EXECUTIVE SUMMARY

OBJECTIVE

The objective of the Roadbelt Intertie Project was to determine the technical feasibility of and budgetary development costs for completion of a transmission loop along the Alaska road system. This information will help determine the project's potential to reduce power costs for rural communities, support regional economic development opportunities, increase United States Department of Defense (DoD) facility resilience, and increase electric power reliability throughout the Alaska road system. **NOTE: THIS PROJECT WAS A HIGH-LEVEL TECHNICAL FEASIBILITY STUDY TO DEVELOP A COST ESTIMATE AND DOES NOT PROPOSE A SPECIFIC ROUTE.**

PROJECT CONFIGURATION

The Roadbelt Intertie Project assumes that new 230 kV transmission lines would be built from Sutton to Glennallen to Tok to Delta Junction, interconnecting islanded road system power utilities and creating a parallel path between the two most populated roadbelt areas. Some portions of the proposed Roadbelt Intertie had been studied previously; however, no comprehensive system studies had been performed.

Alternative utility interconnection configurations with 230 kV lines between Glennallen and Delta Junction and a smaller 138 kV radial line to Tok from either Glennallen or Delta Junction are possible. These alternatives were beyond the scope of this project but may warrant future consideration as they have some technical and cost advantages over the proposed configuration.

The cost basis alignment developed for this project is one of several routes that are possible between the desired interconnection points. It is by no means intended to represent the most feasible or the most preferred route as it has not gone through the environmental impact assessment and public scrutiny needed for route selection. Rather, it was selected as a reasonable representation for key design parameters needed to estimate probable construction costs.

Interconnection configuration, route selection, detailed physical feature design, and public engagement opportunities would occur during future design phases, if the project progresses.

ENVIRONMENTAL CONSIDERATIONS

Previous studies and public input regarding portions of the proposed route indicate that visual and recreational resources may be the most likely environmental categories with potentially significant impacts. Detailed evaluation of all potential environmental impact categories would occur during future design phases if the project progresses. Informal opportunities for public input are currently available. Formal public engagement would be integral to future project development phases, in accordance with national environmental protection regulations.

ESTIMATED COST

Development and construction of the Roadbelt Intertie Project is estimated to cost approximately $566 million (2020 dollars). This estimate is intended as a reconnaissance-level budgetary indication of the anticipated project cost, but it must be recognized that the actual cost could be substantially different due to the preliminary nature of design information at this stage. A reliable cost estimate would require a significant further effort including mapping and imagery acquisition, engineering investigations, environmental studies, feasibility-level design and construction planning, and an estimated project construction timeline. Annual operation and maintenance costs were also estimated.

CONCLUSIONS

Reconnaissance-level engineering evaluation of the Roadbelt Intertie Project indicates that it is technically feasible. Implementing it would increase DoD facility resilience and electric power reliability throughout the Alaska road system.

Recommended next steps for further evaluation of the Roadbelt Intertie Project include:

- Conduct system-wide economic evaluation of potential power cost impacts for all interconnected communities and DoD facilities.
- Perform quantitative cost/benefit evaluation of economic feasibility.
- Study and select optimal utility interconnection configuration (topology).
- Develop a range of transmission line route options satisfying the optimal topology.
- Design and perform environmental studies and engineering investigations, with public input in accordance with the National Environmental Policy Act (NEPA).
- Select transmission line route.
- Perform detailed design.

1.0 INTRODUCTION

Ahtna Environmental, Inc., (Ahtna) and its project subcontractors developed this report for the Denali Commission (Commission) under the United States Department of the Treasury, Bureau of the Fiscal Service (BFS) contract TFSADNC17D0001, order 20342920F00002.

1.1 Project Background

The Commission's mission is to promote rural development, with a focus on infrastructure needs. Recent stakeholder feedback indicates high interest in completion of a transmission loop along the eastern Alaska "roadbelt" to potentially reduce power costs for rural communities, support regional economic development opportunities, increase United States Department of Defense (DoD) facility resilience, and increase electric power reliability throughout the Alaska road system. Some portions of the proposed Roadbelt Intertie had been studied previously; however, no comprehensive system studies had been performed.

1.2 Project Objective

The objective of this Roadbelt Intertie Project was to assess the technical feasibility of and generate a cost estimate for new electric transmission lines following the road system on the east side of Alaska and any required upgrades to existing transmission systems. The proposed Roadbelt Intertie would complete an electric loop from Anchorage to Glennallen to Tok to Fairbanks. Project analysis included connections to Fort Greely, Chitina Hydropower, and Valdez, as well as any required upgrades to existing segments of the electric transmission system from Glennallen to Valdez, Delta Junction to Fairbanks, and along the Parks Highway.

1.3 Scope of Work Summary

Ahtna and its project subcontractors completed the following efforts between November 2019 and November 2020 to achieve the project objective:

- Conceptual Design
- Cost Basis Alignment Research
- Cost Estimation
- Public Awareness Campaign

Sections 2.0 through 5.0 of this report detail project efforts.

1.4 Project Team

Ahtna managed the overall project and provided expertise in imagery, geographic information systems (GIS), cultural resources, and environmental permitting. Ahtna subcontracted Electric Power Systems, Inc. (EPS) to provide transmission system design and analysis, cost estimation, and right-of-way (ROW) ownership research lead services. Ahtna personnel assisted with ROW

ownership research at the direction of EPS' ROW lead. Ahtna subcontracted Agnew::Beck Consulting, Inc. (Agnew::Beck) to lead public awareness efforts.

2.0 CONCEPTUAL DESIGN

The project team reviewed past documentation and made assumptions to assess the technical feasibility of and prepare cost estimates for the Roadbelt Intertie, as detailed in the following sub-sections.

2.1 Project Configuration

Alaska currently has transmission line infrastructure between Fairbanks and Anchorage along the Parks Highway, as well as radial lines to various other communities and power generation facilities. The Roadbelt Intertie Project would complete an electric loop roughly following the road system from Anchorage to Glennallen to Tok to Fairbanks. The project location, approximate new transmission line study corridor, and relevant existing infrastructure locations are depicted on Figure 1.

2.2 Previous Studies

Multiple studies have been conducted that relate to the proposed Roadbelt Intertie in part or in total. The project team reviewed the reports listed in Table 2-1.

TABLE 2-1: PREVIOUS STUDIES

Year Published	Document Title	Prepared For	Prepared By
1989	Northeast Transmission Intertie Project	Alaska Power Authority	Power Engineers, Inc. and Hart-Crowser, Inc.
1989	Railbelt Intertie Reconnaissance Study – Benefit/Cost Analysis	Alaska Power Authority	Decision Focus, Inc.
1993	Analysis and Cost Estimate for the Proposed Sutton to Glennallen 138kV Transmission Intertie Project	Copper Valley Electric Association	Power Engineers, Inc.
1994	Copper Valley Intertie Feasibility Study	State of Alaska, Department of Community and Regional Affairs, Division of Energy	R. W. Beck, Dames & Moore, Inc. and Power Technologies, Inc.
1995	Copper Valley Intertie Feasibility Study Update	Alaska Industrial Development and Export Authority	CH2M Hill and R.W. Beck
2008	Distributing Alaska's Power: A technical and policy review of electric transmission in Alaska	Denali Commission	NANA Pacific
2010	Alaska Railbelt Regional Integrated Resource Plan (RIRP) Study	Alaska Energy Authority	Black & Veatch Corporation
2012	Watana Hydroelectric Study Transmission Connection to CVEA	MWH Americas, Inc.	Electric Power Systems, Inc.
2015	Interior Alaska Regional Energy Plan	Alaska Energy Authority	Tanana Chiefs Conference, Information Insights and WHPacific, Inc.

Year Published	Document Title	Prepared For	Prepared By
2016	Copper River Regional Energy Plan	Alaska Energy Authority	Copper Valley Development Association and Information Insights
2016	Tiekel River Hydropower Reconnaissance Study	Copper Valley Electric Association	MWH Americas, Inc.
2018	Northway to Tok Intertie Study	Northway Village Council	Dryden & Larue, Inc.
2019	ROW Research Report – Alaska Highway Milepost 1387 to Tok	Alaska Power & Telephone	Electric Power Systems, Inc.

