed to be constant as well.

For the head a scaling factor can be derived based on the head increase. Starting from $H_{max,old}$ = 1150 ft to $H_{max,new}$ = 1166 ft a scaling factor of f_{head} = 1.014 ($H_{max,new}$ / $H_{max,new}$) can be applied to the original power. A possible increase of head losses due to the enlarged water ways is assumed to be neglectable.

Assuming that the best efficiency point of the hill chart characteristic is within the operation range of the turbine, the maximum head will be shifted farer away from the optimum due to the increase in head. The efficiency level will decrease in a similar amount like the decrease from ku1 = 0.483 to ku1 = 0.442 (see extrapolated in chapter 4). The average efficiency at ku1 = 0.442 is smaller than the average efficiency at ku1 = 0.483 by factor $f_{average}$ = eta_average_ku1_0.442 / eta_average_ku1_0.483 = 0.9933.

Compared to the power information of the name plate there was an upgrade of the Bradley Lake turbines by VATECH (see different curves in Enclosure A; existing runners versus VATECH runners). The average efficiency change by this upgrade (calculated based on the data in Enclosure A) is an increase by factor $f_{upgrade}$ = 1.012.

The final scaling factor results in

$f_{scaling} = f_{head} * f_{average} * f_{upgrade} = 1.014 * 0.9933 * 1.012 = 1.019$

Starting from the power of $P_{max,\ old}$ = 90170 HP the increased power due to the head increase by 16 ft can be estimated to

$P_{max,new} = P_{max,old} * f_{scaling}$

and results in approx. 91800 HP.

6 Conclusion

It is assumed that all existing turbine components, generators and water ways are designed to safely operate an increased head by 16 ft during normal operation conditions as well as during transient conditions. The same needs to be checked and confirmed separately by suitable methods.

The above-described estimation of power increase from 90170 HP to approx. 91800 HP is a rough estimation only. For a more exact value a more detailed analysis is necessary which considers all existing turbine components and water ways in detail. Anyhow, it might give an indication of what new power level might be reached as a basis for further project decisions.

While the electrical specification and design of the generator does not change, it is assumed that the output of the generator will also increase linear with the turbine output increase. We understand the current name plate capacity of the generator is 63000 kVA, which would - at the factor 1.019 increase to roughly 64200 kVA with the head increase.

BRADLEY LAKE HYDROELECTRIC PROJECT
FERC No. 8221

BRADLEY LAKE EXPANSION NON-CAPACITY LICENSE AMENDMENT

EXHIBIT B
PROJECT OPERATION AND RESOURCE UTILIZATION

https://www.ecfr.gov/current/title-18/chapter-I/subchapter-B/part-4/subpart-F#p-4.51(c)

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June 2026

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ACRONYMS AND ABBREVIATIONS

A

ac-ft	acre-feet
AEA	Alaska Energy Authority

B

BLVD	Bradley Lake Vertical Datum
Bradley Lake Project	Bradley Lake Hydroelectric Project (FERC No. 8221)

C

cfs	cubic feet per second

E

EFMR	East Fork Martin River
El.	Elevation

F

FERC	Federal Energy Regulatory Commission

K

kV	kilovolt

L

LiDAR	light detection and ranging

M

MIF	minimum instream flow
MW	megawatt(s)
MWh	megawatt-hour(s)

P

psid	pounds per square inch differential

R

RM	River Mile[1]

S

SCADA	supervisory control and data acquisition system

U

USGS	United States Geological Survey

W

WFUBC	West Fork Upper Battle Creek
WSE	water surface elevation

[1] The Martin River is discussed in terms of "Project" river miles, which have been established for the purposes of the Bradley Lake Expansion Project (formerly Dixon Diversion Project). Because the Martin River is constantly changing, it does not have standard recognized river mile markers; note that figures using the label "RM" for the Martin River are still showing Project river miles.

1.0 INTRODUCTION

The Alaska Energy Authority (AEA), licensee and owner of the 119.7-megawatt (MW) Bradley Lake Hydroelectric Project (Bradley Lake Project; Federal Energy Regulatory Commission [FERC] No. 8221), is pursuing a non-capacity FERC license amendment. The Bradley Lake Project is an existing power generation facility constructed on the south shore near the head of Kachemak Bay, about 25 miles northeast of Homer, Alaska.

Bradley Lake Project features include a 125-foot-high, 610-foot-long concrete-faced, rockfill main dam at Bradley Lake (59.7553° North/150.8558° West), a separate concrete gravity spillway, and a 3.5-mile-long power tunnel that incorporates a 3,000-foot-long steel-lined tunnel/penstock at the powerhouse (Figure 1.0-1). The Bradley Lake Project generates power from Bradley Lake, which includes water diverted to the lake from the Middle Fork Bradley River, Nuka Glacier, and Upper Battle Creek. Power is transmitted from the Bradley Lake powerhouse to the state's main grid at Bradley Junction via two parallel, 20-mile-long, 115-kilovolt (kV) transmission lines. Homer Electric Association operates the Bradley Lake Project under contract with AEA. Bradley Lake serves Alaska's Railbelt[2] from Homer to Fairbanks and easterly to the Delta Junction area.

AEA proposes to build a new diversion dam (Dixon Diversion) to divert seasonal meltwater and runoff coming from the Dixon Glacier, located at the headwaters of the Martin River, through an underground tunnel to Bradley Lake from May through November, as flows allow (Figure 1.0-1). As part of the amendment, AEA proposes to increase the storage capacity of Bradley Lake and raise the normal maximum operating pool elevation of Bradley Lake by about 16 feet (Bradley Lake Pool Raise) through a combination of raising the concrete spillway crest elevation, adding spillway crest gates, and raising the dam embankment crest. AEA also proposes to install a 0.3-MW micro-hydro turbine in one of the Bradley Lake Dam fishwater release valves. Together, these three components make up the proposed Bradley Lake Expansion Project (Project or proposed development).

Installation of the 0.3-MW micro-hydro turbine would increase the Bradley Lake Project installed capacity from 119.7 MW to 120.0 MW. Raising the normal maximum operating

[2] The Railbelt in Alaska refers to the region served by the Alaska Railroad and the Railbelt electrical grid, which is responsible for providing electricity to approximately 75 percent of the state's population. This region extends from Homer to Fairbanks and easterly to the Delta Junction area.

pool elevation by 16 feet would increase the generating capacity by an additional 0.9 MW due to higher head pressure associated with increasing the net head from 917 feet to 933 feet. The added water diverted to Bradley Lake and storage capacity (from approximately 280,000 acre-feet to 342,000 acre-feet) would increase the amount of power the Bradley Lake Project can produce on average from about 436,000 megawatt-hours (MWh) to 603,000 MWh each year, an increase of approximately 38 percent.[3]

This Exhibit B describes the proposed Bradley Lake Expansion Project operation and resource utilization as an amendment to the existing Bradley Lake Project and proposed operational changes to the Bradley Lake Project.

[3] Since the Battle Creek Diversion became operational in late 2020, other sources of inflow to Bradley Lake have been lower than the normal long-term average. Average annual power generation at the Bradley Lake Project from 2021 through 2025 was approximately 420,000 MWh, while the expected long-term average annual power generation with the Battle Creek Diversion is approximately 436,000 MWh.

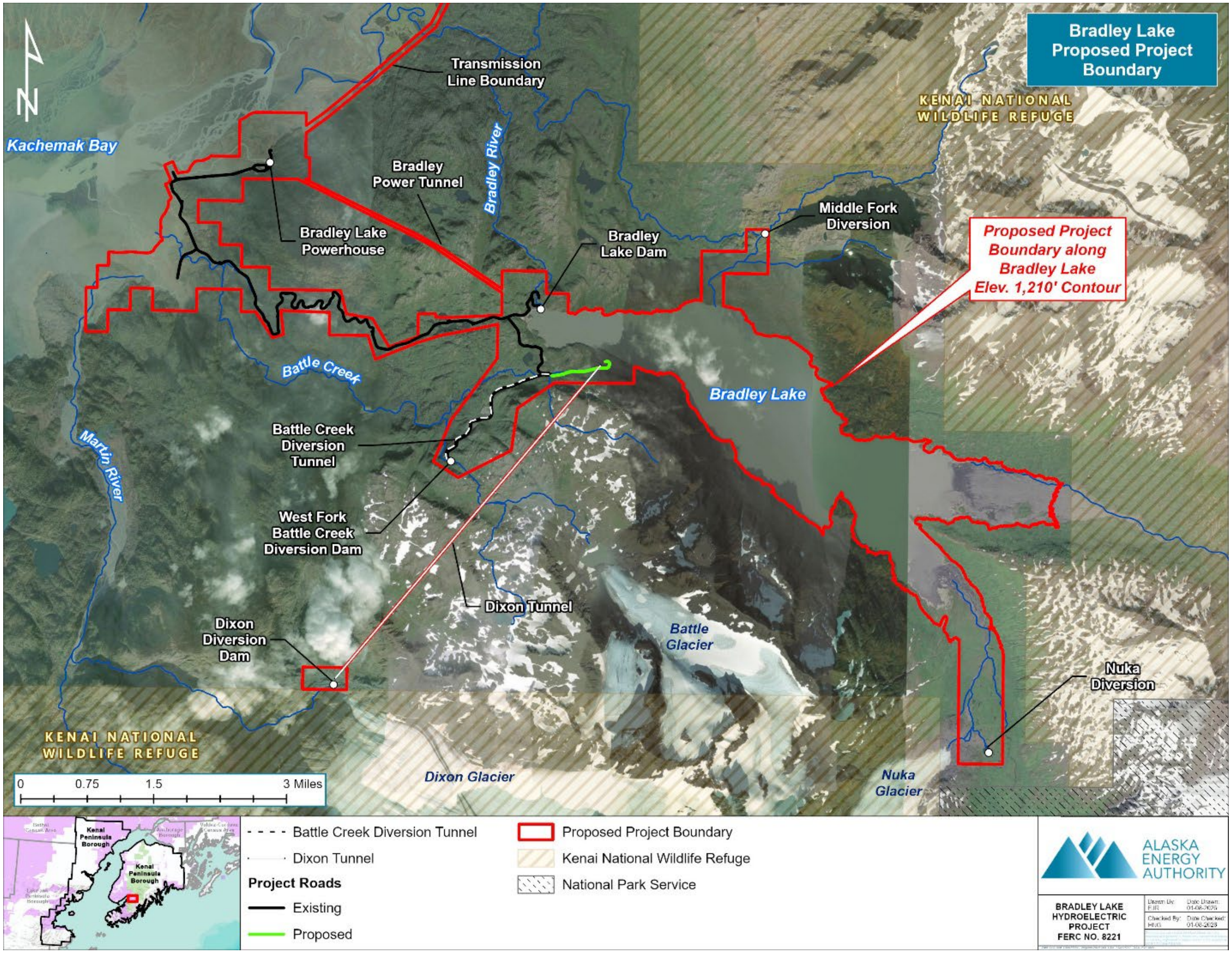


Figure 1.0-1 Location and features of the Bradley Lake Expansion Project near Kachemak Bay, Alaska.

2.0 BRADLEY LAKE PROJECT OPERATION AND RESOURCE UTILIZATION

2.1 Proposed Operational Changes

2.1.1 Bradley Lake Mode of Operation

The Bradley Lake Project would continue to be operated in automatic mode from a remote location. However, complete control facilities are also provided for local operation at the plant. A supervisory control and data acquisition system (SCADA) provides remote plant control and transmits operational data to the remote location. The SCADA system consists of a master control at a dispatch center and a remote unit at the power station. A second remote terminal unit is located at the reservoir gate house to start the propane generator and remotely operate the intake gate and receive gate position and reservoir level data. The proposed Dixon Diversion would be operated remotely.

2.1.2 Annual Plant Factor

The average annual plant factor is determined using the following equation:

$$\frac{\text{Average Annual Output}}{\text{Licensed Capacity x 8,760 hours/year}} = \text{Average Annual Plant Factor}$$

Average annual power generation at the Bradley Lake Project from 2021 through 2025 was approximately 420,000 MWh, and the average annual plant factor was approximately 40 percent based on the current licensed capacity of 119.7 MW. Since the Battle Creek Diversion became operational in late 2020, the inflow to Bradley Lake has been lower than the normal long-term average; the estimated 10-year average annual power generation with Battle Creek is approximately 436,000 MWh, which would have an average annual plant factor of 42 percent. The proposed Bradley Lake Expansion Project is anticipated to produce 603,000 MWh annually on average, and installation of the micro-hydro turbine would increase the Bradley Lake Project's installed capacity to 120.0 MW, which would result in a plant factor of 57 percent.

2.1.3 Proposed Operation and Operation During Maintenance Activities

2.1.3.1 Bradley Lake

The Bradley Lake Project operates in a peaking mode and provides some of the least expensive power to the Railbelt. Since 2003, spill events have occurred on five occasions, driven by specific circumstances. The last spill event occurred in 2019 due to the Swan Lake fire, which had destroyed part of the 115-kV transmission line north of Sterling, temporarily blocking transmission of Bradley Lake power to all Railbelt utility service territories north of the Homer Electric Association service area.

Under the proposed development, the Bradley Lake Project would continue to be operated in coordination with other Railbelt resources to maximize output and optimize water resources to meet load demand when water for generation is available and reduce reliance on natural gas generation. Reservoir elevations would continue to be highest during the fall months and lowest during the spring months prior to snowmelt and glacier melt. The Bradley Lake Project would continue to be operated to minimize spill, and no changes to minimum flows (timing, amount, or duration) into the Lower Bradley River or to operations during maintenance activities are proposed.

The Bradley Lake Dam currently impounds Bradley Lake to a full pool elevation (El.) 1,180 feet (Bradley Lake Vertical Datum [BLVD])[4] with a surface area of 3,802 acres. Normal operation pool elevations range from El. 1,080 feet to El. 1,180 feet providing a usable storage capacity of approximately 280,000 acre-feet and net head at full pool of 917 feet. Under the proposed development, the normal maximum pool elevation would increase from El. 1,180 to El. 1,196 feet. At the higher proposed normal maximum pool elevation of 1,196 feet, the total surface area of Bradley Lake would be 4,033 acres, and the usable storage capacity would increase to approximately 342,000 acre-feet.

2.1.3.2 Dixon Diversion

The Dixon Diversion would divert water from the Dixon Glacier subbasin, to Bradley Lake through a tunnel (Figure 2.1-1) early May through November, as flows allow after meeting proposed minimum instream flow (MIF) releases to the EFMR (Table 2.1-1).

[4] Bradley Lake Vertical Datum (BLVD) is specific to the Bradley Lake Hydroelectric Project. To convert from BLVD to North American Vertical Datum of 1988, add 9.76 feet.

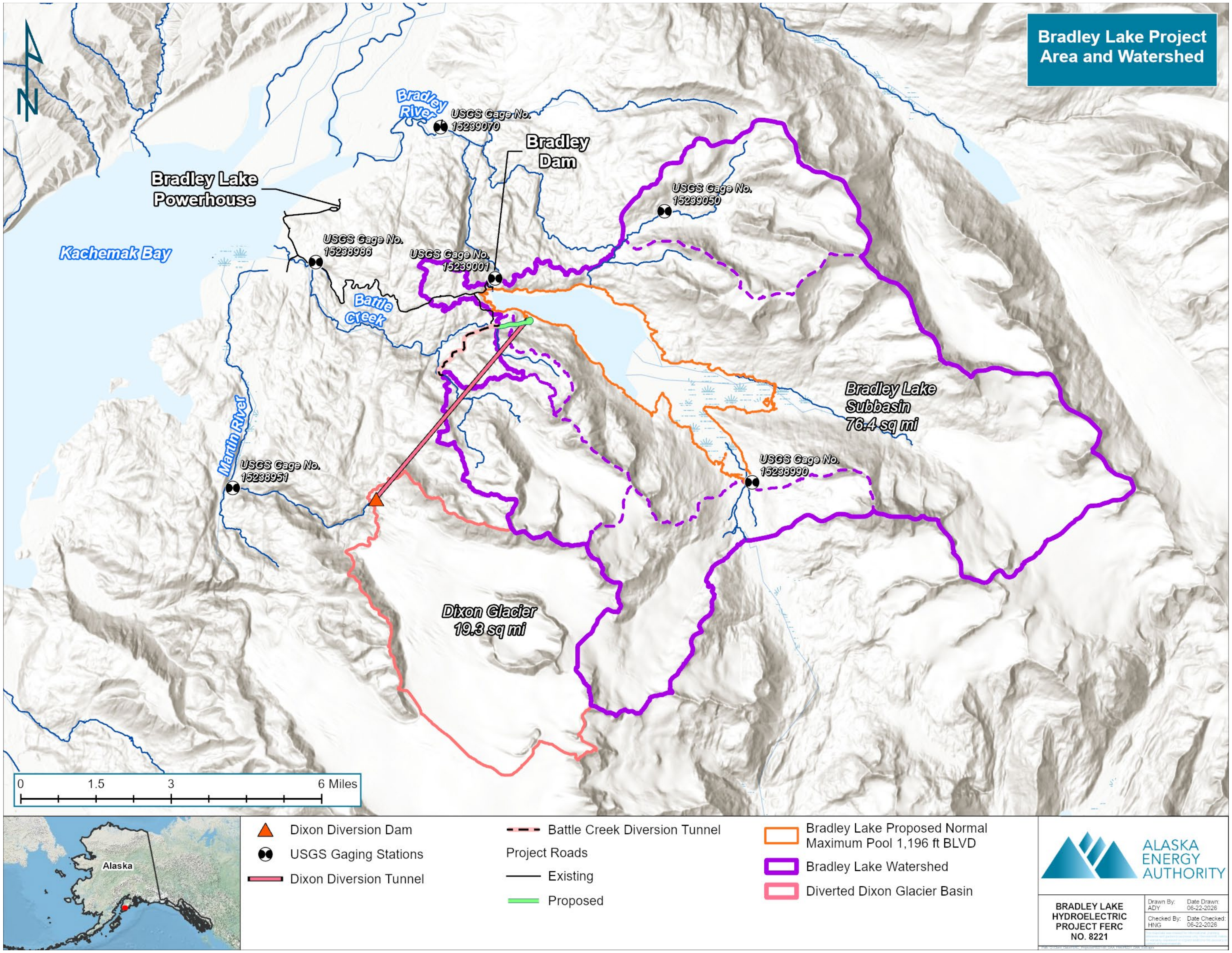


Figure 2.1-1 Proposed Bradley Lake Expansion Project near Kachemak Bay, Alaska.

2.1.3.2.1 Diversion Dam, Head Works, and Conveyance Details

The Dixon Diversion dam would be constructed near the terminus of the Dixon Glacier to impound water to divert through a tunnel to the southwestern portion of Bradley Lake.

Water control features of the Dixon Diversion include the following:

- A motor-operated slide gate regulating MIF through the diversion dam to the EFMR below the diversion.
- A motor-operated slide gate at the diversion dam to provide a low-level outlet to maintain flow through the diversion dam during maintenance operations and act as an alternative gate to provide MIF to the EFMR.
- Two “overshot” crest gates (Obermeyer gates) that would serve two primary purposes:
    - One (or both) gates would be lowered occasionally to flush accumulated sediments in the diversion pool through the diversion dam.
    - One (or both) gates would be lowered to pass large floods, particularly when the diversion pool exceeds El. 1,275.5 feet.

A sediment guide wall would extend off the dike to direct flow and sediment toward the diversion and Obermeyer gates. The wall would create a longer flow path for water going to the tunnel, increasing the hydraulic residence time and promoting sediment to deposit in front of the diversion. The sediment guide wall would also help concentrate velocity toward the diversion during sediment flushing operations.

The forebay berm would divide the diversion pool from the forebay pool that leads to the tunnel intake. The purpose of the forebay berm would be to ensure that water submerges the MIF gate before flowing into the tunnel.

2.1.3.2.2 Diversion Hydrologic Considerations

The 19.3-square mile Dixon Glacier basin (Figure 2.1-1) drains into the East Fork Martin River (EFMR). The upper drainage basin is typically ice and snow covered with minimal runoff from sometime in November until sometime in May. In some years, late warm storms may increase flow for a couple of days in November before colder temperatures are re-established. Beginning around April, the heavy snowpack below the proposed diversion site starts to melt, contributing to gradually increasing, but relatively low flows in May. Snow above the diversion tends to mostly melt in June and later. During June-July, the snow and ice melt from above the diversion is a significant component of the total Martin River flow. During August and September, glacial melt continues to contribute to base flows while storms tend to be frequent, resulting in rapid flow increases in the Martin River. Between storms, runoff from the upper basin may substantially decrease because the snowpack is largely depleted in July.

Historic EFMR flow data are unavailable. The intra-annual variability in flows and the steep bedrock canyon terrain with multiple falls below the glacier make gaging the site very difficult. The United States Geological Survey (USGS) installed the Dixon Creek gage below the Dixon Glacier (USGS Gage No. 15238950) in fall 2021. One stage and discharge measurement were taken in October 2022 before the gage site was washed out and replaced in April 2023 with USGS Gage No. 15238951 EFMR at Mouth near Homer, Alaska, about 3.5 miles downstream of the proposed Dixon Diversion site. This gage was also washed out in August 2024 and has since been re-established.

Due to limited site-specific data, EFMR flow was estimated based on a 43-year record of gaged flow from the Nuka Glacier into the Upper Bradley River (USGS Gage No.15238990; 1980-2022), adjusted for differences in basin area to develop a synthetic record (Figure 2.1-2). The resulting hydrograph on the EFMR (representative of the Dixon Diversion) combines three years of measured discharge (2023-2025) with the synthetic record (1980-2022) for a 46-year record. The estimated annual peak flow from Dixon Glacier was greater than 1,000 cubic feet per second (cfs) in 44 of 46 years and greater than 2,000 cfs in 29 of 46 years (Figure 2.1-2). Seasonally, the annual median estimated flows were highest in August (854 cfs), followed by July (806 cfs), September (444 cfs), June (224 cfs), October (85 cfs), and May (21 cfs) (Figure 2.1-2).

