US Army Corps
of Engineer
Alaska District

Draft Environmental Impact Statement

Alaska Stand Alone Gas Pipeline

January 2012




Volume 3

Appendices A through P

United States Army Corps of Engineers
Alaska District

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Photo credits (cover): Michael Baker Corp. (top left and middle); Ryan Hagerty (top right); and Carl Johnson (bottom).

Appendix A

404(b)(1) Guideline Checklist

404(B)(1) GUIDELINES CHECKLIST

THE FOLLOWING QUESTIONS WILL BE ADDRESSED IN THE USACE DECISION DOCUMENT WHICH WILL BE COMPLETED AFTER THE PUBLIC NOTICE PERIOD OF THE PERMITTING ACTION.

ALTERNATIVES TEST (40 CFR 230.10(A)).

Based on the Alternatives discussion are there available, practicable alternatives having less adverse impact on the aquatic ecosystem and without other significant adverse environmental consequences that do not involve discharges into "waters of the U.S." or at other locations within these waters?

Based on the Alternative discussion, if the project is in a special aquatic site and is not water dependent, has the applicant clearly demonstrated that there are no practicable alternative sites available?

Special Restrictions (40 CFR 230.10(b)). Will the discharge:

Violate state water quality standards?

Violate toxic effluent standards [under Section 307] of the Clean Water Act?

Jeopardize endangered or threatened species or their critical habitat?

Violate standards set by the Department of Commerce to protect marine sanctuaries?

Other restrictions (40 CFR 230.10(c)): Will the discharge contribute to significant degradation of "waters of the U.S." through adverse impacts to:

Human health or welfare, through pollution of municipal water supplies, fish, shellfish, wildlife and/or special aquatic sites?

Life stages of aquatic life and/or wildlife?

Diversity, productivity, and stability of the aquatic life and other wildlife? Or wildlife habitat or loss of the capacity of wetlands to assimilate nutrients, purify water or reduce wave energy?

Recreational, aesthetic, and/or economic values?

Actions to minimize potential adverse impacts [mitigation](40 CFR 230.10(d)). Will all appropriate and practicable steps [40 CFR 230.70-77] be taken to minimize adverse impacts of the discharge on the aquatic ecosystem?

Appendix B

Scoping Report

[Appendices to the Scoping Report are included on the CD attached to Volume 1 of the DEIS and can also be downloaded from the Project website at: http://www.asapeis.com/ScopingMeetings.aspx]

Scoping Report
Alaska Stand Alone Pipeline (ASAP)
Environmental Impact Statement

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May, 2010

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS

ASAP	Alaska Stand Alone Pipeline
BLM	Bureau of Land Management
Corps	United States Army Corps of Engineers
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
NEPA	National Environmental Policy Act
NOI	Notice of Intent
NOAA	National Oceanic and Atmospheric Association
NPS	National Park Service
ROD	Record of Decision
ROW	Right-Of Way
SPCO	State Pipeline Coordinator's Office
TAPS	Trans-Alaska Pipeline System

1.0 INTRODUCTION

The United States Army Corps of Engineers (Corps) Alaska District is preparing an Environmental Impact Statement (EIS) to analyze the Alaska Stand Alone Pipeline (ASAP) as proposed by the Alaska Department of Natural Resources. Cooperating agencies include the Bureau of Land Management (BLM), Environmental Protection Agency (EPA), National Park Service (NPS), and the State Pipeline Coordinator's Office (SPCO). As lead agency, the Corps is responsible for the development of the EIS, as well as all necessary permits within its jurisdiction. The cooperating agencies join in this effort so that the EIS provides the basis for permits and the right-of way (ROW) grants to be issued.

The Notice of Intent (NOI) to prepare an EIS was published in the *Federal Register* on December 4, 2009. The scoping period, during which issues and concerns are identified, was initiated December 7, 2009. As specified in the NOI the original scoping period was scheduled to end February 5, 2010. Responding to a request from a project stakeholder the decision was made to extend the scoping period. A Public Notice was distributed to the original mailing list on February 5, 2010 noting an extension of the scoping period to March 8, 2010. Scoping comments were received through March 8, 2010.

1.1 Scoping Overview

The Corps hosted public scoping meetings for the ASAP EIS to disseminate information about the proposed project and to identify issues and concerns that should be addressed in the EIS (Table 1). Identical formats were followed for each meeting, and the same project information was presented. The meetings combined an open house with a brief, formal presentation, followed by a public question and comment opportunity using the following agenda:

1.0 hour	Open House
0.5 hour	Project Presentation
1.5 hours	Public Question and Comment Period

A court reporter recorded transcripts of each of the public scoping meetings. These transcripts are included in Appendix F.

TABLE 1. SCOPING MEETINGS, LOCATIONS, DATES & TIMES

Date	Time	Meeting	Location
December 8, 2009	5-8 PM	Glennallen Public Scoping Meeting	Tazlina Village Hall Mile 110.5 Richardson Highway, Glennallen
December 9, 2009	5-8 PM	Delta Junction Public Scoping Meeting	Delta Junction Community Center 2287 Deborah Street, Delta Junction
December 10, 2009	11 AM - 1 PM	Nenana Public Scoping Meeting	Nenana Civic Center 723 North A Street, Nenana
December 10, 2009	5-8 PM	Fairbanks Public Scoping Meeting	Pioneer Hall at Pioneer Park 2300 Airport Way, Fairbanks
December 11, 2009	11 AM - 1 PM	Denali National Park/ McKinley Village Public Scoping Meeting	McKinley Park Community Center Mile 230 Parks Highway, McKinley Park
December 14, 2009	5-8 PM	Anchorage Public Scoping Meeting	Anchorage Senior Activity Center 1300 East 19th Avenue, Anchorage

Date	Time	Meeting	Location
December 15, 2009	5-8 PM	Wasilla Public Scoping Meeting	Curtis D Menard Memorial Sports Center 1001 South Mack Drive, Wasilla
December 17, 2009	2-6 PM	Barrow Public Scoping Meeting	Inupiat Heritage Center 5421 North Star Street, Barrow
December 18, 2009	1-4 PM	Agency Scoping Meeting	Federal Building, Bureau of Land Management Office 222 West 7th Avenue, Anchorage

The Corps hosted an agency scoping meeting, beginning at 1:00 pm on December 18, 2009 in Anchorage. This meeting provided a specific opportunity for agencies to hear the scoping meeting presentation and to ask questions of clarification regarding the ASAP EIS project. The presentation and discussion served as a common foundation for identification of issues and concerns by federal and state agencies with jurisdiction and responsibility for resources potentially affected by the project.

This document is a public record of the scoping activities conducted for the ASAP EIS project from the issuing of the NOI through the close of the scoping period. Comments received during scoping are summarized and presented in this document. Comments received after the close of scoping will be considered during the development of the EIS, but are not part of this report.

The organization of this report begins with an overview of the outreach to notify the public and convene the scoping meetings. The body of this report then provides a brief summary of issues and comments offered by the agencies and the general public. The concluding section describes the next steps in the planning process.

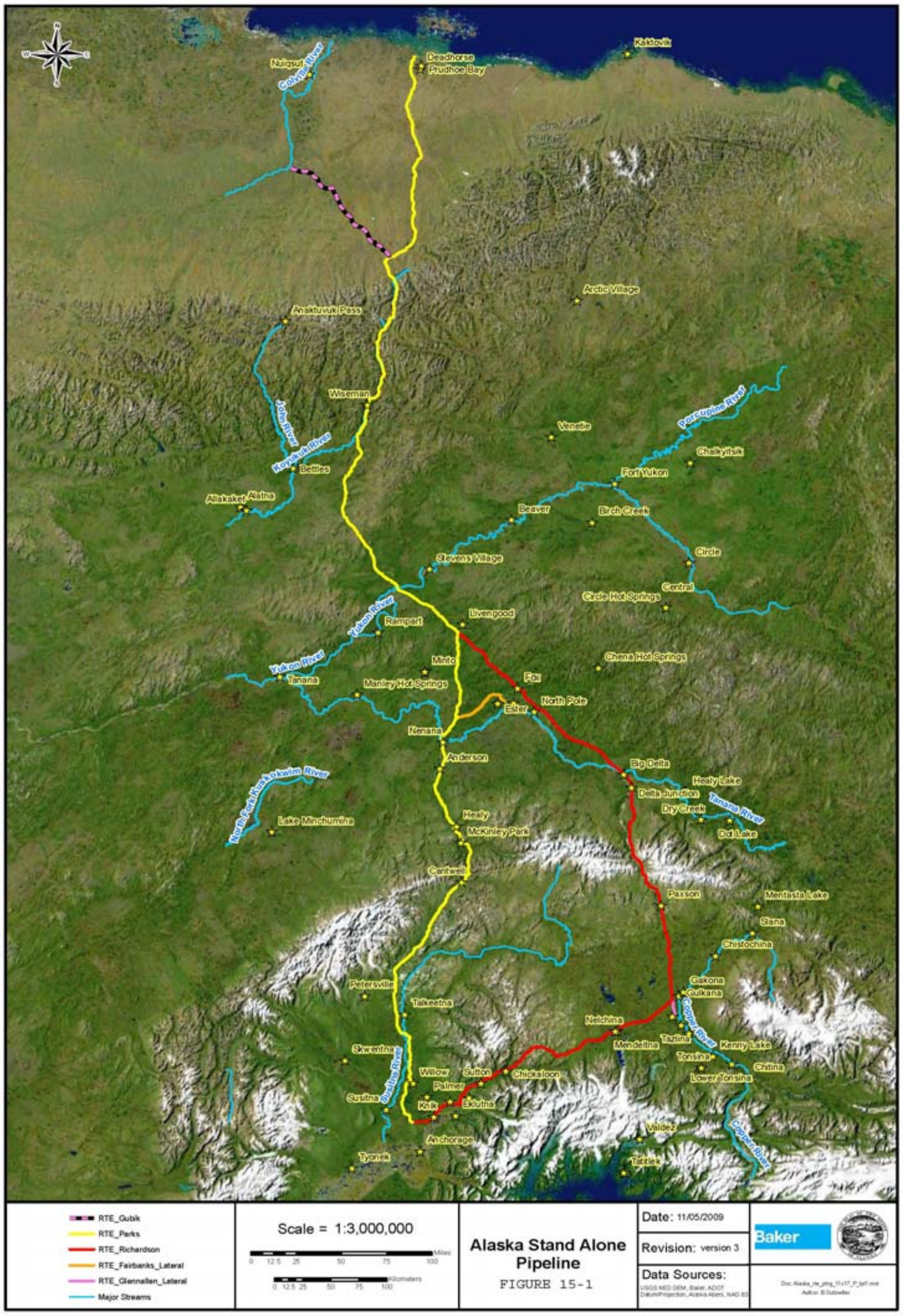
A series of appendices compile the supporting materials for the summaries provided in this report. Detailed materials regarding public notice and outreach are found in Appendix A through Appendix C. Appendices D and E provide a compilation of the original agency, general public and stakeholder comments. Finally, Appendix F includes the original transcripts from the scoping meetings.

1.2 Proposed Project Overview

Alaska Department of Natural Resources proposes a project to construct a 737-mile natural gas pipeline from Prudhoe Bay, located in Alaska's North Slope, to Cook Inlet in South-central Alaska (Figure 1). This pipeline is known as the ASAP project.

The ASAP EIS project area is primarily within existing transportation corridors, consistent with state and federal recommendations to consolidate such activities. The proposed pipeline and associated facilities would primarily cross state lands, although it would also cross federal (BLM), municipal, Native Corporation, Native allotment, and other private lands.

FIGURE 1. PROPOSED ALASKA STAND ALONE PIPELINE



1.3 Purpose of the Proposed Project

The ASAP project would help supply the energy needs of the Interior and South-central regions of Alaska. The pipeline would deliver natural gas and help decrease heating costs in the Interior and provide natural gas storage for periods of peak energy demand in South-central Alaska.

2.0 SCOPING METHODS

Scoping is designed to be an open, public process for identifying the scope of significant physical, biological, and social environmental issues related to the proposed project that should be addressed through the National Environmental Policy Act (NEPA) process. Scoping provides persons potentially affected by the project an opportunity to express their views and offer any suggestions they may have regarding the project and is typically accomplished through written correspondence, public scoping meetings, use of electronic media, and formal and informal consultation with agency officials, interested individuals, and groups.

The scoping process is the first phase of an ongoing public participation program, which keeps relevant agencies and the interested public engaged in the project's progress and informed of opportunities to participate in the preparation of the EIS. In the scoping phase, stakeholders, general public and agencies have an opportunity to 1) bring local issues and concerns within the project area to light, and 2) make comments and suggestions that will help develop a reasonable range of alternatives to be evaluated within the EIS.

The scoping process utilized a number of techniques to ensure that agencies, officials, stakeholders, and members of the public were informed of the project, including:

- Development of a project mailing list
- Newspaper and online notices of scoping meetings
- Public service announcements of scoping meetings
- Public scoping meetings in Glennallen, Delta Junction, Fairbanks, Nenana, McKinley Village, Wasilla, Anchorage, and Barrow
- Agency scoping meeting in Anchorage
- Project email address for comments (info@asapeis.com)
- Project website for project information and electronic comment submission form (http://www.asapeis.com)

2.1 Scoping Activities

The scoping activities conducted during the scoping period are summarized in the following sub-sections. Comments received during scoping are discussed and summarized in Section 3.0.

2.1.1 Project Scoping Announcements

The ASAP EIS process began with publication of the NOI in the *Federal Register* on December 4, 2009. A copy of the NOI is included in Appendix A.

On December 4, 2009, the Corps sent a public notice to affected parties regarding the EIS public scoping meetings and how to obtain more information. On February 5, 2010, the Corps sent out a second public notice to the original mailing list noting an extension of the scoping period and how to obtain more information.

Newspaper announcements for the scoping meetings were advertised in the *Copper River Record* on December 3, 2009; the *Delta Wind* online edition on December 7, 2009; the *Fairbanks Daily News Miner* December 9-10, 2009; the *Anchorage Daily News* on December 14, 2009; the *Mat-Su Valley Frontiersman* on December 10 and 15, 2009; and the *Arctic Sounder* on December 17, 2009. A public service announcement was emailed on December 1, 2009 to the KXGA radio station. Online announcements were posted on the Delta News Web calendar on December 2, 2009; the KSKA Anchorage Public Radio datebook calendar on December 10, 2009. This information is included in Appendix B.

Scoping period deadline reminders were advertised in newspaper announcements in the *Mat-Su Valley Frontiersman* on January 17, 19, and 22, 2010; the *Copper River Record*, *Delta Wind*, and the *Arctic Sounder* January 21, 2010; and the *Fairbanks Daily News Miner* January 22-28, 2010. An online reminder announcement with a link to the ASAP EIS website was posted on the *Anchorage Daily News* homepage January 18-24, 2010 and Peg Tileston's What's Up on January 22, 2010. This information is included in Appendix B.

An extension of the scoping period was advertised in newspaper announcements in the *Copper River Record*, *Delta Wind*, and the *Arctic Sounder* on February 18, 2010; and the *Mat-Su Valley Frontiersman* February 19, 21 and 23, 2010. Online extension announcements with a link to the ASAP EIS website were posted on the *Anchorage Daily News* and *Fairbanks Daily News Miner* homepages February 19-26, 2010. This information is included in Appendix B.

2.1.2 Public Scoping Meetings

Eight public scoping meetings were conducted in December 2009. Exact dates and locations of each meeting are detailed in Table 1. The scoping meeting format and information presented was the same at each public meeting. The open house session, during the first hour, was an opportunity for attendees to view display boards and maps that presented project information and were able to ask questions of the project team. A project overview, including an introduction to the NEPA process, was presented during the following half hour. The public question and comment period began immediately following the presentation with a court reporter recording public testimony.

Comment forms were made available at the meetings in order for attendees to submit written comments during the meeting or mail them at a later date. Supporting information for the public scoping meetings, including display boards and the formal presentation, is included in Appendix C.

2.1.3 Agency Scoping Meeting

An agency scoping meeting was held on December 18, 2009 at 1:00 p.m. at the Bureau of Land Management Office in Anchorage. Agencies received the same formal presentation as the public. Following the presentation, there were a few questions regarding project design components. The intent of the meeting was to provide agencies with an overview of the project. The agencies were asked to provide their scoping comments in writing. Comment submissions are included in Appendix D.

3.0 SUMMARY OF COMMENTS RECEIVED

The ASAP EIS scoping meetings were minimally attended with a few public comments in some locations. Three scoping meetings did not receive any attendees. Much of the discussion of those in attendance focused on details regarding design, alignment, and the relationship to other gas pipeline projects. Seventeen unique comment submissions were received, including four from state or federal agencies, one from local government, one State Representative and eleven from non-profits, businesses and the general public. In addition, oral comments were provided and recorded at all meetings, with the exception of the agency meeting in Anchorage and the scoping meetings with no attendance (Glennallen, Delta Junction, and Wasilla).

Comments received from both agency and public scoping meetings were received in several ways:

- Oral discussion or testimony from the public scoping meeting transcripts
- Written comments received during the public scoping meetings
- Written comments received by postal mail or by fax
- Written comments submitted electronically by email or through the project website

Comments were assigned subject category codes to describe the content of the comment. The issue categories are listed below in Section 3.1. Group affiliations of those that submitted comments include: federal and state agencies, local governments, businesses, special interest groups, and individuals. The complete text of agency and public comments received are in Appendices D and E respectively.

3.1 Issues Identified During Scoping

The comments received during the scoping period fell into the ten impact categories described as follows:

- Cultural Resources
- Communication
- Engineering, including route alternatives
- Cumulative Impacts
- Land Use
- Operations
- Safety
- Socioeconomic
- Surface water and wetlands
- Wildlife and Fisheries

3.2 Agency Comments

Agency scoping comments focused primarily on project definition, route and system alternatives, cumulative impacts and land use. The NPS submitted unique comments regarding the alternative route of the pipeline through Denali National Park. The NPS commented that existing regulations do not allow NPS to grant a right-of-way through the national park. NPS commented that federal legislation has been introduced to allow NPS to grant a right-of-way through national park lands. NOAA specifically identified the Beluga Whale and designated critical habitat in connection with plans for a fractionation plant in Cook Inlet.

For specific agency comments received, see Appendix D.

3.3 Public Comments

All comments received at public scoping meetings, by mail, and email, were assigned to issue categories based on the content of the comment (see Section 3.1). Individual comments are located in Appendix E. Below is a summary of the most common issues encountered during scoping including pipeline routing, facility siting and coordination with other projects. All scoping submissions and comments from members of the public can be seen in their entirety in Appendix E.

- Cumulative Impacts: Comments were received regarding cumulative impacts, fish and wildlife habitat impacts, future development of minerals and petroleum products
- Communication: Comments were received regarding communication and outreach to communities and with other projects. One commenter suggested a citizen's advisory group for the project. Comments were received regarding other in-state and inter-state pipeline projects.
- Engineering/Design/Construction: One comment requested an oil line in addition to the proposed gas line from Gubik. Another comment requested Gubik region gas to be a source option for the proposed gas line. One commenter suggested the East Curry Route Alternative, not included in the project documents, which would by-pass the Parks Highway.
- Land Use/Recreation: Comments identified competing land use along the proposed route. One commenter submitted 225 signatures on a petition to include multi-use paths in the project design.
- Socioeconomic: Comments suggested the EIS include a cost/benefit analysis of the project, local use of natural gas, health impact analysis and environmental justice.
- Wildlife and Fisheries: Comments were received identifying impacts to wildlife and fisheries habitat.

4.0 NEXT STEPS IN THE PLANNING PROCESS

4.1 Develop Alternatives

A reasonable range of alternatives that meet the purpose and need of the project will be identified and examined in the EIS. Applicable input from the scoping process will be incorporated into the range of potential alternatives. This ensures the entire range of positions expressed by participants in the scoping process has been considered. Eliminated alternatives and their justifications will be identified in the EIS. Viable alternatives will be developed with conceptual plans by utilizing available information, or by identifying additional information to be obtained in order to evaluate each alternative on an equal basis. This step of the process will begin May 2010.

4.2 Study of the Affected Environment

All available environmental information associated with the identified issue categories will be reviewed and summarized. The summary will include the most recent scientific research available and all pertinent studies and surveys required for areas that would be potentially impacted by all viable alternatives. This information will be presented in the *Affected Environment* chapter of the EIS. This step of the process will begin April 2010.

4.3 Assess Environmental Consequences of Alternatives

Potential environmental consequences of alternatives will be evaluated, including direct, indirect, and cumulative effects. NEPA compliance associated with federal, state, and local agency permits will be identified and incorporated into the analysis of potential effects. This step of the process will be conducted concurrently with the *Affected Environment* summary and will begin in May 2010.

4.4 Issue the Draft EIS

The Draft EIS will be prepared and made available for review by the public, Tribal Governments, local, state, and federal agencies. The Corps will identify the least environmentally damaging practicable alternative in the final stage of the EIS, namely the Record of Decision (ROD). The Draft EIS will be available for a 60-day review after the Notice of Availability has been published is the *Federal Register*. The public hearings will offer another opportunity for public comment on the Draft EIS. An additional agency meeting will also be held. The public comment period, for inclusion in the Final EIS, is estimated to be from August 2010 to September 2010.

4.5 Issue the Final EIS and Record of Decision

To prepare the Final EIS, revisions will be made on the Draft EIS upon analysis of public comments received. The Final EIS will include submitted comments on the Draft EIS, including revisions made to the EIS in response to comments. This step of the process will include public notice of document availability, the distribution of the document, and a 30-day waiting period on the final document. This step is anticipated to occur from November 2010 to February 2011.

The ROD issued by the Corps concludes the EIS process in February 2011. In their ROD, the Corps will identify the least environmentally damaging practicable alternative, based upon the technical analysis of the EIS and the public comments on the Draft EIS. The Corps in their

ROD will cite the rationale for their conclusions regarding the environmental effects and appropriate mitigation measures for the proposed Alaska Stand Alone Pipeline project.

5.0 CONTACTS

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APPENDIX A

Public Notices

DEPARTMENT OF DEFENSE

Department of the Army, Corps of Engineers

Intent To Prepare a Draft Environmental Impact Statement (DEIS) for the State of Alaska's Proposed Alaska Stand Alone Pipeline (ASAP) Natural Gas Transportation Pipeline

AGENCY: U.S. Army Corps of Engineers, DoD.

ACTION: Notice of Intent.

SUMMARY: The Alaska District, U.S. Army Corps of Engineers (Corps) intends to prepare a Draft Environmental Impact Statement (DEIS) to identify and analyze the potential impacts associated with the construction of the proposed Alaska Stand Alone Pipeline (ASAP) natural gas transportation pipeline. The Corps is the lead federal agency and the Bureau of Land Management (BLM), National Park Service (NPS) and Environmental Protection Agency (EPA) are participating as cooperating agencies in the DEIS development process. The Environmental Impact Statement (EIS) will be used as a basis for the Corps permit decision and to ensure compliance with the National Environmental Policy Act (NEPA). The Corps will be evaluating a permit application for work under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Because ASAP would require decisions and actions by other federal agencies (such as right-of-way grants and other permits), this DEIS will also fulfill the NEPA responsibilities of those federal agencies.

FOR FURTHER INFORMATION CONTACT: Questions about the proposed action and the DEIS can be answered by: Ms. Serena Sweet, Regulatory Division, telephone: (907) 753–2819, toll free in AK: (800) 478–2712, fax: (907) 753–5567, e-mail: *serena.e.sweet@usace.army.mil,* or mail: U.S. Army Corps of Engineers, CEPOA–RD, Post Office Box 6898, Elmendorf AFB, Alaska 99506–0898. Additional information may be obtained at *http://www.asapeis.com.*

SUPPLEMENTARY INFORMATION:

1. The permit applicant, the State of Alaska, is proposing to construct a 24-inch diameter, high-pressure pipeline from Alaska's North Slope to Cook Inlet to transport North Slope natural gas to in-state Alaska markets. The pipeline would be located entirely within the State of Alaska. Gas off-take would be provided for the Fairbanks Area and in other locations along the route. The Alaska Stand Alone Pipeline project includes a Gas Conditioning Plant on the North Slope prior to the pipeline inlet, compressor stations along the pipeline, and natural gas liquid (NGL) extraction facilities to produce utility-grade natural gas. The gas reserves in the Prudhoe Bay field are some of the largest on the North Slope and represent the most likely sources of gas for the pipeline system.

2. *Alternatives:* Two routing options are being considered to bring the gas from the North Slope to Alaska consumers. These two options follow routings from Prudhoe Bay to Cook Inlet via the Parks Highway and the Richardson Highway. Both route options share the same starting point at Prudhoe Bay and ending point (at Mile Post 55 of the Beluga Pipeline) as well as a common routing from Prudhoe Bay to the Livengood area. In addition, two spur line options and two pre-build options, using a proposed Alaska-Canada Gasline as the transport to the takeoff points will be included in this analysis.

a. *Stand Alone Alternative Routes:*

i. Parks Highway Stand Alone—from Prudhoe Bay to Livengood, then to Cook Inlet generally following the Parks Highway; includes service to Fairbanks.

ii. Richardson Highway Stand Alone—from Prudhoe Bay to Livengood, to Fairbanks, then generally following the Trans Alaska Pipeline alignment to Delta Junction, to north of Glennallen via the Richardson Highway, then to Cook Inlet via the Glenn Highway; includes service to Glennallen.

b. *Spur Alternative Routes:*

i. Parks Highway Spur—from Fairbanks to Cook Inlet generally following the Parks Highway.

ii. Richardson Highway Spur—from Delta Junction to north of Glennallen via the Richardson Highway, then to Cook Inlet via the Glenn Highway; includes service to Glennallen.

c. *Pre-Build Alternative Routes:*

i. Parks Highway Pre-Build—from Cook Inlet to Fairbanks generally following the Parks Highway.

ii. Richardson Highway Pre-Build—from Cook Inlet via the Glenn Highway to north of Glennallen then to Delta Junction via the Richardson Highway, then generally following the Trans Alaska Pipeline alignment to Fairbanks (with a smaller diameter pipeline).

d. *Gas Source Alternatives:*

i. *Prudhoe Bay Gas Source:* Natural gas from the Prudhoe Bay gas fields would require treatment at a gas treatment plant that would likely be located at Prudhoe Bay. From Prudhoe Bay the gas pipeline would generally follow the existing Trans Alaska Pipeline System (TAPS) corridor across the North Slope and enter the Brooks Range near Galbraith Lake.

ii. *Gubik Gas Source:* The Gubik Gas Field is located 19 miles east of Umiat and approximately 70 miles west of TAPS Pump Station #2. The pipeline from the Gubik Field would parallel a proposed road alignment to the east, crossing the Anaktuvuk River, and proceeding southeast to the Itkillik River. The route would then parallel the Itkillik River to the east side of Itigaknit Mountain then south to connect with the TAPS Corridor near Toolik Lake. The exact location of the Gubik production facilities has not been selected. The length of the Gubik Pipeline route to the TAPS corridor is estimated to be about 90 miles.

3. *Scoping Process:* The scoping period will begin on December 7, 2009, and end on February 5, 2010.

a. The Corps invites full public participation to promote open communication on the issues surrounding the proposal. All federal, state, Tribal, local agencies, and other persons or organizations that have an interest are urged to participate in the NEPA scoping process. Scoping meetings will be held to receive public input on the proposed purpose and need of the project, to identify significant issues and to discuss proposed alternatives. The scoping process will help to further explain the purpose and need plus the alternatives to be reviewed in the DEIS.

b. The scoping meetings are tentatively planned for the dates and locations listed at *http://www.asapeis.com* (please consult website for any changes and additional information including the scoping summary). The Corps expects to hold scoping meetings in Anchorage, Barrow, Delta Junction, Fairbanks, Glennallen, McKinley Park, Nenana, and Wasilla.

4. The lands along the proposed pipeline corridor and one or more of its alternatives are owned by numerous entities; including, federal and state governments, the State of Alaska, and private land holders. These federal land managers include the BLM, NPS and the Department of Defense. Private landholders include Native corporations, Native allottees, and land owned by other private individuals.

5. The DEIS will analyze the potential social, economic, and environmental impacts to the affected areas. The following major issues will be analyzed in depth in the DEIS: the natural gas delivery system construction and operation and its affect upon the surrounding communities; essential fish

habitat; threatened and endangered species including critical habitat; cultural resources; socioeconomics; and secondary and cumulative impacts.

6. It is anticipated that the DEIS will be available August 2010 for public review.

Dated: November 23, 2009.

Serena E. Sweet,

Project Manager, Alaska District, U.S. Army Corps of Engineers.

[FR Doc. E9–28865 Filed 12–3–09; 8:45 am]

BILLING CODE 3720–58–P

DEPARTMENT OF DEFENSE

Department of the Army, Corps of Engineers

Intent To Prepare a Draft Environmental Impact Statement (DEIS) for the Proposed Point Thomson Project To Develop the Thomson Sand Reservoir by Extracting Gas Condensate and Oil for the Purpose of Commercial Production as Proposed by the Exxon Mobil Corporation (ExxonMobil)

AGENCY: U.S. Army Corps of Engineers, DoD.

ACTION: Notice of Intent.

SUMMARY: The Alaska District, U.S. Army Corps of Engineers (Corps) intends to prepare a Draft Environmental Impact Statement (DEIS) to identify and analyze the potential impacts associated with the development of the Thomson Sand Reservoir, including construction and operation of the proposed project. The Corps will be evaluating a permit application for work under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. The Environmental Impact Statement (EIS) will be used as a basis for the permit decision and to ensure compliance with the National Environmental Policy Act.

FOR FURTHER INFORMATION CONTACT: Questions about the proposed action and the DEIS can be answered by: Ms. Julie McKim, Regulatory Division, telephone: (907) 753–2773, toll free in AK: (800) 478–2712, Fax: (907) 753–5567, e-mail: *julie.w.mckim@usace.army.mil,* mail: U.S. Army Corps of Engineers, CEPOA–RD, Post Office Box 6898, Elmendorf AFB, Alaska 99506–0898. Additional information may be obtained at *http://www.pointthomsonprojecteis.com.*

SUPPLEMENTARY INFORMATION:

1. *Background Information:* The Environmental Protection Agency (EPA) previously issued a notice of intent to prepare a DEIS on April 19, 2002 for a similar proposal to develop oil and gas reserves in or near the Point Thomson Unit, potentially including designation of ocean dredged material disposal site(s). The EPA was the lead Federal Agency because the proposed project would have required authorization under Section 102 of the Marine Protection, Research, and Sanctuaries Act (MPRSA), with the Corps as a Cooperating Agency. Per the applicant's request, the agreement to pursue the EIS was terminated between the EPA and the applicant, Exxon Mobil Corporation (ExxonMobil). In October 2009, ExxonMobil submitted a new proposed project that would not be subject to Section 102 of the MPRSA but would require authorization from the Corps under Section 10 of the Rivers Harbors Act of 1899 and Section 404 of the Clean Water Act. Therefore, the Corps has been designated the lead Federal agency for the revised proposed project.

2. The permit applicant, ExxonMobil, is proposing to develop the Thomson Sand Reservoir located approximately 60 miles east of Deadhorse on the Beaufort Sea coast, in the State of Alaska. A minimum of five wells would be drilled from three pads: a Central Pad, and East and West Pads located to access the eastern and western extent of the reservoir. The applicant would produce gas from the reservoir to recover liquid condensate from natural gas and re-inject the residual gas back into the reservoir, conserving it for future use. Hydrocarbon liquid condenses from the produced natural gas when pressure and temperature are lowered below original reservoir conditions during production at surface processing facilities. ExxonMobil proposes to develop offshore portions of the reservoir using long reach directional drilling techniques from the onshore pads. The produced hydrocarbon liquids (condensate and oil) would be shipped through a new 22-mile long, elevated pipeline from Point Thomson to the existing Badami Development. This pipeline would then tie into the existing Badami common carrier pipeline, which connects with the existing common carrier oil sales pipeline system to the Trans-Alaska Pipeline System Pump Station No. 1. The Central Pad would also include infrastructure to support operations and drilling, such as temporary construction and permanent camps; offices, warehouses, and shops; electric power generating and distribution facilities; diesel fuel, water, and chemical storage; treatment systems for drinking water and wastewater; a grind and inject module; waste management facilities; and communications facilities. Other project facilities, in addition to the drilling pads, would include a gravel airstrip, a bulkhead and dolphins, in-field gravel roads, ice roads, in-field pipelines, and a gravel mine. Dredging may be required at the bulkhead.

3. *Alternatives:* Reasonable alternatives will be identified and evaluated throughout the Scoping and EIS process.

4. *Scoping:* The scoping period will begin on January 11, 2010 and end on February 25, 2010.

a. The Corps invites full public participation to promote open communication on the issues surrounding the proposal. All Federal, State, Tribal, local agencies, and other persons or organizations that have an interest are urged to participate in the NEPA scoping process. Meetings will be held to receive public input on the proposed purpose and need of the project, to identify significant issues and to discuss proposed alternatives. The scoping process will help to further explain the purpose and need plus the alternatives to be reviewed in the DEIS.

b. The DEIS will analyze the potential social, economic, physical, and biological impacts to the affected areas. The following major issues will be analyzed in depth in the DEIS: threatened and endangered species including critical habitat; hydrology and wetlands; fish and wildlife; the construction and operation of the facilities and their effect upon the surrounding communities; cultural resources; socioeconomics; alternatives; secondary and cumulative impacts.

c. The Corps will serve as the lead Federal agency in the preparation of the DEIS. The Environmental Protection Agency, United States Fish and Wildlife Service, and State of Alaska Department of Natural Resources are participating as cooperating agencies.

5. The Corps expects to hold scoping meetings in Anchorage, Barrow, Fairbanks, Kaktovik, and Nuiqsut. Further information about these meetings will be published locally, on the project Web site *http://www.pointthomsonprojecteis.com,* or can be obtained by contacting the Corps as described above. A description of the proposed project will be posted on the project Web site prior to these meetings to help the public focus their scoping comments.

6. It is anticipated that the DEIS will be available November 2010 for public review.

Dated: November 23, 2009.

US Army Corps of Engineers Alaska District

Regulatory Division (1145)
CEPOA-RD
Post Office Box 6898
Elmendorf AFB, Alaska 99506-0898

Public Notice for Environmental Impact Statement

PUBLIC NOTICE DATE: **December 4, 2009**

REFERENCE NUMBER: **POA-2009-651**

The Alaska District, U.S. Army Corps of Engineers (Corps) intends to prepare a Draft Environmental Impact Statement (DEIS) to identify and analyze the potential impacts associated with the construction of the proposed Alaska Stand Alone Pipeline (ASAP) natural gas transportation project.

The Corps is the lead federal agency and the Bureau of Land Management (BLM), National Park Service (NPS) and Environmental Protection Agency (EPA) are participating as a cooperating agency in the DEIS development process.

The DEIS will be used as a basis for the permit decision and to ensure compliance with the National Environment Policy Act (NEPA). The Corps will be evaluating a permit application for work under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Because ASAP would require decisions and actions by other federal agencies (such as right-of-way grants and other permits), this DEIS will also fulfill the NEPA responsibilities of those federal agencies.

The project would consist of a small diameter, high-pressure pipeline from Prudhoe Bay to Cook Inlet to transport North Slope natural gas to in-state Alaska markets. The pipeline would be located entirely within the State of Alaska with gas takeoff points proposed along the route, including Fairbanks. The Stand Alone Pipeline project would include a gas conditioning plant on the North Slope prior to the pipeline inlet, compressor stations along the pipeline, and natural gas liquid (NGL) extraction facilities to produce utility grade natural gas.

The EIS scoping period will begin on December 7, 2009, and end on February 5, 2010. The scoping meetings are tentatively planned for the dates and locations listed at www.asapeis.com (please consult website for any changes and additional information including the scoping summary). The Corps expects to hold scoping meetings in Anchorage, Barrow, Delta Junction, Fairbanks, Glennallen, McKinley Park, Nenana, and Wasilla.

FOR FURTHER INFORMATION CONTACT: Questions about the proposed action and the DEIS can be answered by: Ms. Serena Sweet, Regulatory Division, telephone: (907) 753-2819, toll free in AK: (800) 478-2712, fax: (907) 753-5567, email: serena.e.sweet@usace.army.mil, or mail: U.S. Army Corps of Engineers, CEPOA-RD, Post Office Box 6898, Elmendorf AFB, Alaska 99506-0898. Additional information may be obtained at www.asapeis.com.

NOTICE TO POSTMASTERS: Please post continuously until February 4, 2010.

District Engineer
U.S. Army, Corps of Engineers

US Army Corps
of Engineers
Alaska District

Regulatory Division (1145)
CEPOA-RD
Post Office Box 6898
Elmendorf AFB, Alaska 99506-0898

Public Notice for Environmental Impact Statement

PUBLIC NOTICE DATE: **February 5, 2010**

REFERENCE NUMBER: **POA-2009-651**

*****PUBLIC NOTICE REVISION*****

On December 4, 2009, a Public Notice was distributed stating that the Alaska District, U.S. Army Corps of Engineers (Corps) intends to prepare a Draft Environmental Impact Statement (DEIS) to identify and analyze the potential impacts associated with the construction of the proposed Alaska Stand Alone Pipeline (ASAP) natural gas transportation project. In that notice, the Corps stated that the scoping period would end on February 5, 2010. **In response to several requests, the Alaska District has decided to extend the scoping period to March 8, 2010.**

FOR FURTHER INFORMATION CONTACT: Questions about the proposed action and the DEIS can be answered by: Ms. Serena Sweet, Regulatory Division, telephone: (907) 753-2819, toll free in AK: (800) 478-2712, fax: (907) 753-5567, email: serena.e.sweet@usace.army.mil, or mail: U.S. Army Corps of Engineers, CEPOA-RD, Post Office Box 6898, Elmendorf AFB, Alaska 99506-0898. Additional information may be obtained at www.asapeis.com.

NOTICE TO POSTMASTERS: Please post continuously until **March 8, 2010.**

District Engineer
U.S. Army, Corps of Engineers

APPENDIX B

Media Advertisements

Media Advertisements

December 2009

Tanana Valley Meats in Trouble over Moose Processing

FAIRBANKS, Alaska (AP) – Alaska State Troopers in Fairbanks have received numerous complaints from hunters who took their moose, caribou and sheep meat to Tanana Valley Meats to be processed, said Sgt. Scott Quist with Alaska Wildlife Troopers in Fairbanks.

``We talked to the (Department of Environmental Conservation) about it at length about a month ago, and we recently got a new rash of complaints about people getting rotten meat back or no meat back at all," said Quist.

The state Department of Environmental Conservation visited the plant on two occasions in response to complaints, one from troopers and one from a customer, but didn't issue any citations.

``We went out and did a pretty extensive investigation to the extent that any (game meat) products may have impacted products in the part of plant we regulate," said Lorinda Lhotka, an environmental health officer with DEC in Fairbanks. ``We had to work with them on some storage issues and notified the USDA of those issues."

While the slaughtering of domestic livestock is highly regulated by the DEC and USDA, wild game meat processing doesn't fall under the authority of any state or federal agency.

The state's wanton waste law applies to hunters who salvage meat from animals, not processors who cut it up, Quist said.

The DEC regulates sanitary conditions in relation to how commercial meat is stored and sold.

``We don't have clear regulatory authorities to regulate custom processing for game submitted by hunters," said Ron Klein, food safety and sanitation program manager for the DEC in Anchorage. ``There is no agency that does that. It really is a gray area."

With game animals, nobody except the hunter has any control how an animal is butchered or handled in the field, he said. ``Those issues make it difficult for us to regulate game meat processing," he said. ``Whether the state should be doing that or not is a policy decision for public or the legislature to make."

The USDA's Food Safety Inspection Service oversees the slaughtering and processing of animals at processing plants, but it does not have jurisdiction over wild game unless it's affecting the facility's USDA requirements, said Mark Aherns with the USDA in Anchorage. Aherns would not confirm or deny the USDA had received any complaints about Tanana Valley Meats.

Tanana Valley Meats manager and head meat cutter Stacy Hansen, as well as plant president Scott Miller, acknowledge mistakes were made in the plant's game processing this fall, and Miller said he is ``trying to make it right" with dissatisfied customers.

The problem, both men said, was that the plant got overwhelmed with moose in September and didn't have enough meat cutters to deal with it. Hansen doesn't know how many moose they took in but figures it was more than 200.

Tanana Valley Meats has gone through a tumultuous few years. Started as B-Y Farms in 1989, the plant was purchased by a group of local investors in 2007 when the original owners, Bob and Yvonne Franklin, went out of business.

The slaughterhouse operated without a USDA certificate for nearly two years, doing custom processing, before finally regaining its USDA certification in June.

Information from: Fairbanks Daily News-Miner, http://www.newsminer.com move gradually toward running the count pretty much the same way each year, even with the same people counting the same areas,"

area. Feeder counters count the largest number of birds for each species seen together at the feeder

or dessert to share.

Contact outdoors editor Tim Mowry at 459-7587.

South Fairbanks — Ken Rus
gov

White Mountains caribou hunt closes at

By TIM MOWRY
tmowry@newsminer.com

With the average harvest running at one caribou per day, the Alaska Department of Fish and Game announced the state and federal winter registration permit hunts for the White Mountains Caribou Herd in game management units 20B, 20F and 25C will close today at 11:59 p.m.

The harvest quota for the hunt is 11 caribou and hunters had reported a harvest of eight caribou as of Tuesday, an average of one a day. The hunt opened on Dec. 1.

"Weather has been fairly mild, the harvest has been steady, and we expect the quota to be reached by Thursday," Fairbanks assistant area biologist Tom Seaton with the Alaska Department of Fish and Game said.

The below-average snowfall didn't seem to prevent hunters from finding animals on snowmachines and four-wheelers.

"Snow depths are low so far this winter, but hunters have been able to access caribou," Seaton said. "Mostly they're getting them from the Steese Highway with highway vehicles. Most of the (kills) are real close to the Steese."

At around just 750 animals, the White Mountains herd is relatively small. It supports an annual harvest quota of 23 caribou, which is divided into a fall general hunt for any bull and a winter registration permit hunt for any caribou. Hunters killed 12 caribou in the fall hunt, leaving 11 for the winter hunt, Seaton said.

The winter hunt usually lasts most of the winter but Seaton suspects there are some stragglers from the larger Fortymile Caribou Herd in the White Mountains hunt area that hunters are taking. There's no way to tell the difference between the

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Seaton said.
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Hover over or click on event below for complete information

Public Scoping Meeting

Description: Alaska Stand Alone Pipeline
Environmental Impact Statement

The U.S. Army Corps of Engineers, with participation by the Bureau of Land Management, the Environmental Protection Agency, and the National Park Service as cooperating agencies, invite the public to an open house and scoping meeting. An Environmental Impact Statement (EIS) is being prepared to analyze the construction of the Alaska Stand Alone Pipeline proposed by the Alaska Department of Natural Resources.

The public scoping meeting provides an opportunity to express your views and identify issues to address in the EIS process. The meeting will include background information on the Alaska Stand Alone Pipeline and the process of preparing an EIS.

Visit the project website for more information: www.asapeis.com.

Delta Junction Meeting
December 9, 2009
5:00 - 6:00 pm: Open House
6:00 - 6:30 pm: Presentation
6:30 - 8:00 pm: Public Questions and Comments
Delta Junction Community Center; 2287 Deborah Street

Location: Delta Junction Community Center; 2287 Deborah Street
Date: Wednesday, December 9, 2009
Time: 5:00pm-8:00pm AKST
Duration: 3 hours
Created by: Kacy Hillman
Updated: Wednesday, December 2, 2009 9:09pm GMT

PO Box 609 Delta Junction, AK 99737-0609
Tel. 907/895-4919
webeditor@deltanewsweb.com

Delta Wind

December 09, 2009 Delta Junction, Alaska

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Public Scoping Meeting

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12/07/09

Public Scoping Meeting Alaska Stand Alone Pipeline Environmental Impact Statement The U.S. Army Corps of Engineers, with participation by the Bureau of Land Management, the Environmental Protection Agency, and the National Park Service as cooperating agencies, invite the public to an open house and scoping meeting. An Environmental Impact Statement (EIS) is being prepared to analyze the construction of the Alaska Stand Alone Pipeline proposed by the Alaska Department of Natural Resources. The public scoping meeting provides an opportunity to express your views and identify issues to address in the EIS process. The meeting will include background information on the Alaska Stand Alone Pipeline and the process of preparing an EIS. Visit the project website for more information: www.asapeis.com. Delta Junction Meeting December 9, 2009 5:00 - 6:00 pm: Open House 6:00 - 6:30 pm: Presentation 6:30 - 8:00 pm: Public Questions and Comments Delta Junction Community Center; 2287 Deborah Street

FALL OF AMERICA

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11/30/09

AND THE WESTERN WORLD. You are invited to come and see this nine part series, a critical analysis of the ongoing destruction of our political and economic free market system. Twelve world class experts from government, journalism, and politics discuss the final outcome: world government. THE REMNANT ROOM at M.P. 273.5 Richardson Hwy. hosts this movie and informal round-table on Friday and Saturdays at 6 pm and Sunday at 3 pm.

CITY COUNCIL MINUTES

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09/07/09

The minutes of the Delta Junction City Council meetings can be read at www.ci.delta-junction.ak.us. or copies can be requested from City Hall at 895-4656.

LEPC MINUTES AVAILABLE

Save this Ad

09/07/09

The minutes of the most recent Delta Greely Local Emergency Planning Committee meeting can be read at www.ci.delta-junction.ak.us/lepc/index.htm. LEPC meetings are the second Tuesday of even-numbered months at 6 pm in the old fire station. Call 895-4656 for more information.

Alcoholics Anonymous

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09/07/09

meets Mondays and Thursdays at 7 pm in the Presbyterian/Lutheran Church. Call 895-5260 or 895-4400

Emotions Anonymous

Save this Ad

09/07/09

Tuesdays 7-8 pm for men and women. Meetings held at cabin at Delta Concrete. For more information call Tena Walker 590-0776 or 895-5401.

Women's recovery

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09/07/09

meeting each Tuesday 6-7 pm at a cabin at Delta Concrete. For more information call Tena Walker at 590-0776 or 895-5401

ATTENTION NON-PROFITS

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09/07/09

HIGH SCHOOL VOLLEYBALL

Point Hope puts it into overdrive for No. 5

Four-set victory over Golovin secures title

VAN WILLIAMS
vwilliams@alaskanewspapers.com

Raymond Koenig came up big when his team needed him most, and as a result, he and the rest of the Point Hope coed volleyball players are celebrating another championship.

Koenig was named the match MVP to key a 26-28, 25-18, 25-14, 25-16 victory over Golovin in the title tilt of the ASAA Mixed Six Volleyball State Tournament in Anchorage.

Point Hope has a 5-1 all-time record in the championship match, winning in 2009, 2008, 2006, 2005, 2001).

Koenig and teammate George Vincent were both selected to the all-tournament team.

Vincent played a big role in helping the Arctic Conference champions avoid disaster in the first round, overcoming an early deficit to pull out a thrilling 27-25, 22-25, 17-25, 25-16, 15-11 win over Unalakleet.

Point Hope then beat Southwest champion Newhalen in the semifinals to reach the championship match.

In the ASAA Class 1A-2A state tournament also held at Dimond High School, Klawock beat Skagway in the championship match between two Southeast teams.

Above: Robert Moses Jr. (31) of Golovin returns the ball to waiting Noatak Lynx defenders Ezra Adams (5), Brett Kirk (21) and Brianna Kirk (13).

Right: Tikigaq's Heather Minix digs in to return a ball.

ASAA mixed-six volleyball state tournament

At Dimond High, Anchorage

Championship

Point Hope def. Golovin, 26-28, 25-18, 25-14, 25-16. Match MVPs – Raymond Koenig, Point Hope; Frank Amaktoolik Jr., Golovin.

Third place

Newhalen def. Kwethluk, 18-25, 25-18, 25-18, 25-19. Match MVPs – Matthew Askoak, Newhalen; Carlton Hautala, Kwethluk

Fourth place

Unalakleet def. Noatak, 25-15, 14-25, 25-18, 25-23. Match MVPs – Pete Katongan, Unalakleet; Fred Luther Jr., Noatak

All-Tournament Players

Shralyn Sockpealuk, Golovin; Matthew Akoak, Newhalen; Fred Luther Jr., Noatak; Katiya Erickson, Unalakleet; Freddi Wassillie, Newhalen; Joshua Sergie, Kwethluk; Tammy Papp, Marshall; George Vincent, Point Hope; Pete Katongan, Unalakleet; Bruce Morgan, Russian Mission; Raymond Koenig, Point Hope; Frank Amaktoolik Jr., Golovin.

Awards

Server – Pete Katongan, Unalakleet. Setter – Katiya Erickson, Unalakleet. Hitter – Frank Amaktoolik, Golovin. Defense – Robert Moses Jr., Golovin.

ASAA Class 1A/2A Volleyball State Tournament

At Dimond High, Anchorage

Championship

Klawock def. Skagway, 25-25, 25-19, 25-23. Match MVPs – Tess Larson, Klawock; Elis Doland, Skagway.

Third place

Kalskag def. Koliganek, 25-20, 25-17, 25-13. Match MVPs – Sophia Levi, Kalskag; Brianna Nelson, Koliganek.

Fourth place

Kenny Lake def. Tok, 25-19, 25-14, 19-25, 25-22. Match MVPs – Hannah Rosenkrans, Kenny Lake; Jaycee Peet, Tok.

All-tournament players

Chelsey Kasayulie, Koliganek; Tori Carl, Klawock; Cassie Fefelov, Ninilchik; Reid Goneau, Tok; Sarah O'Leary, Seldovia; Ariel Ramadanovic, Kalskag; Brianna Nelson, Koliganek; Hannah Rosenkrans, Kenny Lake; Elise Doland, Skagway; Patricia Holmber, Kalskag; Tess Larson, Klawock; Jesse Ellis, Skagway.

Awards

Server – Elise Doland, Skagway. Setter – Rebecca Armour, Klawock. Hitter – Ariel Romadanovic, Kalskag. Defense – Hannah Rosenkrans, Kenny Lake.

datebook49

Alaska Stand Alone Pipeline, Environmental Impact Statement, Public Scoping Meeting

WHEN Monday, December 14, 2009, 5 – 8pm

WHERE Anchorage Senior Center, 1300 East 19th Avenue

EVENT TYPE Community

NOTE The U.S. Army Corps of Engineers, with participation by the Bureau of Land Management, the Environmental Protection Agency, and the National Park Service as cooperating agencies, invite the public to an open house and scoping meeting. An Environmental Impact Statement (EIS) is being prepared to analyze the construction of the Alaska Stand Alone Pipeline proposed by the Alaska Department of Natural Resources.

The public scoping meeting provides an opportunity to express your views and identify issues to address in the EIS process. The meeting will include background information on the Alaska Stand Alone Pipeline and the process of preparing an EIS.

Visit the project website for more information: www.asapeis.com.

Anchorage Meeting
December 14, 2009
5:00 - 6:00 pm: Open House
6:00 - 6:30 pm: Presentation
6:30 - 8:00 pm: Questions and Comments

Cookies and coffee will be served. Please come join us!

LINK www.asapeis.com

Printed: Wednesday, December 16, 2009 at 11:39 AM PST

Media Advertisements

January 2010

Anchorage Daily News

26° 29° | 18°
forecast | statewide
Daylight : 9:52 AM - 4:30 PM

Escort tugs rescue drifting oil tanker

An Exxon tanker carrying more than 25 million gallons of Alaska crude oil lost power early Sunday while leaving Prince William Sound and had to be towed to safety, the U.S. Coast Guard said. 7:36 AM

High oil prices open funding doors for Alaska Legislature

Alaska lawmakers are going into the 2010 legislative session planning to spend more money on hometown projects, possibly cover college tuition and consider what to do about the high cost of energy.

Lawmakers reconsider oil taxes

Exxon spill oil persistence may be explained by new study

For nearly a decade, scientists have puzzled over the persistence of oil from the Exxon Valdez oil spill. A pair of Lower 48 researchers on Sunday published the first study to attempt an explanation.

Exxon Valdez background

Kotzebue musher Baker pulls away to win Kuskokwim 300

John Baker of Kotzebue beat the elements and a pair of Iditarod champions, breaking away from Lance Mackey and Martin Buser early Sunday and cruising to victory in the Kuskokwim 300 sled dog race.

Bands play, crowds gather to help wounded policeman

An empty beer pitcher labeled "donations" sat on the wooden bar and rock music shook the walls Sunday night at Chilkoot Charlie's as a local bands performed a five-hour benefit concert for the Anchorage police officer shot Jan. 9.

Law-enforcement agencies join investigation of officer shooting

Troops with the 82nd Airborne Division distribute water in Port-au-Prince.

Chaos overwhelms Haiti as aid effort falters

Prayers of thanksgiving and cries for help rose from Haiti's huddled homeless Sunday, the sixth day of an epic humanitarian crisis that is straining the world's ability to respond and igniting flare-ups of violence amid the rubble of Port-au-Prince.

Photos: The situation in Haiti Sunday

Under the rubble, a few are still alive

Photos Video Featured Reader-submitted Most popular +

Photos: Alyeska's halfpipe

Skiers and snowboarders dropped into Alyeska's new Super Pipe to warm up and compete in the Alyeska Pipeline Masters competition.

Photos: Crystal Gallery

Blocks of ice are brought to life as ice carvers create shapes of all kinds in downtown Anchorage's Crystal Gallery of Ice Carving.

Top Jobs

all 79 top jobs

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Item Processing Specialist
Northrim Bank

Health Care Services
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Southcentral Foundation

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Mill Manager
Coeur Alaska

Executive/Professional
Technology Manager
Kodiak Island Borough School District

News

Anchorage | Mat-Su | Crime | Politics More +

Navy defends sonar training in Gulf of Alaska

Environmentalists are speaking out against Navy plans to train with sonar in the Gulf of Alaska.

Martin Luther King Jr. Day closures

Under pay pressure, Juneau will lay off 10

Politics

Ramras wants constitutional amendment on gas pipeline tax

Palin lands VIP gig at NASCAR's Daytona 500 with other celebs

Alaska Ear

COLUMN
Julia O'Malley

Alaska life, one story at a time.

RURAL BLOG
The Village

Blogging about life and politics in rural Alaska.

Photos: Life in the Bush

Alaska Newsreader

More +

Midtown Anchorage grocery catering to Muslims is Alaska's first

Anchorage is now home to nearly 4,000 Muslims, and in December, Lamin Jobarteh left his career as a business banker to open Alaska Halal Grocery on International Airport Road near C Street.

Vandals wreck 'wannabe Eskimo's' igloo in England 9:02 AM

When built-in antifreeze beats a winter coat 9:58 AM

Aleut baidarka to circumnavigate Puget Sound waters 9:50 AM

Even hardiest Fairbanksans set limits for cold

Reid confronts Murkowski over attack on EPA

Multimedia

Homes By Prudential

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2629 Puffin Point
Home is a delight w/soaring ceilings wall of windows, fresh paint new carpet remodeled bathrooms new doors hardware & lighting 3 bdr, 2.5 ba.

◀ 9 of 9 ▶

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****February 4**
Deadline for comments on the draft Environmental Assessment (EA) for the proposed **EXTENSION FOR THE TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT (ANC) RUNWAY 7R** that includes extending the runway 1,500 feet to the west. For more information, go to www.anc7Rrunwayextensionproject.net. For more information, contact Gary Lincoln at 907-269-0606 or Julianne Hanson at 907-269-0473.

****February 4**
Comments are due on an application for amendment of **AN OIL DISCHARGE PREVENTION AND CONTINGENCY PLAN** from Alaska Tanker Company, LLC, BP Oil Shipping Company, USA, Chevron Shipping Company, LLC, Polar Tankers, Inc., SeaRiver Maritime, Inc., and Tesoro Alaska Company. The plan holders propose amending the approved plans which allow the applicants to conduct oil transfer operations using tank vessels to transport crude oil from the Valdez Marine Terminal, commonly known as TAPS Trade Vessels. The shipping vessels carry a maximum of 1,484,829 barrels of crude oil while in State waters. An oil discharge prevention and contingency plan is required that will commit adequate resources to plan for containment, control, and cleanup of crude oil equal to the discharge response planning standard volumes for these vessels. The review document consists of amendments to the Prince William Sound Tanker Oil Discharge Prevention and Contingency Plan (Core Plan) and the Ship Escort Response Vessel Service (SERVS) Technical Manual submitted December 21, 2009. Copies of the amendment application are available for review at the Alaska Department of Environmental Conservation Anchorage office located at 555 Cordova Street (please call (907) 269-3094 to schedule an appointment); the public libraries in Cordova, Homer, Kenai, Kodiak, Seward and Valdez; the Whittier Harbor Master's office; and the Loussac Public Library in Anchorage. For more information or to submit comments, contact John Kotula at john.kotula@alaska.gov or Fax 907-835-2429.

****February 5**
Deadline for response to **THE ALASKA CENTER FOR OCEAN SCIENCE EDUCATION EXCELLENCE** (COSEE) and the **INTERNATIONAL ARCTIC RESEARCH CENTER** (IARC) a **SURVEY OF ALASKAN TEACHER NEEDS** for resources and training to teach about climate change and marine environments in Alaska. If you are an Alaskan teacher, please fill out a short survey to inform them about what you are doing now and your highest needs for additional resources and training. To take the survey, please click on this link: http://www.surveymonkey.com/s/T3MQZNT. For more information about the survey,
contact Marilyn Sigman msigman@alaska.edu.

****February 5**
Deadline for scoping comments for the **ALASKA STAND ALONE PIPELINE (ASAP) ENVIRONMENTAL IMPACT STATEMENT (EIS**). Comments can be submitted easily at the ASAP EIS website at: www.asapeis.com. The website also includes links to project documents, maps and the EIS schedule. For more information contact Serena Sweet by mail at U.S. Army Corps of Engineers, CEPOA-RD, P.O. Box 6898, Elmendorf AFB, AK, 99506-0898; or by fax at 907-753-5567.

Back to top

EVENTS & MEETINGS - ANCHORAGE - EAGLE RIVER & GIRDWOOD

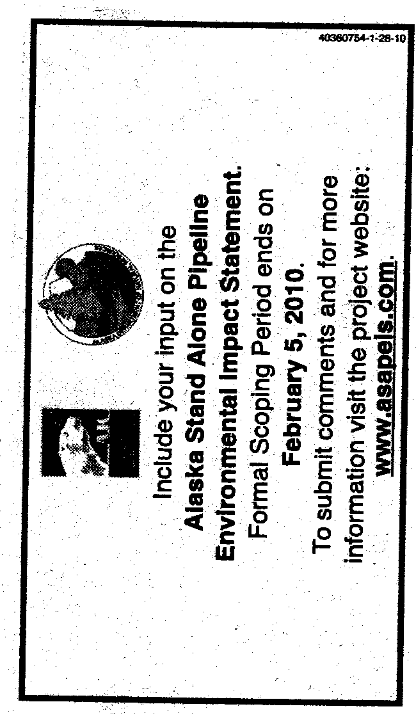
January 22
OUTDOOR RECREATIONAL TRAILS ADVISORY BOARD (ORTAB) will meet from 8;30 to 4:30 in Suite 240, Atwood Building. ORTAB consists of nine members that are regionally selected from areas across Alaska. The primary purpose of the group is to advise the Division of Parks and Outdoor Recreation Director, James King on funding for eligible grant projects under the Recreational Trail Grant Program, the Land & Water Conservation Fund and the Alaska Trails Initiative. Grant funds are used to support trail development and maintenance projects, as well as safety and education programs. Agenda: Recommend funding for the 2010 Recreation Trail Grant Program. Public participation is welcome. For more information, go to http://www.alaskastatetrails.org/ or contact Bill Luck at 269-8699.

****January 23**
GIRDWOOD - **SUSTAINABLE GIRDWOOD FUNDRAISER** will be held from 7 to 9pm hosted by the new Babes in the Woods Art Gallery, along the boardwalk at the Sitzmark Building (109 & 111 Olympic Mountain Loop—the old Java Haus location). The event features musical guest "DJ Militant," and light food and beverage will be provided. There is a $3.00 suggested door donation, but you are welcome even if penniless! The door donation and a portion of any art sales will go to support Sustainable Girdwood's Produce Consumption Survey. If you bring an earth friendly, reusable shopping bag, you will get 10% off your purchase. For more information, contact Evan Cutler at (907) 783-3826 or email EvanAlaska@aol.com.

****January 23**
CRUDE AWAKENING will be shown at 8pm at Organic Oasis, 2610 Spenard Road. Award-winning filmmakers **BASIL GELPKE** and **RAY MCCORMACK** examine the world's dependency on oil and the impending chaos that's sure to follow when the resource is dry in this straight-from-the-headlines

AFFIDAVIT OF PUBLICATION

UNITED STATES OF AMERICA
STATE OF ALASKA } SS.
FOURTH DISTRICT



Before me, the undersigned, a notary public, this day personally appeared Marena Burnell, who, being first duly sworn, according to law, says that he/she is an Advertising Clerk of the Fairbanks Daily News-Miner, a newspaper (i) published in newspaper format, (ii) distributed daily more than 50 weeks per year, (iii) with a total circulation of more than 500 and more than 10% of the population of the Fourth Judicial District, (iv) holding a second class mailing permit from the United States Postal Service, (v) not published primarily to distribute advertising, and (vi) not intended for a particular professional or occupational group. The advertisement which is attached is a true copy of the advertisement published in said paper on the following day(s):

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1/22/10 1/23/10 1/27/10 1/28/10

NAT RESOURCE GROUP

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and that the rate charged thereon is not excess of the rate charged private individuals, with the usual discounts.

Subscribed and sworn to before me on this 31 day of January, 2010

Notary Public in and for the State Alaska.

My commission expires June 3, 2013

ALLISON DONOVAN
NOTARY PUBLIC
My Commission Expires June 3, 2013
STATE OF ALASKA

Delta's newest stylist offers unique services

By MICHELE TRAINOR
Delta Wind

A new hairdresser is in town, and she is busy cutting, styling, and coloring the hair of Delta area residents. Theo Davis, who grew up in Delta Junction, came back to Delta in August and shortly thereafter set up shop.

"We came back just in time for my boys to start school," smiled Davis. "We arrived in Delta the day before school started."

Davis spent the last seven years in Utah working as a hair stylist. However, as her family still resided in Delta Junction, she made the decision to return. In December she formally opened her business, Theo's Salon, in the Jarvis West Building. Theo also offers microdermabrasion, chemical peels, eyelash extensions, brow and lash tints, lash perms, hair extensions, manicures, and pedicures.

"I enjoy doing a variety of things," said Davis. "It keeps me from becoming stagnated, and I like to keep abreast of new styles and trends."

"Theo is fun, has a great imagination and is always ready to try out new, fresh ideas," said client Anne Marie Mills, who was at the salon getting a completely new hairstyle. "She isn't afraid to tell you what looks good, what doesn't, and is always willing to try something new and different. I love it!"

Theo's Salon is open Tuesday through Saturday from 10 a.m. to 6 p.m. and Mondays by appointment only.

She can be reached at 895-5004.

Photo by Michele Trainor

Following a cut and color, Theo Davis, owner of Theo's Salon, puts the finishing ... hair.

Fair looking for 2010 theme

Attention all budding artists and creative minds. The Deltana Fair Association is in need of a logo and theme for the 2010 fair. Grab a pencil and sheet of paper and start doodling.

Here are a few pointers to remember as you design your award-winning logo. It should be easily reproduced in black and white; however, an additional color version is a plus. It should be readable when reduced in size. While the theme and design rests upon your gifted shoulders, the fair pennant, the words "Deltana Fair, Delta Junction, Alaska, July 30-August 1, 2010" should be incorporated in the logo.

Still need some inspiration or a few good ideas to get started? Visit www.deltanafair.com for past themes and logos.

Mail entries to Deltana Fair Association, P.O. Box 408, Delta Junction, Alaska 99737 or email them to info@deltanafair.com. For more information, contact fair manager Eileen Williams at 895-9870. Entries are due by February 15.

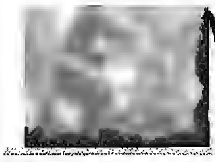
Become a Deltana Fair fan - on Facebook. In just three days, over 100 fans have joined the Deltana Fair. As we continue to grow, you too can become a fan, post your favorite pictures, connect with other fans, and make suggestions as we plan this year's exciting events.

Anyone interested in becoming involved in the fair is encouraged to attend the annual membership meeting scheduled for February 4 at 5:30 p.m. in the Jarvis West building.

Three board seats are up for election: one 1-year seat, one 2-year seat, and one 3-year seat. Current board members will vote to fill these openings during the annual meeting. Don't miss your opportunity to join the board.

Individual Deltana Fair memberships cost $25 per year and include one 3-day adult pass to the fair and one vote at the general membership meeting.

See FAIR, page 20



Who's Driving?

by Mary Odden

We Still Don't 'Get It'

How discouraging to read in the Anchorage Daily News this morning that Martin Luther King's "I Have a Dream" speech was a "rallying cry for black Americans and a classic of world oratory."

Really? Is that all? Just for black people? Just oratory?

I thought it was for everybody.

I listened to a talk by Rudolpho Anaya one time that made me cry, though the latter is in itself not much of an accomplishment.

Anaya, a Hispanic man born in New Mexico in 1937 who never spoke or read or wrote English until he went to school, has written a roomful of beautiful books – novels, children's books, non-fiction, anthologies, poetry, and plays. He said the great civil-war era poet Walt Whitman made him want to be a writer and gave him his first generous understanding of America – its endless varieties and its inclusiveness.

Anaya was discouraged to be told – often throughout his career, he said – that Whitman belonged to a different America than he did, and for Anaya's voice to be authentic he'd have to leave Whitman behind.

Listening to Anaya, I realized I felt the same – the America inside me is so very much Walt Whitman and Robert Frost. Nevermind that they are "white headed men of New England," and I will never be anything but one out of three of those things.

I can claim their voices – the celebration of America's clamour and trade, the silence of a forest profound with mortality, the bodies on our many battlefields, the road not taken – because I am a human being, and I can take the experiences of others into my treasure trove.

Are we a country where only Native Americans can learn from Native Americans, only women can speak for women? That is the tyranny of the "politically correct."

Separate is never equal. Do we wish to be parallel Americas, with fortifications raised around each ethnicity and each gender and each geography so that no one, no experience, no wisdom can get out or in?

I don't believe in reparations or special accommodations made on purely racial grounds – because these trade past injustice for a present injustice – that festers in us and our children.

But that doesn't mean that we should erase history, or cease to acknowledge that terrible things have happened, or give up on the striving toward "justice for all" which we mouth each time we turn to the flag.

I was surprised to learn (I'm always surprised to learn) during the last week's news and commentaries about Haiti, that the rising revolution in then Saint-Domingue (inspired by France's revolution and our own) which culminated in its separation from France in 1804 probably enabled the U.S. to acquire the "Louisiana Purchase."

That is, we have the middle third of the present continental United States because Napoleon Bonaparte got discouraged when he lost his new world empire built on coffee and sugar, indigo and cotton.

I looked in several sources, none of which students are accountable for in the readin', writin', and 'rithmatic of No Child Left Behind, to find out that France charged Haiti 150 million francs (est. 21 billion present dollars) for the lost of "economic and human property."

Haiti paid most of this, with a crippled and barricaded economy, between 1825 and 1947.

The expressed logic: France had poured Africans into Haiti until slaves outnumbered colonists 10 to 1, and they wanted reparation for their loss of those slave bodies. This, I think, casts complication on the word "reparation."

Meanwhile, a lot of other things happened on the island, among them an impersonal shaking of the earth last week.

It was hard to ignore the feeling that the victims were a "them."

Avoiding my work at hand, I paged through online photos of the disaster. I stopped at the photo of a woman's body in the rubble and my eye followed the line of her arm to its hand, and in her hand, the hand of a child, the body it belonged to not visible.

The caption on the picture noted that it was a woman's body, and that she was a victim of the earthquake. The photographer must have seen the child's hand. The Associated Press caption writer must have seen it too.

But for some reason they left unsaid what could clearly be seen, and so I "found" the subject of that photo for myself. And then I looked up at the bolts holding the beams of my own house.

WILDLIFE NOTES: Tracks Left Behind

I think of all the animals, never seen, whose paths crossed with mine: fresh fox prints at night in a blizzard; the pack of wolves who walked in my trail for twenty miles; the waist-deep trenches untold thousands of caribou left in the Cutler Valley one spring; the enormous male grizzly who walked over frosted ground, ka-runch, ka-runch, within fifty feet of my tent, then stopped, considered, and skirted into the trees, leaving me to a long, sleepless, rifle-clutching night.

Following the signs of wild creatures is an exercise of memory, imagination, and observation, an unending process that leads the tracker farther and farther from himself, into the secret lives of beings that move almost silently, often in darkness, flowing through the spaces we leave vacant.

