Project Workplan – Dixon Diversion

1. Overall Project Summary and Approach (45 points)

a. Description of GHG Reduction Measures (20 points)

The Alaska Energy Authority (AEA) proposes the Dixon Diversion project as a Greenhouse Gas Reduction Measure under the Alaska Priority Sustainable Energy Action Plan (PSEAP). The Dixon Diversion project is a significant and transformative expansion of the existing AEA-owned Bradley Lake Hydroelectric project on the Kenai Peninsula of Alaska. The objective of this project is to divert water coming off the Dixon Glacier into Bradley Lake which will increase the capacity of the hydroelectric project by 190,800 MWh/year, as well as offset 106,668 MTCO2e of emissions and displace at least 1.5 billion cubic feet of natural gas annually. The Dixon Diversion project will accomplish this objective through the following project elements: a diversion dam and intake structure at the toe of the Dixon Glacier, a 4.7-mile long 14-foot diameter underground tunnel to convey water from the Martin River to the existing Bradley Lake reservoir, modifications to the existing dam to raise the reservoir elevation by 14 feet, and 1 mile of new access road. By utilizing existing energy infrastructure, this project allows for a significant renewable resource to be developed on an extremely small footprint and represents the largest renewable energy project in Alaska in the last 30 years.

The original Bradley Lake hydroelectric project, commissioned in 1991, has been a steadfast source of low-cost renewable power in Alaska. Located 27 air miles northeast of Homer, Alaska, it boasts 120 MW of installed capacity, featuring a 125-foot-high concrete-faced, rock-filled dam structure, a 3.5-mile-long power tunnel and vertical shaft, generating plant, interior substation, 20 miles of transmission line, and substation. This project generates approximately 400,000 MWh of renewable electricity annually, representing 10% of the total annual power consumed by Railbelt electric utilities. Bradley power stands out as one of the most cost-effective energy sources on the Railbelt.

Alaska's interconnected transmission system, colloquially referred to as the Railbelt, serves 75% of Alaska's population. It spans nearly 700 miles from the Bradley Lake Project in the south to Delta Junction in the north and is operated by four member owned cooperatives, one city owned utility, and AEA. Power generated from the Bradley Lake hydroelectric project has consistently served all consumers along the entire Railbelt.

The Dixon Diversion would not be the first major expansion to the Bradley Lake project. As recently as 2020, AEA completed the West Fork Upper Battle Creek Diversion project. This project constructed a concrete diversion dam, three miles of new road, and a 5-foot diameter pipeline buried alongside the road to convey water from the diversion dam at the headwaters of Battle Creek into Bradley Lake. The additional water flowing into Bradley Lake increased the energy coming out of the project by about 40,000 MWh, or a 10% increase in power generation. The Battle Creek Diversion Project was completed on schedule and within the original budget. The existing and proposed components of the Bradley Lake, Battle Creek, and Dixon Diversion project are shown below.

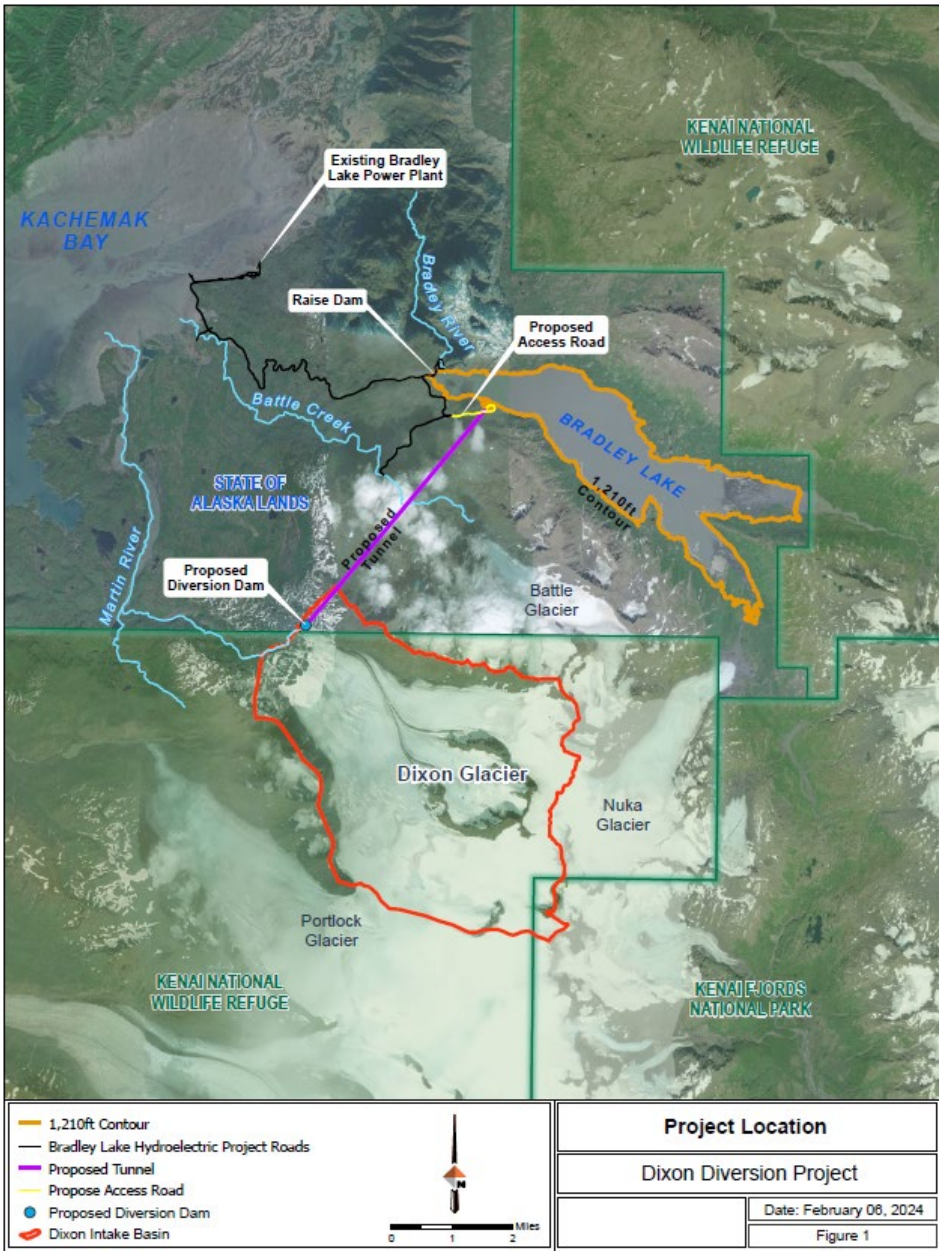


Figure 1: Dixon Diversion Project Map

AEA has identified the Dixon Diversion project as an economic and beneficial expansion of the already successful Bradley Lake Hydroelectric project. This project would increase the energy generated from Bradley by an impressive 50%, meeting 5% of the total demand of the entire Railbelt.

The Dixon Diversion project will use CPRG funds to complete the relicensing process and construct the expansion. This process entails amending the existing Federal Energy Regulatory Commission (FERC) license, an endeavor necessitating several years of comprehensive studies, which AEA has already initiated. Notably, in 2022, AEA filed the Notice of Amendment and Initial Consultation Document, subsequently accepted by FERC. Progressing through the process, preliminary studies were conducted in the summer of 2022, followed by soliciting input from the public and resource agencies on the Draft

Study Plan document in November 2022. Further preliminary studies were undertaken in 2023, focusing on hydrology, stream gauging, and video monitoring to assess fish habitat and usage in the Martin River, the river that comes off the Dixon Glacier.

A Final Study Plan will be submitted in April 2024 which will outline the remaining two years of study plans. This plan will be developed and accepted with input and concurrence from applicable resource agencies to ensure the project's potential effects are well known. Some of the major studies that will occur in the 2024 and 2025 field seasons include but are not limited to: geotechnical drilling and investigation at the tunnel inlet and outlet, continued hydrology and stream gaging, water quality monitoring, geomorphology, aquatic habitat characterization and fish use, and cultural resource studies.