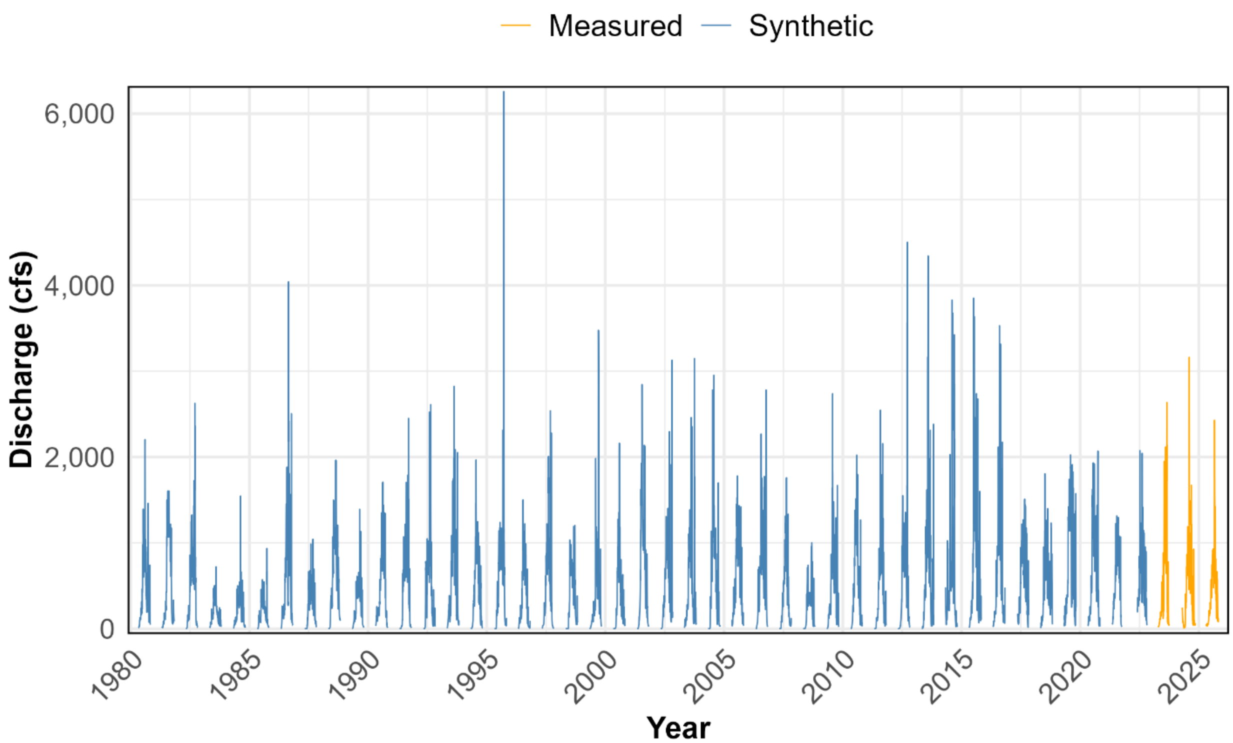


Figure 2.1-2 Estimated flow in the East Fork Martin River, 1980–2025.

2.1.3.2.3 Diversion Operational Considerations

The proposed Dixon Diversion operating period is designated to capture flows during the peak runoff seasons, while maintaining streamflows for fish migration through the Martin River and providing periodic bedload transport.

Minimum Instream Flow Releases

An operation plan for the Dixon Diversion was developed based on releasing sufficient water through the diversion dam to maintain a minimum flow regime in the EFMR below the diversion dam throughout the period of operation. The proposed EFMR MIF releases are provided in (Table 2.1-1). If the incoming flow from the Dixon Glacier basin is less than the defined MIF for that date, all the water would be released to the EFMR. Water would not be diverted to Bradley Lake until the EFMR MIF releases are met.

Table 2.1-1 Proposed Dixon Diversion minimum instream flow releases to the East Fork Martin River.

Date	Daily Average Minimum Flow (DAMF)[a,b,c]	Acceptable Short-term Deviations (rounded to whole numbers)
May 1 – May 15	50 cfs	DAMF less 5% (48 cfs)
May 16 – May 31	Increase flow 5 cfs per day to 130 cfs	DAMF less 5%
June 1 – June 25	150 cfs	DAMF less 5% (143 cfs)
June 26[d] – September 25	75 cfs	DAMF less 5% (71 cfs)
September 26 – October 15	150 cfs	DAMF less 5% (143 cfs)
October 16 – October 22	100 cfs	DAMF less 5% (95 cfs)
October 23[e] – April 30	50 cfs	DAMF less 5% (48 cfs)

[a] DAMF = The 24-hour rolling average is defined as the average flow for a point in time using the proceeding 12-hour time period and the succeeding 12-hour time period. The proposed acceptable short deviation would allow flows to be up to 5% less than the stated DAMF as long as the 24-hour average flow met the DAMF requirement. The MIF may be temporarily modified if required by emergencies beyond the control of the operator, or for short periods upon mutual agreement between AEA and the Alaska Department of Fish and Game.

[b] Or all available EFMR flow, whichever is less.

[c] Plus any additional flow exceeding the tunnel capacity of 1,650 cfs.

[d] Ramp down from 150 cfs to 75 cfs over a 24-hour period.

[e] Ramp down from 100 cfs to 50 cfs over a 24-hour period.

Sediment Management

During Dixon Diversion operation, coarse sediment would accumulate in the diversion pool, and the accumulated sediment would be periodically flushed downstream through the spillway gates as needed. The intent would be to retain sediment away from the diversion tunnel inlet portal and convey it to the EFMR below the diversion and allow the river to transport the sediments downstream to their natural destination. Provisions to periodically flush sediment to the EFMR would maintain delivery of coarse sediment and gravel to the Martin River from its primary source. During hydraulic flushing operations using the Obermeyer gates, water would not be diverted to Bradley Lake. Following sediment removal sufficient to restore operations, the Obermeyer gates would be closed, and normal diversion operations would resume.

Two flushing methods would be used:

- Hydraulic Flushing (Front Side Area): Flushing would be performed by opening or lowering the Obermeyer spillway gates during periods of sufficiently high inflow to mobilize and transport deposited sediment downstream in the EFMR.
- Mechanical Removal (Back Side Area): Sediment in the back side area would be mechanically moved to the stream channel just upstream from the diversion dam slide gates or spillway gates using on-site equipment during periods of low river discharge. These sediments would then be flushed during the next hydraulic flushing.

Sediment yield from the glaciated watershed could be large and vary widely from 610,000 to 6,100,000 cubic yards per year and include clay, silt, sand, gravel, and cobble-sized sediment. Typical coarse sediment portions of the total sediment load in glacial systems range from about 5 percent to 10 percent. Assuming the coarse sediment (gravel and cobble) is 5 percent of the total loading, the average annual gravel and cobble load could range from 30,000 to 300,000 cubic yards per year.

Based on modeling simulations (DOWL 2026), the annual number of sediment flushes is expected to vary widely from year to year, and frequency and duration would depend on conditions at the given time. Hydraulic flushing duration will depend on the EFMR inflow rate. Based on two-dimensional (2D) hydraulic modeling, a flow of 500 cfs would flush most cobble and finer material through the forebay pool, and a flow of 1,000 cfs would flush all cobble but not boulder-sized materials. It is anticipated that these sediment flushing flows would be released as needed to manage bedload accumulation upstream of the diversion dam.

EFMR Channel Maintenance Flow Releases

It is anticipated that periodic channel maintenance flows would be passed through the diversion dam to the EFMR and, hence, to the Martin River. A channel maintenance flow of 1,000 cfs for 12 hours would be released a minimum of 3 years out of each moving 10-year average of Project operation. Storms resulting in flows of 1,000 cfs or more for a duration of 12 hours, as measured at the point of compliance gage, would count for one channel maintenance flow. Additionally, flows resulting from storm events may count as a maintenance flow event if the licensee consults with the Alaska Department of Fish and Game following the storm event and the agency approves the flow levels as recorded at the required gage.

2.1.3.2.4 Diversion and Conveyance Capacity

During normal operation, the Dixon Diversion structure would divert up to 1,650 cfs, which is less than the 2-year recurrence flow of 2,300 cfs at the Dixon Diversion, without spilling, and convey that flow to Bradley Lake via a tunnel.

Flows that exceed the capacity of the diversion tunnel (after delivering the required MIF) would flow through the diversion dam to the EFMR. The excess flow would be routed over the two spillway overshot gates. During flood flows, the two approximately 33-foot-wide by approximately 21-foot-tall overshot gates can be lowered for a flood capacity of about 19,000 cfs (approximately a 17,000-year flood) before overtopping the diversion dam structure at El. 1,282 feet.

The lower slide gate would be approximately 6 feet by 6 feet in size and positioned to provide a low-level outlet to maintain flow through the diversion dam during maintenance operations. The upper slide gate would be approximately 6 feet by 6 feet in size with a capacity of approximately 350 cfs at El. 1,270 feet to reliably deliver the EFMR MIF requirement. The capacity of the two slide gates would not be needed for flood routing.

Table 2.1-2 shows the capacity of the Dixon Diversion MIF bypass gate, spillway gates, and tunnel compared to extreme floods.

Table 2.1-2 Dixon Diversion estimated bypass spillway and diversion tunnel capacity.

Flood Description	Water Surface Elevation of Diversion Pool (feet)	Flow (cfs)		
		Inflow	Tunnel	Bypass in Excess of Tunnel[a]
2 feet of freeboard	1,274	1,450	1,300-1,400	0
1 foot of freeboard	1,275	1,650	1,500-1,600	0
0 feet of freeboard (diversion dam crest)	1,276	1,800	1,650	0-100
10-year flood peak flow	1,281.9	4,500	1,650	2,700-2,800
100-year flood peak flow	*	7,900	0	7,750-7,850

* = The overshot gate(s) would be lowered as needed during inflows that would result in a diversion pool level of El. 1,282 feet or greater if the gates were not operated. The elevation of the diversion pool when the gates are completely lowered is El. 1,268 feet.

[a] The MIF release range of 50 cfs (minimum) to 150 cfs (maximum) is assumed.

2.1.3.2.5 Flow Measurements

The MIF slide gate would have pre-defined diversion pool elevation versus discharge versus gate opening rating tables for EFMR bypass flows that operators would use to change the gate opening as necessary. A water level indicator would be installed at the diversion to measure the diversion pool water level, which would be used to establish the MIF gate opening. The diversion dam would be the point of compliance for measuring the EFMR MIF flows.

2.1.3.2.6 Startup of Diversion and Head Works

The proposed Dixon Diversion is in a remote location, and access to the diversion for annual startup and shutdown, as well as maintenance and inspections during diversion operations, would be via helicopter.

Initially, the annual startup process would include a series of inspections and tests to verify the systems are operational and/or to perform maintenance and repair activities. Specific activities would be to review the diversion pool and, if necessary, mechanically stage accumulated sediments in front of the spillway gates so they can be flushed downstream; inspect the spillway, low-level, and MIF gates for damage; and verify the gates and instrumentation are functioning properly. Upon completion of the inspection and any maintenance and repairs, the MIF gate would be opened and the spillway gates would be set to their raised position to initiate the diversion process. Cameras would also be installed at the facility to allow operators to view conditions at the site. After a couple of years of operations, and if there is no need for any repairs or maintenance, the diversion process may be initiated remotely.

2.1.3.2.7 Operation of the Diversion and Head Works

The Dixon Diversion would be operated remotely from early May through November, as conditions allow. The MIF gate elevation would be designed such that water would flow through the diversion to the EFMR before the diversion pool elevation would be high enough to initiate diversion to Bradley Lake. Inflow to the diversion that exceeds the MIF requirement would flow over the diversion forebay berm sill, through the diversion tunnel, and to Bradley Lake. The diversion forebay berm and forebay would create depositional environments, allowing for large (i.e., greater than gravel) sediment to settle. Fine sediment (e.g., small gravels, sands, and silt) would be conveyed through the tunnel to

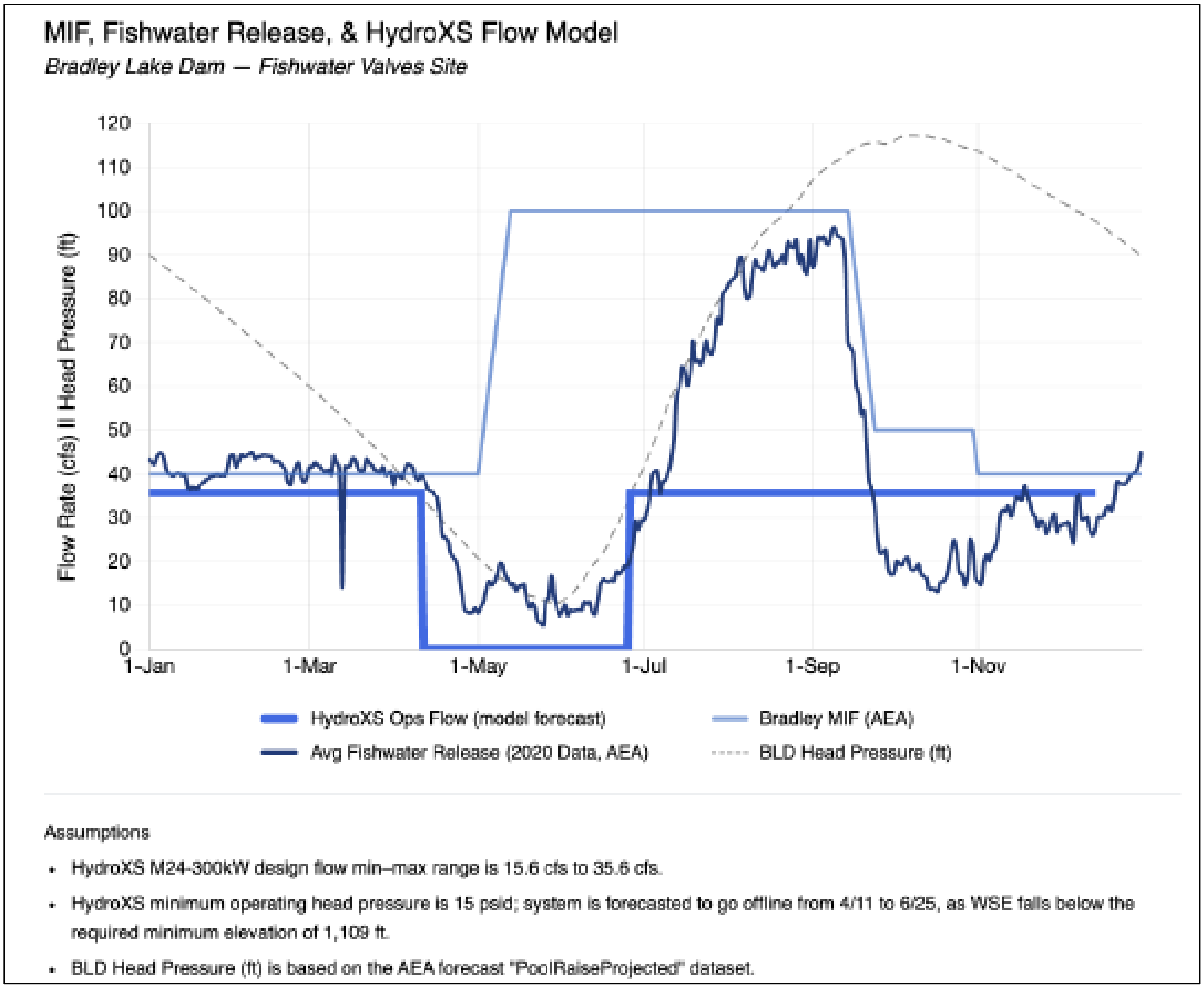
Bradley Lake. The MIF gate would be continuously monitored at the Bradley Lake Project control room and remotely adjusted as necessary to maintain the required MIF.

Flows exceeding the capacity of the diversion tunnel would flow through the diversion dam and continue downstream to the Martin River. During extreme floods, the spillway gates would be lowered, and the dam could be safely overtopped.

In late October to November, Bradley Lake Project operators would inspect the diversion, perform maintenance and repairs, and ensure the gates are in their appropriate position for the non-operating season; the diversion tunnel inlet portal gate would be closed, the overshot spillway gate leaves would be lowered, and the MIF and low-level outlet gates would be opened. During the non-operating period of December to April, all runoff from the Dixon Glacier basin would flow through the diversion to the EFMR.

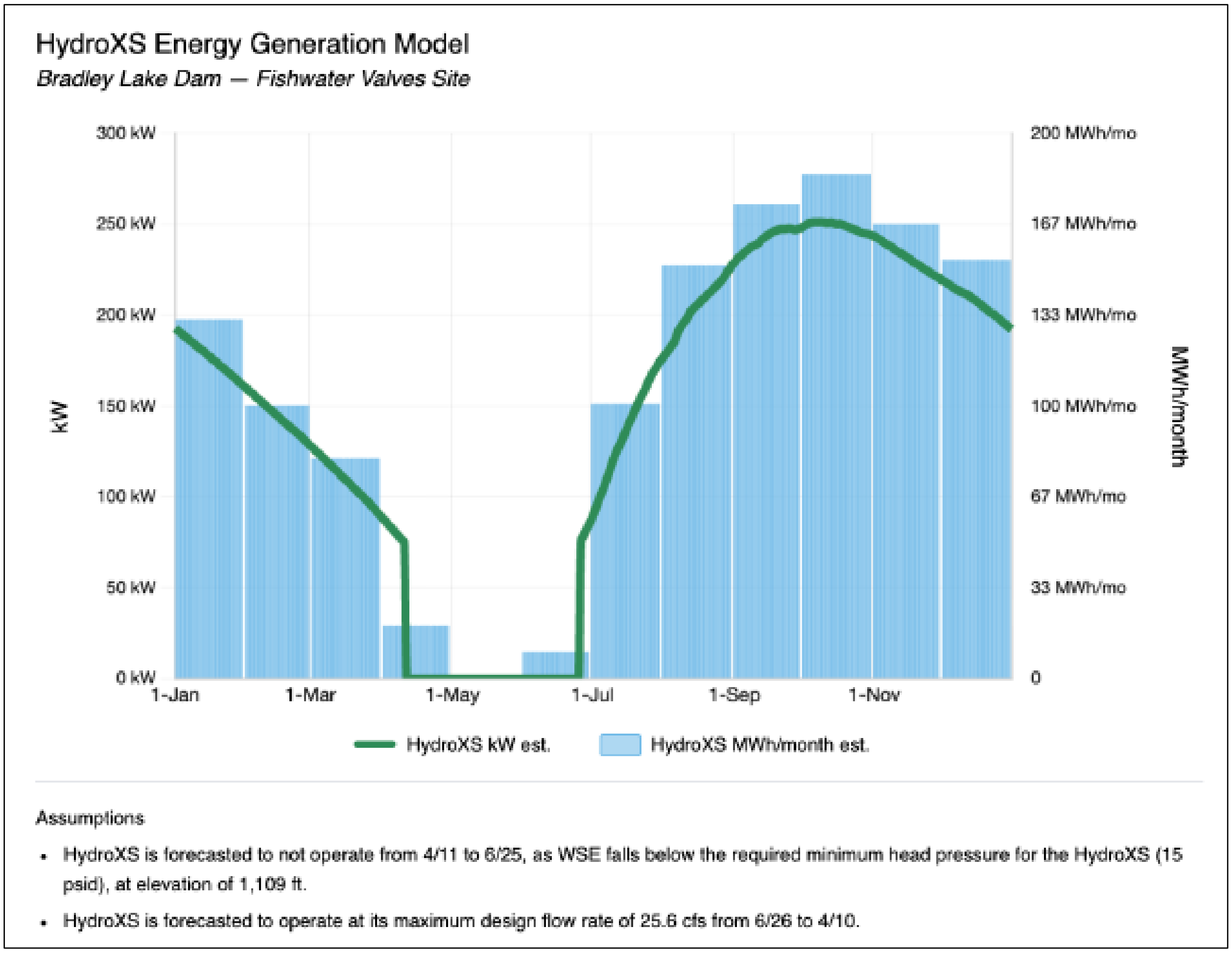
2.1.3.3 Micro-Hydro Turbine

The hydraulic model for the micro-hydro turbine was based on the required Bradley River MIF releases from Bradley Lake and the water surface elevation (WSE) for Bradley Lake. The micro-hydro turbine's minimum operating head pressure is 15 pounds per square inch differential (psid). Bradley Lake elevation falls below operative head pressure level (El. 1,109 feet) from approximately mid-April to the end of June. Under these conditions, the micro-hydro turbine would be offline (Figure 2.1-3). The maximum occurring head pressure is typically reached in early October, when the Bradley Lake WSE will peak at El. 1,192 feet, yielding 51 psid. Following completion of the Bradley Lake Pool Raise, the psid would be expected to increase as the WSE would peak at El. 1,196 feet. The micro-hydro turbine would continuously adjust rotational speed to maintain constant downstream pressure, optimizing turbine efficiency across changing flows. Figure 2.1-4 displays the expected annual generation of 1,274 MWh.



Source: InPipe Energy, Inc. (2026).

Figure 2.1-3 Micro-hydro turbine hydraulic model.



Source: InPipe Energy, Inc. (2026).

Figure 2.1-4 Micro-hydro turbine estimated annual generation.

2.2 Dependable Capacity and Average Annual Generation

2.2.1 Annual Energy Generation

The West Fork Upper Battle Creek (WFUBC) Diversion has been operational since July 2020. The average annual power generation at the Bradley Lake Project since the WFUBC Diversion has been operational (2021-2025) was approximately 419,912 MWh (Table 2.2-1). This period of time was drier than long-term average conditions. The anticipated long-term average annual generation with the WFUBC Diversion is 436,000 MWh[5]. Table 2.2-2 provides the operations of the Bradley Lake Project during an average year with and without implementation of the Dixon Diversion and Bradley Lake Pool Raise.

[5] The long-term average was derived from the past 10 year of releases from Bradley Lake plus the average of the WFUBC Diversion added to the dataset as if the WFUBC Diversion had been online the entire 10-year period.

The proposed Bradley Lake Expansion Project is expected to increase generation by an average of 167,000 MWh annually, increasing the expected long-term average annual energy production from 436,000 MWh to 603,000 MWh (38 percent).

Table 2.2-1 Current Bradley Lake Project generation (MWh) 2021-2025 by month.

Month	Average Monthly Generation (MWh)
January	33,124
February	27,652
March	30,831
April	29,303
May	30,391
June	27,816
July	31,856
August	36,533
September	46,651
October	43,758
November	39,017
December	42,535
Average Monthly Generation	**34,956**
Total Annual Generation	**419,912**

MWh = megawatt-hours.