This note is from Tracks of the Unseen by Alaskan Nick Jans. Each short chapter begins with one of his brilliant photos. The book can be found at the Kenny Lake Public Library. Wildlife Notes are brought to you by Copper Country Alliance.

LEGISLATIVE REPORT: REPRESENTATIVE JOHN HARRIS

January 18, 2010

Oil taxes are once again taking center stage in Juneau.

To spur more oil drilling, Governor Parnell and some legislators want to revise the current oil tax regime known as Alaska's Clear and Equitable Share, a law that went into effect in 2007. The governor has called for expanding tax credits while a couple of Anchorage lawmakers want to reduce the basic tax rate of 25 percent.

I will support a prudent measure that clearly helps stem the decline in the amount of oil flowing down the trans Alaska pipeline, which dropped another five percent over the past year. If companies show that lowering taxes or offering credits will lead to more private sector investment that creates more local jobs and more oil production, then I will vote in favor of it.

Oil taxes are never easy to change. The topic is so big and the stakes are so high that they usually suck a lot of the air out of the room, providing little oxygen for other issues to thrive. Be that as it may, I expect a lot of legislative attention on developing Alaska gas, be it a big pipeline from the North Slope down the highway to Valdez or elsewhere, a smaller in-state line, or encouraging more storage capacity for Cook Inlet gas.

Producers who are interested in a large-diameter pipeline want long-term fiscal certainty – another way of saying they want a gas-tax freeze lasting many years. Whether this is addressed this session remains to be seen, but there is new legislation on this topic that could generate a lot of discussion. All this will happen as two pipeline groups – one led by TransCanada, the other by BP and ConocoPhillips – gear up to hold open seasons after the legislature ends the regular session in April.

And then there's energy. Legislative committees spent time traveling across the state over the past few months, crafting plans to provide more affordable energy to Alaskans be it in the form of natural gas, hydroelectricity, wind power, river or tidal turbines, or other ways to tap the state's vast resources. The governor has proposed adding another $25 million to the renewable energy fund, a program that my colleague from Haines, Representative Bill Thomas, and I worked together to create. I'm encouraged to see continued dedication to this idea as well as efforts to increase state support of weatherization and other energy conservation measures.

One thing I don't want to see happen is another federal economic stimulus package akin to the one approved last year. There's another one making the rounds of Congress these days; only this time, it's being called a "jobs bill" and totals $174 billion.

I oppose this because I believe we must stop building up a mountain of government debt and more bureaucratic red tape with which to burden future generations. Instead, we need to create an environment for the private sector to grow by providing more incentives for American companies to do more business in this country. Repairing roads, airports, and railroads and improving infrastructure are fine. But let's not dump more money into things that don't produce tangible results and only rack up the national debt.

*****

A big heads-up to anyone who has a halibut charter business in Prince William Sound: the National Oceanic and Atmospheric Administration requires operators to apply between February 4 and April 5 for a new limited-entry license.

This is a one-time opportunity. Those who don't apply will lose out even if they qualify for a permit. The agency says the new program is needed to keep charter boats from overfishing for halibut. Charter boat operators will be required to carry permits starting February 1, 2011.

*****

And finally, our prayers go out to the victims of the recent 7.0 earthquake that devastated Haiti.

CHANGE FROM ATS

Renamed Ryan Air celebrates 'toughest on Earth'

Longtime Alaskans in air cargo industry honored

ALASKA NEWSPAPERS STAFF
editor@alaskanewspapers.com

At a celebratory event held in Anchorage last week, rural Alaska cargo carrier Arctic Transportation Services dedicated an evening to celebrating "the toughest people on Earth"—some of the great Alaskans that helped to build the state and the air cargo industry, a news release said.

Those honored were: Eben Hopson, Howard Rock, Eddie Hoffman, Robert G. "Bobby" Sholton, Holger "Jorgy" Jorgensen, Raymond I. Petersen, Frank Ferguson, Neal "Willie" Foster, Martin L. Olson, Wilfred P. Ryan Sr. and Eva Ryan.

At the event, Wilfred "Boyuck" Ryan Jr., ATS president, also paid tribute to his own family and announced that the company was returning to its previous name, Ryan Air. "We have operated for just over 10 years as Arctic Transportation Services, but for more than four decades we ran the business under our family name, Ryan. We are still a family business and tonight we are reclaiming our heritage."

"Moving forward ATS will now operate as Ryan Air, once again," he said.

The name change takes effect immediately and was featured in a roll-out of a new look and identity for the carrier.

Ryan said it was fitting that his parents, Wilfred P. Ryan Sr. and Eva Ryan, the founders of the company, were amongst the toughest people on Earth honored.

"It takes a person with grit and nerves of steel to fly in 50-below-zero weather with radial engines and an 800-foot dirt airstrip. Someone like Dad, who was the sole pilot in the early days of the business," he said.

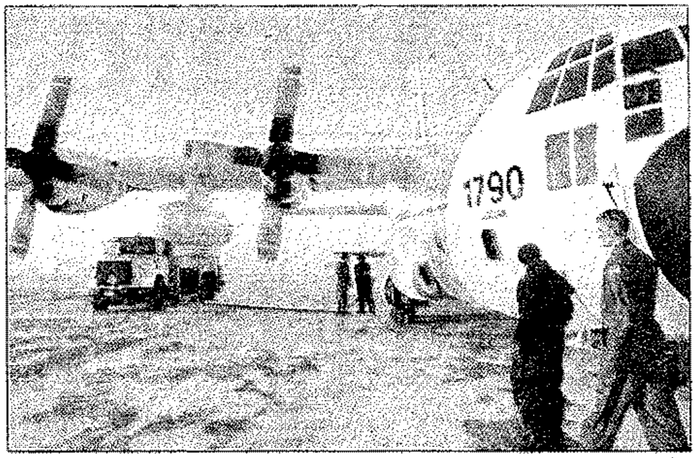
Alongside Wilfred Sr. in the family business was his wife, Eva. Who, Ryan says, was even tougher than her husband. While Wilfred Sr. was in the turbulent skies, Eva was on the ground raising nine children, holding down a fulltime teaching job and managing Unalakleet Air Taxi (the company's original trading name).

"Air transportation is a lifeline to villages throughout the Bush. Mom and Dad understood this and took this fact to heart. Their unwavering dedication to raising the aspirations and quality of life of Bush Alaskans is what makes them two of the toughest people on Earth."

Ryan acknowledged the contribution that all of the honorees had made not only to the state but also to the air cargo business, who along with friends, employees and customers had helped Ryan Air get to where it is today—one of the largest Bush cargo carriers in the state.

Ryan urged all guests to keep tackling hurdles every day and to continue to build Alaska. "No matter what is thrown at us, no matter what the season, no matter how tough the challenge, I urge each and every-one of you here tonight to continue the work of our honorees, to keep looking forward and to keep building our great state. Let's move ahead and do the best job we can!"

FISH DELIVERY FINISHED



PETTY OFFICER THIRD CLASS JONATHAN LALLY/USCG

A Coast Guard Air Station Kodiak HC-130 Hercules aircraft delivers eight pallets of silver salmon fillets to Kotzebue on Jan. 7. The shipment completed the donations of a food drive that contributed 13 tons of frozen fish to the Northwest Arctic village.

FEDERAL DOLLARS FOR EDUCATION

Hurry before Chukchi flat-rate flies

Grant offers discount courses in aviation, alternative energy

VICTORIA BARBER
vbarber@alaskanewspapers.com

Northwest residents who want to earn their pilot license or get low-cost power in their house should check out a couple new courses at University of Alaska Fairbank's Chukchi Campus in Kotzebue.

This semester, a Title III grant from the U.S. Department of Education has allowed the college to offer several new courses in aviation and alternative energy systems without the expensive fees that students would normally pay. That flat rate may apply to only this semester, which is fast approaching, so those that act fast will reap the rewards.

"It's like getting Cokes on sale, you're never going to get to take these classes on this price," said Dr. Robert Mackey III, village access coordinator for Chukchi Campus.

In Introduction to Renewable Energy Systems, students will install two wind turbines and work with solar panels. The distance course will be taught by Dr. Andy Soria at the Fairbanks campus, and students will learn to work with a new technology called a "flow battery." The course begins Feb. 2, so interested students will need to enroll soon.

Mackey said the alternative energy course is aimed at "do it yourselfers" who want to learn to install a small-scale wind turbine or solar cell energy system for their home or camp. No previous experience working with electronic systems is required to take the course, though Mackey said that should not discourage carpenters or electricians from signing up.

"Just as we need people who can work on diesel engines now, we're going to need windmill mechanics in the future," said Mackey. "If you're a trade worker, especially, this is a great skill to put into your tool kit, because alternative energy is coming down the pipe."

While the course is taught by distance, students must be in Kotzebue to take the class.

The school is also offering three aviation courses, private ground school, instrument ground school, and a credit hour in which students can log 20 hours in a flight simulator. The goal of the courses is to allow students to complete the written portions of their pilots' exams and prepare for private flying time.

"The region is always in need of good pilots, and no one is going to be able to fly this region like pilots from the region," said Mackey.

Mackey said that school administrators hope to extend and expand on these course offerings in the future, but it will depend on student interest and funding. For more information about these or any other classes, contact the UAF Chukchi Campus at 800-478-3402.

Victoria Barber can be reached at 907-348-2424 or toll free at 800-770-9830 ext. 424.

AROUND THE ARCTIC

NW Arctic planning commission to meet

The Northwest Arctic planning commission will meet in Kotzebue on Feb. 2 for its quarterly meeting from 9 a.m. to 4:30 p.m. at the Northwest Arctic Borough Assembly Chambers. Teleconferencing is available at 800-315-6338 code 0104#.

On Feb. 3 the Planning Commission will have a special joint meeting with the City of Kotzebue from 9 a.m. to 2 p.m. at the Northwest Arctic Borough Assembly Chambers to discuss the 2010 Census, the Cape Blossom Road project and the upcoming Arctic Mining Conference, April 6-8, in Kotzebue. Teleconferencing is available at 800-315-6338 code 0104#

The public is invited and encouraged to attend. For more information about this meeting and all Planning Commission meetings, contact Ukallaysaaq, planning director, at the Borough Planning Department, 442-2500 or toll free at 800-478-1110.

BIRTHS

Gerald Bud Lee Kanayuq Taalak Kanayurak

Martha Itta and Gilbert J. Kanayurak, of Barrow, announce the birth of their son, Gerald Bud Lee Kanayuq Taalak Kanayurak, at 8:39 a.m. on Sept. 30, 2009, at the Alaska Native Medical Center in Anchorage. He weighed 6 pounds, 9 ounces and measured 19 inches. Gerald joins siblings, Samantha, Keifer, Sinmik, Aviuk, Mackenzie, Cody, Elizabeth, Cynthia I., Ittaaq and Cynthia K. His grandparents are Joseph and Nancy Nukapigak, Fred Kanayurak, Anna Jack and Virginia Spaulding.

Cale Holmes Stoops

Nicole and Jake Stoops, of Kotzebue, announce the birth of their son, Cale Holmes Stoops, at 4:59 a.m. on Dec. 31, 2009,

Media Advertisements

February 2010

Anchorage Daily News

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Anchorage zoning code en route to an update

A years-long effort to make Anchorage's strip malls, stores, office buildings and other commercial structures more visually appealing and accessible is headed for an Assembly vote this spring. But opposition is also rising.

PDF: Photographs illustrating the intent of the commercial design standards

PDF: Commercial design standards as OK'd by Planning and Zoning Commission

Anchor Point vigilantes nab suspects; troopers investigating

Alaska State Troopers are reviewing the actions of a pair of vigilantes alleged to have made citizens arrests of two young fugitives accused in a series of burglaries in the Anchor Point area.

Problems plague child protection office in Bethel

The state is finding it difficult to protect children from abuse and neglect in Bethel and surrounding villages because of high worker turnover, records problems and distant managers, Alaska lawmakers were told Thursday.

2010 ALASKA LEGISLATURE

Murkowski: Alaska needs economic 'soul searching'

Alaska's economy faces threats from environmentalists, federal regulations and even from within, U.S. Sen. Lisa Murkowski told a joint session of the Legislature on Thursday. But Alaskans must do some "soul searching" about the future.

ACLU objects to subpoenas in child exploitation cases

More on the legislative session

2010 WINTER OLYMPICS

Jay Hakkinen eyes a target at the shooting range Thursday.

Hakkinen way off targets in 20-K biathlon

Hakkinen, a four-time Olympian from Kasilof, turned in one of the most disastrous big-moment shooting performances of his career, finishing 76th in the 20-kilometer individual biathlon race Thursday at Whistler Olympic Park.

Photos: Alaskans at the Olympics

Photos: Olympics Day 6

Alaska Olympians: Dispatches, schedule

2010 Olympics coverage

Photos | Video | **Featured** | Reader-submitted | Most popular | +

Profiles: Iron Dog racers

Read-up on the 58 racers competing in the world's longest snowmachine race this year, with bios, bibs, and race history. - **race map**

2010 Winter Olympics

Follow the action from Vancouver, and keep tabs on Alaska's seven Olympians.

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all 107 top jobs

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First Care Medical Center

Executive/Professional
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Ilisagvik College - Barrow

News

Anchorage | Mat-Su | Crime | Politics | More +

Gay rights group asks university to update policy

Members of the gay-straight alliance at the University of Alaska Fairbanks have again asked the Board of Regents to add sexual orientation to the UA nondiscrimination policy. 9:52 AM

Violent downtown robbery leaves victim in critical condition 7:27 AM

Seward Highway reopens after slide 5:06 AM

Mat-Su

Wasilla now has Wings 'n Things; brewery to follow

New organization aims to keep business owners informed

In Brief: Mat-Su

BLOG
Julia O'Malley

Alaska life, one story at a time.

SECTION
Legislative session

Follow the progress of the 26th Legislative session with daily reports from Juneau

Alaska Newsreader

More +

Voice of Down syndrome on 'Family Guy' calls Palin humorless

An actress who has Down syndrome and who voiced the Down syndrome character in a recent "Family Guy" episode says Sarah Palin "does not have a sense of humor."

State grants Old Believer kids alternative test dates 8:30 AM

New study: Why are village fuel prices so high? 9:50 AM

Grandpa reflects on life ahead for newborn Alaskan 9:28 AM

Felt-soled fishing shoes banned in Southeast

George Will: Palin and the limits of populism

play

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Flint Hills apologizes for contamination, but residents remain concerned

NORTH POLE — A Flint Hills Resources spokesman told a roomful of people the company is sorry for a chemical spill that contaminated dozens of private wells and, to a lesser degree, a municipal...

9 hrs ago | 21 | 5 | full story

Media circus engulfs Vonn after Thursday ski crash

• For complete Olympic coverage, visit our Olympics page. • Matias Saari is in Vancouver for the 2010 Winter Games. Get the Alaska perspective here. WHISTLER CREEKSIDE — I experienced...

9 hrs ago | 0 | 4 | full story

Patty Center rink closure indefinite

FAIRBANKS – On Tuesday afternoon, a maintenance worker at the Patty Center ice arena found a soft spot of discolored ice in a corner of the rink, roughly the size of an orange. That small...

9 hrs ago | 1 | 4 | full story

Railbelt utility partnership plan strengthens

JUNEAU — Reworked plans for a big utility partnership have emerged, carrying with them signals of support from most or all the entities involved. The new plan follows months of mutual work by d...

9 hrs ago | 1 | 4 | full story

- Anchorage zoning update heading for spring vote
- Alaska lawmakers to introduce campaign spending bills
- Anchorage hotel workers plan protest over firings
- Trout Unlimited calls for river protection near Pebble Mine

Stacked lenticular clouds over the Wrangell Mountains reflect the early morning sunlight from Glennallen, Alaska, on Friday, Feb. 19, 2009. Michelle Eastty photo

Reports: Alaska market conditions drive high fuel prices

by The Associated Press

3 hrs 14 mins ago | 3

| 3 |

JUNEAU, Alaska - The attorney general and researchers at the University of Alaska Anchorage are attributing high gasoline and heating fuel costs in rural Alaska to market conditions. Two independe...

Calendar

?	February, 2010					
«	‹				›	»
Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28						

Select date

Friday, 19, 2010

post a new event

ALASKA Men's Ice Hockey *7:00 PM*

ALASKA NANOOK Men's Ice Hockey VS. Lake Su...

Valentine concert with... *10:00 PM*

FRIDAY FEBRUARY 12 @ 10pm doors (9:30 door...

Oceans Film Festival *8:00 PM*

A huge movie event, every year it sells ou...

Fairbanks, AK

Currently | Hourly Info | 15 Days | Videos

Mostly cloudy **15°F** RealFeel®: 22°F Winds: Calm

Your Extended Forecast

Today	Tomorrow
High 34°/Low 9° Partly cloudy	High 29°/Low 9° Partly cloudy
Sunday	**Monday**
High 29°/Low 9° Mostly cloudy	High 29°/Low 8° Partly cloudy

Weather Forecast | Weather Maps | Weather Radar

... pulling a small trailer. The vehicle left the roadway and separated within the ditch. Both Krutskikh and his passenger were transported to Fairbanks Memorial Hospital and treated for minor injuries. Damage to the vehicle and trailer was minimal.

DELTA WIND 2/18/10

AS A RS 2477 RIGHT OF WAY

The State of Alaska Department of Natural Resources will make a determination as to whether the Chitina Cemetery Road is a valid right of way under Revised Statute 2477 43 U.S.C. § 932 (commonly referred to as RS 2477 rights of way).

The department has considered the following as required by 11 AAC 51.055(b):

(1) The Chitina Cemetery Road was delineated on the McCarthy Road Improvement Project, Cultural Resource Survey, September, 2003 by Rolfe Buzzell. The scale of the map is one inch to less than one mile as required by 11AAC 51.055(b)(1).

(2) The road was constructed across Federally-owned vacant land when the land was not appropriated or reserved for public use. The land was patented May 3, 1916. The construction and use of the road started in 1910 and meets the requirement of 11 AAC 51.055(b)(2)

(3) Evidence exists of the historic use of this road beginning September 1910 and the cemetery beginning February 15, 1911 which constitutes public acceptance of the right of way. The evidence is set forth in the History of the Chitina Cemetery Road by Kevin Sorensen. The evidence must meet the requirement of 11 AAC 51.055(b)(3)(A).

You may review the evidence at the address below, at the Chitina Alaska Post Office or at http//dnr.alaska.gov/mlw/hottopics/pdfs/chitina_cemetery_roadinfopacket.pdf.

Pursuant to 11 AAC 51.055(c)(1), the department will consider relevant evidence, contrary to or in support of the evidence identified above, that is offered during the public comment period that shall end March 26, 2010. After the public comment period ends, a decision to identify will be issued by the department which may be appealed under 11 AAC 02.

Submit comments to: Public Access Assertion Defense Unit
Department of Natural Resources
State of Alaska
550 West 7th Ave., Suite 1420
Anchorage, AK 99709-3844

State of Alaska v. Justin S. Norberg (5-21-73), guilty of guide-commit, aid, or allow violation, date of offense 8-13-09. Defendant will pay a $50 titution in the amount of $2200 to the Alaska Wildlife Troopers and he is placed on probation until 1-26-2015.

Copper River Record 2/18/10

TEACHING WITH ANIMALS

Volunteers help second-grade students dream big

'I Know I Can' is focus of afternoon program

LARRY KAIRAIUAK AND CATHY EWING
For The Arctic Sounder

University of Alaska alumni and other volunteers will be at Fred Ipalook Elementary School in Barrow on Feb. 25-26 to share a colorful picture book about dreaming big.

Now in its fourth consecutive year, the UA College Savings Plan's "I Know I Can" outreach program will reach 794 second-grade children in 18 schools statewide.

"I Know I Can," a picture book, features animal characters who prompt children to start thinking about career choices and the need for college now. Sponsored as a UA College Savings Plan – Alaska Commission on Postsecondary Education (ACPE) partnership, this initiative has continued to expand.

The book follows a class of animal characters thinking about what they want to be when they grow up. A little mouse character donning a cap and gown hides on each page, thinking "I Know I Can" to himself as the story unfolds.

The teacher, Mrs. Walker, explains to the children that they should start thinking about their futures now, and she gives them lots of ideas, such as being a house builder, farmer, doctor or nurse. "You can become whatever you want if you try," Mrs. Walker says. She even gains the acceptance of one reluctant character, O'Toot the owl, who thinks he already knows everything.

Linda English, director of the UA College Savings Plan, says the primary initiative of the program is to help youngsters think about exciting opportunities that can be ahead for them in life.

"Young children love to think about what they're going to be when they grow up, but we have to make sure they know it requires effort on their part," English said. "We know not every job requires a four-year college degree but most careers require some level of postsecondary training and workforce education beyond high school. Children need positive encouragement beginning at an early age to think about all of the possibilities for their life, including college."

After hearing the story, students draw a picture on a postcard showing what they want to be when they grow up. The postcard is mailed back to the students in a future year as a reminder of their goals. Each student receives their own copy of the book to take home.

The UA College Savings Plan fully funds the project, with operational support from the ACPE. I Know I Can is a nonprofit, national organization based in Ohio.

The UA College Savings Plan offers tax-advantaged savings plans to residents in Alaska and throughout the United States. Students who use the plan to pay for college can attend any qualified school, not just UA.

ACPE is the state's higher education agency, providing promotion, support and access to higher education through a package of financial aid and early education awareness services.

Visit www.alaska.edu/studentservices/outreach/i_know_i_can/index.xml for more information on the "I Know I Can" program, including pictures of postcards drawn by the children, or contact Pearl Brower at Ilisagvik College, 852-1833.

LAWRENCE KAIRAIUAK/COURTESY PHOTO
A student in Anchorage draws a postcard of what he'd like to be when he grows up after reading "I Know I Can." The book is part of an outreach program coming to Barrow that is aimed at getting young students started thinking about their futures.

LOOKING BACK

FEB. 21, 1992
Bill certifying educators of Inupiaq gains in House

A bill that some lawmakers and local educators say would give teachers of Native language and culture the recognition they deserve is moving through the Alaska House of Representatives.

The bill would allow for limited certification of instructors who teach subjects where college training isn't usually available, such as Native culture, language and military science.

The certifications would resolve a long-standing problem of employment equity for these instructors, according to proponents of the bill, because they already perform duties similar to certified teachers with bachelor degrees, yet do not get the same encouragement, recognition or pay that fully certified teachers do.

"If you're going to put teachers in the classroom and give them primary responsibility for the classroom, then they should be certified as teachers," said David Harding, a legislative aide, to the bill's sponsor, Rep. Eileen P. MacLean of Barrow.

"The inequities stem from people teaching but not being called teachers," he said, adding that teachers of Native language and culture are currently called "recognized experts" rather than teachers.

Bob Mulluk, a former Inupiaq instructor and currently an intern assistant principal at Kotzebue Elementary School, said the bill is long overdue, particularly since "our language is in jeopardy of being lost."

Harding said, the bill has the support it needs to pass the full Legislature this session. "Pretty much all of the representative groups that have an interest in it have support for it, so that's why we are confident it will pass."

Rookie credits luck, Snyder's 'Cheers' for win

Rookie dog musher Bish Gallahorn of Kotzebue could list a couple of factors that may have helped him win his second sprint race in a row last weekend. But, neither factor had anything to do with his sled dog racing ability.

Reason No. 1. "I consider it luck. After the dogs teach me a few more things it should go a lot smoother."

Reason No. 2. "I think Snyder was probably up there somewhere cheering for me."

Regardless which one in was , something propelled Gallahorn to the finish line first in all three heats of the first funning of the Dan Snyder Sr. Memorial Feb. 14-16 on Kotzebue Sound. Although Gallahorn also won the Paul Brown Memorial two weeks ago in Noorvik, he said last weekend's victory was particularly satisfying.

"Winning this race has special meaning to me because Snyder was a pretty good friend of mine," he said, "So I am pretty excited about that."

Snyder a longtime sled dog racing enthusiast and an accomplished musher himself, died last fall when his snow machine and sled broke through thin ice on a channel of the Kobuk river about 20 miles east of Kotzebue.

BIRTHS

Kasey Pearl Hopson

Tammy Hopson and Curtis Hopson, of Barrow, announce the birth of their daughter, Kasey Pearl Hopson, at 12:42 a.m. Dec. 14, 2009, at the Alaska Native Medical Center in Anchorage. She weighed 6 pounds, 10.6 ounces and measured 19-3/4 inches. Kasey joins family members, John Cody, Heather and Arlene.

Gabriel Gage Anurvak Nayukuk Swan

Patricia Swan and Darin "Tiny" Swan Sr., of Kotzebue, announce the birth of their son, Gabriel Gage Anurvak Nayukuk Swan, at 12:04 p.m. Jan. 30, 2010, at the Alaska Native Medical Center in Anchorage. He weighed 8 pounds, 13 ounces and measured 20-1/2 inches. Family members include, Andrea, Roberta, Dustin and Darin "Tiny" Swan Jr.

APPENDIX C

Meeting Materials

WELCOME!

The U.S. Army Corps of Engineers (USACE),
Bureau of Land Management (BLM),
Environmental Protection Agency (EPA),
National Parks Service (NPS),
Alaska Department of Natural Resources (ADNR),
and ENTRIX Inc.

Welcomes you to the

Alaska Stand Alone Pipeline (ASAP)
Environmental Impact Statement

Public Scoping Meeting

Alaska Stand Alone Pipeline (ASAP)

Environmental Impact Statement

ASAP Project Area and Alternatives

Route Alternatives
Parks Highway Route
Richards Highway Route

Spur Line Alternatives
Parks Highway Spur
Richardson Highway Spur

Pre-Build Alternatives
Parks Highway Pre-Build
Richardson Highway
Pre-Build

ENTRIX
Down to Earth. Down to Business.

Scoping

The Council on Environmental Quality (CEQ) defines scoping as an *"early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action."*

Objectives of the scoping process:

- identify potentially interested parties
- identify public and agency concerns with a project
- define the range of issues that will be examined in a project
- ensure that relevant issues be identified early and drive the analysis, and
- establish a public record

EIS Process

Step	Steps in the NEPA Process
1	**Federal Notice of Intent (NOI) to Prepare an Environmental Impact Statement (EIS)** December 4, 2009
2	**Scoping** Scoping Period: December 7, 2009 to February 5, 2010 Public Scoping Meetings: December 8 to December 18, 2009 Scoping Report: Estimated Release March 2010
3	**Analysis of Alternatives and Field Investigations**
4	**BLM Identifies Preferred Alternative**
5	**Issue Draft EIS** Estimated Release: Late July 2010 Available for 45-day public review through mid-September 2010
6	**Public Hearing on Draft EIS** Estimated: August 2010
7	**Public Comment Review and Synthesis** Comment Analysis Report available, estimated: September/October 2010
8	**Respond to Comments/Prepare Final EIS** Estimated: October 2010
9	**Issue Final EIS** Estimated: January 2011 Available for minimum 30-day public review
10	**Record of Decision** USACE identifies preferred alternative Public statements of agency decisions Estimated: February 2011

We Are Here

Proposed Alaska Stand Alone Pipeline Environmental Impact Statement (EIS) Estimated Schedule

February 5, 2010	End of Scoping Period
March 2010	Scoping Report Released
July 2010	Draft EIS Released
August 2010	Public Hearings on Draft EIS
October 2010	Comment Analysis Report Available
January 2011	Final EIS Released
February 2011	Record of Decision

Alaska Stand Alone Pipeline (ASAP)

Environmental Impact Statement

Opportunities for submitting scoping comments

DEADLINE for scoping comments is **February 5, 2010**

Ways to Submit Comments:

- Provide oral comments at a scoping meeting
- Submit a comment form
- Submit comment through the project website: www.ASAPEIS.com
- Email to: info@asapeis.com
- Fax to: 907.753.5567
- Mail to: Serena E. Sweet

U.S. Army Corps of Engineers
CEPOARD
P.O. Box 6898
Elmendorf AFB, AK 995060898

ENTRIX
Down to Earth. Down to Business.

Next Steps

- Review and analyze scoping comments
- Prepare and release scoping report
- Identify alternatives for the Draft EIS and select a reasonable range that meets the Purpose & Need
- Describe the environment affected by the proposed action
- Evaluate environmental consequences of the proposed action and alternatives
- Prepare the Draft EIS for release to the public

Anticipated EIS Schedule

February 5, 2010	End of Formal Scoping Period
March 2010	Scoping Report Released
July 2010	Draft EIS Released
August 2010	Public Hearings on Draft EIS
October 2010	Comment Analysis Report
January 2011	Final EIS Released
February 2011	Record of Decision

Ways to Submit Comments:

- Provide oral comments at a scoping meeting
- Submit a comment form
- Submit comment through the project website: www.ASAPEIS.com
- E-mail to: info@asapeis.com
- Fax to: 907.753.5567
- Mail to: Serena E. Sweet

  U.S. Army Corps of Engineers

  CEPOA-RD

  P.O. Box 6898

  Elmendorf AFB, AK 99506-0898

Formal Scoping Period ends February 5, 2010

Comments will be accepted any time during the EIS process.

Alaska Stand Alone Pipeline (ASAP)
Environmental Impact Statement

Scoping Notice

The US Army Corps of Engineers (Corps) is preparing an Environmental Impact Statement (EIS) to analyze the Alaska Stand Alone Pipeline (ASAP) proposed by the Alaska Department of Natural Resources. The Bureau of Land Management, Environmental Protection Agency and National Park Service are participating in this effort as cooperating agencies.

Proposed Project Description

The State of Alaska is proposing to construct a 24-inch diameter, high-pressure pipeline from Alaska's North Slope to Cook Inlet to transport North Slope natural gas to in-state Alaska markets. The pipeline would be located entirely within the State of Alaska. Gas off-take would be provided for the Fairbanks Area and in other locations along the route. The Alaska Stand Alone Pipeline includes a Gas Conditioning Plant on the North Slope, compressor stations along the pipeline, and natural gas liquid extraction facilities to produce utility-grade natural gas.

The formal scoping period for the ASAP EIS begins December 7, 2009 and ends February 5, 2010. Comments will be accepted at any time during the EIS process.

www.ASAPEIS.com

Alaska Stand Alone Pipeline
Alternatives Map

Alaska Stand Alone Pipeline
Project Description

Gas Conditioning Plant

Remove carbon dioxide, hydrogen sulfide and water;
Carbon dioxide and hydrogen sulfide re-injected into a North Slope reservoir;
Compression to increase gas pressure to 2500 pounds per square inch gauge (psig);
Cooling and mechanical refrigeration to cool gas to 30° F.

Pipeline

24-inch diameter;
X70 (nominal 0.6 inch wall thickness);
2500 psig maximum operating pressure;
Two compressor stations;
Buried pipeline except at major river and fault crossings;
Horizontal Directional Drilling as preferred major water body crossing technique where feasible;
Chilled/ambient operating temperature.

Compressor Stations

Centrifugal gas compressors driven by natural gas;
Fuel supplied from the pipeline;
Northern stations equipped with refrigeration for chilled operation;
Southern stations may or may not be equipped with coolers.

Natural Gas Liquid (NGL) Extraction Plant

Required to produce utility grade natural gas;
Standard turbo-expander process;
NGL fractionation;
Small plant in Fairbanks with main plant in Cook Inlet;
Propane used for in-state demand;
Potential for export if available from the North Slope.

Project Alternatives

Route Alternatives

Parks Highway Route
Richardson Highway Route

Spur Line Alternatives

Parks Highway Spur
Richardson Highway Pre-Build

Pre-Build Alternatives

Parks Highway Pre-Build
Richardson Highway Spur

Alaska Stand Alone Pipeline
Environmental Impact Statement

COMMENT FORM

December 2009

Your input is an important element in the scoping phase of this project. To help us consider your views and suggestions, please write them down on this sheet and mail to our address, which is preprinted on the back of this form. Please write legibly (printing is appreciated) and you may attach additional sheets if necessary. Your comments can be submitted via mail; emailed to **info@asapeis.com**; or through the comment section of the website at www.asapeis.com.

Name (PLEASE PRINT): ____________________

Address: ____________________

City, State, Zip Code: ____________________

Telephone (Optional): ____________________

Email (Optional): ____________________

- ☐ **Please retain or add my name to the project mailing list. I wish to receive information in the mail.**
- ☐ **Please add my name and email address to the list. I wish to receive information by electronic mail.**

COMMENTS:

Note: To mail, fold page in half along the dashed line on the back of this sheet so that the address shows. Tape shut and affix a standard first class postage stamp.

Thank you for your participation!

-------------------------------------FOLD HERE-------------------------------------

Place a
First Class
Postage
Stamp
Here

____

____

____

Serena E. Sweet, Project Manager
U.S. Army Corps of Engineers
CEPOA-RD
P.O. Box 6898
Elmendorf AFB, Alaska 99506-0898

Environmental Impact Statement for the Alaska Stand Alone Pipeline (ASAP) Project

Public Scoping Meeting

Welcome and Introductions

- US Army Corps of Engineers (Corps)
- Bureau of Land Management (BLM)
- Environmental Protection Agency (EPA)
- National Park Service (NPS)
- Alaska Department of Natural Resources (ADNR) representing Office of the Governor
- ENTRIX Inc. (ENTRIX)
- ASRC Energy Services (AES)

- **Moderator: Serena Sweet, Corps**

Scoping Meeting Agenda

- Information on Scoping Process
- Background on NEPA Process
- Overview of the Alaska Stand Alone Pipeline (ASAP) Project
- Upcoming Steps for ASAP EIS process
- Public Comment Period

What is included in an Environmental Impact Statement?

- Purpose and need for proposed action
- Reasonable range of alternatives that meet project purpose and need
- Description of the affected environment
- Analysis of environmental consequences of the alternatives

Scoping

- The Council on Environmental Quality (CEQ) defines scoping as an

  "early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action" (40 CFR 1501.7).

- Objectives of the scoping process:
  - identify potentially interested parties
  - identify public and agency concerns with a project
  - define the range of issues that will be examined in a project
  - ensure that relevant issues be identified early and drive the analysis, and
  - establish a public record

Public Scoping Meeting Schedule

December 08, 2009 – Glennallen Public Meeting

December 09, 2009 – Delta Junction Public Meeting

December 10, 2009 – Nenana Public Meeting

December 10, 2009 – Fairbanks Public Meeting

December 11, 2009 – McKinley Village Public Meeting

December 14, 2009 – Anchorage Public Meeting

December 15, 2009 – Wasilla/Palmer Public Meeting

December 17, 2009 – Barrow Public Meeting

Scoping Meeting Procedures

- Please sign in at the registration table
- If you would like to speak, please check the box on the sign-in form
- You may submit written comments today using the comment forms provided at the registration table
- The Q&A and comment portion of this meeting will be transcribed by a court reporter

The NEPA Process

Purpose of the National Environmental Policy Act (NEPA):

- Ensure agency decision-makers take environmental factors into account before making a decision and implementing an action

NEPA is a procedural law that mandates technical analysis and public review, but does not direct decision outcomes

Requirements of NEPA

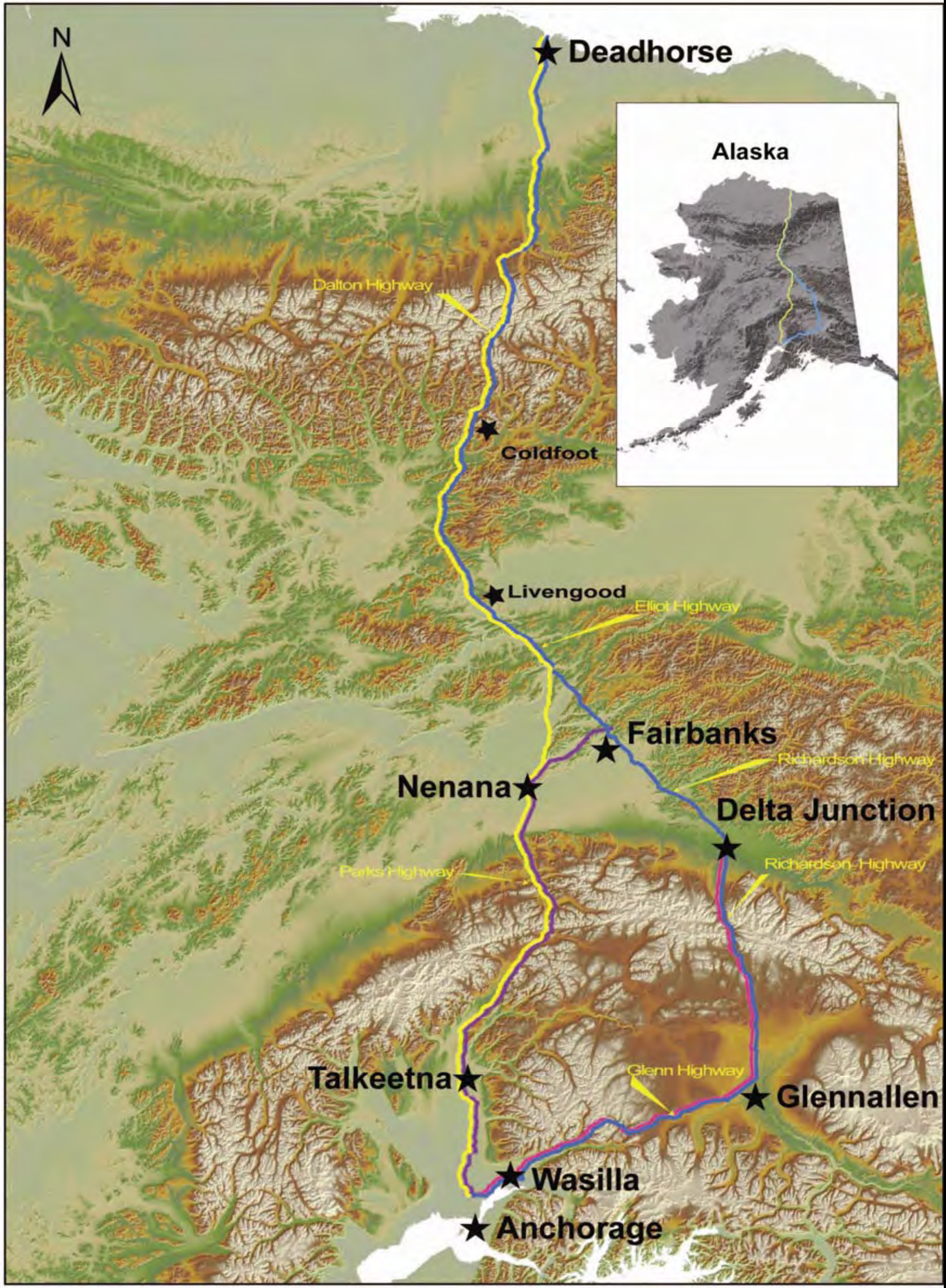
- Assess potential environmental impacts of proposed federal agency actions

- Consider environmental consequences early in decision-making to reduce, prevent, or eliminate environmental damage

- Seek out public comments on issues and alternatives to be addressed during scoping

Stand Alone Routes Evaluated

- Two Stand Alone Routes
  - Parks Highway Corridor
  - Richardson Highway Corridor
- Routes are common to Livengood
- Pipeline ends at Milepost 39 of the Beluga Pipeline



Stand Alone Route Comparison

Stand Alone Routes	Length (Miles)	Difference (Miles)	Terrain (Miles)		
			Flat	Hilly	Mountain
Parks Highway Stand Alone (Applicant Proposed Route)	737		422	295	20
Richardson Highway Stand Alone (Alternative Route)	829	+92	360	449	20

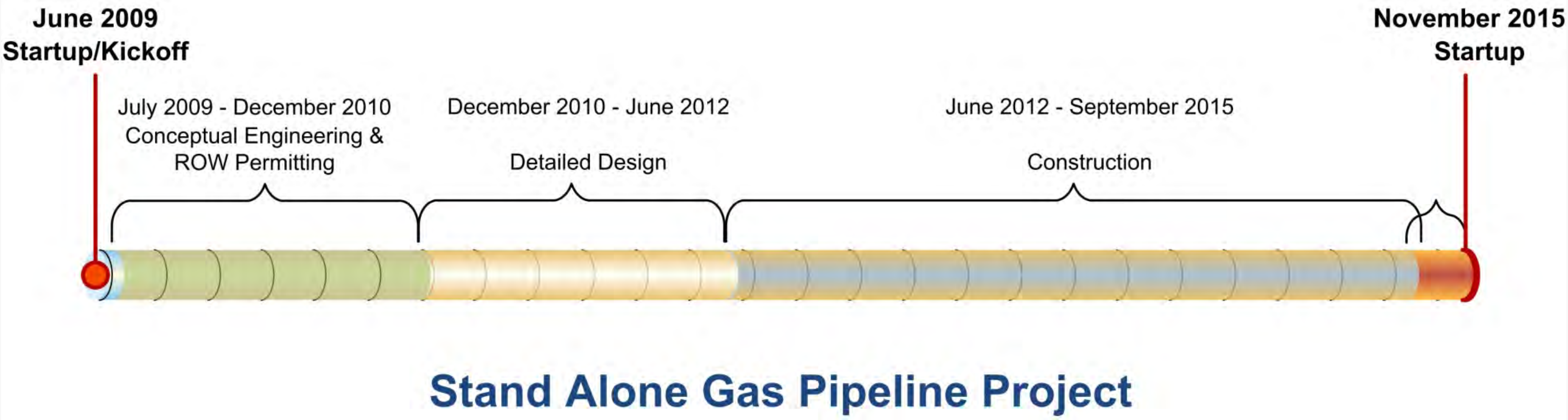
Proposed Pipeline Route Configuration

- 2,000 foot wide analysis corridor
- 100 foot right-of-way
- Pipeline route = 737 miles
- 24” diameter pipeline
- Gas pressurized at 2500 psi
- Prudhoe Bay gas supply
- Gas conditioning at Prudhoe Bay

Pipeline Flow Rate Configurations

- Pipeline Flow Rates
  - 250 Million Standard Cubic Feet/Day (MMscfd)
    - Lower flow configuration will evaluate 16-18 inch Pipeline
  - 500 MMscfd
    - Two Compressor Stations
  - 750 MMscfd
    - Five Compressor Stations
  - 1000 MMscfd
    - Up to eleven compressor stations

Applicant's Project Schedule

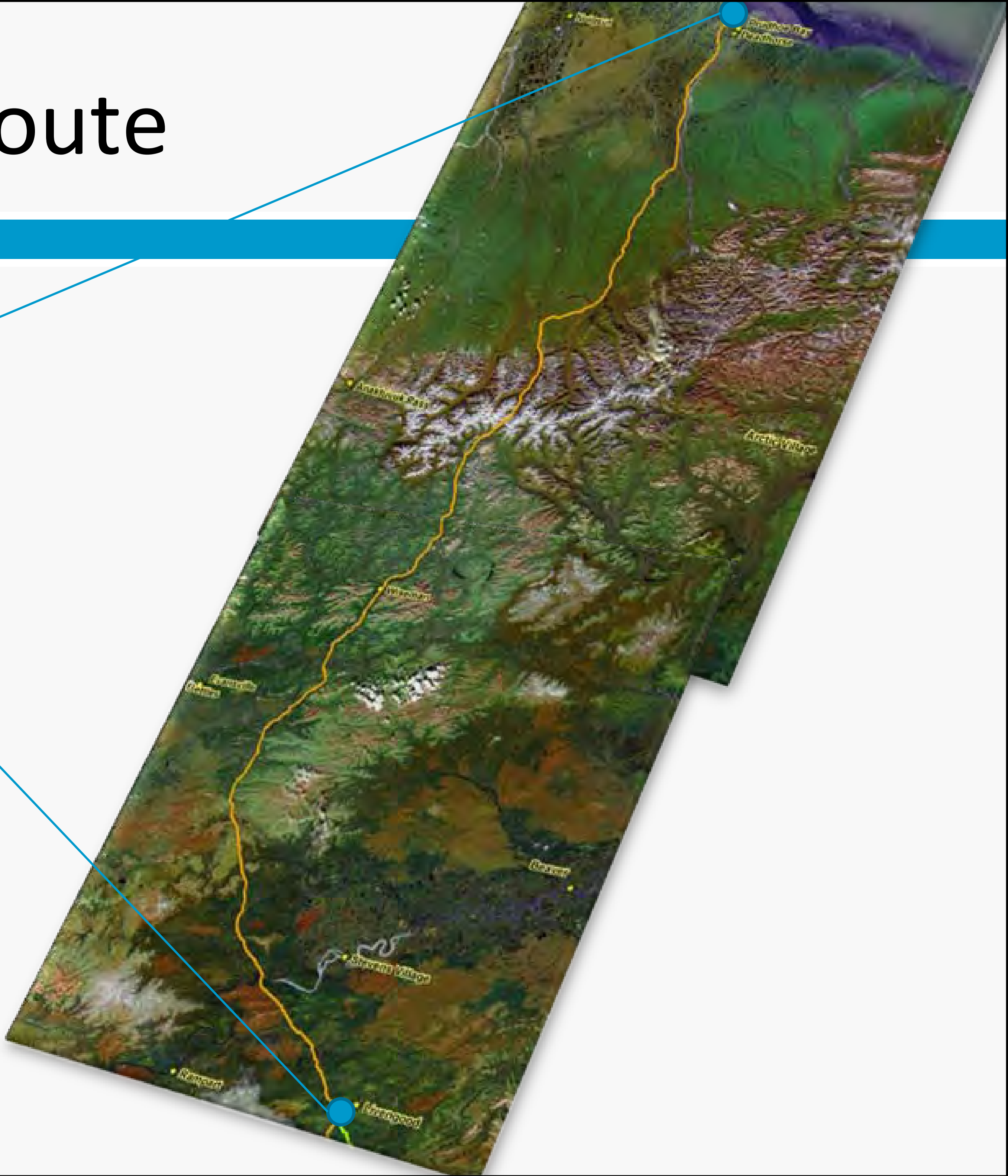


Common Route

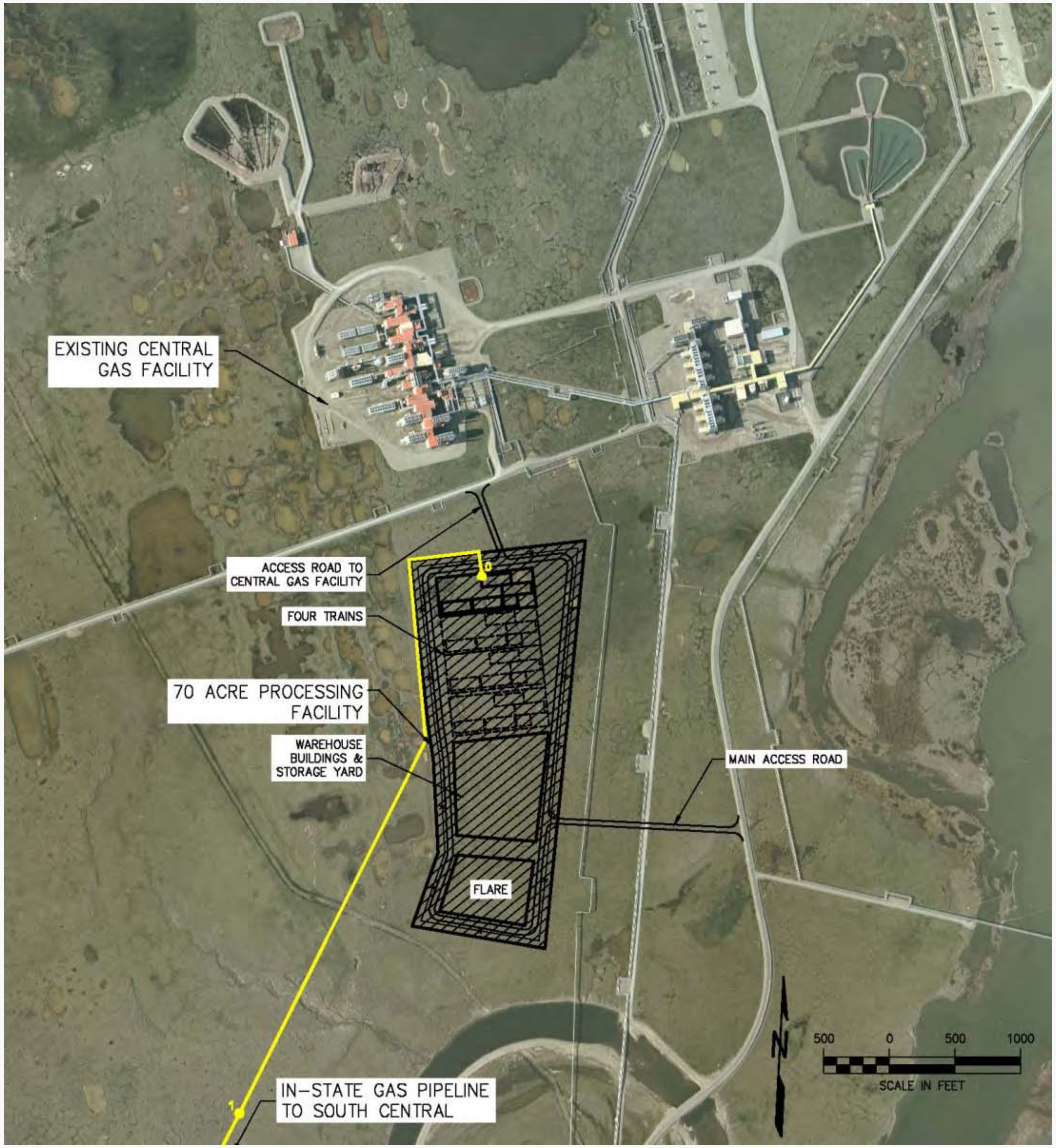
- Prudhoe Bay

  to

- Livengood

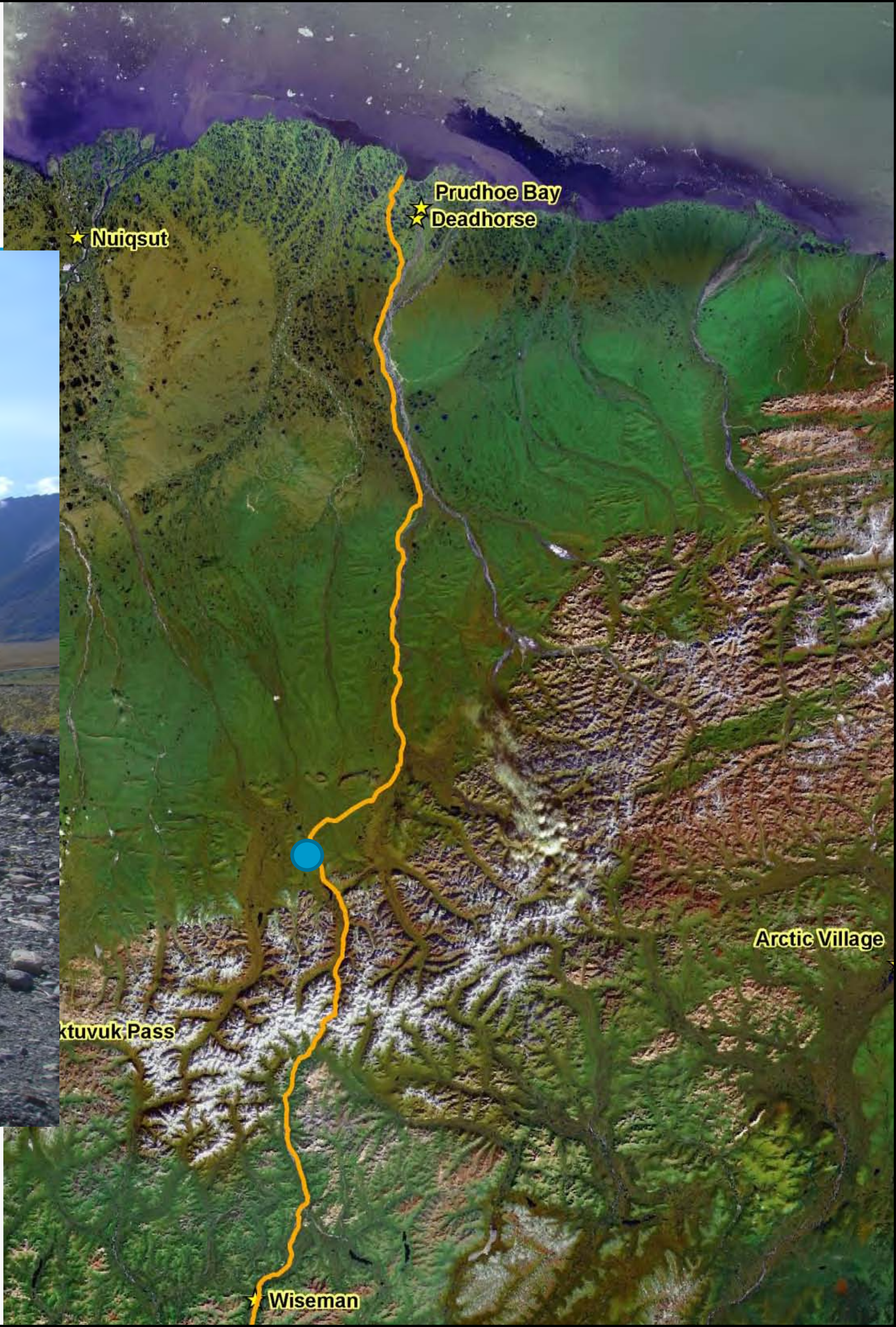


Gas Conditioning Facility – North Slope



North Slope

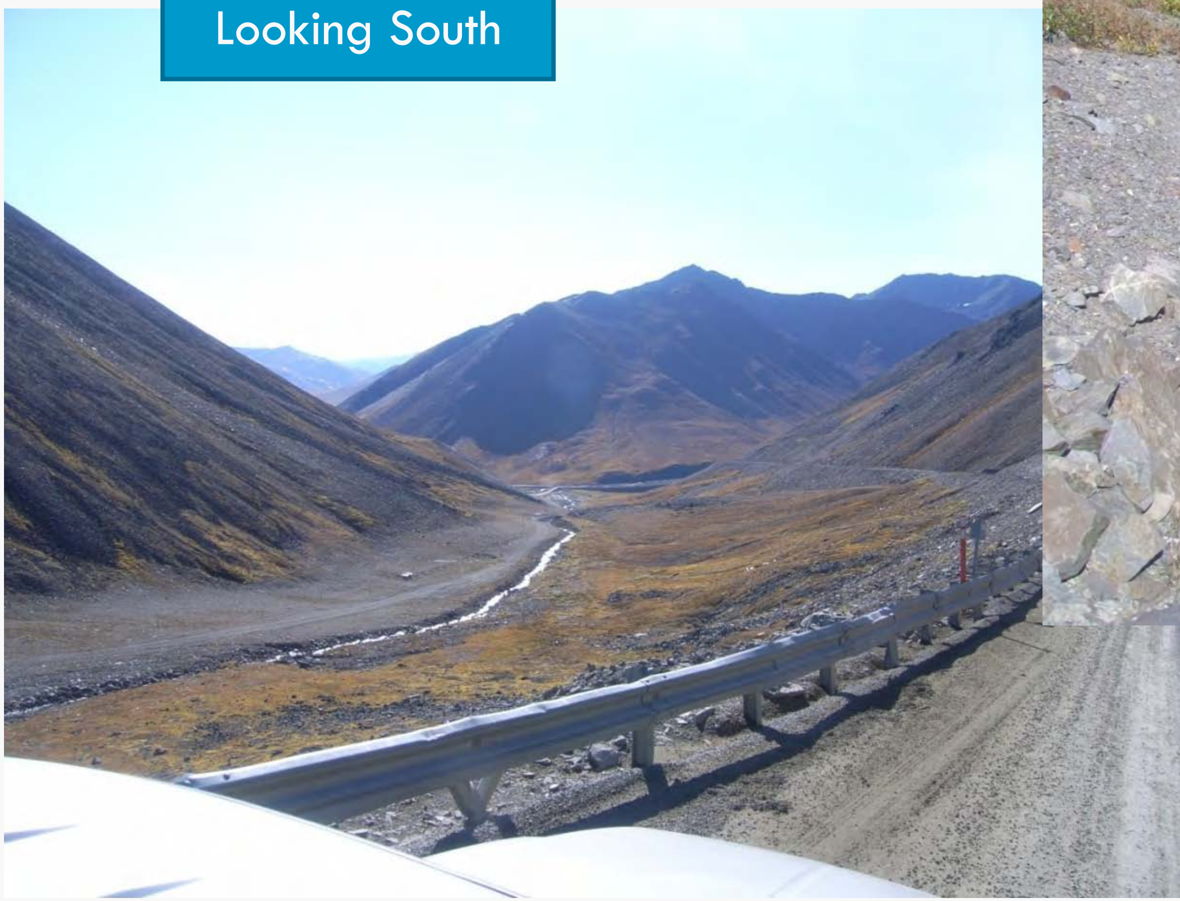
Atigun River Valley



Atigun Pass

Looking North

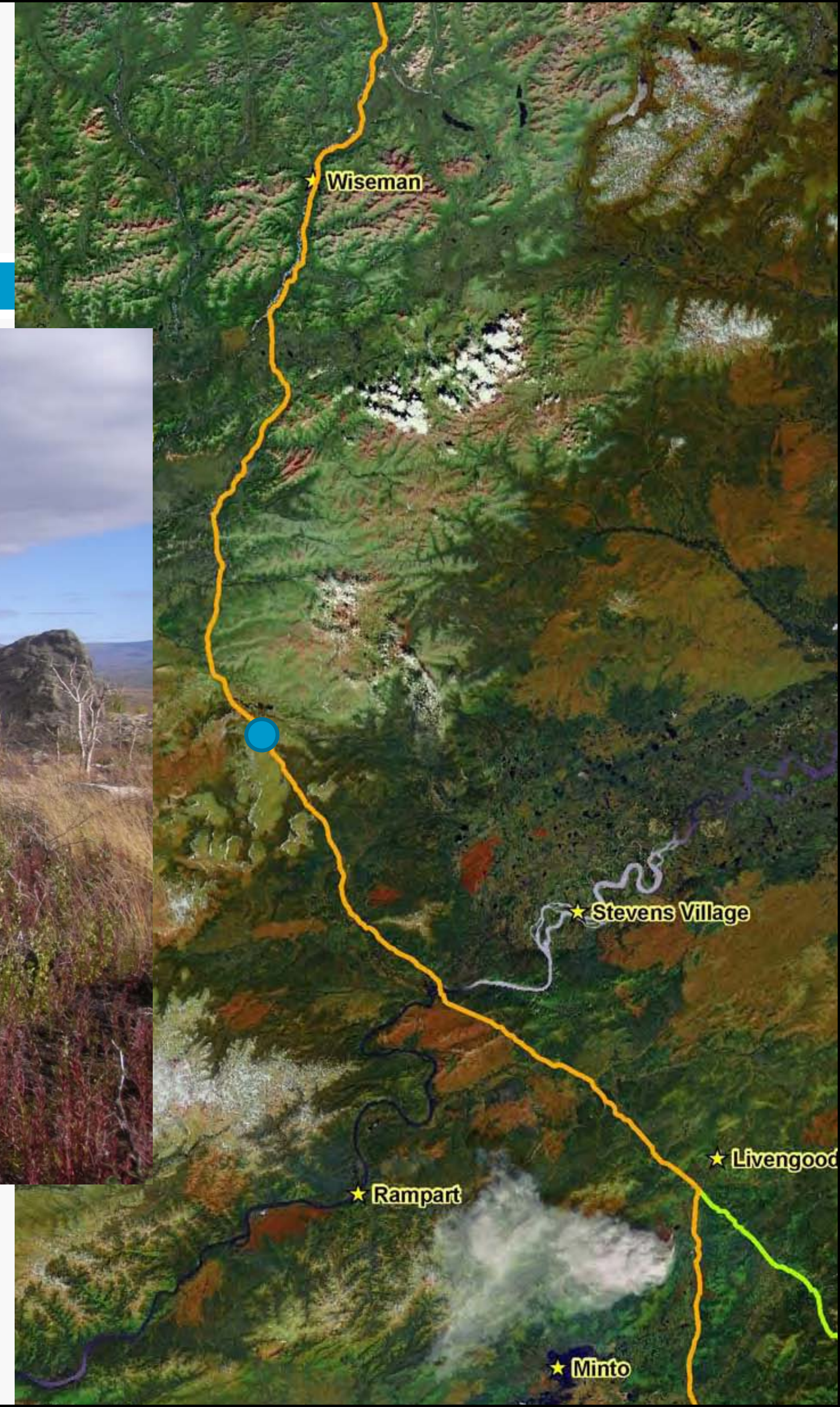
Looking South



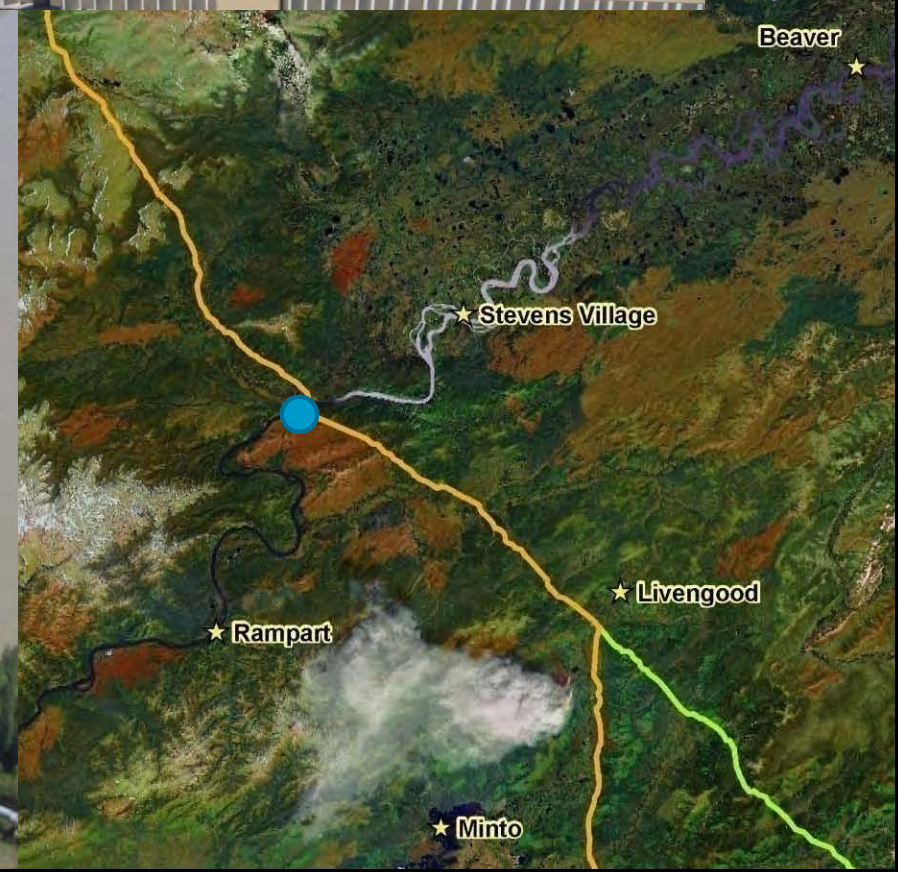
North of Coldfoot

Jim River
North of Prospect

Finger Mountain



Yukon River Bridge



Lost Creek

Parks Highway Stand Alone

- Livengood

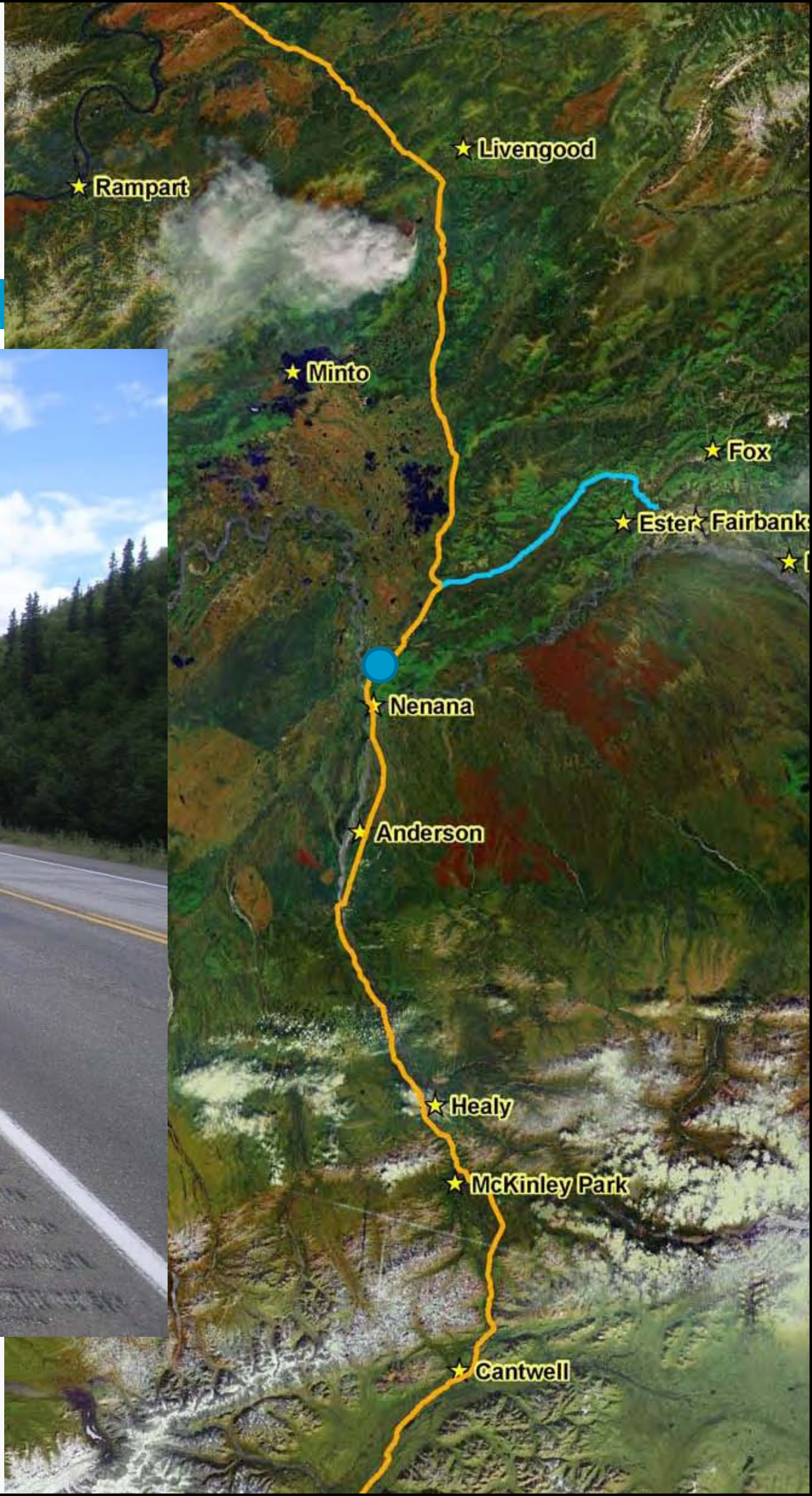
  to

- MP 39 Beluga Pipeline

via Parks Highway

- 12-in diameter pipeline from Dunbar to Fairbanks following Alaska Railroad

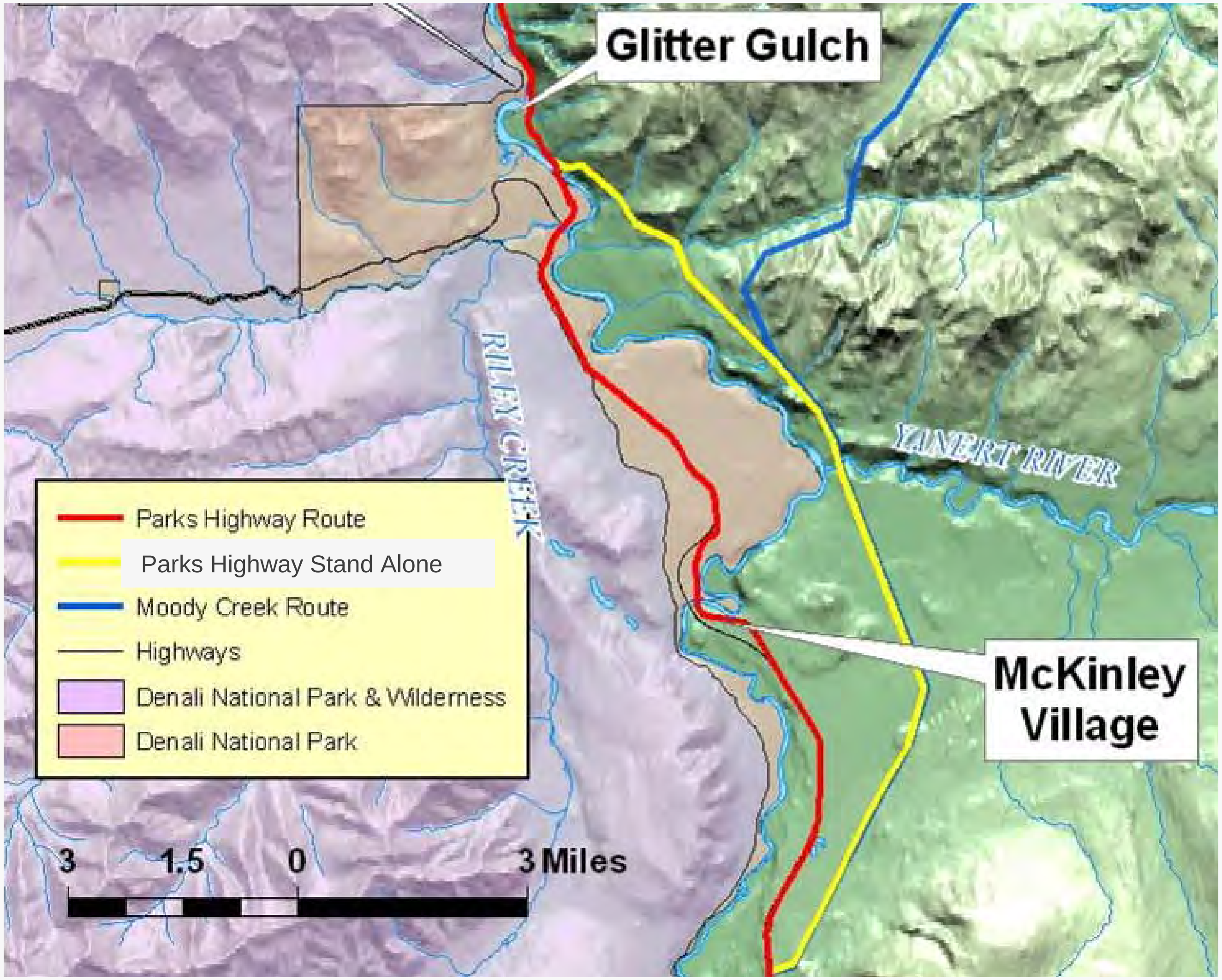
Looking South Up the Nenana Canyon



Denali Village (Glitter Gulch)