Pre-engineering and design work will occur concurrently with the environmental studies, and following the 2025 field season, a Draft Amendment Application (DAA) will be submitted for comment and review to the public, stakeholders, resource agencies, and FERC. The DAA will go through an extensive review process and a Final Amendment Application will be submitted to FERC in 2026. After FERC approval and completion of the National Environmental Protection Act (NEPA) process, the project will go out to bid for construction.

Construction of the Dixon Diversion project will be completed through two primary phases: Dam Raise & Powerline Construction, and Diversion Dam & Tunnel Construction. The dam raise and powerline construction may be bid separately and completed first. The primary reasons for this are that as soon as the dam raise is complete, Bradley Lake will have additional storage capacity that can be utilized.

The lake level will be raised by at least 14 feet through modifications to the dam, including the addition of a gate to the spillway crest and raising the existing dam crest and parapet wall accordingly. The byproduct of additional storage capacity and higher head pressures at the powerplant will result in more efficient energy production from all Bradley water representing an additional 8000 MWh of energy production annually. There were multiple different levels of dam raise investigated as part of this project, and 14 feet likely strikes the right balance in gaining additional reservoir capacity, without altering the dam's structural integrity. The 14-foot raise will be accomplished through minimal intervention. Bradley Lake is surrounded by steep rocky faces along its perimeter, and inflows from a glacial outwash plain to the east. Acreage in the flat outwash plain will become inundated as the reservoir level increases, but total inundation will remain small as most of the lake is surrounded by steep rocky cliffs. AEA has modeled a range of reservoir raise scenarios and an increase up to 28 feet is possible within the project's current areal constraints.

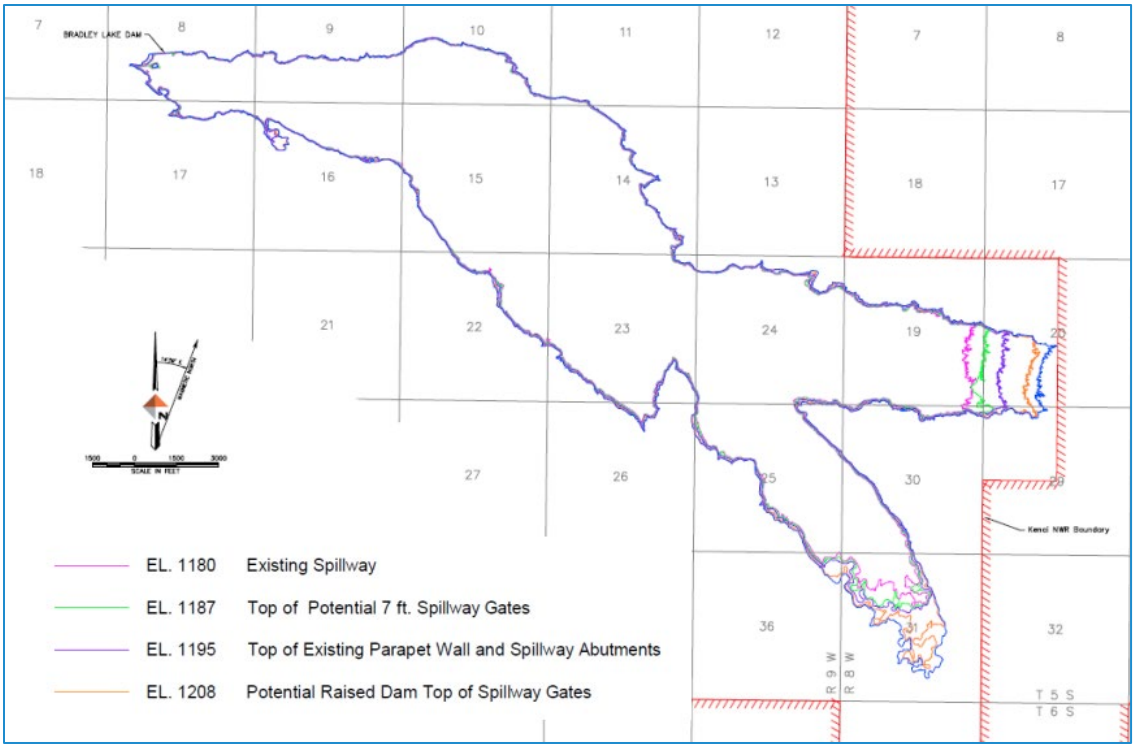


Figure 2: Inundation map of Bradley Lake for a range of dam raise scenarios

Simultaneous to the dam raise, crews would work on installing infrastructure to run three-phase power from the Bradley Lake Powerhouse to the Bradley Dam. This power will run beneath the existing road up to the dam, improving its operability and acting as a power supply for the Tunnel Boring Machine (TBM) used to drill the Dixon Diversion Tunnel, providing clean hydroelectric power in lieu of the alternative diesel-generator-powered TBM operation.

Following installation of 3-phase power and modifications to the Bradley Dam, operations to begin constructing the diversion dam, intake structure, and tunnel can begin. The diversion dam will be constructed near the toe of the Dixon Glacier on State land. This area is accessible only by helicopter, so crews and equipment will be flown in to initiate work on the diversion dam while the tunnel is being constructed. Crews will work out of a man-camp at the project site which will eventually be converted into a permanent maintenance equipment building. The diversion dam will be either constructed as a rock fill dam or rubber dam, with a gated sluiceway for sediment transport and minimum instream flows down the Martin River. Construction of the intake structure and diversion dam is expected to last approximately 1 season.

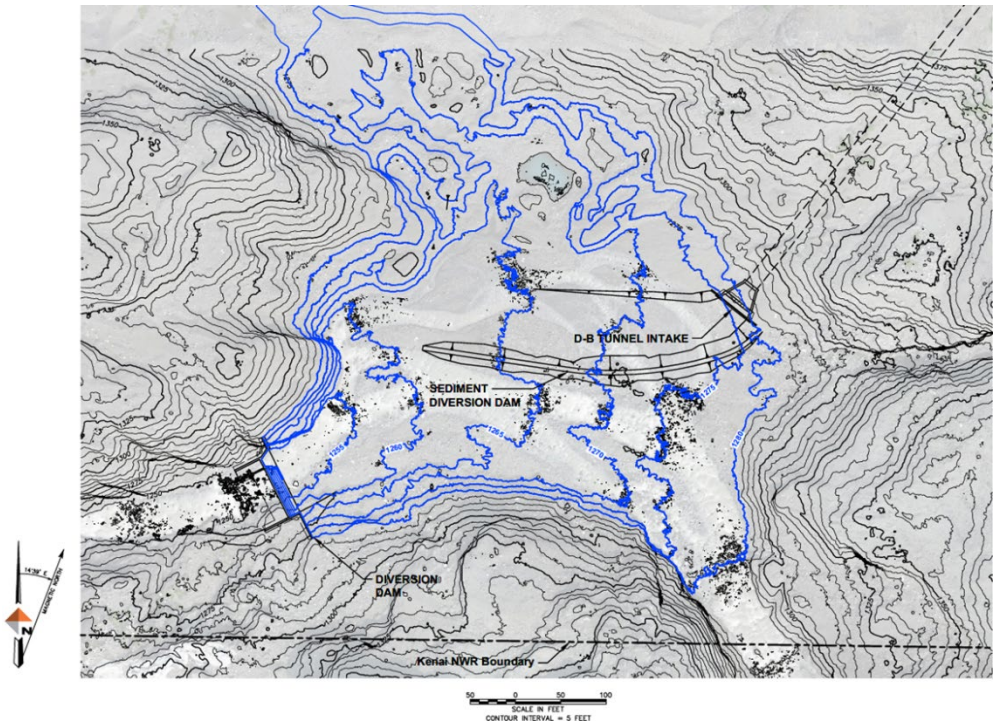


Figure 3: Conceptual design of diversion dam and tunnel intake (plan view)

Figure 4: Toe of Dixon Glacier, location of future diversion dam and tunnel intake

The tunnel construction will be the most expensive and involved aspect of this project. The tunnel will be 4.7 miles long, underground from Bradley Lake to the Dixon diversion dam. The tunnel diameter will be 14 feet, and AEA has determined that there are enough TBMs currently in operation worldwide to source for boring a tunnel of that size. TBM was compared to a drill and blast method of tunnel construction and was found to drill at much faster rates of penetration to justify the mobilization costs of the equipment. The TBM has additional benefits including reduced friction inside the tunnel due to smoother walls from TBM construction compared to drill and blast. Following construction of 300 feet of starter tunnel using drill and blast methods, the TBM will drill uphill towards the diversion dam and TBM operations will take approximately a year to complete. Due to the underground nature of this phase of the project, operations can continue through the winter season.