2.3 Design Requirements

The project team contacted technical stakeholders including power utilities and potential commercial customers to help determine appropriate future load scenarios and other key design requirements. EPS utilized previous study information, technical stakeholder input, and current infrastructure information to establish project design requirements.

2.3.1 Power Utility Requirements

EPS solicited technical input from the Alaska Energy Authority (AEA), Matanuska Electric Association, Inc. (MEA), Alaska Power & Telephone (AP&T) and Copper Valley Electric Association (CVEA) to ensure that key Roadbelt Intertie design parameters encompass power utility requirements.

2.3.1.1 Railbelt Reliability Council

During this project, the State of Alaska passed legislation mandating that Railbelt utilities create an Energy Reliability Organization (ERO) that will guide decisions on new generation and transmission projects. In response, the six interconnected Railbelt utilities, along with six non-utility stakeholders, are actively organizing an ERO dubbed the Railbelt Reliability Council (RRC). The RRC will define and enforce electric reliability standards, coordinate joint planning through an integrated resource planning process, and ensure consistent interconnection protocols for utilities, independent power producers and other grid users. The RRC will also work with the Regulatory Commission of Alaska to develop a cost sharing methodology for assets that have a regional benefit and will also identify and facilitate implementation of effective ways for the Railbelt electric system to reduce electricity costs for ratepayers. Additional background information and current status of RRC implementation can be found at the RRC's website (https://alaskapower.org/rrc/).

Since the Roadbelt Intertie is designed to interconnect with the Railbelt electric system, further project planning and development would likely involve close coordination with the newly formed RRC.

2.3.2 Telecommunication Service Requirements

Ahtna attempted to contact the Alaska Telecom Association, the Matanuska Telephone Association, AP&T, AT&T, Copper Valley Telecom and GCI to determine if there is an interest/need in tapping the proposed Roadbelt Intertie transmission line for power. The response was minimal. Copper Valley Telecom said that their power needs were currently being met by CVEA. GCI initially expressed interest in discussing the matter, but subsequently indicated they were too busy responding to the COVID-19 pandemic to discuss the proposed intertie.

Although fiber-optic telecommunication cable has already been built out in much of the project study area, the proposed transmission line's lightning protection feature happens to have a side benefit that it can be easily upgraded to dual-purpose wire with fiber optic strands in the core, if the need for communication lines were to arise in the future.

2.3.3 Future Power Generation Considerations

EPS considered all known future generation plants during development of system study power transfer and electrical equipment requirements. The proposed transmission system has a capability of transferring at least 75 MegaWatts (MW) of firm power with an additional 50 MW of non-firm power from southcentral Alaska to Fort Greely/Fairbanks. Future generation could increase this power transfer capability depending upon its location and characteristics. Future renewable generation could be located anywhere along the transmission line with little impact on its transmission capability.

2.3.3.1 Chitina (Fivemile Creek) Hydropower

Chitina Hydropower is an approximately 300-400 kiloWatt (kW) run-of-river hydroelectric power plant currently under design and construction on Fivemile Creek adjacent to an existing Chitina Electric, Inc. diesel power plant (AEA, n.d.; Chitina Electric. Inc., n.d.; USDA, 2019). EPS analysis confirmed that the Chitina (Fivemile Creek) Hydropower unit could operate at its full capacity if connected to the proposed 230 kiloVolt (kV) transmission system through the existing 138 kV Glennallen-Valdez transmission line. This project does not include design of or costs for transmission line along the Edgerton Highway corridor that would be required to connect the unit to the grid.

2.3.3.2 Micronuclear Systems

Ahtna contacted George Roe at the Alaska Center for Energy and Power (ACEP) regarding the possibility of micronuclear reactor installations at DoD installations in interior Alaska and implications for the Roadbelt Intertie.

Mr. Roe indicated that there are several commercial entities working through the regulatory process to develop Small Module Reactors (SMRs). The Nuclear Regulatory Commission (NRC) is working to revise the traditional nuclear power plant regulatory process to better accommodate these much smaller power plants. Although encouraging, regulatory reform is not a fast process.

Mr. Roe believes a SMR could not be ready for install earlier than 2026, but likely longer. Proposed SMR output varies considerably from micronuclear units producing 1.5 – 10 MW up to approximately 300 MW. The University of Alaska Fairbanks (UAF) considered a 60 MW unit.

Commercial systems are not intended for installation only on military bases. However, Mr. Roe thinks that DoD facilities may be the best prospect for community and regulatory acceptance since they have extensive security protocols in place. Mr. Roe is not aware of any specific plans to install SMRs in the project study area.

The DoD is also looking to develop small nuclear microreactors designed to be forward deployed for use on remote operating bases (Project Pele). They are currently looking at the 1-5 MW size for that application.

The DoD's Office of the Under Secretary of Defense for Acquisition & Sustainment is working to develop a SMR in the 2-10 MW range for domestic military installations. That program is hoping to demonstrate a SMR at a permanent domestic military installation by 2027.

In summary, micronuclear generation systems do not appear to be an imminent addition to Alaska's power generation portfolio. However, micronuclear power generation system concepts are sized such that they could operate at full capacity if connected to the proposed 230 kV transmission system.

2.4 System Studies

EPS performed static and dynamic electrical system analyses to determine Roadbelt Intertie Project technical feasibility, new infrastructure design requirements, and existing infrastructure modification requirements. The existing Railbelt electrical system model was modified to simulate addition of the proposed Roadbelt Intertie configuration as described in Section 2.1, as well as one alternative configuration for comparison and possible future route selection consideration. The alternate configuration models placement of new transmission lines along the Richardson Highway from Gakona to Delta Junction, and a new radial transmission line from either Gakona or Delta Junction to Tok. Radial configurations do not include new transmission lines along the Alaska Highway from Tok to Delta Junction or the Glenn Highway between Gakona and Tok, and therefore do not have potential to reduce power costs for rural communities or economic developments along one of those two road segments, depending on which radial configuration was selected. Both model configurations have potential to increase DoD facility resilience and reliability throughout the Alaska road system. Cost estimates for the alternate model configuration were not developed since the project scope did not include it.

EPS analyzed steady state power flows and ran various transient stability simulations to evaluate a range of anticipated contingency conditions. Brief system study summaries are provided in the following sub-sections. Additional details are available in EPS' technical report (Appendix A).

2.4.1 Static Analyses

Power flows were evaluated for various transmission line designs, energization, topologies (route configurations), and steady-state voltage control. The steady-state power flow results include recommended interconnection route/path, line voltage, conductor sizing, line spacing, transformers, reactors, and static Volt-Ampere reactive (VAR) compensators (SVCs).

2.4.2 Dynamic Analyses

Transient stability simulations were conducted to evaluate performance of the combined new Roadbelt Intertie and existing Railbelt system during different contingency situations and under various seasonal loading scenarios. Transient stability is a concern for the Railbelt system that occurs after a transmission line or other system component failure occurs that can lead to cascading blackouts along the power system. The contingencies included new faults and trips that are a result of creating a second parallel transmission path between Anchorage and Fairbanks, and well-known contingencies in the Railbelt that can cause instability.

2.4.3 Results

Study results indicate that the proposed Roadbelt Intertie and the alternate model configuration are technically feasible. The recommended design for new Roadbelt Intertie transmission lines is 230 kV operating voltage, single conductor 795 kilo-circular-mil (kcmil) aluminum conductor steel-reinforced cable (ACSR) Drake, with 75% line compensation.

System analyses indicate that infrastructure modifications will be needed, including:

- Substation construction and/or upgrades at the following locations (Figure 1):
  - MEA O'Neill (Sutton)
  - CVEA Pump Station 11 (Glennallen)
  - AP&T Tok
  - Golden Valley Electric Association (GVEA) Jarvis Creek (Delta Junction)
- Communication system modifications including auto-scheduling of GVEA's Wilson Battery Energy Storage System (BESS) and protection and control of the new substations

The alternate model configuration appears to have some technical and cost advantages over the proposed Roadbelt Intertie configuration.

2.5 Cost Basis Assumptions

In order to estimate project development and construction costs, EPS made conceptual project design assumptions based on previous study information, technical stakeholder input, system study results, proven local construction practices, and industry standards. Brief cost basis assumption

summaries are provided in the following sub-sections. Additional details are available in EPS' technical report (Appendix A).