Table 2.2-2 Bradley Lake Project operations during average year currently and with the proposed Dixon Diversion and Bradley Lake pool raise.

Month	Existing Bradley Project with Average Year Inflow[a]			Raised Pool with Average Year Inflow plus Dixon Diversion Inflow		
	Average WSE (ft)	Average Turbine Discharge (cfs)	Total Energy Production (MWh)	Average WSE (ft)	Average Turbine Discharge (cfs)	Total Energy Production (MWh)
January	1,142.6	650	39,180	1,157.7	950	58,101
February	1,131.8	550	30,690	1,141.8	900	50,713
March	1,121.2	500	29,516	1,124.1	900	53,280
April	1,110.7	450	25,441	1,103.4	850	47,708
May	1,104.6	500	29,034	1,085.9	800	45,586
June	1,113.3	500	28,343	1,094.6	500	27,816

Month	Existing Bradley Project with Average Year Inflow[a]			Raised Pool with Average Year Inflow plus Dixon Diversion Inflow		
	Average WSE (ft)	Average Turbine Discharge (cfs)	Total Energy Production (MWh)	Average WSE (ft)	Average Turbine Discharge (cfs)	Total Energy Production (MWh)
July	1,136.9	600	35,969	1,135.8	500	29,941
August	1,154.2	700	42,667	1,169.4	850	52,563
September	1,165.3	750	44,711	1,188.5	950	57,875
October	1,167.1	800	49,361	1,191.9	950	59,991
November	1,159.7	800	47,438	1,183.6	1,000	60,644
December	1,151.7	550	33,446	1,171.5	950	58,864
Total			**435,797**			**603,082**
					Percent Increase	**38**

cfs = cubic feet per second; MWh = megawatt-hours; WSE = water surface elevation.

2.2.2 Dependable Capacity

The dependable capacity for the Bradley Lake Project is based on its load-carrying ability under adverse hydrological conditions. Table 2.2-3 includes operations during an adverse, or dry, year for the current Bradley Lake Project as well as the proposed Project. Under adverse conditions, the current Bradley Lake Project has a dependable operating capacity of 339,800 MWh. The proposed Dixon Diversion, 16-foot Bradley Lake Pool Raise, and micro-hydro turbine would increase the dependable capacity by 44 percent to 488,300 MWh.

Table 2.2-3 Bradley Lake Project expected operations during adverse (dry) year of inflow.

Month	Existing Dam with Dry Year Inflow			Raised Pool with Dry Year Inflow Plus Dixon Diversion Inflow		
	Average WSE (ft)	Average Turbine Discharge (cfs)	Total Energy Production (MWh)	Average WSE (ft)	Average Turbine Discharge (cfs)	Total Energy Production (MWh)
January	1,143.8	500	30,174	1,158.9	800	48,980
February	1,134.8	500	27,982	1,145.1	800	45,221
March	1,124.2	500	29,605	1,128.1	900	53,491
April	1,112.3	500	28,316	1,106.5	900	50,672

Month	Existing Dam with Dry Year Inflow			Raised Pool with Dry Year Inflow Plus Dixon Diversion Inflow		
	Average WSE (ft)	Average Turbine Discharge (cfs)	Total Energy Production (MWh)	Average WSE (ft)	Average Turbine Discharge (cfs)	Total Energy Production (MWh)
May	1,105.5	500	29,062	1,088.0	850	48,536
June	1,115.9	500	28,416	1,102.3	300	16,820
July	1,141.4	300	18,063	1,145.2	400	24,172
August	1,159.7	400	24,508	1,177.1	500	31,143
September	1,167.4	550	32,852	1,191.8	700	42,771
October	1,163.2	500	30,738	1,186.7	650	40,850
November	1,160.2	500	29,663	1,181.3	700	42,360
December	1,151.9	500	30,410	1,170.5	700	43,332
Total			**339,789**			**488,348**
					Percent Increase	**44**

cfs = cubic feet per second; MWh = megawatt-hours; WSE = water surface elevation.

2.2.3 Bradley Lake Project Hydrology

The streamflow characteristics of the drainage basin within the Bradley Lake Project and surrounding environs are highly influenced by the presence of glaciers and the maritime climate of the Gulf of Alaska. Basin location, elevation, and physiographic features also strongly influence the runoff characteristics of the basins. Bradley Lake is located within the Kenai Mountains in an ice-free subalpine valley approximately 1,080 feet above Kachemak Bay. The basin above the lake consists of rugged and precipitous rocky slopes interspersed with various forms of low vegetation and other growth. Higher elevations are characterized by barren slopes with most of the land features carved from the glaciers within the basin. Characteristic of the maritime influence, the basin usually experiences cool summer and moderate winter temperatures. The average annual temperature is 36 degrees Fahrenheit with frequent periods of fog, rain, and clouds. Precipitation within the basin is greatest during the August through December period. The runoff response from rainfall in the basin is influenced greatly by the geologic conditions of the basin. Due to the limited amount of soil cover overlying bedrock, most of the rainfall reaches the stream with very little flow going into groundwater storage. Runoff contributions from snowmelt usually begin in early May and extend through September, with the most significant rainfall runoff contributions occurring from August through October.

Bradley Lake has a direct drainage area of approximately 76.4 square miles which includes currently diverted area from the WFUBC, East Fork Battle Creek, Middle Fork Bradley River, and Nuka Glacier (Figure 2.1-1). Based on 2022 aerial imagery, approximately 29 percent of the drainage area above the lake outlet is covered by glaciers and permanent snowfields. The glaciers contribute runoff as temperatures warm in the spring, beginning in mid- to late May, until late fall (October to November) when temperatures cool again. The Nuka and Kachemak glaciers are the two largest glaciers providing runoff directly into Bradley Lake. The Battle Glacier has also been diverted to Bradley Lake since operations of the WFUBC Diversion began in 2020.

There are currently few gages that record inflow into Bradley Lake or the amount of water available for generation. The two major natural inflow tributaries to the lake are Kachemak Creek, which begins at Kachemak Glacier, and the Upper Bradley River, which is fed by the Nuka Glacier. There are also numerous unnamed first-order streams draining into the lake. There are USGS stream gages recording flow into Bradley Lake near the Nuka Glacier (USGS Gage No. 15238990) and in the Middle Fork Bradley River (USGS Gage No. 15239050). Bradley Lake Project operators record the flow diverted to Bradley Lake from the WFUBC diversion, and the outflow to the Bradley River through the fishwater release pipes and the flow through the powerhouse. There is one gage in the Bradley River below the dam (USGS Gage No. 15239001) and another in the Bradley River near tidewater (USGS Gage. No. 15239070).

The estimated average inflow to Bradley Lake (2021–2025) was estimated from the daily reservoir elevations, WSE-storage rating curve, discharge through the turbines, and flow released through the fishwater valves (Figure 2.2-1). The current and proposed Bradley Lake inflows with the Dixon Diversion are shown in Table 2.2-4. Annual and monthly flow duration curves for the proposed Project are provided in Appendix B1. The average annual inflow to Bradley Lake since completion of the WFUBC Diversion is estimated at approximately 451,000 acre-feet. Approximately 75 percent of the runoff in the Bradley Lake basin occurs from June through September. Mean monthly flows generally peak in July through September and are lowest in February through April, highlighting the seasonal variability in water availability. Most of the floods occurring before mid-July are caused by snowmelt, and those after mid-July are primarily caused by rainfall events.

The Dixon Diversion would operate early May through November as flows allow after meeting the proposed MIF releases to the EFMR. The average annual volume of water to be diverted from Dixon Glacier to Bradley Lake is approximately 163,900 acre-feet (Table 2.2-4), based on the 1,650-cfs capacity of the proposed diversion tunnel, the proposed EFMR MIF releases, and the estimated discharge of the EFMR developed from the 10-year average of the synthetic record (2016–2022) and measured discharge (2023–2025; DOWL 2026).

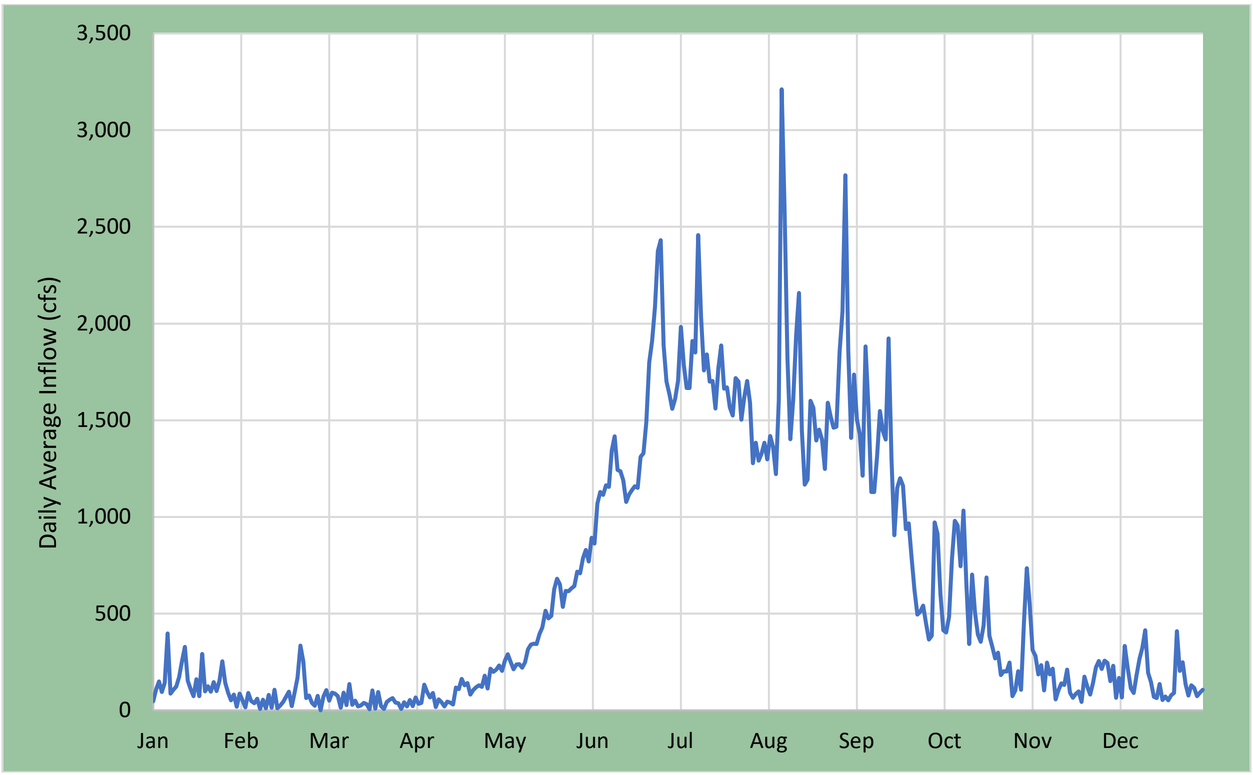


Figure 2.2-1 Hydrograph of annual average inflow to Bradley Lake (2021–2025).

Table 2.2-4 Average daily and monthly inflows to Bradley Lake under current conditions (2021-2025) and with the proposed Dixon Diversion.

Month	Current Average Bradley Lake Inflow[a]		Average Dixon Diversion Inflow[b]		Total Proposed Average Inflow	
	Daily (cfs)	Monthly (ac-ft)	Daily (cfs)	Monthly (ac-ft)	Daily (cfs)	Monthly (ac-ft)
January	138	8,453	0	0	138	8,453
February	73	4,034	0	0	73	4,034
March	50	3,047	0	0	50	3,047
April	97	5,785	0	0	97	5,785
May	453	27,862	21	1,246	474	29,108
June	1,389	82,624	194	11,572	1,583	94,196
July	1,688	103,805	897	55,159	2,585	158,964
August	1,657	101,875	914	56,229	2,571	158,104
September	1,094	65,069	494	29,411	1,588	94,480
October	460	28,271	167	10,277	627	38,548
November	181	10,751	0	0	181	10,751
December	154	9,480	0	0	154	9,480
Average Monthly	**620**		**224**		**844**	
Annual Total		**451,100**		**163,900**		**615,000**

Source: Bradley Lake Dam operating records and the *Martin River Hydrology Study Report* (DOWL 2026).

[a] Sources of inflow to Bradley Lake include: Middle Fork Bradley River (also known as Middle Fork) Diversion (gaged), Nuka Glacier Diversion (gaged), East Fork Upper Battle Creek Diversion, WFUBC Diversion (gaged), Kachemak Glacier, and other unnamed tributary drainages.

[b] Dixon Diversion flows and volumes are based on the 10-year average comprised of synthetic (2016-2022) and measured (2022-2025) discharge.

Minimum, mean, and maximum daily discharge data at the powerhouse and MIF releases to the Bradley River from the dam (2021 through 2025) are provided by month in Table 2.2-4. No spill has occurred since the 2019 Swan Lake fire, which is prior to operation of the WFUBC Diversion. Figure 2.2-2 depicts the daily reservoir elevation, the current normal minimum (El. 1,080 feet) and maximum (El. 1,180 feet) pool elevation, and the average Bradley Lake inflow for the period of 2021 through 2025.

The average daily discharge through the powerhouse from 2021 through 2025 was approximately 587 cfs, and ranged from 0 cfs in the spring to 1,517 cfs in February 2024. The MIF released at the Bradley Lake Dam from the fishwater valves to the Bradley River ranged from less than 0.1 cfs to a maximum of 111 cfs, with an annual average daily release of 35 cfs (Table 2.2-5). The point of compliance for measuring the required Bradley River MIF releases is at the Bradley River USGS gage near Tidewater (USGS Gage No. 15239070), located at River Mile (RM) 1.65 on the Lower Bradley River. The required Bradley River MIF at the Tidewater gage is: 100 cfs May 12 – September 14; 50 cfs September 24 – October 31; and 40 cfs November 2 – April 30, with ramping rates of 5 cfs per day between seasonal transitions.[6]

[6] Order Amending Minimum Flows (172 FERC 62,132). Issued September 8, 2020.

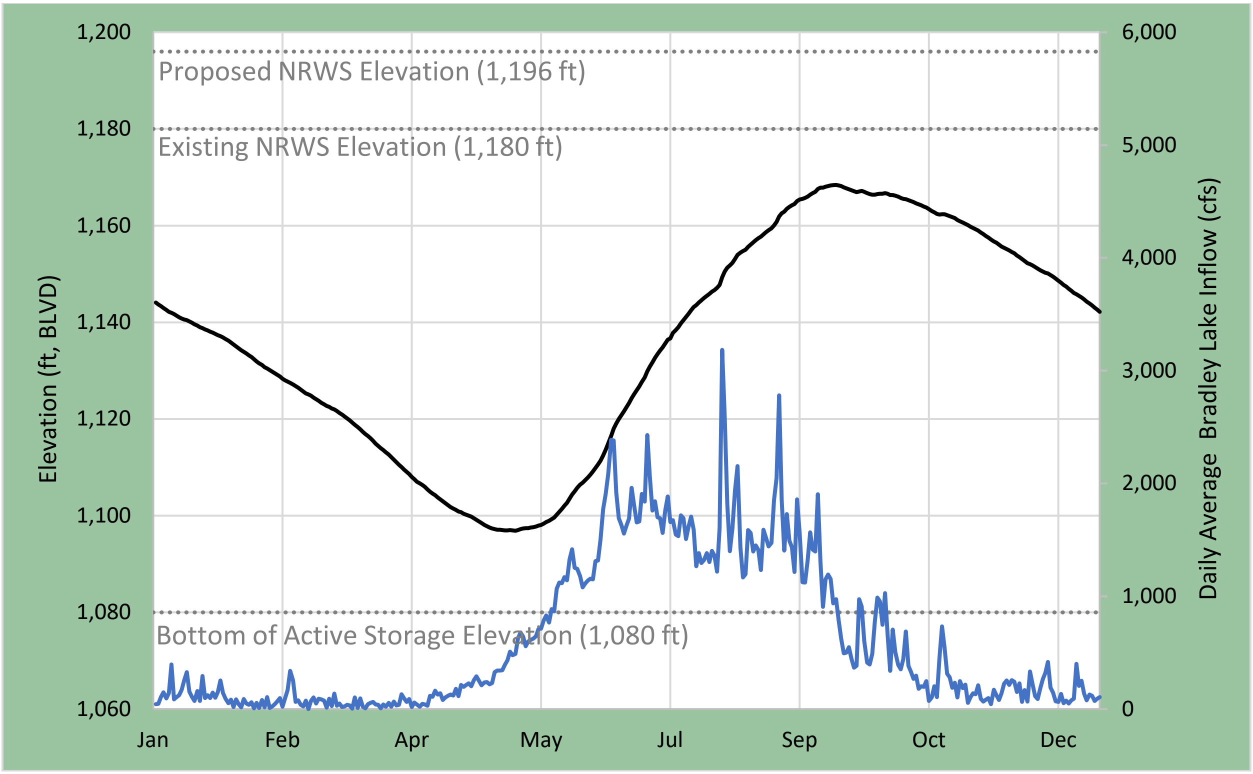


Figure 2.2-2 Average Bradley Lake water surface elevation without the Dixon Diversion in feet BLVD and average inflow (2021–2025).

Table 2.2-5 Bradley Lake Project average monthly and minimum, maximum and average daily discharge through the powerhouse and instream flows released from Bradley Lake Dam to the Bradley River (2021–2025).

Month	Bradley Powerhouse Flows				Bradley Dam Instream Flow Releases[a]			
	Daily Min (cfs)	Daily Average (cfs)	Daily Max (cfs)	Average Monthly (ac-ft)	Daily Min (cfs)	Daily Average (cfs)	Daily Max (cfs)	Average Monthly (ac-ft)
January	163	543	963	33,416	0.3	37.1	49.6	2,282
February	2	499	1,517	27,694	0.6	40.7	50.0	2,263
March	0	510	989	31,374	3.7	39.7	60.9	2,442
April	0	524	1,106	31,138	0.3	31.3	56.2	1,865
May	0	516	1,234	31,732	0.0	11.8	53.3	725
June	160	487	840	28,957	0.0	3.8	43.4	226
July	164	521	781	32,054	0.0	44.2	99.5	2,721
August	248	596	1,304	36,666	3.5	78.6	109.2	4,832
September	334	775	1,332	46,103	0.3	60.0	111.4	3,569
October	161	716	1,308	44,033	0.3	15.8	77.5	970
November	220	651	1,046	38,725	0.3	26.4	54.0	575
December	362	700	1,013	43,025	0.2	34.9	52.0	2,147
Annual Average	**151**	**587**	**1,119**		**0.8**	**35**	**68**	
Total Annual				**424,917**				**24,617**

[a] Note that the point of compliance for Bradley River MIFs is the USGS Gage No. 15239070 Bradley River Near Tidewater, located at RM 1.65.

Figure 2.2-3 shows the estimated daily reservoir elevation and the estimated average Bradley Lake inflow with the proposed Dixon Diversion and Bradley Lake 16-foot pool raise. The average annual volume of water to be diverted from Dixon Glacier to Bradley Lake is approximately 163,900 acre-feet (Table 2.2-4), ranging from 20 cfs in May to 910 cfs in August (Table 2.2-4). No changes to the Bradley River MIF releases are proposed.

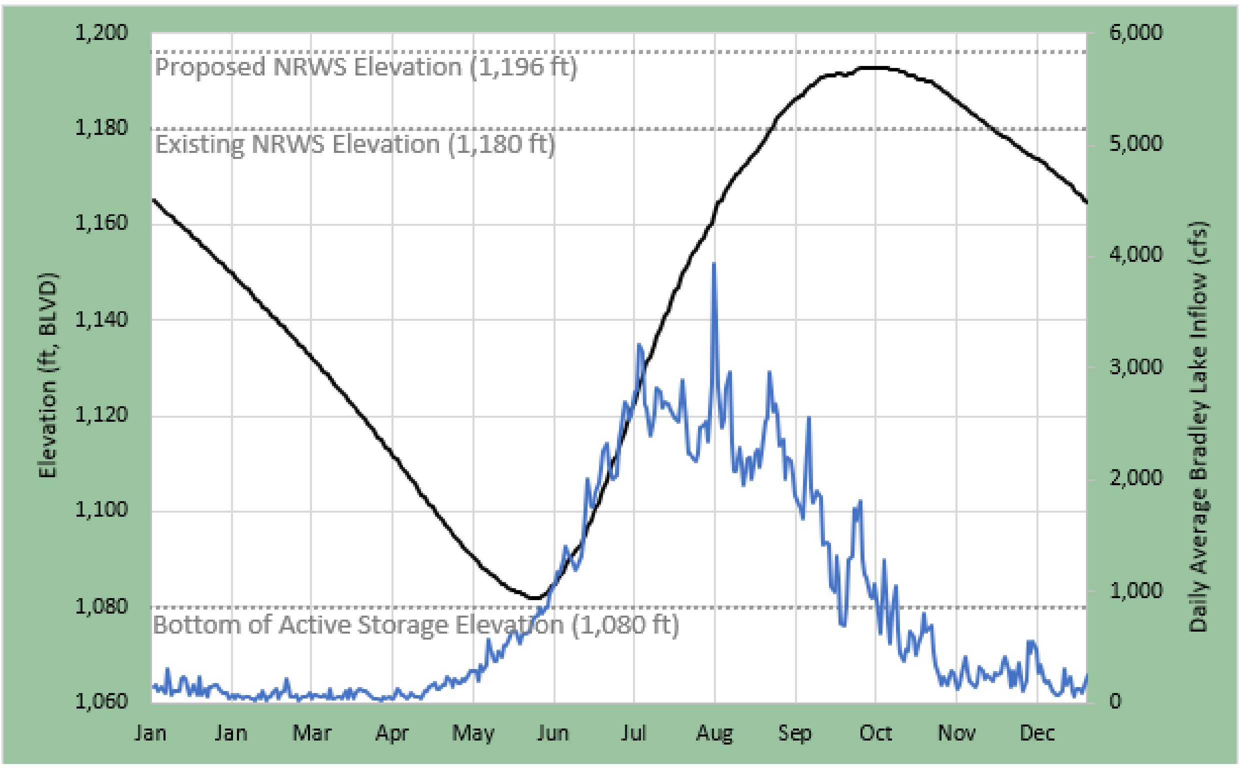


Figure 2.2-3 Estimated long term average Bradley Lake inflow and water surface elevation in feet BLVD and average inflow with the proposed Dixon Diversion and 16-foot Bradley Lake Pool Raise.