Upon completion of the tunnel, equipment and power can be run to the diversion dam via the newly drilled tunnel. This will allow enhanced remote operability of equipment at the diversion dam as well as provide an alternative means to mob and demob equipment from the diversion dam. Upon commissioning of the project, the tunnel should be able to convey up to 1400 cubic feet per second (cfs) of water into Bradley Lake. Several times each summer, flood events along the Martin River will exceed the diversion tunnel's capacity and excess water will flow downriver past the diversion dam creating channel maintenance events on the lower Martin River.

The Dixon Diversion project is expected to come online by early 2030, prior to the start of the 2030 water year, and will immediately provide benefits to the entire Railbelt upon commissioning. With a hydroelectric facility and powerplant already in place, all water that is diverted from Dixon Glacier into Bradley Lake will generate electricity that will directly offset natural gas generated energy in Alaska and provide greenhouse gas reduction benefits to the entire state of Alaska.

b. Demonstration of Funding Need (10 points)

The Total Project Cost for the Dixon Diversion, using a class 4/5 Engineer's Estimate is $342 million. This includes preliminary study and engineering costs, relicensing efforts, and construction costs. This does not include AEA costs.

AEA is not aware of any Federal funding opportunities that currently exist for the development of new state-owned hydroelectric projects of this magnitude. There is a substantial amount of work that has been completed and ongoing to submit the FERC license amendment necessary for the project. This includes preliminary engineering and geotech work for the diversion dam construction and tunnel boring efforts, hydrology and stream gaging to determine energy potential and minimum instream flow requirements for salmon, and permitting and license preparation. AEA has funded work to-date through a $1 million grant from AEA's Renewable Energy Fund, $1.36 million total contribution from local electric utilities, and $5 million in FY24 State of Alaska funds appropriated through the legislature. AEA has put in a request for an additional $7 million from the State of Alaska's FY25 budget to complete preliminary environmental and engineering work in the 2025 season.

Some of project costs may be eligible for the Clean Electricity Investment Tax Credit (48E) or the Clean Electricity Production Tax Credit (45Y), which are expected to be in place until at least 2032, authorized

through the Inflation Reduction Act (IRA) and the state may be eligible to receive those credits through the elective pay provisions provided by the IRA. The amount of that credit will vary based on several factors and would be reduced if AEA uses tax exempt bonds or receives grants to fund the project. Any proceeds from tax credits would be received after the commissioning and would not provide the cash flow needed for construction.

The Dixon Diversion Project appears to be economical and cost competitive with current and future natural gas prices. A Climate Pollution Reduction Grant would ensure this beneficial and transformational project can be completed on time, reducing greenhouse gas emissions in Alaska and reducing Alaska's dependence on rapidly dwindling natural gas supplies. If AEA were not to receive a grant under this program, funding would most likely be secured through utility revenue bonds. The project's cost would fall on customers of the five Railbelt utility co-ops. Alaska's small population and harsh winters are attributed, in part, to the high energy burden experienced by its residents. A Climate Pollution Reduction Grant would relieve the upward pressure on rates that are incurred owing to debt service costs resulting from needed investment for utility-scale energy projects.

c. Transformative Impact (15 points)

75% of Alaska's population is served by the Railbelt for their electric needs. The Railbelt electric transmission (Railbelt) is an electric transmission system comprised of interconnected transmission infrastructure assets owned by four independent member-owned electric cooperatives; one municipal electric utility; and the State-owned Alaska Interties and Bradley Lake Hydroelectric Project transmission assets. This transmission system spans over 700 miles from Bradley Lake at its southernmost point, to Delta Junction in interior Alaska at its northernmost point. The Railbelt also serves multiple major centers of economic activity, and critical assets along its lines, including but not limited to, military installations, hospital / critical care facilities, fire/police/EMS facilities, major ports of entry, and key access points for natural resource extraction and processing all of which rely on power delivered via the Railbelt for their daily operation.

In 2022, the Railbelt generated 4698 GWH of electricity primarily through carbon intensive means. Natural gas fired generators account for approximately 64% of the generation along the Railbelt, with coal and fuel oil accounting for another ~20%. The Railbelt is highly reliant on natural gas and other fossil fuels for its electricity and heating needs, and any increase in renewable generation via hydropower development would directly offset such costly carbon-based energy generation assets.

The Dixon Diversion project is expected to meet ~5% of the Railbelt's electricity demand and would be the largest renewable energy project in Alaska in 30 years. The Bradley Lake hydroelectric project provides firm, year-round power which utilities can dispatch at times of peak demand. In Alaska peak demand occurs in the winter when temperatures are coldest and daylight hours are shortest. Peak generation plants are inefficient compared to baseload plants. Using storage hydropower to meet these peak demands reduce the frequency whereby inefficient and high-carbon emitting generation facilities are turned on to accommodate such peaks in energy demand.

An additional concern in Alaska, and reason to accelerate this project, is the impending natural gas shortage in Southcentral Alaska. Natural gas is the primary energy generation fuel source in Southcentral Alaska, and all such gas is extracted from Cook Inlet gas fields. Cook Inlet is Alaska's oldest producing oil and gas basin and has been producing hydrocarbons since the 1950's. This pool has been in decline for decades, but in a few years the gas produced from Cook Inlet will not be sufficient to meet the energy demands for the Railbelt. A 2023 report commissioned by Enstar, the local natural gas utility in Southcentral Alaska, found that natural gas demand from Cook Inlet will likely exceed supply by 2027-2028. There have been more recent estimates that predict that shortage happening even sooner. Currently, there are no cost-effective alternatives to offset the oncoming shortage. The most likely scenario is that utilities will have to import liquefied natural gas (LNG) to meet the natural gas shortage in the coming years. Southcentral Alaska does not have an LNG import terminal, which would need to be built, and LNG will come with even higher emissions than locally sourced natural gas due to overseas shipping-related emissions. Importing LNG also would represent a significant increase in the cost of energy for all Alaskans. Alaska already faces some of the highest energy costs in the nation, importing LNG would increase the price of natural gas deliveries by at least 50%. The energy produced from the Dixon Diversion project will offset 1.5-1.6 billion cubic feet (bcf) annually. This energy represents 7.5% of the projected unmet natural gas demand in 2030, a significant step in addressing the energy needs for the Railbelt.

The Dixon Diversion is a significant expansion of the Bradley Lake Hydroelectric project and is a firm, reliable energy source that helps regulate energy needs along the Railbelt. Storage hydro has many benefits compared to other types of renewable sources, especially in Alaska, because it is dispatchable year-round. The coldest and darkest winter months correspond to the highest energy demands, and storage hydro remains available to draw from during those times of high demand. Solar and wind are both great renewable resources in Alaska, but their energy output is unpredictable and can destabilize the grid. Increasing firm renewable resources, such as storage hydro, allows utilities to regulate energy and integrate more non-firm energy sources.

A recent cold weather event in January 2023 illustrated the need for storage hydro. Anchorage had been experiencing temperatures below –20 F, breaking daily low-temperature records and the frigid temperatures had been persistent for weeks. The Cook Inlet Natural Gas Storage Facility, an underground gas storage reservoir, had experienced failures on two of five wells. Utilities were all directed to maximize their hydroelectric production to alleviate the pressure on the gas delivery system. Wind and solar resources in Alaska were not able to contribute during this critical period, highlighting the fact that a MW from a storage hydro project like the Dixon Diversion project is far more valuable to Alaska than a MW of energy from wind or solar.

2. Impact of GHG Reduction Measures (60 points)

a. Magnitude of GHG Reductions from 2025-2030 (20 points)

The Dixon Diversion project is scheduled to be completed and commissioned by early 2030. This will capture a full water year in 2030 and associated greenhouse gas reductions from that water. In these systems water typically starts flowing in late April / early May. A minimum instream flow (MIF) will be

established through the FERC licensing process, and once flows exceed the MIF, excess water will be diverted through the Dison Diversion tunnel into Bradley Lake. The water year typically ends in late October / early November once temperatures consistently drop below freezing and there is not enough flow to divert water anymore. The project is expected to be commissioned before spring break-up so the magnitude of greenhouse gas reductions from 2025-2030 would be equivalent to the energy produced from a full water year.