2.5.1 Alignment

EPS developed a project cost basis alignment consisting of "Route Alternative D" from the 1994 *Copper Valley Intertie Feasibility Study* (Section 2.1) between Sutton to Glennallen, and a new alignment from Glennallen to Tok to Delta Junction. Routing for the project cost basis alignment east of Glennallen considered previous partial study information (where available), topography, land ownership, and environmental features such as wetlands and known culturally sensitive areas. Private parcels and environmentally sensitive areas were avoided where possible. Infrastructure was also sited to limit winter and helicopter construction.

The project cost basis alignment developed for this project is one of several routes that are possible between the desired interconnection points. It is by no means intended to represent the most feasible or the most preferred route as it has not gone through the environmental impact assessment and public scrutiny needed for route selection. Rather, it was selected as a reasonable representation for line length, angle structures, and terrain, soil, and access conditions needed to estimate probable construction costs.

2.5.2 Design Features

The project cost estimate was based on the following key design feature assumptions:

- 230 kV line voltage (determined by system studies as required to provide meaningful system-wide power transfers)
- overhead single 795 kcmil ACSR Drake conductor size and stranding (note that 230 kV buried lines are technically unproven for this application and would be significantly more expensive than overhead lines)
- 75% line compensation
- steel H-frame support structures with guyed, 3-pole tubular steel masts
- two 7/16" extra high strength steel overhead ground wires (OHGWs), for lightning protection
- ruling spans, average span lengths, foundation and anchor types based on generalized parameters defined for five loading/construction zones, extrapolated based on previous studies
- 120' ROW width

3.0 COST BASIS ALIGNMENT RESEARCH

The project team researched land use, imagery, cultural and environmental resources in the project study area as detailed in the below sub-sections. This information was used to help guide selection of the project cost basis alignment and to inform project cost estimates.

3.1 Land Use

The project team researched land ownership to guide project cost basis alignment selection and inform land acquisition cost estimation. Ahtna GIS personnel compiled a master parcel dataset for use during this project from various publicly available datasets and supplemental datasets digitized by EPS. Datasets were compiled in order and topology errors (overlaps and gaps) addressed to prioritize land ownership that may result in higher acquisition costs per EPS guidance. Topology errors were also addressed based on shape and graticule references (e.g. Section Grid) when possible. Data sources used in production of the master parcel dataset and figures are described below. Data definitions and limitations are included when available. Detailed land ownership analyses will be required during future project phases, as land ownership changes over time and public datasets are often generalized for overview use. The in-depth title research that would be needed for route selection and eventual acquisition was not part of this project's scope. Additional details regarding the land ownership research effort are included in EPS' technical report (Appendix A).

Figure 2A depicts the project master parcel dataset used for land acquisition cost estimation. Figure 2B depicts additional legislatively designated lands in the proposed project corridor area that may be relevant to future project impact evaluations.

3.1.1 General Land Use – Land Status

The Alaska Department of Natural Resources (ADNR) hosts the Alaska State Geo-Spatial Data Clearinghouse (ASGDC), providing public access to agency datasets to reduce redundancies and foster data sharing. As such, the ASGDC is a primary access point for ADNR lands data. ASGDC lands datasets are extracted from datasets used to produce the State status plats for their respective categories. Each dataset includes cases noted on the digital status plats up to one day prior to the date of extraction. Datasets obtained from the ASGDC for developing the project master parcel dataset include:

- Mental Health Trust – The Alaska Mental Health Trust Authority (Trust), a public corporation that contracts with the Alaska Permanent Fund Corporation to manage the cash corpus of the Trust and with ADNR to manage the land corpus.
- State Mining Claim – Mining claims may be 40 acres or 160 acres in size and remain active so long as rent is timely paid and annual labor requirements are met.
- State Selected Land – Federal lands selected or top-filed for a variety of reasons such as general purpose, expansion of communities, University of Alaska, and recreation.

- State TA/PAT – Lands approved or conveyed to the State for a variety of reasons such as general purpose, expansion of communities, University of Alaska, and recreation.
- Section Grid – Protracted section boundaries electronically generated using aliquot part algorithms developed by ADNR staff.
- Township Grid – Boundaries generated from radian measurements of township corner coordinates, represented to the nearest 0.001 second, recorded on official protraction diagrams from United States Bureau of Land Management (BLM) and ADNR.

The BLM Alaska Spatial Data Management System (SDMS) provides access to BLM-Alaska land record documents, reports, and web mapping tools, such as Master Title Plats (MTPs). Datasets obtained from BLM for developing the project master parcel dataset include:

- Native Allotment – Native Allotment lands
- Region Bnd – Native Corporation lands
- Village Bnd – Village lands

Supplemental datasets were digitized in computer-aided design (CAD) software by EPS and transferred to Ahtna for topology edits and compilation into the master parcel dataset. Parcels were digitized both by conversion from additional agency land parcel layers and manually based on agency online mapping tools, including the BLM MTP and ADNR Alaska Mapper. Digitized datasets include:

- Agriculture
- Federal Aviation Administration (FAA)
- Military
- Native Allotment
- Native Corporation
- Private
- State of Alaska

After the master parcel dataset was finalized, GIS analyst tools were used to calculate various land ownership statistics within a 120-foot corridor of the project cost basis alignment for use in EPS' land acquisition cost estimation efforts.

3.1.2 General Land Use – Special Use Areas

The Alaska State Legislature has designated 32 conservation areas, including state game refuges, critical habitat areas, and wildlife sanctuaries. Datasets outlining these areas are available through the Alaska Department of Fish and Game (ADF&G) web site. Additionally, the Alaska Board of Game has designated Controlled Use Areas around the state that restrict certain methods or means of the harvest of some game species. Ahtna queried all available datasets to identify those applicable to the proposed study corridor. Datasets obtained from ADF&G and illustrated on Figure 2B include:

- ADF&G Legislatively Designated Areas – All 32 conservation areas represented. No additional metadata included. Legislatively designated areas within the 2-mile project corridor include the Delta Junction State Bison Range and the Matanuska Valley Moose Range.
- ADF&G Game Areas with Restrictions – Categories includes Areas Closed to Hunting, Closed to Trapping, Controlled Use, and Management Areas. Areas were designated by the Board of Game and as listed in the Alaska Administration Code (AAC) – 5 AAC 92.550.
- ADNR Legislatively Designated Areas – Areas established by the Legislature for management of forest, recreational, and historical purpose, to protect and preserve natural habitat for fish and/or wildlife, and special restrictions not specifically tied to any previously mentioned purposes. Categories include Forest Legislative Desig, Multiple Use Legis, Parks Legislative Desig, and Wildlife Legis Desig. Dataset extracted from datasets used to produce the State status plats for their respective categories. Each dataset includes cases noted on the digital status plats up to one day prior to the date of extraction. Parks and Wildlife areas not displayed on Figure 2B due to overlap with the other layers relevant to the proposed project area.
- ADNR Recreational Use Areas – Recreation Land category represented. Land classification identifies the purposes for which state land can be used. Dataset extracted from datasets used to produce the State status plats for their respective categories. Each dataset includes cases noted on the digital status plats up to one day prior to the date of extraction.
- ADNR – Special Use Lands – Special Use Land category represented. Special use land designations are for the protection of archeological, biological, historic, recreational, scenic, scientific, or other special resource value warranting additional protections or requirements. Special use designations originate from an area or management plan, or at the director's discretion. Dataset extracted from datasets used to produce the State status plats for their respective categories. Each dataset includes cases noted on the digital status plats up to one day prior to the date of extraction.

3.2 Mapping and Imagery Availability

The Ahtna team utilized currently available public domain mapping and imagery data from government entities for use during this project. Ahtna also researched the availability of higher resolution and/or newer mapping and imagery products from private vendors over the entire project study corridor to support project cost estimation efforts. Figure 3 depicts currently available public domain imagery coverage as well as project study corridor area imagery data gaps that are assumed to require future project-specific imagery purchases.