Denali National Park & Preserve Area

- Feasible and economic route (Yellow Route) avoids the National Park
- 0.1 mile difference

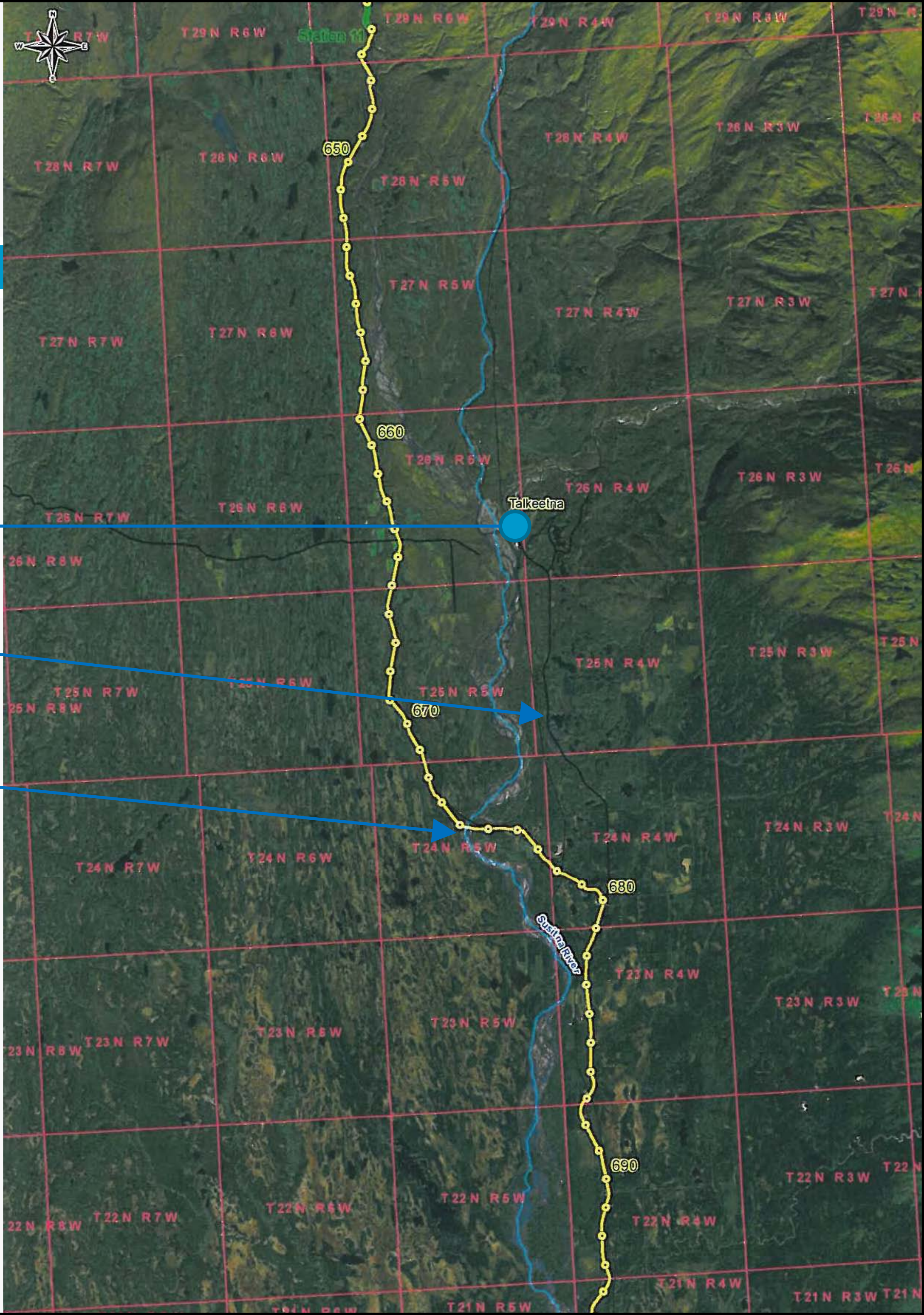


Talkeetna South

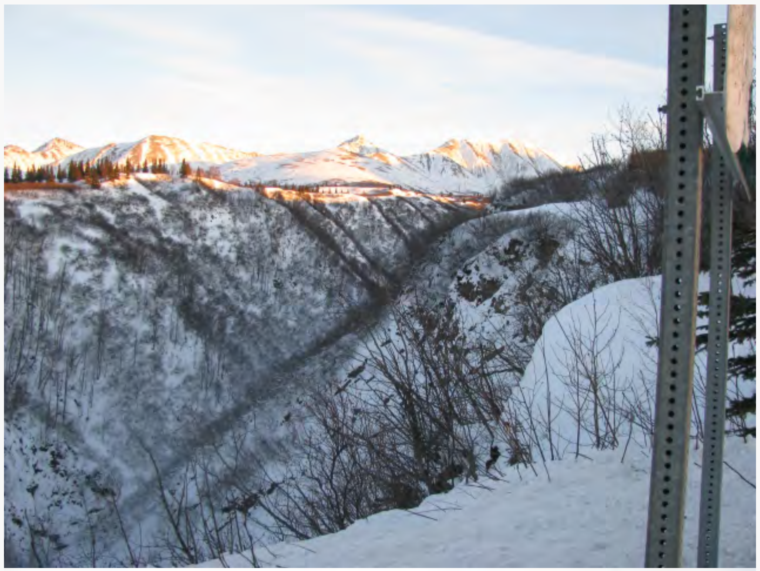
- Pipeline to be located west of Talkeetna

 and Parks Highway

- Crosses Susitna River



Hurricane Gulch (looking north)

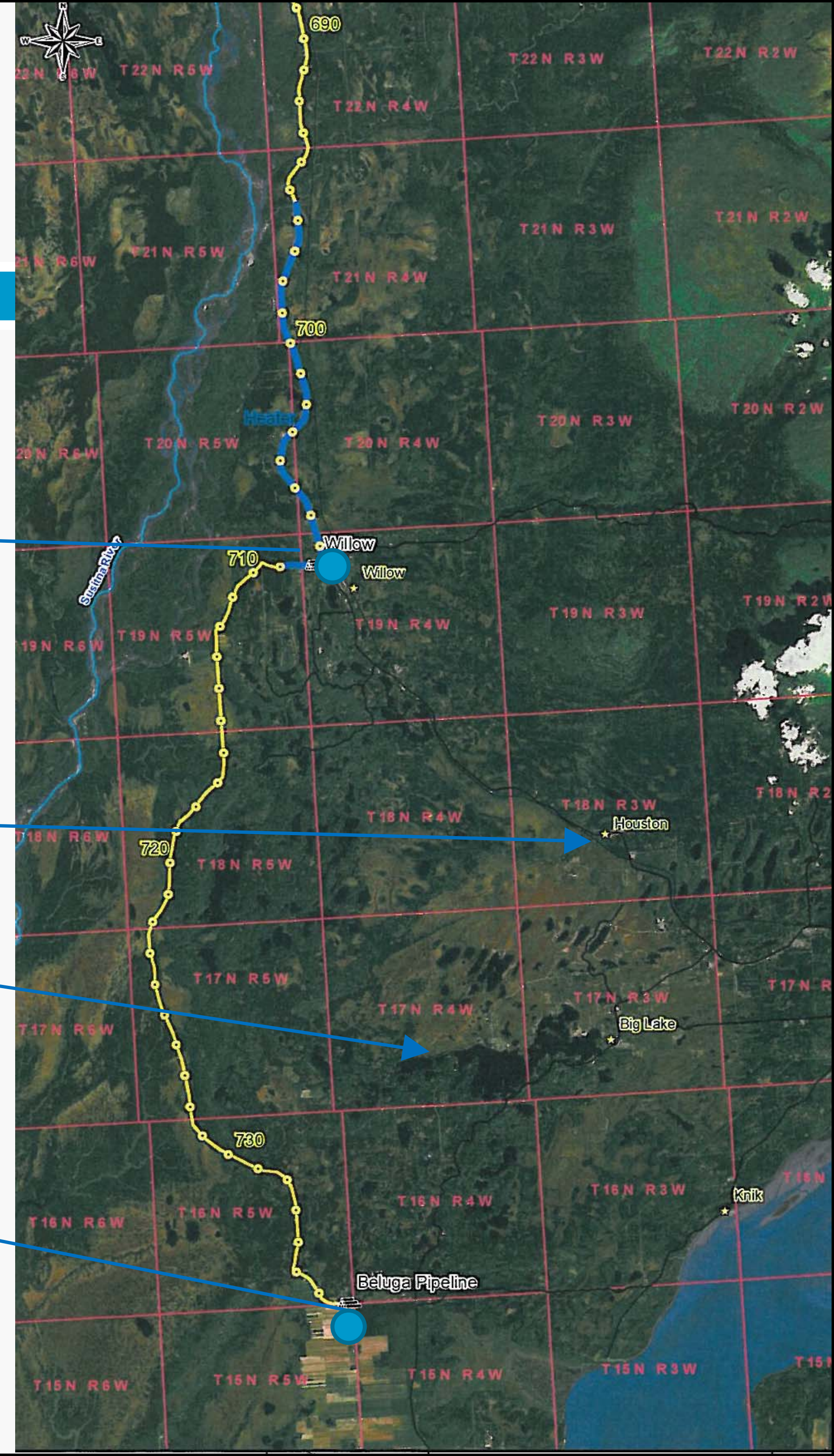


Broad Pass Area

- Pipeline to be located on the east side of the Parks Highway

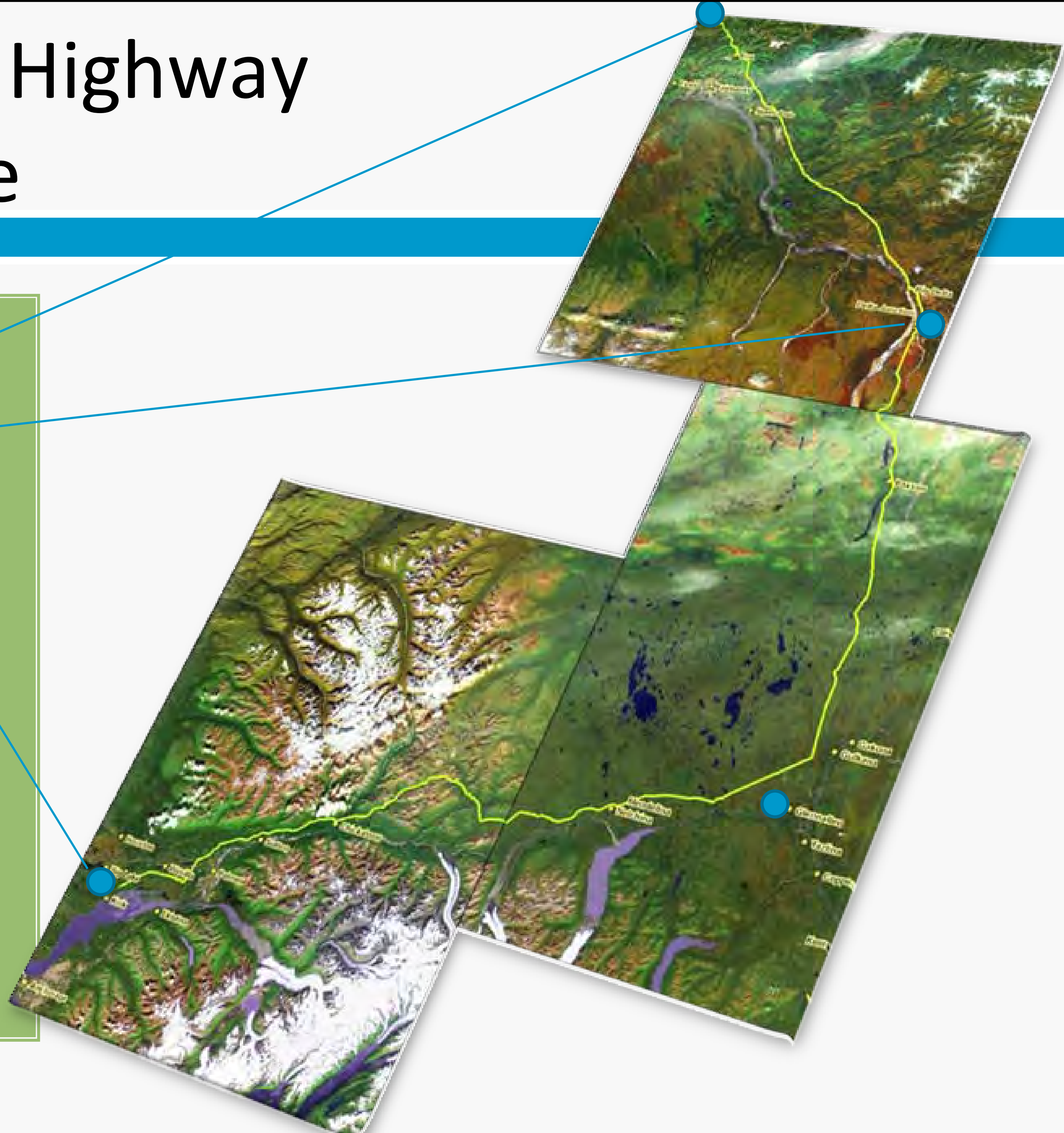
Willow to MP 39 Beluga Pipeline

- Heads west near Willow
- Houston
- Big Lake area
- MP 39 Beluga Pipeline



Richardson Highway Stand Alone

- Livengood to Delta Junction to north of Glennallen
- to MP 39 Beluga Pipeline via Richardson and Glenn Highways



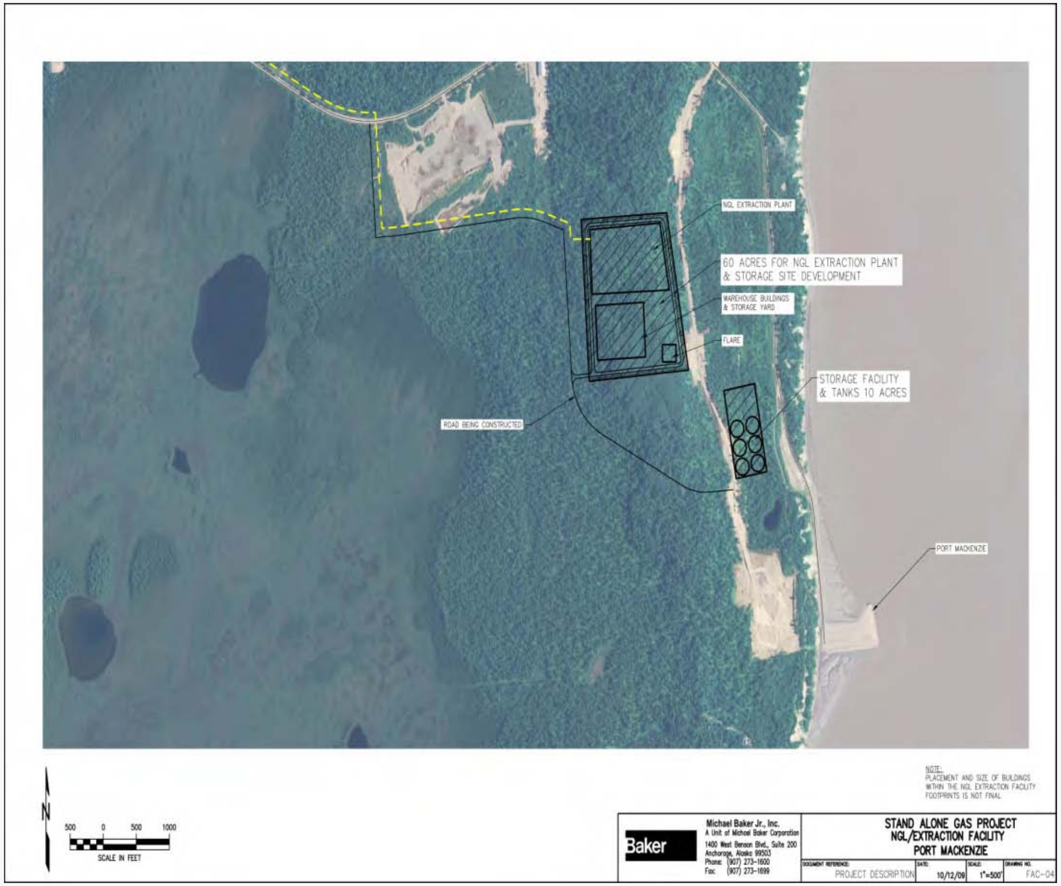
Donnelly Dome

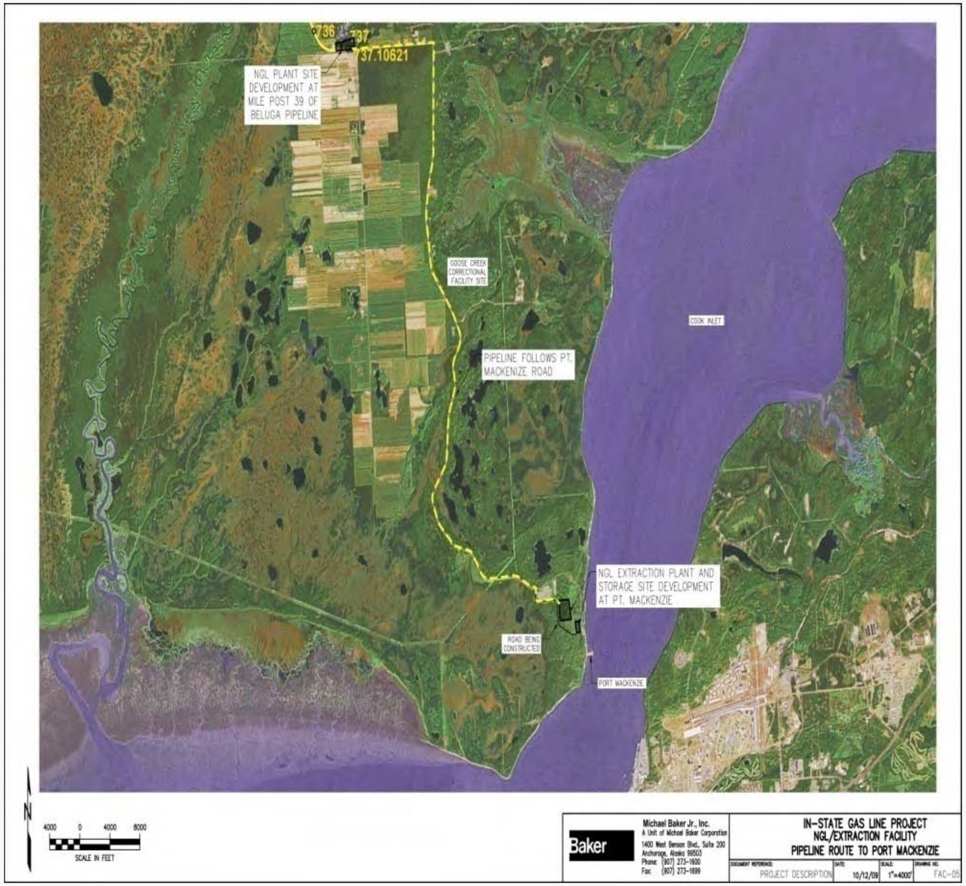
Denali Fault Crossing

Alaska Range

Beluga NGL Facility

Point MacKenzie – NGL Extraction Facility and Pipeline





Stand Alone Route Comparison – Environmental

Routes	Special Land Use Areas (Crossed)	Special Land Use Areas (Adjacent)	Impacted Wetland Acres	Fish Streams
Parks Highway Stand Alone	19	16	1,288	480
Richardson Highway Stand Alone	18	28	1,735	515

- Special Land Use Areas include local, state, and federal parks, recreation areas, and trails.
- No Federally-designated (per ANILCA) Conservation System Units crossed.
- No new permanent public vehicular access roads proposed.

Field Programs

- 2008 – 2009
  - Wetlands
  - Cultural Resources
- 2010
  - Wetlands
  - Cultural Resources
  - Lake Studies
  - Wildlife

Permit Status

- U.S. Army Corps of Engineers Section 404/10
  - Filed November 16, 2009
- State of Alaska Title 38 Right-of-Way
  - Filed November 25, 2009
- Bureau of Land Management Right-of-Way
  - Filed November 25, 2009

Steps in the NEPA Process

- Federal Notice of Intent (NOI) to Prepare an Environmental Impact Statement (EIS)
- Scoping
- Analysis of Alternatives
- Issue Draft EIS
- Public Hearing on Draft EIS
- Public Comment Review and Synthesis
- Respond to Comments/Prepare Final EIS
- Issue Final EIS
- Record of Decision

Ways to Submit Comments

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- Submit comment through the project website: www.ASAPEIS.com
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- Fax to: 907.753.5567
- Mail to:

  Serena E. Sweet
  U.S. Army Corps of Engineers
  CEPOA-RD
  P.O. Box 6898
  Elmendorf AFB, AK 99506-0898

Formal Scoping Period ends **February 5, 2010**

Comments will be accepted any time during the EIS process.

APPENDIX D

Agency Comments

From: Sweet, Serena E POA [Serena.E.Sweet@usace.army.mil]
Sent: Monday, March 08, 2010 6:11 PM
To: Mary Goode
Subject: ASAP EIS Comment
Attachments: COE Ak Stand Alone gas pipeline scoping -ac-3-8-10.pdf

Thank you for your letter regarding the Alaska Stand Alone Pipeline (ASAP) Environmental Impact Statement (EIS). Your comments have been placed in the official record and will be given full consideration during the EIS development process.

If you have any questions, you may contact Ms. Serena Sweet (Lead Project Manager, U.S. Army Corps of Engineers) by phone at (907) 753-2819, or toll free from within Alaska at (800) 478-2712, or by email at serena.e.sweet@usace.army.mil.

For additional information regarding the ASAP EIS process, please visit the project website at www.asapeis.com.

-----Original Message-----
From: Mary Goode [mailto:Mary.Goode@noaa.gov]
Sent: Monday, March 08, 2010 11:59 AM
To: Sweet, Serena E POA
Subject: PDF AK Stand alone gas Pipeline PDF

--
Mary B. Goode
Administrative Assistant
NOAA Fisheries, Alaska Region
mary.goode@noaa.gov
(907) 586-7636

UNITED STATES DEPARTMENT OF COMME
National Oceanic and Atmospheric Administra
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

March 8, 2010

USACE
RECEIVED
MAR 1 1 2010
AK REGULATORY

Colonel Reinhard W. Koenig
District Engineer, Alaska District
U.S. Army Corps of Engineers
P.O. Box 898
Anchorage, AK 99513

Re: POA 2009-651
Alaska Stand Alone Gas Pipeline Project
Scoping Comments

Attn: Serena Sweet

Dear Colonel Koenig:

The National Marine Fisheries Service (NMFS) has reviewed the request for scoping comments on the proposed Alaska Stand Alone Gas Pipeline (ASAP) Project. NMFS offers the following comments under the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), and Essential Fish Habitat (EFH) provisions of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

Background

Prior to this scoping notice, NMFS reviewed the State of Alaska Draft 11-16-2009 Stand Alone Gas Pipeline Project Description/ Plan of Development and the U.S. Army Corps of Engineers (Corps) Notice of Intent to Prepare a Draft Environmental Impact Statement (DEIS) for the State of Alaska's Proposed Alaska Stand Alone Pipeline (ASAP) Natural Gas Transportation Pipeline [Federal Register / Vol. 74, No. 232 / Friday, December 4, 2009]. The State of Alaska proposes to develop a gas pipeline system to transport natural gas, and possibly additional natural gas liquids (NGL), from the North Slope to in-state Alaska markets. Two primary sources of natural gas have been identified as 1) residue gas from the Prudhoe Bay Central Gas Facility (CGF) and 2) produced gas from the Gubik field located in the northern foothills of the Brooks Range. A third potential source is the CGF stabilizer overhead vapor that is currently being re-injected for enhanced oil recovery on the North Slope.

Two alternative routes are proposed and begin at the two primary potential gas sources, then follow the same alignment from the North Slope to Livengood, Alaska (approximately 80 miles north of Fairbanks). The two alternative routes diverge at Livengood. One alternative, the Parks Highway Stand Alone Route, is from Prudhoe Bay to Livengood, then to Cook Inlet. The line generally follows the Parks Highway and includes service to Fairbanks. The second alternative, the Richardson Highway Stand Alone Route, is from Prudhoe Bay to Livengood to Fairbanks, and then generally follows the Trans Alaska Pipeline (TAPS) alignment to Delta Junction. The line then extends to north of Glennallen (via the Richardsen Highway), then to Cook Inlet via the Glenn Highway. This route includes service to Glennallen. Both routes end at Mile Post 55 of the Beluga Pipeline. In addition, the Corps NOI notes two spur line options and two pre-build options as take-off points for any subsequent Alaska-Canada Gas line.

Proposed work includes the construction, operation and maintenance of a 24-inch diameter, high pressure natural gas pipeline system extending about 750 miles from the North Slope of Alaska to the Cook Inlet area. Various project components include pipelines, compressor stations, metering stations, regional operation and maintenance centers, gas conditioning facilities at Prudhoe Bay, natural gas liquid (NGL) extraction facilities in Fairbanks, and NGL extraction, fractionation and storage facilities in Cook Inlet. The project also includes numerous temporary facilities used for construction and staging, such as material sites, access roads, work pads, and construction camps.

The pipeline will longitudinally bisect Alaska from north to south (similar to the existing Trans-Alaska oil pipeline) and cross mountain ranges, vast muskeg and tundra areas, rivers, numerous anadromous fish bearing streams and terminate at marine headlands. The line will be routed near existing infrastructure wherever possible.

Threatened and Endangered Species / Marine Mammals

NMFS has management responsibility for all marine mammals in Alaska except sea otter, walrus, and polar bear, including several species listed as threatened or endangered under the Endangered Species Act. Section 7(a)(2) of the ESA directs federal interagency cooperation "to insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species" or result in the destruction or adverse modification of critical habitat.

The ASAP draft project description/ plan of development notes that 60 acres of Port Mackenzie would be used for NGL extraction and handling facilities. On page 3-15, the document also notes that "depending on the volume of NGL products, it may be necessary to locate the NGL fractionation and storage facilities at tidewater to allow product loading into ocean going vessels." In October 2008, NOAA listed the Cook Inlet beluga whales as endangered. Also, on December 1, 2009, NOAA proposed critical habitat for the Cook Inlet beluga whales. Please be advised that the Cook Inlet beluga whales have been observed in the waters adjacent to the project's Port Mackenzie component and must be considered when evaluating the effects of this project. This portion of Cook Inlet also includes proposed Critical Habitat for Cook Inlet beluga whales. Please visit our web sites http://www.nmfs.noaa.gov/pr/species/esaspecies.htm, http://www.fakr.noaa.gov/ for additional information.

The Marine Mammal Protection Act of 1972 prohibits, with few exceptions, injury, harm or harassment of marine mammals. Under the 1994 Amendments to the MMPA, harassment isdefined as any act of pursuit, torment, or annoyance which has the potential to injure or disturb a marine mammal causing disruption of behavioral patterns including migration, breathing, nursing, breeding, feeding or sheltering. Any unintentional and incidental take of marine mammals by U.S. citizens may be authorized under section 101 (a)(5) of the MMPA. Further information on this program may be found at our web site: http://www.nmfs.noaa.gov/pr/permits/incidental.htm.

Essential Fish Habitat

Section 305(b)(2) of the Magnuson-Stevens Act requires federal agencies to consult on all actions or proposed actions authorized, funded, or undertaken by the agency that may adversely affect EFH. If a federal action agency determines that an action will not adversely affect EFH, no consultation is required, and the federal action agency is not required to contact NMFS about their determination. Please see our website for more information: http://www.fakr.noaa.gov/habitat/efh.htm .

EFH resources within the pipeline corridor include freshwater life stages of Pacific salmon species. EFH resources at marine terminal facilities may include sculpin, Pacific cod, walleye pollock, sand lance, eulachon, and marine life stages of Pacific salmon.

General Comments

NMFS looks forward to receiving more information about the Point Mackenzie aspect of the project. The project's DEIS should address any necessary harbor work, increased vessel traffic, and possible future interactions with any other foreseeable developments in Cook Inlet.

With regard to EFH, NMFS encourages the use of horizontal directional drill crossing methods for buried pipeline and when necessary aerial crossings for unburied pipeline for stream and river crossings. NMFS also encourages that in-water construction avoid times when Pacific salmon concentrate in freshwater areas and occur when activities pose the least impact on sensitive habitats.

In addition, NMFS recommends including specific information in the DEIS on the amount and locations of possible water intakes and/or discharges which may be associated with the NGL extraction facilities. Specifically, NMFS is concerned with any potential water withdraws or discharges into streams and marine waters.

Thank you for the opportunity to coordinate and comment early in the process. We look forward to receiving future updates on the project and to offering additional comments. Should you have any questions, please contact LT Amy Cox by email at amy.b.cox@noaa.gov, or by telephone at (907) 271-6620.

Sincerely,

James W. Balsiger, Ph.D
For Administrator, Alaska Region

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g/COE/2010/HCD/Amy Cox/Alaska Stand Alone Pipeline (ASAP) Scoping Comments 3-8-10

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF
ECOSYSTEMS, TRIBAL AND
PUBLIC AFFAIRS

March 8, 2010

Ms. Serena Sweet, Project Manager
U.S. Army Corps of Engineers
CEPOA-RD
Post Office Box 6898
Elmendorf AFB, Alaska 99506-0898

Ref: 09-054-DOD

RE: SCOPING COMMENTS - U.S. Army Corps of Engineers Alaska Stand Alone Pipeline (ASAP) Natural Gas Transportation Project Environmental Impact Statement Proposed by the State of Alaska

Dear Ms. Sweet:

The U.S. Environmental Protection Agency (EPA) has reviewed the Notice of Intent (NOI) to prepare a Draft Environmental Impact Statement (EIS) for the State of Alaska's Proposed **Alaska Stand Alone Pipeline (ASAP) Natural Gas Transportation Pipeline** published in the *Federal Register (Vol. 74, No. 232; December 4, 2009).* Our review of the NOI was conducted in accordance with our responsibilities as a Cooperating Agency, and pursuant to the National Environmental Policy Act (NEPA), Clean Air Act (CAA) Section 309, and the Clean Water Act.

Section 309 of the CAA specifically directs the EPA to review and comment in writing on the environmental impacts associated with all major federal actions. Under our Section 309 authority, our review of the Draft EIS that will be prepared for the proposed project will consider the expected environmental impacts, and the adequacy of the EIS in meeting procedural and public disclosure requirements of NEPA.

According to the NOI, the State of Alaska is proposing to construct a 24-inch diameter, high-pressure pipeline from Alaska's North Slope to Cook Inlet in order to transport North Slope natural gas to in-state markets. The pipeline would be located entirely within the State of Alaska. Gas off-take would be provided for the Fairbanks Area and in other locations along the route. The project includes a Gas Conditioning Plant (GCP) on the North Slope, compressor stations along the pipeline route, and natural gas liquid (NGL) extraction facilities to produce utility grade natural gas. The Corps is the lead agency on this project. The Bureau of Land Management (BLM), National Park Service, and EPA are cooperating agencies.

We appreciate the opportunity for early involvement in the planning process by providing scoping comments on the proposed ASAP Project. The attached detailed comments (Enclosure 1) are provided to inform the U.S. Army Corps of Engineers (Corps) of issues that warrant consideration during the planning process for the EIS. In providing these comments, it is our goal to have these issues addressed in the draft EIS.

As a Cooperating Agency, we would appreciate continued early coordination and involvement with your office throughout the development of this EIS. We would be available to work with your agency to review and comment on preliminary sections of the document. If you have any questions regarding our comments, please do not hesitate to contact me at (907) 271-3411 or by email at jen.mark@epa.gov. We look forward to continued involvement in this important project.

Sincerely,

Mark S. Jen, Project Manager
Environmental Review and Sediment Management Unit

Enclosures

ENCLOSURE 1

EPA Region 10
Scoping Comments for the Alaska Stand Alone Pipeline (ASAP) Natural Gas Transportation Project

Purpose and Need

EPA recommends that the EIS include a clear and concise statement of the underlying purpose and need for the proposed project, consistent with the implementing regulations for NEPA (see 40 CFR 1502.13). In presenting the purpose and need for this project, the EIS should reflect not only the applicant's purpose and need, but also the broader public interest and need. Given the size of this project area, a concise statement is of critical importance in developing the analysis of alternatives, which could range from being narrowly focused to too broad depending on how the purpose and need statement is written.

In supporting the statement of purpose and need, the EIS should discuss the proposed project in the context of the Alaska energy market, including identification of existing gas providers and sources, public and private demands, existing and proposed natural gas transmission systems, and clearly describe how the need for the proposed action has been determined.

Range of Alternatives

Alternatives Criteria Development

EPA recommends that the EIS identify specific criteria that would be used to (1) develop a range of reasonable alternatives, (2) eliminate alternatives considered, (3) identify the environmentally preferred alternative, and (4) select the agency preferred alternative. For example, criteria could be based on factors such as conservation of important aquatic and terrestrial habitats, maintaining wildlife and fish passage, economics, subsistence resources, public safety, etc. The alternatives criteria should also incorporate substantive issues identified during the public scoping process, and tribal consultation. The EIS should provide the rationale and basis for how these criteria were developed.

Range of Reasonable Alternatives

EPA recommends that the EIS include a range of reasonable alternatives that meet the stated purpose and need for the project and that are responsive to the issues identified during the scoping process and through tribal consultation. A range of reasonable alternatives will ensure that the EIS provides the public and the decision-maker with information that sharply defines the issues and identifies a clear basis for choice among alternatives as required by NEPA. The Council on Environmental Quality (CEQ) recommends that all reasonable alternatives be considered, even if some of them could be outside the capability or the jurisdiction of the agency preparing the EIS for the proposed action. We recommend the Corps evaluate other transportation systems to distribute natural gas between the North Slope and south central/interior regions of Alaska, depending on the purpose and need of the project.

The environmental impacts of the proposal and alternatives should be presented in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision-maker and the public. The potential impacts of each alternative should be quantified to the greatest extent possible. We recommend listing each alternative action's impacts and corresponding mitigation measures in a summary format. EPA encourages selection of practicable alternatives that will avoid and minimize environmental degradation.

Cost Benefit Analysis

We recommend that a general life cycle economic cost analysis be developed for each alternative, which would be used as a comparison in evaluating choices among the action alternatives against the proposed action. The Clean Water Act §404(b)(1) Guidelines require this information in order to determine the practicability of the alternatives in meeting the least environmentally damaging practicable alternative (LEDPA) threshold. This economic cost analysis should be developed early in the planning process and incorporated into the EIS.

Preferred Alternative

Least Environmentally Damaging Practicable Alternative (LEDPA)

To integrate the procedural requirements of NEPA and the requirements of the Clean Water Act, EPA recommends that the Preferred Alternative complies with the Clean Water Act §404(b)(1) Guidelines, which allow only the Least Environmentally Damaging Practicable Alternative (LEDPA) to be issued a Section 404 permit. To expedite the Section 404 permitting process, EPA recommends that a draft §404(b)(1) compliance determination be included in the EIS as an Appendix.

As required under the CWA 404(b)(1) Guidelines, the EIS should discuss alternatives to avoid and minimize potential impacts to wetlands and aquatic resources. For those unavoidable wetland impacts, compensatory mitigation should be evaluated. The EIS should include:

- Acreage and habitat type of waters of the U.S. that would be created or restored.
- Water sources to maintain the mitigation area.
- Re-vegetation plans, including the numbers and species to be planted, as well as special techniques that may be necessary for planting.
- Maintenance and monitoring plans, including performance standards to determine mitigation success.
- Size and location of mitigation zones.
- Parties that would be ultimately responsible for the plan's success.
- Contingency plans that would be enacted if the original plan fails.

The EIS should also discuss the project's compliance with the *Compensatory Mitigation for Losses of Aquatic Resources; Final Rule* (commonly referred to as the Final Mitigation Rule). The regulations establish performance standards and criteria for the use of permittee-responsible compensatory mitigation, mitigation banks, and in-lieu programs to improve the quality and success of compensatory mitigation projects for activities authorized by Corps permits. The EIS should include a compensatory mitigation plan that evaluates the appropriate level of compensation based on the functional assessment of unavoidable wetland impacts.

Integrating In-State Gas Pipeline Projects

On March 13, 2010, EPA provided your office with scoping comments on the Beluga to Fairbanks (B2F) Natural Gas Transportation Pipeline EIS proposed by the Alaska Natural Gas Development Authority (ANGDA). The State of Alaska is the applicant for both the B2F and ASAP projects. The purpose and need for both projects appear to be similar. The ASAP EIS would evaluate alternative pipeline route alignments and configurations that include the B2F pipeline route. Consistent with NEPA, we recommend the Corps integrate the planning and environmental review procedures for both the ASAP and B2F pipeline projects so that both projects run concurrently rather than consecutively. This could be accomplished through the development of a single comprehensive EIS to evaluate the environmental effects of both the ASAP and B2F pipeline projects.

Air Quality

We recommend the EIS provide a detailed discussion of the ambient air conditions (baseline or existing conditions), National Ambient Air Quality Standards (NAAQS), and criteria pollutant non-attainment areas within the pipeline corridor and adjacent project areas. The EIS should estimate emissions of criteria pollutants for the pipeline corridor, as well as ancillary facilities, mobile and non-mobile sources from construction and operation phases, and discuss the timeframe for release of these emissions over the entire lifespan of the project.

EPA recommends the EIS include analysis of the potential impacts to air quality (including cumulative and indirect impacts) from the project, especially during construction. The EIS should identify specify emission sources, such as the GCP, NGL and Fractionation Facilities, Compressor Stations, etc. and quantify these emissions. Such an evaluation is necessary to assure compliance with State and federal air quality regulations, State Implementation Plans (SIPs), and to disclose the potential impacts from temporary or cumulative degradation of air quality. The EIS should include:

- Detailed information about ambient air conditions, NAAQS, and criteria pollutant non-attainment areas in all areas considered for the pipeline corridor and ancillary facilities;
- Data on emissions of criteria pollutants from the proposed project and discuss the timeframe for release of these emissions over the lifespan of the project;
- Specific information about pollutant from mobile sources, stationary sources, and ground disturbance. This source specific information should be used to identify appropriate mitigation measures and areas in need of the greatest attention; and
- An Equipment Emissions Mitigation Plan that identifies actions to reduce diesel particulate, carbon monoxide, hydrocarbons, and NOx associated with construction activities;

<u>General Conformity Analysis</u>

EPA has designated a boundary for the Fairbanks area resulting from the non-attainment of the NAAQS for $PM_{2.5}$ (fine particulate matter that is 2.5 micrometers in diameter or smaller). The CAA requires a general conformity analysis be conducted for any project emissions occurring in an area designated as nonattainment or maintenance from the NAAQS. As part of the analysis, a determination should be made that the emissions (either direct or indirect) from a federal action will not exceed a *de minimis* threshold level (measured in tons per year) for the criteria pollutant of concern ($PM_{2.5}$). If the determination indicates that the proposed ASAP project could contribute to the exceedence of the *de minimis* level, then a general conformity analysis is required to document how the federal action will affect implementation of the Alaska State Implementation Plan (SIP) to reach attainment for $PM_{2.5}$. EPA recommends the EIS discuss whether general conformity analysis is required (i.e., whether the relevant emissions for $PM_{2.5}$ exceed the *de minimis* thresholds) and how the proposed action would comply with the Alaska SIP. If a general conformity analysis is necessary, we recommend that it be integrated with the NEPA process and incorporated into the EIS.

Class I Designation

In Alaska, Denali National Park and Preserve is the only national park designated as Class I under the Clean Air Act (CAA) due to the special features of the area. Federal Class I areas have special protection under the CAA Prevention of Significant Deterioration (PSD) program. The purpose of the PSD program is "to preserve, protect and enhance the air quality in national parks, wilderness areas and other areas of natural, recreational, scenic or historic values and to insure economic growth will occur in a manner consistent with the preservation of existing clean air resources." (42 U.S.C. 7470). As proposed, the ASAP route alignment paralleling to the Parks Highway may extend adjacent to or within Denali National Park and Preserve. Depending on the route location and proximity of the pipeline from the Class I area, a PSD review for pollutants, which could impact the air quality of Denali National Park and Preserve may be required. If a PSD review for pollutants is necessary for this project, then we recommend that it be integrated with the NEPA process and incorporated into the EIS.

Water Resources

§303(d) Listed Water Bodies

Water quality degradation is one of EPA's primary concerns. CWA §303(d) requires States to identify water bodies that do not meet water quality standards and to develop water quality restoration plans to meet established water quality criteria and associated beneficial uses. We recommend the EIS disclose which water bodies may be impacted by the project, the nature of potential impacts, and specific pollutants likely to impact those waters. The EIS should also report those water bodies potentially affected by the project that are listed on the Alaska's most current EPA approved §303(d) list. The EIS should describe enhancement efforts for those waters, how the proposed project will coordinate with on-going protection efforts, and any mitigation measures that will be implemented to avoid further degradation of impaired waters.

Source Water Protection

Public drinking water supplies and/or their source areas often exist in many watersheds. It is possible that source water areas may exist within watersheds in which the ASAP pipeline and associated facilities would be located. Source water is from streams, rivers, lakes, springs, and aquifers, which is used as a supply of drinking water. Source water areas are delineated and mapped by the states for each federally-regulated public water system. The 1996 amendments to the Safe Drinking Water Act (SDWA) require federal agencies to protect sources of drinking water for communities. As a result, state agencies have been delegated responsibility to conduct source water assessments and provide a database of information about the watersheds and aquifers that supply public water systems.

Since construction and operation of the ASAP project may impact sources of drinking water, EPA recommends that the Alaska Department of Environmental Conservation (ADEC) be contacted to identify source water protection areas within the project area. Typical databases may contain information of the watersheds and aquifer recharge areas, the most sensitive zones within those areas, and the numbers and types of potential contaminant sources identified for each system. The EIS document should:

- Identify all source water protection areas within the project area;
- Identify all activities that could potentially affect source water areas;
- Identify all potential contaminants that may result from the proposed project; and
- Identify all measures that would be taken to protect the source water protection areas in the EIS.

Storm Water Management

Under the CWA, any construction project disturbing a land area of one or more acres requires a construction storm water discharge permit for industrial activities under the Alaska Pollutant Discharge Elimination System (APDES) permit program. The EIS should document the project's consistency with applicable storm water permitting requirements and should discuss specific BMPs, erosion and sediment control mitigation measures that may be necessary or beneficial in reducing adverse impacts to surface water quality. Additionally, if the discharge of pollutants from a point source into waters of the U.S. will be necessary, appropriate APDES requirements should be discussed as well.

Anti-degradation Provisions

Anti-degradation provisions of the CWA apply to those water bodies where water quality standards are currently being met. This provision prohibits degrading water quality unless an analysis shows that important economic and social development necessitates degrading water quality. The EIS should indicate how the anti-degradation provisions would be met.

Water Body Crossings

EPA recommends alternatives for pipeline crossing major streams and rivers which would minimize adverse impacts to fisheries and subsistence resources, such as vertical support members, trenching, horizontal directional drilling (HDD), ultra extended reach drilling, and bridges. The EIS should include an analysis of impacts associated with each type of pipeline crossing. We encourage the incorporation of pipeline HDD for major stream crossings. The EIS should adequately characterize the stream/river crossing and identify the types of construction or structure that would be implemented for specific types of waterbody crossings.

Wetlands and other Aquatic Resources

EPA recommends the EIS describe all types of waters of the United States that could be affected by the proposed project and alternatives, and include maps that clearly identify all waters within the project area. The discussion should include acreages, habitat types, values, and functions of these waters. For each alternative pipeline route alignment evaluated in the EIS, we recommend that jurisdictional waters be mapped using aerial interpretation within a minimum 1,000-ft wide corridor. Field delineation of wetlands should be conducted within a minimum 300-ft wide corridor. This is consistent with requirements agreed to for other pipeline projects in Alaska. The EIS should identify and describe the methodology for evaluating wetlands condition and functional assessment consistent with determining compensatory mitigation.

Dredging and Open Water Disposal

EPA recommends the EIS describe how construction and infrastructure materials and modules would be mobilized for this project. For example, the proposed 70-acres Gas Conditioning Plant (GCP) in Prudhoe Bay may require sealift transport to the North Slope and subsequent dredging of a navigational channel. If marine dredging and ocean disposal would be required for this project, please coordinate with EPA pursuant to the Marine Protection, Research, and Sanctuaries Act (MPRSA). If dredging will be required for this project, then the EIS should evaluate the effects of dredging and dredge material disposal on the marine environment. Based on the types of dredging methods proposed, the environmental impacts should be disclosed and mitigation measures identified. The EIS should evaluate ocean disposal sites, upland disposal and/or open water disposal of dredged material. A dredging plan should be developed and included in the EIS. If site designation for open water disposal is required by EPA under §102 MPRSA, then please coordinate early with our office.

Hazardous Materials

EPA recommends the EIS address potential direct, indirect and cumulative impacts of hazardous materials from construction and operation of the project. Natural gas would be transported through communities, as well as rural, unincorporated areas. Although pipeline transport is presumed to be safe, the risk of possible accidental releases of natural gas to the environment is real. Therefore, the EIS should describe measures that will be taken to minimize the chances of such an accident, and emergency planning, response, and clean up measures that would be taken should an accident occur.

We recommend the EIS address the applicability of state and federal hazardous waste requirements, and appropriate mitigation measures to minimize the generation of hazardous materials. The requirements should be consistent with the Natural Gas Pipeline Safety Act (see http://ops.dot.gov/init/partner/partnership.htm). The EIS should also address the issue of spill and leak prevention, planning, and clean up.

Invasive Species

If pesticides and herbicides will be applied during construction, operation, and maintenance of the project, we recommend the EIS address any potential toxic hazards related to the application of the chemicals, and describe what actions will be taken to assure that impacts by toxic substances released to the environment will be minimized. Executive Order 13112, *Invasive Species* (February 3, 1999), mandates that federal agencies take actions to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause.

In particular, construction activities which disturb the ground may expose areas and could facilitate propagation of invasive species. Climate change resulting in warmer temperatures may encourage invasive species which may not normally occur at this climate zone. Mitigation, monitoring, and control measures should be identified and implemented to manage establishment of invasive species throughout the entire pipeline corridor right-of-way from Alaska's North Slope to South Central. We recommend the EIS include a project design feature that calls for the development of an invasive plant management plan to monitor and control noxious weeds, and to utilize native plants for restoration of disturbed areas after construction.

Permafrost

EPA recommends options for avoiding and minimizing adverse impacts to permafrost resulting from the construction and operation of a buried, high pressure, chilled pipeline. Furthermore, the EIS should also evaluate surface disturbance activities to permafrost resulting from the placement of gravel pads for the GTP, compressor stations, NGL and fractionation facility, gas take off delivery facilities, gravel sources, roads, and bridge crossing, etc. In order to avoid impacts to permafrost areas, we recommend the EIS consider an above ground pipeline alternative.

Seismic and Other Risks

Construction and operation of the proposed gas pipeline may cause or be affected by increased seismicity (earthquake activity) in tectonically active zones. Therefore, we recommend the EIS discuss the potential for seismic risk and how this risk will be evaluated, monitored, and managed. A seismic map should either be referenced or included in the EIS. The construction of the proposed project must use appropriate seismic design and construction standards and practices.

Since it is possible that the project activities will have impacts to geologic resources, a study of the geologic resources within the pipeline corridor should be conducted and the results presented in the EIS. Ground movement on these faults can cause a pipeline to rupture, resulting in discharge of gas and subsequent explosion. In particular, potential geologic faults should be identified and described in the EIS.

Blasting

During project construction, blasting may be required in certain areas along the pipeline route corridor, resulting in increased noise and related effects to local residents, and disruption and displacement of wildlife species. We recommend the EIS discuss where blasting in the project area would be required, blasting methods that will be used, and how blasting effects will be controlled and mitigated. Noise levels in the project area should be quantified and the effects of blasting to the public and to wildlife should also be evaluated in the EIS. We recommend a blasting management plan be developed and the environmental impacts evaluated in the EIS.

Protected Species

The proposed project may impact protected species listed under the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA), their habitats, as well as state sensitive species. Evaluation of the proposed project should identify the endangered, threatened, and candidate species under ESA and MMPA, and other sensitive species within the project corridor and surrounding areas. The EIS should describe the critical habitat for the species; identify any impacts the project will have on the species and their critical habitats; and how the proposed project will meet all requirements under ESA and MMPA, including consultation with the U.S. Fish and Wildlife Service (FWS) and National Oceanographic Atmospheric Administration (NOAA). The EIS may need to include a biological assessment and a description of the outcome of consultation with the FWS and NOAA under Section 7 of the Endangered Species Act. The Corps' actions should promote the recovery of declining populations of species.

Social-Cultural Impacts

Socioeconomic Impact

We anticipate that the project will result in direct and indirect employment opportunities for Alaska Native residents. We also anticipate that there will be local and corporation revenues generated from this project. While employment opportunities and local revenues generally increase a community's standard of living (even temporarily), there can also be negative impacts to families, communities, and cultures, especially in areas where residents are participating in traditional cultural practices. These impacts associated with this project, as well as cumulative impacts, should be fully evaluated and disclosed in the EIS.

Project Area Access

We recognize that there will need to be restrictions or limitations imposed on residents that currently use the project area for recreation, subsistence, and travel to other areas. Such restrictions and possible mitigation of these impacts should be developed in close coordination with the users, and impacts should be thoroughly analyzed and reported in the EIS. We recommend the EIS disclose all impacts associated with such activities and describe what actions will be taken to manage and maintain recreational and access opportunities in the project area.

Traditional Knowledge

EPA acknowledges the need to provide meaningful public involvement in the preparation of an EIS and recommends the identification, inclusion, and integration of Traditional Knowledge (TK) into the EIS analysis, as appropriate. TK, in coordination with empirical scientific data, should be used to develop and evaluate alternatives and potential mitigation measures.

We recommend that in addition to reviewing any information available from previous EIS processes regarding subsistence resources, gaps in TK should be identified, and additional TK studies be conducted as necessary to clearly identify concerns and potential impacts, including cumulative, from the proposed project and proposed alternatives. This information should be reviewed and included in the EIS to the extent possible and utilized in the development of the current analysis. For example, additional TK data gaps may include construction timing windows to avoid and minimize critical subsistence harvest activities and wildlife migration periods.

Climate Change and Greenhouse Gas (GHG) Emissions

As you are aware, on February 18, 2010, the CEQ issued draft guidance to Federal Agencies on analyzing the effects of GHG emissions and climate change when describing the environmental effects of a proposed agency action in accordance with NEPA. A copy of the draft guidance is available at:
http://ceq.hss.doe.gov/current_developments/new_ceq_nepa_guidance.html.

EPA recommends evaluation and disclosure of GHG emissions and climate change effects resulting from the proposed pipeline projects, including all elements and phases (e.g., gas conditioning plant, compressor stations, natural gas liquid extraction/storage facilities, etc. and mobilization, staging, construction, and operation). The EIS should establish reasonable spatial and temporal boundaries for this analysis. We recommend that the EIS quantify and disclose the expected annual direct and indirect GHG emissions for the proposed action. In the analysis of direct effects, the EIS should quantify cumulative emissions over the life of the project, discuss measures to reduce GHG emissions, including consideration of reasonable alternatives, and qualitatively discuss the link between such GHG emissions and climate change.

The draft CEQ guidance references a number of technical documents, which provides reporting protocols for quantifying GHG emissions. The EIS should consider the emissions source categories, measurement methodologies and reporting criteria for determining and reporting emissions. The evaluation should consider impacts of climate change on vulnerable communities, such as Tribal and Alaska Native communities. We recommend the EIS consider mitigation measures and reasonable alternatives to reduce action-related GHG emissions. The EIS should include a discussion of cumulative effects to GHG emissions related to the proposed action, which should focus on an assessment of annual and cumulative emissions of the proposed action and the difference in emissions associated with the alternatives.

Cumulative Impacts

The CEQ definition of *cumulative impact* is "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions." The cumulative impacts analysis should therefore provide the context for understanding the magnitude of the impacts of the alternatives by analyzing the impacts of other past, present, and reasonably foreseeable projects or actions and then considering those cumulative impacts in their entirety. The EIS should include and analyze present and reasonably foreseeable projects and actions proximate to the pipeline corridor and vicinity, such as the proposed larger diameter pipelines proposed by Denali and TransCanada. Where adverse cumulative impacts may exist, the EIS should disclose the parties that would be responsible for avoiding, minimizing, and mitigating those adverse impacts.

We recommend the EIS clearly identify the resources that may be cumulatively impacted, the time over which impacts are going to occur, and the geographic area that will be impacted by the proposed project. The focus should be on resources of concern - those resources that are at risk and/or are significantly impacted by the proposed project before mitigation. In the introduction to the *Cumulative Impacts Section,* identify which resources are analyzed, which ones are not, and why. For each resource analyzed, the EIS should:

- Identify the current condition of the resource as a measure of past impacts. For example, the percentage of species habitat lost to date.
- Identify the trend in the condition of the resource as a measure of present impacts. For example, the health of the resource is improving, declining, or in stasis.
- Identify the future condition of the resource based on an analysis of the cumulative impacts of reasonably foreseeable projects or actions added to existing conditions and current trends. For example, what will the future condition of the watershed be?
- Assess the cumulative impacts contribution of the proposed alternatives to the long-term health of the resource, and provide a specific measure for the projected impact from the proposed alternatives.
- Disclose the parties that would be responsible for avoiding, minimizing, and mitigating those adverse impacts.
- Identify opportunities to avoid and minimize impacts, including working with other entities.

Mitigation and Monitoring

As you are aware, on February 18, 2010, the Council of Environmental Quality (CEQ) issued draft guidance for NEPA Mitigation and Monitoring. This guidance seeks to enable agencies to create successful mitigation planning and implementation procedures with robust public involvement and monitoring programs. A copy of the draft guidance is available online at: http://ceq.hss.doe.gov/current_developments/new_ceq_nepa_guidance.html.

The EIS should include a discussion and analysis of proposed mitigation measures and compensatory mitigation under CWA §404. The EIS should identify the type of activities which would require mitigation measures either during construction or operational phases of this project. To the extent possible, mitigation goals and measureable performance standards should identified in the EIS to reduce impacts to a particular level or adopted to achieve an environmentally preferable outcome.

Mitigation measures could include best management practices and options for avoiding and minimizing impacts to important aquatic habitats and to compensate for the unavoidable impacts. Compensatory mitigation options could include mitigation banks, in-lieu fee, preservation, conservation fund, etc. and should be consistent with the *Compensatory Mitigation for Losses of Aquatic Resources; Final Rule* (33 CFR Parts 325 and 332 and 40 CFR Part 230). A mitigation plan should be developed in compliance with 40 CFR Part 230 Subpart J 230.94, and included in the EIS.

An environmental monitoring program should be designed to assess both impacts from the project and that mitigation measures being implemented are effective. The EIS should identify clear monitoring goals and objectives, such as what parameters are to be monitored, where and when monitoring will take place, who will be responsible, how the information will be evaluated, what actions (contingencies, triggers, adaptive management, corrective actions, etc.) will be taken based on the information. Furthermore, the EIS should discuss public participation , and how the public can get information on mitigation effectiveness and monitoring results.

Consultation with Federally-Recognized Tribal Governments

We commend the Corps for your early initiation of Tribal government-to-government consultation for this project. We encourage the Corps to continue effective and early consultation and communication with interested tribal governments as this project moves forward.

The proposed ASAP project may potentially affect traditional subsistence and cultural practices and resources of certain tribal members living near and/or utilizing resources in the project area. In addition, there is potential for those that obtain subsistence resources and other traditional or cultural resources through barter and trade to be impacted. Tribal governments whose members or traditional resources may be impacted, either directly and indirectly, by this action, should be invited to consult on a government-to-government basis on this project consistent with *Executive Order 13175, Consultation and Coordination with Indian Tribal Governments (November 6, 2000).* EO 13175 indicates that the U.S. government will continue "to work with Indian tribes on a government-to-government basis to address issues concerning Indian tribal self-government, trust resources, and Indian tribal treaty and other rights." Documentation of these consultations should be included in the EIS, as should any activities to address any concerns identified by tribal governments.

Tribal Consultation Plan

We recommend the Corps develop a Tribal Government-to-Government Consultation Plan which would outline the process for working effectively with tribal governments during the EIS development process. This plan would be useful in determining the best timing for conducting the consultation meetings which would avoid conflict with Alaska Native Village subsistence seasons, which vary depending on the community. This plan should be developed in collaboration with affected and/or interested tribal governments.

Consultation Process

The EIS should document the tribal consultation and coordination process by providing a chronology with the dates and locations of meetings with tribal governments, results of the meetings, and a discussion of how the tribal governments' input was used to develop the EIS. The consultation and coordination with tribal governments should continue throughout the EIS development phase. Additional attention should be given to schedule meetings and program decision points in the EIS process to avoid conflicts with subsistence and other traditional activities whenever possible.

As you are aware, the July 28, 1999, CEQ Memorandum to Heads of Federal Agencies addresses the designation of non-Federal agencies, such as Alaska Tribal governments, to be cooperating agencies in the implementation of NEPA. We recommend the Corps invite affected Tribal governments to participate in the ASAP EIS development as a cooperating agency. This would provide for the establishment of a mechanism for addressing inter-governmental issues throughout the EIS development process.

Environmental Justice and Public Participation

EPA recommends the EIS clearly disclose what efforts were taken to ensure effective public participation in the scoping process and throughout the development of the EIS. In addition, since low income, minority and/or Alaska Native communities could be impacted by the proposed project, the EIS should disclose what efforts were taken to meet environmental justice requirements consistent with EO 12898 (*Federal Actions to Address Environmental Justice in Minority and Low-Income Populations).* We recommend that this should include the following:

- A description of the methodology and criteria utilized for identifying low income and people of color communities, if appropriate; the sources of data utilized for these analyses, and the references utilized for establishing the criteria.
- A comprehensive accounting of all impacts on low income or minority communities, including (but not limited to) cumulative and indirect impacts, exposure pathways unique to the impacted communities, historic exposures, and impacts to cultural, historic and protected resources. In addition, the EIS needs to determine if the impacts to these communities will be disproportionately higher than those on non-low income or non-minority communities. For such a determination, the EIS must identify a reference community, provide a justification for utilizing this reference community, and include a discussion of the methodology for selecting the reference community.
- The EIS should demonstrate that communities, if any, bearing disproportionately high and adverse effects have had the opportunity for meaningful input into the decisions being made about the project. The EIS should describe what was done to inform the communities about the project and the potential impacts in will have on their communities (notices, mailings, fact sheets, briefings, presentations, exhibits, tours, news releases, translations, newsletters, reports, community interviews, surveys, canvassing, telephone hotlines, question and answer sessions, stakeholder meetings, and on scene information), what input was received from the communities, and how that input was utilized in the decisions that were made regarding the project.

Extra attention should be given to schedule meetings and decision points in the EIS process to avoid conflicts with subsistence and other traditional activities whenever possible. We also recommend that particular attention be given to consideration of the dependence of local communities on local and regional subsistence resources, access to those resources, and perception of the quality of those resources. Various EJ assessment tools are available at: http://www.epa.gov/compliance/resources/policies/ej/index.html#tools.

Health Risk or Impact Analysis

Consistent with Sections 4321 and 4331 of NEPA, and the goals of EO 12898 and 13045, if human health could be impacted by the proposed project, we recommend the Corps undertake a screening process to determine which aspects of health (including, but not limited to public, environmental, mental, social, cultural health, etc.) could be impacted. Depending on the results of the screening, an analysis of health effects, such as a health risk assessment (HRA) or Health Impact Assessment (HIA), may need to be conducted in order to determine the direct, indirect and cumulative impacts to health. This analysis will likely need as much time to complete as the EIS, so early screening is essential to ensuring a timely analysis. EPA recommends the Corps partner directly with local, state, tribal and federal health officials to conduct the appropriate analysis, and to determine appropriate and effective mitigation of health impacts.

<u>Scope of the Health Assessment in EIS</u>

Health effects from development projects or programs are often more far-reaching than is commonly recognized by project proponents and non-health agencies that are considering development decisions or planning land-use policy. Contaminant exposure or cancer risks are common areas for impact assessment; however numerous other health impacts that could occur as a result of a new project, program or policy are often overlooked.

For example, this EIS should look for information that can be used to assess the project's effects by looking at how income from new jobs can have positive health impacts by increasing socioeconomic status or increasing access to health care. This income has also been associated with decreased access to health care by changing someone's eligibility for public assistance programs. Income from new jobs has also been associated with increased rates of alcohol and drug use, and domestic violence and child abuse due to increased discretionary income, rapid social and community change (particularly in rural areas) and disrupted family structure due to unusual work schedules. Increased income can also result in increased ownership of motorized vehicles, which often results in less physical activity, particularly in the village setting. Although such health impacts have been documented for other projects on numerous occasions, they are rarely addressed in project development or permitting.

<u>Data Collection</u>

In order to appropriately evaluate health, specific health data are required that may not be routinely collected as part of the scoping process. In order to ensure that the necessary data are available for this evaluation, it is important to involve public health professionals in the NEPA process. For large projects, this should occur early in the process, such as before or during project scoping and/or prior to submitting permit applications.

Public health data and expertise for prospective health impact analysis, or for providing input on health issues, may be available from local and state health departments, tribal health agencies, or federal public health agencies such as the U.S. Centers for Disease Control and Prevention's National Center for Environmental Health, U.S. Agency for Toxic Substances and Disease Registry, or Indian Health Service.

Methods and Tools

a. *Health Impact Assessment (HIA)*

The framework known as Health Impact Assessment (HIA) is a combination of procedures, methods and tools that enables systematic analysis of the potential positive or negative effects of a policy, plan, program or project on the health of a population and the distribution of those effects within the population. [1] HIA identifies appropriate actions to manage or mitigate negative effects. HIA is currently the only widely accepted methodology or framework used to provide decision-makers with information about how a specific policy, project or program may affect human health.

The World Health Organization (WHO) and the U.S. Centers for Disease Control and Prevention support the use of HIA as a tool to address health impacts when policies, programs or projects are being developed. Many other countries have successfully used HIA for these purposes. The International Finance Corporation, a member of the World Bank Group, has adopted HIA as the standard for evaluating health and requires it of any projects for which it provides funding.

b. *Guidelines and Resources*

Guidelines for conducting HIA are available from various sources.[2] WHO has links to many of these at: http://www.who.int/hia/about/guides/en/. The International Finance Corporation has developed detailed guidelines for conducting HIA. A draft version of these guidelines can be found at: http://www.ifc.org/ifcext/sustainability.nsf/Content/PublicComment_HealthImpactAssessment.

Historical and Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA) of 1966 requires Federal agencies to take into account the effects of their undertakings on historic properties. Since the ASAP project area may represent a frequent historical use by native Tribes, the State Historic Preservation Officer (SHPO) will need to be consulted. In addition, we recommend the Corps involve the public and local governments, as well as identify other potential consulting parties.

The 1992 amendments to NHPA placed major emphasis on consultation with tribal governments. Consultation must respect tribal sovereignty and the government-to-government relationship between the Federal and tribal governments, as discussed above. Consultation for tribal cultural resources is required under Section 106. Tribal governments must be consulted about actions on or affecting their lands or resources on the same basis and in addition to the SHPO. The EIS should evaluate the historic extent and condition of the environment to adequately address impacts to cultural resources of concern to tribal governments. Potential impacts to resources of concern to the tribes may include, but are not limited to, impacts to cultural resource areas, archaeological sites, traditional cultural properties of landscapes, sacred

[1] This definition is from the International Association for Impact Assessment (IAIA), which modified from the World Health Organization's Gothenberg consensus statement (1999).

[2] EPA does not endorse or recommend use of any single or particular guidance on HIA. These references are provided as general information and to assist permitting agencies with identifying additional resources on HIA.

sites, and environments with cultural resources significance. The EIS should disclose the Native Alaskan historical and traditional significance of the project area, the importance of ethno-botany, hunting, fishing, and gathering uses of the area by Alaska Natives, any long term traditional ecological management of the area, and any significant historical events that took place there. The tribal government(s) must be specifically engaged and consulted with in accordance with Section 106 of the NHPA.

EPA recommends the Corps initiate consultation with the potentially affected tribal government(s) specific to their interests and concerns about traditional and cultural resources. The scope of impacts to these resources should include the direct, indirect, and cumulative impacts to:

- Sacred sites;
- Traditional cultural properties or landscapes;
- Hunting, fishing, gathering areas (including impacts to ecosystems that support animals and plants that are or once were part of the Tribes and tribal descendants traditional resource areas);
- Access to traditional and current hunting, fishing and gathering areas and species;
- Changes in hydrology or ecological composition of springs, seeps, wetlands and streams, that could be considered sacred or have traditional resource use associations;
- Travel routes that were historically used, and travel routes that may be currently used;
- Historic properties, districts or landscapes.

To determine whether the area of potential effect would be eligible for the National Register of Historic Places, the perspectives of the tribal government(s) should be considered. Such considerations should include the list above as well as significant events that may have taken place in the past (tribal wars, establishment of trade routes, etc.).

EPA further recommends that a Record of Decision (ROD) not be completed until the 106 consultation process has been fully completed. If adverse effects to traditional cultural properties, sacred sites, or other areas of cultural resource concern are identified, any Memorandum of Agreement (MOA) developed to resolve these concerns under Section 106 should be addressed in the ROD. Unless there is some compelling reason to do otherwise, the Section 106 MOA should be fully executed before the ROD is issued, and the ROD should provide for implementation of the terms of the MOA.

United States Department of the Interior

NATIONAL PARK SERVICE
Alaska Region
240 West 5th Avenue, Room 114
Anchorage, Alaska 99501

IN REPLY REFER TO

L7619 (AKRO-EPC)

MAR 08 2010

Serena Sweet
EIS Project Coordinator
U.S. Army Corps of Engineers
CEPOA-RD-S
P.O. Box 6898
Elmendorf AFB, Alaska 99506-0898

Dear Ms. Sweet:

Thank you for the opportunity to provide agency scoping comments for the draft environmental impact statement (EIS) on the Alaska Stand Alone Pipeline (ASAP). The National Park Service (NPS) has three primary concerns with the ASAP, which are discussed in this letter. First, we do not yet have a signed agreement with the State of Alaska or Bureau of Land Management (BLM), the lead bureau for the U.S. Department of the Interior on this EIS, for cost recovery to participate in the EIS as provided in the BLM cost recovery procedures and regulations implementing section 304 of FLPMA (43 U.S.C. 1734). Second, the NPS is interested in knowing how a gas pipeline along the Parks Highway route would affect the resources and values of Denali National Park and Preserve, whether the proposed route would by-pass the park or would cross it. Third, the NPS has a responsibility to protect other park and recreational resources in Alaska pursuant to section 6(f)(3) of the Land and Water Conservation Fund Act.