2.2.4 Area-Capacity Curve

Bradley Lake currently has an active storage capacity of approximately 280,000 acre-feet at the normal maximum operating pool elevation of El. 1,180 feet. Under the proposed development, the normal maximum operating pool elevation would increase by 16 feet to El. 1,196 feet, increasing the active storage capacity to approximately 342,000 acre-feet and increasing the surface area from 3,802 acres to 4,033 acres.

Bradley Lake's normal minimum operating pool elevation is El. 1,080 feet, which is the minimum elevation that provides sufficient hydraulic head to deliver the maximum required instream flow through the fishwater valves to the Bradley River. Storage above this elevation is used for normal operations, while volumes below El. 1,080 feet are designated as dead or emergency storage.

Approximately 31,200 acre-feet of emergency storage is available between El. 1,060 feet and El. 1,080 feet, allowing temporary drawdown to the crown of the power tunnel at El. 1,060 feet. For reference, the power tunnel inlet invert is at El. 1,030 feet, and the fish bypass inlet invert is at El. 1,065 feet. The current active storage volumes (i.e., volumes above El. 1,080 feet) were calculated using 2016 and 2022 LiDAR mapping (Figure 2.2-4). The emergency and dead storage volumes (Figure 2.2-4) are based on the bathymetric survey used to report the area and capacity of Bradley Lake in the 1984 license application.

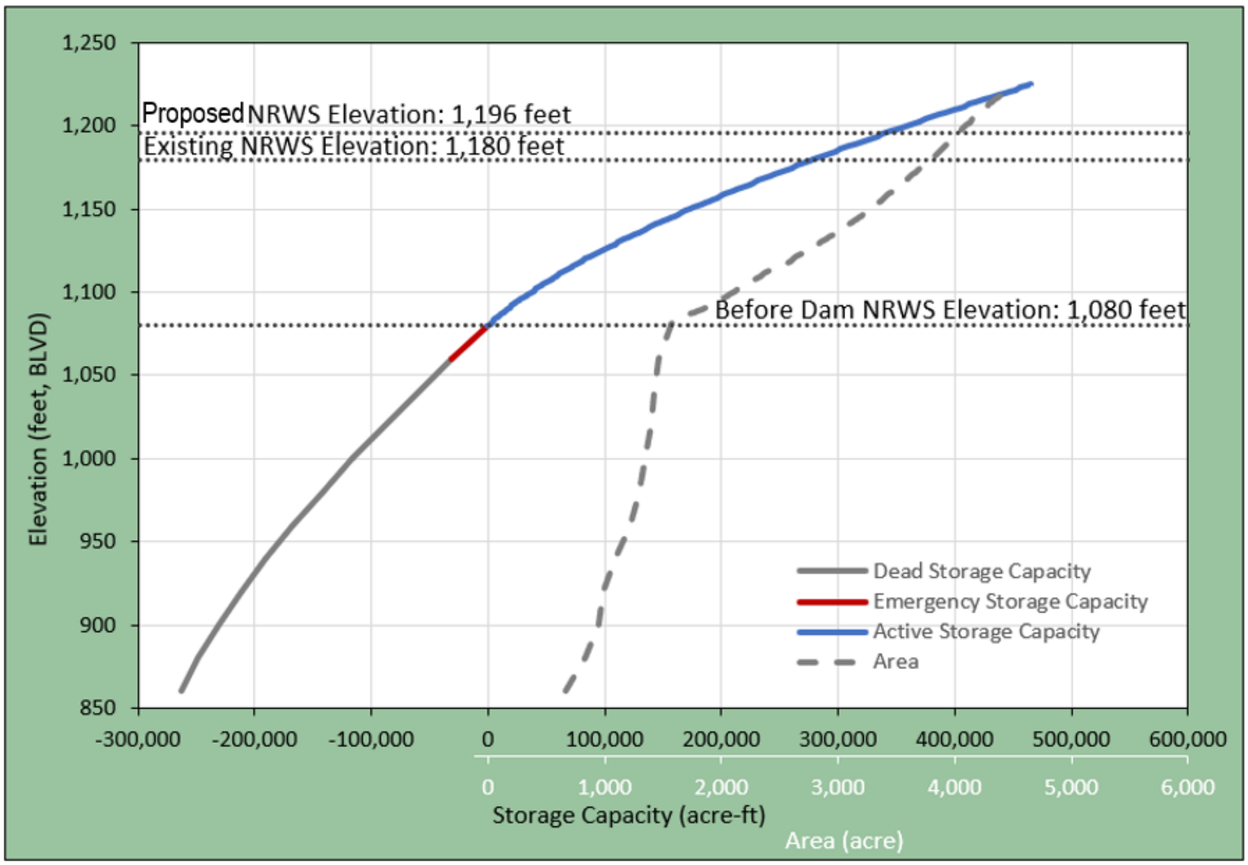


Figure 2.2-4 Bradley Lake area-capacity curve.

2.2.5 Estimated Hydraulic Capacity

The hydraulic capacity of the Bradley Lake Project is approximately 1,200 cfs. No Bradley Lake Project features are proposed to be modified to increase the hydraulic capacity at the same head, but the increased head would marginally increase the hydraulic capacity.

During routine annual maintenance, the Bradley Lake Project is shut down and the capacity is 0 cfs.

2.2.6 Tailwater Rating Curve

The tailwater rating curve for the Bradley Lake Project would not change.

2.2.7 Power Plant Capability Versus Head

The minimum head on the powerplant would not change, but the average and maximum head would increase because of the increased normal maximum lake level and inflow volume. All turbine components and water ways of the existing plant are assumed to be suitable to safely operate an increased head by 16 feet based on factors of safety of the equipment. A head increase at the dam results in roughly the same increase in net head for the turbines. This scaling factor is partially offset by a small decrease in efficiency as the maximum head will be shifted further away from the optimum head. An increase in head loss attributable to the pool raise is assumed to be negligible.

3.0 USE OF PROJECT POWER

The energy produced by the Bradley Lake Project facility is purchased by the five Railbelt utilities to offset fossil fuel generation. Bradley Lake Project energy has historically been used for peaking generation. During dry and average years, with the proposed Dixon Diversion in place, more water would be stored in Bradley Lake for release during the winter period. During wet years, the incremental energy generation would be distributed as much as practical over the year to reduce the likelihood of spillage. The Bradley Lake Project facility uses approximately 2,500 MWh annually.

Power generated at the Bradley Lake Project provides power to the Alaska Railbelt region. The Railbelt electrical grid is defined as the service areas of five regulated public utilities that extend from Fairbanks to Anchorage and the Kenai Peninsula. These public utilities are Golden Valley Electric Association; Chugach Electric Association; Matanuska Electric Association; Homer Electric Association; and the City of Seward Electric System. Seventy-five percent of the Alaskan population lives within the Railbelt region.

The proposed Project would allow the Bradley Lake Project to increase average annual generation from approximately 436,000 MWh to 603,000 MWh, which would help the

Railbelt region meet its current and forecasted loads. The energy generated from the Bradley Lake Expansion is expected to offset 1.5 billion cubic feet of natural gas per year.

4.0 PLANS FOR FUTURE DEVELOPMENT

AEA does not currently have any plans for future development of the Bradley Lake Project during the current license term.

5.0 REFERENCES

DOWL. 2026. Martin River Hydrology Study Report. Bradley Lake Expansion Project. Prepared for the Alaska Energy Authority by DOWL, LLC. May 29, 2026.

InPipe Energy, Inc. 2026. Proposal: The HydroXS with Variable Speed Control. Prepared for Alaska Energy Authority. May 2026.

Voith Hydro. 2026. Hydraulic Technical Description: Vertical Pelton Turbines. Extrapolation of Model Efficiency Curves and Estimation of increased Turbine Power. Bradley Lake. Prepared for Alaska Energy Authority. June 2026.

APPENDIX B1

MONTHLY FLOW DURATION CURVES DEVELOPED FROM BRADLEY LAKE INFLOWS (2021-2025) AND PROPOSED DIXON DIVERSION OPERATIONS

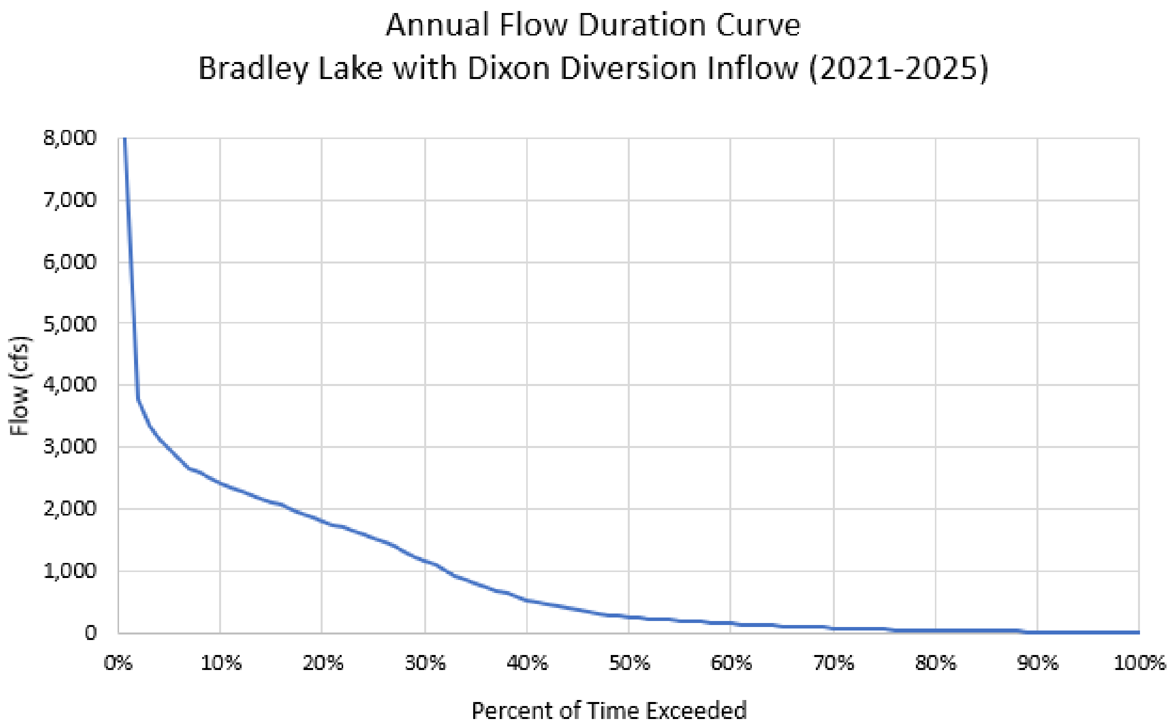


Figure B1-1 Annual flow duration curve of Bradley Lake inflows (2021–2025) with proposed Dixon Diversion operating May through November.

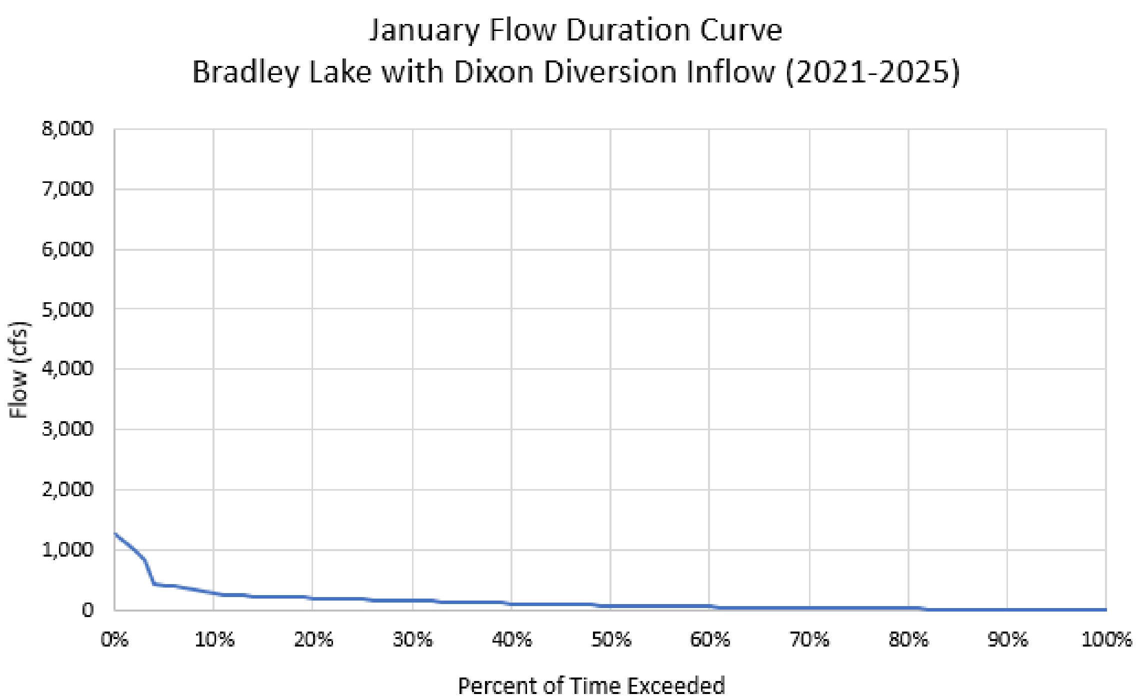


Figure B1-2 January flow duration curve of Bradley Lake inflows (2021–2025) with proposed Dixon Diversion operating May through November.

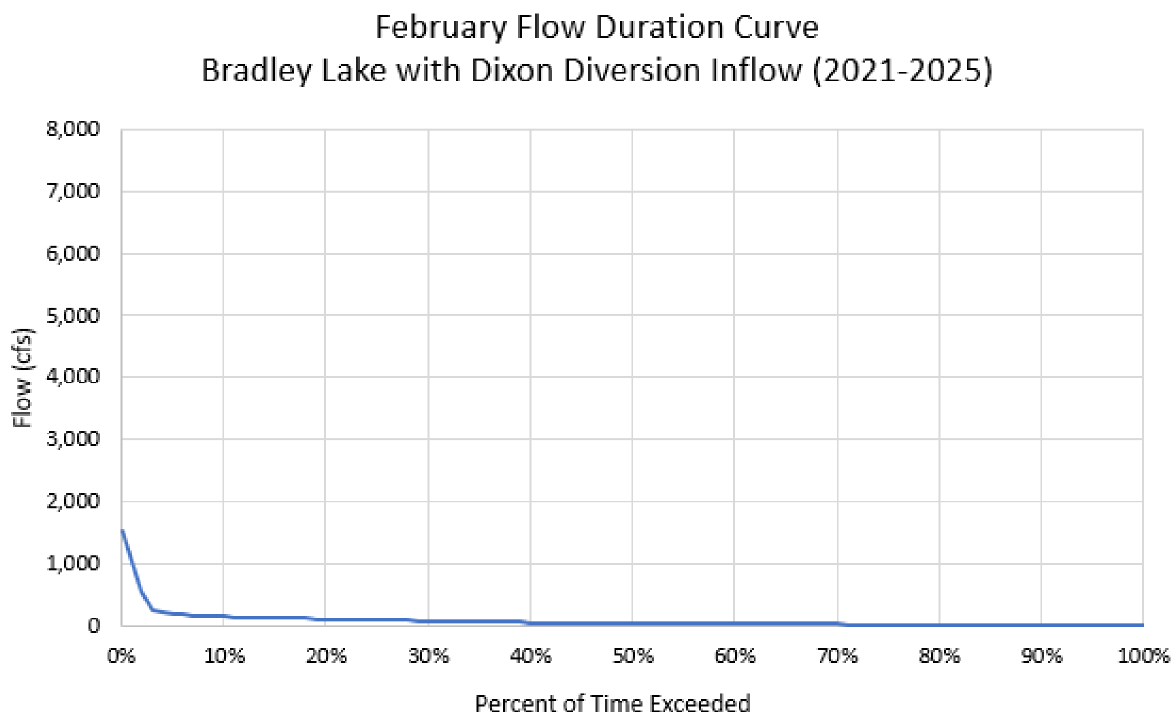


Figure B1-3 February flow duration curve of Bradley Lake inflows (2021–2025) with proposed Dixon Diversion operating May through November.

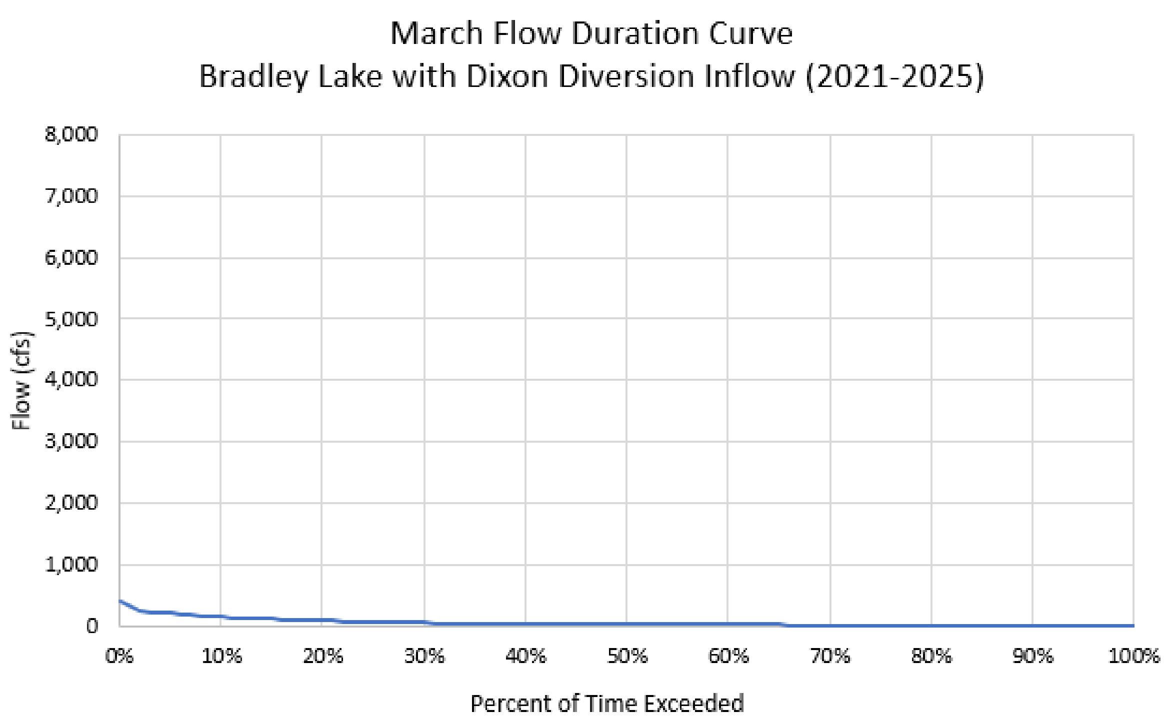


Figure B1-4 March flow duration curve of Bradley Lake inflows (2021–2025) with proposed Dixon Diversion operating May through November.

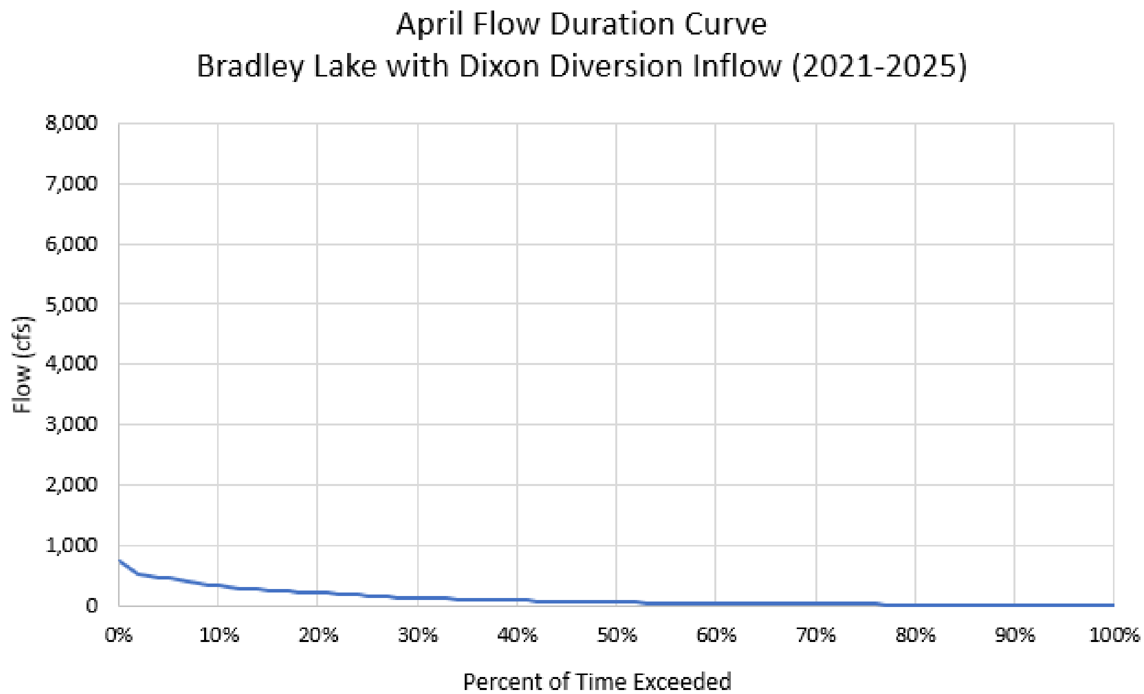


Figure B1-5 April flow duration curve of Bradley Lake inflows (2021–2025) with proposed Dixon Diversion operating May through November.