The Alaska Statewide Digital Mapping Initiative initially identified the need to improve statewide mapping themes. This initiative was instrumental for obtaining federal funding for the Alaska Mapping Initiative (AMI), led by the United States Geological Survey (USGS) and with overview from the Alaska Mapping Executive Committee (AMEC). Together, these initiatives stemmed

multi-agency collaboration in the acquisition of statewide orthorectified imagery and 3-dimensional elevation data. The Alaska Geospatial Council (AGC) was established in 2015 to improve geospatial activity in Alaska. The AGC is led by the ADNR Division of Geological & Geophysical Surveys (DGGS). The AGC is the local and regional voice of Alaska as it interfaces with the AMEC.

The State of Alaska purchased satellite imagery from the *Satellite Pour l'Observation de la Terre* (SPOT). GeoNorth Information Systems, LLC (GNIS) currently holds a contract with ADNR to host this imagery on a web map service (WMS) mosaic that covers the entire Roadbelt Intertie study corridor (AGC, n.d.). The SPOT imagery was collected from 2010-2016 and has 2.5 meter pixel resolution or better for the entire area. The SPOT imagery is licensed for federal, state, local and tribal use, as well as public non-commercial use. Licensing is available for commercial use through GNIS.

Interferometric Synthetic Aperture Radar (IFSAR) data derived digital surface models (DSMs) for Alaska are available through AMI, covering the entire Roadbelt Intertie study corridor. Multiple online portals are available to access IFSAR tiles in various formats, including the ADNR DGGS, USGS Earth Resources Observation and Science (EROS) Center, and The National Map, a collaborate. The IFSAR data was collected from 2010-2012 and has 5 meter pixel resolution. Ahtna developed digital topography to support Roadbelt Intertie Project conceptual design efforts from the IFSAR DSM data (DGGS, n.d.).

The Matanuska-Susitna Borough (MSB) collected imagery in 2011, 2016, 2017 and 2019 that covers some portions of the project study corridor (MSB, n.d). The MSB imagery has 1 foot pixel resolution. MSB collected Light Detection and Ranging (LiDAR) data in 2011 at the same time as the original imagery collection event. High resolution digital elevation models (DEMs) have been created from the 2011 LiDAR data that may be suitable for future engineering design tasks, but coverage of the project study corridor is limited.

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) collected agricultural area imagery from 2012-2013 that covers portions of the northern Roadbelt Intertie study corridor. The NRCS imagery has 1 foot pixel resolution. It is currently available as a WMS through the University of Alaska's Geographic Information Network of Alaska (GINA, n.d.).

The State of Alaska's, Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs (DCRA) has collected imagery covering several villages near the project study corridor, including Copper Center, Tazlina, Glennallen, Gulkana, Gakona, Chistochina, Mentasta Lake, Tok, and Tanacross. The DCRA coverage is limited to the core village areas and the immediate Richardson Highway corridor, but it does offer some coverage of the project study corridor. The DCRA imagery was collected from 2001-2009 and has either 1 foot or 1/2 foot resolution, depending on the area. It is currently available as a streaming service or for download upon request (DCRA, n.d.).

Quantum Spatial, Inc. (Quantum), a private local vendor, indicated that they have relatively recent high-resolution imagery covering portions of the Richardson Highway, but that it likely would not cover study corridor areas away from the highway. Quantum also has partial older imagery coverage that overlaps with some of the DCRA imagery areas. Ahtna and Quantum concluded that it will likely be more cost-effective to fill project mapping and imagery data gaps with high-resolution satellite imagery.

Maxar Technologies' business unit DigitalGlobe owns a large quantity of archived high-resolution satellite imagery and offers new tasking for acquisition of current high-resolution satellite imagery (DigitalGlobe, n.d.). DigitalGlobe satellite imagery sales are currently handled by certified resellers such as LAND INFO Worldwide Mapping, LLC (LAND INFO). LAND INFO queried the DigitalGlobe satellite imagery archive against the imagery data gaps depicted on Figure 3. LAND INFO then provided estimated pricing for available archived and newly tasked satellite imagery purchases as well as post-processing costs such as orthorectification. Pricing assumptions such as archived imagery availability, acceptable imagery age, and imagery quality specifications (resolution, cloud-free, leaf-free, etc.) would need to be revisited during future project phases.

Unmanned aerial vehicle (UAV) imagery collection could be very cost-effective for areas of high interest such as substations and other infrastructure sites where ultra-high-resolution imagery would be beneficial. UAV imagery collection can generate high-resolution DSMs that would be suitable for detailed engineering purposes. UAV imagery collection costs are not specifically included in the project cost estimate.

Project-specific LiDAR data would likely be necessary for detailed design. A budget for LiDAR acquisition is included in EPS' engineering services cost estimate (Appendix A).

In summary, the project team utilized public domain topographic information and imagery for this reconnaissance-level engineering study. Mapping and imagery data purchases covering most if not all areas of the study corridor would be required during future project phases to obtain suitable high-resolution mapping and imagery data for detailed engineering design and environmental study work. Mapping and imagery data purchase budgets for both engineering design and environmental study purposes are included in the project cost estimate.

3.3 Cultural Resource Considerations

The Roadbelt Intertie Project is defined as an undertaking under Section 106 of the National Historic Preservation Act (NHPA) (Pub. L. No. 89-665, as amended by Pub. L. No. 96-515). Prior to authorizing an undertaking, the NHPA requires that federal agencies consider the potential effects of that undertaking on historic properties. The NHPA implementing regulations (36 Code of Federal Regulations [CFR] 800) define the process used to identify, evaluate, and assess effects on historic properties that may result from completing the undertaking. Historic properties are defined as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) maintained by the Secretary of the Interior (SOI).

In an effort to avoid and/or minimize potential impacts to cultural resources and historic properties, a preliminary cultural resource desktop analysis was conducted. The primary objective of this analysis was to establish known cultural resource sensitivity areas for consideration in current and future project development phases.

3.3.1 Cultural Resources Study Area

As part of the NHPA Section 106 process, the lead federal agency for a project is responsible for defining the Area of Potential Effect (APE). The APE, as defined in NHPA implementing regulation 36 CFR § 800.16, is "...the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist...".

During the early design and engineering phases of a project, a broader study area can be used to conduct cultural resource research and investigations. The project study area can then be further refined to develop an APE as project engineering is finalized. For purposes of this preliminary desktop analysis, Ahtna defined the cultural project study area as a 1-mile (mi) buffer on either side of the project cost basis alignment.

3.3.2 Methodology

Ahtna queried the Alaska Department of Natural Resources, Office of History and Archaeology's Alaska Heritage Resources Survey (AHRS) Integrated Business Suite (IBS) database to identify known cultural resources and historic properties (i.e. AHRS sites) within the cultural study area. Locational information for the AHRS sites within the study area was aggregated on a per mile basis to establish known cultural resource sensitivity zones. Under the provisions of the Archaeological Resources Protection Act and the NHPA, specific AHRS site location information is restricted in distribution, and is not included in this report.

3.3.3 Preliminary Analysis Results

Figure 4 depicts AHRS site densities within the study corridor. Project engineers considered AHRS site densities during selection of the project cost basis alignment and project cost estimation. The documented cultural resource information will also facilitate future engineering and environmental planning efforts.

3.3.4 Limitations and Recommendations

This cultural desktop assessment is a high-level preliminary review of AHRS sites already identified within the study corridor for the Roadbelt Intertie Project. The data utilized in this assessment was obtained from the AHRS IBS. Potential AHRS IBS data limitations include:

- accuracy of current site location
- current site condition

- extent to which site boundaries were delineated and/or mapped

Cultural resources and historic properties may exist in areas without documented AHRS sites. It is recommended that additional desktop research be performed during future project phases, to include updated AHRS IBS database queries as well as previous cultural resource field survey coverage data gap analysis. This additional desktop research would help guide route selection and cultural resource field survey planning (i.e., identifying survey targets, creating march charts, etc.).

3.4 Environmental Considerations

Ahtna conducted a desktop analysis to identify environmental features along the proposed study corridor. Current environmental features were compared with features identified in previous studies, where applicable. This high-level environmental feature information was used to help gauge the estimated magnitude of future study, permitting, and mitigation requirements. It was not specifically considered during selection of the project cost basis alignment. Further environmental analyses will be required during future project phases, if the project moves forward.