The State of Alaska has submitted applications to federal agencies to obtain permits for a proposal to build a 20-inch to 24-inch diameter natural gas pipeline from Gubik and/or Prudhoe Bay fields on the North Slope of Alaska to South-central Alaska. Depending on the throughput rates, the gas pipeline would transport natural gas up to 1 million standard cubic feet per day at a maximum of 2,500 pounds per square inch (psi). The State is examining two alternative routes with variations. Both routes would parallel the Trans-Alaska Pipeline System (TAPS) route from the North Slope to a point north of Fairbanks near Livengood. From there the preferred Parks Highway Alternative route would proceed south along the eastern edge of the Minto Flats and connect to the Parks Highway north of Nenana and follow that highway south to near Willow, and then go overland to the Beluga Pipeline station north of Cook Inlet. The Richardson Highway Alternative route would follow the Elliot Highway and TAPS past Fairbanks and Eielson AFB after which it would follow TAPS or the Richardson Highway to north of Glennallen, and then along the Glenn Highway to Wasilla and over to Beluga Pipeline station. If this project is delayed and a large (48-inch diameter) natural gas pipeline is built from the North

Slope to the 48 contiguous States, then a smaller diameter pipeline to South-central Alaska could still be built as a pre-built spur line along either alternative route.

The NPS has been designated as a cooperating agency on the EIS because one alternative, a variation of the Parks Highway route alternative, would traverse about 7 miles of Denali National Park and Preserve in its eastern end. Congress originally established this park as Mount McKinley National Park in 1917 to "set apart as a public park for the benefit and enjoyment of the people" a "game refuge" to be managed for "the freest use ... for recreation purposes by the public and for the preservation of animals, birds, fish, and ... the natural curiosities and scenic beauties thereof." Subsequent legislation expanded the park eastward to the Nenana River for wildlife protection and to provide appropriate land for park visitor facilities. This area includes the railroad easement, train depot, Parks Highway, park transportation center, Denali Visitor Center, Murie Science and Learning Center, Riley Creek Campground, Camper Convenience Center, concessioner and researcher housing, and the U.S. Post Office. The park's purposes were rededicated when ANILCA expanded and redesignated the unit as Denali National Park and Preserve "to preserve unrivaled scenic and geological values associated with natural landscapes; to provide for the maintenance of sound populations of, and habitat for, wildlife species of inestimable value to the citizens of Alaska and the Nation... and undisturbed ecosystems. " The lands between the AKRR easement and the Nenana River are part of the one percent of the former Mt. McKinley National Park currently evaluated as ineligible for wilderness designation.

The route proposed by the applicant avoids lands in Denali National Park and Preserve (DNP), passing to the east of DNP. An alternative route to the proposed route would cross approximately seven miles of DNP. This would require a right of way (ROW) under Title XI of the Alaska National Interest Lands Conservation Act of 1980 (ANILCA). Title XI prescribes the process for application, evaluation, and approval/disapproval of a ROW through a conservation system unit (CSU) in Alaska. Currently the NPS does not have legislative authority to issue a ROW for a natural gas pipeline. Under the Title XI process, a land managing agency without authority to issue a ROW for a facility (a natural gas pipeline in this case) must make a preliminary recommendation on the application to the President of the United States. If the President approves the application, he must recommend approval to Congress. To approve the application and authorize the ROW, Congress must pass a joint resolution.

Senator Murkowski introduced a bill in Congress in April 2009 (S. 766) which, as currently written, would provide authority for the NPS to issue a ROW for the proposed pipeline through DNP. This bill was revised and incorporated into section 354 of the American Clean Energy Leadership Act of 2009 (S. 1462). Neither of these bills has yet come up for a full vote on the Senate floor.

The NPS believes any decision considering a gas pipeline route through DNP should be based on the existing ANILCA Title XI process, including the preparation of an EIS. If, after review of public comments from the scoping period, or later on the draft EIS, the State of Alaska wishes to change its preferred alternative to a route traversing DNP, then a revised application must be submitted to all the permitting federal agencies in accordance with the Title XI process. This may restart the EIS process.

Before recommending approval or disapproval of a natural gas pipeline ROW through the DNP, the NPS must consider the EIS analysis of impacts and the decision process provided in Title 43

Code of Federal Regulations (CFR) § 36.7, and whether the proposed pipeline may be legally permitted through the park. The regulations at 43 CFR § 36.7 (a)(2) specify nine factors that must be considered by all appropriate federal agencies, including the NPS. If such a route is selected, the NPS would work with the applicant to minimize visual and other impacts along the highway corridor in the park. Construction of a public multi-use trail over the ground disturbed by the pipeline installation may be an option.

If a natural gas pipeline is constructed in or near the park, the NPS would be interested in obtaining natural gas from the line to facilitate conversion of heating and fueling operations at the park from fuel oil and diesel to the less polluting natural gas. This would reduce total air pollution and the potential for fuel oil spills in the front country of the park. We understand a conditioning plant may be required to strip methane from the pipeline stream if mixed natural gases are shipped down the pipeline. Adjacent sizeable tourism businesses and residences could also be serviced, further reducing air pollutants in the front country area of the park.

If a natural gas pipeline is built and operating pressure approaches the maximum of 2,500 psi, then, according to the U.S Department of Transportation Pipeline Hazardous Materials and Safety Administration, a gas pipeline explosion along such a facility could devastate a large area. The engineering, operations, and safety of such a proposed natural gas pipeline must take into consideration public health and safety in the heavily used front country of the park and in the adjoining developed areas both north and south of the park boundary.

The NPS has oversight responsibility for certain state and local recreational resources pursuant to section 6(f)(3) of the Land and Water Conservation Fund Act (Public Law 88-198) and its implementing regulations at 36 CFR Part 59. It appears this project has the potential to impact state and/or local parks subject to Section 6(f)(3), such as Denali State Park and the Nancy Lakes State Recreation Area. Section 6(f)(3) prohibits conversion, either permanently or temporarily, of qualifying park resources to other than public outdoor recreation use without approval by the Secretary of Interior, as delegated to NPS. Conversion of park resources to other uses may occur only where it can be demonstrated that all practical alternatives have been considered. A replacement park of equal or greater fair market value and similar usefulness and equivalent location is required for all conversion approvals. In Alaska this program is administered by the Alaska Division of Parks and Outdoor Recreation (ADPOR). NPS recommends that the applicant contact ADPOR to determine whether any of the proposed routes will impact recreational resources subject the provisions of section 6(f)(3).

James King, Director
Alaska Division of Parks and Outdoor Recreation
550 West 7th Avenue, Suite 1380
Anchorage, AK 99501-3561
(907) 269-8700

Please direct questions or comments about these comments to Bud Rice at 907-644-3530 or Bud_Rice@nps.gov.

Sincerely,

Sue E. Masica

Sue E. Masica
Regional Director, Alaska Region

cc:
Ron Dutton, BLM-USDI ASAP Project Lead
James King, Director, ADPOR

From: Sweet, Serena E POA [Serena.E.Sweet@usace.army.mil]
Sent: Thursday, February 04, 2010 3:44 PM
To: Winters, Jack F (DFG)
Cc: Tricia Waggoner; asap@entrix.com
Subject: RE: Alaska Stand Alone Pipeline Scoping Comments
Attachments: ASAP Scoping Comments .PDF

Thank you for your email regarding the Alaska Stand Alone Pipeline (ASAP) Environmental Impact Statement (EIS). Your comments have been placed in the official record and will be given full consideration during the EIS development process.

If you have any questions, you may contact Ms. Serena Sweet (Lead Project Manager, U.S. Army Corps of Engineers) by phone at (907) 753-2819, or toll free from within Alaska at (800) 478-2712, or by email at serena.e.sweet@usace.army.mil.

For additional information regarding the ASAP EIS process, please visit the project website at www.asapeis.com.

-----Original Message-----
From: Winters, Jack F (DFG) [mailto:jack.winters@alaska.gov]
Sent: Monday, February 01, 2010 4:00 PM
To: Thompson, Mike; Brown, Anne L (JPO); Weaver, Aaron
Cc: Roach, Don; Taube, Tom; James, David ; Nowlin, Roy A (DFG); Simon, Jim; McLean, Mac; Ott, Alvin G (DFG); Howard, Kerry; Fleener, Craig L (DFG); See, Marianne G (DFG); Bethe, Michael L (DFG); Daigneault, Michael J (DFG); Hilsinger, John R (DFG); Bergstrom, Daniel J (DFG); Regnart, Jeff; Lingnau, Tracy L (DFG); Kavalok, Tony (DFG); Parker, Fronty (DFG); Dubois, Steve; Miller, Matthew G (DFG); Swanton, Charlie; Small, Bob; DelFrate, Gino (DFG); Tobey, Robert W (DFG); Somerville, Mark A (DFG); Rutz, David S (DFG); Hasbrouck, James J (DFG); Larsen, Douglas N (DFG); Borba, Bonnie M (DFG); Schwanke, Becky A (DFG); Lenart, Beth ; Caikoski, Jason; Young, Donald D (DFG); Vania, Tom D (DFG); Brookover, Thomas E (DFG); Simpson, Ellen M (DFG); Weiss, Ed; McKim, Julie W POA; Sweet, Serena E POA; Perrin, Don ; Brase, Audra; Burr, John; Scanlon, Brendan; Morris, Bill
Subject: Alaska Stand Alone Pipeline Scoping Comments

Aaron,

Attached are the ADF&G scoping comments for submittal to the US Army Corps of Engineers for the environmental impact statement for the proposed Alaska Stand Alone Natural Gas Pipeline.
Call me if you have
any questions. Thanks.

Jack
459-7285

MEMORANDUM

Department of Fish and Game

STATE OF ALASKA

Division of Habitat

TO: Aaron Weaver
Natural Resource Specialist
State Pipeline Coordinator's Office
Department of Natural Resources
Anchorage

DATE: February 1, 2010

TELEPHONE: 459-7285
FAX: 459-7303

FROM: Jack Winters
Acting Regional Supervisor
Department of Fish and Game
Division of Habitat

SUBJECT: Alaska Stand-Alone Pipeline EIS Scoping Comments

The Alaska Department of Fish and Game (ADF&G) has reviewed several documents submitted by the State of Alaska to the US Army Corps of Engineers (USACE) for the Alaska Stand-Alone Gas Pipeline (ASAP) Environmental Impact Statement (EIS) development process. These documents include: *the Stand-Alone Gas Pipeline Project Description/Plan of Development*; the *Stand-Alone Gas Pipeline Route Alternatives Analysis*, and the *Parks Highway Stand-Alone Gas Pipeline State of Alaska ROW Permit Application*. The following comments are the ADF&G's EIS scoping comments on the proposed project and submitted project documents. While comments on the *Parks Highway Stand-Alone Gas Pipeline State of Alaska ROW Permit Application* are more focused on clarifications or additional information needs for the state right-of-way permit, some of the issues raised can be used to further refine the analysis of issues in the EIS.

General Comments

One of the difficulties in assessing and evaluating potential environmental impacts of this 700 to 800 mile long pipeline, depending on the selected route, is the lack of detailed design information for many of the project components. For example, summer versus winter construction, and gravel or ice workpads will each have differing environmental effects. Depending on the extent of use of any of these modes of construction, considerably different degrees of effects could be encountered. Similarly, the number and location of material sites, the volume of gravel needed for roads, pads, and pipeline bedding, ditch spoil disposal sites, and predicted disposal volumes all may affect the analysis, depending on estimates used for each of these project components. The lack of detailed design information for this project compromises the completeness and detail of the environmental analysis for the project. Considerable care will be needed to ensure each of the project components and environmental effects are adequately evaluated during the EIS process.

The EIS should carefully assess the effects of the buried pipeline on permafrost integrity, pipeline stability and integrity, erosion susceptibility and integrity of the pipeline ditch backfill, and stream bank stability for buried pipeline crossings before the pipeline becomes operational and charged with chilled gas (potentially one or more years). The lack of chilled gas in the line may reduce the ability of the disturbed soils to quickly return to their former temperature equilibrium. A similar situation will also occur upon pipeline abandonment when chilled gas is no longer cooling the ditch backfill. This analysis will be particularly important for the northern sections of the pipeline where the pipeline is buried in soils with continuous permafrost or extensive discontinuous permafrost.

The EIS should carefully assess the effects of soil disturbance caused by burial of the pipeline to permafrost integrity, particularly through streambanks and wetlands. Ditching through stream banks, especially in unstable, ice-rich soils, may cause physical and thermal degradation , causing loss of riparian habitat, drainage of wetland complexes, potential changes in stream morphology, and increased sedimentation, with a resultant loss of aquatic habitat. The pipeline ditch can intercept overland flow that may erode backfill material from the pipeline ditch and potentially serve as a canal carrying water with a high sediment load into nearby streams or wetlands. The interception of stream flow and wetland cross drainage can pose significant problems, particularly in areas of continuous and discontinuous permafrost in rolling or mountainous terrain. Rehabilitation, especially in ice-rich soils, may require extensive, repeated ditch maintenance and long-term thermal stabilization activities before the habitat can return to its former stability and productivity.

The EIS should carefully assess the effects to fish and aquatic mammals of not only increased sedimentation and structural changes to streams from the buried pipeline intersecting streams, but also the physical effects of the chilled pipeline on water temperature and ice formation. The chilled pipeline may create ice dams at streams or create aufeis fields that then cause substantial erosion and sedimentation during breakup. Ice dams created by the chilled pipeline at stream crossings could reduce water flow into fish overwintering areas either by diverting it or by locking it up in aufeis. The chilled pipeline could lower water temperature, causing changes in the timing of spawning for those species that rely on water temperature cues for migration and spawning. This may delay spawning enough for some species such that spawning is precluded or carried out with reduced success. For fish that use water temperature as a cue to move to overwintering areas, the chilled pipeline could accelerate freeze-up in fall, potentially preventing fish from reaching suitable overwintering areas. The chilled pipeline could lower background water temperatures with direct effects on the time required for fish eggs to develop (e.g., small decreases in water temperature could delay hatching to a time period not conducive to survival of the newly hatched fish).

The EIS should examine the effects of blasting on aquatic and terrestrial biological resources. Blasting during sensitive life stages of wildlife (e.g., Dall sheep lambing, raptor nesting, bear denning) can impact reproduction or survival. Blasting of the pipeline ditch in or near streams could cause mortality of adult and juvenile fish as well as developing eggs.

The Stand-Alone Gas Pipeline Project Description/Plan of Development

Page 1.1. The Gubik gas field has been identified as one of the potential sources of gas for the proposed pipeline. However, no complete pipeline alignment to Gubik from the main pipeline is depicted in the project documents.

Page 1-5. The text indicates "a smaller pipeline to supply the demand in Fairbanks is part of this system and is called the "Fairbanks Lateral." If the Fairbanks Lateral is part of this pipeline system, then it should be fully evaluated as part of the EIS process. Considerable additional detail is needed for this component.

Page 2.3. The text states the gas conditioning facility will chill the gas to 30° F. In areas of continuous permafrost, will gas at 30° F be adequately chilled to maintain permafrost conditions along the line?

Page 3.1. A material site location and its mining plan should be provided for the Prudhoe Bay gas conditioning facility.

Page 4.9. Temporary work camps as well as permanent facilities need to be surrounded by electric fences to minimize human interactions with foxes, and brown and black bears that were common during construction of the Trans-Alaska Pipeline. The temporary storage and proper disposal of putrescible wastes will be an important part of minimizing human/carnivore interactions, as well as the prohibition of direct feeding of animals.

Page 4-11. The text states " to reduce the amount of disposal required, downed brush and timber, other than marketable timber, will be stockpiled on the right-of-way and burned." Hydroaxing, chipping or mulching the timber and shrubs and leaving it within the right-of-way would be a better alternative to burning. Burning this material on the right-of-way, particularly if the right-of-way is cleared one year before actual construction, could lead to permafrost degradation, site instability, and loss of material that could be used in rehabilitation of the right-of-way.

Page 4-13. Ditching and pipe stringing operations need to consider wildlife movements. Extensive lengths of ditch or pipe either awaiting welding or laying, can deflect or form barriers to wildlife movement (moose migration between summer and winter range; caribou seasonal migrations). In the worst case, open ditch could result in animal entrapment. These activities will need to be scheduled to avoid times of the year when major movements of these animals occur across the right-of-way. Cross-right-of-way access will also need to be maintained for resident animals during non-migratory periods. Similarly, ditching and pipe installation across some fish streams may need to be scheduled to minimize disruption to fish passage or fish spawning.

Page 5-1. Water for camps as well as for ice work pads, laydown areas, drive lanes in areas where winter construction is proposed needs to be carefully evaluated to determine if adequate quantities exist. In areas where water or ice sources are limited, modified or alternative construction techniques may be required to avoid the use of gravel for construction purposes.

Page 5-6. For areas with a permanent drivable workpad or permanent access roads, designed low water crossings will need to established for small streams crossing the pipeline right-of-way.

Parks Highway Stand-Alone Gas Pipeline State of Alaska ROW Permit Application.

Section 8.0. This section requires both depth and width of streams and waterbodies crossed by the pipeline. However, in Attachment 2, only approximate width information is provided. Depth information is important as it will have an effect on the right-of-way width needed to accommodate ditch spoil and safety needs at the deeper stream crossings.

Section 13.0. The subsection on the gas conditioning facility states that an unconditioned option – transportation of the gas with CO_2 – is being considered. If this is the case, then the analysis for the right-of-way application and the analysis for the EIS should include discussions of the effects of CO_2 transport with the gas stream and the necessary facilities at the southern end of the pipeline to remove and dispose of this product.

Section 44.0. The Fairbanks Gas Take-off Facility depicted on Figure 43-1 should have the route by which the facility is connected to the existing road system shown on this figure.

Section 46.0. This section notes burning of slash may impact air quality. As noted in the comments on the project description, burning this material on the right-of-way, particularly if the right-of-way is cleared one year before actual construction, could lead to permafrost degradation, site instability, and loss of material that could be used in rehabilitation of the right-of-way.

Section 49.0. Wildlife mitigation measures that also need to be included during project construction include bear (carnivore) interaction plans and the fencing of all permanent facilities as well as construction camps and facilities. Plans for different segments of mainline construction (dependent on likelihood of carnivore presence on that segment) should also be prepared. The temporary storage and proper disposal of putrescible wastes will be an important part of minimizing human/carnivore interactions, as well as the prohibition of direct feeding of animals.
Cook Inlet beluga whales should be added to the list of threatened and endangered species that are known to occur in the project area.

Section 52.0. It is unclear how freeze-protected hydrotest water will be treated and discharged following pipeline testing.

Section 54.0. Table 54-1 lists likely subsistence/personal use communities. Additional communities that should be considered include Alatna, Stevens Village, Gakona, and Gulkana.

Section 54.0. Table 54-2 lists federally recognized tribes by region. Additional tribes that should be considered for inclusion in this list include Alatna Village, Native Village of Stevens, Native Village of Gakona, and Gulkana Village.

Section 59.0. This section lists references that may be of use in evaluating this right-of-way application. However, it does not include any documents for the Richardson Highway Alternative.

Attachment 2, Stream Crossing Data, Parks Highway and Richardson Highway Alternatives. These data tables need to be re-examined to correctly note which streams contain anadromous fish. There are numerous streams, particularly north of the Alaska range that contain anadromous fish but are not identified as such in these tables.

Attachment 9, Sensitive Areas/Habitats along ROW. The tables in this section listing previously identified areas and periods of sensitivity along the gas source routes and pipeline routes are overly simplified to the point of being inaccurate, particularly where groups of species are listed for large geographical areas; identify sensitive areas that are hundreds of miles from the pipeline route (e.g., caribou calving areas in the Utukok Hills); and have incorrect periods of sensitivity (e.g., whitefishes spawn in September or October – not in July and August). These tables need to be rewritten to simplify, clarify, and directly delineate sensitive species, sensitive areas and periods of sensitivity.

Some of the public roadways along the pipeline alignment have seasonally heavy traffic to and from the Susitna Flats, Goose Bay and Palmer Hayflats State Game Refuges and other sites accessed for hunting and fishing. Maintaining vehicular traffic for vehicles with boats, trailers, RV's will be an issue during construction. Specifically, the narrow gravel route into to the Little Susitna Public Use facility (Point McKenzie Road to Ayshire Road to Little Susitna River Access Road) is heavily used seasonally.

Pipeline construction would occur along about 1.5 miles of the Little Susitna Access Road northwest of the existing gas pipeline and facility. The pipeline also takes off cross country from the Little Susitna Access Road to eventually intersect with the Parks Highway near Willow. In the area just north of the Little Susitna Access Road the line parallels the Susitna Flats State Game Refuge border. Separation of the pipeline right-of-way from the refuge border will avoid or minimize incursions of all terrain vehicles and other vehicular traffic into the refuge. Gating or otherwise blocking access along the line where it intersects existing access roads will also minimize incursions into the refuge. Similar concerns also apply to the pipeline routing along and through the Minto Flats State Game Refuge.

Richardson Highway Alternative – Palmer to Glennallen; Wildlife

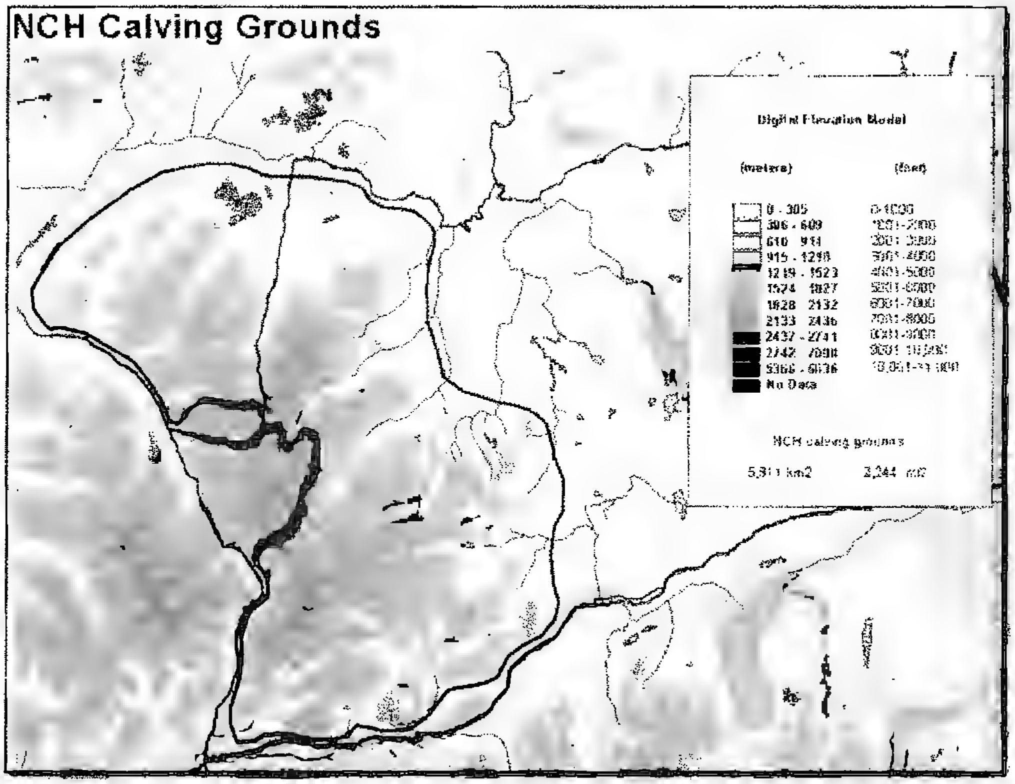
The following comments regarding wildlife along the Glennallen to Palmer pipeline route were originally submitted as part of the ADF&G comments on the Alaska Natural Gas Development Authority (ANGDA) proposed Beluga to Fairbanks (B2F) natural gas pipeline. Although the ASAP project differs from the B2F line, the routing from Glennallen to Palmer is essentially the same and the expected effects to wildlife would be the same. The comments have been modified to delete references to specific aspects of the B2F line. The route as proposed cuts through key habitats for caribou, moose, grizzly bear, Dall sheep, wolverine, as well as important non-game species like birds-of-prey.

Pipeline construction through the Chitna Pass area during Dall's sheep lambing and Nelchina caribou calving, roughly 1 May to 15 June, may negatively impact reproductive success of sheep and caribou in the area. Similarly, disturbance to sheep and caribou hunting parties (as well as moose and bear hunters) in this same area is likely to occur during the period 10 August to 20 September.

The route through the Chitna Pass area needs to be made impassible to motorized vehicles once pipeline construction is finished. Creating a new access road up Caribou Creek, across Chitna Pass, and down Boulder Creek would lead to increased hunter access via ATV to areas that currently serve as refugia. This could lead directly to new restrictions being imposed on hunters, and hunting opportunity being restricted to help conserve the wildlife populations in the area.

<u>CARIBOU</u>

Use north of the Glenn Highway by caribou from the Nelchina Caribou Herd (NCH) has been documented during the calving and post-calving period (15 May - 30 July), where the pipeline route is proposed. Concentrations of post-calving caribou have been found on a regular basis from the Upper Oshetna River, south to Mazuma Creek and into Caribou Creek (Map 2). The NCH very rarely uses the Matanuska valley south of the Glenn Highway.



Map 2. Elevation map of the NCH calving grounds, the most sensitive habitat of the herd. The NCH ranges year-round from Chickaloon (at the lower left corner of this map), throughout Unit 13, northeast to Chicken along the Taylor Highway in Game Management Unit 20E.

During calving and post-calving, caribou generally avoid construction activities and travel routes. If such activities are allowed in this area, calf survival and recruitment may be compromised if animals are forced to move out of the area.

Beginning in late June, the herd can begin to disperse. Caribou move down into the proposed area of concern (Boulder Creek to Squaw Creek) in larger numbers during July and August in preparation for the rut and winter. Although caribou harvest is reliant upon annual caribou movements, historic hunt records reveal the importance of the entire area from Chickaloon, east to the Syncline Mountains for Tier II caribou hunters. The fall caribou hunt runs 10 August – 20 September.

MOOSE

Moose calve throughout the proposed area, and spend a considerable portion of late summer and fall above treeline within the area of concern. The calving period (15 May - 15 June) should be avoided for any construction related activities that may disrupt these animals during this period.

The area of concern is also very important to fall moose hunters. In 2007, approximately 305 hunters pursued moose in the area, and 59 moose were harvested. Both general season hunters and tier II hunters consistently use this area. Moose hunting runs 15 August – 20 September. Moose will remain above treeline in the high country until mid-December to late-January, when the increasing snow depth forces them down to lower wintering areas. This area then becomes a migration corridor for moose.

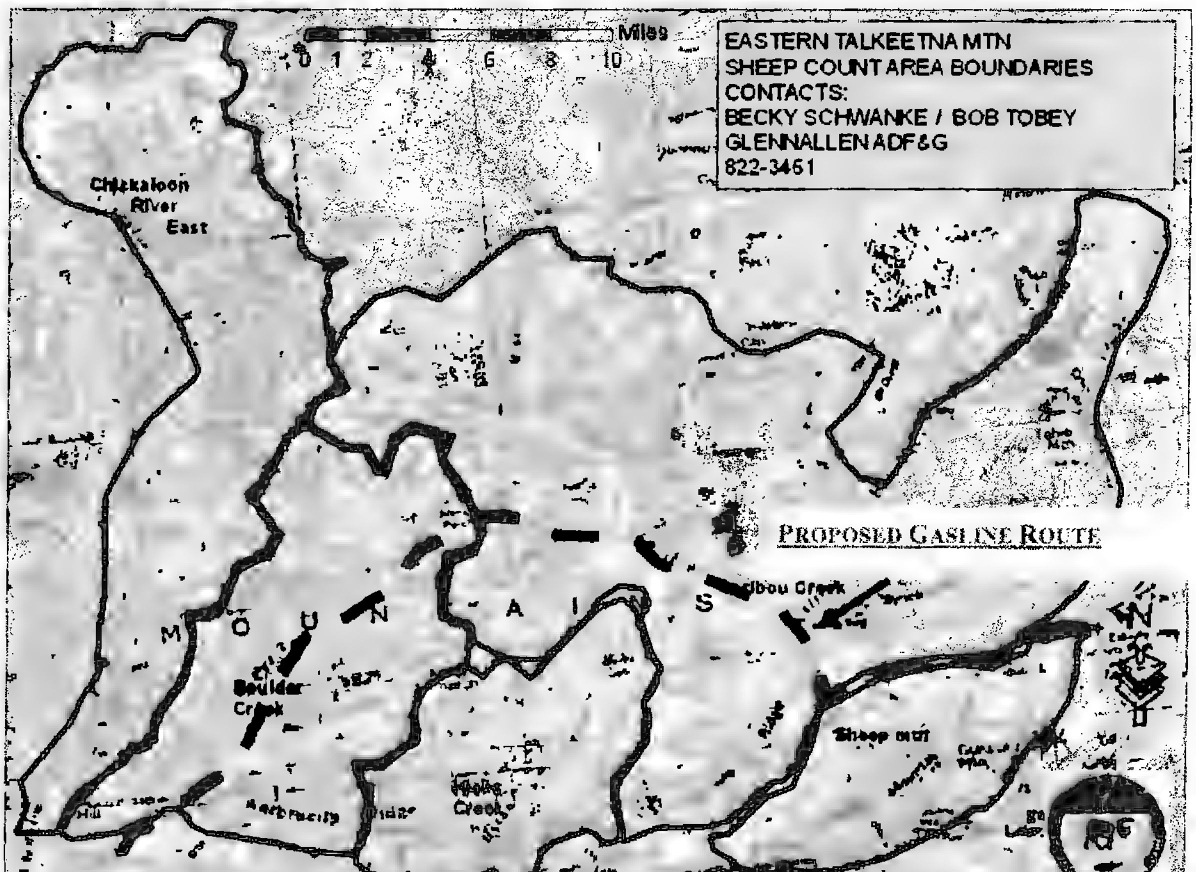
GRIZZLY BEAR

Grizzly bears may be found throughout the area of concern, however they are most vulnerable during their hibernation period (15 October – 15 May). If bears are disrupted during this period, they may have difficulty surviving the winter. The high country in this area of concern is especially critical denning habitat for sows with young cubs. From earlier work with radiocollared bears, we know that bear dens occur throughout the proposed route area, though we do not keep an updated file of bear den locations for this area.

DALL SHEEP

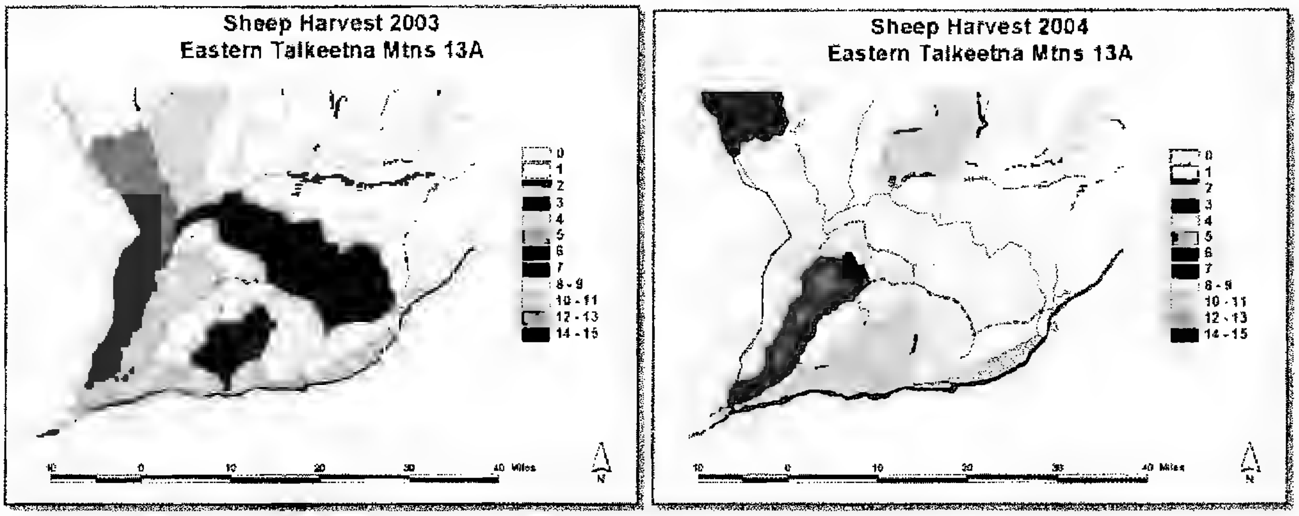
Dall sheep will likely be impacted the most by this proposed route, which cuts through the center of prime sheep habitat. The importance of Dall sheep in this area has long been recognized, and the Sheep Mountain viewing area (which is closed to the taking of Dall sheep) was established specifically to safeguard this resource. The most recent comprehensive sheep survey data we have within this area (Map 3) are from 2007 when 872 sheep were observed in this area, which is down from 1,081 observed in 2003. The decline was largely attributable to increased over-winter mortality in 2004-05, showing the sensitivity of this population.

One concern is with the route along the north side of Sheep Mountain. Sheep must have continual access between the island Sheep Mountain and the Syncline Mountains just to the north across Squaw Creek. Any construction activities in this drainage could be detrimental to sheep movements. In addition to this particular area, sheep move freely throughout the entire area searching out vital mineral licks, following green up, and seeking critical escape terrain. Upper Caribou Creek and Boulder Creek in particular are home to the highest concentrations of sheep year round for this area. Construction activity anywhere in these upper drainages may have adverse effects to sheep.



Map 3. Sheep count areas in the eastern Talkeetna Mountains, with proposed gas line route.

In addition to the area being very important year-round sheep habitat, it is also very important for a large number of sheep hunters. The harvest maps below (Map 4), show the area receives phenomenal pressure from sheep hunters on an annual basis. Most recently, in 2007, nearly 140 sheep hunters pursued sheep in this area, and 20 rams were harvested (down from the 2003 and 2004 harvests due to higher natural mortality in 2004-05). The sheep hunting season runs 10 August – 20 September.



Map 4. Sheep harvest in the eastern Talkeetna Mountains, with proposed gas line route.

Of particular concern would be increased public access along the proposed route. Declining sheep populations around the state have led to increased public concern for sheep and the future of sheep hunting. The Chugach Mountains just south of this area were recently converted from a general season to a limited entry drawing hunt due to heavy hunting pressure in the face of declining sheep numbers. The public is already concerned about the potential displacement of hunters to areas such as this, and the effect that will have on the already depressed sheep population. Creating additional access at this point should be highly discouraged. If access is improved and exploitation of this wildlife resource increases, there could be a cascade of changes in sheep management in this area.

Currently there is an impasse along Caribou Creek just above the confluence with Alfred Creek. Hunters using off-road vehicles (ORVs) to sheep hunt in this area are stopped at this impasse, and are forced to use much longer and more difficult routes to access the upper valley. Currently the area is accessed mostly by aircraft, a much more expensive and limited mode of transportation. By allowing the pipeline to run up Caribou Creek, the impasse could be removed and replaced with a dirt road, or a trail at the very least running along the pipeline (residual from pipeline construction and/or for maintenance purposes). Even if a locked gate were installed, hunters would still be expected to find a way to utilize this route. Access would thus be improved, and further exploitation of the sheep population would be expected. Restoration of this impasse is crucial to maintaining the status quo in respect to this resource issue. We recommend against any pioneering of new access routes ORV users could capitalize on in this remote habitat unless it is developed as part of a unit-wide, multiple land owner/user group planning process.

Additionally, any increased winter snowmachine access around critical sheep wintering habitat and escape cover could result in displacement of sheep and an increase in overwinter mortality. Bringing snowmachine access closer to wintering areas allows easier travel for wolves and coyotes on trails and could give predators increased mobility allowing higher rates of predation.

NON-GAME

This area is very important wolverine habitat. Wolverines using this area are important as a source population for maintaining wolverine numbers in the Copper River Basin. The area is productive, and wolverine have been documented emigrating out of the area to other habitats.

This area is also a world-class raptor migratory corridor and nesting area. Of particular importance is nesting habitat for golden eagles. The cliffs are suitable for nesting because of their physical structure and proximity to large numbers of neonatal sheep and caribou that are heavily utilized as prey for the first two months of nesting by eagles.

This concludes our scoping comments on the proposed Alaska Stand-Alone Gas Pipeline Project. If you have any questions regarding these comments, please contact me at 459-7285 or jack.winters@alaska.gov.

ecc:
Al Ott, ADF&G, Fairbanks
Mac McLean, ADF&G, Fairbanks
Mike Thompson, SPCO, Anchorage
Tom Taube, ADF&G, Fairbanks
John Burr, ADF&G, Fairbanks
Bonnie Borba, ADF&G, Fairbanks
Roy Nowlin, ADF&G, Fairbanks
Jason Caikoski, ADF&G, Fairbanks
Fronty Parker, ADF&G, Delta
Mike Bethe, ADF&G, Palmer
Mark Somerville, ADF&G, Glennallen
Bob Tobey, ADF&G, Glennallen
Ellen Simpson, ADF&G, Anchorage
Charlie Swanton, ADF&G, Juneau
Doug Larsen, ADF&G, Juneau
Dan Bergstrom, ADF&G, Anchorage
Tony Kavalok, ADF&G, Anchorage
Gino DelFrate, ADF&G, Anchorage
James Hasbrouck, ADF&G, Anchorage
Jim Simon, ADF&G, Fairbanks
Marianne See, ADF&G, Anchorage
Julie McKim, USACE, Anchorage
Don Perrin, ADNR, Anchorage
Kerry Howard, ADF&G, Juneau
Bill Morris, ADF&G, Fairbanks
Don Roach, ADF&G, Fairbanks
Brendan Scanlon, ADF&G, Fairbanks
Audra Brase, ADF&G, Fairbanks
David James, ADF&G, Fairbanks
Beth Lenart, ADF&G, Fairbanks
Don Young, ADF&G, Fairbanks
Steve Dubois, ADF&G, Delta
Mike Daigneault, ADF&G, Anchorage
Becky Schwanke, ADF&G, Glennallen
Ed Weiss, ADF&G, Anchorage
Tom Brookover, ADF&G, Anchorage
Bob Small, ADF&G, Juneau
Tracy Lingnau, ADF&G, Anchorage
Jeff Regnart, ADF&G, Anchorage
Matthew Miller, ADF&G, Anchorage
David Rutz, ADF&G, Palmer
Tom Vania, ADF&G, Anchorage
Craig Fleener, ADF&G, Juneau
John Hilsinger, ADF&G, Juneau
Serena Sweet, USACE, Anchorage
Anne Brown, SPCO, Anchorage

JFW/jfw

From: Sweet, Serena E POA [Serena.E.Sweet@usace.army.mil]
Sent: Thursday, February 04, 2010 7:55 PM
To: Palmer, Sean P (DEC)
Cc: Tricia Waggoner; asap@entrix.com
Subject: RE: ASAP Draft EIS

Thank you for your email regarding the Alaska Stand Alone Pipeline (ASAP) Environmental Impact Statement (EIS). Your comments have been placed in the official record and will be given full consideration during the EIS development process.

If you have any questions, you may contact Ms. Serena Sweet (Lead Project Manager, U.S. Army Corps of Engineers) by phone at (907) 753-2819, or toll free from within Alaska at (800) 478-2712, or by email at serena.e.sweet@usace.army.mil.

For additional information regarding the ASAP EIS process, please visit the project website at www.asapeis.com.

-----Original Message-----
From: Palmer, Sean P (DEC) [mailto:sean.palmer@alaska.gov]
Sent: Thursday, January 14, 2010 9:30 AM
To: Sweet, Serena E POA
Subject: ASAP Draft EIS

Hi Serena,

ADEC would like to see the following addressed in the Draft EIS for the Alaska Stand Alone Pipeline Project.

1. What sort of BMPs will be implemented to protect water quality during construction activities?
2. How does the applicant plan on mitigating for impacts to wetlands?
3. During construction, how does the applicant plan to protect water quality from sediment transport and hydrocarbon leakage?
4. For Purposes of the Antidegradation Policy of the Alaska Water Quality Standards, hopefully the EIS will address the questions below.
a. Describe how allowing lower water quality is necessary to accommodate important economic or social development in the area where the water is located.
b. Explain by reducing water quality how this will not violate the applicable criteria of 18 AAC 70.020 or 18 AAC 70.235 or the whole effluent toxicity limit in 18 AAC 70.030.
c. During construction and operation activities, describe how the resulting water quality will be adequate to fully protect existing uses of the water.
d. How will the methods of pollution prevention, control, and treatment found by ADEC to be most effective and reasonable be applied to all wastes and other substances to be discharged.
e. Explain how all wastes and other substances discharged will be treated and controlled to achieve (i) for new and existing point sources, the highest statutory and regulatory requirements; and (ii) for nonpoint sources, all cost-effective and reasonable best management practices.

If you have any questions please call or email me. Thanks and have a good day.

Thanks,
Sean Palmer
Alaska Department of Environmental Conservation Division of Water

555 Cordova Street - Anchorage, AK 99501-2617
(907) 269-7564, fax (907) 334-2415

"Eventually, all things merge into one, and a river runs through it. The river was cut by the world's great flood and runs over rocks from the basement of time. On some of those rocks are timeless raindrops. Under the rocks are the words, and some of the words are theirs. I am haunted by waters." -Norman Maclean

MATANUSKA-SUSITNA BOROUGH

Planning and Land Use Department

Planning Division

350 East Dahlia Avenue • Palmer, AK 99645

Phone (907) 745-[illegible] • Fax (907) 745-[illegible]

www.matsugov.us • [illegible]

March 8, 2010

Serena Sweet
U.S. Army Corps of Engineers
CEPOA-RD
PO Box 6898
Elmendorf AFB, Alaska 99506-0898

RE: POA-2009-651 DEIS – Proposed Alaska Stand Alone Pipeline (ASAP) Natural Gas Transportation Project

Dear Ms. Sweet:

Following are the Borough's comments on the intent to prepare a Draft Environmental Statement (DEIS) for the proposed Alaska Stand Alone Pipeline Natural Gas Transportation Project.

The borough owns a majority of the property bordering the Parks Highway between Petersville Road and the Denali State Park. Currently, the Matanuska-Susitna Borough, in cooperation with the National Parks Service, and the State of Alaska, Department of Natural Resources, Division of Parks, is in the process of implementing recommendations in the South Denali Implementation Plan (SDIP). The cooperative agencies are dedicated to ensure that development in the area takes into consideration the touristic and historic values of the area, and that it does not detract from the proposed development associated with the SDIP. Should the Parks Highway be identified as the preferred route for the ASAP, the borough recommends that as much of the proposed development as possible occur within the State of Alaska, Department of Transportation, Parks Highway right-of-way, and that it be constructed underground, to minimize potential negative impacts to the scenic qualities of the South Denali area. See this website for further information on the South Denali project http://www.[illegible]

In addition, the borough is anticipating an impending decision from the Federal Surface Transportation Board, concerning a route for the proposed rail spur to Port MacKenzie. Once the rail route is determined, the ASAP project could consider this route as another possible option for the project route. See this website for further information on the rail extension project: http://www.portmacrail.com/

The Port MacKenzie industrial area is available for locating processing and exporting facilities related to the gas line and may be considered for your future facilities. See this website for further information on the Port MacKenzie district: http://www.matsugov.us/Port/

Electrical utilities in the State, and particularly in the rail belt, are considering alternative and competitive options for electrical generation and transmission throughout the rail belt region. Our local electrical coop, Matanuska Electric Association, has information on their website (http://www.mea.coop/) about options for new generation and transmission options (click on New Generation in the left column). Discussion should also take place with these rail belt electrical utilities on possible routes for the ASAP, to identify the best possible options to accomplish a variety of statewide utility needs.

Finally, the Parks Highway route of the pipeline will likely pass through the Trapper Creek, Susitna, Willow, Big Lake and Point MacKenzie Community Councils. These communities each have a comprehensive plan which should be consulted during the evaluation of pipeline routes. The comprehensive plans are available on the Matanuska-Susitna Borough webpage (www.matsugov.us) under the planning division. Contact information for the councils is available on request.

Thank you for the opportunity to comment on the preparation of the EIS for the Alaska Stand Alone Pipeline Natural Gas Transportation Project. We look forward to continued participation in the process. Should you have further questions please contact me at (907) 746-[illegible].

Respectfully,

Eileen Probasco
Chief of Planning

CC: [illegible], Chief of Land & Resource Management, MSB
Brad Sworts, Transportation & Environmental Planner, MSB
Joe Griffith, General Manager, Matanuska Electric Association

APPENDIX E

Public Comments

Kacy Hillman

From: Tricia Waggoner
Sent: Monday, January 11, 2010 11:33 AM
To: Kacy Hillman
Subject: FW: ASAP EIS Scoping Comment Response

Follow Up Flag: Follow up
Flag Status: Completed

Tricia Waggoner
pmwaggoner@nrg-llc.com
(907) 263-8103 Direct
(907) 575-7300 Cell
(907) 263-8110 Fax

From: Sweet, Serena E POA [mailto:Serena.E.Sweet@usace.army.mil]
Sent: Monday, January 11, 2010 11:33 AM
To: Mark Landt
Cc: asap@entrix.com; Tricia Waggoner
Subject: ASAP EIS Scoping Comment Response

Thank you for your email regarding the Alaska Stand Alone Pipeline (ASAP) Environmental Impact Statement (EIS). Your comments have been placed in the official record and will be given full consideration during the EIS development process.

Additionally, your contact information has been added to our EIS distribution list. You will receive newsletters and other information distributed throughout the EIS development process.

If you have any questions, you may contact Ms. Serena Sweet (Lead Project Manager, U.S. Army Corps of Engineers) by phone at (907) 753-2819, or toll free from within Alaska at (800) 478-2712, or by email at serena.e.sweet@usace.army.mil.

For additional information regarding the ASAP EIS process, please visit the project website at www.asapeis.com.

Serena E. Sweet
Project Manager | (907) 753-2819

U.S. Army Corps of Engineers
CEPOA-RD-S
P.O. Box 6898
Elmendorf AFB, AK 99506-0898
Fax: (907) 753-5567
Email: Serena.E.Sweet@usace.army.mil
www.poa.usace.army.mil/reg

-----Original Message-----
From: Mark Landt [mailto:MLandt@renaissancealaska.com]
Sent: Tuesday, January 05, 2010 6:49 AM
To: Sweet, Serena E POA
Subject: Pipeline to Gubik

Serena,

Does the Draft EIS for the SOA's proposed ASAP include a pipeline corridor to Gubik? If so, as owners of the oil field at Umiat we would like to insure that the corridor includes an oil line in addition to the gas line. Please feel free to call me if you have any questions. We are also available to meet and review with you our plans at Umiat.

Thanks,

Mark

Mark R. Landt

Renaissance Alaska, LLC

2500 Tanglewilde Ave., Suite 340

Houston, Texas 77063

(281) 768-7650 Wk

(214) 738-6945 Cell

(832) 201-7495 Fax

mlandt@renaissancealaska.com

Kacy Hillman

From: Tricia Waggoner
Sent: Monday, January 11, 2010 11:16 AM
To: Kacy Hillman
Subject: FW: ASAP EIS Scoping Comment Response

Follow Up Flag: Follow up
Flag Status: Completed

Tricia Waggoner
pmwaggoner@nrg-llc.com
(907) 263-8103 Direct
(907) 575-7300 Cell
(907) 263-8110 Fax

From: Sweet, Serena E POA [mailto:Serena.E.Sweet@usace.army.mil]
Sent: Monday, January 11, 2010 11:13 AM
To: Hanley, Mark
Cc: asap@entrix.com; Tricia Waggoner
Subject: ASAP EIS Scoping Comment Response

Thank you for your email regarding the Alaska Stand Alone Pipeline (ASAP) Environmental Impact Statement (EIS). Your comments have been placed in the official record and will be given full consideration during the EIS development process.

Additionally, your contact information has been added to our EIS distribution list. You will receive newsletters and other information distributed throughout the EIS development process.

If you have any questions, you may contact Ms. Serena Sweet (Lead Project Manager, U.S. Army Corps of Engineers) by phone at (907) 753-2819, or toll free from within Alaska at (800) 478-2712, or by email at serena.e.sweet@usace.army.mil.

For additional information regarding the ASAP EIS process, please visit the project website at www.asapeis.com.

Serena E. Sweet
Project Manager | (907) 753-2819

U.S. Army Corps of Engineers
CEPOA-RD-S
P.O. Box 6898
Elmendorf AFB, AK 99506-0898
Fax: (907) 753-5567
Email: Serena.E.Sweet@usace.army.mil
www.poa.usace.army.mil/reg

-----Original Message-----
From: Hanley, Mark [mailto:Mark.Hanley@anadarko.com]
Sent: Friday, January 08, 2010 12:00 PM
To: Sweet, Serena E POA
Subject: Distribution list and Gubik gas

Hi Serena,

My name is Mark Hanley and I am the Public Affairs Manager here in Alaska for Anadarko Petroleum. Can you please add me to your distribution list for any information that is sent out regarding the Alaska Stand Alone Pipeline Environmental Impact Statement? Thanks, my information is below:

Mark Hanley
Alaska Public Affairs Manager
Anadarko Petroleum Corporation
3201 C Street, Suite 603
Anchorage, AK 99503
(907)273-6310 direct phone
(907)227-2718 cell phone
(907)563-9479 fax
mark.hanley@anadarko.com email

As background, Anadarko is currently operating a gas exploration program in the Foothills of Alaska's North Slope. Many refer to this as the Gubik area, since our exploration acreage encompasses the Gubik gas field which was discovered in the late 1950's. We have exploration access to over a million gas prone acres in the area around Umiat and Gubik, made up of state, federal and Arctic Slope Regional Corporation land. We drilled four wells in the past two seasons, all of which encountered gas, and we are continuing to try and evaluate the potential commerciality of gas from the region.

A key consideration for us will be the ability to transport potential future gas to market, so we are very interested in the work being done for an Alaska Stand Alone Pipeline. In reviewing the documents on your website, I noticed that some, like the 11-16-09 Draft Project Description/Plan of Development and the maps under the maps tab, include Gubik gas as a potential supply option, which we appreciate. I did notice that the map in the Scoping Presentation does not show gas from the Gubik region as an option. It makes sense to us to include Gubik region gas as an option, so that all possibilities are considered as you go through the public process of evaluating a Stand Alone Gas Pipeline project and so additional work in the future can be avoided if Gubik region gas turns out to be an initial or supplemental supply of gas for the pipeline.

While gas from Prudhoe already exists and gas from our exploration area may not be ready to produce by the proposed pipeline start up in 2016, our gas appears to be "dry", which means we won't likely need as much conditioning and treatment as gas from Prudhoe. NGL extraction plants in Fairbanks and Cook Inlet would also not likely be necessary, reducing some costs for our gas relative to gas from Prudhoe. Anyhow, gas from different areas has different advantages and disadvantages and it seems prudent to consider multiple supply options as the Environmental Impact Statement is developed for the Stand Alone Gas Pipeline Project.

Thanks for adding me to your distribution list and if you have questions or would like more information about our gas exploration activities in the Foothills, please don't hesitate to contact me.

Sincerely,

Mark Hanley

Pat Winklmann
P.O. Box 62
Healy, Alaska 99743
(907)683-2305

January 25, 2010

USACE
RECEIVED
JAN 26 2010
AK REGULATORY

Serena Sweet, Project Manager
U.S. Army Corps of Engineers
P.O. Box 6898
Elmendorf AFB, Ak 99506

Dear Serena:

Enclosed with this letter is a petition I circulated throughout the Denali Borough for the last month in support of including trail ways / pathways for public use along the course of the pipeline (A.S.A.P.) if the project is completed . I am very pleased that well over 200 residents, adults and students alike were inclined to sign on in support of this idea.

When it comes to decisions, I hope that you take into consideration the support these residents have for community friendly, multi use trails in conjunction with the pipeline.

Thank you – feel free to contact me at the above address or phone number if necessary.

Sincerely,

Pat Winklmann

Pat Winklmann

January 2010

Are you interested in having the safety of bike paths, side walks and running trails for Denali Borough residents and visitors?

For Your Information . . .

The **Alaska Stand Alone Pipeline** (ASAP) is a project proposed by the Alaska Department of Natural Resources to deliver natural gas from the North Slope to in-state markets in Interior and South Central Alaska. This project is currently in the planning stages.

At a recent meeting locally it was noted that a gas pipeline project through the Denali Borough by 'ASAP' may easily incorporate a "bike/ pedestrian" path into its design and construction as part of the project, ***if there is ample interest in doing this.***

A 'Multi Use Pathway' project is now being considered by our Borough Assembly.

The comment period for the 'ASAP' project is over on February 5, 2010.

So, if you would like to see the development of Multi-use pathways in our borough, voice your opinion by signing the attached petition.

Thanks,

'Multi Use Trails' supporters (There are a lot of us)

For further information contact:
Pat Winklmann 683-2305 PO Box 62 Healy, Alaska 99743
winklmann@ hotmail.com

Address & Email added on 2/3/10

Alaska Stand Alone Pipeline
Environmental Impact Statement

COMMENT FORM

December 2009

Your input is an important element in the scoping phase of this project. To help us consider your views and suggestions, please write them down on this sheet and mail to our address, which is preprinted on the back of this form. Please write legibly (printing is appreciated) and you may attach additional sheets if necessary. Your comments can be submitted via mail; emailed to **info@asapeis.com**; or through the comment section of the website at www.asapeis.com.

Name (PLEASE PRINT): HAROLD HEINZE

Address: 1336 STAUBBACH CIRCLE

City, State, Zip Code: ANCHORAGE AK 99508

Telephone (Optional): (907) 257-1347

Email (Optional): heinzye@acsalaska.net

☒ **Please retain or add my name to the project mailing list. I wish to receive information in the mail.**

☒ **Please add my name and email address to the list. I wish to receive information by electronic mail.**

COMMENTS: I BELIEVE THAT AN ALTERNATIVE PROJECT WOULD INCLUDE A GLENNALLEN TO VALDEZ SEGMENT. THE POTENTIAL SHIPMENT OF GAS FROM VALDEZ WOULD SIGNIFICANTLY LOWER ALASKA CONSUMER COSTS.

Note: To mail, fold page in half along the dashed line on the back of this sheet so that the address shows. Tape shut and affix a standard first class postage stamp.

Thank you for your participation!

Alaska Stand Alone Pipeline
Environmental Impact Statement

COMMENT FORM

December 2009

Your input is an important element in the scoping phase of this project. To help us consider your views and suggestions, please write them down on this sheet and mail to our address, which is preprinted on the back of this form. Please write legibly (printing is appreciated) and you may attach additional sheets if necessary. Your comments can be submitted via mail; emailed to **info@asapeis.com**; or through the comment section of the website at www.asapeis.com.

Name (PLEASE PRINT): HAROLD HEINZE

Address: 1336 STAUBBACH CIRCLE

City, State, Zip Code: ANCHORAGE AK 99508

Telephone (Optional): (907) 257-1347

Email (Optional): heinzye@acsalaska.net

☒ **Please retain or add my name to the project mailing list. I wish to receive information in the mail.**

☒ **Please add my name and email address to the list. I wish to receive information by electronic mail.**

COMMENTS: I BELIEVE THE ROUTE SEGMENT BETWEEN SOUTH OF GULKANA AND EUREKA WILL CREATE A SUPER HIGHWAY OF TRESPASS. AN ALTERNATIVE FOLLOWING THE TAPS + GLENN HIGHWAY CORRIDORS SHOULD BE INCLUDED

Note: To mail, fold page in half along the dashed line on the back of this sheet so that the address shows. Tape shut and affix a standard first class postage stamp.

Thank you for your participation!

Sweet, Serena E POA

From: Sweet, Serena E POA
Sent: Thursday, February 04, 2010 1:31 PM
To: 'heinze@acsalaska.net'
Subject: ASAP EIS Scoping Comment Response

Thank you for submitting comments regarding the Alaska Stand Alone Pipeline (ASAP) Environmental Impact Statement (EIS). Your comments have been placed in the official record and will be given full consideration during the EIS development process.

Additionally, your contact information has been added to our EIS distribution list. You will receive newsletters and other information distributed throughout the EIS development process.

If you have any questions, you may contact Ms. Serena Sweet (Lead Project Manager, U.S. Army Corps of Engineers) by phone at (907) 753-2819, or toll free from within Alaska at (800) 478-2712, or by email at serena.e.sweet@usace.army.mil.

For additional information regarding the ASAP EIS process, please visit the project website at www.asapeis.com.

Tricia Waggoner

From: webmaster@asapeis.com
Sent: Friday, February 05, 2010 3:32 PM
To: info@asapeis.com
Subject: SPAM-LOW: Added Comment

First Name: Becky
Last Name: Long
Mailing Address: PO Box 320
City: Talkeetna
State: Alaska
Zip: 99676
Phone: 9073739773
Email: issues320@hotmail.com
Comment: 2/5/10 This is a scoping comment. 1. There needs to be an assessment of impacts on the lives and access of remote residential residents and property owners near the pipeline route. 2. The pipeline route should not use the electrical intertie route that is east of the Talkeetna area. Remote residential residents and property owners do not want the negative impacts to their access and way of life if the pipeline uses the electrical intertie transmission route. 3. Must scope the impacts on remote residents and property owners and the habitat and wildlife populations that would be in the vicinity of the compressor statements. Comments representing the Board of Directors of Alaska Survival.

Please do not reply to this email

Tricia Waggoner

From: Sweet, Serena E POA [Serena.E.Sweet@usace.army.mil]
Sent: Monday, February 08, 2010 1:19 PM
To: issues320@hotmail.com
Cc: Tricia Waggoner; asap@entrix.com
Subject: RE: SPAM-LOW: Added Comment

Thank you for your email regarding the Alaska Stand Alone Pipeline (ASAP) Environmental Impact Statement (EIS). Your comments have been placed in the official record and will be given full consideration during the EIS development process.

Additionally, your contact information has been added to our EIS distribution list. You will receive newsletters and other information distributed throughout the EIS development process.

If you have any questions, you may contact Ms. Serena Sweet (Lead Project Manager, U.S. Army Corps of Engineers) by phone at (907) 753-2819, or toll free from within Alaska at (800) 478-2712, or by email at serena.e.sweet@usace.army.mil.

For additional information regarding the ASAP EIS process, please visit the project website at www.asapeis.com.

From: webmaster@asapeis.com[SMTP:WEBMASTER@ASAPEIS.COM]
Sent: Friday, February 05, 2010 6:32:27 PM
To: info@asapeis.com
Subject: SPAM-LOW: Added Comment
Auto forwarded by a Rule

First Name: Becky
Last Name: Long
Mailing Address: PO Box 320
City: Talkeetna
State: Alaska
Zip: 99676
Phone: 9073739773
Email: issues320@hotmail.com
Comment: 2/5/10 This is a scoping comment. 1. There needs to be an assessment of impacts on the lives and access of remote residential residents and property owners near the pipeline route. 2. The pipeline route should not use the electrical intertie route that is east of the Talkeetna area. Remote residential residents and property owners do not want the negative impacts to their access and way of life if the pipeline uses the electrical intertie transmission route. 3. Must scope the impacts on remote residents and property owners and the habitat and wildlife populations that would be in the vicinity of the compressor statements. Comments representing the Board of Directors of Alaska Survival.

US Army Corps of Engineers
Alaska District

CONVERSATION RECORD

VISIT______
CONFERENCE______
TELEPHONE
INCOMING______
OUTGOING X

DATE 2/15/10
TIME 10:00am

Name of Person(s) Contacted or in Contact with you:	Their Organization:	Their Telephone #:
Ruth McHenry	Copper Country Alliance	907-822-3644

Subject:
ASAP EIS Scoping Comments

Summary:

2/16: I called Ms. McHenry to discuss her email question sent on 2/15/10. I explained that although there is a route selected by the applicant as their preffered alternative, the NEPA process will require us to identify and analyze alternatives to that route and/or design that may be feasible and meet the project purpose. She stated that that answered her question.

2/24: I called Ms. McHenry again regarding her email question on 2/17/10. I stated that the preffered route (proposed by the applicant) would follow a path through Chitna pass; however we are still in the scoping phase of the EIS development and would welcome any input on alternatives to the proposed route. I also stated that a route along the highway has been identified as a potential alternative and will be analyzed in the EIS. (I also explained that the ASAP EIS is proposed to follow the Parks Highway as the preffered route)

Name of Person Documenting Conversation	Signature	Date
Serena Sweet	[signature]	2/24/10

Sweet, Serena E POA

From: Ruth McHenry [cca@coppervalleyak.net]
Sent: Monday, February 15, 2010 8:48 AM
To: Sweet, Serena E POA
Subject: Stand Alone Gas Pipeline Routes

Dear Serena,

Someone just told me that the routes for the Stand Alone Gas Pipeline routes had already been signed off before Scoping. Is that true? If so, what kind of public process was there? Is there any prospect of them changing as a result of public input?

Ruth
--
Ruth McHenry, Volunteer staff
Copper Country Alliance
HC 60 Box 306T, Copper Center AK 99573
907-822-3644

Sweet, Serena E POA

From: Ruth McHenry [cca@coppervalleyak.net]
Sent: Wednesday, February 17, 2010 7:04 AM
To: Sweet, Serena E POA
Subject: Chitna Pass deviation on Richardson route

Good morning, Serena,

Thank you for your call yesterday. I neglected to ask specifically about the Chitna Pass section of the Richardson route. As you'll see in my comments, that's the area we're most concerned about. We've also heard that geological difficulties have put a route closer to the highway "off the table". Do you know if that section is open to more discussion?

Thanks,
Ruth
--
Ruth McHenry, Volunteer staff
Copper Country Alliance
HC 60 Box 306T, Copper Center AK 99573
907-822-3644

COPPER COUNTRY ALLIANCE
HC 60 Box 306T
Copper Center, Alaska 99573
Phone (907) 822-3644 Fax (907) 822-3644
e-mail cca@coppervalleyak.net

"Protecting the rural and wild natural environment of the Wrangell Mountains/Copper Basin region."

February 9, 2010

U. S. Army Corps of Engineers
ATTN: Serena Sweet, Project Manager via e-mail to Serena.E.Sweet@usace.army.mil
PO Box 6898
Elmendorf AFB, AK 99506-0898

Re: Alaska Stand Alone Gas Pipeline Project

Dear Ms. Sweet:

Copper Country Alliance is a grassroots 501(c)(3) organization that addresses conservation issues in the Copper Basin. Most of our members are Copper Basin residents. In this letter, we are providing EIS Scoping comments on the Stand Alone Gas Pipeline Project. We are limiting our comments to the portion we know best--the "Richardson Highway " route from Isabel Pass to Chickaloon River.

These comments are in response to materials provided in the Draft *Alaska Stand Alone Gas Pipeline Project Description/Plan of Development.* We have not read the *Alternatives Analysis*, because it is too large a document for us to download.

Copper Country Alliance supports the goal of distributing Alaska's natural gas within the state as a short-term, more affordable, lower pollution alternative to diesel and heating oil. We strongly urge, however, that the Stand-Alone Gas Pipeline project be done in the best possible way, in order to minimize habitat and wildlife disturbance and maximize benefits to Alaskans, both in terms of jobs and of a lasting legacy of healthy public lands, clean air, and clean water.

Members of our organization served for several years on the Yukon Pacific Corp.'s (YPC's) Trans-Alaska Gas System Environmental Review Committee (TAGS-ERC). Many of our following comments are based on that process:

FISH AND WILDLIFE:

- In addition to fish and wildlife considerations mentioned elsewhere, the EIS should consider:
    - Construction and post-construction impacts to subsistence, due to temporary or permanent increases in the hunting and fishing population, increased access, disruption of wildlife behavior, habitat impacts, and other factors.
    - Construction timing to avoid critical periods for various species; e.g., the Nelchina caribou herd's migration, the calving and lambing seasons for moose, caribou, and sheep, and waterfowl nesting periods.
    - Construction timing to avoid periods when large numbers of hunters are in certain areas; e.g., August 10 through September 20 for caribou and sheep.
    - Periods when helicopter-ferrying should be avoided, in order to avoid disturbing wildlife and hunters' efforts to obtain food for their families.

- Food and garbage handling procedures to avoid attracting and habituating carnivores and scavengers.

- The Alaska Department of Fish and Game, the U.S. Fish and Wildlife Service, the Bureau of Land Management, and the Southcentral Alaska Regional Subsistence Advisory Council should be closely consulted on an ongoing basis (during the EIS process and construction) regarding these and other fish and wildlife issues.

OFF-ROAD VEHICLES:
Off-road vehicles (OHVs) can have severe impacts on wildlife, their habitats, vegetation, soils, and water quality. OHV riders also (probably mostly unintentionally) sometimes trespass on Native Corporation and other private lands. Therefore, it is important that the EIS give increased attention to preventing increased OHV access along its route, both on the right-of-way and via access roads.

The *Project Description/Plan of Development* states that, "None of the temporary or permanent access roads will be available for public use during or after construction." How will that be accomplished? The EIS should specify barrier techniques and require enforcement. Some suggestions:

- Temporary winter access roads could cross lakes, making summer ATV use unfeasible.
- Where feasible, access roads could be routed to make use of natural topographic and vegetative pinch points where barricades are more effective.
- Increase enforcement efforts at times (e.g., hunting season, holiday weekends) when OHV use peaks.

ROUTING:
The *Project Description* (Section 5, first paragraph) makes a good case for adhering to established corridors:

> "The location of the Project facilities parallel existing transportation corridors and was selected specifically to minimize impacts. This early planning reduces the need to extend new roads into pristine lands to create access to construct and operate the pipeline and compressor stations. Existing right-of-way, terrain, TAPS and other pipelines, and roads limit specific route locations within these corridors to some extent in certain locations."

In spite of that, however, sections of the proposed Richardson Highway route deviate significantly from established corridors--the Richardson Highway, the Glenn Highway, and TAPS. These sections amount to about **40%** of the Isabel Pass to Chickaloon River part of the route. They are, from north to south (*using approximate project mileposts and place name locations*):

- Hogan Hill to west of Gulkana River (Milepost 655-675: The route runs east of TAPS and the highway for a number of miles, crosses the highway, then crosses the Gulkana River several miles downstream of the TAPS bridge. Before rejoining TAPS, it crosses lake-rich wetlands populated with nesting swans. This was identified as an area of wildlife concern in the TAGS-ERC process.

- Gakona to Upper Tazlina (Milepost 689-696): The route takes a straight diagonal course to the Southwest, bypassing Glennallen. Increased ATV access and fish and wildlife habitat are concerns.

- Tahneta to Chickaloon River (Milepost 745-792): The proposed route would deviate from the Glenn Highway and go behind Sheep Mountain. It would go along Squaw, Caribou, Chitna and Boulder Creeks, traversing some of the region's best habitat for Dall sheep, as well as important caribou and moose habitat. A major concern is whether gas line construction would "improve" access and increase the amount and range of ATV traffic. (There is, for instance, a natural barrier up Caribou Creek. If this were blasted, it would provide ATV access.) This in turn could be expected to affect wildlife.

According to ADFG data, the 2007 harvest for that area included 59 Dall rams, 49 caribou, 59 moose, 8 grizzly bear, and 8 black bear. These are significant numbers. Therefore, a project that could impact wildlife is of considerable concern to ADFG biologists, hunters, local residents, photographers, and recreationists. Also, the deviation goes through a highly scenic hiking route, one of those described in *55 Ways to the Wilderness* by Helen Nienhueser and John Wolfe, Jr. ATV traffic has impaired this wilderness experience; it would be important to understand if construction of the gas line would lead to even more motorized recreation. We urge more studies of a route which instead stays close to the Glenn Highway.

We appreciate your keeping to the east side of Summit Lake, as the highway and TAPS do. A route around the west side of Summit Lake would meet considerable opposition. The high, open country in that vicinity makes it vulnerable to ATV impacts. Scenic vistas, especially from the Denali Highway, would be impaired. It is also part of a valuable wintering area for the Nelchina caribou herd.

Deviations from existing rights-of-way always raise important questions about fish and wildlife, their habitats, and OHV impacts. As the route selection process continues, relevant agencies, Native organizations, and the general public should be closely consulted about route specifics, and should be kept fully informed if any additional route deviations are considered.

We appreciate that the document provides early information about construction details. Therefore, we have very little to add, as follows:

RIGHT-OF-WAY CLEARING:

- Consider using a hydroaxe on some sections, so that only the narrow trench for the pipe is disturbed. A hydroaxe shreds timber and maintains the natural ground surface and cover.
- Large diameter trees should be logged (rather than mowed down by dozer), decked, and made available for commercial use. Smaller trees and limbs should be made available for chipping and pelleting operations. Where there is feasible access, close to the highway, consider making firewood available for households. Many residents burn wood; some are having difficulty obtaining enough.
- To minimize the spread of spruce bark beetles, spruce not otherwise utilized should be chipped and spread or buried in the work-pad. Because of global warming, it should not be burned.