Based on synthetic flows of the Martin River averaged over the previous decade, accounting for expected minimum instream flow requirements and the capacity of the 14-foot diameter diversion tunnel, the Dixon Diversion project will produce 190,800 MWh of electricity annually.

EPA's 2022 eGRID conversion factor for the Alaska Railbelt (AKGD – ASCC Alaska Grid subregion) nonbaseload rates gives an accurate estimation of CO2e reductions for projects that displace electricity generation. For the Railbelt the eGRID subregion annual CO2e non-baseload output emission rate is 1,232.508 lb/MWh.

$$190{,}800\ MWh \times 1{,}232.508\ \frac{lb\ CO2e}{MWh} \times\ \frac{1\ MT}{2204.62\ lb} = 106{,}668\ MT\ CO2e$$

Magnitude of GHG Reductions from 2025-2030 = 106,668 MTCO2e

b. Magnitude of GHG Reductions from 2025-2050 (10 points)

To estimate the magnitude of GHG Reductions from 2025-2050, the same annual energy output from Dixon will be used over a 25-year period. It is likely that the energy numbers over this period could be even higher, due to an observable trend of higher flows in recent years due to warmer summers melting the source glaciers at a faster rate.

$$106{,}668\ MTCO2e\ \times 25\ years\ =\ 2{,}666{,}701\ MTCO2e$$

Magnitude of GHG Reductions from 2025-2050 = 2,666,701 MTCO2e

c. Cost effectiveness of GHG Reduction (15 points)

$343,659,601/ 106,668MTCO2e = **$3,222/MTCO2e**

The Dixon Diversion project boasts a remarkable level of cost-effectiveness that is not captured in the scoring. Due to the extensive and involved FERC licensing process, realization of project benefits are delayed until both licensing and construction are finished. Even through all project funds will be utilized within five years, the advantages of greenhouse gas reduction won't commence until the fifth year. Nevertheless, upon completion, this project is poised to deliver year-round benefits to Alaska for approximately a century. When considering the lifecycle of a typical hydroelectric project, the cost-effectiveness is notably high, with hydroelectric projects consistently producing the most economical energy along the Railbelt.

d. Documentation of GHG Reduction Assumptions (15 points)

Annual greenhouse gas reductions resulting from the Dixon Diversion project are calculated from offsets of expected energy production from the hydroelectric project. To develop estimations of energy produced from the Dixon Diversion project, it is critical to accurately measure the discharge of the Martin River. The Martin River, which comes off the Dixon Glacier, is a fast moving, cold, and highly turbid river. Upon exiting the glacier, the Martin River quickly enters a canyon characterized by a series of waterfalls and deep canyon walls. Upon exiting the canyon, the river becomes highly braided and remains that way until the reaching tidewater.

Due to its remote nature, highly mobile bed load, and lack of defined channel, the Martin River is a challenge to accurately measure. In the summer of 2023, there was a large field effort to characterize the Martin River. The United States Geological Survey (USGS) installed and operates a stage gage on the Martin River around where it first exits the canyon (USGS 15238951). AEA hired a contractor to install additional stream gages on the Martin River, with the primary gage located at the "Constriction". The contractor performed 10 site visits between April and September to gather discharge measurements. These measurements were used to build a stage-discharge relationship for both gage locations, and from there the daily flow could be estimated over the summer.

A hydrograph was created for the summer 2023 season using a combination of the two established gage sites on the Martin River.

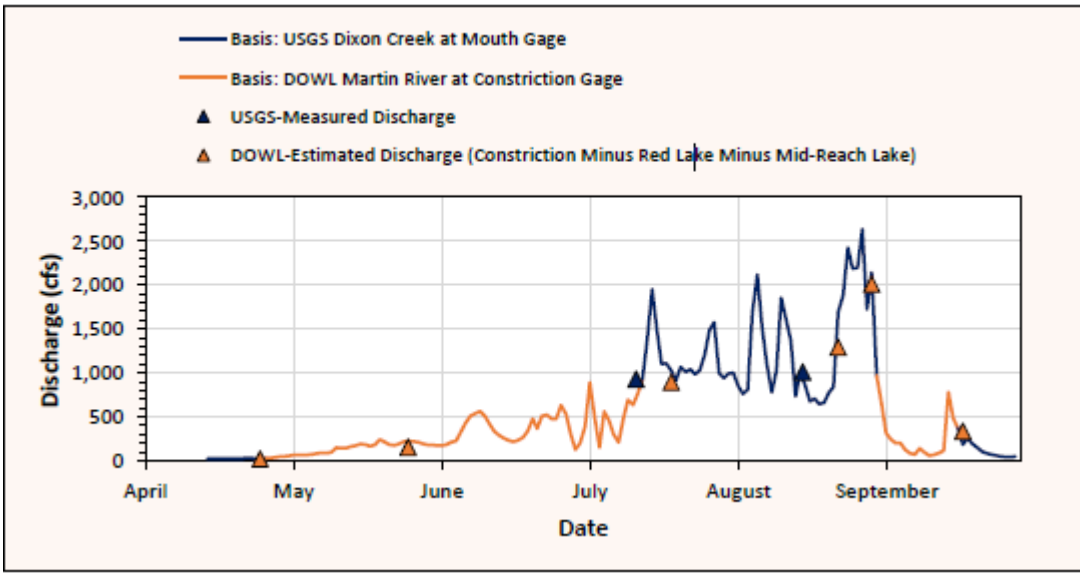


Figure 5: Hydrograph of discharge on Martin River, 2023 Water Year

Although the gage records on Martin River only go back 1 year, a synthetic flow was created by establishing a relationship between stage heights on the Martin River and the Upper Bradley River near Nuka Glacier. The Upper Bradley River at Nuka Glacier USGS gage has a 40-year record, and the Nuka and Dixon glaciers are adjacent and at similar elevations, which allows a fair comparison of discharge in the two basins.