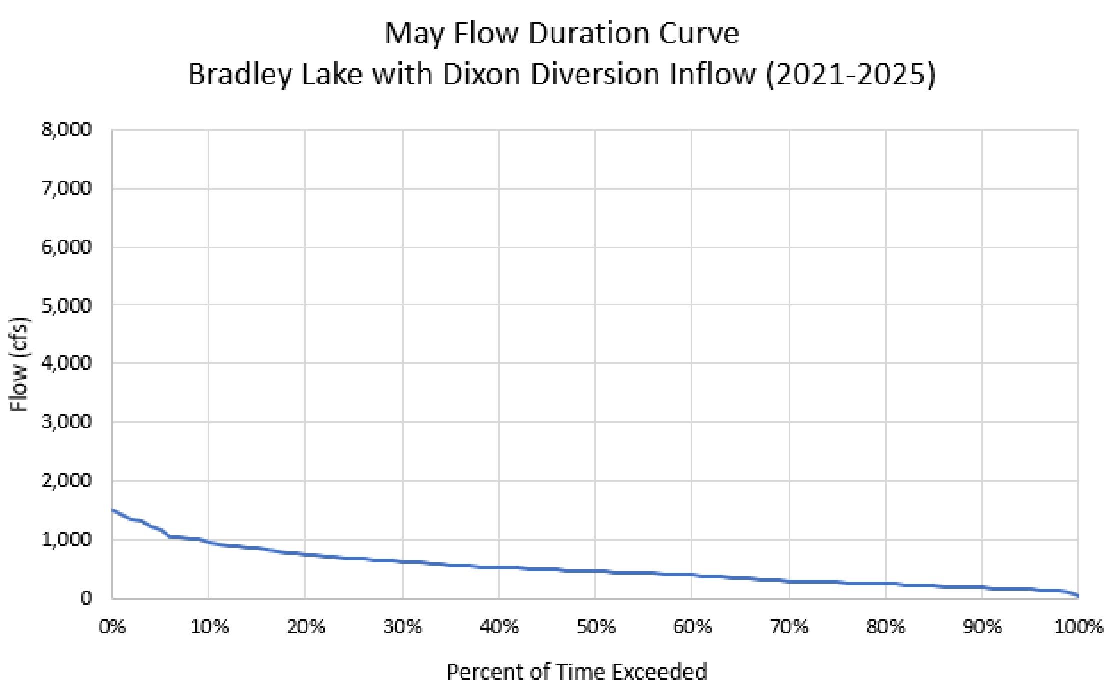


Figure B1-6 May flow duration curve of Bradley Lake inflows (2021–2025) with proposed Dixon Diversion operating May through November.

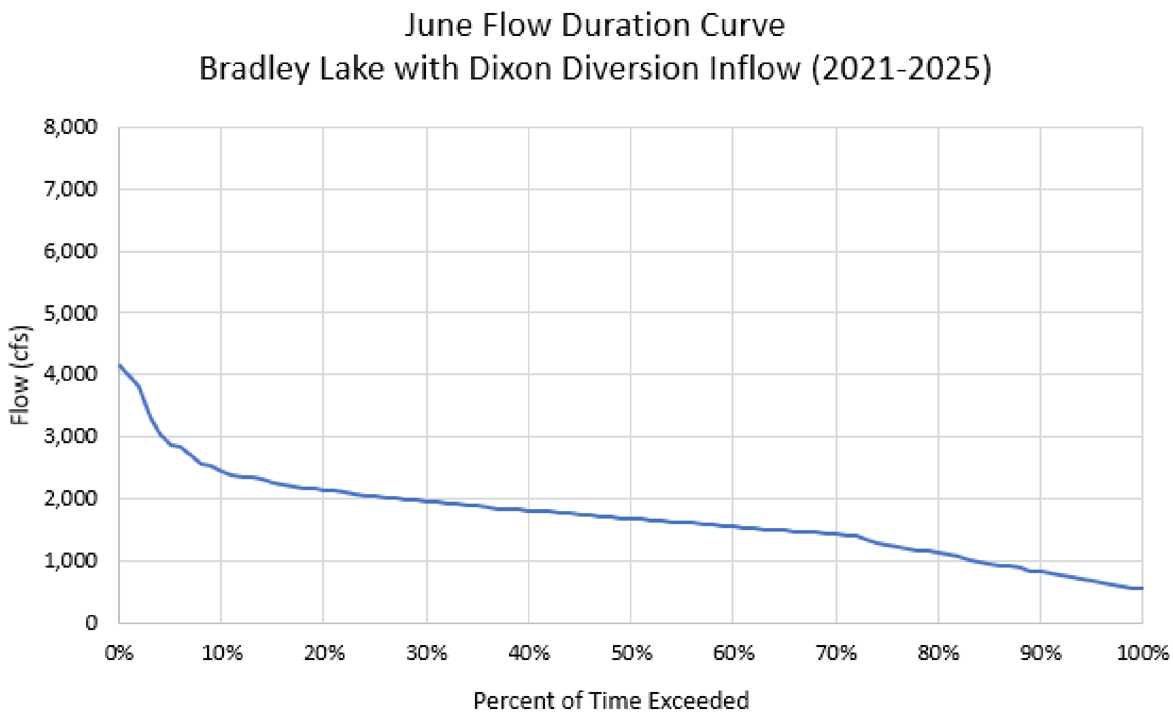


Figure B1-7 June flow duration curve of Bradley Lake inflows (2021–2025) with proposed Dixon Diversion operating May through November.

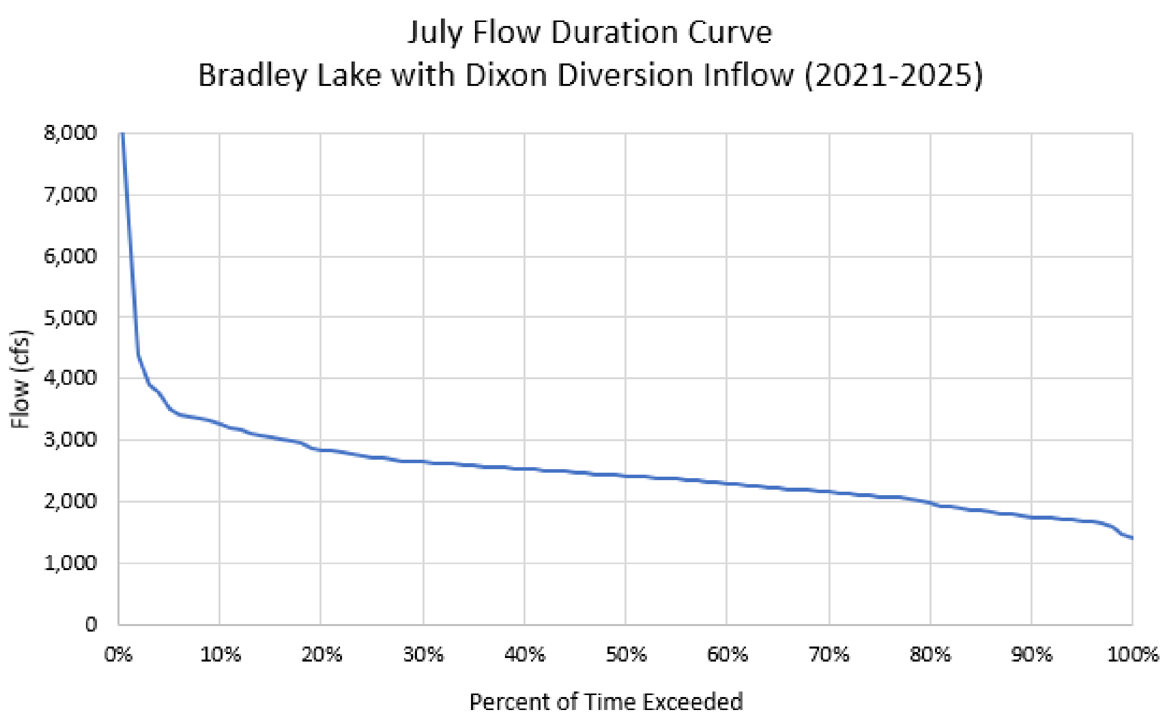


Figure B1-8 July flow duration curve of Bradley Lake inflows (2021–2025) with proposed Dixon Diversion operating May through November.

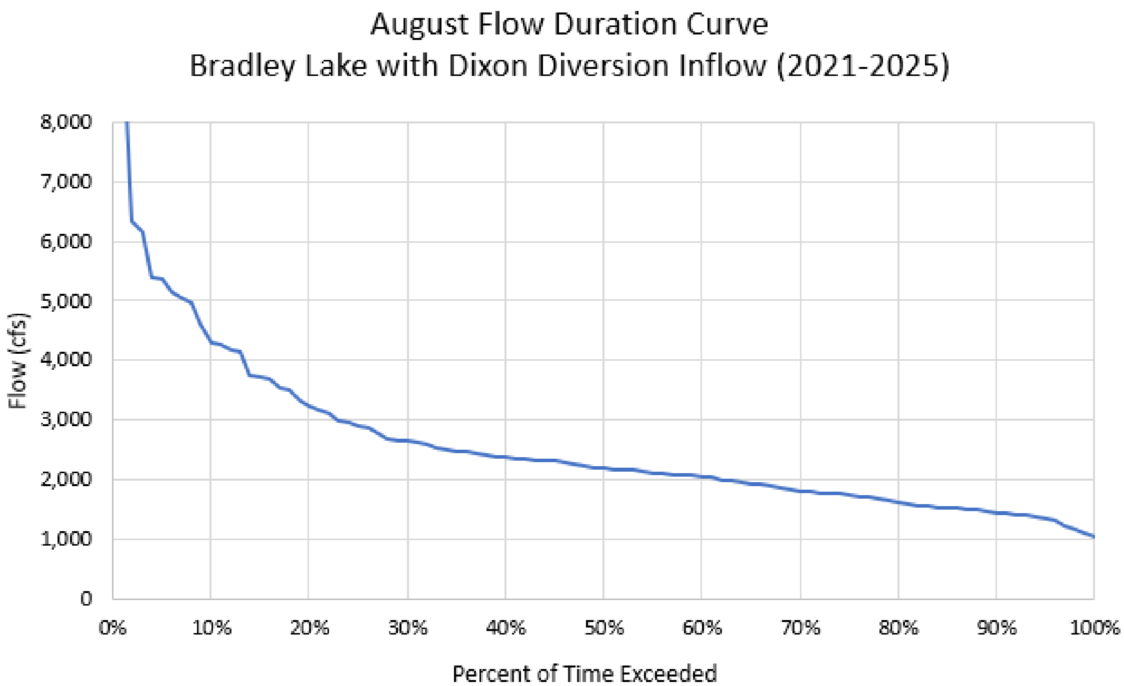


Figure B1-9 August flow duration curve of Bradley Lake inflows (2021–2025) with proposed Dixon Diversion operating May through November.

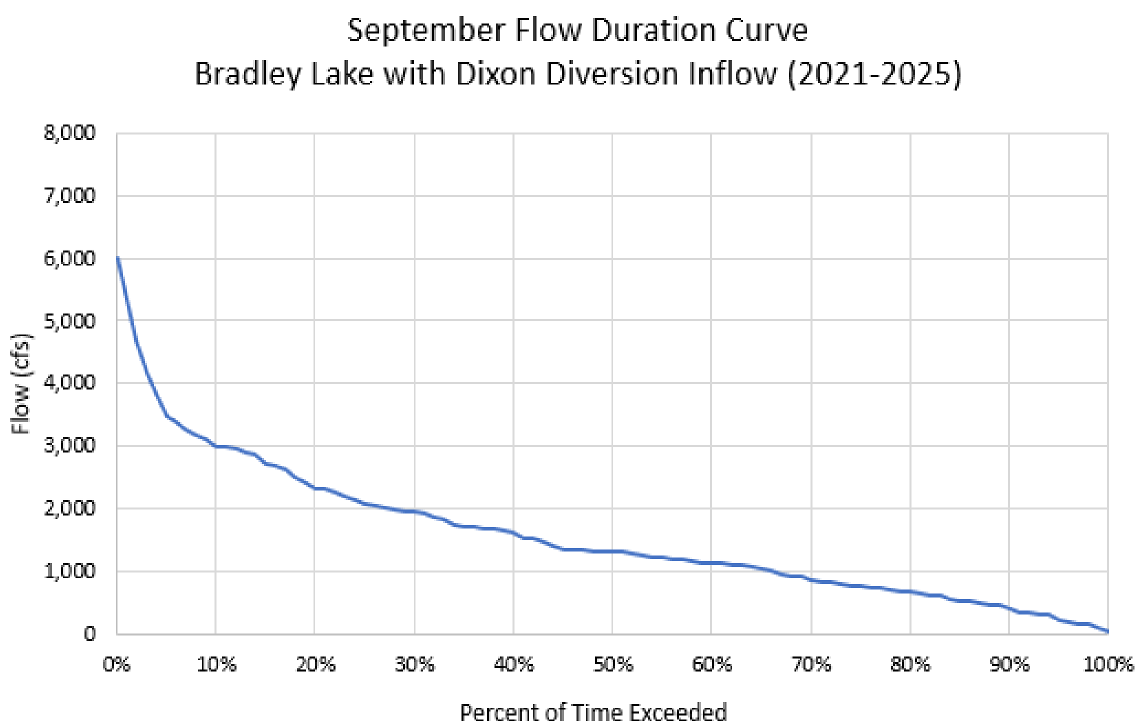


Figure B1-10 September flow duration curve of Bradley Lake inflows (2021–2025) with proposed Dixon Diversion operating May through November.

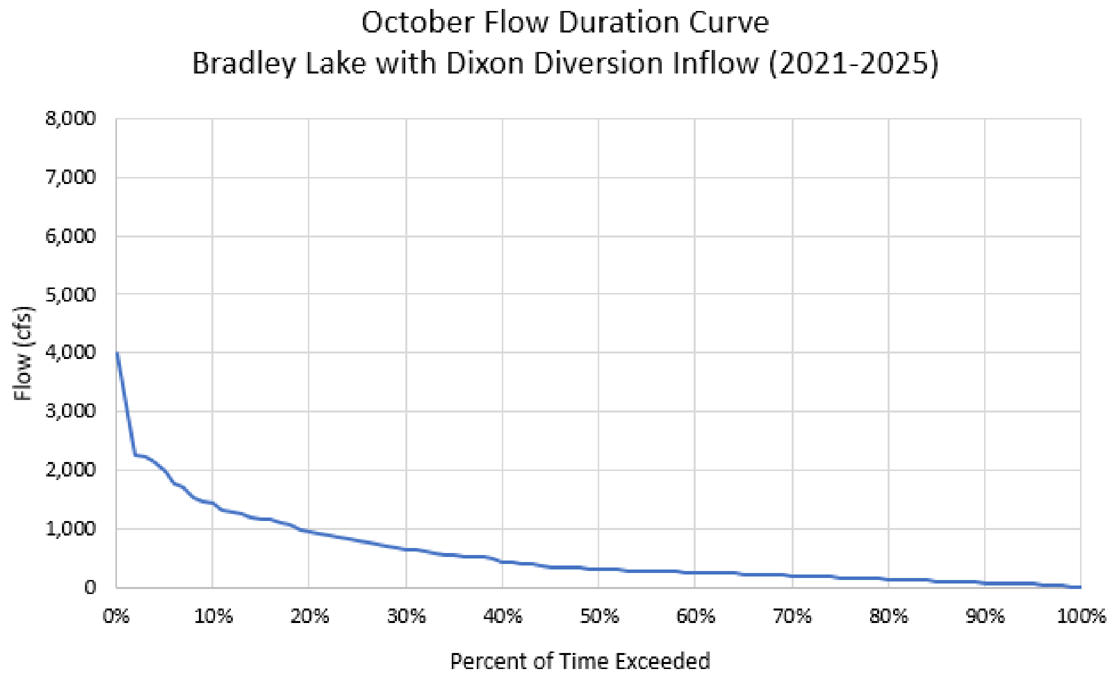


Figure B1-11 October flow duration curve of Bradley Lake inflows (2021–2025) with proposed Dixon Diversion operating May through November.

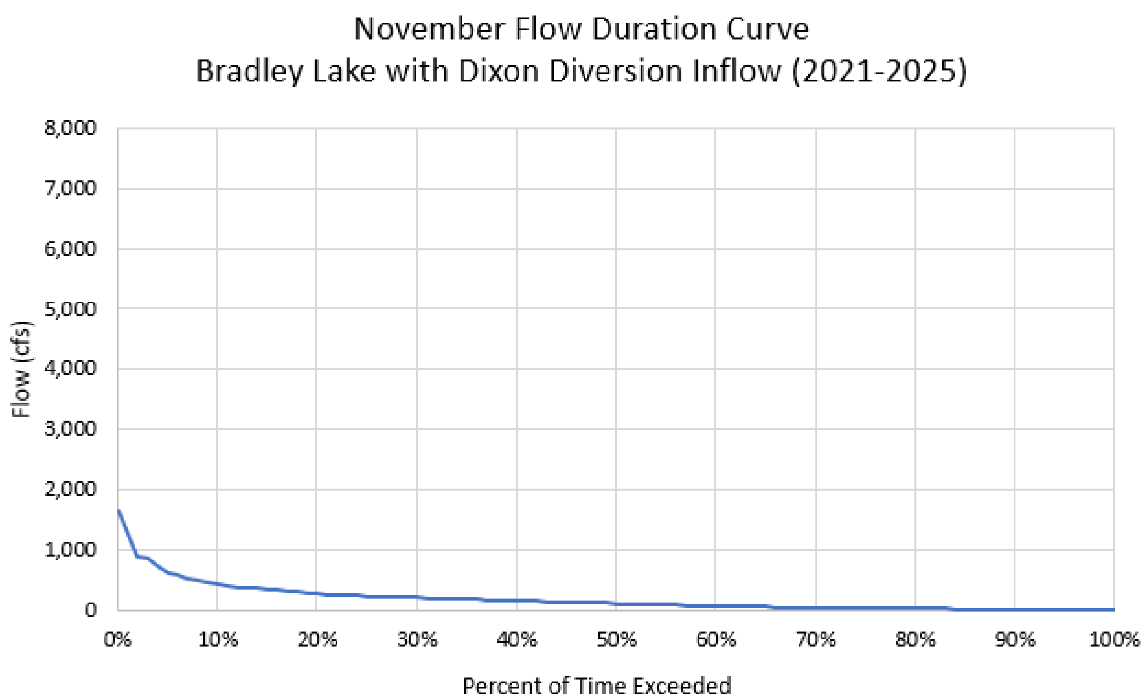


Figure B1-12 November flow duration curve of Bradley Lake inflows (2021–2025) with proposed Dixon Diversion operating May through November.

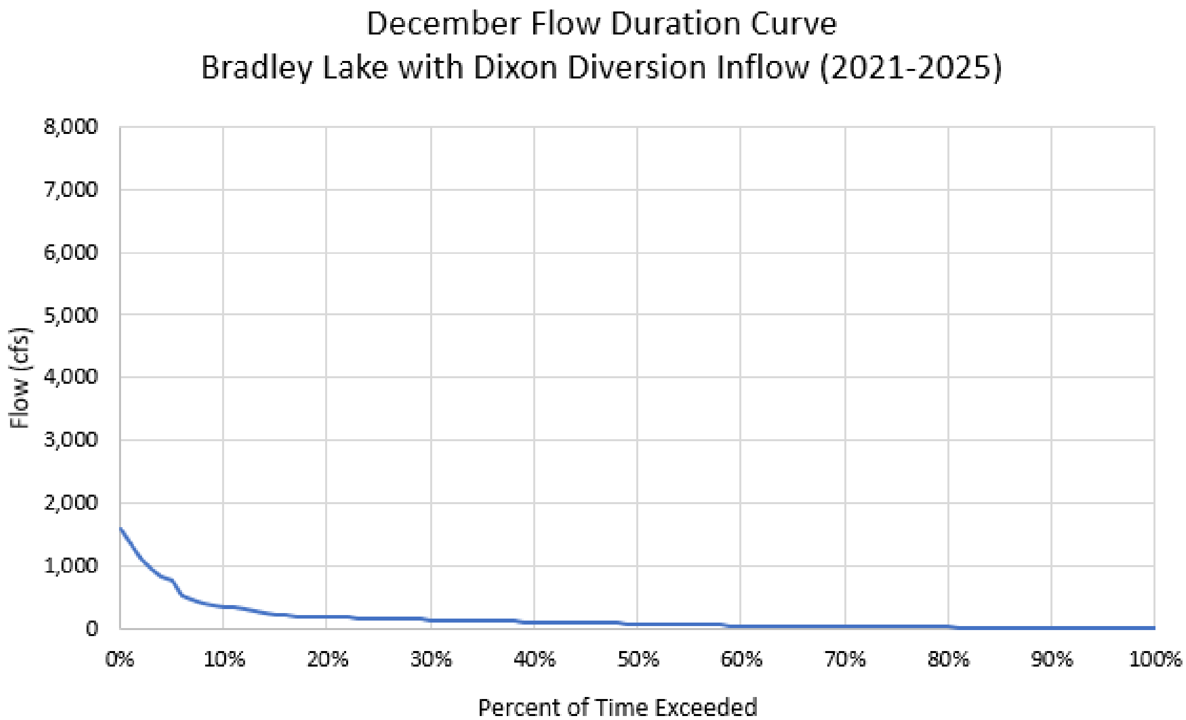


Figure B1-13 December flow duration curve of Bradley Lake inflows (2021–2025) with proposed Dixon Diversion operating May through November.

BRADLEY LAKE HYDROELECTRIC PROJECT

FERC No. 8221

BRADLEY LAKE EXPANSION NON-CAPACITY LICENSE AMENDMENT

EXHIBIT C
CONSTRUCTION HISTORY

https://www.ecfr.gov/current/title-18/chapter-I/subchapter-B/part-4/subpart-F#p-4.51(d)

Prepared for:

Alaska Energy Authority
813 West Northern Lights Boulevard
Anchorage, Alaska 99503-2495

Prepared by:

Kleinschmidt Associates

June 2026

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LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

A

AEA	Alaska Energy Authority, formerly Alaska Power Authority

B

Bradley Lake Expansion Project	license amendment for Dixon Diversion and Bradley Lake Pool Raise
Bradley Lake Pool Raise	16-foot pool raise to Bradley Lake
Bradley Lake Project	Bradley Lake Hydroelectric Project (FERC No. 8221)

D

Dixon Diversion	new diversion dam and appurtenant features at the toe of the Dixon Glacier, diversion tunnel, and exit portal access road

F

FERC	Federal Energy Regulatory Commission

P

Project	Bradley Lake Expansion Project

U

USACE	United States Army Corps of Engineers

W

WFUBC	West Fork Upper Battle Creek

1.0 INTRODUCTION

Alaska Energy Authority (AEA), licensee and owner of the 119.7-megawatt Bradley Lake Hydroelectric Project (Bradley Lake Project; Federal Energy Regulatory Commission [FERC or Commission] No. 8221), is pursuing a FERC license amendment to the existing license. AEA proposes to build a new diversion dam (Dixon Diversion) to divert seasonal meltwater and runoff coming from the Dixon Glacier, located at the headwaters of the Martin River, to Bradley Lake via an underground tunnel. AEA also proposes to raise the normal maximum operating pool elevation of Bradley Lake by about 16 feet (Bradley Lake Pool Raise) through a combination of raising the concrete spillway crest elevation, adding spillway crest gates, and raising the dam embankment crest. Lastly, AEA is proposing to install a 0.3-megawatt micro-hydro turbine in one of Bradley Lake's fishwater release valves. Together, these three components make up the Bradley Lake Expansion Project (Project), which would increase the Bradley Lake Project's generating capacity and provide more power to the Railbelt. This Exhibit C provides the construction history of the Bradley Lake Project as well as the preliminary schedule for the proposed Project.