WORK-PAD AND ACCESS ROAD CONSTRUCTION AND REHABILITATION

- Material site development constitutes one of the major surface disturbances. Given the difficulties of rehabilitation, and the potential for spread of invasive species, siting is critical. We appreciate the requirement to use existing sites as much as possible.
- We appreciate that the document recognizes the importance of revegetating with native species. During pipeline construction and operation, we urge continued consultation with the National Park Service, the Alaska Plant Materials Center, and other agencies that have expertise in revegetation with native species and in techniques to avoid introducing and spreading invasive species. Some past right-of-way projects in the Copper River Basin have failed to take precautions against invasive species, with the consequent spread of such species as Narrowleaf Hawksbeard and Wild Sweetclover.

DITCHING (TRENCHING), PIPE-LAYING, AND BACKFILL

- River training structures, intended to protect pipeline crossings, present long-term maintenance challenges, tend to block side channels, and commonly fail to accommodate natural changes in river channels.
- Dust control will be necessary.

ABOVE-GROUND PIPE

- If there are any significant distances of above-ground pipe, adequate crossings should be provided for wildlife. TAPS moose crossings were often in the wrong places; caribou crossings were often ineffective. ADFG should play a key role.

COMPRESSOR STATIONS:

- The effects of compressor activities and operating noise on wildlife must be considered when siting compressor stations. ADFG should play a key role.
- "Blow-downs" can happen at compressor stations. The result can be a very loud screech. Can this problem be eliminated through design? If not, impacts to wildlife and humans must be considered.

CATASTROPHIC EVENTS:

- Potential catastrophic events include, but are not limited to:
    - Earthquake (fault zones such as Donnelly Dome, McGinnis Glacier, and Denali)
    - Flood
    - Explosion
- Potential catastrophic events should be identified and evaluated. Prevention of damage from such events should be part of the design process. Appropriate responses should be planned.

CONSTRUCTION MONITORING:

- A strong Quality Control (QC) program is necessary to avoid rework during operations and to ensure adherence to requirements resulting from the EIS process.
- An observer should be assigned to each piece of equipment that operates close to TAPS. An example of what can happen without an observer was provided in 2000, when work was being done on TAPS to correct leaning Vertical Support Members and off-center "shoes" at Squirrel Creek. In that instance, a backhoe accidentally hit the elevated oil pipeline, penetrating the insulation but fortunately not damaging the pipe.
- Construction impact minimization requires sufficient oversight, interagency coordination, and delegation of authority. A biologist and an engineer should always be on-site.
- Project sponsors, contractors, and subcontractors must commit to doing the job in the environmentally preferred manner, the first time. Corporate commitment to quality and regulatory compliance is essential to environmentally responsible construction and operation.

CITIZEN OVERSIGHT: As mentioned above, members of our organization served on the Trans-Alaska Gas Pipeline Environmental Review Committee (TAGS-ERC). This committee, composed of representatives of various conservation and Alaska Native groups and funded by YPC, worked with YPC to identify environmental concerns *in advance of construction.* By identifying problem areas in advance, conservation groups and YPC were able to work together on solutions rather than waste time and money in litigation or in pursuing unsuitable options. This process was far more detailed, and involved considerably more sharing of technical information, than the usual public involvement aspects of an EIS process.

- We strongly believe that a Citizens' Oversight Group (similar to TAGS-ERC, but with independent science advisors) would be a huge benefit to the people of this state (who, after all, own the gas and own much of the land through which the gas line would pass). This group would see the project through from beginning to end (design/construction/operation).
- There should be an environmental subcommittee to oversee issues like wildlife, erosion and stream crossings. There should also be a socio-economic subcommittee to deal with issues like local hire, job

training, and cultural resource protection, and to see that maximum benefit flows to Alaskan communities. The group should be funded and staffed, have independent science advisors, and be independent of project sponsor control.
- We request that establishment and funding of a Citizens' Oversight Group, as described above, be a condition of the right-of-way lease.
- A Citizens' Oversight Group would have the same purpose as the ERC did—to help make this the best possible pipeline from environmental and socio-economic viewpoints. Alaska Natives, environmental organizations, unions, landowners' associations, and groups like the Copper Valley Development Association would have places at the table.

Thank you for the opportunity to comment. We look forward to seeing our concerns, questions, and requests addressed in the EIS.

Sincerely,

COPPER COUNTRY ALLIANCE

Ruth McHenry
Volunteer Staff

Tricia Waggoner

From: Sweet, Serena E POA [Serena.E.Sweet@usace.army.mil]
Sent: Thursday, February 11, 2010 12:57 PM
To: Ruth McHenry
Cc: Tricia Waggoner; asap@entrix.com
Subject: RE: Scoping comments

Thank you for your email regarding the Alaska Stand Alone Pipeline (ASAP) Environmental Impact Statement (EIS). Your comments have been placed in the official record and will be given full consideration during the EIS development process.

Additionally, your contact information has been added to our EIS distribution list. You will receive newsletters and other information distributed throughout the EIS development process.

If you have any questions, you may contact Ms. Serena Sweet (Lead Project Manager, U.S. Army Corps of Engineers) by phone at (907) 753-2819, or toll free from within Alaska at (800) 478-2712, or by email at serena.e.sweet@usace.army.mil.

For additional information regarding the ASAP EIS process, please visit the project website at www.asapeis.com.

-----Original Message-----
From: Ruth McHenry [mailto:cca@coppervalleyak.net]
Sent: Tuesday, February 09, 2010 8:53 AM
To: Sweet, Serena E POA
Subject: Scoping comments

Dear Ms. Sweet:

Our comments for the Alaska Stand Alone Gas Project EIS Scoping are attached.
Thank you for telling me about the deadline extension!

Ruth McHenry
--
Ruth McHenry, Volunteer staff
Copper Country Alliance
HC 60 Box 306T, Copper Center AK 99573
907-822-3644

US Army Corps of Engineers
Alaska District

CONVERSATION RECORD

VISIT_______
CONFERENCE_______
TELEPHONE
INCOMING X
OUTGOING_______

DATE 2/19/10
TIME 2:00pm

Name of Person(s) Contacted or in Contact with you:	Their Organization:	Their Telephone #:
Gilbert Venton		907-968-2239

Subject: ASAP EIS Scoping Comments

Summary:

Mr. Venton left a voicemail on 2/19/10 stating that he was interested in the ASAP EIS because he had received a copy of the revised public notice. I was able to get back in contact with Mr. Venton on 2/22/10. I asked if he had been able to view the website. He stated that the internet was currently down, so I told him I would send a CD to him containing the project information. I sent the CD to him at PO Box 50, Allakaket, AK 99720 on 2/24/10

Name of Person Documenting Conversation	Signature	Date
Serena Sweet	[signature]	2/24/10

US Army Corps of Engineers
Alaska District

CONVERSATION RECORD

VISIT____
CONFERENCE____
TELEPHONE
INCOMING____
OUTGOING X

DATE 2/23/10
TIME 10:00 am

Name of Person(s) Contacted or in Contact with you:	Their Organization:	Their Telephone #:
Lloyd Paningona	Inupiat Community of the Arctic Slope	907-852-4227

Subject: ASAP EIS Scoping Comments

Summary:
I called Mr. Paningona per his request by email on 2/17/10. He asked where he could obtain information related to the ASAP EIS process & project. I told him about the project website, but he stated that he would prefer a CD containing the information. I sent him a CD at the address below on 2/24/10.

Address:
Lloyd Paningona
Inupiat Community of the Arctic Slope
P.O. Box 934
Barrow, AK 99723

Name of Person Documenting Conversation	Signature	Date
Serena Sweet	[signature]	2/24/10

Sweet, Serena E POA

From: Lloyd Paningona [icas.realty@barrow.com]
Sent: Wednesday, February 17, 2010 4:37 PM
To: Sweet, Serena E POA
Subject: AK Stand Alone Pipeline

Attachments: Glacier Bkgrd.jpg

CD sent on 2/24/10

Glacier Bkgrd.jpg (4 KB)

Serena,

My name is Lloyd Paningona, I am the Realty Director with the Inupiat Community of the Arctic Slope a federally recognized tribal government in Barrow AK. I just received the extension notice on the scoping period for the ASAP project. I have been involved with other projects here on the slope and I would like additional information if you would enlighten me on this. Please contact me at my office briefly at 907-852-4227 if you would, Thanks.

Lloyd Paningona, Realty Director
Inupiat Community of the Arctic Slope
P.O. Box 934
Barrow, AK 99723-0934
Phone # 907-852-4227 ext 227
Fax # 907-852-4234
icas.realty@barrow.com

Dear Serena,

Here is my reply to the plans for the Alaska Stand Alone Pipeline Project:

My name is Jean Carey Richardson and I own the property at mile 134 on The Parks Highway. This 160 acres was homesteaded by my mother, Mary Carey. Mother had been the first high school teacher in Talkeetna, when Talkeetna was a fly-in area, and discovered this area flying with Don Sheldon. She thought it had the best view of McKinley in Alaska, even better than the National Park. After she homesteaded there, she started a campaign for a road through the area so "Everyone could enjoy the view." When the highway finally came through in 1972 she opened a business which the family is still operating today.
Our small motel, 8 rooms, is popular with traveler's who want to get away from hectic modern life and enjoy the peace and tranquility here, we don't even have TV in the rooms.
Our reservations for the coming summer includes a group of Lutheran Pastors, who have chosen our lodge as a place to retreat, relax and meditate. I don't believe that they or any of our other guests would appreciate the sounds of bulldozers and backhoes.
I believe a much better route for the pipeline through our area would be to follow the railroad right of way from where it crosses the Parks Highway north of Curry Ridge and travels along the east side of Curry Ridge past the old ghost town of Curry. This is the easiest route through this area with lower elevations, which is why the railroad chose that route. The main reason the Parks Highway diverts from the railroad route in our area is because Mother put so much pressure on Governors Egan and Hickel to have a highway with a spectacular view. I don't believe the view would be of any importance to the pipeline.

Other reasons for the East of Curry Ridge Route:
1. It would be further from the Alaska Fault Zone. We had a 7.2 earthquake northwest of the lodge a few years ago that might have destroyed or damaged a pipeline.
2. The east side of Curry Ridge is almost uninhabited, and fewer people would be disrupted.
3. Rights of Way could be more easily negotiated with the railroad.
4. Heavy equipment could be dropped anywhere in route by the train.
5. This is a shorter, easier route, and should be quite a bit less expensive.

Thank you for the opportunity to give my opinion on this matter.

Jean Carey Richardson

-----Original Message-----
From: Sweet, Serena E POA <Serena.E.Sweet@usace.army.mil>
To: alaskajean907@aol.com
Sent: Mon, Feb 22, 2010 1:35 pm
Subject: For your reply

Serena E. Sweet
Project Manager | (907) 753-2819

U.S. Army Corps of Engineers
CEPOA-RD-S
P.O. Box 6898
Elmendorf AFB, AK 99506-0898
Fax: (907) 753-5567
Email: Serena.E.Sweet@usace.army.mil
www.poa.usace.army.mil/reg

Tricia Waggoner

From: Sweet, Serena E POA [Serena.E.Sweet@usace.army.mil]
Sent: Thursday, February 25, 2010 3:13 PM
To: darkwalking@yahoo.com
Cc: Tricia Waggoner; asap@entrix.com
Subject: ASAP EIS Scoping Comment Response

Thank you for your email regarding the Alaska Stand Alone Pipeline (ASAP) Environmental Impact Statement (EIS). Your comments have been placed in the official record and will be given full consideration during the EIS development process.

Additionally, your contact information has been added to our EIS distribution list. You will receive newsletters and other information distributed throughout the EIS development process.

If you have any questions, you may contact Ms. Serena Sweet (Lead Project Manager, U.S. Army Corps of Engineers) by phone at (907) 753-2819, or toll free from within Alaska at (800) 478-2712, or by email at serena.e.sweet@usace.army.mil.

For additional information regarding the ASAP EIS process, please visit the project website at www.asapeis.com.

Tricia Waggoner

From: webmaster@asapeis.com
Sent: Thursday, February 25, 2010 11:30 AM
To: info@asapeis.com
Subject: SPAM-LOW: Added Comment

First Name: Tom
Last Name: Starr
Mailing Address: 6070 w/beverly lk rd
City: Wasilla
State: Alaska
Zip: 99654
Phone: 9073737317
Email: darkwalking@yahoo.com
Comment: As a lifetime Alaskan I have been a proponent of a gas line since oil and gas discovery even prior to statehood. Bullet line, well yesss.In my closet theres a T-shirt depicting a laughing figure asking what gasline circa 1973..we have The Alaska Railroad corp, and a well done to the folks responsible for that now lets have the Alaska Pipeline corp.There is no need for Alaskans to be held hostage over their resources by big oil, or big corporations. Lets get er done kids

Please do not reply to this email

From: Sweet, Serena E POA [Serena.E.Sweet@usace.army.mil]
Sent: Friday, February 26, 2010 12:19 PM
To: tom starr
Cc: Tricia Waggoner; asap@entrix.com
Subject: ASAP EIS Comment Response

Thank you for your email regarding the Alaska Stand Alone Pipeline (ASAP) Environmental Impact Statement (EIS). Your comments have been placed in the official record and will be given full consideration during the EIS development process.

Additionally, your contact information has been added to our EIS distribution list. You will receive newsletters and other information distributed throughout the EIS development process.

If you have any questions, you may contact Ms. Serena Sweet (Lead Project Manager, U.S. Army Corps of Engineers) by phone at (907) 753-2819, or toll free from within Alaska at (800) 478-2712, or by email at serena.e.sweet@usace.army.mil.

For additional information regarding the ASAP EIS process, please visit the project website at www.asapeis.com.

-----Original Message-----
From: tom starr [mailto:darkwalking@yahoo.com]
Sent: Thursday, February 25, 2010 5:42 PM
To: Sweet, Serena E POA
Cc: xanadu@mtaonline.net
Subject: asap

hi

knowing the changes necessary to develop a project of both this magnitude, and importance to local economies, and for service to the populace of Alaska in general, I would hope that the corps would consider the obvious need to begin such a project, as well as the many future economic benefits to Alaska and the nation. I know little of your requirements for the EIS or for that matter for prerequisite requirements for the expeditious construction phases of such a project. I have worked on the trans Alaska pipeline oil project, the Beluga to Anchorage natural gas project and was Employed for thirty one years in the laborers local 341 in Anchorage as a pipe layer.. I know that the expense of such a project as the ASAP is not an issue with your agency so much as the necessary protection of both the environment now, as well as the safety,functionality and lasting durability of the finished product now and far into the future.

Thank you for the opportunity to comment and may I urge you and your department,(agency) to act swiftly and fairly for the good of all concerned.

Thank you again

Tom Starr

Tricia Waggoner

From: webmaster@asapeis.com
Sent: Tuesday, March 02, 2010 7:10 AM
To: info@asapeis.com
Subject: SPAM-LOW: Added Comment

First Name: Land
Last Name: Cole
Mailing Address: po box 41
City: Denali Park
State: Alaska
Zip: 99755
Phone:
Email: landcole@mtaonline.net
Comment: As a Parks Highway resident I believe that the footprint and impact of the pipeline construction makes it unacceptable for the parks highway route. The majority of Alaska's tourism activity occurs along the Parks highway corridor and the development of a pipeline in this area would permanently change the experience of traveling the parks highway. I also do not want to look at another scar across the landscape as we already have the intertie which has had limited usefulness in comparison to its cost of development and impact to the environment. I appreciate that burying the pipeline would lessen its visual impact however the 100' wide construction platform would be a permanent scar that is incompatible with other uses of this area be they tourism, hunting or recreation. Thank you for your time. Land Cole 38 yr resident of the Parks Highway

Please do not reply to this email

Tricia Waggoner

From: Sweet, Serena E POA [Serena.E.Sweet@usace.army.mil]
Sent: Monday, March 08, 2010 2:51 PM
To: landcole@mtaonline.net
Cc: Tricia Waggoner; asap@entrix.com
Subject: ASAP EIS Comment

Thank you for your email regarding the Alaska Stand Alone Pipeline (ASAP) Environmental Impact Statement (EIS). Your comments have been placed in the official record and will be given full consideration during the EIS development process.

Additionally, your contact information has been added to our EIS distribution list. You will receive newsletters and other information distributed throughout the EIS development process.

If you have any questions, you may contact Ms. Serena Sweet (Lead Project Manager, U.S. Army Corps of Engineers) by phone at (907) 753-2819, or toll free from within Alaska at (800) 478-2712, or by email at serena.e.sweet@usace.army.mil.

For additional information regarding the ASAP EIS process, please visit the project website at www.asapeis.com.

US Army Corps of Engineers
Alaska District

CONVERSATION RECORD

VISIT____
CONFERENCE____
TELEPHONE
INCOMING____
OUTGOING X

DATE 3/8/10

TIME 1:30pm

Name of Person(s) Contacted or in Contact with you:	Their Organization:	Their Telephone #:
Arlene Spurgin		907-322-7878

Subject: ASAP EIS Question

Summary:

I called Ms. Spurgin back to answer questions related to the ASAP EIS process. She wanted to know when the pipeline would be built. I explained that we were still in the process of collecting information to include in our analysis. She stated that she wanted more information about the location in relation to her property. I stated I would send her a CD containing the project information at the address below.

*Note: on 3/5/10 Julie McKim also contacted Ms. Spurgin to return her phone call. She provided her with answers to questions regarding the size of the pipe, how the route would be maintained and if the pipe would be buried. She also provided her with the project website (www.asapeis.com)

→Address: 246 Charles Street, Fairbanks, Ak 99701

Name of Person Documenting Conversation	Signature	Date
Serena Sweet	[signature]	3/8/10

Representative Chris Tuck

Alaska State Legislature
District 29 - Representing [illegible]

March 8, 2010

Serena Sweet
Regulatory Division
U.S. Army Corps of Engineers, CEPOA-RD
P.O. Box 6898
Elmendorf AFB, AK 99506-0898

Re: [illegible]
Proposed Alaska Stand Alone Natural Gas Transportation Pipeline; 74 Federal Register 232 (December 4, 2009)

Dear Ms. Sweet:

These comments are in response to the Notice of Intent to prepare a Draft Environmental Impact Statement on the Stand Alone Gas Pipeline.

Securing a reliable low cost source of natural gas is a vital economic driver for Alaska, generating jobs and opportunities for families.

By improving Alaska's energy outlook, we can make it easier for businesses to flourish and families to survive. Low cost energy will allow families more disposable income, as well as help sustain local businesses, promote new industries, and keep money flowing into our local economy. Reasonable energy prices will also help community organizations, schools and municipalities reduce taxpayer burden and use scarce funds for other needs.

Any natural gas development will help get us closer to the energy security that's crucial to Alaska's economic independence.

I therefore urge you to complete all necessary reviews on the stand alone gas line in a timely fashion, so that Alaska can progress forward.

Thank you for the opportunity to comment.

Chris Tuck

Representative Chris Tuck

Year-Round
Phone (907) 269-[illegible]
Toll-free (866) [illegible]

May-December
716 W. 4th Ave. Suite 370
Anchorage, AK 99501

January-April
State Capitol Bldg. Rm [illegible]
Juneau, AK 99801

From: Sweet, Serena E POA [Serena.E.Sweet@usace.army.mil]
Sent: Monday, January 11, 2010 2:34 PM
To: Bob Sattler
Cc: asap@entrix.com; Tricia Waggoner
Subject: ASAP EIS Scoping Comment Response

Thank you for your email regarding the Alaska Stand Alone Pipeline (ASAP) Environmental Impact Statement (EIS). Your comments have been placed in the official record and will be given full consideration during the EIS development process.

Additionally, your contact information has been added to our EIS distribution list. You will receive newsletters and other information distributed throughout the EIS development process.

If you have any questions, you may contact Ms. Serena Sweet (Lead Project Manager, U.S. Army Corps of Engineers) by phone at (907) 753-2819, or toll free from within Alaska at (800) 478-2712, or by email at serena.e.sweet@usace.army.mil.

For additional information regarding the ASAP EIS process, please visit the project website at www.asapeis.com.

Serena E. Sweet
Project Manager | (907) 753-2819

U.S. Army Corps of Engineers
CEPOA-RD-S
P.O. Box 6898
Elmendorf AFB, AK 99506-0898
Fax: (907) 753-5567
Email: Serena.E.Sweet@usace.army.mil
www.poa.usace.army.mil/reg

Serena E. Sweet
Project Manager | (907) 753-2819

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Fax: (907) 753-5567
Email: Serena.E.Sweet@usace.army.mil
www.poa.usace.army.mil/reg

-----Original Message-----
From: Bob Sattler [mailto:bob.sattler@tananachiefs.org]
Sent: Friday, January 08, 2010 11:28 AM
To: Sweet, Serena E POA
Subject: ASAP gas pipeline NEPA review

Please add Tanana Chiefs Conference to your contact list for information, announcements, meetings, communications and as a key stakeholder in the proposed Alaska Stand Alone Pipeline. I'm not aware of any communications between the COE and TCC and its affiliated Tribes on this project. Are you aware of the GtoG report done by the Morris Udall Foundation on the relations between TCC and the DoD? You may know that TCC is a tribal consortium for the Interior region of the State and we've been involved in pre-scoping for the large pipeline for several years and intensively involved in the environmental restoration of the old military pipelines through the region for more than a decade with the COE. I'll prepare copies of our series of reports and send them to you for material to be tiered into your NEPA process. On another topic, TCC manages a self-governance compact for Realty Services over Native allotments and you mention in the federal register that there are allotments along the route of the proposed line. For those lands, legal jurisdiction is vested with the Bureau of Indian Affairs and we work with them to counsel allotment owners, issue access permits, right-of-ways and so forth with the consent of the land owners. Has the COE or anyone else associated with your project sent notices of your scoping meetings to the potentially affected Native allotment owners and to the Tribal governments listed in the appendix of the project application for a ROW? For more information about TCC take a look as www.tananachiefs.org. We'll talk on the phone at some point - Bob Sattler (Environmental Quality Analyst)

Tanana Chiefs Conference
Chief Peter John Tribal Building
122 First Avenue, Suite 600
Fairbanks, Alaska 99701-4897
(907) 452-8251 Fax: (907) 459-3850

SUBREGIONS

UPPER KUSKOKWIM
McGrath
Medfra
Nikolai
Takotna
Telida

LOWER YUKON
Anvik
Grayling
Holy Cross
Shageluk

UPPER TANANA
Dot Lake
Eagle
Healy Lake
Northway
Tanacross
Tetlin
Tok

YUKON FLATS
Arctic Village
Beaver
Birch Creek
Canyon Village
Chalkyitsik
Circle
Fort Yukon
Venetie

YUKON KOYUKUK
Galena
Huslia
Kaltag
Koyukuk
Nulato
Ruby

YUKON TANANA
Alatna
Allakaket
Evansville
Fairbanks
Hughes
Lake Minchumina
Manley Hot Springs
Minto
Nenana
Rampart
Stevens Village
Tanana

March 8, 2010

Alaska Stand Alone Pipeline Natural Gas Transportation Pipeline
U.S. Army Corps of Engineers CEPOA-RD
Post Office Box 5898
Elmendorf AFB, Alaska 99506-0898

Dear Ms. Sweet:

Tanana Chiefs Conference (TCC) is the Alaska regional non-profit Native corporation representing the Interior region of Alaska. The Alaska Stand Alone Pipeline (ASAP) traverses more land through the TCC region compared to any other region in Alaska. Interest in the ASAP line by TCC and its member Tribes will grow as more information becomes available about the project and as you expand public outreach and Tribal consultation. TCC and its member Tribes may seek to influence the socioeconomic components throughout the NEPA process. The COE should anticipate that the level of participation in the NEPA process by TCC and its member Tribes will evolve as the Tribal leadership becomes more familiar with the project.

My review of project documents on the ASAP website leads me to conclude that the administrative record thus far is heavy on the natural environment and light on the human environment. Given the nature of the project, which is to bring lower cost energy to Alaskans, the treatment of impacts to the human environment should be commensurate with the probable effects of the project. My reading of the available project documents is that they do not contain substantive analysis of probable socioeconomic benefits, such as the percentage reduction in homeowner cost for heating and electricity in urban and rural settings.

As far as I am aware, TCC had not received formal notices of the public scoping meetings convened in December of last year. Please add us to your distribution list for any notices, announcements or scheduled activities relating to the federal environmental review. It would also be prudent to expand your mailing list with all of the federally recognized Tribes identified in the preliminary project documents. In regard to the Tribal entities, one of the project documents makes reference to Healy Tribal Council in the TCC region, and I presume you meant Healy Lake Tribe. I'm not aware of a Tribe in the town of Healy, but there are Tribes in Nenana and Cantwell. Nenana and Healy Lake are members of TCC and the regional for-profit Native corporation (Doyon, Limited), but Cantwell is a member of the Ahtna region.

You may know that the Native villages of the TCC region were involved in settling the aboriginal land claims in Alaska with respect to the Trans-Alaska Pipeline (TAPS) many years ago. With that behind them, the "Pipeline Tribes" of the TCC region have extensive histories on the topic of pipelines in Interior Alaska. The "TAPS experience" by those Tribes should be drawn into the affected environment and incorporated into the interdisciplinary analysis for the ASAP line as a proxy to better understand the socioeconomic components of the human environment.

The socioeconomic analysis for your project should also include an analysis of the capacities developed by the regional and village entities that were created by the Alaska Native Claims Settlement Act (ANCSA). One project document states: *"Because of its overland route through interior Alaska, an in-state pipeline will also provide construction and operational jobs and new business opportunities for Alaskan citizens." (Parks Highway Stand Alone Gas Pipeline ROW Permit Application and Bureau of Land Management Plan of Development.* Alaska Department of Transportation and Public Facilities, November 2009, Page 30-31). The contribution that the ASAP line may provide for employment and business opportunities to those ANCSA entities is a critically important topic for socioeconomic analysis. Perhaps this could be accomplished by some level of comparison on how the ASAP may be similar or different from the TAPS development.

The following section highlights six topics of interest:

1. Bringing energy relief to rural Alaska

An in-state gas pipeline provides obvious synergies to serve demand for natural gas not only in the Anchorage bowl area, but also along the route. The residents of these areas currently are confronted with extraordinarily high-energy costs. A gas pipeline will provide to these residents, for the first time, low cost clean natural gas for home heating, electricity generation, and potential industrial development (in Parks Highway Stand Alone Gas Pipeline ROW Permit Application and Bureau of Land Management Plan of Development. *Alaska Department of Transportation and Public Facilities, November 2009, Page 30-31).*

This statement should be expanded to identify an implementation plan for bringing low cost energy to rural Alaska. This purported first-time service for rural residents would be a remarkable development and ASAP should make it clear how the pipeline project will ensure deliver of natural gas products to bring energy (and economic) relief to rural residents. Thus far, the in-state gas studies have suggested that propane is the only economic source to deliver to rural Alaska. The plan by the ASAP developers to implement that goal is significant. In lieu of a delivery system to rural areas, a revenue-sharing mechanism similar to the power-cost equalization could be proposed that lowers or stabilizes the cost of energy generation with diesel systems currently installed in rural villages.

Possibly the ASAP project should include a separate alternative to address rural energy issues and how the project may contribute to those issues. Elements of the implementation plan might include: 1) needs, opportunities and constraints of bringing a gas liquid energy source to rural villages, 2) an analysis of capitalization costs associated with converting home heating and electrification in villages to a gas liquid source 3) transportation needs for delivering a gas liquid to roadless villages, 4) a cost-benefit analysis of a diesel to gas liquid conversion, and 5) an analysis of the power-cost equalization program and its applicability to the transition from diesel to a gas liquid source. If carried through by ASAP delivery of a lower cost source of energy, rural villages in the TCC region may experience a phase of revitalization.

2. Tribal Consultation

Project documents state:

The project developer will assist the BLM and USACE in government to government consultation with federally-recognized Alaska Native tribes as requested. The project developer will also consult with and negotiate land-access permits with each tribal landowner prior to taking actions that have substantial direct effects on federally recognized tribal governments in conformance with Executive Order 13175.

The project developer will prepare an integrated stakeholder engagement strategy and implementation plan as part of its land acquisition program and work with the BLM and USACE during the preparation of the third party EIS. The EIS meets the intent of the provisions for environmental justice and includes the fair treatment and meaningful involvement of all potentially affected individuals with respect to the proposed pipeline project; including strategies for providing equal access to the decision-making processes. (in *Parks Highway Stand Alone Gas Pipeline ROW Permit Application and Bureau of Land Management Plan of Development.* Alaska Department of Transportation and Public Facilities, November 2009, Page 35).

Close consultation with directly impacted Tribes should be further developed for this project. The ASAP commitment to provide equal access to the decision-making process is commendable. You may know that TCC and some of its member Tribes have a long history of collaborating with the COE, particularly on environmental restoration of formerly used defense sites in the Upper Tanana River region. The current NEPA process of the ASAP line may borrow from a previous study resulting from a former cooperative agreement entitled *Situation Assessment and Recommendations for Government-to-Government consultations between Interior Alaska Tribes and the U.S. Department of Defense on Military Impacts in*

Interior Alaska. You may find some guiding elements in this report that the COE and/or cooperating agencies for the ASAP project may adopt in the NEPA review.
The quoted passage above implies that the State of Alaska or its agent developer will specifically consult with Tribal landowners. Procedurally the lead agency is responsible for consultations in areas other than land ownership, but it is critically important for the COE to understand the land tenure policies in Alaska. You may know that the Alaska Native Claims Settlement Act provided fee simple ownership of land selections to non-tribal ANCSA village corporations. With few exceptions, the ANCSA legislation left Alaska Native villages as "landless Tribes". This is a subject that should be understood clearly by the lead federal agency and its cooperating agencies in order to meet with the right Native organizations for land under different jurisdictions. For TCC, you will need to meet with us on any land issue concerning Native allotments and I elaborate on this below.

The project documents cite subsistence as an environmental justice issue and it may also need to be addressed as a health issue. Other environmental justice issues may concern: 1) employment and training, 2) understanding potential health impacts such as infectious and chronic diseases posed by a large transient workforce, 3) implementing fair and just compensation for any taking of Native lands, 4) providing for energy relief to villages (as stated above) and 5) respecting the legal authority provided to federally recognized Tribal governments. It is likely that universal issues among numerous directly impacted villages may relate to employment and energy. The potential for the gas pipeline to reduce energy costs in rural Alaska may be the most significant environmental justice issue.

3. Native allotments

The ASAP documentation mentioned that as many as 56 Native allotments may be potentially affected by the project; However, there is no mention of the Bureau of Indian Affairs (BIA) as the federal agency exercising legal jurisdiction over those lands. Similar to the BIA authority is TCC's self-governance compact with the BIA that delegates the day to day management of the Native allotment lands. For any potentially affected Native allotment, the applicant and lead federal agency should communicate with the allotment owner(s) and TCC. The delegated authority to TCC's Real Estate Services program includes land status, ownership, counseling allotment owners, along with duties to prepare the administrative record for land transactions such as access permits and rights-of-ways.

A side topic regarding Native allotments concern outstanding trespass cases the pose a potential cloud to title. Specifically, there are some unresolved trespasses with the Parks Highway right-of-way that should be resolved before the ASAP advances to right-of-way acquisition. With that said, some allotment owners are likely to be interested in leasing their land for the ASAP right-of-way and selling aggregate material for the project. Those opportunities should be further explored in consultation with allotment owners and the TCC Real Estate Services program.

4. Health impacts

TCC has initiated a project to begin understanding potential health impacts posed by the multiple gasline projects in Interior Alaska. The COE may not be familiar with the health impact assessment (HIA) conducted in recent years for the environmental review on proposed federal leasing in the National Petroleum Reserve. That work was conducted by the Alaska Native Tribal Health Consortium and is a model to expand HIA analysis in Alaska. TCC currently has a proposal pending with the Health Impact Project, an NGO funded by the PEW Charitable Trust and the Robert Wood Johnson Foundation. Funded projects receive technical assistance to initiate the HIA analysis. In our case, should this project be funded, TCC will invite federal officials involved in all of the gasline projects to our orientation meeting. The TCC study would produce a written report specific to the parameters of a pipeline project that could be tiered into any NEPA review. In very general terms, the TCC initiative would assess health impacts such as: 1) infectious and chronic diseases posed by a large transient workforce, 2) how a large pipeline project through the Interior would affect the diverse health services programs at TCC, and 3) to develop series of demographic health profiles for directly affected Native villages.

The ASAP documents identify the rural medical clinics in some TCC villages as facilities that may be considered by the project sponsor for services. However, there is no documentation on the resources available at the clinics, nor the range of medical and auxiliary services that may be available. More importantly, there is no mention under what conditions the clinics would be able to provide services to non-beneficiaries (i.e., pipeline construction workers). Consequently, there is a need to consult with TCC and the Tribal leadership about what service may be requested by the project sponsors. TCC has added telemedicine capabilities at several of its village-based clinics and those services may be sought after by a project sponsor.

5. Cultural Resources

The project document states:

Inventory, documentation, and preservation of cultural resources and mitigation of adverse effects to cultural resources will be based on a programmatic agreement between the concerned federal permitting entities, State Historic Preservation Officer, and the Advisory Council on Historic Preservation. The agreement will clarify the procedures for considering cultural resources and will formalize the relationships between the various agencies. The relevant federally-recognized Tribes and the public will participate in the implementation of the agreement, as required by Section 106. (Parks Highway Stand Alone Gas Pipeline ROW Permit Application and Bureau of Land Management Plan of Development. Alaska Department of Transportation and Public Facilities, November 2009, Page 36).

One of the components of the TCC Real Estate Services Program is to comply with the National Historic Preservation Act on Native allotment lands. If Native allotments are in the area of potential affects for the ASAP, TCC and the Bureau of Indian Affairs may need be included as a consulting party on the programmatic agreement.

6. Other

TCC issued a notice in their newspaper, *The Council*, last month encouraging constituents to contact COE on this project. We are also sponsoring a forum on the gas pipeline projects at the annual TCC convention on March 15, 2010. A representative of the State of Alaska has agreed to speak about the ASAP line to potential stakeholders at the TCC convention.

This letter reflects a compilation of my observations as a profession staff member of TCC and, my preliminary comments are not official positions endorsed by TCC or its member Tribes. My opinions here are subject to revision as I learn more about the ASAP project. Views expressed in this initial comment letter should not be misconstrued to represent the interests of any federally recognized Tribe that may be affected by the project. The COE will need to consult with each Tribe to understand their interest in the project, and their issues, concerns and priorities.

Should you have any questions, I can be reached at 907-452-8251, ext. 3343.

Sincerely,

Robert Sattler
Senior Archaeologist/Environmental Quality Analyst

TRUSTEES FOR ALASKA

A Nonprofit Public Interest Law Firm Providing Counsel to Protect and Sustain Alaska's Environment

1026 W. 4th Ave, Ste 201 • Anchorage, AK 99501 • 907.276.4244(v) • 907.276.7110(f) • ecolaw@trustees.org Web Address: www.trustees.org

March 8, 2010

Serena Sweet
Regulatory Division
U.S. Army Corps of Engineers, CEPOA-RD
P.O. Box 6898
Elmendorf AFB, AK 99506-0898

Re: Intent to Prepare a Draft Environmental Impact Statement for the State of Alaska's Proposed Alaska Stand Alone (ASAP) Natural Gas Transportation Pipeline, 74 Federal Register 232 (December 4, 2009)

Dear Ms. Sweet:

These comments regarding the proposed Alaska Stand Alone Pipeline are submitted on behalf of the Copper River Watershed Project, Northern Alaska Environmental Center, and the Sierra Club, Alaska Chapter. These comments are in response to the Notice of Intent ("NOI") to prepare a Draft Environmental Impact Statement ("DEIS" or "EIS") and provide advice on the scope of the EIS, including significant issues to be addressed and relevant information that should be considered. *See* 74 Fed. Reg 232 (December 4, 2009).

The State of Alaska has proposed the construction of a pipeline to deliver natural gas from the Prudhoe Bay area to the Cook Inlet region to providing needed energy resources to the Fairbanks and Southcentral regions of Alaska. The pipeline would begin either at Prudhoe Bay or the Gubik field in the northeastern Brooks Range. From either location, the pipeline would intersect with the Dalton Highway, and essentially follow the Trans Alaska Pipeline corridor to Livengood. From there, the pipeline would follow one of two routes to the Wasilla area: the Parks Highway route or the Richardson Highway route. The Parks Highway route would proceed through the east side of Minto Flats to the Parks Highway and follow it down to Wasilla. The Parks Highway route would include a smaller pipeline to provide natural gas to Fairbanks (the "Fairbanks Lateral"). The Richardson Highway route would continue to Fairbanks, following the Richardson Highway to Delta Junction, to just north of Glennallen, and then follow the Glenn Highway to the Wasilla area. The Richardson Highway route would include a small spur line to Gleunallen (the "Glennallen Lateral"). From Wasilla, the pipeline would proceed to Point Mackenzie, intersecting the Beluga Pipeline at mile 39.

The commenters are generally in favor of the delivery of Prudhoe Bay "stranded" natural gas to Alaska's communities to provide energy for electricity production and heating of residences and businesses. Natural gas is a cleaner-burning fossil fuel than oil or coal that will provide energy as we develop more renewable energy sources. As noted in detail below, however, there are numerous factors that must be considered in the preparation of the DEIS.

I. PURPOSE OF SCOPING UNDER NEPA

The planned permitting associated with construction of the Alaska Stand Alone Pipeline is a major federal action with the potential to significantly affect the environment; therefore, the Army Corps of Engineers ("Corps") must comply fully with the National Environmental Policy Act ("NEPA") before moving forward with the proposal. The purpose of scoping under NEPA is to establish the scope of the project and alternatives and the significant issues that will require in-depth analysis in the EIS. 40 C.F.R. § 1501.7(a)(2). The purpose of the EIS is to "provide full and fair discussion of significant environmental impacts and [to] inform decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment." 40 C.F.R. § 1502.1.

II. PURPOSE AND NEED

The EIS must provide a description of the underlying need and purpose to which the agency is responding in proposing the alternatives including the proposed action. 40 C.F.R. § 1502.13. The EIS must succinctly describe the environment of the area(s) that will be affected by the project and alternatives. 40 C.F.R. § 1502.15. The EIS must "[r]igorously explore and objectively evaluate all reasonable alternatives[.]" 40 C.F.R. § 1502.14. This alternatives requirement is "the heart" of the EIS. 40 C.F.R. § 1502.14. To satisfy the alternatives requirement, the EIS must consider a reasonable range of alternatives to a given project, and it must rigorously explore and objectively evaluate those alternatives. 40 C.F.R. § 1502.14(a). Descriptions must be given for any alternatives eliminated from detailed study. *Id.*

In this case, the project proponent, the State of Alaska, has very loosely identified the purpose and need. In the *Stand-Alone Gas Pipeline Project Description / Plan of Development* (Draft 11-16-09), the State of Alaska asserts a variety of reasons for promoting the project. It first discusses the various unsuccessful efforts in shipping natural gas from the North Slope to "North America, Asia, or both." *Id.* at 1-1. It then discusses the various projects moving forward as a result of the Alaska Gasline Inducement Act ("AGIA") Trans-Canada Pipeline and projects competing with the AGIA pipeline (the Denali Pipeline). Then, the State of Alaska discusses the residential and commercial needs for natural gas in the Cook Inlet and Fairbanks areas. *See id.* at 1-2. But, apparently, the purpose of this project is not to meet the natural gas needs of the Cook Inlet and Fairbanks regions, nor meeting the needs of any other communities in Alaska. Rather, it is being pursued as a back-up in case the "spur line" from the Alaska-

Canada Gasline, whether the AGIA or Denali line, does not happen. *See id.* So, rather than being the ASAP line, it is the Just-in-Case line.

The commenters' first suggestion is that the purpose and need be stated more clearly, deliberately and concisely in the DEIS. Is the purpose and need to simply build a pipeline, or is it to deliver natural gas to Fairbanks and the Cook Inlet region? Is the State of Alaska pursuing design of a pipeline that is not, at this time, planned to actually be constructed? Is this a paper exercise that is a waster of the public's time and money? Does the State's project proposal duplicate other environmental review efforts for the Enstar Natural Gas company's proposed "bullet line"? What is the relationship of this project with the studied road routes to Umiat in the Alaska Department of Transportation's proposed Foothills Pipeline Access Project? What is the total quantity of natural gas proposed to be transported, over what period of time? Is this project considered an Alaska Natural Gas Pipeline project? How will this project contribute to meeting the energy needs of the United States? The lead agency should inquire more fully with the State of Alaska to determine the answers to these questions and draft a purpose and need statement that provides a meaningful understanding of the true purpose and need for the project. Only then will the Corps be able to appropriately define the various alternatives, whether accomplished by a natural gas pipeline or other means, that may accomplish the goals expressed in the purpose and need.

III. ENVIRONMENTAL CONSEQUENCES

A. Considerations Under NEPA and ANILCA

The EIS must include a discussion of the environmental consequences of the proposed action and alternatives, including the environmental impacts of each alternative, any adverse environmental effects that cannot be avoided if the proposal is implemented, and any irreversible and irretrievable commitments of resources. 40 C.F.R. § 1502.16. This section must include discussions of the direct and indirect, including cumulative, effects of the proposed project on the human environment, as well as means to mitigate adverse environmental impacts. 40 C.F.R. §§ 1502.16, 1508.25(c). The effects and impacts to be analyzed include ecological, aesthetic, historical, cultural, economic, social, and health impacts. 40 C.F.R. § 1508.8.

Direct effects are those that are caused by the project and that occur in the same time and place. 40 C.F.R. § 1508.8(a). Indirect effects are those that are somewhat removed in time or distance from the project, but nonetheless reasonably foreseeable. 40 C.F.R. § 1508.8(b). "Cumulative impact" is defined as:

> [T]he impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

40 C.F.R. § 1508.7. Thus, the proposal must be analyzed as it relates to other actions that are individually insignificant but cumulatively significant. *See* 40 C.F.R. § 1508.27(b)(7).

The EIS must also consider actions that are connected with, or closely related to, the project in question. 40 C.F.R. § 1508.25(a)(1). Actions are connected for the purpose of EIS analysis if they are automatically triggered by the proposed action, cannot or will not proceed without the proposed action, or, together with the proposed action, are interdependent parts of a larger action. 40 C.F.R. § 1508.25(a)(1).

For the purpose of evaluating significant impacts in the EIS, if there is relevant information that is lacking and the information is "essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant," the information must be included in the EIS. 40 C.F.R. § 1502.22(a).

In preparing the EIS and complying with NEPA, "all agencies of the Federal Government shall recognize the worldwide and long-range character of environmental problems." 16 U.S.C. § 102(2)(F). This is particularly true where both the proposed action and its effects occur in U.S. territory. *See Envtl. Defense Fund v. Massey*, 986 F.2d 528, 536 (D.C. Cir. 1993).

The Corps must also examine the existing comprehensive conservation plans for the various national parks, national wildlife refuges, and state parks and evaluate whether the pipeline, along either route, is consistent with the uses and management specified in those plans. ANILCA § 304(g)(3)(A)(iii). The Corps must also conduct a subsistence evaluation under section 810(a) of ANILCA, to determine whether the proposed construction and operation of a natural gas pipeline would significantly restrict subsistence uses and resources. *See* 16 U.S.C. § 3120(a). If the Corps determines that the construction and operation of a natural gas pipeline would significantly restrict subsistence uses, then it must undertake the steps identified in Section 810(a) of ANILCA before proceeding. Additionally, the Corps must address any legal requirements there may be regarding adjacent land designations, including the compatibility of transportation corridors for these units or impacts within them as a result of pipeline construction and operation.

The following sections address issues of particular importance that should be analyzed and addressed.

B. Ecological Considerations

Lands adjacent to the joint and separate routes for the proposed pipeline involve nationally and internationally significant fish and wildlife resources. The DEIS should carefully consider and analyze the following general principles:

- The overall purposes and ecological significance of the Arctic National Wildlife Refuge, Gates of the Arctic National Park & Preserve, Kanuti National Wildlife Refuge, Yukon Flats National Wildlife Refuge, Wrangell-St. Elias National Park & Preserve, Denali National Park & Preserve, Chugach National Forest, Chugach State Park, White Mountains National Recreation Area, Colville River Special Area within the National Petroleum Reserve-Alaska, Minto Flats State Game Refuge and other State of Alaska refuges, critical habitat areas, and research natural areas should be addressed in all appropriate sections of the document (description of the existing environment, impacts of various alternatives, irreversible losses etc.). This analysis should address the species and their habitats that may be affected, wilderness values, subsistence and recreation uses, as well as the other purposes of these public lands.

- The impacts of the proposed action over a broad enough time scale to realistically identify the full consequences that might occur during the duration of the pipeline's operation, and beyond through the recovery phase after the extraction and transport of natural gas has ceased. This period could conceivably extend over 100 years.

- The potential effects of both acute and chronic pollution of the watersheds near the gas conditioning facility, NGL extraction facilities, and pipeline crossings with special attention to the downstream environments where toxic substances may be transported to, and accumulate over time. This watershed analysis should address the potential degradation of habitat values over the long term for lands adjacent to and downstream of all stand alone pipeline-related facilities. The potential for pollution extending down the streams and rivers should also be addressed.

- Air quality baseline needs to be available and impacts addressed throughout the pipeline routes, including Gubik pipeline route. The impacts of priority pollutants, toxic pollutants, and greenhouse gas emissions including black carbon and mitigation plans for operations associated with gas wells and extraction, processing operations, gas conditioning facility, NGL extraction facilities, pipelines need to be assessed. The cumulative impacts of the gas line project with Prudhoe Bay oil field emissions need to be assessed.

- Human health impact assessment should be conducted for the cumulative impacts of this project combined with other activities, particularly on the North Slope.

- Full consideration of the physical environment and how it might be altered from the proposed action and its implications for fish, wildlife and habitat values must be addressed. For example, issues such as the disturbance of sensitive loess soils and permafrost both in the area of gas conditioning and NGL extraction, as well as the proposed pipeline routes. Potential impacts to soils, vegetation, including rare and sensitive plants, water quality and quantity, wetlands, and habitat values, including fragmentation, should be fully described and discussed.

- Any known or suspected animal migrations including caribou, moose, fish, and others that could be impeded or impacted by proposed construction and operation activities related to the pipeline and accompanying road, along both proposed routes, should be identified and fully evaluated in the impact sections of the DEIS. Background noise and disturbance levels need to be assessed for all facilities, road traffic, construction noise, to fish and wildlife habitats and populations as well as subsistence resources and activities, and wilderness values in parks, refuges, etc.

- All known or suspected threatened or endangered species that may be present or impacted should also be fully addressed.

- The existing environment values for the Toolik Lake Research Natural Area and University Toolik Field Station and broader areas where invaluable long-term ecological research is being conducted.

- What will be the impacts to migratory birds from bird strikes to facilities such as gas conditioning facilities?

- A thorough cumulative impacts analysis that considers the proposed pipeline and alternatives together with the impacts of other activities in the affected regions, both current and in the reasonably foreseeable future. For example, cumulative impact analysis of the Gubik field gas source should include potential impacts of additional oil development at nearby Umiat and gas development within the National Petroleum Reserve-Alaska, various proposed road projects in the area, such as the State of Alaska's proposed Umiat road and road to Nome.

- Finally, the DEIS should in all of its analyses assume scenarios, and conduct the appropriate analysis, for the various pipeline projects, including the AGIA or Denali pipeline and "spur line," Enstar Natural Gas Company's proposed "bullet line" project; and the "All Alaska Pipeline" which would follow the existing Trans-Alaska Pipeline route to Valdez for shipment of LNG.

C. Climate Change Considerations

The significant adverse impacts of global climate change on the United States and the world have long been recognized by Congress (*see, e.g.,* Global Change Research Act of 1990, Public Law 101-606, 104 Stat. 3096-3104 (1990), codified at 15 U.S.C. §§ 2921 *et seq.*), the courts (*see, e.g. Massachusetts v. Envtl. Prot. Agency,* 127 S. Ct. at 1455 ("The harms associated with climate change are serious and well recognized.")), and the Department of Interior itself (*see, e.g.* Secretarial Order 3226, Evaluating Climate Change Impacts in Management Planning (Jan. 19, 2001) *available at* http://elips.doi.gov/elips/sec_orders/html_orders/3226.htm ("There is a consensus in the international community that global climate change is occurring and that it should be addressed in governmental decision making.").

The Arctic has experienced some of the most severe and rapid warming associated with global climate change. Already the average temperature in the Arctic has risen at almost twice the rate as the rest of the world, and Alaska has warmed an average of 4° F over the past half century. Warming has ushered in a host of alarming ecological changes including the loss of sea ice, shifts in vegetation zones and species' diversity and ranges, and the thawing of permafrost. *See Ctr. for Biological Diversity v. Nat'l Highway Transp. Safety Admin.*, 508 F.3d 508, 523 (9th Cir. 2007) ("recent evidence shows that there have already been severe impacts in the Arctic due to warming").

The impacts of global climate change on the Arctic are expected to greatly accelerate due to increased global concentrations of carbon dioxide and other greenhouse gases, primarily from the burning of fossil fuels. The decline in the extent of sea-ice has reached its lowest coverage and stability in recent years, with some models showing the disappearance of most summer sea ice by the end of this century and more recent data pointing to a complete loss of sea ice by mid-century or sooner. Similarly, melting of the Greenland ice sheet in 2004 was ten times the rate observed in 2000. Indeed, Greenland's ice and polar ice are now losing mass at rates not thought possible several years ago.

The proposed natural gas pipeline, if constructed, would likely remain in operation as long as oil and gas production activities in the Prudhoe Bay and offshore (which appears imminent) regions continue. This would result in active operations for at least 50 years, if not more. The well-documented climate warming that is now under way will likely result in significant changes over the next 50 or 100 years as well. Because of the potential time scales involved, it is imperative that the DEIS address several aspects of climate change in relation to both the description of the environment and impact assessments for the various alternatives, including assumptions of exploration and development scenarios. There should be a presentation and analysis of the known climate-driven changes that are currently occurring in the Arctic and Interior regions, as well as a description of expected changes over the next 50 to 100 years. This may require additional baseline studies or modeling analysis and incorporation of traditional knowledge to be undertaken for the DEIS.

Some of the known or expected changes that have been identified so far include: warmer, dryer summers, increased incidence of wild fires, thawing of permafrost, forest disease and insect infestations, changes in precipitation, drying of wetlands and water bodies, increased water temperature in the various rivers crossed by the pipeline, and changes in frequency of river flooding during spring breakup, and changes to salmon health, populations and distributions. All of these and perhaps other factors have the potential to alter vegetation, water regimes, water quality, habitat values for fish and wildlife, and subsistence resources and hunting and fishing as we have known them up to this point. For example, (1) continued warming may create new or more challenging design and construction problems where proposed development and transportation access routes encounter areas of unstable permafrost and loess soils; (2) there may uot be adequate water quantity for wildlife and other refuge purposes and also oil and gas development activities such as ice roads, drilling, etc.; (3) the consequences for sensitive habitat areas downstream of development activities under such changing conditions are unknown; and (4) how climate change will affect the values of the lands involved in the exchange is unknown. It will be critical to have the best possible description and analysis of the long-term environmental trends (up to 100 years) so that impacts associated with the proposed action and alternatives can be reasonably assessed.

Fossil fuel emissions including black carbon are the major contributor to human-induced climate change and therefore the DEIS must evaluate the contribution of this project to greenhouse gas emissions both in the pipeline-related facilities and operations, as well as the increased consumption of natural gas and production of electricity that will result from the residential and commercial use of the natural gas. Finally, global warming has the potential to have profound effects on the planning areas throughout the state.

As such, the direct and indirect effects of global warming must be analyzed and considered by the Corps in the DEIS.

D. Pipeline Construction and Operation-Related Impacts

In addition to some of the issues addressed elsewhere in this letter, the following are some, but not all, of the potential impacts of construction and operation of the pipeline that need to be considered by the Corps in preparing the DEIS[1]:

- Impacts from biodiversity loss, habitat loss and degradation, noise disturbance to wildlife, including musk ox, moose, caribou, wolves, wolverine, lynx, other furbearers, Dall sheep, golden eagle and other raptors, waterfowl, other migratory birds, and salmon and other fish.

- Impacts to water quality and quantity, including water uses and potential water pollution.

- Impacts to tundra, permafrost, vegetation, wetlands, rivers, and other surface areas as a result of creation and use of material sites for gravel and other materials for construction of the pipeline.

- Impacts to native plants, soils and water quality from seeding and fertilization during the restoration phase of construction.

- Impacts to fish and wildlife habitat as a result of blasting and drilling, road traffic, during construction, and operation of gas handling and processing facilities.

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[1] The commenters also suggest that the Corps review the analysis in the original EIS for the construction of the Trans Alaska Pipeline for its accuracy and completeness. Such a review will likely provide the Corps with valuable insight into the potential impacts to consider and analyze for such a large-scale project.

- Impacts to roadway integrity as a result of boring for portions of the pipeline where pipe will be buried underneath the ground or road bed.

- Impacts to soils, fish and wildlife habitat, water quality, and area ecology as a result of using landfill sites for disposal of scrap materials, timber, and other debris. The DEIS should also consider if long-term monitoring of such landfill sites will be necessary in order to ensure these values are protected.

- Impacts to subsistence resources and access, traditional land use areas, historic sites, and Alaska Native cultures.

- Impacts to air quality and from air emissions including greenhouse gas emissions to the local, regional and global environment.

- Impacts to air quality and pollution in the villages and communities along the pipeline corridor, taking into consideration air flow and/or lack thereof within the Yukon Flats and Fairbanks, particularly in cold winter temperatures when air quality attainment is an issue and considering human health effects and ecological impacts.

- Impacts to conservation system unit, recreation area, critical habitats and other public land values including the environment, fish and wildlife, subsistence resources and wilderness from potential spills and contamination.

- Hydrology changes, impacts to wetlands and floodplains, watershed changes and other modifications of stream flow and sediments as a result of construction of river and stream crossings.

- The DEIS should be very specific in detailing exactly the streams, creeks and rivers that will be crossed, and where.

- Effects on fish, wildlife, subsistence and the environment throughout the Colville River, Itkillik River, Yukon River, Tanana River, Susitna River, Copper River and other watersheds.

- Impacts from worker camp construction and operation, including wildlife fragmentation, noise, dust, increased human access, habitat, waste production and disposal and hydrological impacts. Cumulative impacts from associated seismic and drilling operations to these resources.

- Impacts from road and pipeline routes through ecological, scientific, wild, recreational, subsistence and other resources of the various creeks, streams and rivers and parks and refuges to be crossed during construction and operation.

- Impacts from construction, particularly where pipeline crossings of roadways will involve trenching and shut down road use, on recreational and commercial users of the roadways and well as wilderness recreation affected. This analysis should consider broad economic impacts associated with such impacts, particularly in areas that will be acutely impacted, such as the McKinley Village area and Minto Flats State Game Refuge.

- Impacts to access of park, refuge, recreation area lands by the public, particularly during the high use periods of the summer and winter seasons.

- A comprehensive analysis of the socioeconomic and cultural impacts from delivery of natural gas to targeted communities.

- Community health-related impacts, including water and air quality issnes and an analysis of health problems in other regions of the state with significant long-term construction projects.

- Impacts to fire management due to construction activities during times and locations where there is likely wildfire activity, as well as impacts on fire management as a result of the constructed pipeline. This will be particularly crucial during right-of-way clearing which, according to Section 4.3.3 of the State of Alaska Draft Plan of Development, will involve clearing and burning of timber on the right-of-way as it is cleared.

- Impacts on archaeological and historical resources along the pipeline routes.

- Impacts to rare and sensitive plants.

- Loss of intact and undisturbed Arctic and subarctic ecosystems as a scientific benchmark for long-term studies.

- How construction and operation of the pipeline affects Environmental Justice concerns.

Mitigation measures to address these impacts must also be developed and analyzed. This shonld inclnde adequate spill protection and prevention along the Yukon River, Copper River, or any other major anadromous stream or river, and its tributaries and nearby fish streams are designated as "environmentally sensitive areas."

In addition, the Corps should consider, analyze and ensure that there are binding plans, funding and provisions for decommissioning, dismantling, and removal of the infrastructure when the pipeline is no longer operational.

E. <u>Consideration of Alternative Routes</u>

In all of the alternatives analyzed in the DEIS, the Corps needs to comprehensively address the socioeconomic, environmental and cultural impacts, both direct and indirect, of the alternatives. The Corps should also consider how this proposed project relates to other concurrently proposed natural gas pipeline projects in order to comprehensively address the full range of alternatives and not consider projects in an incremental, piecemeal fashion nor through redundant environmental review processes.

The Corps must also analyze what, if any, changes would occur to fire cycles and fire-fighting plans in the region resulting from the various alternatives. The Corps should also consider whether construction of the natural gas pipeline will lead to further tourism to see the pipeline and its adjacent lands, as with the Trans-Alaska Pipeline, and any impacts as a result thereof. The Corps also needs to analyze any impacts to wilderness values and lands. If there is any local opposition at any point along the proposed routes, the Corps must take that into consideration with regard to the desirability of those routes. The Corps is also encouraged to seek and take into account traditional knowledge of local residents at all locations along the proposed routes and areas it will affect when seeking baseline data and determining direct, indirect and cumulative impacts. The Corps and its cooperating agencies should conduct an in-depth analysis and comparison of waterfowl, wildlife and fish and subsistence values of the lands to be impacted by the construction of all possible pipeline alternatives. If there is insufficient information upon which to conduct this analysis, particularly field site visits conducted on the ground, such baseline information should be gathered and incorporated into the DEIS.

1. Common Pipeline Route

As noted previously, the Alaska Stand Alone Pipeline would generally follow the Dalton Highway, and essentially follow the Trans-Alaska Pipeline corridor to Livengood. This route would cross or parallel several major rivers and streams, including the Colville River, Itkillik River, Atigun River, Hammond River, Middle Fork Koyukuk River, and Yukon River, to name a few. It would pass between the Arctic National Wildlife Refuge and Gates of the Arctic National Park & Preserve as it passes through the Galbraith Lake area. These two parks are pristine Arctic wilderness areas, important for fish and wildlife habitat, subsistence use and recreational use. Further south, it would pass between Yukon Flats National Wildlife Refuge and Kanuti National Wildlife Refuge, and then near to White Mountains National Recreation Area. All impacts identified under Section III.D above should be considered for these areas. Additionally, the cumulative impacts of various other northern Arctic projects, planned and existing, must be considered, namely the roads to Umiat and Nome and any oil and gas production and development in the National Petroleum Reserve – Alaska ("NPRA").

2. The Parks Highway Alternative

As noted previously, the Parks Highway route would depart Livengood and proceed with new road constructed through the east side of Minto Flats within the Minto

Flats State Game Refuge that bypasses Fairbanks to the Parks Highway and follow it down to Wasilla. Any analysis should consider whether completely bypassing Fairbanks, and providing only a "lateral" line, is the best way and most cost-effective to deliver natural gas to the Fairbanks area. This route would cross or parallel several major rivers and streams, including, but not limited to, the Tanana River and Susitna River. It would pass through Denali National Park & Preserve, the most visited national park in Alaska, and Denali State Park. These two parks are part of a contiguous ecosystem, representing important fish and wildlife habitat, and providing valuable resources for subsistence use, recreational use and significant economic development through tourism. All impacts identified under Section III.D above should be considered for these areas.

3. The Richardson Highway Alternative

The Richardson Highway route would continue to Fairbanks, following the Richardson Highway to Delta Junction, to just north of Glennallen, and then follow the Glenn Highway to the Wasilla area. A considerable amount of the route departs from existing rights-of-way, namely the stretch of pipeline from just south of Station 10 of the Trans-Alaska Pipeline to Tolsona. Since this is area is undisturbed, baseline data and studies must be undertaken to assess the actual impacts of the project. This route would closely follow and cross the Tanana River, parallel the Matanuska River, and would parallel the important Copper River, one of the most important watersheds, for subsistence as well as commercial fishing, of salmon in the state. This route would also parallel the boundary of Wrangell-St. Elias National Park & Preserve and pass through Chugach State Park. While not directly involved in this route, the Chugach National Forest lies downstream along the Copper River and must be considered in all analyses. All impacts identified under Section III.D above should be considered for these areas.

4. Prudhoe Bay source versus Gubik Field source

One of the possible sources for gas identified in the State of Alaska's draft Plan of Development is Prudhoe Bay. While extraction from this natural gas source would involve fewer disturbances of pristine areas, the Corps should consider the direct and indirect impacts of a gas conditioning facility and pipeline outfall on the existing infrastructure, and how that infrastructure is capable of handling the new facility and pipeline. For the Gubik Field, the Corps should consider all socioeconomic, cultural, subsistence and ecological impacts identified in Section III.D. The cumulative impacts must be addressed on the Colville River and Utukok Special Areas in the National Petroleum-Reserve Alaska. The Corps should place considerable emphasis on analyzing cumulative impacts when evaluated in connection with the planned roads to Nome and Umiat.

In conclusion, we strongly urge the Corps to comply with NEPA requirements and take a thorough, hard look at the direct, indirect and cumulative impacts of such a large construction project and operation of such a pipeline. Given the vagueness of the defined purpose and need, it is difficult to provide more detailed scoping comments since the purpose and need generally dictate the issues for analysis and level of analysis required. Given the large number of rivers and streams that the pipeline will cross, and the valuable parks and refuges along all proposed routes, the Corps must adequately consider the risks to the environment, economy, subsistence, and wildlife involved in such a large construction project that will take considerable time to complete. Then, the Corps must address the long-term impacts as this pipeline will likely remain for 50-100 years.

Thank you for the opportunity to submit these scoping comments. If you have any questions, please contact me at (907) 276-4244, ext 115 or cjohnson@trustees.org.

Sincerely,

Carl H. Johnson
Staff Attorney

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, ALASKA
REGULATORY DIVISION
P.O. BOX 6898
ELMENDORF AFB, ALASKA 99506-0898

REPLY TO
ATTENTION OF:

MAR 22 2010

Regulatory Division
POA-2009-651

Mr. Robert Sattler
Tanana Chiefs Conference
122 First Avenue, Suite 600
Fairbanks, Alaska 99701-4897

Dear Mr. Sattler:

Thank you for your letter regarding the Alaska Stand Alone Pipeline (ASAP) Environmental Impact Statement (EIS). Your comments have been placed in the official record and will be given full consideration during the EIS development process.

Additionally, your contact information has been added to our EIS distribution list. You will receive newsletters and other information distributed throughout the EIS development process.

If you have any questions, you may contact Ms. Serena Sweet (Lead Project Manager, U.S. Army Corps of Engineers) by phone at (907) 753-2819, or toll free from within Alaska at (800) 478-2712, or by email at serena.e.sweet@usace.army.mil.

For additional information regarding the ASAP EIS process, please visit the project website at www.asapeis.com.

Sincerely,

Serena Sweet
Project Manager

APPENDIX F

Scoping Meeting Transcripts

Anchorage, Alaska

December 14, 2009

ALASKA STAND ALONE PIPELINE

ENVIRONMENTAL IMPACT STATEMENT

PUBLIC SCOPING MEETING

ANCHORAGE, ALASKA

SENIOR CENTER

December 14, 2009

P R O C E E D I N G S

(Anchorage, Alaska - 12/14/2009)

(Presentation)

(On record)

MR. LAKOSH: Questions?

MS. BENSON: Sure.

MR. LAKOSH: From the State's -- I've got several questions. The State isn't actually going to build this thing?

MS. BENSON: No, in fact I should have made that point. The State is just doing the pre-work, the -- to facilitate the purchase by private pipeline developers. Neither -- we will not -- the State -- I don't work for the State, the State won't be building the project, it'll be sold to pipeline development entities.

MR. LAKOSH: So all these costs for doing this are going to be recovered from the final.....

MS. BENSON: I don't know exactly how that works, but -- I don't know exactly how that works. We could -- we could find that out and get that back to you.

MR. LAKOSH: Well, I think.....

MS. BENSON: And the pipeline developer will not own the gas either, they will have to purchase the gas from local producers, they will just be building the pipeline.

MR. LAKOSH: So when is the open season supposed to be on this?

MS. BENSON: July, 2000 -- oh, this doesn't have an open season. This is different than the big line as I understand.

MR. KENDALL: Well, Tom, if I might. Are you telling me the gas coming out of the North Slope is not ours, are you telling me it belongs to the producers as opposed to being Alaskan gas?

MS. BENSON: No, who builds this pipeline will not own the gas that goes in it, they'll have to purchase it from the North Slope producers.

MR. KENDALL: I thought it was our gas. So we have no access to our gas, we're building a pipeline for somebody else, paying dividends for their gas?

MS. BENSON: This pipeline project that we're reviewing tonight in EIS is actually not about building the pipeline, we're -- the state of Alaska's not building the pipeline, it's going to be sold, this package of permits will be sold to someone or a company that wants to build the pipeline. We're just at the very beginning stages so this will be bundled up into a package of permits and environmental information and the project's builder will buy that and then build a pipeline assuming it's feasible.

MR. LAKOSH: Now what's the relationship -- I was told when I came in by the alumni that this wouldn't go through if the main line goes through. So is there a special relationship and is there a fixed relationship to the main line as far as go or no go, proceed or not proceed on this -- at least the northern half of this project or what?

MS. BENSON: If the big line is built in a timely way this would become a spur line to supply Anchorage's south side.

MR. LAKOSH: So.....

MS. BENSON: Because neither one of the big lines comes south. So.....

MR. LAKOSH: Well, the question is I'm worried about paying $3 billion in tariffs for a pipeline that becomes obsolete two years after it's built and has to be torn out. So what -- I'd like to know what -- is there anything in writing that creates a fixed relationship between -- you know, a decision point between the main line going through, how long you've got to wait for the main line to go through, how much delay and wait in the main line is an acceptable delay before this -- more than half of this project will go through?

MS. BENSON: Those are all really good questions. I don't have the answer to that. If the big line is built in a timely fashion and actually beats this construction schedule, then this would become a spur line off the big line. If it's not this project, if it receives all its permits and received the record of decision underneath us would be the line. So they're not linked.

MS. SWEET: And I -- from a corps of engineers standpoint I just wanted to speak to the corps requirements. One of the purposes of looking at all of these different aspects of the project is to incorporate into the analysis the possibility that the big line may or may not be constructed within a timely manner. So we're trying to cover all bases to make sure that if a big line does come on line in 10 years, it could become a spur line very easily without having to duplicate this environmental analysis, however if it does not come on line there's a backup plan that could be used to bring the gas south from the North Slope.

MR. LAKOSH: Well, that -- okay. So this is part of the alternatives decision that the corps is going to make?

MS. SWEET: Well, I guess alternatives speak to different projects that fit the purpose and need. If you're talking about a spur line that's a different purpose and need than say a stand alone line from the North Slope. What we're trying to make sure is that we include all the possibilities.

MR. LAKOSH: Well, that's the point here for the -- my beef -- you know, I could argue about a spur line too, but my biggest beef is building a $3 billion pipeline north of Fairbanks that is going to be obsolete with a 48. Nobody's going to put gas in a 24 line when they can get it cheaper out of a 48.

MS. SWEET: Certainly.

MR. LAKOSH: So why would we want -- why would the

State even pursue such a boondockle (ph) and what is the alternative process for looking at the alternative of 48 to Fairbanks versus a 24 to Fairbanks. Is there a firm position of the corps on that alternative and where is the breakdown on how much delay in development of the main line is acceptable before you permit this 24 inch line north of Fairbanks?

MS. SWEET: And there isn't a firm agreement or firm termination at this point, but one of the things we are looking at is the possibility of examining perhaps a large diameter line versus just a 24 inch line at this point, but we need that kind of input and this is -- this is exactly the kind of information we're looking at from the public and to incorporate in our analysis. So like I said we're very early on and we're trying to get all the feedback we can. So this is going to help us when we go down the road.

MR. LAKOSH: I mean how does the corps assess impediment to high velocity flow through the active layer above the permafrost. Most of this stuff north of Fairbanks is going to only have a few feet of active sub-strait, you know, it's going to be frozen two to three feet down and you're talking about blocking that cross flow across that area. What is the standard -- the corps of engineers standard regarding that, you may have to build below the line, can they -- is a berm above that active layer the preferred method, what -- what's the standard of construction?

MS. SWEET: At this point we don't have a stan -- a position on the standard of construction, but again any information you have, any ideas you have that we could look at, we're definitely looking for that kind of input. Did you have any other.....