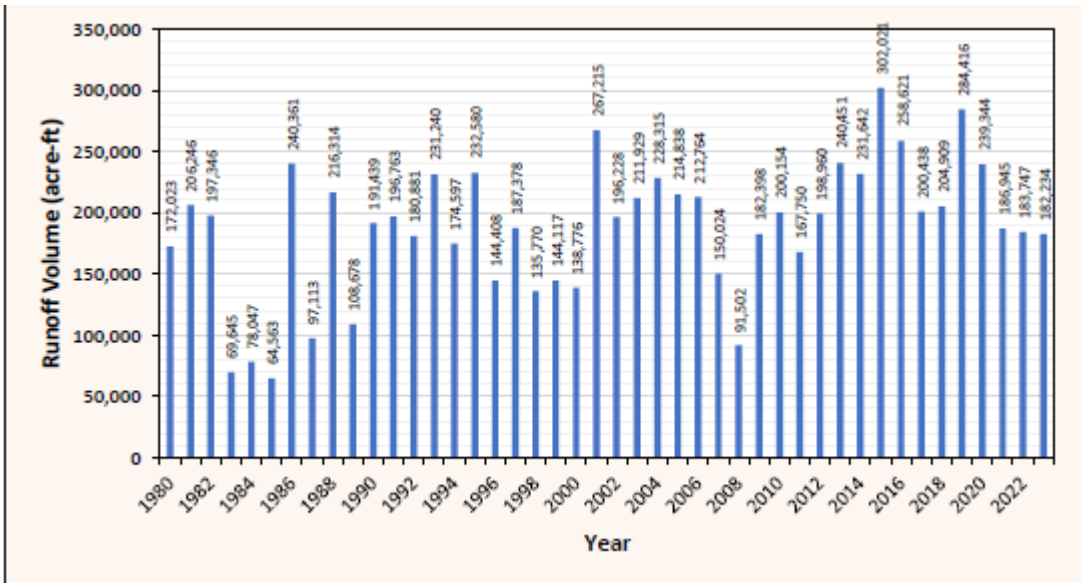


Figure 6: Synthetic 40 year annual runoff volume (acre-ft) from Dixon Glacier

A 10 year average of synthetic flow was used to estimate discharge from the Dixon glacier. This was done to capture the increase in flows from recent years due to higher summer temperatures resulting in an increased contribution of flow from ice melt. It was also assumed that the first 100 cfs of flow would always go downstream to account for future minimum instream flow stipulations. The Dixon Diversion Tunnel will be 14 feet in diameter and has a modeled capacity of 1,400 cfs, so any flood flows in excess of 1,400 cfs were assumed to go downstream on the Martin River rather than divert to Bradley Lake and would not contribute to the energy numbers for the project. Using the 10-year synthetic flow record, 238,500 acre-ft of runoff is predicted annually from the Martin River from rainfall, snow melt, and glacier melt. A majority of this flow will occur in July and August. The minimum instream flow (MIF) will account for 32,100 acre-ft, or 13% of the total runoff. Flood flows will account for 22,200 acre-ft or 10% of the total runoff, leaving 182,800 acre-ft diverted to Bradley Lake. At the Bradley Lake hydroelectric project, the efficiency of the generators gives a conversion of acre-ft to MWh of almost exactly 1:1 (ranges from 0.95-1.05). For modeling purposes, it is assumed a 1:1 ratio and 182,800 acre-ft of diverted water will account for an additional 182,800 MWh of renewable energy generation.

The proposed 14-foot dam raise would increase the capacity of Bradley Lake and raise lake levels which would in turn raise head pressure at the Bradley Lake hydroelectric plant. The increased head pressure will increase efficiency of the two 60 MW generators and account for ~8,000 MWh of electric generation annually. Combining the values of 10-year average annual diverted water with the increased head pressure from a higher reservoir gives an average annual increase in energy from the Dixon Diversion project of 190,800 MWh.

EPA's 2022 eGRID data was used to estimate the greenhouse gas reductions that will result from the Dixon Diversion project. Generation data from the Alaska Railbelt is represented by the AKGD – ASCC Alaska Grid Subregion. As mentioned earlier, electricity produced on the Railbelt is primarily through natural gas fired generators. The eGRID nonbaseload rates will give an accurate representation of CO2e

reductions for projects that displace electricity generation. The eGRID factors consider the differences in baseload generation vs peaking generation, and for the Railbelt eGRID subregion the annual CO2e non-baseload output emission rate is 1,232.508 lb/MWh. Multiplying the AKGD non-baseload output emission rate with the expected energy production from Dixon and converting to metric tons produces a result of 106,668 MTCO2e annual reduction in greenhouse gas produced in Alaska.

3. Environmental Results – Outputs, Outcomes, Performance Measures (30 points)

a. Expected Outputs and Outcomes (10 points)

The Dixon Diversion is a significant expansion of the existing Bradley Lake hydroelectric project. Building off existing renewable energy infrastructure, AEA will achieve significant greenhouse gas reductions from a relatively small footprint. Specific outputs from the Dixon Diversion project include: Diversion dam and intake structure near the toe of Dixon Glacier, 4.7 mile long 14 foot diameter tunnel to convey water from the Dixon Glacier into Bradley Lake, 1 mile of new access road leading to the tunnel outlet, modifications to the existing Bradley Lake dam to raise reservoir level by 14 feet, and new 3-phase power and conduit running from the existing hydroelectric generating facility to the new diversion dam.

The expected outcomes of the Dixon Diversion project are:

1. 190,800 MWh of annual renewable energy generation,
2. A reduction in annual CO2e emissions of 106,668 MTCO2e, and
3. An offset of 1.5 billion cubic feet of natural gas used for electric generation by Railbelt utilities.

This project is the largest renewable energy project in Alaska in over 40 years. Not only will Dixon offset a significant amount of greenhouse gas emissions, it will provide electric utilities operational flexibility since storage hydro can be used at any time during the year. Additionally, Dixon helps the State of Alaska in addressing its impending natural gas supply shortage. All the clean electricity produced by this project will directly offset significantly more expensive electricity that will be produced using imported LNG in the coming years.

b. Performance Measures and Plan (10 points)

The Bradley Lake hydroelectric project is governed by the Bradley Lake Project Management Committee (BPMC) which oversees the planning, execution, and monitoring of the Bradley Lake Project. This committee meets monthly and is responsible for coordinating, budgeting, scheduling, resource allocation, risk management, and stakeholder communication. The BPMC was established following commissioning of the original hydroelectric project in 1982 and consists of AEA and the five Railbelt utilities that purchase power from Bradley Lake. The five utilities are Chugach Electric Association, Golden Valley Electric Association, Homer Electric Association, Matanuska Electric Association, and the City of Seward.

The Bradley Lake Power Sales Agreement (PSA) defines the terms and conditions in which power generated from Bradley is sold and allocated. The PSA outlines in specific terms that AEA sells, and utilities subsequently purchase their percentage share of the project capacity. Each utility submits a Water Year energy budget of expected monthly usage (MWh). Predicted vs Actual inflows to the

reservoir are closely monitored and the Bradley Lake operations committee, containing representatives from each utility, are frequently adjusting energy usage from the project to reflect present-day reservoir conditions.

The coordination of five electric utilities utilizing Bradley Lake for power necessitates the accurate and reliable tracking of lake inflows and power generation. Additional power produced from the Dixon Diversion project would be assumed to be allocated according to the current ownership breakdown. This system is fair and reliable and has produced an equitable distribution of energy offtake for over 40 years.

Future performance measuring and tracking for the Dixon Diversion project would be an AEA responsibility carried out by the BPMC through the Bradley Lake Water Tracking Spreadsheet. Gauges will be installed at the Dixon diversion dam to accurately measure the exact contribution of inflows into Bradley Lake from the Dixon Glacier. Additional energy contributions resulting from the dam raise and higher head pressures can easily be calculated by increased generator efficiency calculations.

In addition to accurate water tracking, the energy produced by the two 60MW turbines at the Bradley Lake hydroelectric plant is closely metered. The Bradley Lake project monitors and tracks all power distributed from the plant and that data is reported to the BPMC.

Total energy output from the Dixon Diversion project will be converted into avoided CO2e emissions offset through EPA's 2022 eGRID conversion factors for the AKGD subregion non-baseload generation. AEA will use the most recent version of this dataset in future years as that data becomes available.

c. Authorities, Implementation Timeline, and Milestones (10 points)

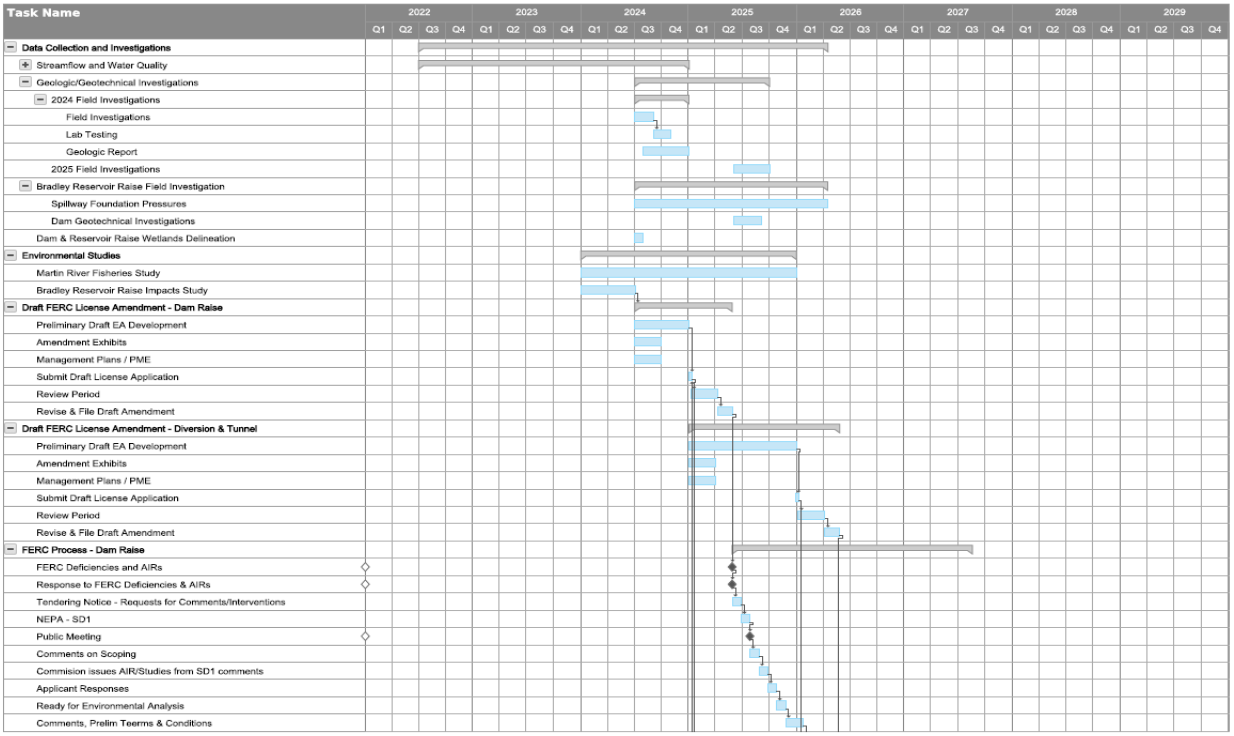
AEA owns the existing Bradley Lake hydroelectric project and will be wholly responsible for managing the Dixon Diversion project and all required reporting to the DOE. AEA will coordinate closely with the members of the BPMC as well as the operations team at Bradley in order for all current and future stakeholders to be well informed of project activities and progress.