In-depth environmental analysis of the Sutton to Glennallen portion of the study corridor was conducted and documented in the 1994 *Copper Valley Intertie Feasibility Study* (Section 2.1). The 1994 analysis identified environmental issues and areas expected to require further consideration during permitting and construction phases. The report was intended as the basis for an Environmental Assessment (EA), should one become necessary. The 1994 analysis considered two primary routes, with more alternative segments in some areas. The current project cost basis alignment is comparable to the routes and alternative segments analyzed at the time throughout the entire proposed project corridor.

The 1994 report described the affected environment, including wetlands/vegetation, water resources, aquatic ecology, wildlife including birds, mammals and threatened and endangered (T&E) species, land use and land status, cultural/historical resources, recreation, visual/scenic resources, air quality, and electric and magnetic fields. Similar datasets are available now, with updates and advanced modeling tools for spatially viewing data. Public domain datasets obtained from government entities for comparison to changes from 1994 are presented in Figures 5A – 5G and described in the following sub-sections.

3.4.1 Anadromous Waters Catalog (AWC)

The ADF&G Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes (AWC) and the Atlas to the AWC (Atlas) specify streams, rivers, or lakes that are protected for anadromous fish, as depicted in Figure 5A. The AWC is a numerical listing of the water bodies documented as being used by anadromous fish and the Atlas visually depicts these water bodies, and the fish history phases for which the water bodies are used (ADF&G, n.d.-a). Location information is primarily derived from USGS quadrant maps, field observations, and aerial photos. ADF&G data limitations note that over time, the relevant USGS quadrant maps may not be current for on-the-ground use. Additionally, some polygons are used to specify areas containing a number

of water bodies supporting anadromous fish that cannot be depicted accurately on quadrant maps (1:63,360-scale). These polygons and lakes are both symbolized as waterbodies on Figure 5A. The AWC datasets are updated annually; however, many anadromous rearing locations have not yet been surveyed or documented.

In 1994, 14 anadromous streams were identified as crossed or directly downstream of the potential route alignments between Sutton and Glennallen, based on the 1992 AWC. The 2019 AWC includes 32 streams within the current proposed study corridor (Johnson, J., and B. Blossom, 2019a, 2019b).

3.4.2 National Wetlands Inventory

The United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) maps wetlands for the State of Alaska, as part of the Emergency Wetland Resources Act of 1986 (USFWS, n.d.). The NWI was first published in 1984, with the first update published in 1991 and additional updates planned at ten-year intervals. The next update is scheduled for 2020. The NWI indicates five possible wetland status categories in Alaska for each USGS quadrant map in production (1:63,360 scale).

The 1994 *Copper Valley Intertie Feasibility Study* (Section 2.1) also relied on the USFWS NWI and supplemented the analysis for missing sections using aerial photography. As in 1994, three wetland categories (palustrine, lacustrine, and riverine) are found within this project's proposed study corridor. The currently mapped area of each wetland category within the proposed study corridor is listed on Figure 5B for reference. However, regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used by the NWI. Not all wetland types depicted on Figure 5B may come under the Clean Water Act jurisdiction.

Recently, the definition and implementation regarding waters of the United States (WOTUS) was updated by regulatory agencies. The United States Environmental Protection Agency (EPA) and the United States Department of the Army published the Step One Rule to repeal the 2015 Clean Water Rule and return to the regulatory text prior to the 2015, effective December 2019. The Navigable Waters Protection Rule (Step Two) replaces the Step One Rule and categorizes jurisdictional waters into four categories, effective June 2020. The four federally regulated categories of WOTUS are as follows:

- Territorial seas and traditional navigable waters
- Perennial and intermittent tributaries
- Lakes, Ponds, and impoundments of jurisdictional waters
- Wetlands adjacent to jurisdictional waters

The scope of federal jurisdiction will depend on the definition of WOTUS and implementation of the Section 404 Permit Program under the Clean Water Act at the time of permitting.

3.4.3 Wildlife Species Concentration and Habitat Use

ADF&G provides the latest resources available for species and habitat assessment through an online open data portal (ADF&G, n.d.-b) and various other access points on the ADF&G website. Legacy ADF&G reports including the 1973 *Alaska's Wildlife and Habitat* (AWH) and the 1985 *Alaska Habitat Management Guide* (AHMG) continue as the basis for illustration of the distribution and concentrations of wildlife.

In 2016, ADF&G digitized the AWH data that was collected over many years, with dataset limitations provided individually. Generally, datasets were deliberately limited to simplify use of maps. ADF&G also digitized the AHMG data. The original maps were created using USGS quadrant maps at a 1:250,000 scale and divided into regions. The data was further categorized as Distribution, Human Use, and Community Use of species. The digitized areas and attributes of species data produced through these various sources are not identical but similar.

While ADF&G datasets were not available in 1994 in the same format, the AWH and the AHMG were the guiding basis for species habitat illustrated in the 1994 *Copper Valley Intertie Feasibility Study* (Section 2.1). Ahtna queried all available species datasets to identify ones applicable to the proposed study corridor. Selected applicable datasets were mapped for reference and comparison to the 1994 report. Datasets from the AWH were generally found to have larger coverage areas, thus more conservative. Datasets from the AHMG were found to contain additional attributes in some instances, such as rutting and calving areas. In areas of overlap between datasets, the AWH was prioritized with the AHMG overlain as applicable for supplemental habitat illustration. Regional datasets and select attributes were grouped as needed for cartographic purposes. Dataset limitations and attribute descriptions noted in published metadata are as follows:

- AWH Moose (Figure 5C) – Categories include Concentration Areas, Spring-Summer Concentrations, Fall Concentrations, Winter Concentrations and Distribution. ADF&G notes the categories chosen were deliberately limited to simplify use and when conflicting data was available, the most conservative interpretation was applied. Concentration areas refers to specific areas where moose group together for an essential activity. Spring-Summer Concentrations represent areas where parturient cows, yearlings, and some bulls concentrate on favored feeding areas. Fall Concentrations represent rutting and post-rutting distribution. Winter concentrations represent areas where moose concentrate during winter months. Distribution represents areas where moose are present, although may not be year-round and abundance is not a distinction. All categories displayed on Figure 5C, as applicable. The category Concentration Areas was not found within the project area.
- AHMG Moose (Figure 5C) – Categories include General Distribution, Known Calving Concentration Areas, Known Rutting Concentration Areas, and Known Winter Concentration Areas. Multiple categories are grouped where applicable. Known Calving Concentration Areas represent where concentrations of moose, especially parturient cows, have been observed during the calving period for more than one year.

Known Rutting Concentration Areas represent where concentrations have been observed during the rutting period for more than one year. General Distribution and Known Winter Concentration Areas not displayed on Figure 5C due to overlap with the AWH dataset.

- AWH Caribou (Figure 5D) – Categories include: Present, Calving, Summer Range, and Winter Range. Categories are summarized for individual caribou herds, where known. Individual herds may not summer or winter in the illustrated area at any given year but have done so at some time in recent years. Calving areas are used annually. All categories displayed on Figure 5D.
- AWH Caribou Migration Routes (Figure 5D) – Known, traditional migration routes depicted with arrows.
- AHMG Caribou (Figure 5D) – Categories include Known General Distribution, Known Calving Areas, Known Rutting Areas, Known Summer Concentration Areas, and Known Winter Use Areas. Multiple categories are grouped where applicable. Known Calving Areas represent areas where most calving by a specific herd has been observed. Known General Distribution and Known Winter Concentration Areas not displayed on Figure 5D due to overlap with the AWH dataset. The category Known Rutting Areas was not found within the project area.
- AWH Dall Sheep (Figure 5E) – The only mapping category used is Range. Too little data is available for specific populations to delineate lambing areas, winter ranges, etc. It is possible sheep are found where surveys have not been conducted and some habitat areas may not contain sheep at all seasons or all years.
- AHMG Dall Sheep (Not Presented) – Categories include General Distribution and Known Winter Use Areas. General Distribution and Known Winter Use Areas not displayed on Figure 5E due to overlap with the AWH dataset.
- AWH Primary Waterfowl Habitat in Alaska (Figure 5F) – Categories include Waterfowl Habitat and Pelagic Areas. Waterfowl breeding habitat plus habitat used mainly as feeding, resting, and staging areas. The category Pelagic Areas was not found within the project area.
- AHMG Trumpeter Swan (Figure 5F) – Categories include General Distribution, Known Dispersed Nesting and Brood-Rearing Areas, Known Molting Concentration Areas, Known Nesting and Brood-Rearing Concentration Areas, Known Spring and/or Fall Concentration Areas, and Known Spring Concentration Areas. All categories displayed on Figure 5F as one habitat group.
- AHMG Bald Eagle (Figure 5F) – Points represent sites where active or inactive Bald Eagle nests have been observed. No attributes are included within the dataset. Bald Eagle known concentration areas are not found within the project area.