MR. LAKOSH: So there's no standard for Arctic construction under the corps for -- in permafrost?

MS. SWEET: At this point we don't have a standard for permitting. We look at the project as proposed and receive public input.

MS. SWEET: Did you have any other comments or questions?

MR. LAKOSH: Oh, I got a lot. I'll give somebody else a chance.....

MS. SWEET: Okay. If you could just.....

MR. LAKOSH: They're all -- they're all on the dole here so I don't.....

MS. SWEET: Yeah. We -- do you mind stating your name at the beginning and coming to the mic so we make sure he can get it on the.....

MR. ROGERS: My name is Mike Rogers and I'll followup on the gentleman who just spoke concerns about everything from boondockles through environmental hazards. As I hear a presentation revolving around an alternative, either or, a preferred route versus an alternative route, I'm inclined to wonder if for whatever reasons brought up just a moment ago, boondockle or disaster for the environment, any reason, at this time can you preclude the possibility that there would be no pipeline, that it will either be a or be, or, is, in fact, it possible that the direct environmental impact statement will recommend do nothing?

MS. SWEET: One of the alternatives always examined in the development of an EIS is the no action alternative and that will be incorporated in the analysis so that will be put into the document and put forward for public comment also.

MR. KENDALL: Well, thank you. My name's Paul, middle initial P, Kendall. And I guess first of all I really -- you need to get some cameras, ladies and gentlemen. I -- these moments should be on camera going out to 700,000 people in Alaska so we can all be learning together. We miss these golden moments, everybody here will walk away feeling more intelligent than the next person and you should see -- the leaders should take trips to these classes and seminars. They come back thinking they're Einsteins and that we have no relevance. And by bringing a camera to these meetings we can -- we can educate everybody. And I think you're missing a golden opportunity, especially in the -- in the era of U-Tube and I'd like to see your questions go around repeatedly in turn.

And I guess my next question is I'd like to see an instrument, a legal instrument from the oil companies that says they're not going to use that TAPS line to move gas. I'm very concerned that TAPS line's two-thirds empty and I do not think any more oil is going to leave Alaska which is a bigger discussion. But if they had planned the demise of that pipeline through some technological reconstructs of the carbon and the hydrogen and are able to move it they will really have scooped everything here and all this is for naught. And I think the confusion lies in not having clear signals from the oil companies to us as a community.

And I'll -- I have lots of questions, but I'll wait for everybody to have a turn. And I'm really curious how many citizens are here as opposed to all you working groups, eight or 10 of you, I'm sure you all met together before. So I'd like to hear the little people's voices so instead of -- instead of hearing each one of you jump in because we're beginning to see that too, we have meetings and all the groups are being paid and it becomes this inside discussion and not us.

MR. LAKOSH: About this section through the Park, why are they going through the Park when they have a utility corridor.....

MS. SWEET: We'll just.....

MR. LAKOSH: My name's Tom Lakosh, L-A-K-O-S-H. What's this about going through the Park when there's clearly a powerline corridor on the other side of the road, can the State explain this?

MR. CARWILE: Well, there's also the state highway, the Parks Highway, going through the Park for about seven miles. And the intertie does take off from Carlo and heads across Theanner (ph), but then it diverges away from Healy Canyon and goes through some very ravine filled tributaries of the creek tributary to Healy Creek and comes out at Healy eventually in the coalmine area and powerplant. But it's a -- it's challenging country for a pipeline.

MR. LAKOSH: So they -- so technically since they're on the road they're in the Park and that's why they have to go through the Park permit process?

MR. CARWILE: Well, they -- if -- yes, they would need a permit both from DOT and the Park Service to go through the Park on the Parks Highway. But the.....

MR. RICE: Let me just clarify for the record that I'm Bud Rice and that was Steve Carwile with Denali National Park. I'm Bud Rice with the National Park Service.

And also if -- and the alternative looks at a route through the Park, we had to do a finding that -- we have a finding that indicates whether or not there is a prudent, feasible alternative outside the Park. Because one of the purposes for ANILCA which is the Alaska National Interest Lands Conservation Act, was to protect these conservation system units and we don't want to degrade them even for something as important to the state of Alaska as a gas line. But even if we had a finding that a route through the Park -- there was another alternative feasible route and I think there is one because that's the proposal, there could still be a decision by the Park Service if we get authorization from Congress to allow a gas pipeline through the Park, that there might be more benefits than adverse problems, in other words the national park would like to get natural gas to run its bus fleet, to heat buildings, et cetera, in the summer, and then even the superintendent's interested in having a route that's a little ways away from the road and it would be a bike path and you can lay the gas line underneath that. So there's some interest, but I'm not sure it outweighs the adverse impacts to the Park. We would go through that decision process.

MR. LAKOSH: Yeah, can we get all of the resource agencies, that put links on the -- Tom Lakosh -- to put links on the website for all of the applicable regulatory requirements so we can have a full set of regs that will allow us to look at -- you know, for scoping and EIS purposes or for the entire permitting process, not just the -- me, but EIS stuff.

MS. SWEET: That's an excellent suggestion, we'll definitely take that down to make sure that gets incorporated onto the website.

Other comments or questions?

MR. LAKOSH: Yeah, the -- like I said my primary concern -- Tom Lakosh again. The primary concern regarding this project is an obsolete northern half of the line that's going to cost us somewhere close to $3 billion to put in as opposed -- you know, right next to a -- the 48 inch line. And when I took a look at the plan before I came down here I noticed there was no removal and restoration for particularly hydrologic obstructions, river crossings, abutments, bridges, stuff like that. Isn't that a requirement for the EIS, I mean, isn't that a written prerequisite to have, you know, removal plans in place?

MS. SWEET: This is Serena Sweet for the corps. Yes, that is a requirement and it's something that we maybe don't have the details of just yet, but we are working on solving with the applicant. So that information will also be incorporated in the draft EIS, we just don't have it to date.

MR. LAKOSH: Well, wouldn't you check the application, is it sufficient for you without that in there?

MS. SWEET: Not necessarily.

MR. CARWILE: Is the question about the removal of the permitted facilities should they become obsolete?

MR. LAKOSH: Well, the river crossings, you can't leave an obstruction over a waterway, bridge abutments are going to obstruct the actual river flow, you're going to have a pipeline that's, you know, undoubtedly going to affect the hydrologic flow of the permafrost, you've got all kinds of problems here, you know, with leaving, you know, bridges, abutments, the piping some places, facilities, roads, you know, access road, all of things can become obsolete two years, a year, two years, three years after the northern half is built.

And I just don't understand, you know, why there isn't a set in stone relationship to the main line here and, you know, a fixed, you know, period of time of delay that is an acceptable delay, level of delay, say five years, say 2022 or something before you'll even okay a permit on this or the State will even go forward or any third party that's going to actually build this and I think the State, you know, ought to get serious here and not waste all these folks' time with a permitting process, they've got better things to do than to -- to review a phony EIS for a nonexistent project. And before you guys -- you know, we haven't even gotten to the open season yet and you guys are talking about duplicating the route, essentially building a 24 right next to a 48, for $3 billion. And the State ought to just withdraw the application and come back with a set, you know, relationship between the 48 and the 24 because this is a waste of everybody's time until we know what's going to go on here. I could see, you know, planning out a spur line, but clearly north of Fairbanks there's no reason to put these guys through a permitting process.

MR. CARWILE: So that could be a condition of the 48 inch line to hey, you remove the 24.

MR. LAKOSH: Yeah, right. So you better pay for Enstar.

MR. McDONNELL: I don't need a mic, I can speak without a mic. I'm just a private citizen, I don't belong to one of the sinister groups you're referring to here. And I appreciate all the -- I appreciate all the comments you're making, but, you know, Occam's Razor, are you familiar with that one, never make more assumptions than the minimum needed. I think all of a sudden you got way ahead of the game here and you're way up -- way out there. You know what these folks are trying to do is something that's very preliminary right now, just a governmental study to find out feasibility, you know, all of a sudden we're leaping way ahead here, years and years in advance. And you bring up some interesting points that I agree with you, but however I think we're -- instead of wasting a lot of time doing that, you know, what they're proposing here is trying to -- feasibility is just going to happen, we don't know it's going to happen, we don't know if anybody's going to buy the gas, we don't know if they're even going to make the thing, okay, going to build the line. But, again, don't make more assumptions than the minimum needed, (indiscernible) okay.

And I think if you keep that in mind and all the good points you brought up I think are well worth -- well worth consideration, you should think about them. But I don't see anything wrong with what's going on right now in just trying to find out if it's possible. I mean we've got -- the legislature in our State is behind this thing, okay, our economy of the state unfortunately is tied to oil and gas. And personally I would like to see us put more money toward research and development for more green technologies, but it just so happens that here in Alaska we seem to be stuck with this right now. And we're going to be in this position for the next two or three generations, we're not going to run out of oil in 50 years, we're not going to run out of oil perhaps even for 100 years. We should be thinking ahead, but right now this is just one little piece of the pie.

And that's my personal comment and I'm just an average citizen, I don't belong to any of you sinister groups, okay.

MS. SWEET: You want to state your name also.

MR. McDONNELL: Oh, Jerry McDonnell.

MS. SWEET: Thank you.

MR. KENDALL: Well, I don't know if it's sinister or not, but I do think my country's on a wayward path, I think Alaska's a very special place. I think we're obligated to raise these far reaching concerns, but I do understand your need to stay positive, okay, and to cheerlead which is what you're really talking about. And I'm for that, but it seems to me that if I'm in a quandary and I'm the average person, everybody else must be in a quandary too. And I don't understand the paralysis. And it would seem to me we would have put out a worldwide RFP in participates or a deed or an open -- open season. They come up with this trick techno -- tech terms and the stakeholders and things like that. We should have put out a list, a request for those people interested in gas and then we should be going from there. I don't think this chesting out if you will or this false sense of intimidation's going to work. And here's why I don't if I might. And I think this is an important discussion, both yours and Mr. Lakosh's, and I'm sure you folks, you gentlemen and ladies obviously could take up the whole night with just some smaller detailing.

But I'm concerned that Obama and the rest of the world is these boys are headed to de-carbon, don't you think for a minute they're not. So I'm talking this is a serious move here, the free enterprise market's coming with a force I've never seen before to move away from carbon. And here we are gambling everything on carbon and everything is set to leave. If you have not -- if you don't expect the oil -- the oil of Alaska's done for, ladies and gentlemen, it's never leaving Alaska again, 70 percent of that oil is used for transportation and the rest of the world if you'll go to my blog spot, mfh20magneticfields -- mfh20.(indiscernible).com.

So here's my concern, I want the oil companies here, I want them here building testimony that goes to a factual record that is introducible to a court for an action of law or accountability. We continue to have this discussion outside of the principals out of some fear based mentality. And the minute that you realize there is no more oil free money as has been constructed or gas quite frankly, then I think we can begin to rebuild Alaska and find its true value.

And I don't want to stay up here all night. I'm for a redundant line, a gas line, but I was under the impression it was our gas, our gas. I'm not going to pay Exxon $3 billion and some of the biggest corporations and the most influential corporations in the world to lay a pipeline for me so we can try to intimidate them while they run off somewhere else and I'm left, you know, with my people and their homes being hammered under some economic means of subjugation for Enstar and some bankers. Now so we need some reasonable discussions on this thing, but we need principals, we need those people who can be held to account with their public testimony as a matter of record. And the really sad thing I'm still -- it's so magnificent the time you're living in it's hard to shut me up because I feel like I should just -- if you could only see what's coming your way and how special you are, you're being diverted by all these trivial carbon conversations.

But if I might the carbon line would be a good line to lay in, that's what is -- it's a hydrogen with carbon line, in the event you have some catastrophic event that was unpredictable and the reason that bullet line is a good thing is because you represent a land with vast amounts of resources and special challenges and then those challenges are additional resources. So Obama should be here along with you and the oil companies and they should be defining for us our role and their participation along with the respective corps of army engineers and the budget overflow, oversight committees and we should be developing Alaska as a very, very special place. But somehow I -- we can't seem -- the oil seems to be so part and parceled out that we can seem to get traction. And I blame it on the oil companies because they are not coming forward. And when you get a relationship like that where it's not clearly defined or showing you the look, we know what that means and believe me if you don't know what it means you'll do some research, you'll see that they don't need us and they're preparing to go carbon free in all their operations. Vallero (ph) put in 33 wind farm -- wind turbines, they just did a big contract with renewable oils from Prada, your Alaskan tankers just went to all gas to all electric unloading in San Diego, BP just put in a big 180 mile underground electric cable to an offshore gas platform, took the gas off, put in electricity and put in direct cable from Norway and there was -- BP's involved in the EV project, if you look that up there's 11 cities that are going -- well, I'm going -- I'm going to get back to your pipeline. But I'm trying to show you that you're in the midst of some very special times here and what's happening is incredible, intelligent, loyal servants to the public are being distracted in some of these projects I think that are just not being well founded or well grounded in where we're going.

And again in closing -- let me say that a few more times, I'm real concerned about that pipeline, ladies and gentlemen, you can't lose $24 billion a year going two-thirds empty, I mean, it's -- it's -- it is for all practical purposes your TAPS line could shutdown, they can shut that baby down within the hour. If that's the case, that would be a coupd'tat if they could run those carbons through that pipeline and we need to know what their intentions are because all this other stuff is just diverting us.

Sorry for the long time, but.....

MS. SWEET: Any other comments or questions at this point? Anyone else have anything else before I.....

MR. LAKOSH: Comment.

MS. SWEET: Comments. Okay. One last comment and then we're going to close up, but we can chat more if that works.

MR. LAKOSH: Okay. A comment. The scope -- scoping should necessarily include alternative service of Fairbanks and points south through the Trans-Canada Pipeline, 48 inch main line as an alternative to the northern section. The alternatives that should be reviewed and evaluated should necessarily also include service of Fairbanks with propane truck from the North Slope and distributed through a pipeline system through a regas -- through a gassification of pipe -- pipeline distribution system for the Fairbanks area as opposed to our illustrious Mr. Ramos' concern that individual tanks might fail. In other words, distribution through a pipeline system, through gassification pipeline system won't gel because it's all buried and below the frost line. And for service of southcentral Alaska of importation of liquified natural gas, cancellation of the export license and exploration and production of the remaining 2 TCF of natural gas in the Cook Inlet region.

To the extent that there are going to be -- that the application and EIS must necessarily have a retirement, removal and restoration plan associated with it for removal of all obstructions to hydrological flows including all abutments and pikes within potential channel of all rivers and for all areas where there is hydrological flow, again active sub-strait above permafrost and such that that obstruction to flow in that circumstance be considered for the life of the physical presence of the pipeline. In other words, this pipeline may be there for 1,000 years and the change in permafrost levels may preclude putting -- may require building the pipeline, digging the pipeline much deeper to prevent hydrological obstruction in the future, it may require building a berm above and that may settle over long time reduction in permafrost, that there be an evaluation of the impacts to ecosystems from construction of a berm above the normal terrain, that there be a plan to most definitely remove all pipeline sections and physical facilities and structure after the useful lifetime and that includes under circumstances where the vast majority of flow through the 24 inch line is being better served by a 48 inch line so that the -- there be a cost benefit analysis be done as to the impact to -- the continued impact from minimal flows through the northern section of the pipeline where the pipeline no longer serves the original intended purpose of bringing 500 BCF or whatever or .5 BCF to Fairbanks and southcentral Alaska, there has to be a cutoff point where the flow -- sections that are not under active flow or under minimal flow be removed if they create an obstruction in adverse to hydrologic flow or other adverse environmental impact.

MS. SWEET: If you want we can chat more maybe with these other people and then we'll close up the meeting and we've got lots of time, we're going to be here until 8:00 o'clock and we'll just talk more if that's all right.

MR. LAKOSH: It's your meeting.

MS. SWEET: Thank you everyone, do we have any other quick comments or questions before I close it up formally?

MR. KENDALL: Can you stay on the microphone and continue to chat, just let those people leave, shut down the official meeting, it would be nice to talk with you and still.....

MS. SWEET: We can do that, yeah. Let's go -- maybe move to the edge of the room so that people can move out. Will that work? Let's keep the court reporter on for a few minutes until we've captured everything I think, this is good dialogue.

MR. KENDALL: I'd like to give another comment, but I'd like -- I want to hear other people, you know, we're all here to listen. If I might -- I would enjoy a casual conversation. I'd like to add to it if I might that this really needs to be looked at from a hydrogen shipping point of view.

And I'm surprised that Obama and Mr. Chew -- let me tell you something, ladies and gentlemen, these people come out of Chicago, these boys have seen every con game in the world. They're moving to new energies with a swiftness and dedication I've never seen in my lifetime. And the home unit, they're now putting out home units, MIT just patented a home unit that on five meters of water can run your entire home and drive 500 miles. So the new reasoning has to be around hydrogen. And if you're not checking all of this piping with some hydrogen flow contents of energy (indiscernible) I think you're making a mistake there. So.....

UNIDENTIFIED VOICE: Was it you who said you're all bureaucrats?

MS. SWEET: We're not all bureaucrats.

UNIDENTIFIED VOICE: I just see you as all people, myself and lots of other (indiscernible), I don't know.

MS. SWEET: I think at this point we'll go ahead and formally close the meeting. As I said most of us will still be here for a while and we can chat if you have any other questions or comments.

Thank you all for coming and this ends the presentation. Thank you.

(Off record)

(END OF PROCEEDINGS)

TRANSCRIBER'S CERTIFICATE

I, Salena A. Hile, hereby certify that the foregoing pages numbered 02 through 23 are a true, accurate, and complete transcript of proceedings, transcribed under my direction from a copy of an electronic sound recording to the best of our knowledge and ability.

________________________ ________________________________

DATE SALENA A. HILE

Nenana, Alaska

December 10, 2009

U.S. ARMY CORPS OF ENGINEERS

STATE OF ALASKA

ALASKA STAND ALONE PIPELINE (ASAP)
ENVIRONMENTAL IMPACT STATEMENT

PUBLIC HEARING AND PUBLIC COMMENT PERIOD

NENANA, ALASKA

DECEMBER 10, 2009

APPEARANCES:

MS. SERENA SWEET, U.S. Army Corps of Engineers

MR. MIKE SOTAK, ASRC Energy Services

* * * *

P R O C E E D I N G S

(Presentation given by Mr. Mike Sotak)

PUBLIC TESTIMONY

MS. SERENA SWEET: I think at this point, we'll open up the floor for comments and questions.

MR. JIM SACKETT: I have a question. Jim Sackett with Toghotthele Corporation, T-o-g-h-o-t-t-h-e-l-e. Jim, J-i-m, last name Sackett, S-a-c-k-e-t-t.

What impact would the large diameter pipeline that Denali and TransCanada are considering have in terms of impact on this? If those go, does the stand-alone -- has that been taken off the table, or is this going to be based on its own merits separate from that, or will the large diameter pipeline have an impact?

MR. MIKE SOTAK: If the stand-alone -- or if the big line were to go within a reasonable period of time, this stand-alone would fall -- would fold up and collapse. It doesn't make sense if the -- if the big line is going to go in a reasonable period of time for the stand-alone to go forward, because as I showed you on the first slide -- I don't know if you can go back to that -- we looked at the options of the spur lines from the big line.

And so our conclusion was that if the big line were to go within a reasonable period of time, let's say, 2020, -19, -20, -21, you wouldn't build a spur line -- or the stand-alone.

MR. JIM SACKETT: I thought you had a completion date of 2014 on this one.

MR. MIKE SOTAK: 2015.

MR. JIM SACKETT: 2015?

MR. MIKE SOTAK: We do.

MR. JIM SACKETT: So it would already have been built for four years?

MR. MIKE SOTAK: Well, it would -- we're going to see -- you know, all of this is going to be the same time that the open season is going to be occurring for both -- for the big line. And so you're going to have some sense of where the -- you are with the big line after the open season.

MR. JIM SACKETT: At Mile Post 39 at Beluga, does Enstar own the pipeline from there down?

MR. MIKE SOTAK: Enstar owns the whole -- they're the local distribution company for all natural gas in the Anchorage area.

MR. JIM SACKETT: So would they, in a sense, become a gatekeeper of sorts? You build this 700 miles of pipeline, but at the very end you turn control over to a private company?

MR. MIKE SOTAK: They would have to work out an arrangement with the purchasers of the gas from the North Slope, people who bought gas and are transporting it through the system. Then they would be -- they would be transporting within their own system to the same purchasers. They're a common carrier pipeline, so they must provide service, and they just have to provide their rates. Their rates are regulated.

The one thing I guess I didn't say to everybody -- I think we talked about it earlier -- is that this pipeline would be a common carrier pipeline, and whoever builds this project does not own the gas that's in the pipeline. Whoever builds this project is building it and will transport gas through it at -- for a cost.

MS. SERENA SWEET: Thank you, Mike. Were there any other questions at this point? Comments? Thank you all for coming.

(Off record)

(END OF PROCEEDINGS)

* * * *

C E R T I F I C A T E

UNITED STATES OF AMERICA)ss.
STATE OF ALASKA)

I, Elizabeth D'Amour, Notary Public in and for the State of Alaska, residing at Fairbanks, Alaska, and court reporter for Liz D'Amour & Associates, Inc., do hereby certify that the annexed and foregoing ALASKA STAND ALONE PIPELINE ENVIRONMENTAL IMPACT STATEMENT PUBLIC SCOPING MEETING was taken before Lynn DiPaolo on the 10th day of December, 2009, beginning at the hour of 12:00 o'clock p.m. at Nenana, Alaska; and thereafter transcribed by Lynn DiPaolo; that the hearing has been retained by me for the purpose of filing the same with U.S. Army Corps of Engineers, CEPOA-RD, P.O. Box 6898, Elmendorf AFB, Alaska, as required by the U.S. Army Corps of Engineers; that I am not a relative or employee or attorney or counsel of any of the parties, nor am I financially interested in this action.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal this 29th day of December, 2009.

____

Elizabeth D'Amour

S E A L Notary Public in and for Alaska

My commission expires: 12/28/2010

Fairbanks, Alaska

December 10, 2009

U.S. ARMY CORPS OF ENGINEERS

STATE OF ALASKA

ALASKA STAND ALONE PIPELINE (ASAP)
ENVIRONMENTAL IMPACT STATEMENT

PUBLIC HEARING AND PUBLIC COMMENT PERIOD

FAIRBANKS, ALASKA

DECEMBER 10, 2009

APPEARANCES:

MS. SERENA SWEET, U.S. Army Corps of Engineers

MR. MIKE SOTAK, ASRC Energy Services

* * * *

P R O C E E D I N G S

(Presentation given by Mr. Mike Sotak)

PUBLIC TESTIMONY

(No public testimony was given following the presentation)

* * * *

C E R T I F I C A T E

UNITED STATES OF AMERICA)ss.
STATE OF ALASKA)

I, Elizabeth D'Amour, Notary Public in and for the State of Alaska, residing at Fairbanks, Alaska, and court reporter for Liz D'Amour & Associates, Inc., do hereby certify that the annexed and foregoing ALASKA STAND ALONE PIPELINE ENVIRONMENTAL IMPACT STATEMENT PUBLIC SCOPING MEETING was taken before Lynn DiPaolo on the 10th day of December, 2009, beginning at the hour of 6:00 o'clock p.m. at Fairbanks, Alaska; and thereafter transcribed by Lynn DiPaolo; that the hearing has been retained by me for the purpose of filing the same with U.S. Army Corps of Engineers, CEPOA-RD, P.O. Box 6898, Elmendorf AFB, Alaska, as required by the U.S. Army Corps of Engineers; that I am not a relative or employee or attorney or counsel of any of the parties, nor am I financially interested in this action.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal this 29th day of December, 2009.

____

Elizabeth D'Amour

S E A L Notary Public in and for Alaska

My commission expires: 12/28/2010

Denali Park, Alaska

December 11, 2009

U.S. ARMY CORPS OF ENGINEERS

STATE OF ALASKA

ALASKA STAND ALONE PIPELINE (ASAP)

ENVIRONMENTAL IMPACT STATEMENT

PUBLIC HEARING AND PUBLIC COMMENT PERIOD

DENALI PARK, ALASKA

DECEMBER 11, 2009

APPEARANCES:

MS. SERENA SWEET, U.S. Army Corps of Engineers

MR. MICHAEL SOTAK, ASRC Energy Services

* * * *

P R O C E E D I N G S

(Presentation given by Mr. Michael Sotak)

(On record)

PUBLIC TESTIMONY

MS. SERENA SWEET: I know a few of you came in a little bit after. We can fill you in maybe after this, but if -- does anyone have anything to add?

MR. CASS RAY: Could you take us back -- just for one second back to the slide that shows Glitter Gulch.

MS. TRICIA WAGGONER: It takes just a second.

MS. SERENA SWEET: This one?

MR. CASS RAY: Yes.

MS. SERENA SWEET: One more forward.

MS. TRICIA WAGGONER: You wanted the other one?

MR. CASS RAY: The next one.

MS. SERENA SWEET: Yes.

MR. CASS RAY: That's the one. Thank you.

AUDIENCE MEMBER: Is that the power line, the yellow line? The same route as the Intertie?

MS. SERENA SWEET: Is that yellow line the power line route?

MR. MICHAEL SOTAK: There will be a little bit of it along the power line, but not -- for the most part it probably won't. I would think that possibly right in this area here will be along the Intertie. But remember, the Intertie can go across large spans where you can't put pipelines. That's why, you know, the Intertie comes through what is -- what is the -- into this. The blue Intertie is here. Okay. Well, no, I'm sorry. This is.....

AUDIENCE MEMBER: That's not the intertie.

MR. MICHAEL SOTAK: What is that canyon? Moody -- I want to say Moody Creek. Is it Moody Canyon? Okay. Moody Canyon was looked at many years ago and dropped because of its difficulty of construction and terrain. You know, in a lot of areas you can put power lines across large spans, and you can do that through Moody Canyon, but you could not put a pipeline in there because you have the steep hills and ravines that go back and forth and back and forth and back and forth. And you're so isolated there, if you have an avalanche or something, the pipeline goes out, your whole supply to Anchorage is out for a long period of time, and you have no other option or alternative.

So this route is a very stable route and a very easy route, really to construct. Some people suggested that, yeah, it might be a difficult route. We looked at it, and it's very easy to move across.

AUDIENCE MEMBER: Is that a bridge?

MR. MICHAEL SOTAK: I'm sorry?

AUDIENCE MEMBER: Would it be a bridge?

MR. MICHAEL SOTAK: No. It will be open cut.

AUDIENCE MEMBER: I mean, under the Yanert?

MR. MICHAEL SOTAK: I'm sorry?

MS. PAT WINKLMANN: You'd be going under the Yanert?

MR. MICHAEL SOTAK: You would go in and excavate the river bottom, put the pipe in, and then cover it back up. And you just are -- you have to put the pipe in -- if it's solid rock, then it's easy to blast. You put the pipe in the trench, and then you cover it over, and that pipe is going to stay in that solid rock.

If it's material that's -- you know, that can't -- you know, erode, you just have to put it down deep enough so that you get away from the scour area. And open river crossings are the easiest way to do it and the most effective way, because once it's in underneath the river and placed -- and the banks were restored, you don't even know the pipeline is there. Yes.

AUDIENCE MEMBER: What are the Title 11 issues that you mentioned?

MR. MICHAEL SOTAK: Well Title 11, you know, a pipeline is -- under Title 11 -- you can do a lot of things under Title 11, but you can't put a pipeline into a National Park under Title 11.

MS. SERENA SWEET: Ron, would you mind giving us a few pointers on Title 11 requirements real quick.

MR. RON DUTON: A Title 11 allows transportation assistance to go through some of the conservation units that were created. In the case of Denali National Park, the Park Service is not authorized to grant a right of way for a pipeline. Therefore, the process -- it's still conceivable that it could happen, but it ends up going to Congress after a lengthy review, and then to the President for approval.

There is legislation that's been proposed by Senator Murkowski. It passed out of committee, it's part of a much larger bill. We have no idea if it's going to move. But there is legislation that would authorize the Park Service -- or give the Park Service authority to grant right of way. We would still have to go through the Title 11 process.

And that's one of the reasons we're looking at this as an alternative. If the legislation passes in time, the alternative could be accepted and go through the park. But it would have to pass prior to the Draft EIS. Because there's certain steps that -- either that or we'd have to start over the entire process.

MR. MICHAEL SOTAK: And the draft EIS would have to identify, as part of Title 11, that this is the preferred option to the other one. And a hearing would have to be held in Washington DC during the public hearing process. Those things would have to go forward to be in compliance with

Title 11.

MS. SERENA SWEET: And, sir, do you mind stating your name just so we can get that on the.....

MR. JOHN WINKLMANN: You bet. John Winklmann.

MS. SERENA SWEET: Thank you.

MR. JOHN WINKLMANN: I'm from Healy.

MS. SERENA SWEET: Excellent. Thank you very much. Other comments, questions?

MR. CASS RAY: Do you know what milepost the river will rejoin the highway there in the south? Do you know about what milepost that is?

MR. MICHAEL SOTAK: I don't, but right now we're -- right here is where we are at milepost -- what is it -- 2.....

MR. CASS RAY: 230.

MR. MICHAEL SOTAK: .....230, and this is roughly six miles from this point down to this point. So I would say this is probably about 235, 236, somewhere in there would be my guess.

AUDIENCE MEMBER: That's 224; the other direction. Yeah.

MR. MICHAEL SOTAK: I'm sorry. 224, 225. I'm doing the opposite.

AUDIENCE MEMBER: We understand it.

MS. SERENA SWEET: And, I'm sorry. Could we get your name, also, on the.....

MR. CASS RAY: Cass Ray.

MS. SERENA SWEET: Thank you. Do we have anyone else at this point? Well, we're going to be here for several more minutes, and there's information around the room if you want to take a look at that, and we can answer any questions you have. And like I said, thank you for coming, and we'll be here. Thank you.

(Off record)

(END OF PROCEEDINGS)

* * * *

C E R T I F I C A T E

UNITED STATES OF AMERICA)
) ss.
STATE OF ALASKA)

I, Crystal D. Scotti, Notary Public in and for the State of Alaska, residing at North Pole, Alaska, and court reporter for Liz D'Amour & Associates, Inc., do hereby certify:

That the annexed and foregoing ALASKA STAND ALONE PIPELINE ENVIRONMENTAL IMPACT STATEMENT PUBLIC SCOPING MEETING was taken before me on the 11th day of December 2009, beginning at the hour of 11:53 a.m., at Denali Park, Alaska;

That this hearing, as heretofore annexed, is a true and correct transcription of the hearing, taken by me and thereafter transcribed by me;

That the original of this hearing has been retained by me for the purpose of filing the same with the U.S. Army Corps of Engineers, CEPOA-RD, P.O. Box 6898, Elmendorf AFB, Alaska, as required by the U.S. Army Corps of Engineers;

That I am not a relative or employee or attorney or counsel of any of the parties, nor am I financially interested in this action.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal this 7th day of January 2010.

____
Crystal D. Scotti
Notary Public in and for Alaska
My Commission Expires: 9/15/2010

S E A L

Barrow, Alaska

December 17, 2009

ALASKA STAND ALONE PIPELINE

ENVIRONMENTAL IMPACT STATEMENT

PUBLIC SCOPING MEETING

BARROW, ALASKA

HERITAGE CENTER

December 17, 2009

P R O C E E D I N G S

(Barrow, Alaska - 12/17/2009)

(On record)

(Invocation by Elder)

(Presentation)

MR. NAGEAK: How many fault lines long the.....

MS. SPRETER: I -- you know, I don't know. I don't have that answer. Does anybody here have the answer of exactly how many faults -- our person who's the expert in that is on his way to Hawaii. He's been going up and down this highway for over 30 years and I think he knows every fault.

MR. NAGY: You have mentioned in the past that there's potentially one in the Yukon River, which is the reason for the aerial crossing.....

MS. SPRETER: Right.

MR. NAGY: .....there, so that's at least two.

MS. SPRETER: Okay. There's two. Okay.

(Presentation continues)

MR. NAGEAK: Are there trees to be cut, willow, you know, and that other stuff or -- for the roads, and what would happen to all that.....

MS. SPRETER: It's restored.

MR. NAGEAK: Huh?

MS. SPRETER: It's -- anything that -- along the route, if I'm not mistaken.

MS. SWEET: The details of the restoration work have not been finalized, but input as far as what you would recommend would be good. We're going to be working on those details as we move through the process and.....

MR. NAGEAK: And what's the -- what's the width for that right-of-way?

MS. SWEET: I believe.....

MR. DUTTON: Fifty foot on federal -- fifty foot from BLM, 30 from the State, I believe, plus the width of the pipe.

MR. NAGEAK: How much?

MS. SPRETER: Going across State land it would be 30. If it's going across federal land, it's 50.

MR. DUTTON: Plus the width of the pipe.

MS. SPRETER: And then that one path I showed you where it would have reclaimed there, there's that one fault line that I showed you. Yes.

MR. HERREMAN: And in your corridors, you mentioned a 2000 foot wide corridor to start with, and then you said you're only doing 300 foot for your analysis for as far as wildlife impacts. So is your 2000 foot corridor, is that what's actually being -- what's the actual imprint during the construction?

MS. SWEET: The way this is being looked at is a 2,000 foot, it's a biological assessment corridor. That 300 foot corridor is speaking to the Watley's type survey. And then 100 foot corridor is the construction.....

MR. DUTTON: Yes.

MS. SWEET: .....corridor. So it's kind of necking down as you get more detailed to a smaller width, but they're still trying to incorporate the total footprint within the corridor so that additional data collection later on wouldn't be necessary if the pipe had been moved around a little bit within that -- when they do the actual design and engineering if it's just a light shift that's necessary, ideally it would be within that corridor.

MR. HERREMAN: And when you start looking at accuracy.....

MS. VORDERSTRASSE: Excuse me, can ask you the individuals asking questions to state their name and who they represent so that.....

MR. HERREMAN: I'm sorry.

MS. VORDERSTRASSE: .....we as a community who is speaking? Thank you.

MR. HERREMAN: Sorry. I'm Jason Herreman. I'm one of the biologists with the North Slope Borough.

REPORTER: Thank you.

MR. HERREMAN: So when you start talking about just raptor issues you know, you're looking -- you're looking at a half mile to a mile that you're required to stay away from some of these nests, so I'm kind of wondering why you're only looking at wildlife at a 300 foot corridor when you're going to be dealing with these issues directly on constructing this pipeline. I mean, that's -- just right there, that's one that just pops out right away for issues as far as wildlife.

MS. SWEET: Okay. And I think that's the kind of information that we're looking for is what sort of factors are going to be needed for the different agencies to make their -- their permitting decisions or different local decisions, so if you just provide us with that, that's -- we will take into consideration certainly.

Real quick before we move forward, I just have two other quick points I wanted to make. The scoping process, as I said, is one of the earliest processes in the development of environmental impact statement. I also wanted to point out the timing that we expect the draft environmental impact statement to be completed, and that will be in probably July of 2010. We expect public hearings on the draft environmental impact statement of August of that year. And finally I just want to put up some information on -- my contact information and other ways to submit comments. This information is also available in that folded handout in the back of the room, so if you want to grab one of those, you're welcome to have that all written down. At this point, I would like to open it up to public comment and question, and as I said, if you could state your name we'd appreciate that and go ahead.

MS. VORDERSTRASSE: Edith Vorderstrasse from UIC UMIAQ. The presentation that was just presented today, is that available.....

MS. SWEET: Yeah, that's available on our website. And it's actually on the link for scoping meetings, I believe at the bottom it can be downloaded. And that website is -- it's the one up there. It's also on that handout.

MR. NAGEAK: Is that -- is that where we can get that -- your presentation today?

MS. SWEET: Yeah. On that website on the link that says scoping meetings you can download these slides that we -- we gave today.

MR. NAGEAK: Okay. Good. This one on the top?

MS. SWEET: Yeah. And I can get you a handout too that has it also.

MS. VORDERSTRASSE: It's on this thing, the (In Inupiat) that we got at the door.

MR. NAGEAK: Okay.

MS. SWEET: Yeah.

MR. NAGEAK: Thank you. Okay.

MS. SWEET: There have been a few technical issues in the last few days with some of the items on the website, so give us a couple of days and it'll be ready. We've been on the road, so we haven't been able to deal with them maybe, but we'll have it up for sure. And if for reason it doesn't work, get a hold of me and I'll make sure you get a copy. If nothing else, we can get you a CD or something else to make sure you get it.

I also wanted to mention quickly the formal scoping period ends on February 5th. That's when we're going to cut off the comments accepted to be included within our scoping report. However, we will be accepting comments throughout the EIS process, so.....

MR. NAGEAK: So the -- I'm sorry.....

REPORTER: State your name.

MR. NAGEAK: Ben Nageak, BLM, Barrow. So the -- the agencies are working towards this project, they will be working on some of the issues themselves that might come up with the -- especially in the BLM area?

MS. SWEET: Right. The purpose of the environmental impact statement is ideally to get all of the information together in one place so that all the decision-makers can look at the same set of information and make educated decisions. Yes.

MR. JEMMING: Is the United States Fish and Wildlife going to be a cooperating agency as well? And this is -- my name is Jonny Jemming from North Slope Borough law department.

MS. SWEET: They have not signed on yet as a cooperating agency. That doesn't mean that they can't further on. There's no deadline to sign on as cooperating agency, but they have not yet indicated that they are interested in being involved.

MR. JEMMING: Okay.

MS. SWEET: Other comments or questions at this point?

MR. BROWER: In the August, later, in the impact statement, and then after, at a more appropriate, are you going to come back to Barrow with that information?

MS. SWEET: We will send out notifications when the draft EIS is done so that everybody will get a chance to take a look at it and then we'll come back after you've had -- I think it's a -- there's a waiting period of about a month that we give the individuals. And then we come back and we'll -- we'll let everybody talk about it and have another meeting and discuss your concerns or issues at that point. So we expect that to be in August, but, you know, the best laid plans don't always go -- things may -- may change. That's our anticipated date. Yes.

MR. JEMMING: This is Jonny Jemming again with the North Slope Borough law department. If we're on the record, we'll submit comments in writing as well, but some of the things that we've been asking from other agencies is that in an environmental planning and review is for health impact assessments of projects and included in health impact assessments are analyses related to impacts of air emissions that are connected to the action, possible water quality impacts that we know you'll be looking at anyway, but we want to have those directly tied into the public and community health, specifically when you're looking at disproportionate impacts to village communities such as whether it be areas like Nuiqsut or others. But we know that with air quality in particular that we have a lot of interest in knowing where additional emission sources will be occurring, because the concentrations in areas like Nuiqsut are elevated. And so we're trying to keep track of those trends as we look at the health impacts on those types of communities. So we would hope that you would look at those types of impacts.

And then we also have been asking for more indirect analyses on the possible habitat impact. And those, we'll get from wildlife and we'll submit them.

But the question that I have related to those comments is can you indicated to where you preliminary identified any compressor stations?

MS. SWEET: There -- there -- we're calling them compressor station envelopes at this point and actually within the -- I think it's the department of the army permit application, there's a set of maps that include the locations along the pipe where compressor stations could be. So take a look at those maps and that should give you an indication of a general area where they're proposed to be, the exact location and has not been finalized, so.....

MR. BROWER: Those compressor stations (indiscernible) that we can -- that you can give to the (indiscernible).....

MS. VORDERSTRASSE: Repeat the question. It's hard to hear you.

MS. SWEET: Yeah.

REPORTER: Speak up. Speak up, Arnold.

MS. SWEET: I think the question was related to is the compressor station going to be able to be used for LNG for smaller communities along the pipe or other.....

MR. BROWER: Private.

MS. SWEET: .....private entities?

MR. BROWER: Entrepreneurs that want to sell the (indiscernible) gas?

MS. SWEET: I think at this point that's not part of the proposal, but I don't think it's restricted, but -- and that's a good question and we're -- I think it's something that the State needs to -- to consider. And but if you wanted to include -- we'll include this in our comments so that they can definitely consider it.

MR. BROWER: For my area -- it's coming up on my area and that we're -- we certainly would like to be enjoying some benefit as the State.

MS. SWEET: Certainly.

MR. BROWER: And not pay $9 a gallon for our (indiscernible).

MS. VORDERSTRASSE: Please speak up.

MS. SWEET: Other comments or questions at this point? Yes.

MR. JEMMING: Relating to the comment just provided, we also -- one of the comments that we'll also submit in writing to have on the record is relating to Executive Order 12898, an environmental justice analysis and talking about benefits to communities that will obviously be suffering some of the impacts of any possible impacts to be occurring; but Executive Order

12898 would ask that you -- and we would encourage you to look at an environmental justice analysis, identify possible benefits to the communities to offset any disproportional impacts, especially since we have a lot of indicators that these types of actions may have possible impacts on subsistence use. So we try to identify other ways to mitigate that.

MS. SWEET: Other comments or questions?

(No comments)

MS. SWEET: I think we're -- we're going to be here and we're giving this same presentation starting at 5:00 o'clock for those of you who may have come in a little bit late. But in the meantime we'll be here answering questions and be available.

So thank you for all for coming.

We really appreciate and thank you.

(Off record)

(END OF PROCEEDINGS)

TRANSCRIBER'S CERTIFICATE

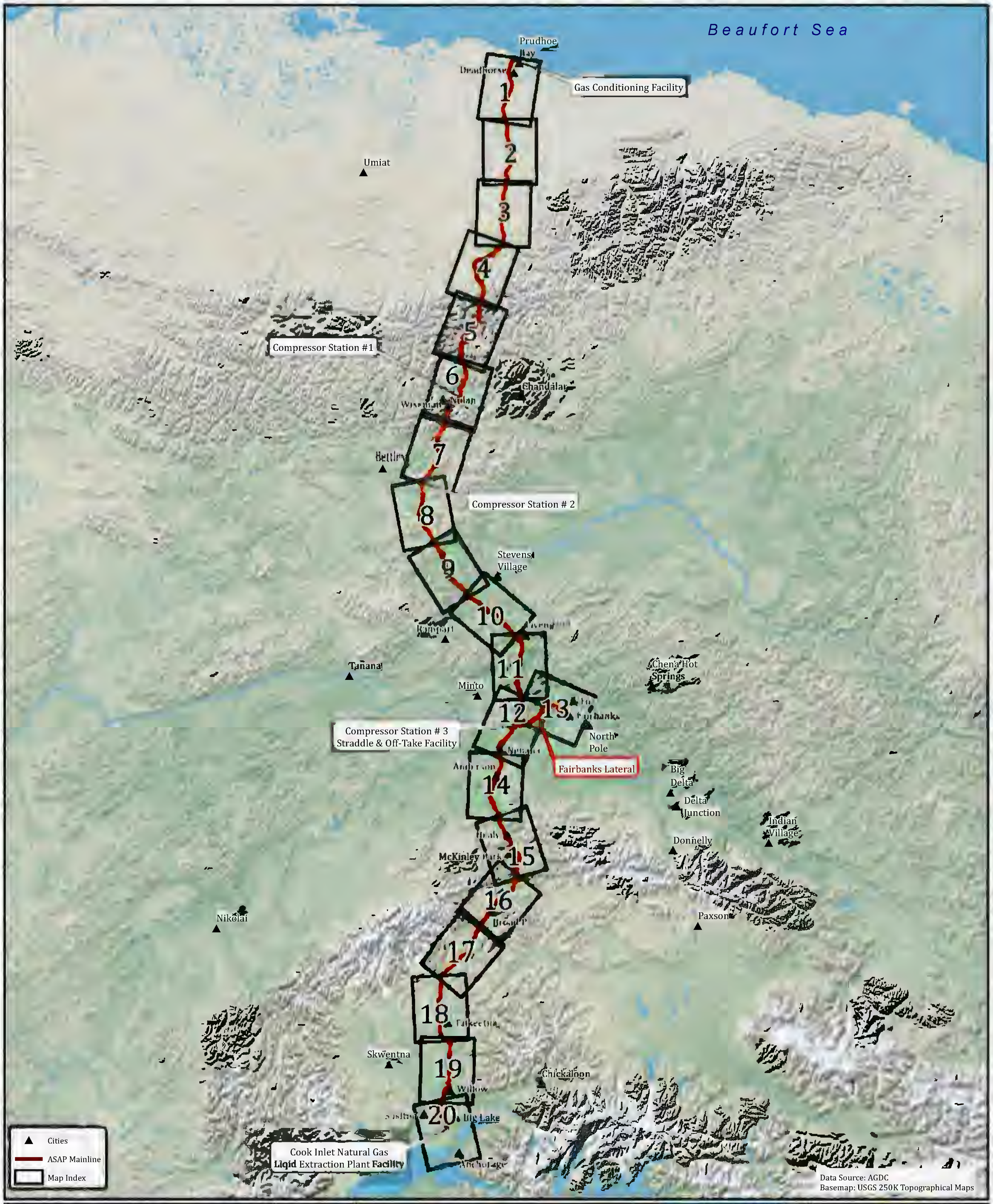
I, Salena A. Hile, hereby certify that the foregoing pages numbered 02 through 11 are a true, accurate, and complete transcript of proceedings, transcribed under my direction from a copy of an electronic sound recording to the best of our knowledge and ability.

_________________________ _________________________________

DATE SALENA A. HILE

Appendix C

Project Maps



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Alaska Stand Alone Gas Pipeline

Proposed Project USGS Topographical Maps Index

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October 2011

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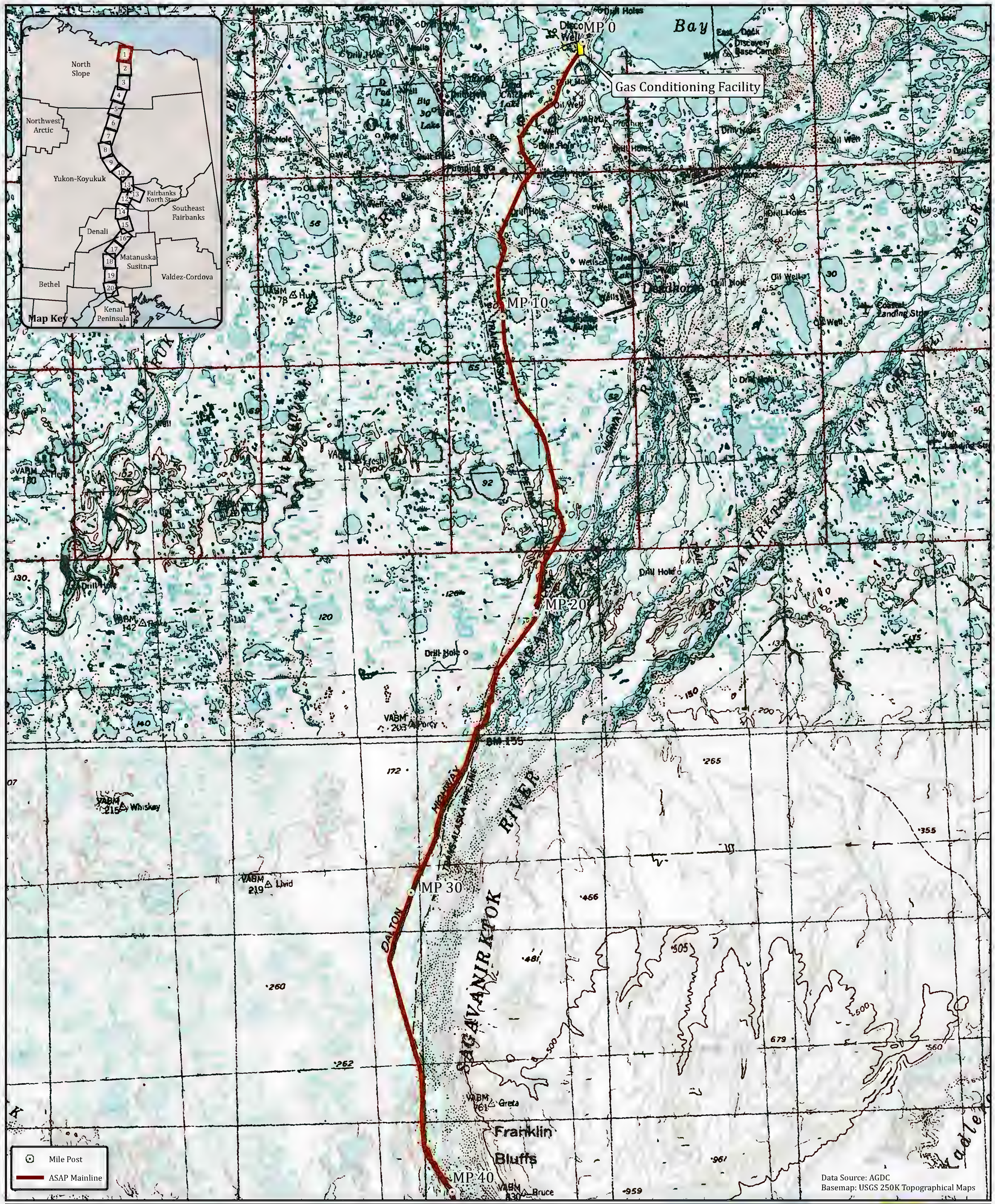

Alaska Stand Alone Gas Pipeline

Proposed Project on USGS Topographical Maps

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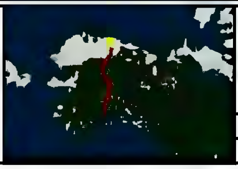

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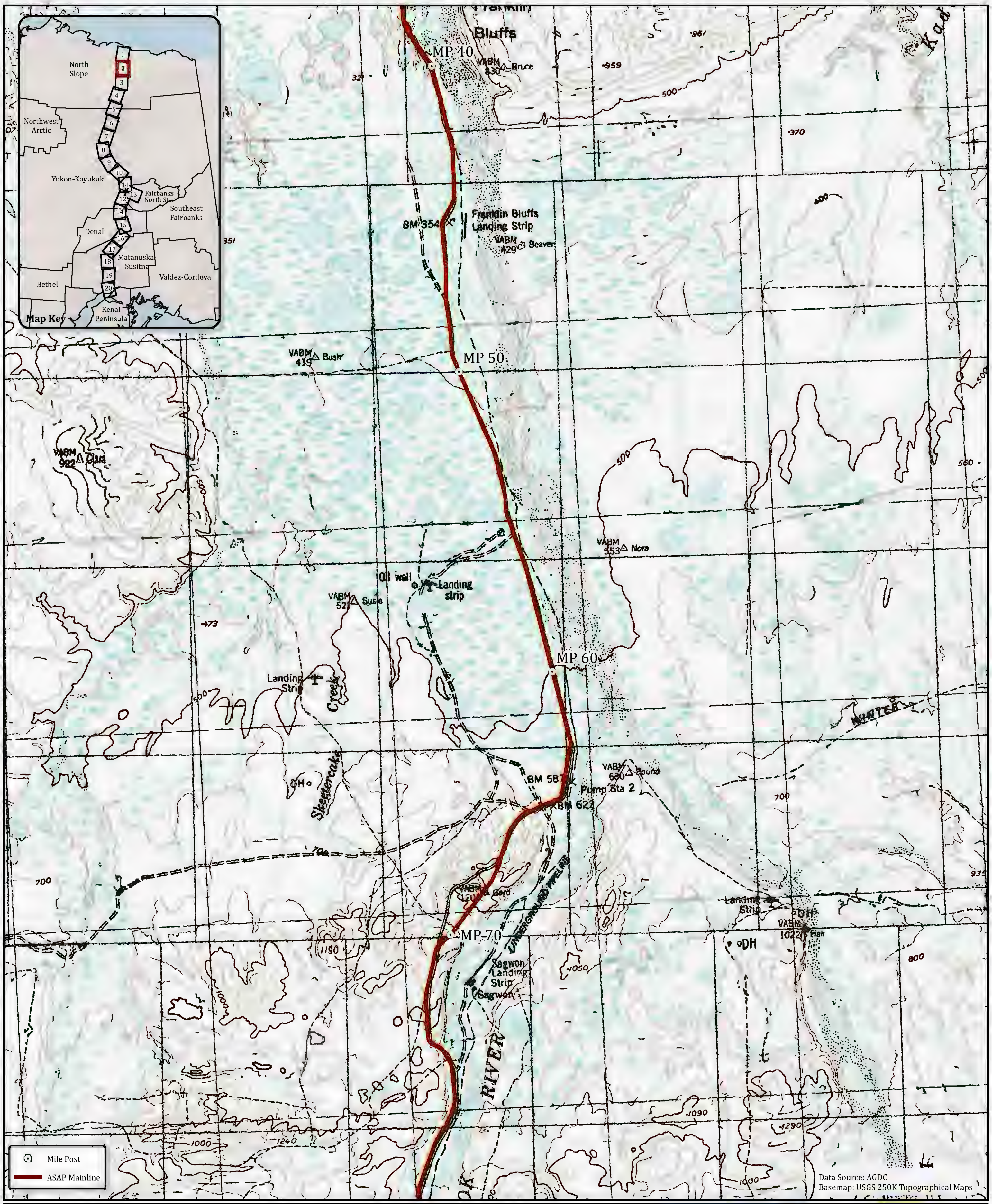

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Alaska Stand Alone Gas Pipeline

Proposed Project on USGS Topographical Maps

Page 2 of 20

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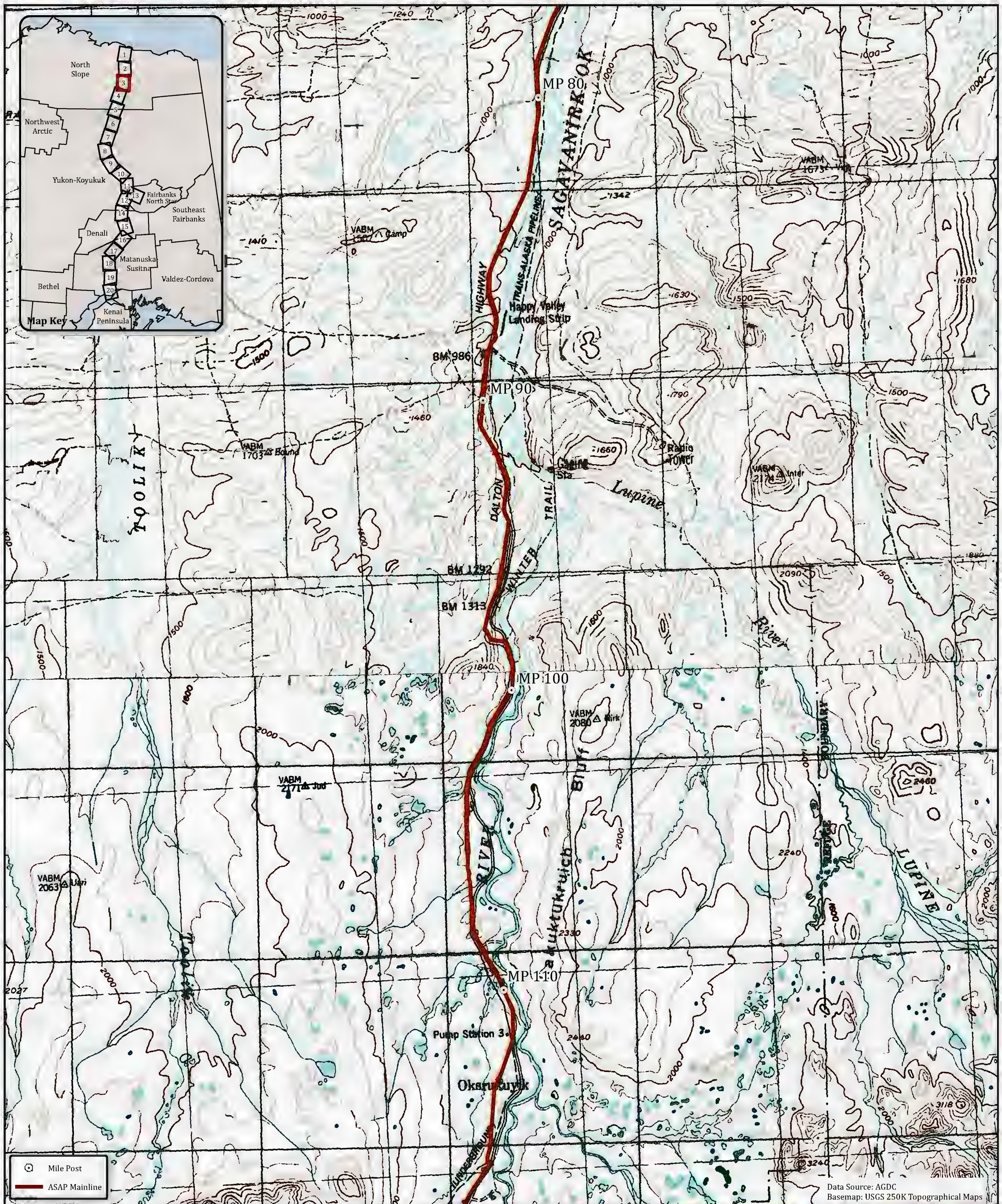

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Page 3 of 20

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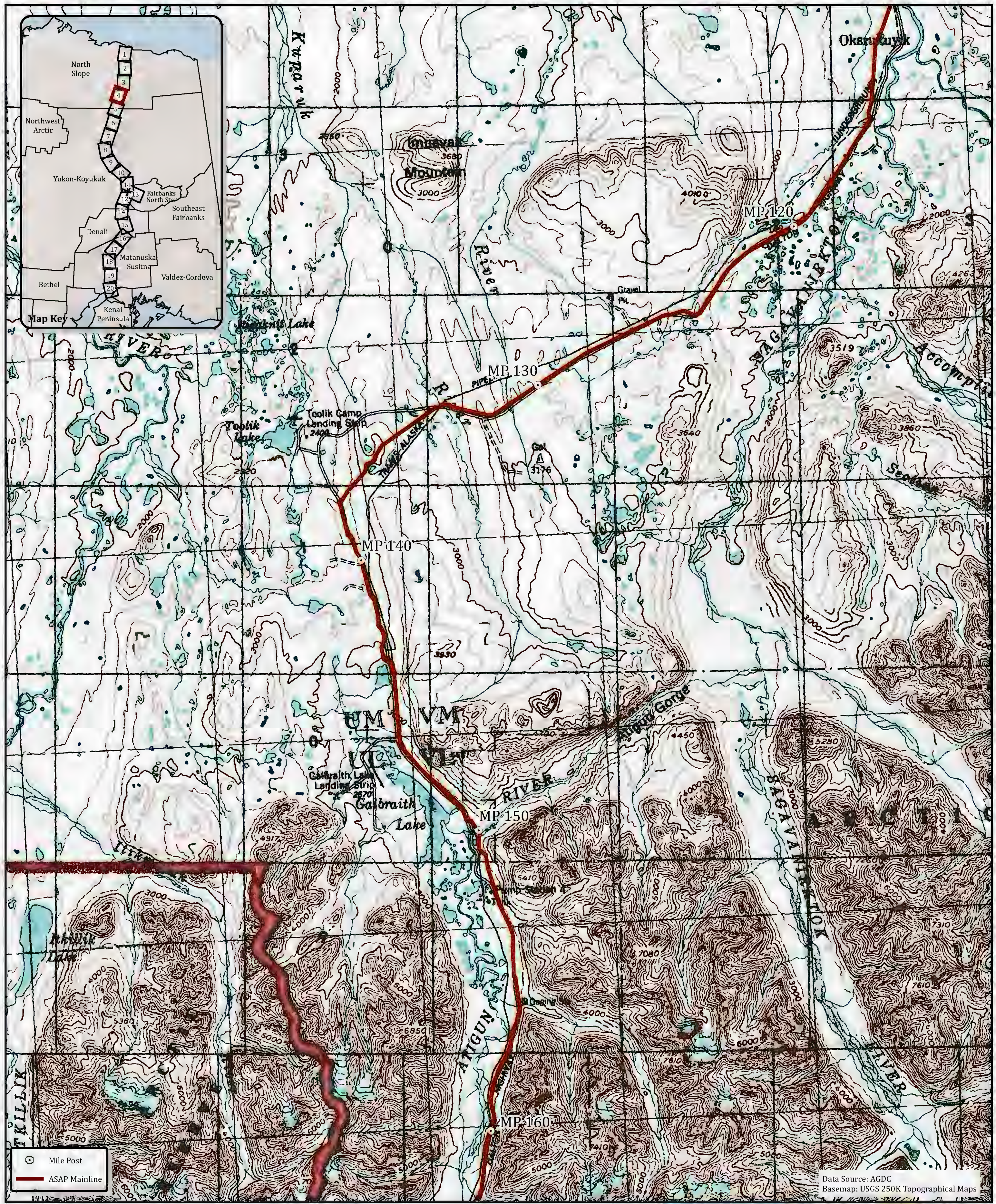

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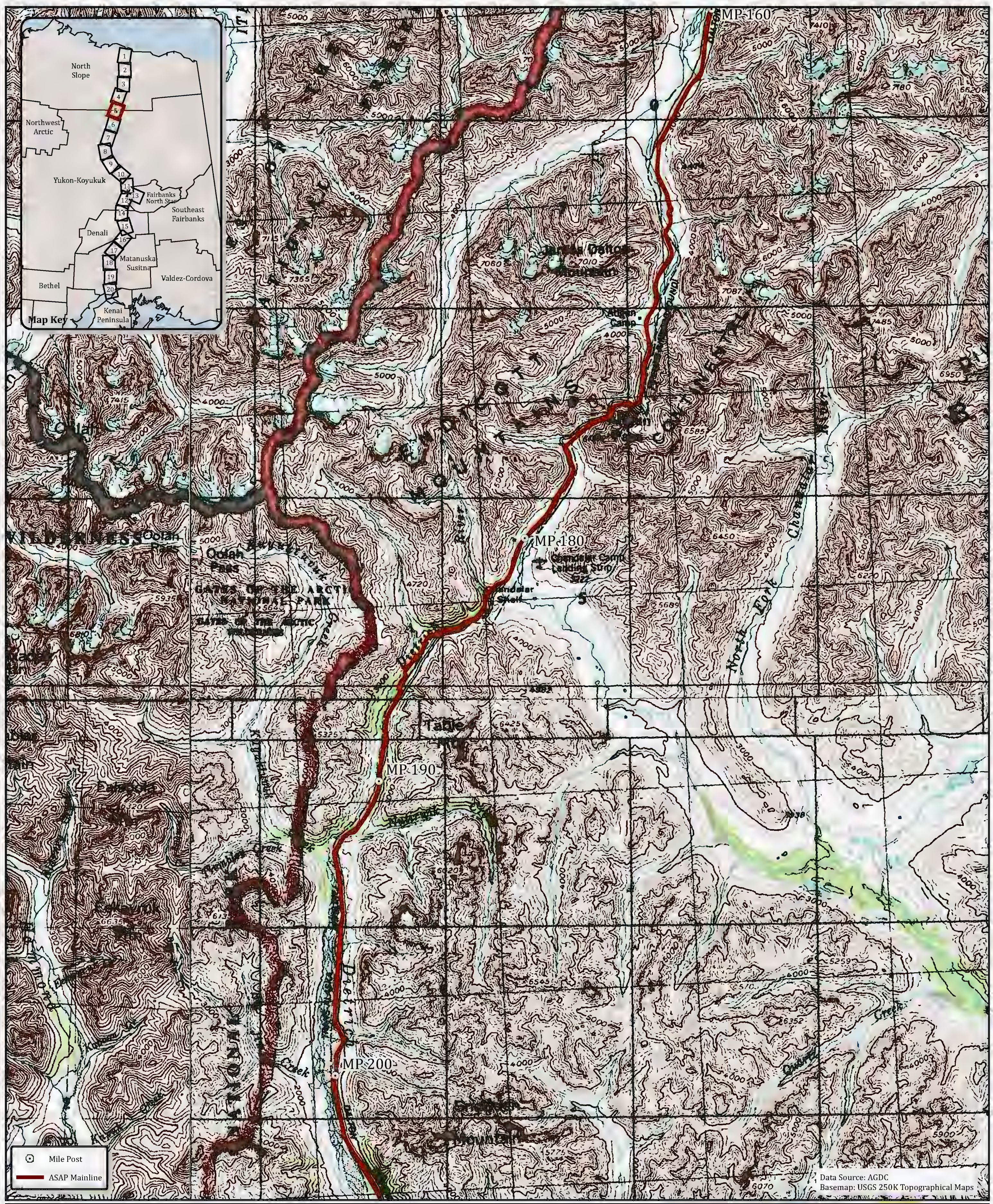

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Alaska Stand Alone Gas Pipeline

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Page 5 of 20

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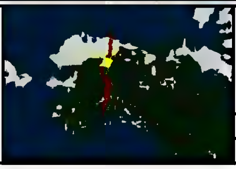

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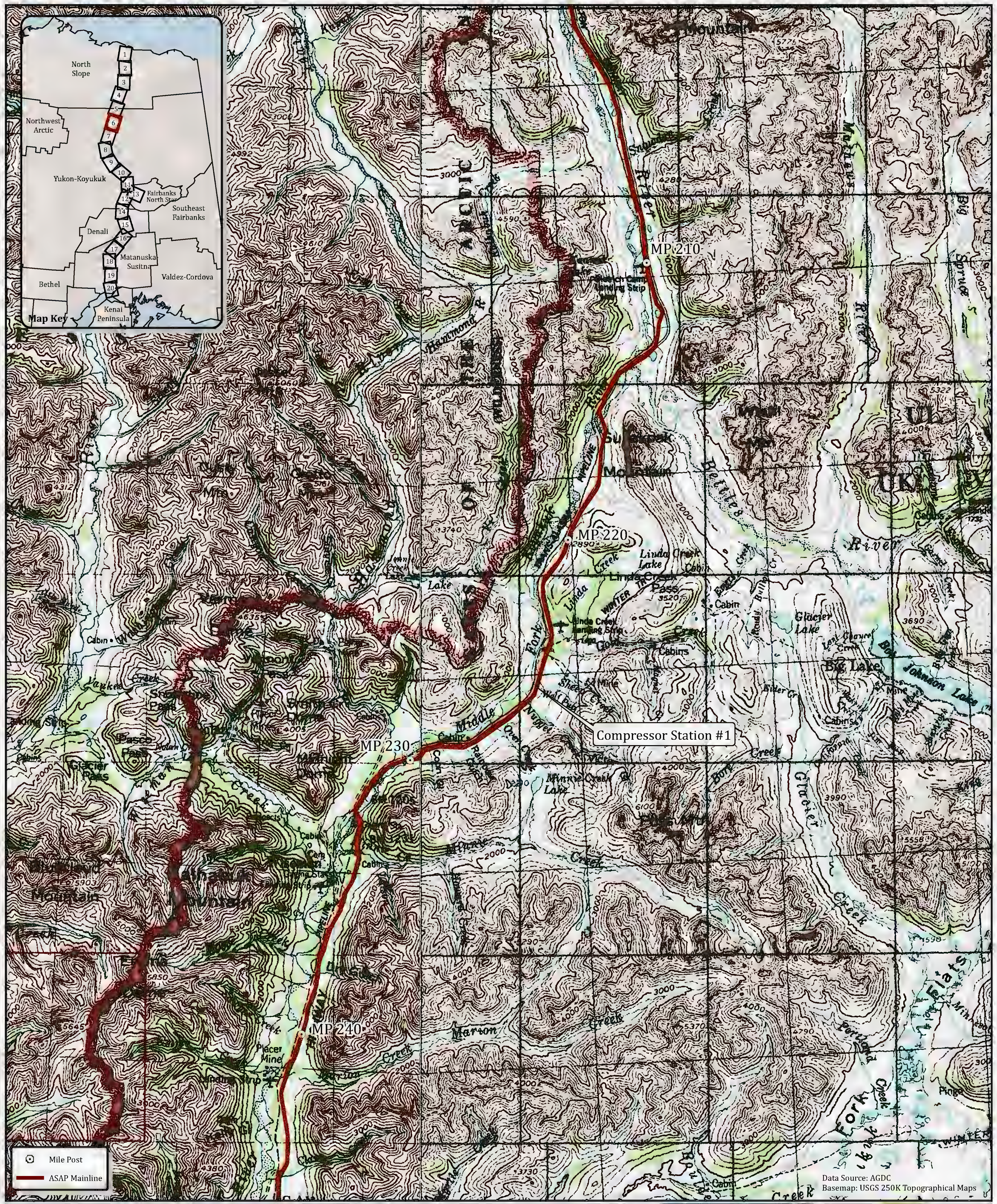