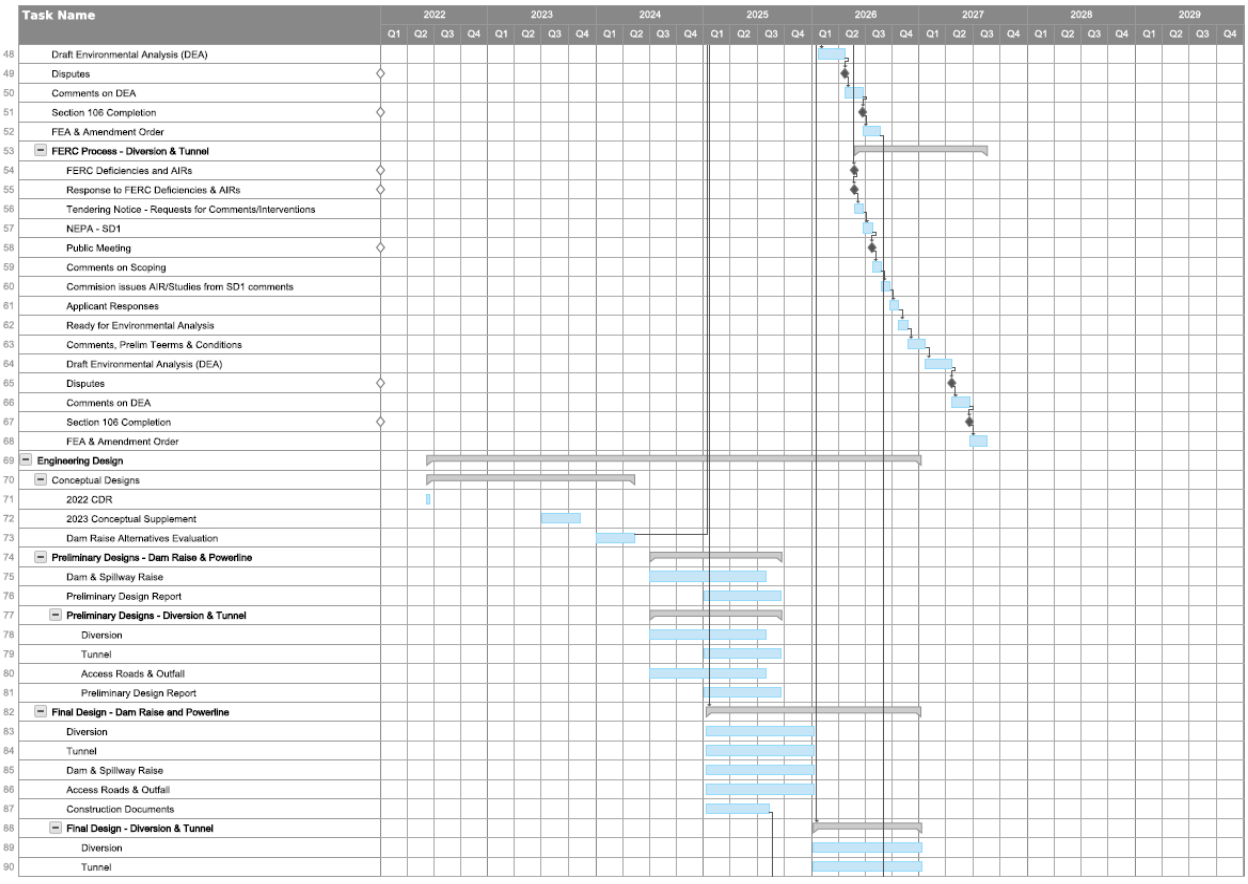
AEA is under contract with an engineering firm and an environmental firm to complete preliminary engineering and design work and perform the required environmental studies in preparation for a FERC license amendment. AEA is also closely working and consulting with state and federal resource agencies such as Alaska Department of Fish and Game, United States Fish and Wildlife Service, and the Kenai National Wildlife Refuge to gather feedback and input into AEA's study plans. This ensures that the baseline environmental conditions of the project are fully understood as the project progresses.

AEA will contract with an engineering firm to complete the final design but is also evaluating alternative contract procurement options to expedite project completion such as: Early Contractor Involvement (ECI), Construction Manager at Risk (CMAR), Construction Manager General Contractor (CMGC), or Progressive Design Build (PDB).

A conceptual project schedule is provided below for FERC licensing, engineering, and construction of the Dixon Diversion. Use of alternative contract procurement could expedite the schedule. The conceptual project schedule considered which project components would need to be completed during the spring,

summer, and fall season. Some components, such as procurement and tunneling could be completed year-round.





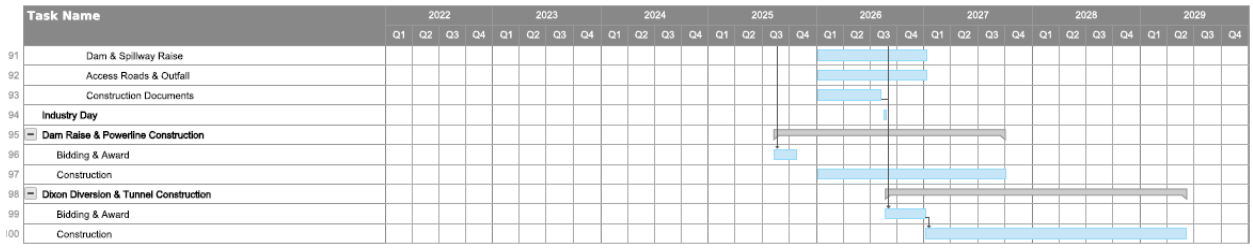


Figure 7: Conceptual Project Schedule

The above schedule outlines major project milestones and tasks along with estimated durations and completion dates. Construction is anticipated to last about 3 seasons, with additional context provided below:

Season 1:

- Project procurement and Notice to Proceed would occur in prior fall season, allowing contractor the winter season to plan, as well as full first season of construction
- Procurement of long lead time components, such as Tunnel Boring Machine (TBM), electrical equipment for the high-voltage system, dam spillway gates, and intake gates at Dixon
- First season of construction would concentrate on installation of the electrical conduits from Bradley Station to Bradley Lake, as well as the access to the downstream portal and portal development. There would be bidding and schedule efficiencies gained if the powerline could be completed in advance of season 1.
- Development and commissioning of workforce housing.
- Initial construction of the Dixon diversion dam and the upstream portal could be developed in the first season but could be delayed until the second season without any delay to the commissioning to the project as it is not a critical path milestone. Access to the upstream portal and diversion dam would be by helicopter until tunnel boring operations are complete.
- Improvements associated with raising Bradley Dam could occur during any of the summer seasons and is not a critical path item; however, the project will see immediate gains in reservoir capacity once this milestone is achieved.