Additionally, ADF&G participates with the Western Association of Fish and Wildlife Agencies (WAFWA), which developed an online Crucial Habitat Assessment Tool (CHAT) designed to inform the pre-planning phase of development projects with emphasis for energy and infrastructure development (ADF&G, n.d.-c). The tool is considered a work-in-progress but aims to manage and

provide large data volumes and new tools for viewing data. As depicted on Figure 5G, the Alaska CHAT publishes aggregated and ranked data layers based on terrestrial and aquatic Species of Concern, freshwater integrity and species richness. A similar habitat assessment tool was not available in 1994 but the aggregated layers summarize data from ADF&G, which were available in 1994. Areas of each rank category that fall within the project study corridor were calculated for reference and are noted on Figure 5G.

In summary, potential environmental impacts, future study, and permitting requirements for the proposed project study corridor have not changed substantially from the 1994 environmental constraints analyses. Datasets have been updated over time and will continue to change with data availability and developments of analysis tools. Additional datasets and inter-agency analysis tools have also developed. Specific environmental considerations for the project will depend on route selection, data availability, agency coordination, and ground reconnaissance. Impacts can be minimized using protective measures, such as timing construction activities to avoid disruption to wildlife activities and following Best Management Practices (BMPs). The anticipated environmental impact evaluation and mitigation process is discussed further in the following section.

3.5 Environmental Impact Evaluation Process

The National Environmental Policy Act (NEPA) establishes requirements for environmental impact assessment, public input, and documentation regarding proposed actions. Various federal, state, and local agencies as well as land owners and other non-governmental stakeholders would be involved in the NEPA evaluation process.

3.5.1 Involved Agencies

The following federal, state and local agencies would likely be involved in Roadbelt Intertie Project environmental scoping, providing input to environmental documents, and/or permitting.

- USDA Rural Utilities Service (RUS): RUS approval may be required depending on how the project is funded. In some scenarios RUS might serve as the lead agency.
- USACE / EPA - Alaska Department of Environmental Conservation (ADEC): A USACE Clean Water Act Section 404 permit would be required where the project could affect waters of the United States, including wetlands. An EPA Section 401 water quality certification permit, administered by the ADEC, would be obtained concurrently with the Section 404 permit.
- United States Coast Guard (USCG): USCG consultation and/or permits for in or over-water structures may be required if the Roadbelt Intertie crosses navigable waters.
- BLM: The BLM administers land along both the Glenn and Richardson Highway portions of the proposed study corridor. A BLM ROW permit would be needed if the proposed Roadbelt Intertie would cross their lands. The BLM ROW permit would be coordinated through the Glennallen District Office.

- FAA: An obstruction evaluation determination is required for any project that may affect the national airspace, air navigation facilities, or airport capacity. Applicable aeronautical studies are conducted by the FAA's Obstruction Evaluation Group (OEG).
- ADF&G: ADF&G Title 16 Fish Habitat Permits would be required at all water body crossings designated as fish habitat.
- ADNR: ADNR may require as-built surveys related to a State of Alaska easement.
- DOT&PF: The Alaska Department of Transportation and Public Facilities (DOT&PF) has permit authority for utilities in their rights of way.
- SHPO: The SHPO would be consulted to evaluate the effects on cultural resources within the proposed route. Actions affecting cultural resources on BLM lands also require consultation with the SHPO. SHPO consultation is also necessary on private and native corporation lands.
- USFWS: The USFWS would be consulted about T&E species and migratory birds. Primary project concerns are related to the potential of electrical transmission lines to impact migratory birds.
- MSB: Projects within the MSB require a development permit that typically requires a 20-day review period and approval by the planning board for projects of this scale. MSB also requires a public involvement process.

In addition to coordination with the above agencies, the Alaska National Interest Lands Conservation Act (ANILCA) requires federal agencies to consult with the State of Alaska, affected units of state government, and affected Native corporations concerning projects on federal lands.

3.5.2 Environmental Impact Statement

The Roadbelt Intertie Project is too large to be considered for categorical exclusion from NEPA requirements. A lead federal agency would be established to coordinate preparation of an Environmental Assessment (EA), an Environmental Impact Statement (EIS) or both. Development of the EA and/or EIS would evaluate any environmental consequences of the proposed project, including need for further studies or mitigation, and provide formal opportunities for public input.

An EA determines whether a federal action has the potential to cause significant environmental effects. Generally, an EA includes a brief discussion of:

- Need for the proposed action
- Alternatives (when there is an unresolved conflict concerning alternative uses of available resources)
- The environmental impacts of the proposed action and alternatives
- A listing of agencies and persons consulted.

Based on the EA, one of the following actions would occur:

- If the agency determines that the action will not have significant environmental impacts, the agency will issue a Finding of No Significant Impact (FONSI), documenting why the agency has concluded that the proposed action would not result in significant environmental impacts.
- If the EA determines that the environmental impacts of a proposed federal action will be significant, an EIS would be prepared.

Proposed projects that are anticipated to have significant environmental impacts can omit EA preparation and proceed directly to preparation of a more detailed and rigorous EIS. It is assumed that preparation of an EIS would be required for the Roadbelt Intertie Project, due to its size. Note that EIS documents typically remain valid for 5 years.

3.5.2.1 Agency Consultations

During preparation of an EIS, consultations would be sought with various agencies including USFWS, ADF&G, SHPO, and FAA.

3.5.2.1.1 USFWS

The Endangered Species Act (ESA) directs all federal agencies to work to conserve endangered and threatened species and to use their authorities to further the purposes of the Act. Section 7 of the Act, called "Interagency Cooperation," is the mechanism by which federal agencies ensure the actions they take, including those they fund or authorize, do not jeopardize the existence of any listed species. USFWS is the lead agency for the ESA consultation.

3.5.2.1.2 ADF&G

ADF&G has the statutory responsibility for protecting freshwater anadromous fish habitat and providing free passage for all fish in freshwater bodies (AS 16.05.841-871). The Roadbelt Intertie Project will likely cross numerous waterbodies that support anadromous fish, requiring agency consultation and Title 16 Fish Habitat Permits.

3.5.2.1.3 Alaska State Historic Preservation Office Section 106 Consultation Concurrence

The applicant would consult with the SHPO on the project's potential to impact historic properties. Historic properties are cultural resources eligible for the NRHP. Cultural resources include but are not limited to historic and prehistoric archaeological sites, built environment, and traditional cultural properties. Consultation will likely consist of defining direct and indirect (visual) APEs for the project, identifying cultural resources within the project's APEs, determining if any of the cultural resources within the APEs are historic properties, and then requesting concurrence from SHPO on a Determination of Effect for the project. Determining whether cultural resources are historic properties or not may require additional research and/or field survey work.

Mitigation will be necessary if a Determination of Adverse Effect is made. Mitigation measures, if necessary, will be established in a Memorandum of Agreement (MOA). Likely parties to the

MOA include the applicant, federal and state government agencies, local native and community organizations, and land owners. Other parties may be discovered through the Section 106 Consultation process.

It is important to note that the lead federal agency for the EIS will not sign a Finding of No Significant Impact (FONSI) if the Section 106 Consultation process has not been completed. Getting a signed FONSI can take considerable time. Allow 18 to 24 months for this process. Expenses will revolve around whether additional archaeological survey is required and/or whether professional assistance is needed in developing a Determination of Effect.