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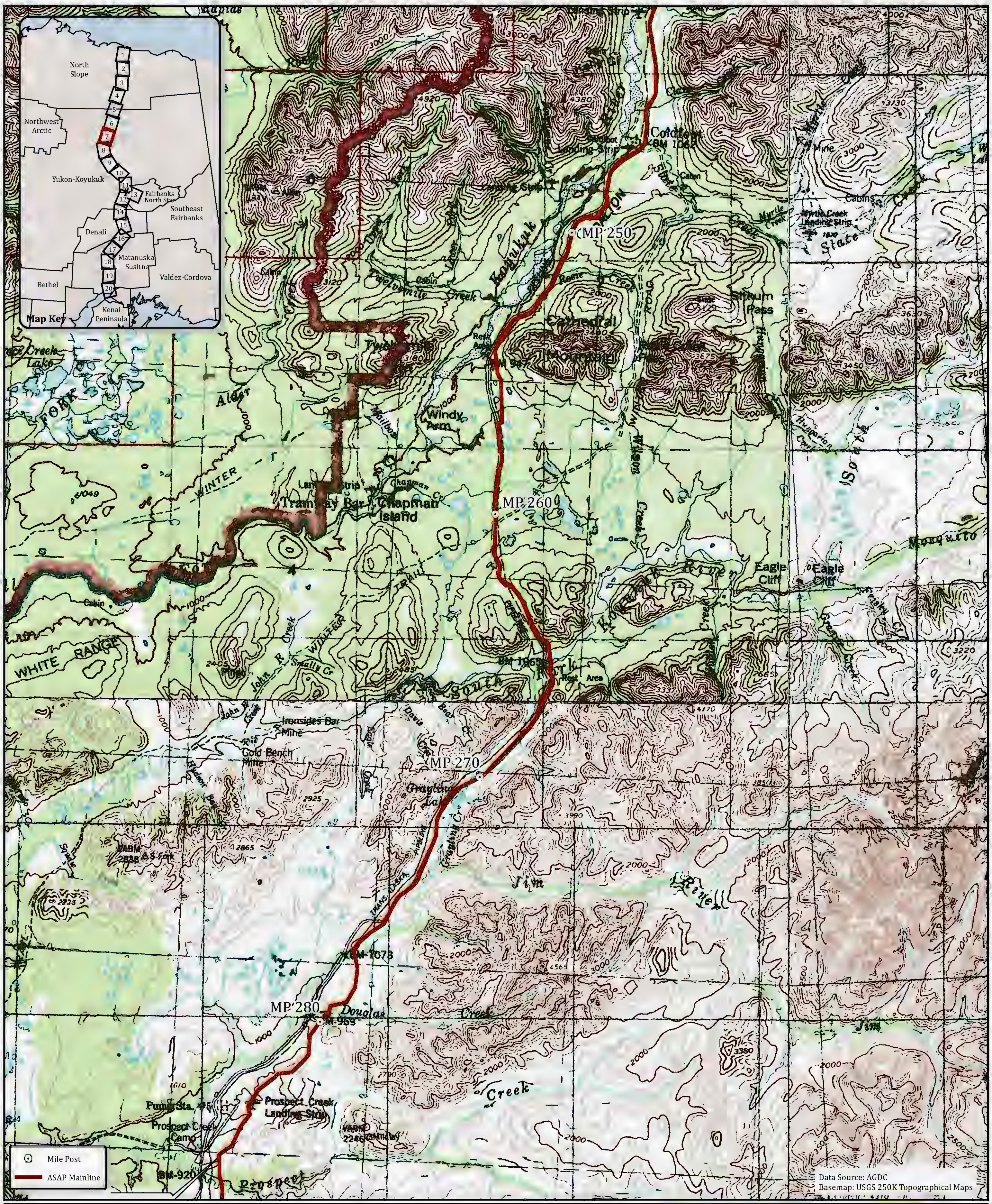

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Alaska Stand Alone Gas Pipeline

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Page 8 of 20

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Alaska Stand Alone Gas Pipeline

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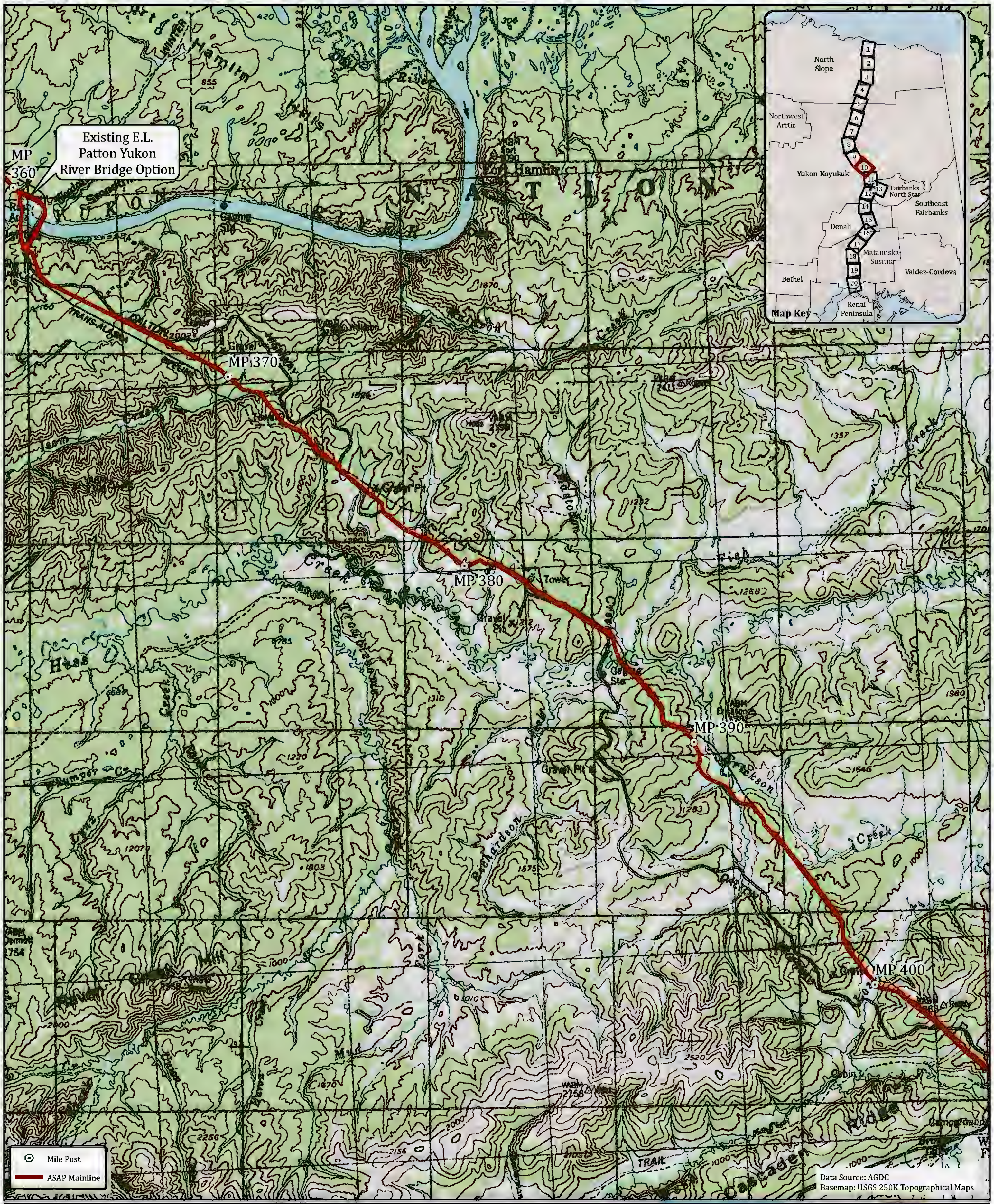

Alaska Stand Alone Gas Pipeline

Proposed Project on USGS Topographical Maps

Page 10 of 20

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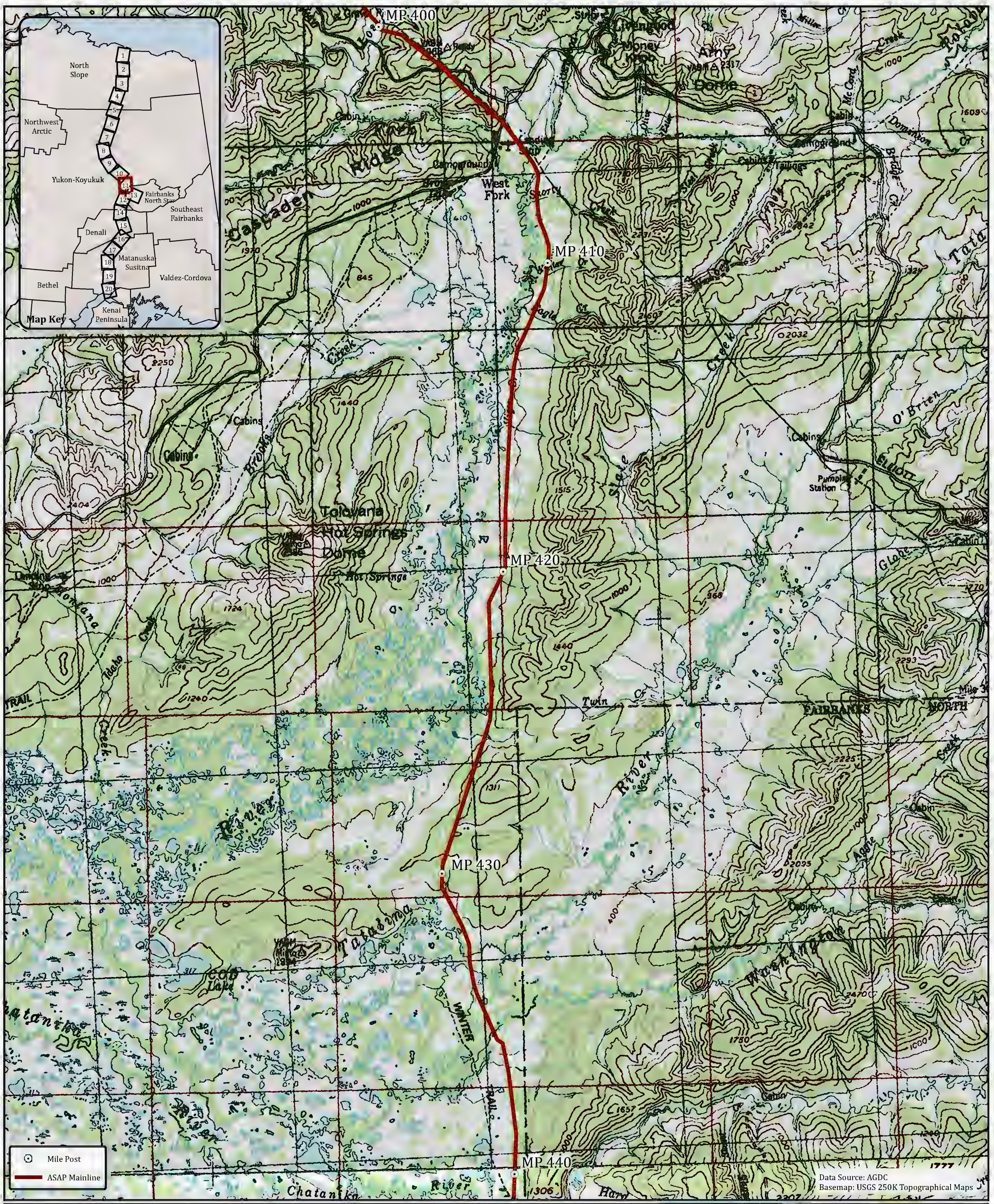

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Alaska Stand Alone Gas Pipeline

Proposed Project on USGS Topographical Maps

Page 11 of 20

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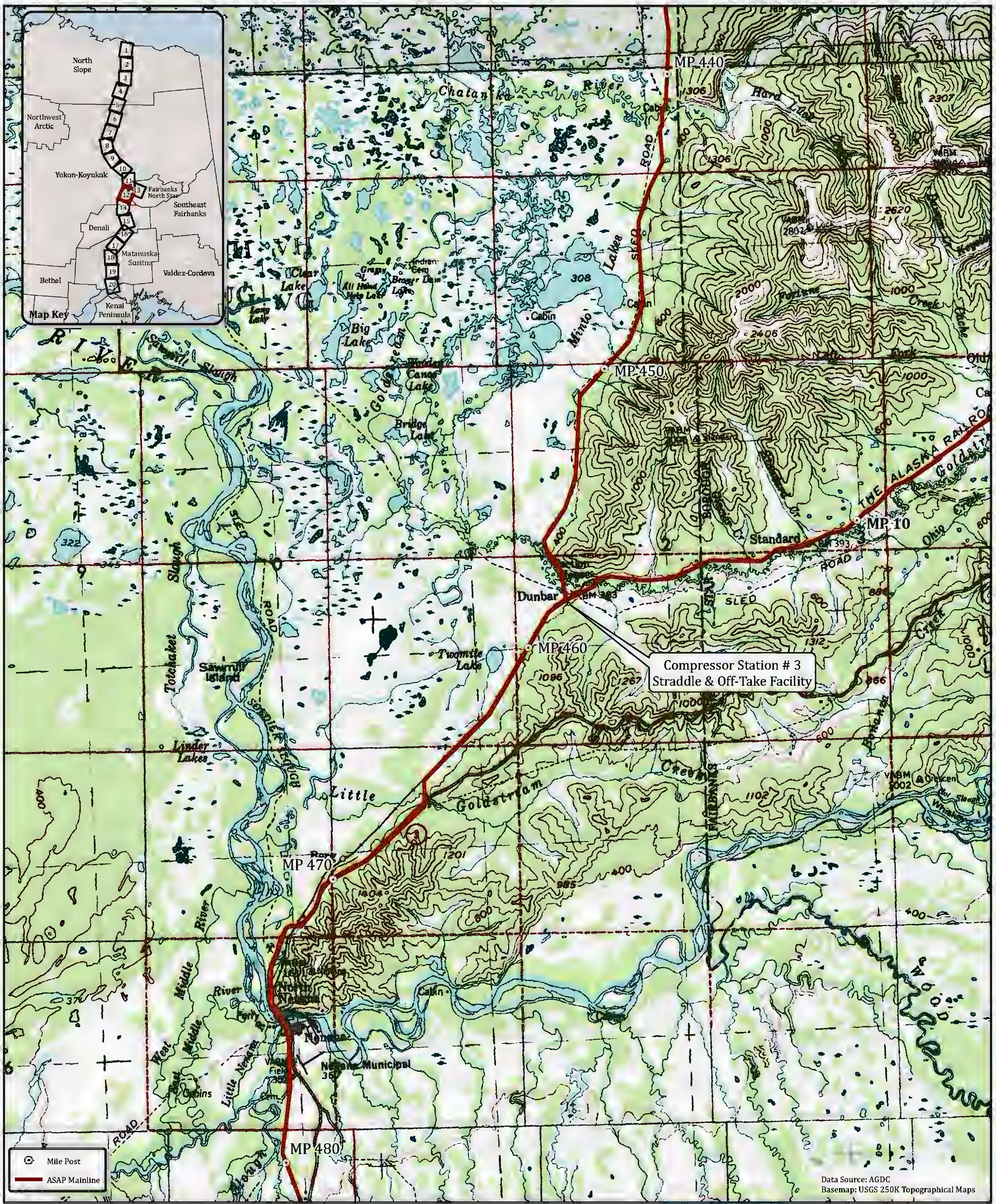

Alaska Stand Alone Gas Pipeline

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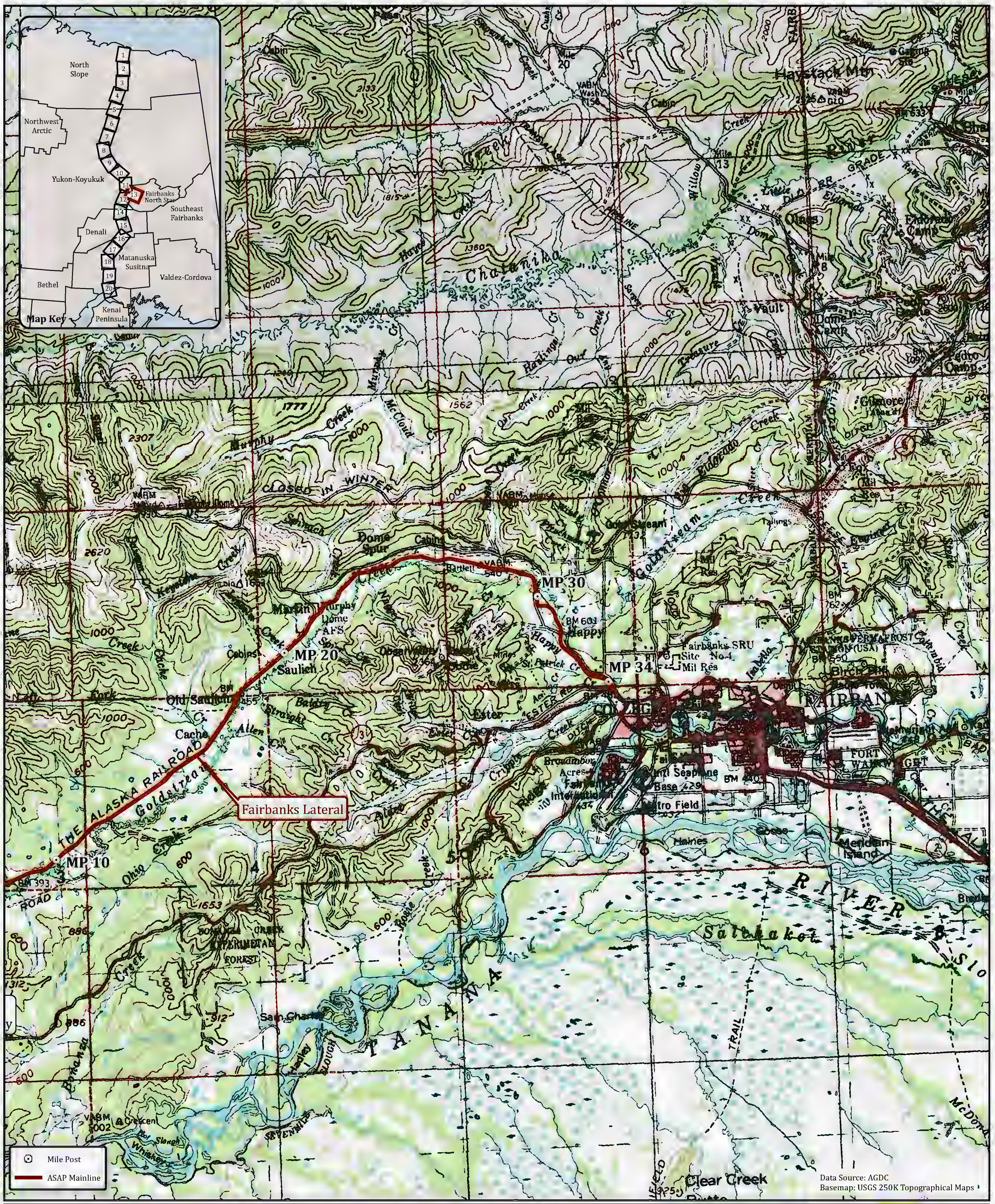

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Alaska Stand Alone Gas Pipeline

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Page 13 of 20

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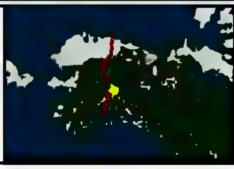

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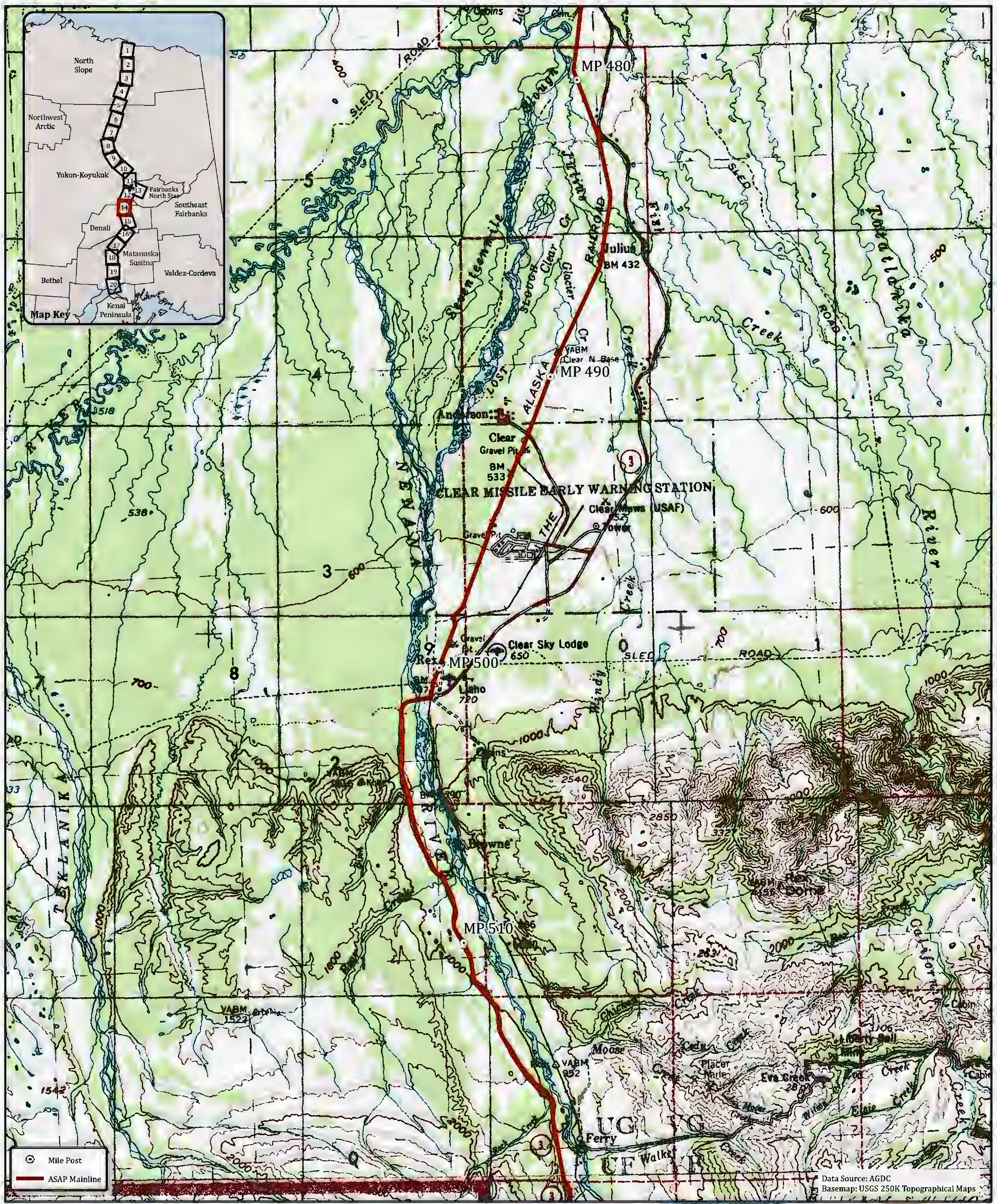

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Alaska Stand Alone Gas Pipeline

Proposed Project on USGS Topographical Maps

Page 14 of 20

0 2.25 4.5 Miles

October 2011

Map Projection: NAD 1983 State Plane Alaska

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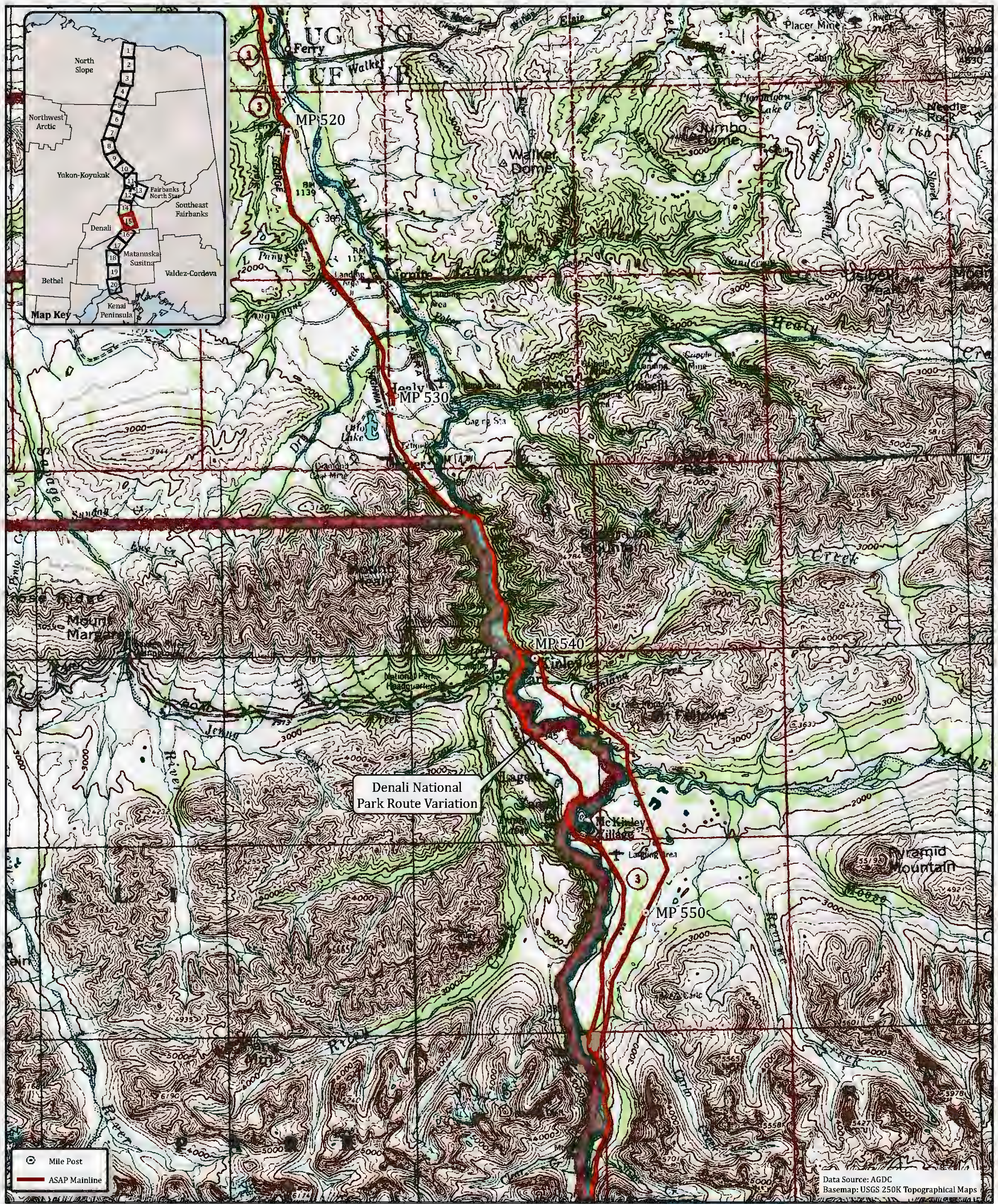

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Alaska Stand Alone Gas Pipeline

Proposed Project on USGS Topographical Maps

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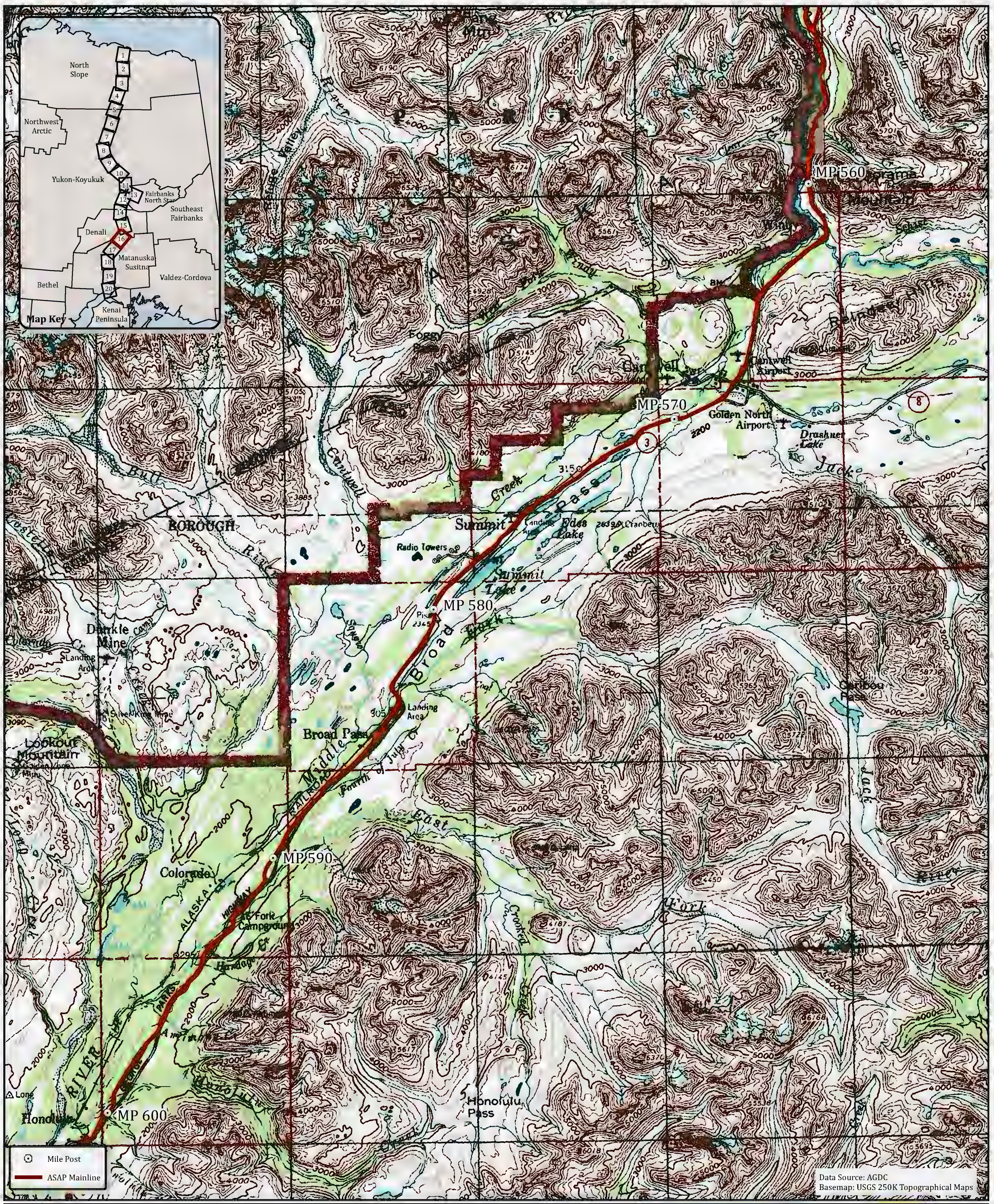

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Alaska Stand Alone Gas Pipeline

Proposed Project on USGS Topographical Maps

Page 16 of 20

0 2.5 5 Miles

October 2011

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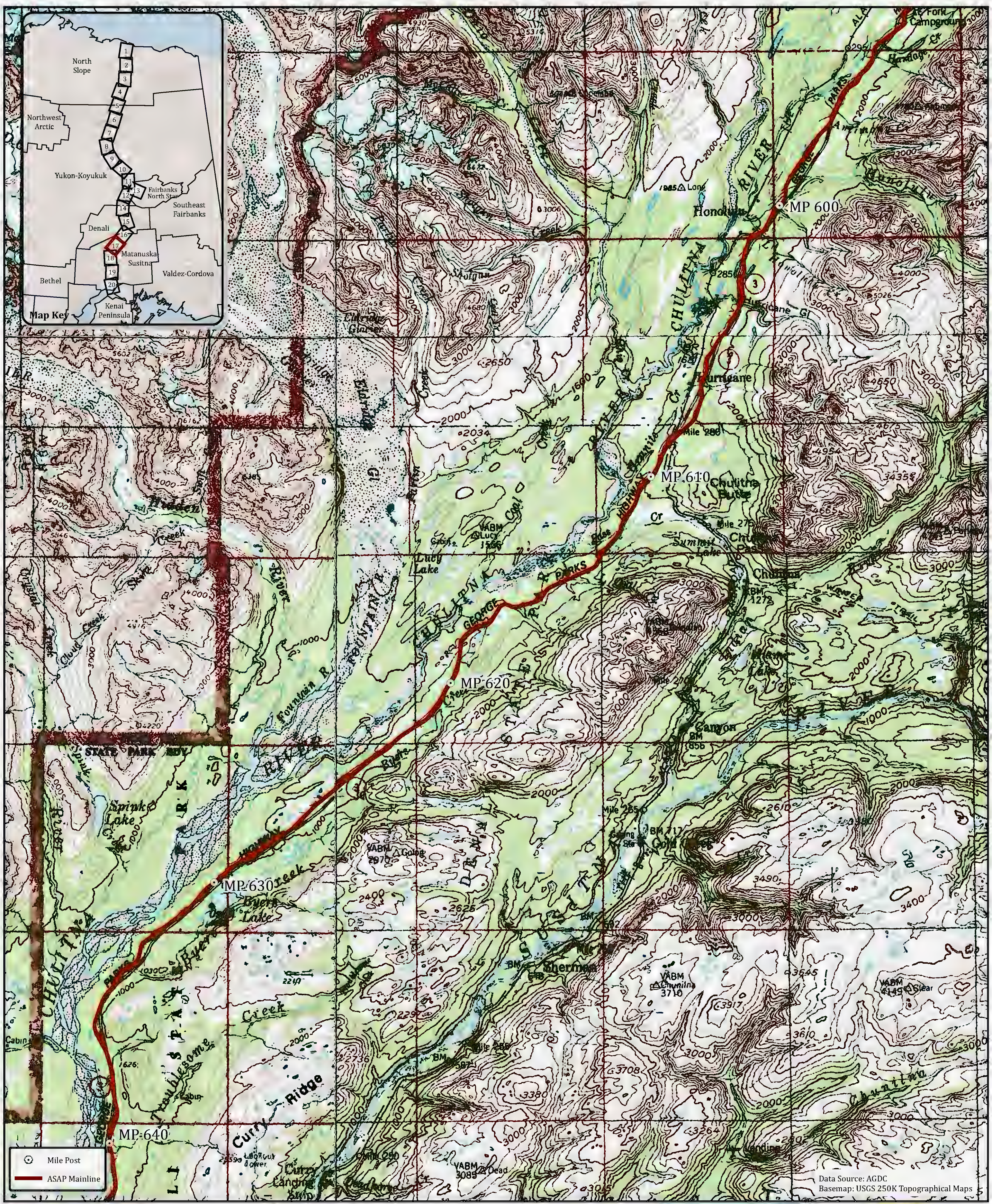

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Alaska Stand Alone Gas Pipeline

Proposed Project on USGS Topographical Maps

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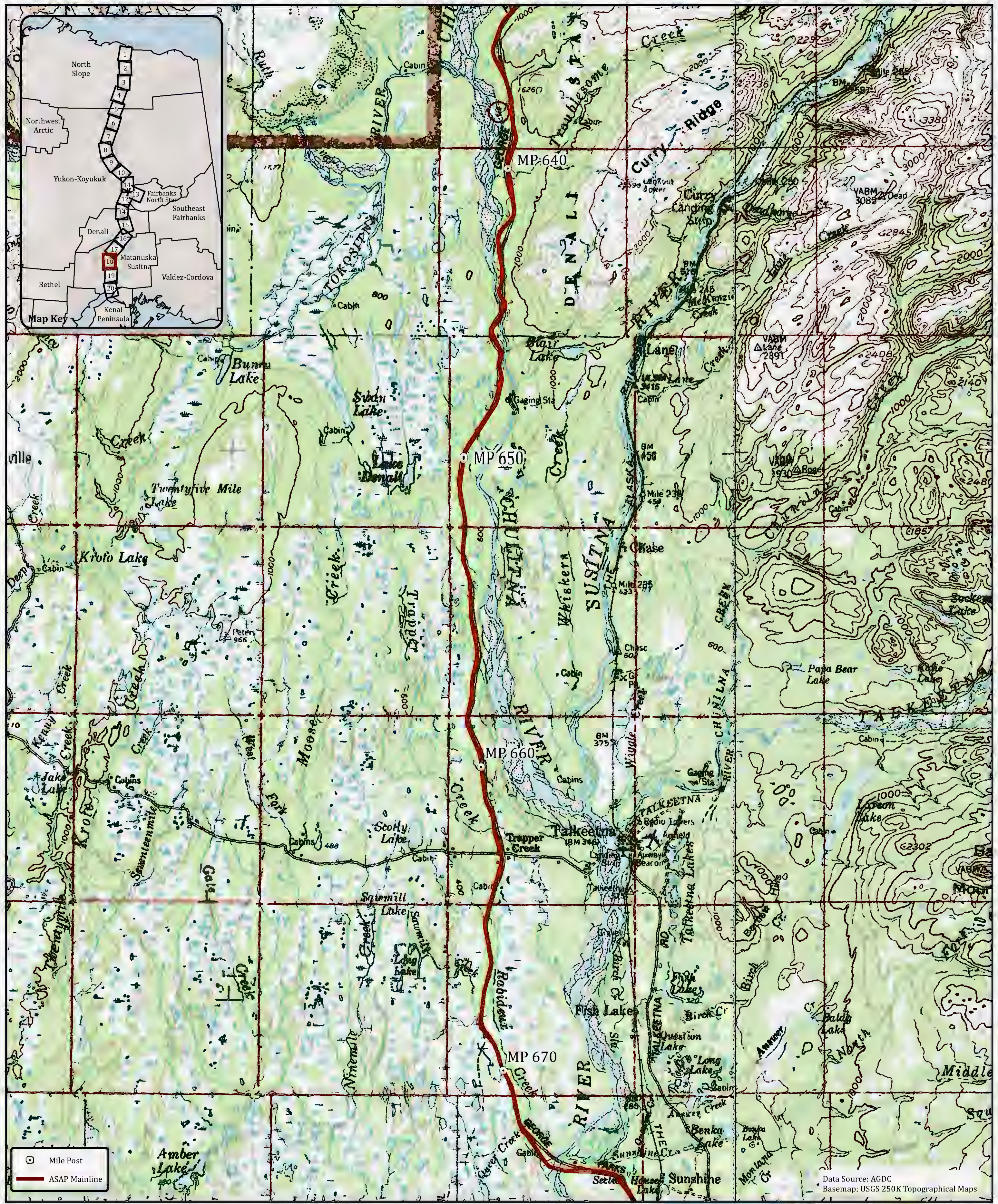

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Alaska Stand Alone Gas Pipeline

Proposed Project on USGS Topographical Maps

Page 18 of 20

0 2.5 5 Miles

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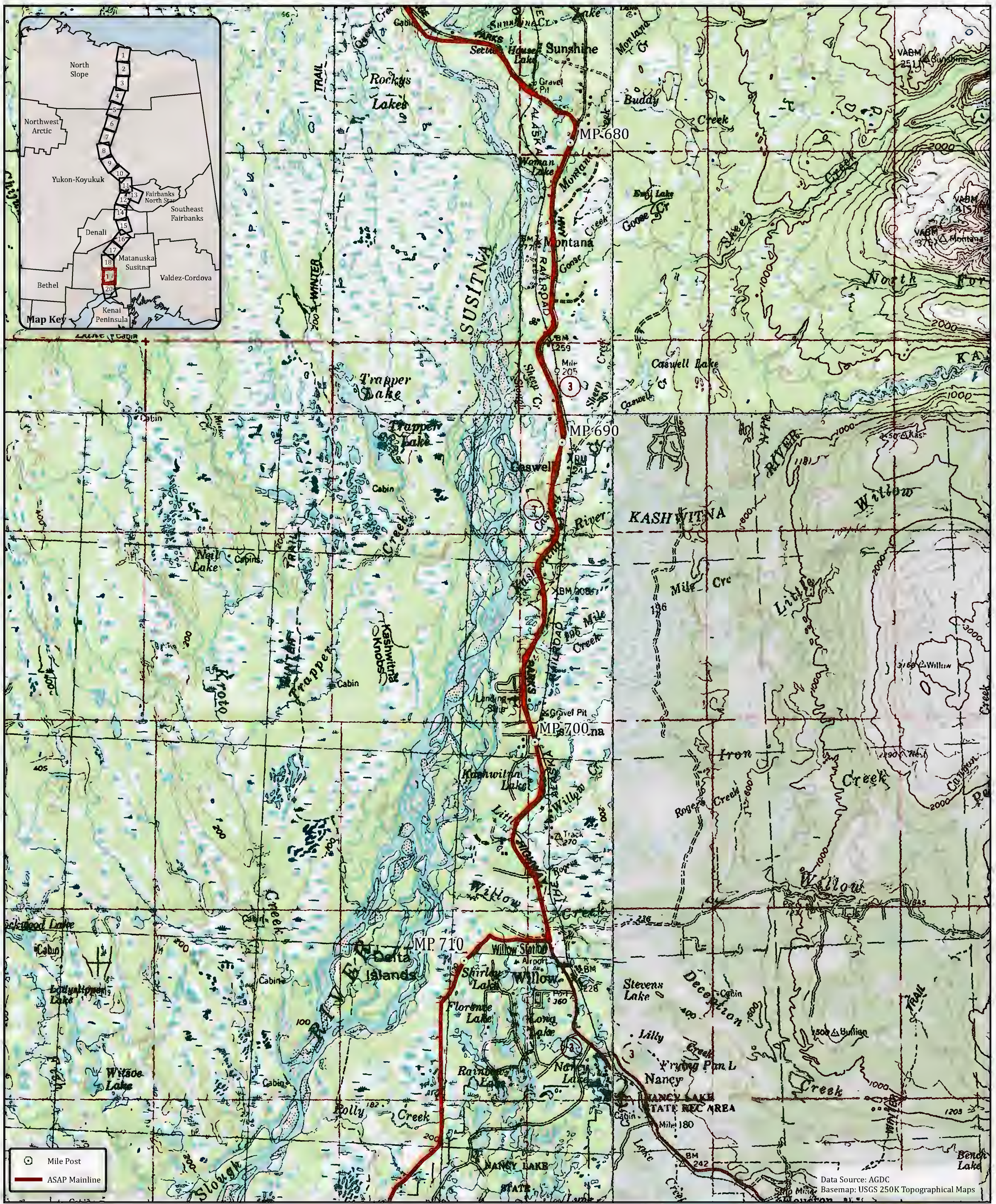

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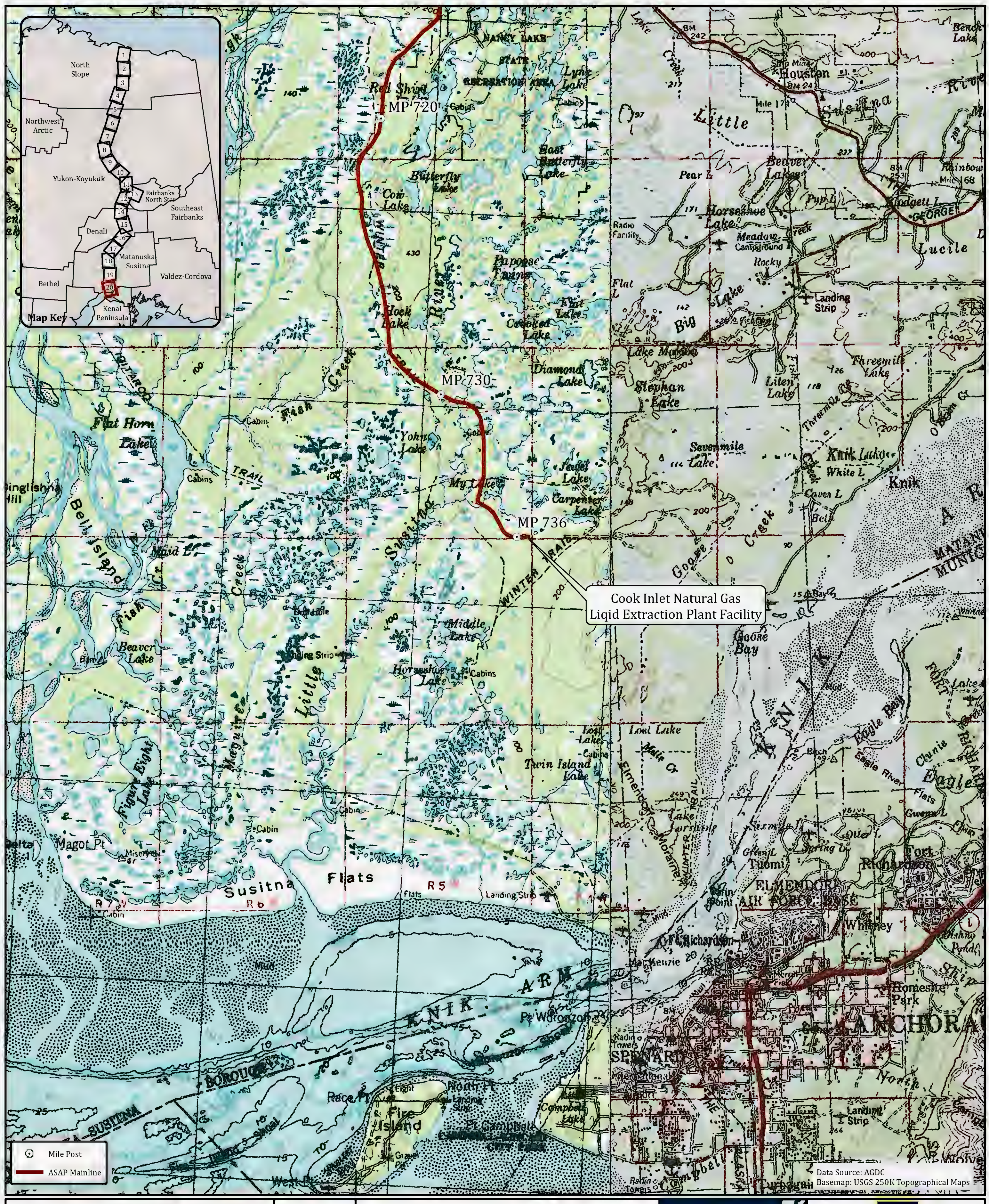

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Alaska Stand Alone Gas Pipeline

Proposed Project on USGS Topographical Maps

Page 20 of 20

0 2.5 5 Miles

October 2011

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Appendix D

Access Roads

Appendix D: Access Roads

ID 1	ID 2	Status	Type	Material	Route Name	Longitude	Latitude	Length (feet)	Surface	Comments	Mile Post
Mainline Access Roads											
1	Access_Roads_ASAP_V5.1	New	Permanent	Gravel	James Dalton Hwy	-149.86217321200	67.49683313240	258.86	108.26	In-State Compressor Station #4	70.2
2	Access_Roads_ASAP_V5.2	New	Permanent	Gravel	James Dalton Hwy	-150.68403878700	66.79740301330	3851.43	2827.85	In-State Compressor Station #5	285.7
3	Access_Roads_ASAP_V5.3	New	Permanent	Gravel	Parks Hwy	-148.94875154200	64.66355055700	309.34	127.94	In-State Compressor Station #8	466.2
4	Access_Roads_ASAP_V5.4	New	Permanent	Gravel	Spine Rd.	-148.60726820100	70.24552553920	2430.87	975.37	Laydown yard 1	5.5
5	Access_Roads_ASAP_V5.5	New	Permanent	Gravel	James Dalton Hwy	-148.59348333800	70.05538663230	506.43	225.20	Block Valve 1	20
6	Access_Roads_ASAP_V5.6	New	Temporary	Ice	James Dalton Hwy	-148.77794928500	69.91970535420	67.70	31.14		30.6
7	Access_Roads_ASAP_V5.7	New	Temporary	Ice	James Dalton Hwy	-148.76484544800	69.85284320040	102.72	47.36		35.4
8	Access_Roads_ASAP_V5.8	New	Permanent	Gravel	James Dalton Hwy	-148.72250034300	69.79115867200	48.97	22.53	Block Valve 2	40
9	Access_Roads_ASAP_V5.9	New	Permanent	Gravel	James Dalton Hwy	-148.70611081000	69.76782594090	84.79	39.00		41.6
10	Access_Roads_ASAP_V5.10	New	Permanent	Gravel	James Dalton Hwy	-148.70960493900	69.72112012470	100.44	81.47	Laydown yard 2	45
11	Access_Roads_ASAP_V5.11	New	Temporary	Ice	James Dalton Hwy	-148.70641948900	69.67428098810	91.45	42.07		48.3
12	Access_Roads_ASAP_V5.12	New	Temporary	Ice	James Dalton Hwy	-148.64414781200	69.60527240700	157.69	44.45		53.4
13	Access_Roads_ASAP_V5.13	New	Permanent	Gravel	James Dalton Hwy	-148.57221458700	69.49898173680	143.53	63.28	In-State Compressor Station #1	60.9
14	Access_Roads_ASAP_V5.14	New	Permanent	Gravel	James Dalton Hwy	-148.55790386600	69.47888820500	93.33	42.93		62.4
15	Access_Roads_ASAP_V5.15	New	Temporary	Ice	James Dalton Hwy	-148.65697449100	69.42702087350	389.01	80.39		67.1
16	Access_Roads_ASAP_V5.16	New	Temporary	Ice	James Dalton Hwy	-148.73744758800	69.39261778770	1443.66	579.26		70.2
17	Access_Roads_ASAP_V5.17	Existing	Permanent	Gravel	James Dalton Hwy	-148.76807651500	69.25848149990	142.95	63.05	Block Valve 3	80.2
18	Access_Roads_ASAP_V5.18	New	Temporary	Gravel	James Dalton Hwy	-148.83101645600	69.15386964040	56.34	25.92		87.7
19	Access_Roads_ASAP_V5.19	Existing	Temporary	Gravel	James Dalton Hwy	-148.83056528300	69.09686620320	70.25	32.32		91.9
20	Access_Roads_ASAP_V5.20	New	Permanent	Gravel	James Dalton Hwy	-148.81718510700	69.06811863920	298.07	123.55		94.1
21	Access_Roads_ASAP_V5.21	Existing	Permanent	Gravel	James Dalton Hwy	-148.82127031900	69.01037639440	134.38	59.71	Block Valve 4	98.7
22	Access_Roads_ASAP_V5.22	Existing	Permanent	Gravel	James Dalton Hwy	-148.86871290300	68.89919874980	776.60	311.61		106.7
23	Access_Roads_ASAP_V5.23	Existing	Permanent	Gravel	James Dalton Hwy	-148.86238737300	68.87444898890	209.29	88.92		108.5
24	Access_Roads_ASAP_V5.24	Existing	Permanent	Gravel	James Dalton Hwy	-148.82211170500	68.84267179310	256.41	108.74	APL Pump Station #3	110.9
25	Access_Roads_ASAP_V5.25	New	Permanent	Gravel	James Dalton Hwy	-148.85370432600	68.79231301570	1475.48	592.02	In-State Compressor Station #2	114.6
26	Access_Roads_ASAP_V5.26	New	Temporary	Gravel	James Dalton Hwy	-149.05246969600	68.70239658350	61.56	28.32		123

Appendix D: Access Roads

ID 1	ID 2	Status	Type	Material	Route Name	Longitude	Latitude	Length (feet)	Surface	Comments	Mile Post
27	Access_Roads_ASAP_V5.27	New	Permanent	Gravel	James Dalton Hwy	-149.39016592100	68.64653979870	73.30	33.72	Block Valve 5	133
28	Access_Roads_ASAP_V5.28	New	Permanent	Gravel	James Dalton Hwy	-149.53424561400	68.60414033600	163.91	70.30		138
29	Access_Roads_ASAP_V5.29	New	Temporary	Gravel	James Dalton Hwy	-149.48060886100	68.54293242700	81.45	37.47		142.6
30	Access_Roads_ASAP_V5.30	New	Permanent	Gravel	James Dalton Hwy	-149.47328502400	68.53019350100	76.20	35.05		143.6
31	Access_Roads_ASAP_V5.31	Existing	Permanent	Gravel	James Dalton Hwy	-149.46160518900	68.49602789500	101.46	46.87	Galbraith Lake access road	146
32	Access_Roads_ASAP_V5.32	New	Permanent	Gravel	James Dalton Hwy	-149.44834702700	68.48679887000	80.22	66.18	Laydown yard 5	146.8
33	Access_Roads_ASAP_V5.33	New	Temporary	Gravel	James Dalton Hwy	-149.37895115400	68.45795606790	107.73	49.32	Block Valve 6	149.4
34	Access_Roads_ASAP_V5.34	New	Permanent	Gravel	James Dalton Hwy	-149.32190436700	68.39924084740	98.94	56.80	In-State Compressor Station #3	154
35	Access_Roads_ASAP_V5.35	Existing	Permanent	Gravel	James Dalton Hwy	-149.36009499700	68.30389369810	48.32	22.23		160.8
36	Access_Roads_ASAP_V5.36	New	Permanent	Gravel	James Dalton Hwy	-149.40761615400	68.22641692880	212.25	90.08		166.8
37	Access_Roads_ASAP_V5.37	New	Permanent	Gravel	James Dalton Hwy	-149.43280262600	68.17542715390	84.39	38.82	Block Valve 7	170.7
38	Access_Roads_ASAP_V5.38	New	Permanent	Gravel	James Dalton Hwy	-149.53703986800	68.11336502230	1169.88	469.41		176.5
39	Access_Roads_ASAP_V5.39	New	Temporary	Gravel	James Dalton Hwy	-149.65923875700	68.03519271520	138.93	61.48		183.5
40	Access_Roads_ASAP_V5.40	New	Permanent	Gravel	James Dalton Hwy	-149.74385143800	68.00303784700	109.16	49.87	Block Valve 8	187
41	Access_Roads_ASAP_V5.41	New	Temporary	Gravel	James Dalton Hwy	-149.82481059400	67.93061306450	92.47	42.54		192.7
42	Access_Roads_ASAP_V5.42	New	Permanent	Gravel	James Dalton Hwy	-149.82349182400	67.92321501860	40.26	18.52		193.2
43	Access_Roads_ASAP_V5.43	Existing	Permanent	Gravel	James Dalton Hwy	-149.80627893800	67.79223447790	268.72	112.10		202.6
44	Access_Roads_ASAP_V5.44	New	Permanent	Gravel	James Dalton Hwy	-149.75346837500	67.73878380630	266.60	111.28	Block Valve 9	206.6
45	Access_Roads_ASAP_V5.45	New	Permanent	Gravel	James Dalton Hwy	-149.74166572500	67.71683597360	253.64	106.22		208.2
46	Access_Roads_ASAP_V5.46	New	Permanent	Gravel	James Dalton Hwy	-149.72568192100	67.68391893430	62.40	28.71		210.5
47	Access_Roads_ASAP_V5.47	New	Temporary	Gravel	James Dalton Hwy	-149.72994547000	67.64811752640	67.45	31.03		213.2
48	Access_Roads_ASAP_V5.48	New	Temporary	Gravel	James Dalton Hwy	-149.78766750200	67.62254272210	334.14	273.81	New access road to Extra temporary workspace, aded 3/30/10	215.7
49	Access_Roads_ASAP_V5.49	New	Temporary	Gravel	James Dalton Hwy	-149.96592580700	67.46918599540	59.25	38.89		228.6
50	Access_Roads_ASAP_V5.50	New	Permanent	Gravel	James Dalton Hwy	-150.16835132700	67.27432549060	55.23	26.47	Block Valve 10	244.6
51	Access_Roads_ASAP_V5.51	New	Temporary	Gravel	James Dalton Hwy	-150.30231395300	67.18126633980	216.79	56.33		252.7
52	Access_Roads_ASAP_V5.52	Existing	Permanent	Gravel	James Dalton Hwy	-150.35688897400	67.14120330750	5299.34	2126.32		256.9

ID 1	ID 2	Status	Type	Material	Route Name	Longitude	Latitude	Length (feet)	Surface	Comments	Mile Post
53	Access_Roads_ASAP_V5.53	New	Permanent	Gravel	James Dalton Hwy	-150.34463558400	67.05820689540	79.39	19.36	Block Valve 11	262
54	Access_Roads_ASAP_V5.54	Existing	Permanent	Gravel	James Dalton Hwy	-150.30151516300	66.99243981750	65.50	30.13		267.4
55	Access_Roads_ASAP_V5.55	New	Temporary	Gravel	James Dalton Hwy	-150.47972501300	66.89743039940	208.60	88.65		275.9
56	Access_Roads_ASAP_V5.56	Existing	Temporary	Gravel	James Dalton Hwy	-150.68322369900	66.74733819060	5925.65	847.42	MP and AR edited 2/22/10, Access road length cut short due to existing road	288.9
57	Access_Roads_ASAP_V5.57	Existing	Permanent	Gravel	James Dalton Hwy	-150.66691793000	66.71713746370	1434.31	575.51		290.8
58	Access_Roads_ASAP_V5.58	Existing	Permanent	Gravel	James Dalton Hwy	-150.65948523000	66.68584618080	1987.00	797.27		293.5
59	Access_Roads_ASAP_V5.59	Existing	Permanent	Gravel	James Dalton Hwy	-150.66188158200	66.66573741560	666.02	267.24		294.8
60	Access_Roads_ASAP_V5.60	Existing	Permanent	Gravel	James Dalton Hwy	-150.66669764500	66.65791012880	1671.27	670.58		295.2
61	Access_Roads_ASAP_V5.61	Existing	Permanent	Gravel	James Dalton Hwy	-150.67747905000	66.62995824850	950.35	381.32		297.4
62	Access_Roads_ASAP_V5.62	Existing	Permanent	Gravel	James Dalton Hwy	-150.76097180700	66.58392530910	9985.24	2542.27	Field verify if we can cross TAPS, Access road length cut short due to existing road	300.9
63	Access_Roads_ASAP_V5.63	New	Permanent	Gravel	James Dalton Hwy	-150.72528922900	66.53422636200	497.38	201.28	Block Valve 13	304.5
64	Access_Roads_ASAP_V5.64	New	Temporary	Gravel	James Dalton Hwy	-150.65463493100	66.46668605390	135.61	62.16		309.9
65	Access_Roads_ASAP_V5.65	New	Permanent	Gravel	James Dalton Hwy	-150.52033131300	66.39715976260	50.92	23.42		316.1
66	Access_Roads_ASAP_V5.66	Existing	Permenant	Gravel	James Dalton Hwy	-150.40044073400	66.30546285480	52.50	24.15	Block Valve 14	323.6
67	Access_Roads_ASAP_V5.67	Existing	Temporary	Gravel	James Dalton Hwy	-150.19433475400	66.15995226230	67.80	45.45		335.5
68	Access_Roads_ASAP_V5.68	New	Permanent	Gravel	James Dalton Hwy	-150.13554080900	66.03700615920	82.82	38.10	In-State Compressor Station #6	344.6
69	Access_Roads_ASAP_V5.69	Existing	Permanent	Gravel	James Dalton Hwy	-150.08733233600	66.00884308900	1846.02	740.70		347.4
70	Access_Roads_ASAP_V5.70	Existing	Permanent	Gravel	James Dalton Hwy	-149.86751187700	65.93770689650	2888.94	436.47	Laydown Yard 9, footprint added 2/17/10, MP and AR edited 2/22/10	355.7
71	Access_Roads_ASAP_V5.71	New	Permanent	Gravel	James Dalton Hwy	-149.73100394300	65.85613473660	1169.48	469.25		362.7
72	Access_Roads_ASAP_V5.72	New	Permanent	Gravel	James Dalton Hwy	-149.71428504700	65.84970471490	78.71	36.21	Block Valve 15	363.5
73	Access_Roads_ASAP_V5.73	New	Permanent	Gravel	James Dalton Hwy	-149.64863474100	65.83607942880	1547.81	646.86		365.6
74	Access_Roads_ASAP_V5.74	Existing	Permanent	Gravel	James Dalton Hwy	-149.57073869500	65.82128108040	523.70	211.54	existing road is 25 feet wide, will need to be widened	368
75	Access_Roads_ASAP_V5.75	Existing	Temporary	Gravel	James Dalton Hwy	-149.43934540600	65.78442526960	759.01	304.55		372.7

Appendix D: Access Roads

ID 1	ID 2	Status	Type	Material	Route Name	Longitude	Latitude	Length (feet)	Surface	Comments	Mile Post
76	Access_Roads_ASAP_V5.76	New	Permanent	Gravel	James Dalton Hwy	-149.31212241000	65.73552527210	259.52	108.51		378.8
77	Access_Roads_ASAP_V5.77	Existing	Permanent	Gravel	James Dalton Hwy	-149.17930678000	65.70581594300	1072.30	430.25	Block Valve 16	382.5
78	Access_Roads_ASAP_V5.78	Existing	Permanent	Gravel	James Dalton Hwy	-149.09540132500	65.68738266410	229.79	96.92		385.2
79	Access_Roads_ASAP_V5.79	Existing	Permenant	Gravel	James Dalton Hwy	-149.06161474800	65.66745890720	5092.79	2043.45		386.9
80	Access_Roads_ASAP_V5.80	New	Permanent	Gravel	James Dalton Hwy	-149.03340381500	65.64474326040	659.96	264.80		388.8
81	Access_Roads_ASAP_V5.81	Existing	Permanent	Gravel	James Dalton Hwy	-148.80793435700	65.51804475220	3329.34	1335.87	In-State Compressor Station #7	399.9
82	Access_Roads_ASAP_V5.82	New	Permanent	Gravel	Elliot Hwy	-148.63902129100	65.46862600060	586.77	279.65	Laydown yard 10	406.1
83	Access_Roads_ASAP_V5.83	New	Temporary	Gravel	Elliot Hwy	-148.54320625100	65.37728471740	16920.66	6789.47	Wilber Creek Extention Road	412.3
84	Access_Roads_ASAP_V5.84	New	Permanent	Gravel	Elliot Hwy	-148.66541129900	65.31933607970	11619.58	4662.27	Block Valve 17	416.8
85	Access_Roads_ASAP_V5.85	New	Permanent	Gravel	Elliot Hwy	-148.14042244600	65.21696600890	111705.59	22647.42	Block Valve 18	434.6
86	Access_Roads_ASAP_V5.86	New	Permanent	Gravel	Murphy Dome Rd	-148.20714528300	64.90999182720	108094.77	6567.54	AR- Murphy Dome Road, Status, Access road length cut short due to existing road	441.7
87	Access_Roads_ASAP_V5.87	New	Permanent	Gravel	Sled Road	-148.70813716900	64.88788577720	259.71	108.59		447.8
88	Access_Roads_ASAP_V5.88	New	Permanent	Gravel	Parks Hwy	-148.93446499300	64.66915990000	43642.33	16490.92		458.1
89	Access_Roads_ASAP_V5.89	Existing	Temporary	Gravel	Parks Hwy	-149.10118796600	64.56346789540	288.20	119.70		475.7
90	Access_Roads_ASAP_V5.90	Existing	Temporary	Gravel	Parks Hwy	-149.27993905200	64.21826673510	395.00	161.35		501.3
91	Access_Roads_ASAP_V5.91	New	Permanent	Gravel	Parks Hwy	-149.29871001700	64.20550117680	42.58	19.59		502.6
92	Access_Roads_ASAP_V5.92	Existing	Permanent	Gravel	Parks Hwy	-149.22692910900	64.09244931730	82.15	34.64	Block Valve 22	511
93	Access_Roads_ASAP_V5.93	New	Permanent	Gravel	Parks Hwy	-149.12974100200	63.99333930390	146.17	64.30	In-State Compressor Station #9	518.8
94	Access_Roads_ASAP_V5.94	Existing	Temporary	Gravel	Parks Hwy	-149.10570783600	63.93652592690	78.18	35.96		523.1
95	Access_Roads_ASAP_V5.95	Existing	Temporary	Gravel	Parks Hwy	-149.10049640800	63.93389368150	172.06	74.40	Existing road is 13 feet wide	523.3
96	Access_Roads_ASAP_V5.96	New	Permanent	Gravel	Parks Hwy	-149.02290382500	63.86793904750	188.66	137.74	Laydown yard 11	528.7
97	Access_Roads_ASAP_V5.97	Existing	Permanent	Gravel	Parks Hwy	-148.99007423100	63.82299536440	58.66	26.98	Existing road is 30' wide	532.1
98	Access_Roads_ASAP_V5.98	New	Permanent	Gravel	Parks Hwy	-148.93587570200	63.80363347220	1331.93	299.18	Access road to Nenana xing at rex, crossing the RR tracks, added 3/30/10	534.4
99	Access_Roads_ASAP_V5.99	New	Permanent	Gravel	Parks Hwy	-148.92154838500	63.79326661560	2829.71	1305.53	Access road to Nenana River at Rex, added	534.7

ID 1	ID 2	Status	Type	Material	Route Name	Longitude	Latitude	Length (feet)	Surface	Comments	Mile Post
										3/30/10	
100	Access_Roads_ASAP_V5.100	New	Permanent	Gravel	Parks Hwy	-148.89896318600	63.75264935170	12.51	5.76	Block Valve 23	538.3
101	Access_Roads_ASAP_V5.101	New	Permanent	Gravel	Parks Hwy	-148.77390958400	63.65173076930	4160.03	1665.38	New access road extension to the existing Yanert road, added 3/30/10	547.3
102	Access_Roads_ASAP_V5.102	New	Permanent	Gravel	Parks Hwy	-148.77771749000	63.60299097490	109.17	49.88		551.2
103	Access_Roads_ASAP_V5.103	New	Permanent	Gravel	Parks Hwy	-148.81393195000	63.50646077310	145.83	64.18	Block Valve 24	558.2
104	Access_Roads_ASAP_V5.104	Existing	Permanent	Gravel	Parks Hwy	-148.91250681700	63.38669858990	906.02	146.00	Laydown yard #11	568.1
105	Access_Roads_ASAP_V5.105	New	Permanent	Gravel	Parks Hwy	-148.96338020300	63.37445643670	119.17	53.78	In-State Compressor Station #10	570
106	Access_Roads_ASAP_V5.106	New	Permanent	Gravel	Parks Hwy	-149.33322882100	63.20296758430	44.09	20.28	Block Valve 25	587.6
107	Access_Roads_ASAP_V5.107	New	Temporary	Gravel	Parks Hwy	-149.52867794600	63.08043238400	243.63	94.42		598.4
108	Access_Roads_ASAP_V5.108	New	Temporary	Gravel	Parks Hwy	-149.59227953900	63.01308727620	173.44	75.22	South Bank Hurricane Gulch	603.7
109	Access_Roads_ASAP_V5.109	New	Permanent	Gravel	Parks Hwy	-149.60939344300	63.00006927360	31.11	14.31	Block Valve 26	604.8
110	Access_Roads_ASAP_V5.110	New	Temporary	Gravel	Parks Hwy	-149.88942600200	62.83922204410	70.53	87.24		620.2
111	Access_Roads_ASAP_V5.111	New	Permanent	Gravel	Parks Hwy	-149.92823227900	62.81941720730	84.51	27.35	Block Valve 27	622.1
112	Access_Roads_ASAP_V5.112	New	Temporary	Gravel	Parks Hwy	-150.00492406700	62.79139079820	99.06	69.64		625.2
113	Access_Roads_ASAP_V5.113	New	Temporary	Gravel	Parks Hwy	-150.12904069600	62.74755159530	100.01	60.86		630.2
114	Access_Roads_ASAP_V5.114	New	Temporary	Gravel	Parks Hwy	-150.22634160600	62.63543458010	202.95	43.38	In-State Compressor Station #11	639.7
115	Access_Roads_ASAP_V5.115	Existing	Permanent	Gravel	Parks Hwy	-150.23194084100	62.56643795160	111.49	50.78	AR North Chulitna River Bank, MP and AR edited 2/22/10	644.7
116	Access_Roads_ASAP_V5.116	Existing	Temporary	Gravel	Parks Hwy	-150.27548472800	62.48288492410	87.30	40.16		651.1
117	Access_Roads_ASAP_V5.117	New	Permanent	Gravel	Parks Hwy	-150.26378568800	62.42355549290	73.09	0.00		655.2
118	Access_Roads_ASAP_V5.118	New	Permanent	Gravel	Parks Hwy	-150.26640338000	62.37367423320	52.69	24.24	Block Valve 28	658.7
119	Access_Roads_ASAP_V5.119	Existing	Temporary	Gravel	Parks Hwy	-150.25226915100	62.35141567510	96.02	44.17		660.3
120	Access_Roads_ASAP_V5.120	Existing	Temporary	Gravel	Parks Hwy	-150.23270688800	62.22035492410	96.31	13.67		669.8
121	Access_Roads_ASAP_V5.121	New	Temporary	Gravel	Parks Hwy	-150.18361237500	62.17811972150	2127.72	853.73	North Susitna River bank	673.5
122	Access_Roads_ASAP_V5.122	New	Temporary	Gravel	Parks Hwy	-150.17087364200	62.17430785880	941.64	377.83	Length:335' Approx. New AR for the most part, ex road is 28" wide, 533 ft long	673.8