2.0 CONSTRUCTION HISTORY

2.1 Original Construction

The power generation potential of the Bradley Lake Project was first studied by the United States Army Corps of Engineers (USACE) and presented in a report dated March 1955. The Bradley Lake Project was authorized by Congress in 1962, but despite its feasibility, federal funds were not available for its construction. The AEA (then Alaska Power Authority) assumed responsibility for the Bradley Lake Project in 1982. Preliminary plans were developed and field investigations started in 1982. In April 1984, AEA submitted an application for license to FERC. The license to construct the Bradley Lake Project was issued on December 31, 1985, and the Bradley Lake Project was constructed and became operational in 1991.

The 1991 Bradley Lake Project works consisted of: (a) a low diversion dike at the outlet of the Nuka Glacier pool into the upper Nuka River and a rock cut, diverting flow into the Upper Bradley River; (b) a diversion on the Middle Fork Bradley River consisting of an excavated channel allowing water to naturally flow to Marmot Creek, a tributary to Bradley Lake that operates in all seasons; (c) a low diversion dam on the East Fork Upper Battle

Creek that diverts water to an unnamed tributary of Bradley Lake; (d) a concrete-faced rockfill dam and a parapet wall on the crest; (e) an ungated ogee spillway located on a saddle feature east of the dam; (f) the existing Bradley Lake; (g) a 407.5-foot-long, 10.5-foot-nominal diameter horseshoe-shaped tunnel through the east abutment for emergency flow releases; (h) two 28-inch-diameter pipes with motor-operated valves to release the required Bradley River minimum instream flows; (i) an intake channel; (j) an intake structure with removable trashracks; (k) a concrete-lined power tunnel consisting of: (1) a horizontal section with dual gates downstream of the intake, operated through a vertical gate shaft; (2) an inclined section; and (3) a main section with steel lining on the downstream side; (l) a steel penstock consisting of a roll-out section and a manifold section with three outlets, one capped and two with branches; (m) a reinforced concrete powerhouse containing two generating units; (n) a tailrace channel discharging into Kachemak Bay; (o) the generator leads; (p) a transformer; (q) a double circuit transmission line from the substation adjacent to the powerhouse to Bradley Junction; (r) access facilities including a barge basin and ramp and Bradley Lake Project roads connecting powerhouse lower and upper construction camps and the dam; (s) recreation facilities consisting of campsites near the barge basin dock and near Bradley Lake; and (t) appurtenant facilities.

See Exhibit A for additional information on the Bradley Lake Project description.

2.2 Modifications or Additions to the Existing Project

In 1999,[1] the Bradley Lake Project eliminated the small craft dock and replaced it with the existing boat ramp located at the barge dock.

In 2004, the Bradley Lake Project deactivated its use of the Martin River airstrip field, as it was no longer needed for Bradley Lake Project purposes and posed security risks.

In 2016, the West Fork Upper Battle Creek (WFUBC) Diversion was approved by FERC.[2] This included a diversion dam on the WFUBC diverting water through an underground pipeline and canal into a natural channel flowing into Bradley Lake. The WFUBC Diversion is a surface water diversion to the existing Bradley Lake reservoir that does not impound

[1] FERC Accession No. 19991210-0061.
[2] FERC Accession No. 20160906-3039.

water, nor does the diverted water cause the existing capacity of the Bradley Lake reservoir to be exceeded. The WFUBC Diversion became operational in July 2020.

See Exhibit A for additional information on the Bradley Lake Project description.

3.0 PROJECT SCHEDULE OF NEW DEVELOPMENT

3.1 Preliminary Project Schedule

The Bradley Lake Expansion Project schedule presents milestones for construction, allowing time for FERC review of required construction documents. Bidding and construction activities are anticipated to occur in the timeframes below.

3.2 Schedule Considerations

The construction schedule below (Table 3.3-1) considered several important factors, including but not limited to:

- Weather patterns and a short construction season;
- Bird nesting periods as related to removal of vegetation, excavation, and blasting;
- Logistics regarding equipment and commodities deliveries history;
- Compliance with any Alaska Department of Fish and Game Fish Habitat Permit and USACE permit stipulations;
- Timing of approvals/authorizations for the Bradley Lake Expansion Project construction by FERC; and
- Limited availability of large contractors in Alaska at time of advertisement for bids.

3.3 Construction Schedule

A more detailed construction schedule will be prepared by the contractor awarded the construction of the Bradley Lake Expansion Project. A Preliminary Project Schedule is provided in Table 3.3-1. However, due to Alaska's short construction season, the timing of the state's legislative session relative to its fiscal year, and state procurement procedures, AEA requests the Commission approve construction to begin within 3 years of receiving FERC's authorization and be completed within 6 years of receiving FERC's authorization.

AEA may begin site preparations, i.e., clear vegetation, in the summer of 2027.

Table 3.3-1 Preliminary Project Schedule.

Project Milestone	Timeframe
Submit Application to FERC	June 2026
Respond to FERC Additional Information Requests and Agency Terms and Conditions	Summer 2026
Project License Amendment Approved	June 2027
Bidding Documents Completed for Issuance	March 2027
Advertise for Bids	April–June 2027
Pre-Bid Site Visit and Pre-Bid Conference	July 2027
Bid Opening	August 2027
Award Bid	October 2027
Notice to Proceed	October 2027
Begin Construction, Including Camp Mobilization	April 2028
Construction Period	April 2028–July 2031
Project Completion, Including Demobilization	July 2031

BRADLEY LAKE HYDROELECTRIC PROJECT

FERC No. 8221

BRADLEY LAKE EXPANSION NON-CAPACITY LICENSE AMENDMENT

EXHIBIT F
GENERAL DESIGN DRAWINGS AND SUPPORTING DESIGN REPORT

Public

Prepared for:

Alaska Energy Authority
813 West Northern Lights Boulevard
Anchorage, Alaska 99503-2495

Prepared by:
Kleinschmidt Associates

June 2026

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LIST OF APPENDICES

1.0 PROJECT DRAWINGS AND SUPPORTING DESIGN

The design drawings show plan, elevations, and sections of the Bradley Lake Expansion Project. Drawings that require modifications related to this proposed amendment are provided herein. Table 1-1 provides a summary of the drawing numbers and titles for the 29 drawings (Appendix F-1). A Preliminary Supporting Design Report (SDR) is provided with Exhibit F in Appendix F2-1 and F2-2.

Table 1-1 Design Drawings.

Exhibit F Drawings	Project Feature	Title
Sheet F-1	General Information	Cover Sheet
Sheet F-2	General Information	Project Map
Sheet F-3	Dixion Diversion	Geotechnical Investigations
Sheet F-4	Tunnel Outlet	Geotechnical Investigations
Sheet F-5	Dixion Diversion and Tunnel Outlet	Boring Logs
Sheet F-6	Dixion Diversion	Overall Site Plan
Sheet F-7	Dixion Diversion	Tunnel Inlet - Plan and Profile
Sheet F-8	Dixion Diversion	Tunnel Inlet Approach Plan
Sheet F-9	Dixion Diversion	Sedimental Guide Wall - Plan and Profile
Sheet F-10	Dixion Diversion	Diversion Dam - Plan and Profile
Sheet F-11	Dixion Diversion	Diversion Dam - Civil Sections and Details
Sheet F-12	Dixion Diversion	Diversion Dam Isometrics
Sheet F-13	Tunnel Outlet Access Road	Typical Sections
Sheet F-14	Tunnel Outlet Access Road	Overall Plan, Profile, and Sheet Index
Sheet F-15	Tunnel Outlet	Potential Spoil Disposal Areas
Sheet F-16	Tunnel Outlet	Portal Details
Sheet F-17	Dixion Diversion Tunnel	Overall Tunnel Plan and Profile
Sheet F-18	Bradley Lake Dam Modifications	Tunnel Segmental Lining Details
Sheet F-19	Bradley Lake Dam Modifications	General Plan
Sheet F-20	Bradley Lake Dam Modifications	Geotechnical Investigation
Sheet F-21	Bradley Lake Dam Modifications	Dam and Spillway Summary Logs
Sheet F-22	Bradley Lake Dam Modifications	Site Plan

Exhibit F Drawings	Project Feature	Title
Sheet F-23	Bradley Lake Dam Modifications	Sections
Sheet F-24	Bradley Lake Dam Modifications	Sections
Sheet F-25	Bradley Lake Dam Modifications	Dam Grout Plan and Profile
Sheet F-26	Bradley Lake Dam Modifications	Borrow Areas
Sheet F-27	Bradley Lake Dam Modifications	Spillway Plan and Profile
Sheet F-28	Bradley Lake Dam Modifications	Spillway Sections
Sheet F-29	Bradley Lake Dam Modifications	Spillway Sections

The drawings (Appendix F1) and SDR (Appendix F2) referenced herein contain sensitive and detailed engineering information that, if used improperly, may compromise the safety of the Bradley Lake Expansion Project and those responsible for its operation. Therefore, the drawings and SDR have been labeled "Contains Critical Energy Infrastructure Information – Do Not Release." Agencies may file a Critical Energy Infrastructure Information (CEII) request under 18 CFR § 388.113 or a Freedom of Information Act (FOIA) request under 18 CFR § 388.108 to obtain the Exhibit F drawings or the SDR.

BRADLEY LAKE HYDROELECTRIC PROJECT
FERC No. 8221

BRADLEY LAKE EXPANSION NON-CAPACITY LICENSE AMENDMENT

EXHIBIT G
PROJECT BOUNDARY MAPS

Prepared for:

ALASKA ENERGY AUTHORITY

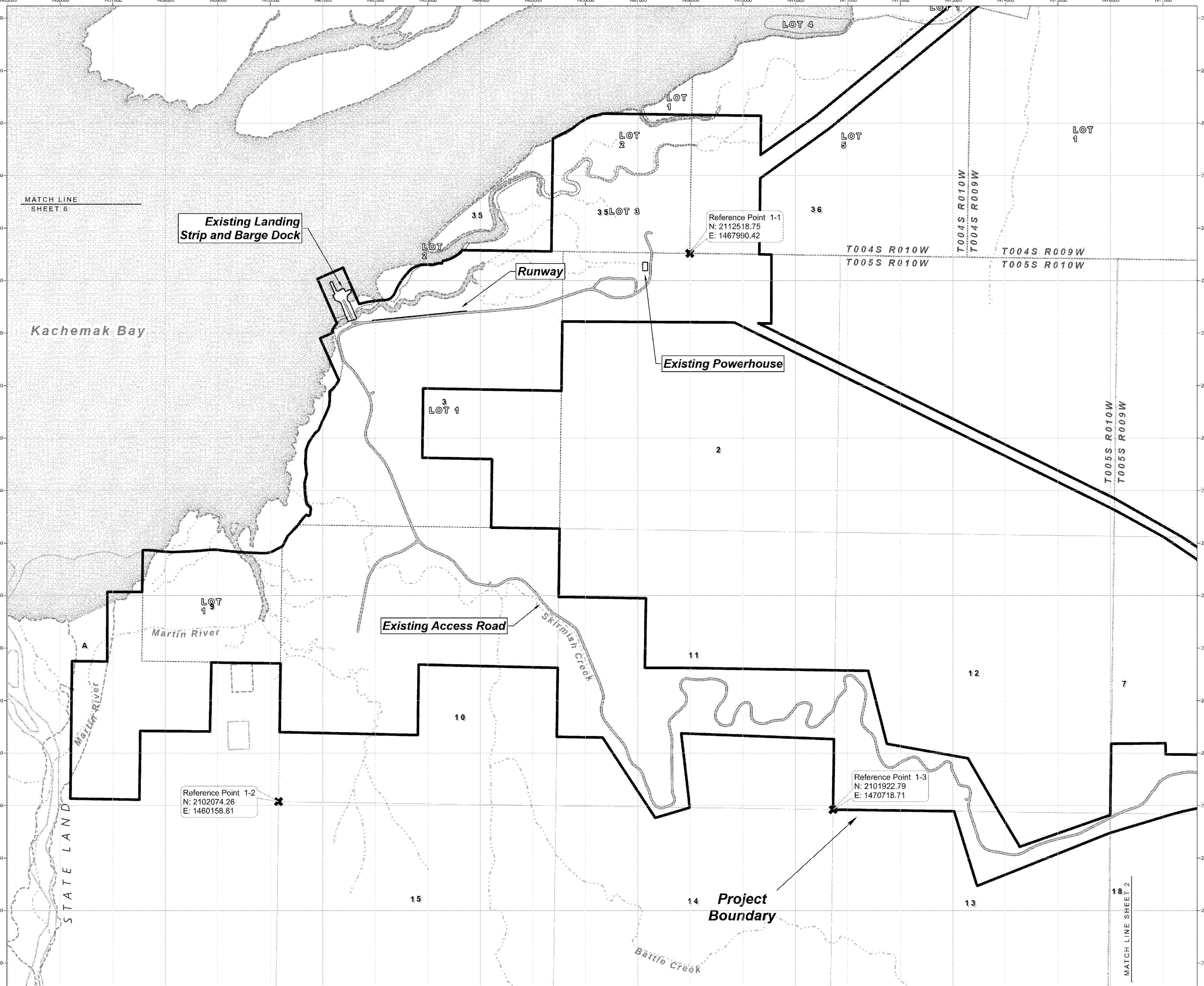
Alaska Energy Authority
813 West Northern Lights Boulevard
Anchorage, Alaska 99503-2495

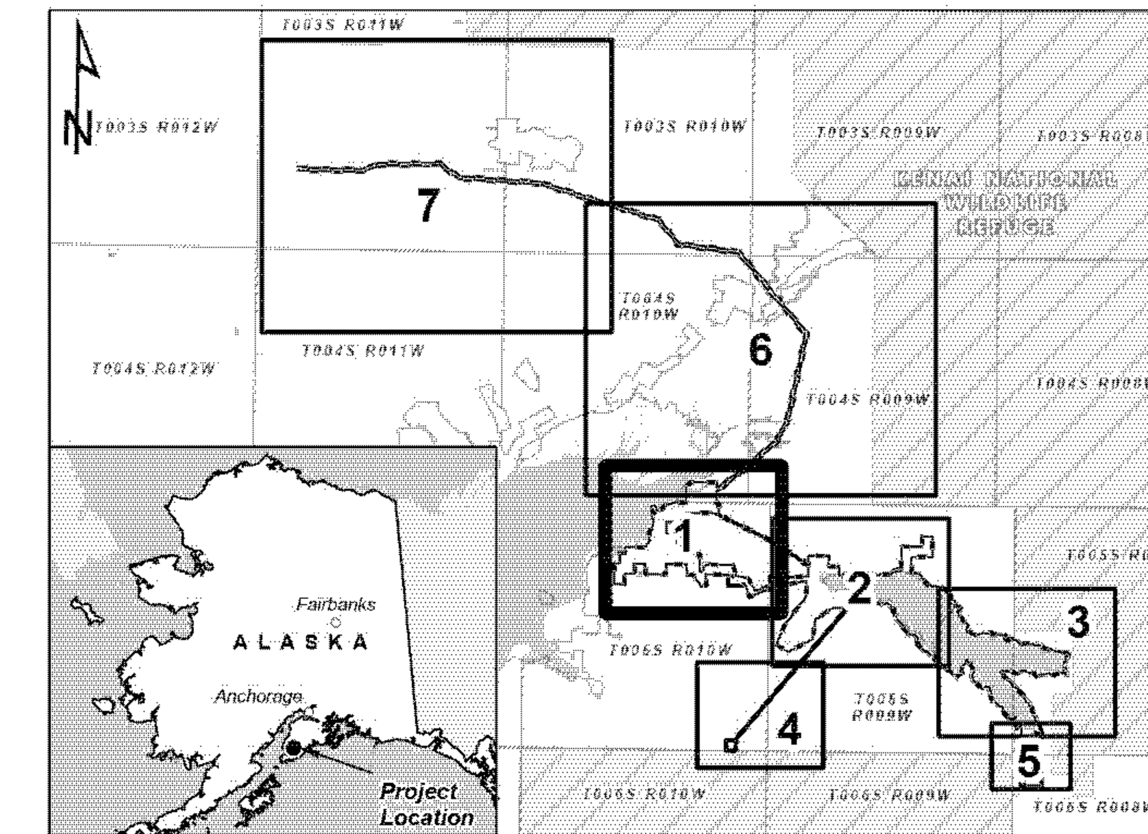
Prepared by:

Kleinschmidt

Kleinschmidt Associates

June 2026





TN

MN

13.65°E
6/23/2026

Proposed Project Boundary	Stream/River
Reference Point	PLSS Second Division
Project Feature	PLSS Section
Existing Project Road	PLSS Township/Range
	Waterbody
	State Land

Map notes:
1. The Bradley Lake Project is located in the State of Alaska in Kenai Peninsula Borough.
2. Reference Point coordinates are shown in NAD 1983 2011 StatePlane Alaska 4 FIPS 5004 Ft US.
3. Elevation shown are referenced to the Bradley Lake Vertical Datum (BLVD). The conversion factor between BLVD and the North American Vertical Datum of 1988 (NAVD 88) is, NAVD88 – 9.76 feet = BLVD.
5. Licensee has acquired all flowage rights and title in fee or the right to use in perpetuity all lands necessary or appropriate for the construction, maintenance, and operation of the Project. All property records are kept on file with the licensee.
6. There are no federal lands within the Project boundary. The Proposed Project Boundary lies entirely within Alaska State Land.
7. The Project boundary description, as required by 18 CFR 4.41, is represented here by a grid of Northings and Eastings around, and graticules within, the map frame. Any position in Northings and Eastings along the Project boundary can be determined using these references.
8. The Proposed Project Boundary, in part, was developed from contour elevation derived from 2022 LiDAR surveys conducted by NV5 Geospatial, Anchorage, AK.

SURVEYORS STATEMENT

I HEREBY CERTIFY TO THE FEDERAL ENERGY REGULATORY COMMISSION (FERC) THAT THIS PLAN MEETS THE CONDITIONS SET FORTH BY FERC FOR ITS EXPRESSED PURPOSE. THE PURPOSE OF THIS MAP IS TO PROVIDE A GEOREFERENCED VISUAL DEPICTION OF THE LOCATION OF PROJECT FEATURES AND BOUNDARIES BASED ON THE BEST AVAILABLE HISTORICAL DRAWINGS AND DIGITAL REFERENCE SOURCES INCORPORATED INTO THE GEOGRAPHIC INFORMATION SYSTEM (GIS). LOCATIONS HAVE NOT BEEN VERIFIED BY PHYSICAL FIELD SURVEYS AND THIS DRAWING SHOULD NOT BE USED FOR PURPOSES OF DEVELOPING PROPERTY BOUNDARY DESCRIPTIONS.