Season 2:

- Development of the downstream started tunnel would take place early in the second year of construction.
- TBM tunneling operations would begin in Season 2 and are foreseen as running through the winter season, operating from the three-phase line power installed in the first season.

Season 3:

- Completion of the TBM operation, dismantling and removal of the TBM, and steel lining of fault sections within tunnel.
- Once the tunnel is completed through the upstream portal, the inlet structure and associated mechanical work can be completed. At this point, it may be possible for diversion access to be through the completed tunnel and eliminate the need for helicopter access. The contractor

would need to consider how the timing of these activities might delay the commissioning of the project.
- Electrical work within the tunnel to bring power and communication to the diversion structure.
- Completion, testing, and commissioning of the project.

4. Low-income and Disadvantaged Communities (35 points)

a. Community Benefit (25 points)

In 2021, Alaska ranked first among U.S states with a per capita energy expenditure of $8,711, amounting to nearly 11.15% of its GDP. This ranking has remained consistent since 2015[1]. The Dixon Diversion project will result in lower energy costs over the long-term and provide resiliency benefits to all customers of the Railbelt – a 700-mile-long stretch of Alaska that serves as the State's economic backbone and is home to approximately three quarters of the state's population. With anticipated increases in natural gas prices of >50% within the next 10 years, the addition of low-cost, reliable, year-round power from storage hydro projects such as Dixon becomes even more critical. The Dixon Diversion project enhances Alaska's energy security by increasing renewable penetration and grid stability, improving resilience to fuel price fluctuations and supply side disruptions, and providing stored energy to regulate other intermittent renewable energy resources. The Railbelt region includes 20 census tracts that are considered disadvantaged with a population of 62,348 and 17 Alaska Native Village Statistical Areas (ANVSA) with a combined population of 160,082 resulting in a total disadvantaged population of 22.430, or 39.6% of the population on the Railbelt[2]. These communities will receive direct benefits from the Dixon Diversion project via lower cost energy generation and improved public health benefits from reduced carbon emissions. Alaska has the third highest per capita energy-related CO2 emissions in the United States[3].

Importantly, the benefits of federal investment in the Railbelt are not limited to those directly connected to the Railbelt grid. AEA manages the Power Cost Equalization (PCE) program, which extends the financial benefits of lower Railbelt electric rates to positively impact over 81,000 residents in 188 remote communities statewide[4]; these rural communities not connected to the Railbelt's electric network will directly benefit from reduced Railbelt rates resulting from utility scale renewable projects such as Dixon. Almost all these remote communities are disadvantaged with extremely high electricity costs; PCE reduces costs in these communities based on a statutory formula tied to Railbelt rates. Using the statutory PCE credit formula, a one-cent reduction in residential electric rates on the Railbelt results in an increased credit to PCE communities estimated to be $1.4 million based on historical usage. This innovative, built-in transfer mechanism demonstrates Alaska's prioritization of equitable benefits sharing

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1 https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_sum/html/rank_pr.html&sid=US

2 https://live.laborstats.alaska.gov/data-pages/alaska-population-estimates

3 https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.eia.gov%2Fenvironment%2Femissions%2Fstate%2Fexcel%2Ftable4.xlsx&wdOrigin=BROWSELINK

4 https://www.akenergyauthority.org/Portals/0/Power%20Cost%20Equalization/2024.02.26%20FY23%20PCE%20Statistical%20Report%20by%20Community%20(Final%20Optimzed).pdf?ver=om4p4ZK_A-xwHiFPOHfvDQ%3d%3d

and provides a time-tested means to ensure benefits realized by Railbelt consumers extend to Justice40 communities statewide.

Over 40% of the benefits of this project will impact low-income and disadvantaged communities by lowering the cost of energy, improving health outcomes, and increasing energy resiliency. In addition, with the project expected to lower energy costs over the long-term, the potential for creating induced jobs exists but is not measurable now.

AEA does not anticipate negative effects on these communities from this project; it uses a small footprint that is remotely located, away-from almost all communities and is not expected to adversely impact fish habitat. AEA will solicit feedback from communities to identify any other potential negative impacts.

b. Community Engagement (10 points)

AEA's mission is to reduce the cost of energy in Alaska; and, the Dixon Diversion project delivers on that mission, as well as provides positive environmental and public health benefits. AEA has already conducted several public outreach meetings in accordance with FERC relicensing processes related to the Dixon Diversion project and plans to implement a broader community outreach and engagement program to increase knowledge about the benefits of the project and provide additional opportunities for public input. AEA will partner with local and Tribal governments, community organizations, and utilities to foster meaningful public involvement and provide public outreach.

AEA hosted Joint Agency and public meetings to review the Dixon Diversion project and Proposed Study Plans on May 27, 2022, March 5, 2024, and March 19, 2024. These meetings were posted on AEA's public facing website, listed on the State of Alaska's public meeting notice board, and distributed to the project's email distribution list which includes Tribal Entities, state resource agencies, and various other project stakeholders. AEA plans to conduct additional joint public and agency meetings as the project progresses and develops. These include a 2024 Field season debrief meeting in December 2024, a 2025 pre-Field Season meeting in April 2025, a 2025 Field Season Debrief Meeting in December 2025, and 2-3 public meetings to solicit comments on the Draft Amendment Application submitted to FERC in 2026.

Communication with the public will flow both ways, and outreach will occur at recurring events and in stand-alone community meetings. The community outreach and engagement program will include: public meetings, both in person and virtual; social media posts; updates on AEA's website; participation by AEA in recurring events, such as, Alaska Municipal League Office Hours, Tribal Council meetings, City Council meetings, and Chamber of Commerce lunches; and, participation in more informal settings, such as the Alaska Federation of Natives Convention, Alaska Black Caucus Sunday night Zoom meetings, Alaska State Fair, Alaska Federation of Filipino Americans programming, and energy and environmental conferences held throughout the state. During 2023, AEA staff members participated in dozens of different events throughout the state providing information at exhibitor booths, participating in panel discussion, and presenting on AEA's ongoing projects.

Furthermore, the Dixon Diversion project and its benefits align with another AEA project, the Railbelt Innovation Resiliency Project, which was awarded a grant through the Department of Energy's Grid Resilience and Innovative Partnership Program. Assuming the Dixon Diversion project is funded, similar timelines for these two projects create a synergistic opportunity for community engagement.

5. Job Quality (5 points)

AEA expects new jobs to be created during the project's construction, which will be bid out. AEA is committed to fostering safe, healthy, and inclusive workplaces with equal opportunity, free from harassment and discrimination. Implementing projects that contribute to reducing GHG emissions will consider Good Jobs Principles. Work performed with this funding will be done in compliance with Alaska public contracting law, which contains provisions for local hire, apprenticeship training, prevailing wages and other forward-looking policies. Bidding and contract documents include specific provisions to implement equity-focused policies related to all phases of contracting and construction. The contract provisions address nondiscrimination, equal employment opportunity, reasonable accommodations for employees with disabilities, and non-segregation of facilities.

6. Programmatic Capability and Past Performance (30 points)

a. Past Performance (10 points)

AEA has mature staff and management systems in place to administer awards. AEA has a full suite of qualified individuals and a system of checks and balances. AEA's Finance and Accounting departments manage the fiscal compliance and reporting requirements for grants and sub-awards. Additionally, AEA staffs a grants department that includes a grants manager and a grant coordinator. Internal control procedures are in place for compliance reviews, budgetary controls, invoice approvals, periodic project status and financial reporting. AEA hires an independent audit firm to report on compliance for each major federal program, report on internal control over compliance, and report on the Schedule of Expenditures of Federal Awards required by the Uniform Guidance. AEA's FY2023 Single Audit Report found that the Alaska Energy Authority complied, in all material respects, with the compliance requirements referred to above that could have a direct and material effect on each of its major federal programs for the year ended June 30, 2023. AEA policies and procedures are published on our website, including for Procurement, Governance, Annual Reports, and Audits.