3.5.2.1.4 FAA

The obstruction evaluation process begins at a regional level within the FAA, and involves all lines of business including Airports, Airway Facilities, Flight Standards, Flight Procedures, and Air Traffic. The governing regulation is 14 CFR Part 77, Safe, Efficient Use, and Preservation of the Navigable Airspace.

The FAA's philosophy in evaluating objects that may impact navigable airspace is that each is presumed to be a hazard until proven otherwise. This posture clearly favors the aeronautical community and is consistent with the FAA's overall mission of promoting aviation safety.

If a tower or other object is found to have a significant adverse impact, a "hazard" determination will be issued. However, in many of these cases, the FAA negotiates with the proponent until the conditions are met for a "no-hazard with conditions" determination. These efforts are a key benefit of the FAA's participation at this level.

3.5.2.2 Impact Categories

The Roadbelt Intertie Project location and features are such that all NEPA environmental impact categories must be analyzed during preparation of an EIS. Some of the anticipated impact categories are discussed further in the following sub-sections.

3.5.2.2.1 Visual

In considering the effects of proposed projects or activities on society and the environment, assessment of visual impacts is important to several types of resources. Visual impacts affect purely scenic resources and scenic experiences of the landscape. However, projects or activities may affect other resources and experiences that have an important visual component or aspect such as wild and scenic rivers, wilderness, or historic sites and trails.

Environmental reviews conducted during the 1994 study indicated that visual impacts were potentially one of the most significant impact categories for the Sutton to Glennallen portion of the Roadbelt Intertie project, and that likely has not changed.

3.5.2.2.2 Recreation

Recreation and special use areas are described as state or nationally managed land having scenic, historic, archaeological, scientific, biological, recreational, or other special resource values that warrant additional protections and special requirements (e.g. trail systems, parks, wildlife refuges, etc.). Figure 2B depicts some special use areas in the Roadbelt Intertie project area. Environmental reviews conducted during the 1994 study indicated that recreational impacts were potentially one of the most significant impact categories, and this likely is still the case.

The applicant will need to coordinate with local government planning departments, recreational service areas, and volunteer trail groups who maintain recreational trails traversed by the Roadbelt Intertie Project in order to avoid or reduce impacts to recreational use and access.

3.5.2.2.3 Wetlands and Waterways

A review of the project study corridor was conducted for the presence and distribution of wetlands and aquatic resources. The USFWS NWI Wetland Mapper was utilized to identify wetlands and water bodies in the project area.

The NWI Wetland Mapper indicated near complete coverage of the proposed project study corridor by freshwater emergent, freshwater forested scrub, freshwater pond, lakes, and rivers. All of these features and resources are regulated by the USACE. Fill placement and other discharges of construction materials into these features requires a section 404 permit from the USACE and may require mitigation and/or restoration of impacted habitats.

The proposed Roadbelt Intertie would cross numerous waterways that may be navigable waters and may require USCG and USACE approval for in or over-water structures.

3.5.2.2.4 Avian Resources

Preliminary research indicates that the project corridor are an important migration corridor and summer foraging area for waterfowl, and other various migratory birds.

Migration timing for birds has northern migrants arriving or passing through the project area between the last week of March and early June. South migrating species would be anticipated before ice-up.

Pre-construction surveys of bird use in planned intertie placement areas may be needed depending on consultation feedback from USFWS biologists.

Ground clearing and construction activities associated with the project should take into account the recommended “no-clearing” windows established by the USFWS. The no-clearing window during which vegetation removal should be avoided is June 1 to July 31. Adhering to the no-clearing window restriction will help the project comply with the Migratory Bird Treaty Act.

3.5.2.2.5 Other Mammals

The project corridor is expected to be within the range of numerous large and small mammals. Further consultation and analysis of the effects of the intertie placement is needed to ensure limited disruption to migrations and habitat access on a specific site basis.

3.5.2.2.6 Fisheries

Fish collection records provided by the ADF&G indicate the use of project area waterways by numerous resident and anadromous fish species. Records indicate the occurrence of pink salmon (*Oncorhynchus gorbuscha*), chum salmon (*Oncorhynchus keta*), coho salmon (*Oncorhynchus kisutch*), sockeye salmon (*Oncorhynchus nerka*), Chinook salmon (*Oncorhynchus tshawytscha*), and Dolly Varden trout (*Salvelinus malma*) in project area waters that may be effected by the Roadbelt Intertie and other project development activities.

Waterway crossings and in-water structures in rivers, streams, and other waterways will require a Fish Habitat Permit from ADF&G and may trigger the need for mitigation activities and implementation of specific BMPs during project operation, maintenance, and development.

3.5.2.2.7 Threatened and Endangered Species

A cursory review of literature for the area does not show the presence of any T&E species.

3.5.3 Permit Requirements

The following are the minimum known required environmental permits for the Roadbelt Intertie Project:

- USACE Section 404 Permit with EPA-ADEC 401 Certification;
- BLM ROW Permit;
- FAA Obstruction Evaluation Determination;
- ADF&G Title 16 Fish Habitat Permits;
- MSB Development Permit; and
- Ahtna, Inc. Land Use Permit.

3.5.3.1 USACE Section 404 Permit / EPA-ADEC Section 401 Permit

Once the permit application is assigned, the public notice may not go out for a month. A typical permit application public notice period for an individual permit is 30 days. The USACE has no regulatory requirement for issuing the permit within a certain timeframe.

The USACE requires compensatory mitigation in all cases for wetlands loss. A Nationwide Permit (NWP) 12 could potentially apply to the Roadbelt Intertie Project if the total wetlands impacts are 0.5 acres or fewer. An NWP typically requires a 15-day review. However, as of April 2020, NWP 12 is in litigation and the USACE issued a directive not to process any NWP 12 verifications until

further notice. If an applicable NWP is either not available or the project does not meet impacted wetlands acreage criteria, an individual Section 404 permit with a longer processing time would be required. The EPA-ADEC Section 401 water quality certification is issued concurrently with the 404 permit. There is a permit fee of $100. Total processing time can be 3 to 6 months. Note that the USACE will assess compensatory mitigation as a 1:1.5, 1:2 or 1:3 metric. This means that for every acre of impact, 1.5 acres, 2 acres, or 3 acres will have to be compensated for. The cost is based on the land values.

3.5.3.2 BLM ROW Permit

The BLM typically negotiates an agreement with the applicant where funds are set aside for BLM staff to process the ROW permit application. The resulting environmental document required would be prepared based on the lead federal agency statutes and regulations. If BLM is the lead federal agency, the agreement between the applicant and BLM will include funds for preparation of this document.

The BLM will also require an EIS per their regulations. The BLM may choose to complete this document, in which case it will require reimbursement from the applicant. The applicant may have the opportunity to hire a contractor to do the EIS; however, note that the applicant will want to coordinate with agencies prior to selecting a consultant and getting cost estimates. Cost estimates will depend on what special studies may be needed for the corridor. A contractor may be less expensive and more efficient, depending on the BLM staff availability. However, it is still subject to the BLM approval and must satisfy their requirements. The BLM reserves the right to deny a ROW permit even after the applicant pays these fees and conducts this research. The BLM suggests that applicants schedule a pre-application conference with their staff to learn about their issues and concerns. In general, the staff will be concerned about reasonable alternatives and why a certain route was selected over other routes.

There may be other fees besides the cost reimbursement to the federal agencies for staff time. The BLM staff may author the EIS or the applicant may hire a consultant to complete it. This can take at least 6 to 9 months and possibly a full year if the BLM is the lead federal agency and they decide to conduct field work.

3.5.3.3 FAA Obstruction Evaluation Determination

The FAA's OEG conducts aeronautical studies for any object that may affect the national airspace, air navigation facilities, or airport capacity. In accordance with 14 CFR Part 77, an applicant must file notice at least 45 days before the start date of the proposed construction or alteration or the date an application for a construction permit is filed, whichever is earliest. However, the FAA recommends that notices be filed 60-90 days before planned construction. The aeronautical study process includes evaluations by various lines of business, and any identified impacts must be resolved before a final agency determination is issued. In addition, the proposal may warrant a 30-day public notice to obtain aeronautical impacts.