STATE OF MAINE
STEPHEN W. EVERETT
2161
PROFESSIONAL LAND SURVEYOR

ALASKA ENERGY AUTHORITY

BRADLEY LAKE HYDROELECTRIC PROJECT
FERC NO. 8221

PROJECT BOUNDARY MAP

EXHIBIT G

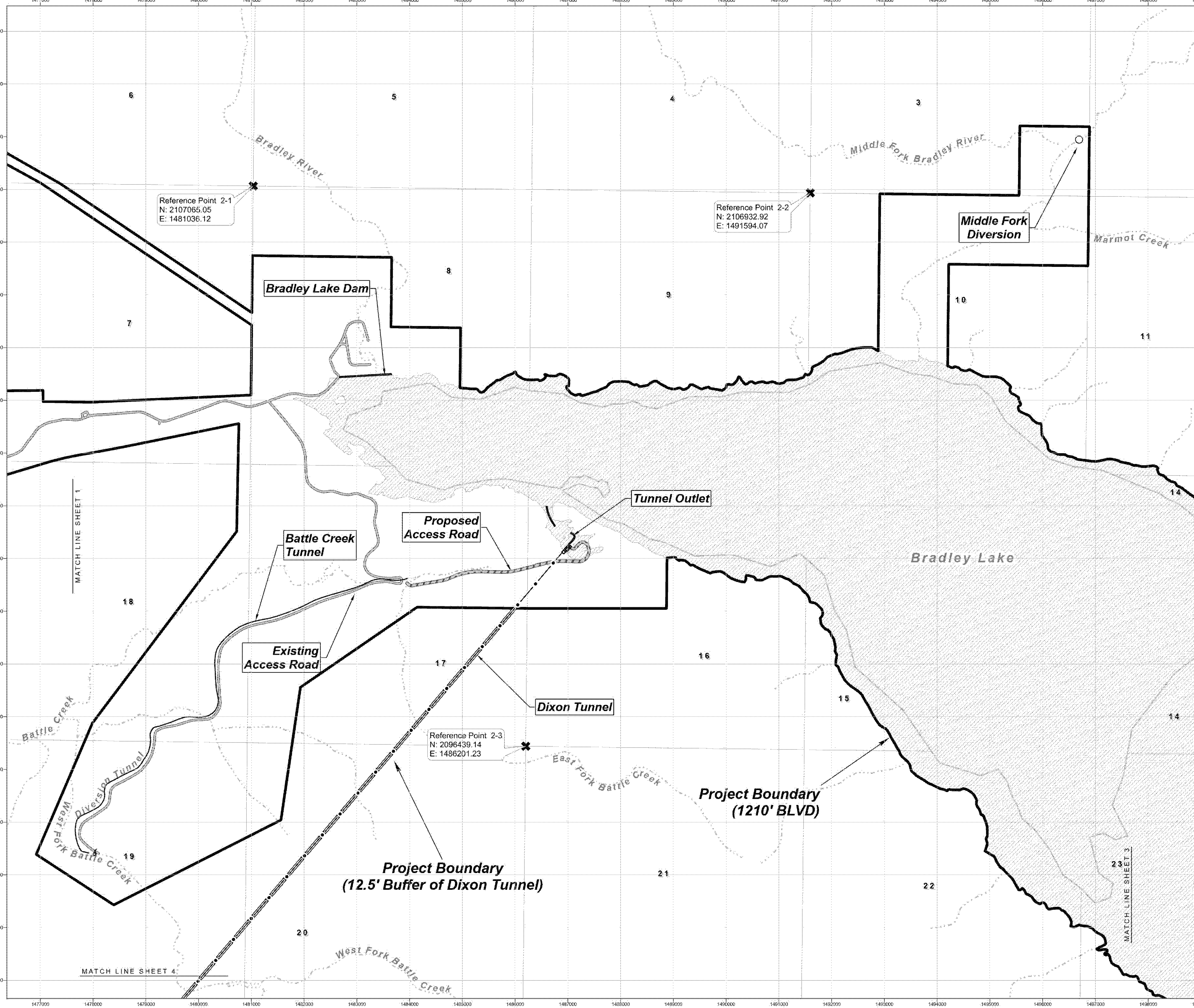
SCALE: 1" = 900'

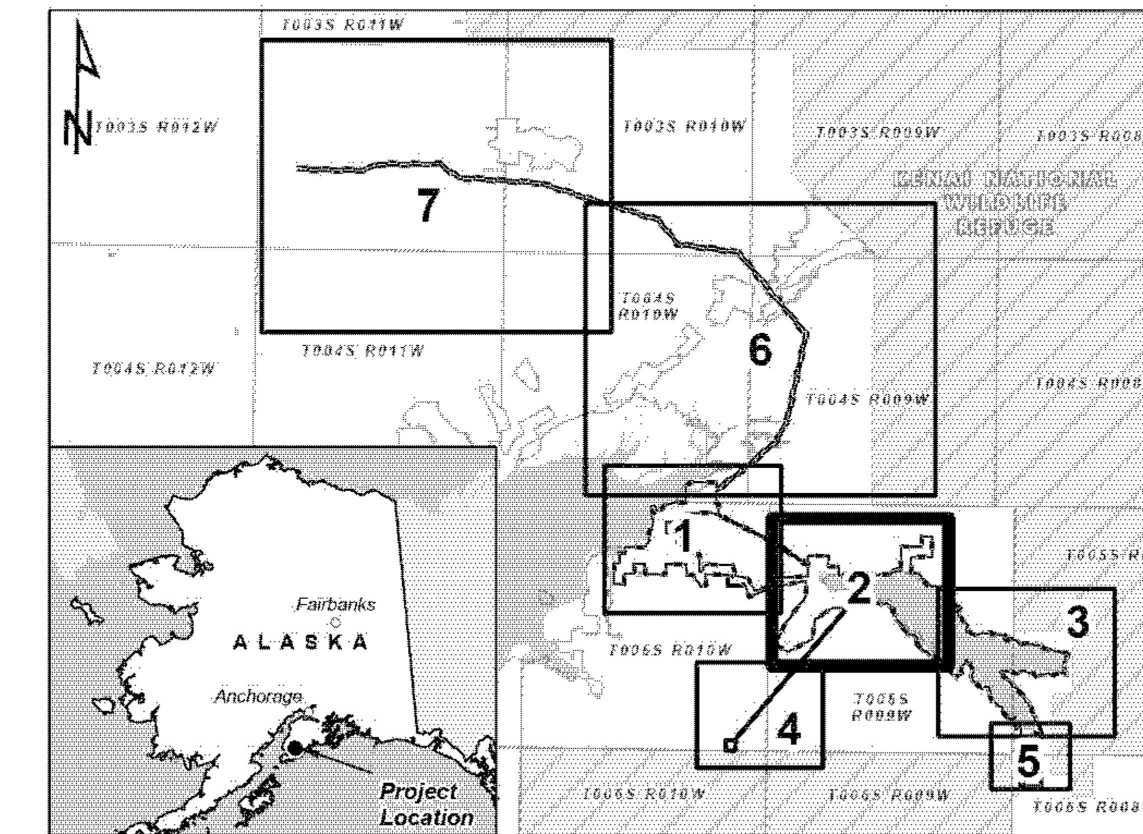
SHEET NO. 1 OF 7

0 650 1,300 2,600 3,900 5,200 Feet

DATE: JUNE 2026

FERC DWG. NO. 8221-





TN
MN
13.69°E
6/23/2026

Proposed Project Boundary	Project Feature	PLSS Section
Reference Point	Dixon Tunnel	PLSS Township/Range
Project Feature	Existing Project Road	Waterbody
	Proposed Project Road	State Land
	Stream/River	

Map notes:
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ALASKA ENERGY AUTHORITY

BRADLEY LAKE HYDROELECTRIC PROJECT
FERC NO. 8221

PROJECT BOUNDARY MAP

EXHIBIT G

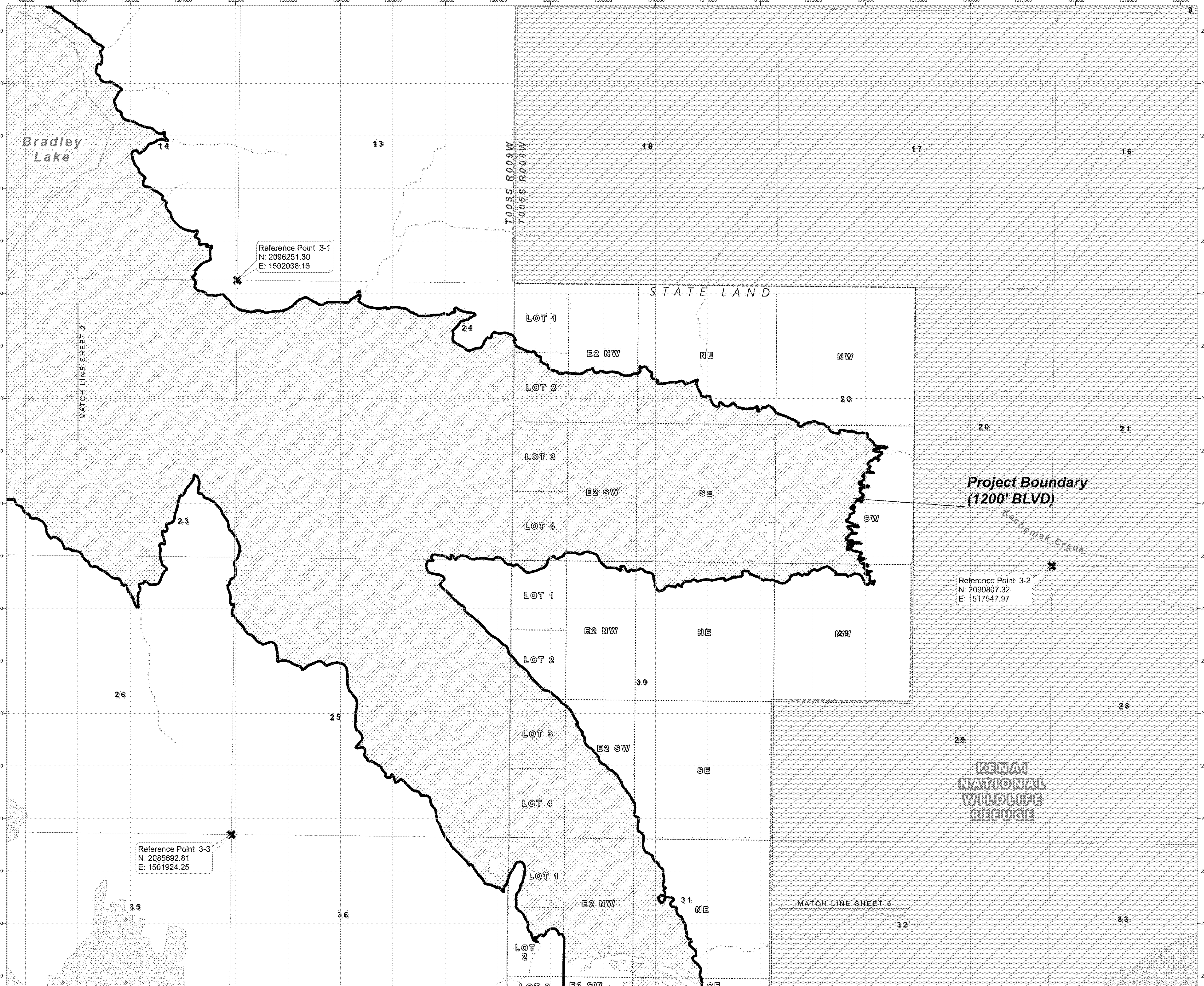
SCALE: 1" = 900'

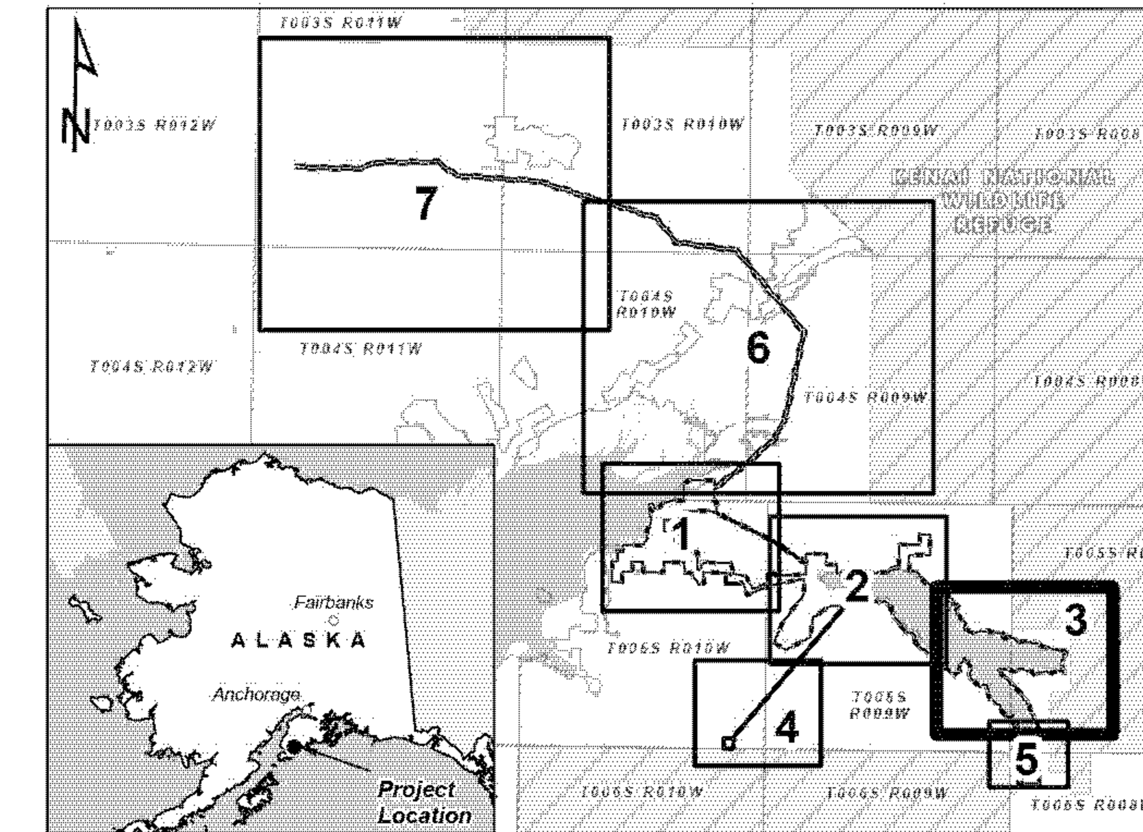
SHEET NO. 2 OF 7

0 650 1,300 2,600 3,900 5,200 Feet

DATE: JUNE 2026

FERC DWG. NO. 8221-





TN
MN
13.74°E
6/23/2026

Proposed Project Boundary
Reference Point
Stream/River
Glacier
PLSS Second Division
PLSS Section
PLSS Township/Range
Waterbody
Kenai National Wildlife Refuge
State Land

Map notes:
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STATE OF MAINE
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ALASKA ENERGY AUTHORITY

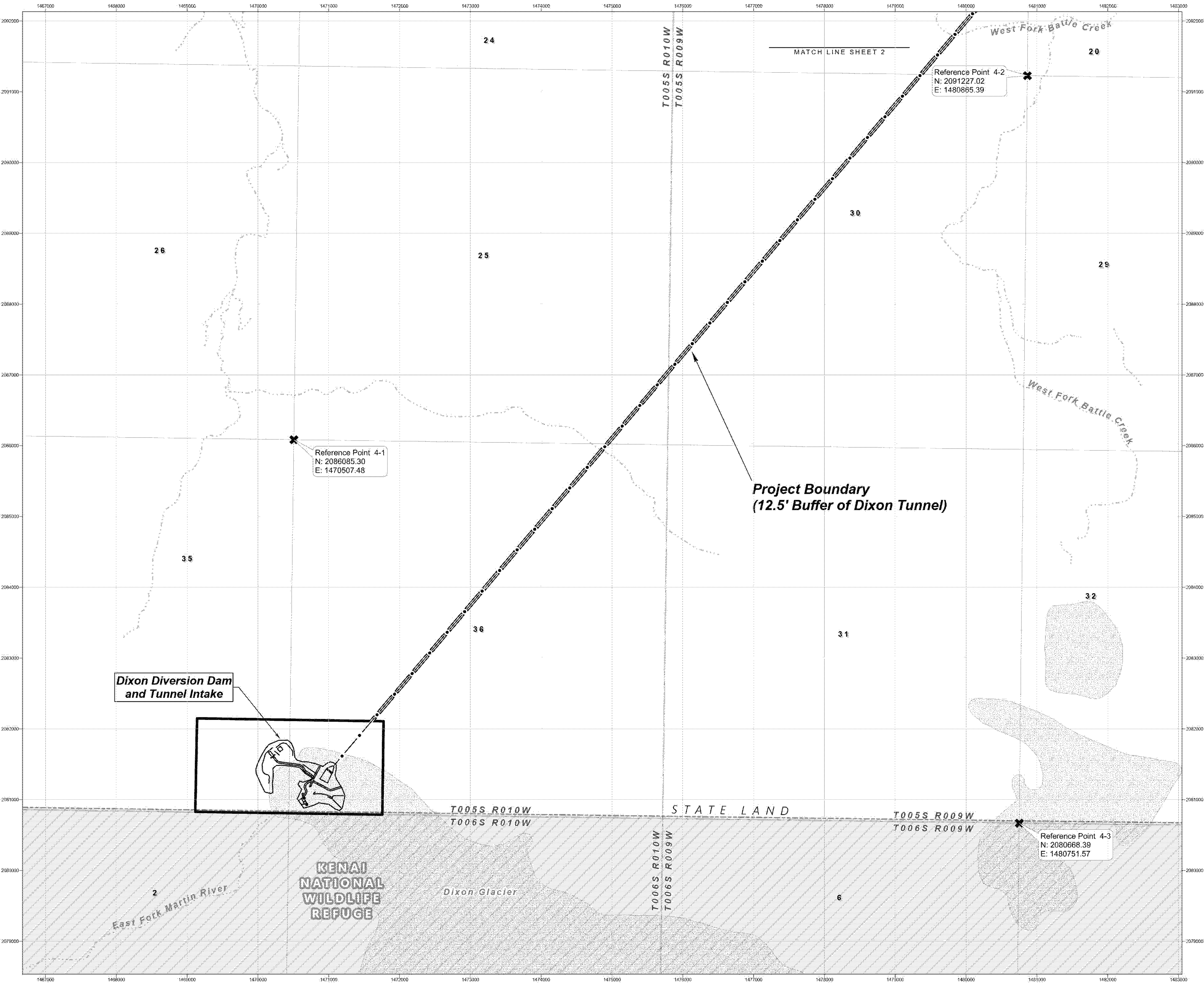
BRADLEY LAKE HYDROELECTRIC PROJECT
FERC NO. 8221

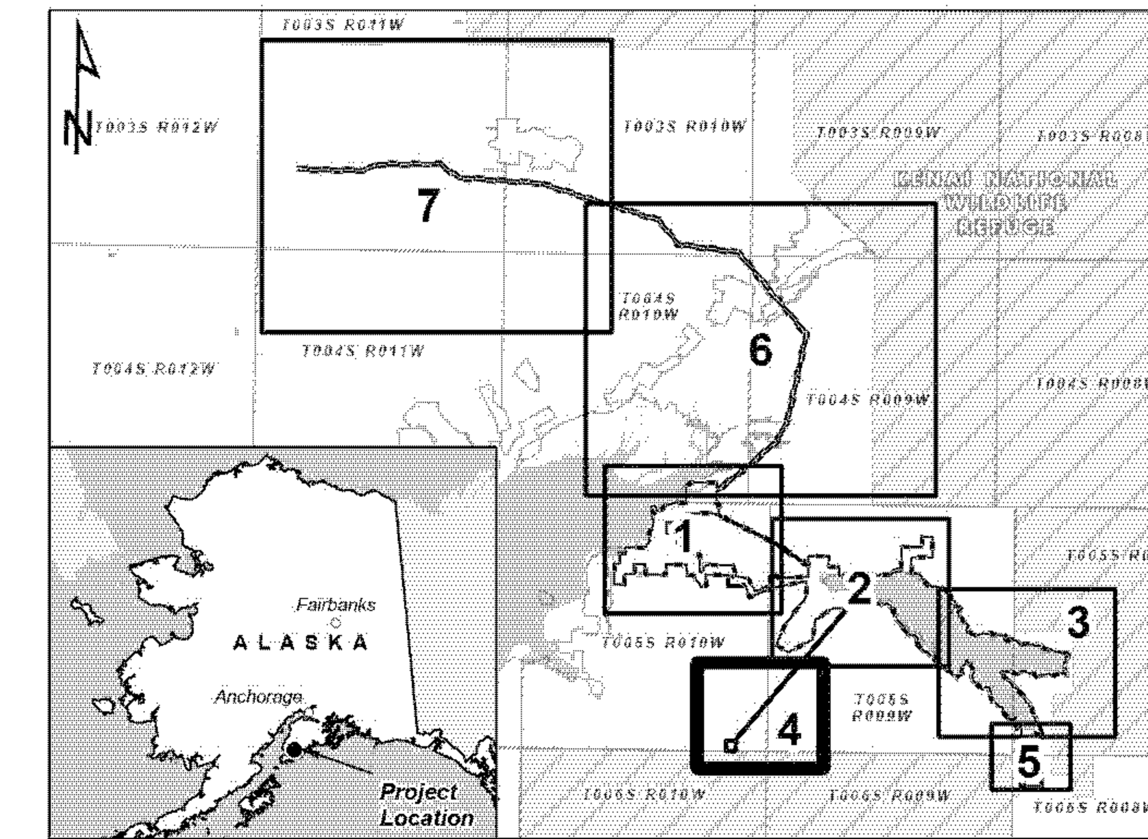
PROJECT BOUNDARY MAP

EXHIBIT G
SCALE: 1" = 900'
SHEET NO. 3 OF 7

0 650 1,300 2,600 3,900 5,200 Feet

DATE: JUNE 2026
FERC DWG. NO. 8221-





TN
MN
13.67°E
6/23/2026

Proposed Project Boundary	Dixon Tunnel	PLSS Township/Range
Reference Point	Stream/River	Waterbody
Project Feature	Glacier	Kenai National Wildlife Refuge
	PLSS Section	State Land

Map notes:
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STEPHEN W. EVERETT
2161
PROFESSIONAL LAND SURVEYOR