The wide array of current and past programs, and grant management experience, ensures that AEA is appropriately prepared to manage this project, including through a subaward and project delivery and assessment process the following is a small sample of the many awards AEA manages from federal agencies:

Department of Energy (DOE)

Project Title: Preventing Outages and Enhancing the Resilience of the Electric Grid Formula Grant to States
Assistance Agreement No.: DE-GD0000002
CFDA: 81.254

Description: This project is in direct support of Section 40101(d) of the Infrastructure Investment and Jobs Act (i.e., Bipartisan Infrastructure Law (BIL)). The objective of this project is to improve the resilience of the electric grid against disruptive events. Per BIL Section 40101(a)(1), a disruptive event is an event in which operations of the electric grid are disrupted, preventively shut off, or cannot operate safely due to extreme weather, wildfire, or a natural disaster.
Contact: Lucas Greza, Lucas.Greza@netl.doe.gov, (304)285-4663

Denali Commission (DC)

Project Title: 2019 Nikolai Rural Power System Upgrades
Assistance Agreement No.: 01574-00
CFDA No.: 90.100
Description: Design a new power plant in Nikolai, Alaska.
Contact: Katie Conway, kconway@denali.gov (907) 341-9617

United States Department of Agriculture (USDA)

Project Title: Sustainable Wood Energy Systems
Assistance Agreement No.: 19 DG –11100106-811
CFDA: 10.674
Description: Technical assistance aimed at helping communities displace fossil fuels and reduce heating costs through assessing, developing, and maintaining biomass heating and biomass combined heat and power projects in Alaska.
Contact: Priscilla Morris, Priscilla.morris@usda.gov (907) 743-9467

U.S. Department of Defense (DOD)

Project Title: 2022 Black Rapids Training Center Line Extension
Assistance Agreement No.: DOD-HQ00052210045
CFDA: 12.600 (contract 31201)
Description: A 34-mile electrical power line extension to connect the Black Rapids military installation to supply safe, reliable, and efficient grid power.
Contact: Tim Robert timothy.b.robert.civ@mail.mil, (916) 557-7315

Environmental Protection Agency (EPA)

Project Title: 2016-2022 State Clean Diesel Emission Reduction Act
Assistance Agreement No.: DS-01J63901
CFDA: 66.040
Description: Partially fund the replacement of up to twenty-five non-certified and lower tier diesel engines with Tier 2 and 3 marine engines and low PM emitting nonroad engines based on a community prioritization list.
Contact: Lucita Valiere, valiere.lucita@epa.gov (206) 553-8087

In addition to the sample of Federal awards listed above, AEA completed the West Fork Upper Battle Creek Diversion Project in 2020. This project was very similar in nature to the proposed Dixon Diversion project, as it was an expansion of the existing Bradley Lake Hydroelectric Project to divert water from an adjacent glacial basin into the Bradley Lake Reservoir. AEA successfully worked with state resource agencies pre and post project to quantify fish use and habitat in Battle Creek and develop minimum instream flows that have so far proven to increase fish use in Lower Battle Creek. AEA has a track record

from the Battle Creek project of efficiently working with FERC throughout the license amendment process, as well as managing construction contractors in a remote location to complete a large-scale project on time and on budget.

b. Reporting Requirements (10 points)

Department of Energy (DOE) - Project Title: Preventing Outages and Enhancing the Resilience of the Electric Grid Formula Grant to States
DOE requires submission of a project management plan within 90 days of award date and quarterly progress reports during the period of performance. DOE also requires that all projects under this grant adhere to BABA and Davis-Bacon requirements. AEA has met all required outcomes to date.

Denali Commission (DC) - Project Title: 2019 Nikolai RPSU
All progress and financial reporting requirements for this project have been met. The final close out report will be submitted in June 2024.

United States Department of Agriculture (USDA) - Project Title: Sustainable Wood Energy Systems
AEA submitted quarterly progress and financial reports throughout the duration of this grant.

U.S. Department of Defense (DOD) - Project Title: 2022 Black Rapids Training Center Line Extension
AEA has worked cooperatively with the owner agency, Office of Liaison Defense Community Cooperation (OLDCC), and Golden Valley Electric Association (GVEA) to review the conflicts and keep the agency appraised of the revised schedule. AEA submits progress and financial reports through the OLDCC project portal.

Environmental Protection Agency (EPA) - Project Title: 2016-2022 State Clean Diesel Emission Reduction Act
In 2015 AEA received the DERA funds via Reimbursable Services Agreement from Department of Environmental Conservation (DEC) and reported through DEC. Starting in 2016, AEA's relationship was directly with the EPA. AEA's quarterly reporting, both financial and progress reports have always been on time. AEA conducted several site monitors, which have resulted in no findings. For this program, AEA submits a final technical report at the end of each award.

c. Staff Expertise (10 points)

AEA is an independent and public corporation of the State of Alaska, est. 1976. AEA is governed by a board of directors with the mission to "reduce the cost of energy in Alaska." AEA is the State Energy Office and lead agency for statewide energy policy and program development. Whether building modern and code-compliant bulk fuel tank farms, upgrading to high- efficiency generators in rural powerhouse systems or integrating renewable energy projects, AEA emphasizes community-based project management. AEA's core programs work to diversify Alaska's energy portfolio, lead energy planning and policy, invest in Alaska's energy infrastructure and provide rural Alaska with technical and community assistance.

AEA has over 25 professionals on staff, including engineers, planners, project developers, project managers, accountants and finance officers, and policy analysts. As the state's designated energy office, AEA has managed hundreds of millions of dollars in federal, state, and private funds to plan and build infrastructure in urban and rural Alaska. AEA's building is located conveniently in Anchorage with adequate technology, spacing, and facilitation equipment. AEA has capabilities for video conferencing, hosting meetings, and a team for procuring services and materials.

Collectively, AEA staff have worked with nearly every community in the state to deliver critical supply and demand energy services. Likewise, AEA staff are networked to the vast array of Alaska energy stakeholders from small rural non-profits and utilities to large regional Alaska Native Corporations and tribal organizations, and from conservation organizations to technology- or solution-oriented working groups. AEA's capacity to conceptualize, implement, and successfully complete supply and demand energy projects through an outcomes-focused process positions the agency well to lead a coordinated joint team that will overcome barriers to implement the Whitter Shore Power project.

AEA has the experience, expertise, equipment, and staff ready to achieve the project objectives set out in this application. AEA has a whole team of staff specifically designated for grants, compliance, procurement, contracting, and finance. Each of these teams has adequate resources to ensure the project is on budget and on schedule.

AEA is engaged in all levels of consumer energy including project and resource identification, design and permitting, and financing and construction. Over decades of experience developing energy projects in Alaska, AEA has continuously improved on process, application of technology and delivery of service. AEA integrates energy technology and advances in grid services into all program areas both on the supply- and demand-side.

AEA, as owner of significant generation and transmission assets in the Railbelt region of Alaska, and in furtherance of its mission to reduce the cost of energy in the State, plays an important role in ensuring that sound public policy and energy planning initiatives within the region maximize the potential benefits to the broadest group of stakeholders. Without a specific certificated area, and as owners of assets which cross multiple jurisdictional boundaries, AEA is uniquely positioned to facilitate discussions amongst stakeholder groups and find solutions for the region in its entirety. AEA does so through its leadership role on the management committees associated with its assets.

AEA also manages the Renewable Energy Fund, the Emerging Energy Technology Fund, the Power Cost Equalization Program and various Energy Efficiency and Conservation Programs.

AEA provides grants and loans for qualified energy infrastructure projects and owns energy infrastructure for the benefit of Alaskans. AEA has the legal authority to enter into a financial assistance relationship with U.S. Department of Energy as discussed in this application. Additionally, as a state agency, AEA produces an annual report to the Governor, yearly federal single audit, and financial statements.

The Alaska Energy Authority (AEA) has mature staff and management systems in place to administer this award. Per the organizational chart, we have a full suite of highly qualified individuals and a system of

checks and balances in place. AEA's financial and project management capabilities are demonstrated in our yearly audit and financial report, located on our website. https://www.akenergyauthority.org/Who-We-Are/Newsroom/Publications-and-Resources

AEA has successfully managed, completed and closed well over 300 grants in the last decade from many different agencies as well as private funds from the Volkswagen Settlement and Wells Fargo.

7. Budget (45 points)

Total funding request for the Dixon Diversion project is $348,415,151. Detailed Budget Narrative and Budget Spreadsheet are included as an attachment to this application.

Budget Attachments:

- Budget_AlaskaEnergyAuthority.pdf
- Budgetcalcs_AlaskaEnergyAuthority.xlsx