Once the FAA has completed an aeronautical study, a determination valid for 18 months is issued regarding the project's impact to air navigation. One of three responses is typically issued:

- Determination of No Hazard - The proposed project does not exceed obstruction standards and marking/lighting is not required.
- Determination of No Hazard with Conditions - The proposed project would be acceptable contingent upon implementing mitigating measures such as the marking and lighting of the structures.
- Determination of Hazard - The proposed project was determined to be a hazard to air navigation and may not be constructed.

3.5.3.4 ADF&G Title 16 Fish Habitat Permits

Any stream crossing will involve coordination with the ADF&G. Their permit processes allow for certain culverts or bridges that allow for resident fish passage and for anadromous fish in streams known to support such species. Fish passage permits are not difficult to obtain and do not routinely take more than a couple of months. Expenses in obtaining a fish passage permit are anticipated to be minimal.

3.5.3.5 MSB Development Permit

The MSB development permit application must be accompanied by a fee. The fee is $750 if in a Resource Development Zone or Transportation Corridor Zone. The Conditional Use Permit fee is $500. The permit can take 6 to 9 months to process depending on when the council meets.

3.5.3.6 Ahtna, Inc. Land Use Permit

This permit would be needed if the Roadbelt Intertie were to cross lands owned by Ahtna, Inc. Processing it would probably not be time consuming.

3.5.3.7 Summary

Table 3-1 summarizes the anticipated environmental permit requirements for the Roadbelt Intertie Project.

TABLE 3-1: ENVIRONMENTAL PERMIT REQUIREMENT MATRIX

Agency	Permit Name	Permit Coverage/Rationale
USACE / EPA-ADEC	404 Permit with EPA-ADEC 401 Certification	A USACE Clean Water Act Section 404 Permit would be required where the project could affect waters of the USA, including wetlands. An EPA Section 401 water quality certification permit administered by the ADEC would be obtained concurrently with the Section 404 permit.
BLM	ROW Permit	A BLM ROW permit would be needed if the proposed Roadbelt Intertie would cross BLM-managed lands.

Agency	Permit Name	Permit Coverage/Rationale
FAA	Obstruction Evaluation Determination	Determination of project's air navigation hazard and any required mitigation measures, conducted by the FAA's OEG.
ADF&G	Title 16 Fish Habitat Permits	ADF&G coordination regarding need for Title 16 fish habitat permits will be required for any stream crossings.
MSB	Development Permit	Projects within the MSB require a development permit that typically requires a 20-day review period and approval by the planning board for projects of this scale.
Ahtna, Inc.	Land Use Permit	This permit would be needed for the transmission line to cross any lands owned by Ahtna, Inc.

Key:
ADEC State of Alaska Department of Environmental Conservation
ADF&G State of Alaska Department of Fish and Game
BLM United States Department of the Interior, Bureau of Land Management
EPA United States Environmental Protection Agency
FAA Federal Aviation Administration
MSB Matanuska-Susitna Borough
ROW right-of-way
USACE United States Army Corps of Engineers

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4.0 COST ESTIMATION

Following selection of the Roadbelt Intertie cost basis alignment and design features, the project team estimated total project development costs as well as operation and maintenance costs. EPS also considered qualitative benefits of the project. Quantitative cost-benefit analyses were not conducted as they were not within the project scope; however, that would be a recommended next step if the project moves forward.

4.1 Cost Estimate Summary

Cost estimates for the Roadbelt Intertie Project are summarized in Table 4-1. Additional detail regarding the construction, engineering, and ROW acquisition cost estimates can be found in EPS' technical report (Appendix A). The estimated costs provided are intended to be EPS and Ahtna's professional opinion of the probable construction costs plus additional allowances for engineering, environmental studies, ROW acquisition, permitting activities, project management, and construction monitoring. The actual project costs could be substantially different from those indicated below depending on route selection, results of future design and environmental studies, market conditions, regulatory changes, or other factors.

TABLE 4-1: PROJECT DEVELOPMENT COST ESTIMATE SUMMARY

	Item	Amount (2020 Dollars)
	Construction	
	Transmission Line	$ 410 M
	Substation Modifications	$ 56 M
	Communication Modifications	$ 4 M
A	**Construction Subtotal (including Contingency)**	**$ 470 M**
B	**Engineering Services**	**$ 12 M**
C	**Environmental Services, ROW Acquisition, Permitting**	**$ 26 M**
	DESIGN AND CONSTRUCTION SUBTOTAL (A+B+C)	$ 508 M
D	**Construction Management (5% of A)**	**$ 23 M**
E	**Owner Costs (5% of A+B+C+D)**	**$ 26 M**
F	**Contingency on Non-Construction Costs (10% of B+C+D+E)**	**$ 9 M**
	TOTAL PROJECT DEVELOPMENT COST	**$ 566 M**

Operation and maintenance cost estimates for the Roadbelt Intertie Project are summarized in Table 4-2. Additional detail can be found in EPS' technical report (Appendix A).

TABLE 4-2: OPERATION AND MAINTENANCE COST ESTIMATE SUMMARY

Item	Amount (2020 Dollars)
Transmission Line O&M (first 10 years)	$ 400,000 per year
Transmission Line O&M (remainder of assumed 50-yr project life)	$ 800,000 per year
Substation O&M (total for O'Neill, Pump Station 11, Tok and Jarvis Creek)	$ 470,000 per year

4.2 Qualitative Cost Benefit Analysis

The Roadbelt Intertie Project offers several benefits. It would allow total transfers between the Southern and Northern Railbelt sections to increase from approximately 65-75 MW to 125 MW. In addition to the total energy transfer capacity improvement, the new line would increase electric power reliability throughout the Alaska road system by allowing at least 75 MW to be considered as firm power and not subject to interruption by any single line outage. Implementation of the Roadbelt Intertie Project would allow development of future generation in southcentral, interior, or eastern Alaska based on economics and not be geographically constrained. The new line would allow firm power deliveries to Fort Greely, which will substantially increase not only the amount of power that could be supplied to the facility, but the resiliency of that power. The new line would increase the Railbelt/Roadbelt's ability to accept renewable energy and provide significant spatial diversity for these resources. The project has potential economic benefits including reduced power costs for rural communities and support for regional economic development opportunities. The economic opportunity costs and potential environmental impacts of building the Roadbelt Intertie would be evaluated in detail during the NEPA process.

Although not included in the proposed Roadbelt Intertie Project design or cost, additional DoD facility resilience may be realized if the proposed Fossil Creek substation was also built, allowing Joint Base Elmendorf-Richardson to access redundant Railbelt/Roadbelt power through connection to MEA infrastructure.

5.0 PUBLIC AWARENESS CAMPAIGN

The Ahtna team assisted the Commission with project public engagement efforts as detailed in the following sub-sections.

5.1 Objectives

Public awareness campaign objectives were to:

1. let the public know early that a high-level preliminary reconnaissance engineering study was underway,
2. direct the public to a project website as a source of information and early public input mechanism, and
3. share that formal public meetings would be held during future design phases, if the project advances.

Detailed input regarding design features and transmission line routing was not solicited due to the conceptual nature of the design at this point in project development.

5.2 Stakeholder Messaging Team

In support of the Commission's public awareness campaign goals, the Ahtna team invited public relations stakeholders from the Ahtna Intertribal Resource Commission, AP&T, CVEA, GVEA, MEA and Tanana Chiefs Conference to join a stakeholder messaging team. GVEA declined to participate. Representatives of other listed entities participated in stakeholder messaging team teleconferences, provided input regarding public awareness campaign scheduling and format, and reviewed project communication materials prior to publication.

5.3 Project Website

The Ahtna team developed a project website (www.denali.gov/Roadbelt/Intertie/Information) to provide the public with project information as well as project-specific contact information for any questions or comments.

5.4 Public Awareness Meetings

Informational meetings were planned in 5 communities along the proposed transmission line study corridor. Scheduling discussions were initiated with contacts in Sutton, Chickaloon, Glacier View, Glennallen and Tok. However, the in-person public awareness meetings were cancelled due to the COVID-19 pandemic and associated safety measures implemented by state and local government agencies. In lieu of in-person meetings, a project flyer was developed and distributed to community contacts for circulation. If the project moves forward, route selection and a range of opportunities for public input, including public meetings or other forums, would occur during future design phase(s). The project flyer is provided in Appendix B.

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