ALASKA ENERGY AUTHORITY

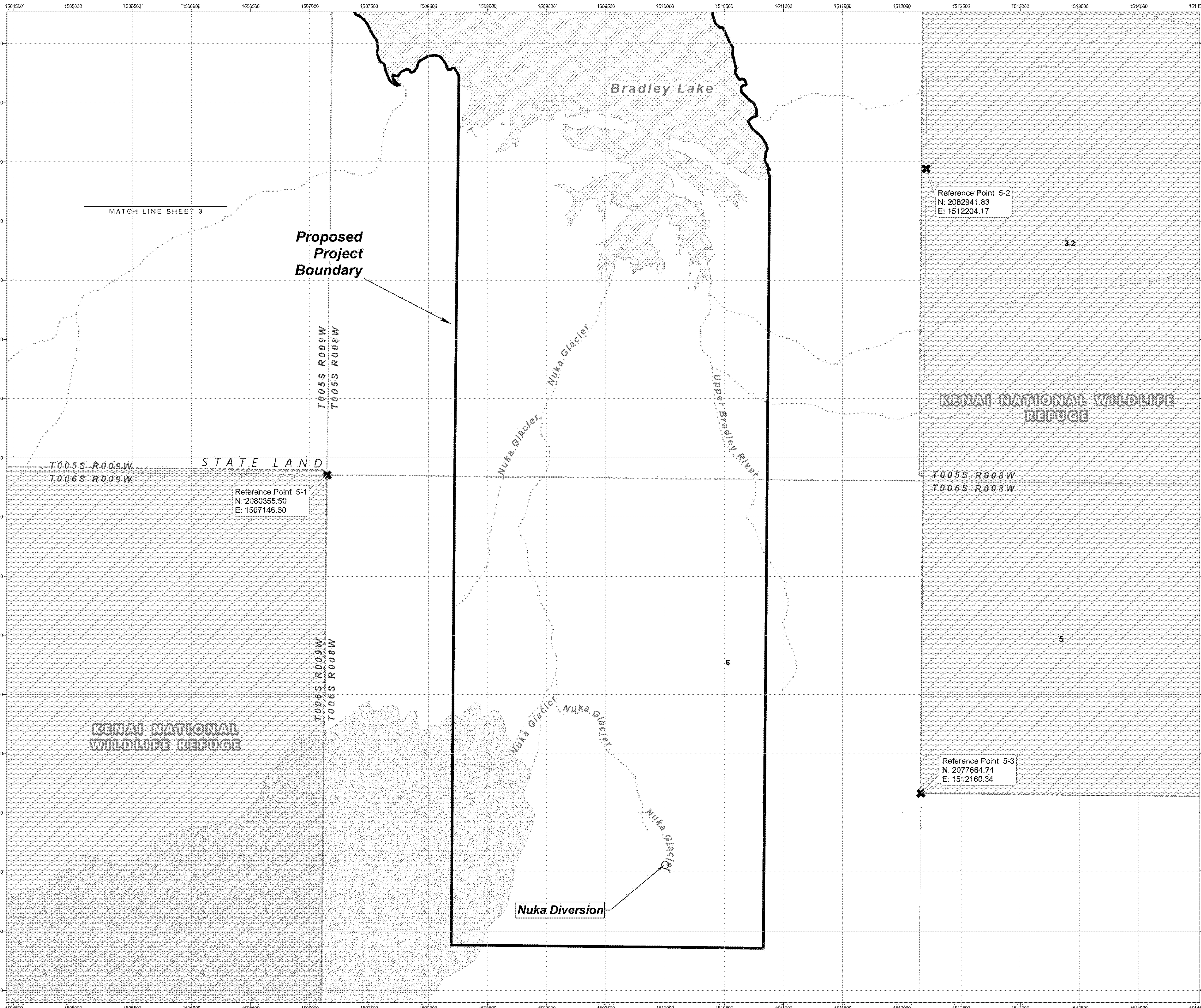
BRADLEY LAKE HYDROELECTRIC PROJECT
FERC NO. 8221

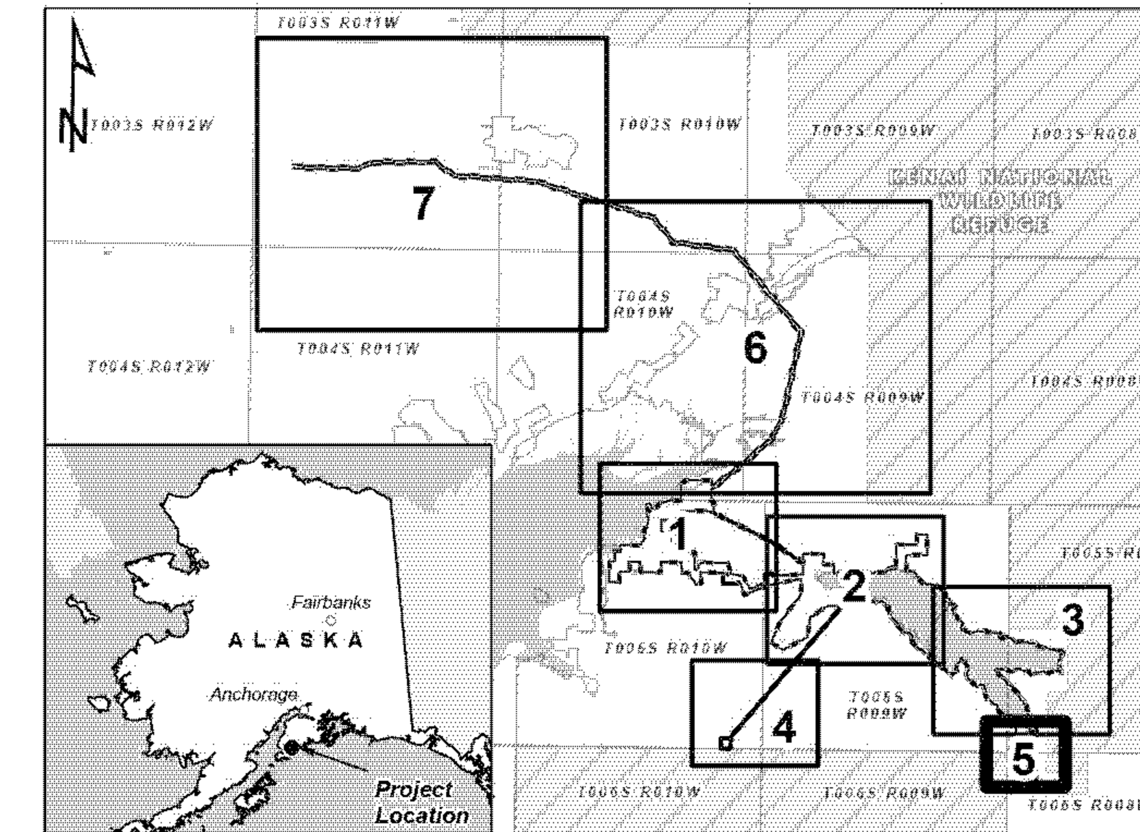
PROJECT BOUNDARY MAP

EXHIBIT G — SCALE: 1" = 650' — SHEET NO. 4 OF 7

0 487.5 975 1,950 2,925 3,900 Feet

DATE: JUNE 2026 — FERC DWG. NO. 8221-





TN
MN
13.74°E
6/23/2026

- Proposed Project Boundary
- Reference Point
- Project Feature
- Stream/River
- Glacier
- PLSS Section
- PLSS Township/Range
- Waterbody
- Kenai National Wildlife Refuge
- State Land

Map notes:
1. The Bradley Lake Project is located in the State of Alaska in Kenai Peninsula Borough.
2. Reference Point coordinates are shown in NAD 1983 2011 StatePlane Alaska 4 FIPS 5004 Ft US.
3. Elevation shown are referenced to the Bradley Lake Vertical Datum (BLVD). The conversion factor between BLVD and the North American Vertical Datum of 1988 (NAVD 88) is, NAVD88 – 9.76 feet = BLVD.
5. Licensee has acquired all flowage rights and title in fee or the right to use in perpetuity all lands necessary or appropriate for the construction, maintenance, and operation of the Project. All property records are kept on file with the licensee.
6. There are no federal lands within the Project boundary. The Proposed Project Boundary lies entirely within Alaska State Land.
7. The Project boundary description, as required by 18 CFR 4.41, is represented here by a grid of Northings and Eastings around, and graticules within, the map frame. Any position in Northings and Eastings along the Project boundary can be determined using these references.
8. The Proposed Project Boundary, in part, was developed from contour elevation derived from 2022 LiDAR surveys conducted by NV5 Geospatial, Anchorage, AK.

SURVEYORS STATEMENT

I HEREBY CERTIFY TO THE FEDERAL ENERGY REGULATORY COMMISSION (FERC) THAT THIS PLAN MEETS THE CONDITIONS SET FORTH BY FERC FOR ITS EXPRESSED PURPOSE. THE PURPOSE OF THIS MAP IS TO PROVIDE A GEOREFERENCED VISUAL DEPICTION OF THE LOCATION OF PROJECT FEATURES AND BOUNDARIES BASED ON THE BEST AVAILABLE HISTORICAL DRAWINGS AND DIGITAL REFERENCE SOURCES INCORPORATED INTO THE GEOGRAPHIC INFORMATION SYSTEM (GIS). LOCATIONS HAVE NOT BEEN VERIFIED BY PHYSICAL FIELD SURVEYS AND THIS DRAWING SHOULD NOT BE USED FOR PURPOSES OF DEVELOPING PROPERTY BOUNDARY DESCRIPTIONS.

STATE OF MAINE
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ALASKA ENERGY AUTHORITY

BRADLEY LAKE HYDROELECTRIC PROJECT
FERC NO. 8221

PROJECT BOUNDARY MAP

EXHIBIT G

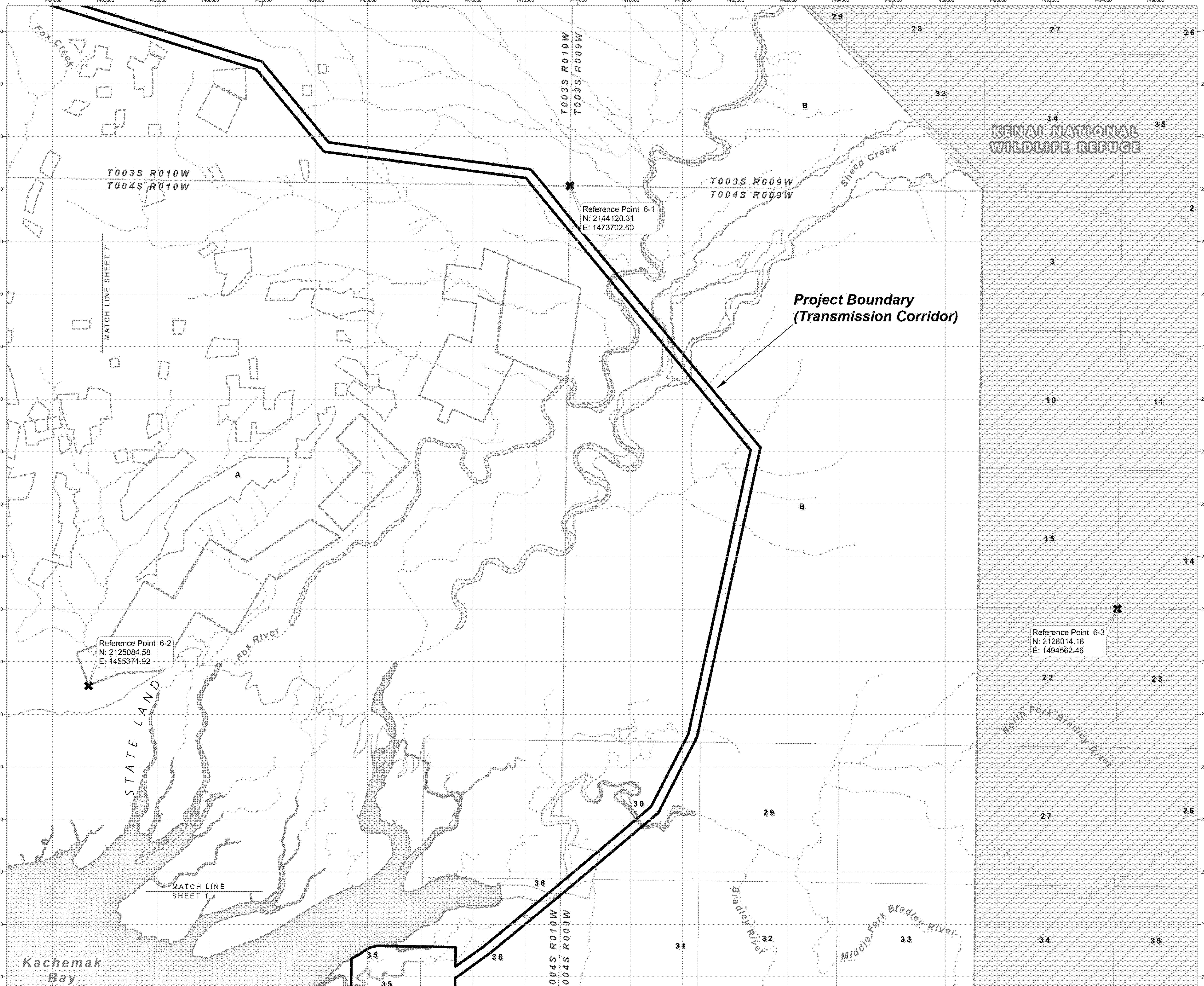
SCALE: 1" = 400'

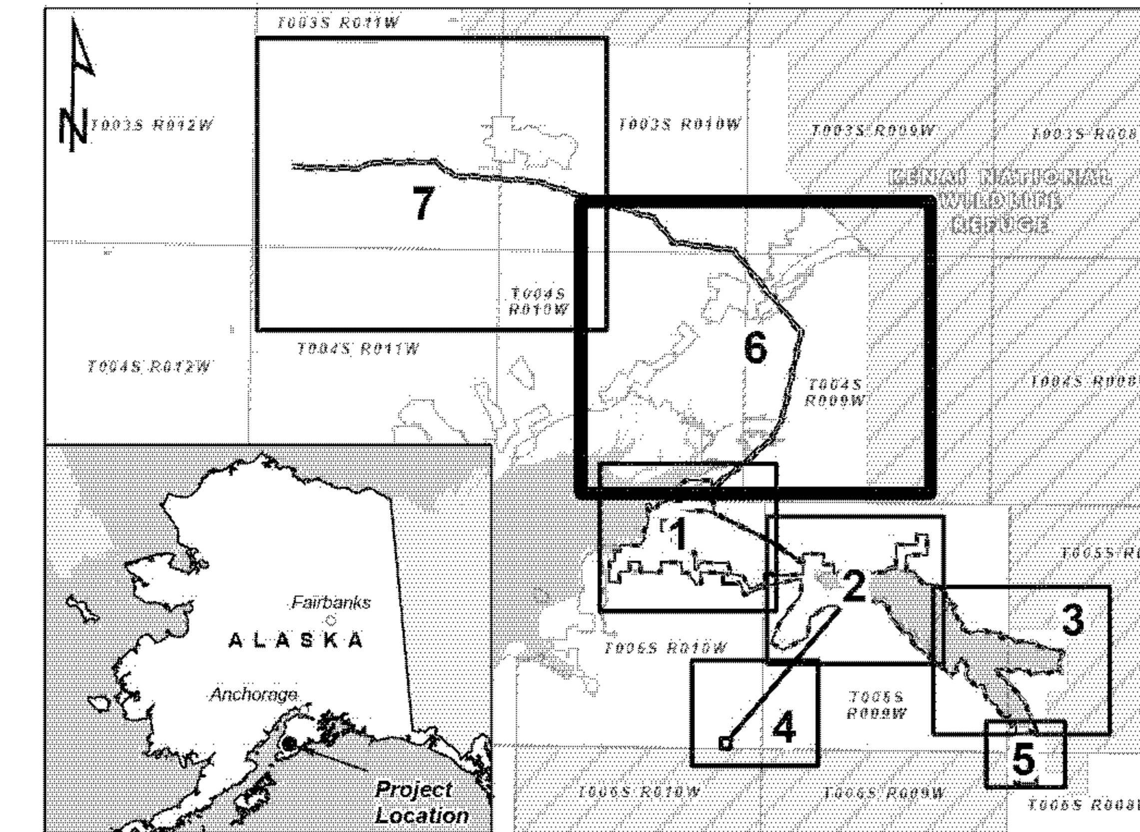
SHEET NO. 5 OF 7

0 300 600 1,200 1,800 2,400 Feet

DATE: JUNE 2026

FERC DWG. NO. 8221-





TN

MN

13.67°E
6/23/2026

- Proposed Project Boundary
- Reference Point
- Stream/River
- PLSS Section
- PLSS Township/Range
- Waterbody
- Kenai National Wildlife Refuge
- State Land

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ALASKA ENERGY AUTHORITY

BRADLEY LAKE HYDROELECTRIC PROJECT
FERC NO. 8221

TRANSMISSION CORRIDOR MAP

EXHIBIT G

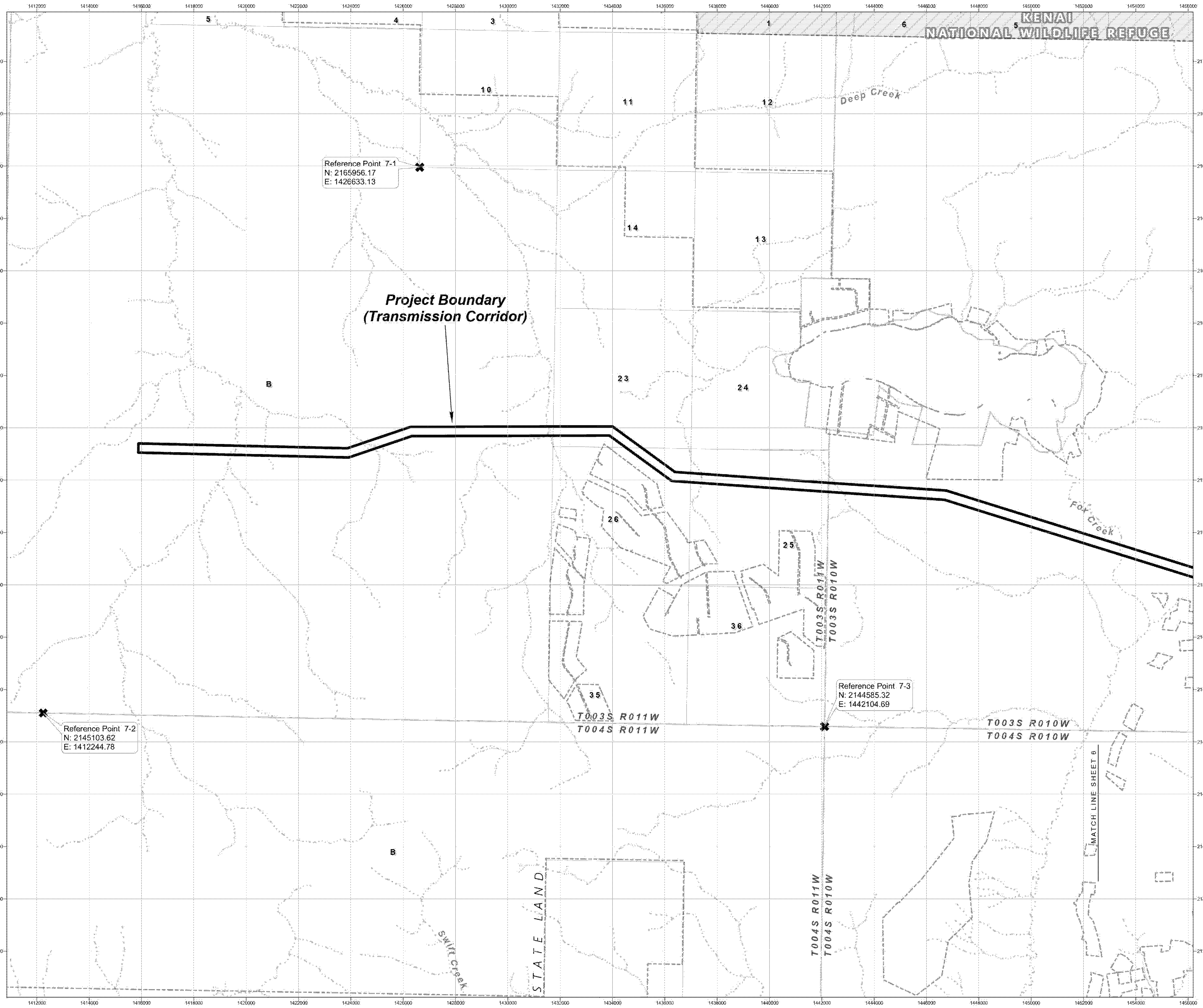
SCALE: 1" = 1,800'

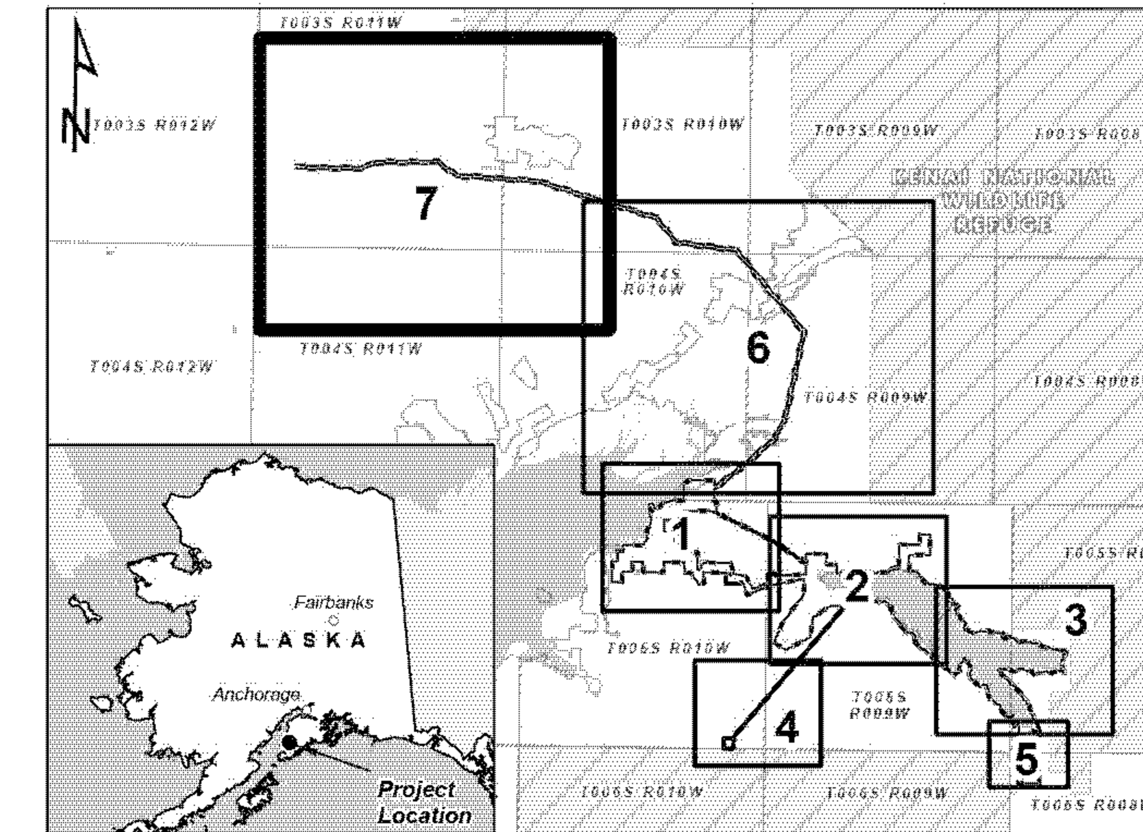
SHEET NO. 6 OF 7

0 1,350 2,700 5,400 8,100 10,800 Feet

DATE: JUNE 2026

FERC DWG. NO. 8221-





TN
MN
13.59°E
6/23/2026

Proposed Project Boundary
Reference Point
Stream/River
PLSS Section
PLSS Township/Range
Waterbody
Kenai National Wildlife Refuge
State Land

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BRADLEY LAKE HYDROELECTRIC PROJECT
FERC NO. 8221

TRANSMISSION CORRIDOR MAP

EXHIBIT G

SCALE: 1" = 1,800'

SHEET NO. 7 OF 7

0 1,350 2,700 5,400 8,100 10,800 Feet

DATE: JUNE 2026

FERC DWG. NO. 8221-