ID 1	ID 2	Status	Type	Material	Route Name	Longitude	Latitude	Length (feet)	Surface	Comments	Mile Post
123	Access_Roads_ASAP_V5.123	New	Permanent	Gravel	Parks Hwy	-150.13281302600	62.17085130180	115.25	52.25		675.2
124	Access_Roads_ASAP_V5.124	Existing	Permanent	Gravel	Parks Hwy	-150.06481258300	62.14266966790	97.40	21.70	Block Valve 29	678.3
125	Access_Roads_ASAP_V5.125	Existing	Temporary	Gravel	Parks Hwy	-150.04862353500	62.11946467060	109.04	49.82	Ex. road is 15' wide	680.4
126	Access_Roads_ASAP_V5.126	New	Temporary	Gravel	Parks Hwy	-150.05286955100	61.98398579380	66.26	46.78		690.2
127	Access_Roads_ASAP_V5.127	New	Permanent	Gravel	Parks Hwy	-150.08854601800	61.88515307910	33.90	15.60	Block Valve 30	697.5
128	Access_Roads_ASAP_V5.128	Existing	Temporary	Gravel	Parks Hwy	-150.07605803900	61.84490803630	163.18	70.94		700.4
129	Access_Roads_ASAP_V5.129	New	Permanent	Gravel	Parks Hwy	-150.18786990500	61.65788762380	10248.89	4112.29	Block Valve 31	716.9
130	Access_Roads_ASAP_V5.130	New	Permanent	Gravel	Parks Hwy	-149.26794919000	64.21907896250	17.77	8.17	Block Valve 21 New access road	501
131	Access_Roads_ASAP_V5.131	New	Permanent	Gravel	Parks Hwy	-149.08637291800	64.48016552130	857.97	0.00	Block Valve 20 Existing access road- No work required	481.6
132	Access_Roads_ASAP_V5.132	New	Permanent	Gravel	Parks Hwy	-148.78108453700	64.81309400610	21821.38	8797.70	Block Valve 18 Extension to an existing access road	449.5
133	Access_Roads_ASAP_V5.133	New	Permanent	Gravel	James Dalton Hwy	-150.40196930000	66.95497660460	101.44	46.86	Block Valve 12	271.2
					Fairbanks Lateral Access Roads						
1	Access_Roads_Fairbanks_v4.fid--2f7dc2d7_12ed9d98956_-3676	Existing	Permanent	Gravel	Parks Hwy	-148.58649568900	64.71541554060	42309.21	3982.90	AR-Old Nenana Hwy and Standard Creek Road, MP and AR edited 2/22/10	4.3
2	Access_Roads_Fairbanks_v4.fid--2f7dc2d7_12ed9d98956_-3675	Existing	Permanent	Gravel	Parks Hwy	-148.19958856300	64.79116182800	54267.72	0.00	AR-Parks Hwy 2nd Access Road, MP and AR edited 2/22/10	12.1
3	Access_Roads_Fairbanks_v4.fid--2f7dc2d7_12ed9d98956_-3674	Existing	Permanent	Gravel	Parks Hwy	-148.10696504500	64.92647118290	1434.58	0.00	Existing road	24.8
4	Access_Roads_Fairbanks_v4.fid--2f7dc2d7_12ed9d98956_-3673	Existing	Permanent	Gravel	Parks Hwy	-148.19311795500	64.89914910810	5328.76	0.00	Existing road	21.5
5	Access_Roads_Fairbanks_v4.fid--2f7dc2d7_12ed9d98956_-3672	Existing	Permanent	Gravel	Parks Hwy	-147.98529571100	64.92409246130	2031.11	0.00	Existing road	28.3

Appendix E

Stream Crossings Tables

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* [a,b,c,d]	Resident Fish** [e,f]
ST_1	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_2	Gas Conditioning Facility to Mile 540	Arctic	Putuligayuk R.	Artificial Path	TT	Winter 1	Y	Y
ST_3	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	TT	Winter 1	Y	
ST_4	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_5	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_6	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_7	Gas Conditioning Facility to Mile 540	Arctic	Low-life Cr.	Perennial Stream/River	open cut	Winter 1	N	Y
ST_8	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	Y
ST_9	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	Y
ST_10	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	Y
ST_11	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	Y
ST_12	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	Y
ST_13	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	Y
ST_14	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side channel	Perennial Stream/River	open cut	Winter 1	N	Y
ST_15	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_16	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_17	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_18	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_19	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_20	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	Y
ST_21	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	Y
ST_22	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* a,b,c,d	Resident Fish** e,f
ST_23	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_24	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N	
ST_25	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	Y
ST_26	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	Y
ST_27	Gas Conditioning Facility to Mile 540	Arctic	Spoiled Mary Cr	Perennial Stream/River	open cut	Winter 1	N	Y
ST_28	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	Y
ST_29	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_30	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_31	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 1	Y	
ST_32	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	TT	Winter 1	Y	
ST_33	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	TT	Winter 2	Y	Y
ST_34	Gas Conditioning Facility to Mile 540	Arctic	Lori Cr	Perennial Stream/River	open cut	Winter 2	N	Y
ST_35	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_36	Gas Conditioning Facility to Mile 540	Arctic	Stump Cr	Perennial Stream/River	open cut	Winter 2	N	Y
ST_37	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 2	N	Y
ST_38	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 2	N	Y
ST_39	Gas Conditioning Facility to Mile 540	Arctic	Arthur Cr	Perennial Stream/River	open cut	Winter 2	N	Y
ST_40	Gas Conditioning Facility to Mile 540	Arctic	Gustafson Gulch	Perennial Stream/River	open cut	Winter 2	N	Y
ST_41	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_42	Gas Conditioning Facility to Mile 540	Arctic	Polygon Cr	Perennial Stream/River	open cut	Winter 2	N	Y
ST_43	Gas Conditioning Facility to Mile 540	Arctic	Poison Pipe Cr	Perennial Stream/River	open cut	Winter 2	N	Y
ST_44	Gas Conditioning Facility to Mile 540	Arctic	Climb Cr	Perennial Stream/River	open cut	Winter 2	N	Y

Appendix E – Stream Crossings Tables

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* a,b,c,d	Resident Fish** e,f
ST_45	Gas Conditioning Facility to Mile 540	Arctic	Dennis Cr	Perennial Stream/River	open cut	Winter 2	N	Y
ST_46	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_47	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_48	Gas Conditioning Facility to Mile 540	Arctic	Unnamed	Perennial Stream/River	open cut	Winter 2	N	Y
ST_49	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_50	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_51	Gas Conditioning Facility to Mile 540	Arctic	Oksrukuyik Cr	Perennial Stream/River	open cut	Winter 2	N	Y
ST_52	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_53	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_54	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_55	Gas Conditioning Facility to Mile 540	Arctic	Toolik R.	Perennial Stream/River	open cut	Winter 2	N	Y
ST_56	Gas Conditioning Facility to Mile 540	Arctic	E. F. Kuparuk R	Perennial Stream/River	open cut	Winter 2	N	Y
ST_57	Gas Conditioning Facility to Mile 540	Arctic	Kuparuk R	Perennial Stream/River	TT	Winter 2	Y	Y
ST_58	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_59	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_60	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_61	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_62	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_63	Gas Conditioning Facility to Mile 540	Arctic	Terry Cr	Intermittent Stream/River	open cut	Winter 2	N	Y
ST_64	Gas Conditioning Facility to Mile 540	Arctic	Terry Cr	Intermittent Stream/River	open cut	Winter 2	N	Y
ST_65	Gas Conditioning Facility to Mile 540	Arctic	Mack Cr	Intermittent Stream/River	open cut	Winter 2	N	Y
ST_66	Gas Conditioning Facility to Mile 540	Arctic	Ed Cr	Intermittent Stream/River	open cut	Winter 2	N	Y

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* [a,b,c,d]	Resident Fish** [e,f]
ST_67	Gas Conditioning Facility to Mile 540	Arctic	Jill Cr	Intermittent Stream/River	open cut	Winter 2	N	Y
ST_68	Gas Conditioning Facility to Mile 540	Arctic	Galbraith L. trib	Artificial Path	open cut	Winter 2	N	Y
ST_69	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_70	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_71	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_72	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_73	Gas Conditioning Facility to Mile 540	Arctic	Atigun R.	Artificial Path	TT	Winter 2	N	Y
ST_74	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_75	Gas Conditioning Facility to Mile 540	Arctic	Tee Lake Outlet	Intermittent Stream/River	open cut	Winter 2	N	Y
ST_76	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_77	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_78	Gas Conditioning Facility to Mile 540	Arctic	Vanish/Holden Cr	Perennial Stream/River	open cut	Winter 2	N	Y
ST_79	Gas Conditioning Facility to Mile 540	Arctic	Mainline Spring Cr	Intermittent Stream/River	open cut	Winter 2	N	Y
ST_80	Gas Conditioning Facility to Mile 540	Arctic	Roche Moutonee Cr	Perennial Stream/River	open cut	Winter 2	N	Y
ST_81	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_82	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_83	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_84	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_85	Gas Conditioning Facility to Mile 540	Arctic	Waterhole Cr.	Intermittent Stream/River	open cut	Winter 2	N	Y
ST_86	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_87	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	Y
ST_88	Gas Conditioning Facility to Mile 540	Arctic	Tyler Cr	Perennial Stream/River	open cut	Winter 2	N	Y

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* a,b,c,d	Resident Fish** e,f
ST_89	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_90	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_91	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_92	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_93	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_94	Gas Conditioning Facility to Mile 540	Arctic	Atigun R. floodplain	Artificial Path	open cut	Summer 1	N	Y
ST_95	Gas Conditioning Facility to Mile 540	Arctic	Atigun R. floodplain	Perennial Stream/River	open cut	Summer 1	N	Y
ST_96	Gas Conditioning Facility to Mile 540	Arctic	Atigun R. floodplain	Perennial Stream/River	open cut	Summer 1	N	Y
ST_97	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_98	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_99	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_100	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Artificial Path	open cut	Summer 1	N	
ST_101	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_102	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_103	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_104	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Summer 2	N	
ST_106	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Summer 2	N	
ST_107	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 2	N	
ST_108	Gas Conditioning Facility to Mile 540	Interior	Unnamed	Perennial Stream/River	open cut	Summer 2	N	Y
ST_109	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 2	N	
ST_110	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 2	N	
ST_111	Gas Conditioning Facility to Mile 540	Interior	N.F. Chandalar R	Perennial Stream/River	open cut	Summer 2	N	Y

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* a,b,c,d	Resident Fish** e,f
ST_112	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Summer 2	N	
ST_113	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	Y
ST_114	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	Y
ST_115	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	Y
ST_116	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	Y
ST_117	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	Y
ST_118	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	Y
ST_119	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Intermittent Stream/River	open cut	Winter 1	N	Y
ST_120	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	Y
ST_121	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Artificial Path	open cut	Winter 1	N	Y
ST_122	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Artificial Path	open cut	Winter 1	N	Y
ST_123	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Artificial Path	open cut	Winter 1	N	Y
ST_124	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Artificial Path	open cut	Winter 1	N	Y
ST_125	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Artificial Path	open cut	Winter 1	N	Y
ST_126	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Artificial Path	open cut	Winter 1	N	Y
ST_127	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	Y
ST_128	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	Y
ST_129	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_130	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	Y
ST_131	Gas Conditioning Facility to Mile 540	Interior	Unnamed	Perennial Stream/River	open cut	Winter 1	N	Y
ST_132	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Intermittent Stream/River	open cut	Winter 1	N	Y
ST_133	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Intermittent Stream/River	open cut	Winter 1	N	Y

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* a,b,c,d	Resident Fish** e,f
ST_134	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	Y
ST_135	Gas Conditioning Facility to Mile 540	Interior	Nutirwik Cr	Artificial Path	open cut	Winter 1	N	Y
ST_136	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Intermittent Stream/River	open cut	Winter 1	N	Y
ST_137	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Intermittent Stream/River	open cut	Winter 1	N	Y
ST_138	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Intermittent Stream/River	open cut	Winter 1	N	Y
ST_139	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_140	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_141	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N	
ST_142	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_143	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N	
ST_144	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N	Y
ST_145	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_146	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_147	Gas Conditioning Facility to Mile 540	Interior	Snowden Cr	Perennial Stream/River	open cut	Winter 1	N	Y
ST_148	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N	
ST_149	Gas Conditioning Facility to Mile 540	Interior	Sahr's Slough	Intermittent Stream/River	open cut	Winter 1	N	Y
ST_150	Gas Conditioning Facility to Mile 540	Interior	Disaster Cr	Perennial Stream/River	open cut	Winter 1	N	Y
ST_151	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N	
ST_152	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N	
ST_153	Gas Conditioning Facility to Mile 540	Interior	Brockman Cr	Perennial Stream/River	open cut	Winter 1	N	Y
ST_154	Gas Conditioning Facility to Mile 540	Interior	Dietrich R	Artificial Path	open cut	Winter 1	N	Y
ST_155	Gas Conditioning Facility to Mile 540	Interior	Eva Cr	Perennial Stream/River	open cut	Winter 1	N	Y

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* a,b,c,d	Resident Fish** e,f
ST_156	Gas Conditioning Facility to Mile 540	Interior	MF Koyukuk R	Artificial Path	open cut	Winter 1	Y	Y
ST_157	Gas Conditioning Facility to Mile 540	Interior	WF Sukakpak Cr	Perennial Stream/River	open cut	Winter 1	N	Y
ST_158	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_159	Gas Conditioning Facility to Mile 540	Interior	Linda Cr	Perennial Stream/River	open cut	Winter 1	N	Y
ST_160	Gas Conditioning Facility to Mile 540	Interior	Gold Cr.	Perennial Stream/River	open cut	Winter 1	N	Y
ST_161	Gas Conditioning Facility to Mile 540	Interior	Sheep Cr	Perennial Stream/River	open cut	Winter 1	N	Y
ST_162	Gas Conditioning Facility to Mile 540	Interior	Wolf Pup Cr	Perennial Stream/River	open cut	Winter 1	N	Y
ST_163	Gas Conditioning Facility to Mile 540	Interior	Nugget Ct	Perennial Stream/River	open cut	Winter 1	N	Y
ST_164	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N	Y
ST_165	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N	
ST_166	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N	
ST_167	Gas Conditioning Facility to Mile 540	Interior	MF Koyukuk R	Perennial Stream/River	open cut	Winter 1	N	Y
ST_168	Gas Conditioning Facility to Mile 540	Interior	MF Koyukuk R	Artificial Path	open cut	Winter 1	Y	Y
ST_169	Gas Conditioning Facility to Mile 540	Interior	Hammond R	Artificial Path	open cut	Winter 1	Y	Y
ST_170	Gas Conditioning Facility to Mile 540	Interior	MF Koyukuk R	Perennial Stream/River	open cut	Winter 1	Y	Y
ST_171	Gas Conditioning Facility to Mile 540	Interior	Minnie Cr	Perennial Stream/River	open cut	Winter 1	Y	Y
ST_172	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N	
ST_173	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N	
ST_174	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N	
ST_175	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N	
ST_176	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N	
ST_177	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N	

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* a,b,c,d	Resident Fish** e,f
ST_178	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N	
ST_179	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N	
ST_180	Gas Conditioning Facility to Mile 540	Interior	Marion Cr	Perennial Stream/River	open cut	Winter 1	Y	Y
ST_181	Gas Conditioning Facility to Mile 540	Interior	Mary Angel Cr	Intermittent Stream/River	open cut	Winter 1	N	Y
ST_182	Gas Conditioning Facility to Mile 540	Interior	SR Mary Angle Cr	Intermittent Stream/River	open cut	Winter 1	N	Y
ST_183	Gas Conditioning Facility to Mile 540	Interior	Clara Cr	Perennial Stream/River	open cut	Winter 1	N	Y
ST_184	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_185	Gas Conditioning Facility to Mile 540	Interior	Slate Cr	Perennial Stream/River	open cut	Winter 1	Y	Y
ST_186	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N	
ST_187	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_188	Gas Conditioning Facility to Mile 540	Interior	Rosie Cr	Perennial Stream/River	open cut	Winter 2	Y	Y
ST_189	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_190	Gas Conditioning Facility to Mile 540	Interior	Jackson Slough	Perennial Stream/River	open cut	Winter 2	N	Y
ST_191	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_192	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	Y	Y
ST_193	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_194	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_195	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_196	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_197	Gas Conditioning Facility to Mile 540	Interior	Chapman Cr	Perennial Stream/River	open cut	Winter 2	N	Y
ST_198	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_199	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* a,b,c,d	Resident Fish** e,f
ST_200	Gas Conditioning Facility to Mile 540	Interior	SF Koyukuk R	Artificial Path	TT	Winter 2	Y	Y
ST_201	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_202	Gas Conditioning Facility to Mile 540	Interior	Aba-dabba Cr	Perennial Stream/River	open cut	Winter 2	N	Y
ST_203	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_204	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_205	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_206	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_207	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_208	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_209	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_210	Gas Conditioning Facility to Mile 540	Interior	Jim River	Artificial Path	open cut	Winter 2	Y	Y
ST_211	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_212	Gas Conditioning Facility to Mile 540	Interior	Douglas Cr	Perennial Stream/River	open cut	Winter 2	Y	Y
ST_213	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_214	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_215	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_216	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N	
ST_217	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_218	Gas Conditioning Facility to Mile 540	Interior	Prospect Cr	Perennial Stream/River	open cut	Summer 1	Y	Y
ST_219	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_220	Gas Conditioning Facility to Mile 540	Interior	Little Nasty Cr	Perennial Stream/River	open cut	Summer 1	N	Y
ST_221	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* [a,b,c,d]	Resident Fish** [e,f]
ST_222	Gas Conditioning Facility to Mile 540	Interior	NF Bonanza Cr	Perennial Stream/River	open cut	Summer 1	N	Y
ST_223	Gas Conditioning Facility to Mile 540	Interior	SF Bonanza Cr	Perennial Stream/River	open cut	Summer 1	N	Y
ST_224	Gas Conditioning Facility to Mile 540	Interior	Pung's Crossing Cr	Perennial Stream/River	open cut	Summer 1	N	Y
ST_225	Gas Conditioning Facility to Mile 540	Interior	Alder Mtn Cr	Perennial Stream/River	open cut	Summer 1	N	Y
ST_226	Gas Conditioning Facility to Mile 540	Interior	Fish Cr	Perennial Stream/River	open cut	Summer 1	N	Y
ST_227	Gas Conditioning Facility to Mile 540	Interior	MF Fish Cr	Perennial Stream/River	open cut	Summer 1	N	Y
ST_228	Gas Conditioning Facility to Mile 540	Interior	SF Fish Cr	Perennial Stream/River	open cut	Summer 1	N	Y
ST_229	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_230	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_231	Gas Conditioning Facility to Mile 540	Interior	Kanuti R	Artificial Path	open cut	Summer 1	N	Y
ST_232	Gas Conditioning Facility to Mile 540	Interior	Caribou Mtn. Cr	Perennial Stream/River	open cut	Summer 1	N	Y
ST_233	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_234	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_235	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_236	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_237	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_238	Gas Conditioning Facility to Mile 540	Interior	Finger Mtn Cr	Intermittent Stream/River	open cut	Summer 1	N	Y
ST_239	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_240	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_241	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_242	Gas Conditioning Facility to Mile 540	Interior	M Br WF Dall R	Perennial Stream/River	open cut	Summer 1	N	Y
ST_243	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* [a,b,c,d]	Resident Fish** [e,f]
ST_244	Gas Conditioning Facility to Mile 540	Interior	S Br wF Dall R	Perennial Stream/River	open cut	Summer 1	N	Y
ST_245	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_246	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_247	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_248	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_249	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_250	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_251	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_252	Gas Conditioning Facility to Mile 540	Interior	Fred Cr	Perennial Stream/River	open cut	Summer 1	N	Y
ST_253	Gas Conditioning Facility to Mile 540	Interior	NF Ray R	Perennial Stream/River	open cut	Summer 1	N	Y
ST_254	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_255	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_256	Gas Conditioning Facility to Mile 540	Interior	Ft. Hamlin Hills Cr	Perennial Stream/River	open cut	Summer 1	N	Y
ST_257	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Summer 1	N	
ST_258	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_259	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_260	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_261	Gas Conditioning Facility to Mile 540	Interior	Phelps Cr	Perennial Stream/River	open cut	Winter 2	N	Y
ST_262	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_263	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_264	Gas Conditioning Facility to Mile 540	Interior	Wood Chopper Cr	Perennial Stream/River	open cut	Winter 2	N	Y
ST_265	Gas Conditioning Facility to Mile 540	Interior	Burbot Cr	Perennial Stream/River	open cut	Winter 2	N	Y

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* a,b,c,d	Resident Fish** e,f
ST_266	Gas Conditioning Facility to Mile 540	Interior	Yukon R	Artificial Path	new bridge	Winter 2	Y	Y
ST_267	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_268	Gas Conditioning Facility to Mile 540	Interior	Isom Cr	Perennial Stream/River	open cut	Summer 1	N	Y
ST_269	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_270	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_271	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_272	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_273	Gas Conditioning Facility to Mile 540	Interior	Hot Cat Cr	Perennial Stream/River	open cut	Summer 1	N	Y
ST_274	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_275	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_276	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_277	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_278	Gas Conditioning Facility to Mile 540	Interior	Hess Cr	Artificial Path	open cut	Summer 1	N	Y
ST_279	Gas Conditioning Facility to Mile 540	Interior	Hess Cr	Perennial Stream/River	open cut	Summer 1	N	Y
ST_280	Gas Conditioning Facility to Mile 540	Interior	Erickson Cr	Perennial Stream/River	open cut	Summer 1	N	Y
ST_281	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_282	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_283	Gas Conditioning Facility to Mile 540	Interior	Lost Cr	Perennial Stream/River	open cut	Summer 1	N	Y
ST_284	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_285	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_286	Gas Conditioning Facility to Mile 540	Interior	Tolovana R	Perennial Stream/River	open cut	Winter 1	Y	Y
ST_287	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* a,b,c,d	Resident Fish** e,f
ST_288	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_289	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_290	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_291	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_292	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_293	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_294	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_295	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_296	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_297	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_298	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_299	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_300	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_301	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_302	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_303	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_304	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_305	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_306	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_307	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_308	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_309	Gas Conditioning Facility to Mile 540	Interior	Tatalina River	Perennial Stream/River	open cut	Winter 1	N	

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* a,b,c,d	Resident Fish** e,f
ST_310	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_311	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_312	Gas Conditioning Facility to Mile 540	Interior	Washington Creek	Perennial Stream/River	open cut	Winter 1	N	
ST_313	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	TT	Winter 1	N	
ST_314	Gas Conditioning Facility to Mile 540	Interior	Chatanika River	Artificial Path	TT	Winter 1	Y	
ST_315	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_316	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_317	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_318	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_319	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_320	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_321	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_322	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_323	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_324	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_325	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_326	Gas Conditioning Facility to Mile 540	Interior	Little Goldstream Creek	Perennial Stream/River	open cut	Winter 1	N	
ST_327	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_328	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_329	Gas Conditioning Facility to Mile 540	Interior	Tanana River	Artificial Path	TT	Winter 2	Y	
ST_330	Gas Conditioning Facility to Mile 540	Interior	Fish Creek	Perennial Stream/River	open cut	Winter 2	N	
ST_331	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* a,b,c,d	Resident Fish** e,f
ST_332	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_333	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_334	Gas Conditioning Facility to Mile 540	Interior	Julius Creek	Perennial Stream/River	open cut	Winter 2	N	
ST_335	Gas Conditioning Facility to Mile 540	Interior	Glacier Creek	Perennial Stream/River	open cut	Winter 2	N	Y
ST_336	Gas Conditioning Facility to Mile 540	Interior	Nenana River	Artificial Path	open cut	Winter 2	Y	
ST_337	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_338	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_339	Gas Conditioning Facility to Mile 540	Interior	Birch Creek	Perennial Stream/River	open cut	Winter 2	N	
ST_340	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_341	Gas Conditioning Facility to Mile 540	Interior	Bear Creek	Perennial Stream/River	open cut	Winter 2	Y	
ST_342	Gas Conditioning Facility to Mile 540	Interior	June Creek	Perennial Stream/River	open cut	Winter 2	Y	
ST_343	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_344	Gas Conditioning Facility to Mile 540	Interior	Rock Creek	Perennial Stream/River	open cut	Winter 2	N	
ST_345	Gas Conditioning Facility to Mile 540	Interior	Slate Creek	Perennial Stream/River	open cut	Winter 2	N	
ST_346	Gas Conditioning Facility to Mile 540	Interior	Little Panguingue Creek	Perennial Stream/River	open cut	Winter 2	Y	
ST_347	Gas Conditioning Facility to Mile 540	Interior	Panguingue Creek	Perennial Stream/River	open cut	Winter 2	Y	
ST_348	Gas Conditioning Facility to Mile 540	Interior	Dry Creek	Artificial Path	open cut	Winter 2	N	
ST_349	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	TT	Winter 2	N	
ST_350	Gas Conditioning Facility to Mile 540	Interior	Antler Creek	Perennial Stream/River	open cut	Summer 1	N	
ST_351	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_352	Gas Conditioning Facility to Mile 540	Interior	Nenana River	Artificial Path	open cut	Summer 1	Y	Y
ST_353	Gas Conditioning Facility to Mile 540	Interior	Coyote Creek	Perennial Stream/River	open cut	Summer 1	N	

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* a,b,c,d	Resident Fish** e,f
ST_354	Gas Conditioning Facility to Mile 540	Interior	Dragonfly Creek	Perennial Stream/River	open cut	Fall 1/Winter 2	N	
ST_355	Gas Conditioning Facility to Mile 540	Interior	Eagle Creek	Perennial Stream/River	open cut	Fall 1/Winter 2	N	
ST_356	Gas Conditioning Facility to Mile 540	Interior	Fox Creek	Perennial Stream/River	open cut	Fall 1/Winter 2	N	
ST_357	Gas Conditioning Facility to Mile 540	Interior	Grizzly Creek	Perennial Stream/River	open cut	Fall 1/Winter 2	N	
ST_358	Gas Conditioning Facility to Mile 540	Interior	Hornet Creek	Perennial Stream/River	open cut	Fall 1/Winter 2	N	
ST_359	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Fall 1/Winter 2	N	
ST_360	Gas Conditioning Facility to Mile 540	Interior	Junco Creek	Perennial Stream/River	open cut	Fall 1/Winter 2	N	
ST_361	Gas Conditioning Facility to Mile 540	Interior	Kingfisher Creek	Perennial Stream/River	open cut	Fall 1/Winter 2	N	
ST_362	Mile 540 to Mile 555	Interior	Name Unknown	Perennial Stream/River	open cut	Fall 1/Winter 2	N	
ST_363	Mile 540 to Mile 555	Interior	Montana Creek	Perennial Stream/River	open cut	Fall 1/Winter 2	N	
ST_364	Mile 540 to Mile 555	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_365	Mile 540 to Mile 555	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_366	Mile 540 to Mile 555	Interior	Yanert Fork	Artificial Path	open cut	Summer 1	N	Y
ST_367	Mile 540 to Mile 555	Interior	Carlo Creek	Perennial Stream/River	open cut	Summer 1	N	
ST_368	Mile 555 to Cook Inlet NGLEP Facility	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_369	Mile 555 to Cook Inlet NGLEP Facility	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_370	Mile 555 to Cook Inlet NGLEP Facility	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_371	Mile 555 to Cook Inlet NGLEP Facility	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* a,b,c,d	Resident Fish** e,f
ST_372	Mile 555 to Cook Inlet NGLEP Facility	Interior	Slime Creek	Perennial Stream/River	TT	Summer 1	N	
ST_373	Mile 555 to Cook Inlet NGLEP Facility	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_374	Mile 555 to Cook Inlet NGLEP Facility	Interior	Nenana River	Artificial Path	open cut	Summer 1	Y	
ST_375	Mile 555 to Cook Inlet NGLEP Facility	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_376	Mile 555 to Cook Inlet NGLEP Facility	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_377	Mile 555 to Cook Inlet NGLEP Facility	Interior	Jack River	Perennial Stream/River	TT	Summer 1	N	
ST_378	Mile 555 to Cook Inlet NGLEP Facility	Interior	Pass Creek	Perennial Stream/River	TT	Summer 1	N	
ST_379	Mile 555 to Cook Inlet NGLEP Facility	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	Y
ST_380	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Middle Fork Chulitna River	Artificial Path	TT	Summer 1	Y	
ST_381	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Fourth of July Creek	Perennial Stream/River	open cut	Summer 1	N	
ST_382	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	East Fork Chulitna River	Perennial Stream/River	TT	Summer 1	Y	
ST_383	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Hardage Creek	Perennial Stream/River	TT	Summer 1	Y-NOM	
ST_384	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_385	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Antimony Creek	Perennial Stream/River	TT	Summer 1	N	
ST_386	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Summer 1	N	
ST_387	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Honolulu Creek	Perennial Stream/River	open cut	Summer 1	Y	
ST_388	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Summer 1	Y-NOM	
ST_389	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Little Honolulu Creek	Perennial Stream/River	open cut	Summer 1	Y	
ST_390	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Hurricane Gulch	Perennial Stream/River	existing bridge	Winter 1	N	
ST_391	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Granite Creek	Perennial Stream/River	TT	Winter 1	Y	
ST_392	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Division Creek	Perennial Stream/River	open cut	Winter 1	Y	

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* a,b,c,d	Resident Fish** e,f
ST_393	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_394	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Pass Creek	Perennial Stream/River	TT	Winter 1	Y	Y
ST_395	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Little Coal Creek	Perennial Stream/River	existing bridge	Winter 1	Y	
ST_396	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	Y	
ST_397	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Horseshoe Creek	Perennial Stream/River	open cut	Winter 1	Y	
ST_398	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Byers Creek	Perennial Stream/River	TT	Winter 1	Y	
ST_399	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_400	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Troublesome Creek	Perennial Stream/River	TT	Winter 1	Y	
ST_401	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_402	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_403	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	Y-NOM	
ST_404	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_405	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_406	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Chulitna River	Artificial Path	existing bridge	Winter 1	Y	
ST_407	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	Y	Y
ST_408	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_409	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_410	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	Y	
ST_411	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	TT	Winter 1	Y	
ST_412	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	Y	Y
ST_413	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	TT	Winter 1	Y	
ST_414	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	Y	

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* a,b,c,d	Resident Fish** e,f
ST_415	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	TT	Winter 1	Y	
ST_416	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_417	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_418	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Trapper Creek	Perennial Stream/River	TT	Winter 1	Y	
ST_419	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	TT	Winter 1	Y	
ST_420	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	Y-NOM	
ST_421	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	Y-NOM	
ST_422	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Sawmill Cr	Perennial Stream/River	open cut	Winter 1	Y	Y
ST_423	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	Y	Y
ST_424	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 1	N	
ST_425	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Queer Cr	Perennial Stream/River	open cut	Winter 1	Y	Y
ST_426	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Rabideux Creek	Perennial Stream/River	TT	Winter 1	Y	
ST_427	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	TT	Winter 2	Y-NOM	
ST_428	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Susitna River	Artificial Path	TT	Winter 2	Y	
ST_429	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_430	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 2	Y	
ST_431	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Little Montana Creek	Perennial Stream/River	open cut	Winter 2	Y	
ST_432	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Montana Creek	Perennial Stream/River	TT	Winter 2	Y	
ST_433	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_434	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Goose Creek	Perennial Stream/River	open cut	Winter 2	Y	
ST_435	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 2	Y-NOM	
ST_436	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 2	Y	

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* a,b,c,d	Resident Fish** e,f
ST_437	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Sheep Creek	Perennial Stream/River	TT	Winter 2	Y	
ST_438	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Caswell Creek	Perennial Stream/River	open cut	Winter 2	Y	
ST_439	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_440	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Kashwitna River	Artificial Path	TT	Winter 2	Y	
ST_441	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Half Mile Creek	Perennial Stream/River	TT	Winter 2	Y	Y
ST_442	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Little Willow Creek	Perennial Stream/River	TT	Winter 2	Y	
ST_443	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_444	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Willow Creek	Artificial Path	TT	Winter 2	Y	
ST_445	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 2	Y	
ST_446	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	unnamed	Perennial Stream/River	open cut	Winter 2	Y	Y
ST_447	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Rolly Creek	Perennial Stream/River	TT	Winter 2	Y	Y
ST_448	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_449	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_450	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Fish Creek	Perennial Stream/River	TT	Winter 2	Y	
ST_451	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_452	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_453	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	open cut	Winter 2	N	
ST_454	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Little Susitna River	Artificial Path	TT	Winter 2	Y	
ST_455	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	TT	Winter 2	Y	
ST_456	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Perennial Stream/River	TT	Winter 2	Y	Y
ST_24_1	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Stream	open cut	Winter 1	N	
ST_19_1	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Stream	open cut	Winter 1	N	Y

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* a,b,c,d	Resident Fish** e,f
ST_17_2	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Stream	open cut	Winter 1	N	
ST_17_1	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Stream	open cut	Winter 1	N	
ST_14_1	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Stream	open cut	Winter 1	N	
ST_135_1	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Stream	open cut	Winter 1	N	Y
ST_135_2	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Stream	open cut	Winter 1	N	Y
ST_139_1	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 1	N	
ST_142_1	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 1	N	
ST_143_1	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 1	N	
ST_146_1	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 1	N	
ST_151_1	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 1	N	
ST_151_2	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 1	N	
ST_151_3	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 1	N	
ST_155_1	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 1	N	
ST_160_1	Gas Conditioning Facility to Mile 540	Interior	Cushing Cr	Stream	open cut	Winter 1	N	Y
ST_163_1	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 1	N	
ST_172_1	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 1	N	
ST_172_2	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 1	N	
ST_174_2	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 1	N	
ST_173_2	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 1	N	
ST_173_1	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 1	N	
ST_174_1	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 1	N	
ST_182_1	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 1	N	

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* [a,b,c,d]	Resident Fish** [e,f]
ST_189_1	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 2	N	
ST_189_2	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 2	N	
ST_189_3	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 2	N	
ST_199_1	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 2	N	
ST_200_1	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 2	N	
ST_203_1	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 2	N	
ST_203_2	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 2	N	
ST_60_1	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Stream	open cut	Winter 2	N	
ST_60_2	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Stream	open cut	Winter 2	N	
ST_70_1	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Stream	open cut	Winter 2	N	
ST_96_1	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Stream	open cut	Summer 1	N	
ST_99_1	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Stream	open cut	Summer 1	N	
ST_443_1	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Stream	open cut	Winter 2	N	
ST_276_1	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Summer 1	N	
ST_261_1	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 2	N	
ST_257_1	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Stream	open cut	Winter 2	N	
ST_105	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Perennial Stream/River	open cut	Summer 2	N	
ST_N2	Denali National Park Route Variation	Interior	Nenana River		unknown	Unknown	Y	
ST_N1	Denali National Park Route Variation	Interior	Nenana River		existing bridge	Unknown	Y	
ST_F1	Fairbanks Lateral	Interior	Goldstream Creek	Perennial Stream/River	Open cut	Summer 2	N	
ST_F2	Fairbanks Lateral	Interior	Unnamed	Perennial Stream/River	Open cut	Summer 2	N	
ST_F3	Fairbanks Lateral	Interior	Unnamed	Perennial Stream/River	Open cut	Summer 2	N	

TABLE E-1 Stream Crossings of the Proposed Project

Stream Crossing	Segment	Hydrological Region	Stream Name	Description	Cross Mode	Construction Season	Anadramous* a,b,c,d	Resident Fish** e,f
ST_F4	Fairbanks Lateral	Interior	Glacier Creek	Perennial Stream/River	Open cut	Summer 2	N	
ST_F5	Fairbanks Lateral	Interior	Standard Creek	Perennial Stream/River	Open cut	Summer 2	N	
ST_F6	Fairbanks Lateral	Interior	Unnamed	Perennial Stream/River	Open cut	Summer 2	N	
ST_F7	Fairbanks Lateral	Interior	Unnamed	Perennial Stream/River	Open cut	Summer 2	N	
ST_F8	Fairbanks Lateral	Interior	Unnamed	Perennial Stream/River	Open cut	Summer 2	N	
ST_F9	Fairbanks Lateral	Interior	Unnamed	Perennial Stream/River	Open cut	Summer 2	N	
ST_F10	Fairbanks Lateral	Interior	Unnamed	Perennial Stream/River	Open cut	Summer 2	N	
ST_F11	Fairbanks Lateral	Interior	Cache Creek	Perennial Stream/River	Open cut	Summer 2	N	
ST_F12	Fairbanks Lateral	Interior	Unnamed	Perennial Stream/River	Open cut	Summer 2	N	
ST_F13	Fairbanks Lateral	Interior	Lincoln Creek	Perennial Stream/River	Open cut	Summer 2	N	
ST_F14	Fairbanks Lateral	Interior	Unnamed	Perennial Stream/River	Open cut	Summer 2	N	
ST_F15	Fairbanks Lateral	Interior	Spinach Creek	Perennial Stream/River	Open cut	Summer 2	N	
ST_F16	Fairbanks Lateral	Interior	Unnamed	Perennial Stream/River	Open cut	Summer 2	N	
ST_F17	Fairbanks Lateral	Interior	Unnamed	Perennial Stream/River	Open cut	Summer 2	N	
ST_F18	Fairbanks Lateral	Interior	Moose Creek	Perennial Stream/River	Open cut	Summer 2	N	
ST_F19	Fairbanks Lateral	Interior	Goldstream Creek	Perennial Stream/River	Open cut	Summer 2	N	
ST_F20	Fairbanks Lateral	Interior	unnamed	Perennial Stream/River	Open cut	Summer 2	N	

Key: N=No, Y=Yes, Y-NOM= nominated anadromous stream, TT= Trenchless Technology.

*Streams that have been nominated as anadromous were considered anadromous. ** Resident fish data is incomplete.

[a] Johnson and Blanche 2010.

[b] Johnson et al. 2004.

[c] Johnson and Klein 2009.

[d] AGDC 2009.

[e] ADF&G 2011a.

[f] USBLM 2002.

TABLE E-2 Stream Crossings of the Proposed Project Known to Contain Anadromous Fish

Stream Crossing ID	Segment	Hydro Region	Waterbody Name	Construction Season	Crossing Mode	Anadromous	Anadromous Species and Life Stage
ST_002	Gas Conditioning Facility to Mile 540	Artic	Putuligayuk River	Winter 1	TT	Y	DVr, BCr
ST_003	Gas Conditioning Facility to Mile 540	Artic	Name Unknown	Winter 1	TT	Y	Unknown
ST_031	Gas Conditioning Facility to Mile 540	Artic	Name Unknown	Winter 1	open cut	Y	DVp
ST_032	Gas Conditioning Facility to Mile 540	Artic	Name Unknown	Winter 1	TT	Y	DVp
ST_033	Gas Conditioning Facility to Mile 540	Artic	Name Unknown	Winter 2	TT	Y	DVp
ST_057	Gas Conditioning Facility to Mile 540	Artic	Kuparuk River	Winter 2	TT	Y	Unknown
ST_156	Gas Conditioning Facility to Mile 540	Interior	Middle Fork Koyukuk River	Winter 1	open cut	Y	CHp
ST_168	Gas Conditioning Facility to Mile 540	Interior	Middle Fork Koyukuk River	Winter 1	open cut	Y	Kp, CHp,Wp
ST_169	Gas Conditioning Facility to Mile 540	Interior	Hammond River	Winter 1	open cut	Y	CHr, Kp
ST_170	Gas Conditioning Facility to Mile 540	Interior	Middle Fork Koyukuk River	Winter 1	open cut	Y	Kp, Wp, CHp
ST_171	Gas Conditioning Facility to Mile 540	Interior	Minnie Creek	Winter 1	open cut	Y	Kr
ST_180	Gas Conditioning Facility to Mile 540	Interior	Marion Creek	Winter 1	open cut	Y	Kr
ST_185	Gas Conditioning Facility to Mile 540	Interior	Slate Creek	Winter 1	open cut	Y	CHp, Kp
ST_188	Gas Conditioning Facility to Mile 540	Interior	Rosie Creek	Winter 2	open cut	Y	Kr
ST_192	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Winter 2	open cut	Y	Kr
ST_200	Gas Conditioning Facility to Mile 540	Interior	South Fork Koyukuk River	Winter 2	TT	Y	Ks, CHs, Wp, Kr
ST_210	Gas Conditioning Facility to Mile 540	Interior	Jim River	Winter 2	open cut	Y	CHs, Ks
ST_212	Gas Conditioning Facility to Mile 540	Interior	Douglas Creek	Winter 2	open cut	Y	Kr
ST_218	Gas Conditioning Facility to Mile 540	Interior	Prospect Creek	Summer 1	open cut	Y	Kr
ST_266	Gas Conditioning Facility to Mile 540	Interior	Yukon River	Winter 2	new bridge	Y	CHp, COp, Kp
ST_286	Gas Conditioning Facility to Mile 540	Interior	East Fork Tolovana River	Winter 1	open cut	Y	Unknown
ST_314	Gas Conditioning Facility to Mile 540	Interior	Chatanika River	Winter 1	TT	Y	Kp, COp, CHp

TABLE E-2 Stream Crossings of the Proposed Project Known to Contain Anadromous Fish

Stream Crossing ID	Segment	Hydro Region	Waterbody Name	Construction Season	Crossing Mode	Anadromous	Anadromous Species and Life Stage
ST_329	Gas Conditioning Facility to Mile 540	Interior	Tanana River	Winter 2	TT	Y	CHp, COp, Kp
ST_336	Gas Conditioning Facility to Mile 540	Interior	Nenana River	Winter 2	open cut	Y	CHp, COp, Kp
ST_341	Gas Conditioning Facility to Mile 540	Interior	Bear Creek	Winter 2	open cut	Y	Unknown
ST_342	Gas Conditioning Facility to Mile 540	Interior	June Creek	Winter 2	open cut	Y	COs
ST_346	Gas Conditioning Facility to Mile 540	Interior	Little Panguingue Creek	Winter 2	open cut	Y	Unknown
ST_347	Gas Conditioning Facility to Mile 540	Interior	Panguingue Creek	Winter 2	open cut	Y	Cor
ST_352	Gas Conditioning Facility to Mile 540	Interior	Nenana River	Summer 1	open cut	Y	CHp, COp, Kp
ST_374	Mile 555 to Cook Inlet NGLEP Facility	Interior	Nenana River	Summer 1	open cut	Y	CHp, COp, Kp
ST_380	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Middle Fork Chulitna River	Summer 1	TT	Y	Kr, Ks, COs
ST_382	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	East Fork Chulitna River	Summer 1	TT	Y	COp, Ks
ST_383	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Hardage Creek	Summer 1	TT	Y-NOM	Unknown
ST_387	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Honolulu Creek	Summer 1	open cut	Y	COpr, Ks
ST_388	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Summer 1	open cut	Y-NOM	Unknown
ST_389	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Little Honolulu Creek	Summer 1	open cut	Y	Ks
ST_391	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Granite Creek	Winter 1	TT	Y	Unknown
ST_392	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Division Creek	Winter 1	open cut	Y	Unknown
ST_394	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Pass Creek	Winter 1	TT	Y	Unknown
ST_395	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Little Coal Creek	Winter 1	existing bridge	Y	Unknown
ST_396	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 1	open cut	Y	Unknown
ST_397	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Horseshoe Creek	Winter 1	open cut	Y	Sp, Pp, Kp, COp, CHp
ST_398	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Byers Creek	Winter 1	TT	Y	Sp, Ks, COs, CHs
ST_400	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Troublesome Creek	Winter 1	TT	Y	CHs, COs, Ks, Ps

TABLE E-2 Stream Crossings of the Proposed Project Known to Contain Anadromous Fish

Stream Crossing ID	Segment	Hydro Region	Waterbody Name	Construction Season	Crossing Mode	Anadromous	Anadromous Species and Life Stage
ST_403	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 1	open cut	Y-NOM	Unknown
ST_406	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Chulitna River	Winter 1	existing bridge	Y	Sp, Pp, Kp, COp, CHs
ST_407	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 1	open cut	Y	COs, Ps
ST_410	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 1	open cut	Y	COp
ST_411	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 1	TT	Y	COp
ST_412	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 1	open cut	Y	COr, COs
ST_413	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 1	TT	Y	COp
ST_414	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 1	open cut	Y	COp
ST_415	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 1	TT	Y	COr, ALr, COp, ALp
ST_418	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Trapper Creek	Winter 1	TT	Y	COr, Kr, COs
ST_419	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 1	TT	Y	COrs
ST_420	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 1	open cut	Y-NOM	Unknown
ST_421	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 1	open cut	Y-NOM	Unknown
ST_422	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Sawmill Creek	Winter 1	open cut	Y	COrs
ST_423	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 1	open cut	Y	COr, Kr
ST_425	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Queer Creek	Winter 1	open cut	Y	COr
ST_426	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Rabideux Creek	Winter 1	TT	Y	COr, Kr
ST_427	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 2	TT	Y-NOM	Unknown
ST_428	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Susitna River	Winter 2	TT	Y	CHs, COs, Kp, Pp, Sp, ALp, COp, CHp
ST_430	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 2	open cut	Y	COr
ST_431	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Little Montana Creek	Winter 2	open cut	Y	COr

TABLE E-2 Stream Crossings of the Proposed Project Known to Contain Anadromous Fish

Stream Crossing ID	Segment	Hydro Region	Waterbody Name	Construction Season	Crossing Mode	Anadromous	Anadromous Species and Life Stage
ST_432	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Montana Creek	Winter 2	TT	Y	CHs, COr, Ksr, Ps
ST_434	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Goose Creek	Winter 2	open cut	Y	CHs, COsr, Ksr, Ps
ST_435	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 2	open cut	Y-NOM	Unknown
ST_436	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 2	open cut	Y	COr
ST_437	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Sheep Creek	Winter 2	TT	Y	CHs, COp, Ksr, Ps
ST_438	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Caswell Creek	Winter 2	open cut	Y	COsr
ST_440	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Kashwitna River	Winter 2	TT	Y	CHs, COp, Kpr, Pp, DVp
ST_441	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	197 1/2 Mile Creek	Winter 2	TT	Y	Kr
ST_442	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Little Willow Creek	Winter 2	TT	Y	Ps, Krs, COrs, CHp
ST_444	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Willow Creek	Winter 2	TT	Y	Ps, Ksr, COrs, CHs
ST_445	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 2	open cut	Y	COpr
ST_446	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 2	open cut	Y	COr
ST_447	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Rolly Creek	Winter 2	TT	Y	Unknown
ST_450	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Fish Creek	Winter 2	TT	Y	Unknown
ST_454	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Little Susitna River	Winter 2	TT	Y	Unknown
ST_455	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 2	TT	Y	Unknown
ST_456	Mile 555 to Cook Inlet NGLEP Facility	Southcentral	Name Unknown	Winter 2	TT	Y	Unknown
ST_N1	Denali National Park Route Variation	Interior	Nenana River	Undetermined	Existing bridge	Y	CHp, COp, Kp
ST_N2	Denali National Park Route Variation	Interior	Nenana River	Undetermined	Unknown	Y	CHp, COp, Kp

Key: N=No, Y=Yes, Y-NOM= nominated anadromous stream, TT= Trenchless Technology.
Species Codes: AL=Arctic Lamprey, BC=Broad Whitefish, CH=Chum Salmon, CO=Coho Salmon, DV=Dolly Varden, K=Chinook (King) Salmon, P=Pink Salmon, S=Sockeye Salmon, W=Whitefishes, undifferentiated.
Life Stage Codes: m=migration, p=present, r=rearing, s=spawning, juv=juvenile.

TABLE E-3 Stream Crossings of the Proposed Project Known to Contain Resident Fish

Stream Crossing ID	Segment	Hydro Unit	Stream Name	Description	Cross Mode	Construction	Anadramous * a, b, c, d	TAP Fish Species[e]	AFFI Resident Fish**[f]	Life Stage[f]	Life History[f]
ST_286	Gas Conditioning Facility to Mile 540	Interior	Tolovana R	Perennial Stream/River	open cut	Winter 1	Y	AB?, BB, CI, CN?, CS:/ DS, GR, HW, IN			
ST_39	Gas Conditioning Facility to Mile 540	Arctic	Arthur Cr	Perennial Stream/River	open cut	Winter 2	N	AC, BB, CN, GR			
ST_40	Gas Conditioning Facility to Mile 540	Arctic	Gustafson Gulch	Perennial Stream/River	open cut	Winter 2	N	AC, BB, CN, GR			
ST_42	Gas Conditioning Facility to Mile 540	Arctic	Polygon Cr	Perennial Stream/River	open cut	Winter 2	N	AC, BB, CN, GR			
ST_73	Gas Conditioning Facility to Mile 540	Arctic	Atigun R.	Artificial Path	TT	Winter 2	N	AC, BB, CN, GR, LT, RW			
ST_79	Gas Conditioning Facility to Mile 540	Arctic	Mainline Spring Cr	Intermittent Stream/River	open cut	Winter 2	N	AC, BB, CN, GR, RW			
ST_51	Gas Conditioning Facility to Mile 540	Arctic	Oksrukuyik Cr	Perennial Stream/River	open cut	Winter 2	N	AC, BB?, CN, GR, LT, RW?	DV	juv/adult	unknown
ST_94	Gas Conditioning Facility to Mile 540	Arctic	Atigun R. floodplain	Artificial Path	open cut	Summer 1	N	AC, BB?, CN,GR,LT? RW			
ST_95	Gas Conditioning Facility to Mile 540	Arctic	Atigun R. floodplain	Perennial Stream/River	open cut	Summer 1	N	AC, BB?, CN,GR,LT? RW			
ST_96	Gas Conditioning Facility to Mile 540	Arctic	Atigun R. floodplain	Perennial Stream/River	open cut	Summer 1	N	AC, BB?, CN,GR,LT? RW			
ST_43	Gas Conditioning Facility to Mile 540	Arctic	Poison Pipe Cr	Perennial Stream/River	open cut	Winter 2	N	AC, CN, GR			
ST_80	Gas Conditioning Facility to Mile 540	Arctic	Roche Moutonee Cr	Perennial Stream/River	open cut	Winter 2	N	AC, CN, GR, LT, RW, WF			
ST_78	Gas Conditioning Facility to Mile 540	Arctic	Vanish/Holden Cr	Perennial Stream/River	open cut	Winter 2	N	AC, CN, GR,RW			
ST_27	Gas Conditioning Facility to Mile 540	Arctic	Spoiled Mary Cr	Perennial Stream/River	open cut	Winter 1	N	AC, CN,GR			
ST_44	Gas Conditioning Facility to Mile 540	Arctic	Climb Cr	Perennial Stream/River	open cut	Winter 2	N	AC, GR			
ST_45	Gas Conditioning Facility to Mile 540	Arctic	Dennis Cr	Perennial Stream/River	open cut	Winter 2	N	AC, GR			
ST_55	Gas Conditioning Facility to	Arctic	Toolik R.	Perennial	open cut	Winter 2	N	AC, GR			

TABLE E-3 Stream Crossings of the Proposed Project Known to Contain Resident Fish

Stream Crossing ID	Segment	Hydro Unit	Stream Name	Description	Cross Mode	Construction	Anadramous * a, b, c, d	TAP Fish Species[e]	AFFI Resident Fish**[f]	Life Stage[f]	Life History[f]
	Mile 540			Stream/River							
ST_66	Gas Conditioning Facility to Mile 540	Arctic	Ed Cr	Intermittent Stream/River	open cut	Winter 2	N	AC, GR, LT?			
ST_14	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side channel	Perennial Stream/River	open cut	Winter 1	N	AC, GR, S9?			
ST_28	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	AC,BB,BW,CA,CN ,CS,DS,GR,HW?, PS,RW,S9			
ST_63	Gas Conditioning Facility to Mile 540	Arctic	Terry Cr	Intermittent Stream/River	open cut	Winter 2	N	AC? GR			
ST_64	Gas Conditioning Facility to Mile 540	Arctic	Terry Cr	Intermittent Stream/River	open cut	Winter 2	N	AC? GR			
ST_65	Gas Conditioning Facility to Mile 540	Arctic	Mack Cr	Intermittent Stream/River	open cut	Winter 2	N	AC? GR			
ST_67	Gas Conditioning Facility to Mile 540	Arctic	Jill Cr	Intermittent Stream/River	open cut	Winter 2	N	AC? GR			
ST_9	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	AC?, BB, BW?, CN?, GR, RW?, S9			
ST_10	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	AC?, BB, BW?, CN?, GR, RW?, S9			
ST_57	Gas Conditioning Facility to Mile 540	Arctic	Kuparuk R	Perennial Stream/River	TT	Winter 2	Y	AC?, CN, GR, LT?			
ST_8	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	AC?, CN, GR, RW			
ST_21	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	AC?, CN, GR,S9			
ST_37	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 2	N	AC?, CN,GR,RW,S9			
ST_25	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	AC?, CN? GR, S9			
ST_26	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	AC?, CN? GR, S9			

TABLE E-3 Stream Crossings of the Proposed Project Known to Contain Resident Fish

Stream Crossing ID	Segment	Hydro Unit	Stream Name	Description	Cross Mode	Construction	Anadramous * a, b, c, d	TAP Fish Species[e]	AFFI Resident Fish**[f]	Life Stage[f]	Life History[f]
ST_38	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 2	N	AC?, CN?, GR S9			
ST_19_1	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Stream	open cut	Winter 1	N	AC?, GR, S9			
ST_33	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	TT	Winter 2	Y	AC?, GR,CD			
ST_11	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	AC?, GR?, BB, WF			
ST_12	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	AC?, GR?, BB, WF			
ST_13	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	AC?, GR?, BB, WF			
ST_75	Gas Conditioning Facility to Mile 540	Arctic	Tee Lake Outlet	Intermittent Stream/River	open cut	Winter 2	N	ACT, BB, CN, GR, LT, RW			
ST_266	Gas Conditioning Facility to Mile 540	Interior	Yukon R	Artificial Path	new bridge	Winter 2	Y	AL? BB, BC? BL? BW, CA, CN, CS? DS, GR, HO?	CN	juv/adult	resident
ST_278	Gas Conditioning Facility to Mile 540	Interior	Hess Cr	Artificial Path	open cut	Summer 1	N	AL? BC, BW, CN, CS, DS, GR, HW, IN, LS, NP, RW	BB, GR, LS, CN	juv/adult, juv/adult, juv/adult, juv/adult	residents
ST_279	Gas Conditioning Facility to Mile 540	Interior	Hess Cr	Perennial Stream/River	open cut	Summer 1	N	AL? BC, BW, CN, CS, DS, GR, HW, IN, LS, NP, RW			
ST_20	Gas Conditioning Facility to Mile 540	Arctic	Sag. R. side chan	Perennial Stream/River	open cut	Winter 1	N	B/G, LWC			
ST_265	Gas Conditioning Facility to Mile 540	Interior	Burbot Cr	Perennial Stream/River	open cut	Winter 2	N	BB			
ST_181	Gas Conditioning Facility to Mile 540	Interior	Mary Angel Cr	Intermittent Stream/River	open cut	Winter 1	N	BB, CN ,GR, LS, WF			
ST_210	Gas Conditioning Facility to Mile 540	Interior	Jim River	Artificial Path	open cut	Winter 2	Y	BB, CN, DS, GR, HW, KS, LS, NP, RW			
ST_171	Gas Conditioning Facility to Mile 540	Interior	Minnie Cr	Perennial Stream/River	open cut	Winter 1	Y	BB, CN, DV, GR, LS, RW, KS			

TABLE E-3 Stream Crossings of the Proposed Project Known to Contain Resident Fish

Stream Crossing ID	Segment	Hydro Unit	Stream Name	Description	Cross Mode	Construction	Anadramous * a, b, c, d	TAP Fish Species[e]	AFFI Resident Fish**[f]	Life Stage[f]	Life History[f]
ST_154	Gas Conditioning Facility to Mile 540	Interior	Dietrich R	Artificial Path	open cut	Winter 1	N	BB, CN, DV?, GR, KS? LS, RW			
ST_222	Gas Conditioning Facility to Mile 540	Interior	NF Bonanza Cr	Perennial Stream/River	open cut	Summer 1	N	BB, CN, GR, HW?, LS, LW, NP, RW			
ST_223	Gas Conditioning Facility to Mile 540	Interior	SF Bonanza Cr	Perennial Stream/River	open cut	Summer 1	N	BB, CN, GR, HW?, LS, NP, RW			
ST_135_1	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Stream	open cut	Winter 1	N	BB,CN,DV,GR,LS	GR	juv/adult	resident
ST_135_2	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Stream	open cut	Winter 1	N	BB,CN,DV,GR,LS	GR	juv/adult	resident
ST_136	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Intermittent Stream/River	open cut	Winter 1	N	BB,CN,DV,GR,LS			
ST_137	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Intermittent Stream/River	open cut	Winter 1	N	BB,CN,DV,GR,LS			
ST_138	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Intermittent Stream/River	open cut	Winter 1	N	BB,CN,DV,GR,LS			
ST_132	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Intermittent Stream/River	open cut	Winter 1	N	BB,CN,DV,GR,LS, RW			
ST_133	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Intermittent Stream/River	open cut	Winter 1	N	BB,CN,DV,GR,LS, RW			
ST_134	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	BB,CN,DV,GR,LS, RW			
ST_231	Gas Conditioning Facility to Mile 540	Interior	Kanuti R	Artificial Path	open cut	Summer 1	N	BB: BC? BW?, CN, CS? DS? GR, HW? IN? LS? NP, RW			
ST_200	Gas Conditioning Facility to Mile 540	Interior	SF Koyukuk R	Artificial Path	TT	Winter 2	Y	BB?, BW?, CN, DS, GR, HW?, KS, LS,NP?, RW, SK?			
ST_167	Gas Conditioning Facility to Mile 540	Interior	MF Koyukuk R	Perennial Stream/River	open cut	Winter 1	N	BB?, CN, CS?, DS, DV, GR, KS?, LS, NP?, RW	GR,	juv/adult	resident
ST_168	Gas Conditioning Facility to Mile 540	Interior	MF Koyukuk R	Artificial Path	open cut	Winter 1	Y	BB?, CN, CS?, DS, DV, GR, KS?, LS, NP?, RW			

TABLE E-3 Stream Crossings of the Proposed Project Known to Contain Resident Fish

Stream Crossing ID	Segment	Hydro Unit	Stream Name	Description	Cross Mode	Construction	Anadramous * a, b, c, d	TAP Fish Species[e]	AFFI Resident Fish**[f]	Life Stage[f]	Life History[f]
ST_156	Gas Conditioning Facility to Mile 540	Interior	MF Koyukuk R	Artificial Path	open cut	Winter 1	Y	BB?, CN, DS? DV, GR, LS, NP? RW	BB	juv/adult	resident
ST_122	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Artificial Path	open cut	Winter 1	N	BB?, CN, DV, GR,LS?,RW	GR	juv/adult	resident
ST_128	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	BB?, CN, DV, GR,LS?,RW	GR	juv/adult	resident
ST_113	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	BB?, CN, DV, GR,LS?,RW			
ST_114	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	BB?, CN, DV, GR,LS?,RW			
ST_115	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	BB?, CN, DV, GR,LS?,RW			
ST_116	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	BB?, CN, DV, GR,LS?,RW			
ST_117	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	BB?, CN, DV, GR,LS?,RW			
ST_118	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	BB?, CN, DV, GR,LS?,RW			
ST_119	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Intermittent Stream/River	open cut	Winter 1	N	BB?, CN, DV, GR,LS?,RW			
ST_120	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	BB?, CN, DV, GR,LS?,RW			
ST_121	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Artificial Path	open cut	Winter 1	N	BB?, CN, DV, GR,LS?,RW			
ST_123	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Artificial Path	open cut	Winter 1	N	BB?, CN, DV, GR,LS?,RW			
ST_124	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Artificial Path	open cut	Winter 1	N	BB?, CN, DV, GR,LS?,RW			
ST_125	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Artificial Path	open cut	Winter 1	N	BB?, CN, DV, GR,LS?,RW			
ST_126	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Artificial Path	open cut	Winter 1	N	BB?, CN, DV, GR,LS?,RW			
ST_127	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	BB?, CN, DV, GR,LS?,RW			

TABLE E-3 Stream Crossings of the Proposed Project Known to Contain Resident Fish

Stream Crossing ID	Segment	Hydro Unit	Stream Name	Description	Cross Mode	Construction	Anadramous * a, b, c, d	TAP Fish Species[e]	AFFI Resident Fish**[f]	Life Stage[f]	Life History[f]
ST_130	Gas Conditioning Facility to Mile 540	Interior	Dietrich R.	Perennial Stream/River	open cut	Winter 1	N	BB?, CN, DV,GR, LS?, RW			
ST_253	Gas Conditioning Facility to Mile 540	Interior	NF Ray R	Perennial Stream/River	open cut	Summer 1	N	BB?, CN, GR, IN?, LC?, LS, NP, RW	BB, GR, CN	juv/adult, juv/adult, juv/adult	residents
ST_2	Gas Conditioning Facility to Mile 540	Arctic	Putuligayuk R.	Artificial Path	TT	Winter 1	Y	BW, CA, CS, LT, SB			
ST_226	Gas Conditioning Facility to Mile 540	Interior	Fish Cr	Perennial Stream/River	open cut	Summer 1	N	BW? CN, DS? GR, LS, NP?, RW, SK			
ST_155	Gas Conditioning Facility to Mile 540	Interior	Eva Cr	Perennial Stream/River	open cut	Winter 1	N	CD?, GR	DV, CN	juv/adult, juv/adult	unknown, resident
ST_252	Gas Conditioning Facility to Mile 540	Interior	Fred Cr	Perennial Stream/River	open cut	Summer 1	N	CD?, GR			
ST_242	Gas Conditioning Facility to Mile 540	Interior	M Br WF Dall R	Perennial Stream/River	open cut	Summer 1	N	CD?, GR, IN?, WF?			
ST_244	Gas Conditioning Facility to Mile 540	Interior	S Br wF Dall R	Perennial Stream/River	open cut	Summer 1	N	CD?, GR, IN?, WF?			
ST_197	Gas Conditioning Facility to Mile 540	Interior	Chapman Cr	Perennial Stream/River	open cut	Winter 2	N	CD?, GR, NP?			
ST_264	Gas Conditioning Facility to Mile 540	Interior	Wood Chopper Cr	Perennial Stream/River	open cut	Winter 2	N	CD?, GR, NP? WF?			
ST_256	Gas Conditioning Facility to Mile 540	Interior	Ft. Hamlin Hills Cr	Perennial Stream/River	open cut	Summer 1	N	CD?, GR, RW, NP			
ST_224	Gas Conditioning Facility to Mile 540	Interior	Pung's Crossing Cr	Perennial Stream/River	open cut	Summer 1	N	CD?, GR, RW?			
ST_111	Gas Conditioning Facility to Mile 540	Interior	N.F. Chandalar R	Perennial Stream/River	open cut	Summer 2	N	CN, CI?, DV?, GR, HW?, NP?, RW	GR	juv/adult	resident
ST_170	Gas Conditioning Facility to Mile 540	Interior	MF Koyukuk R	Perennial Stream/River	open cut	Winter 1	Y	CN, DS, DV, GR, KS, LS, NP?, RW	GR, CN	juv/adult, juv/adult	residents
ST_185	Gas Conditioning Facility to Mile 540	Interior	Slate Cr	Perennial Stream/River	open cut	Winter 1	Y	CN, DS, DV, GR, KS, RW			
ST_157	Gas Conditioning Facility to Mile 540	Interior	WF Sukakpak Cr	Perennial Stream/River	open cut	Winter 1	N	CN, DV, GR	GR, LS, CN	juv/adult, juv/adult, juv/adult	residents

TABLE E-3 Stream Crossings of the Proposed Project Known to Contain Resident Fish

Stream Crossing ID	Segment	Hydro Unit	Stream Name	Description	Cross Mode	Construction	Anadramous * a, b, c, d	TAP Fish Species[e]	AFFI Resident Fish**[f]	Life Stage[f]	Life History[f]
ST_180	Gas Conditioning Facility to Mile 540	Interior	Marion Cr	Perennial Stream/River	open cut	Winter 1	Y	CN, DV, GR, KS, RW	KS	juv	anadromous
ST_169	Gas Conditioning Facility to Mile 540	Interior	Hammond R	Artificial Path	open cut	Winter 1	Y	CN, DV, GR, KS?, WF	chum salmon, LS, CN	juv, juv/adult, juv/adult	anadromous, resident, resident
ST_153	Gas Conditioning Facility to Mile 540	Interior	Brockman Cr	Perennial Stream/River	open cut	Winter 1	N	CN, DV, GR, RW	DV	juv/adult	resident
ST_147	Gas Conditioning Facility to Mile 540	Interior	Snowden Cr	Perennial Stream/River	open cut	Winter 1	N	CN, DV, GR, RW?			
ST_135	Gas Conditioning Facility to Mile 540	Interior	Nutirwik Cr	Artificial Path	open cut	Winter 1	N	CN, DV,GR,RW?	GR	juvenile	resident
ST_160	Gas Conditioning Facility to Mile 540	Interior	Gold Cr.	Perennial Stream/River	open cut	Winter 1	N	CN, DV?, GR, RW?			
ST_150	Gas Conditioning Facility to Mile 540	Interior	Disaster Cr	Perennial Stream/River	open cut	Winter 1	N	CN, GR			
ST_159	Gas Conditioning Facility to Mile 540	Interior	Linda Cr	Perennial Stream/River	open cut	Winter 1	N	CN, GR			
ST_161	Gas Conditioning Facility to Mile 540	Interior	Sheep Cr	Perennial Stream/River	open cut	Winter 1	N	CN, GR			
ST_163	Gas Conditioning Facility to Mile 540	Interior	Nugget Ct	Perennial Stream/River	open cut	Winter 1	N	CN, GR			
ST_182	Gas Conditioning Facility to Mile 540	Interior	SR Mary Angle Cr	Intermittent Stream/River	open cut	Winter 1	N	CN, GR			
ST_202	Gas Conditioning Facility to Mile 540	Interior	Aba-dabba Cr	Perennial Stream/River	open cut	Winter 2	N	CN, GR			
ST_218	Gas Conditioning Facility to Mile 540	Interior	Prospect Cr	Perennial Stream/River	open cut	Summer 1	Y	CN, GR, KS, LS, NP, RW			
ST_190	Gas Conditioning Facility to Mile 540	Interior	Jackson Slough	Perennial Stream/River	open cut	Winter 2	N	CN, GR, KS, RW			
ST_88	Gas Conditioning Facility to Mile 540	Arctic	Tyler Cr	Perennial Stream/River	open cut	Winter 2	N	CN, GR, RW			
ST_220	Gas Conditioning Facility to Mile 540	Interior	Little Nasty Cr	Perennial Stream/River	open cut	Summer 1	N	CN, GR, RW			
ST_227	Gas Conditioning Facility to	Interior	MF Fish Cr	Perennial	open cut	Summer 1	N	CN, GR, RW			

TABLE E-3 Stream Crossings of the Proposed Project Known to Contain Resident Fish

Stream Crossing ID	Segment	Hydro Unit	Stream Name	Description	Cross Mode	Construction	Anadramous * a, b, c, d	TAP Fish Species[e]	AFFI Resident Fish**[f]	Life Stage[f]	Life History[f]
	Mile 540			Stream/River							
ST_228	Gas Conditioning Facility to Mile 540	Interior	SF Fish Cr	Perennial Stream/River	open cut	Summer 1	N	CN, GR, RW?			
ST_212	Gas Conditioning Facility to Mile 540	Interior	Douglas Cr	Perennial Stream/River	open cut	Winter 2	Y	CN, GR, RW?, KS			
ST_36	Gas Conditioning Facility to Mile 540	Arctic	Stump Cr	Perennial Stream/River	open cut	Winter 2	N	CN, GR,LT,S9			
ST_162	Gas Conditioning Facility to Mile 540	Interior	Wolf Pup Cr	Perennial Stream/River	open cut	Winter 1	N	CN, GR?			
ST_225	Gas Conditioning Facility to Mile 540	Interior	Alder Mtn Cr	Perennial Stream/River	open cut	Summer 1	N	CN, GR?, RW?			
ST_56	Gas Conditioning Facility to Mile 540	Arctic	E. F. Kuparuk R	Perennial Stream/River	open cut	Winter 2	N	CN? GR			
ST_280	Gas Conditioning Facility to Mile 540	Interior	Erickson Cr	Perennial Stream/River	open cut	Summer 1	N	CN? GR, LS			
ST_283	Gas Conditioning Facility to Mile 540	Interior	Lost Cr	Perennial Stream/River	open cut	Summer 1	N	CN? GR, WF			
ST_188	Gas Conditioning Facility to Mile 540	Interior	Rosie Cr	Perennial Stream/River	open cut	Winter 2	Y	CN?, DV?, GR, RW? KS	KS, GR, CN	juv, juv/adult, juv/adult	anadramous, resident, resident
ST_183	Gas Conditioning Facility to Mile 540	Interior	Clara Cr	Perennial Stream/River	open cut	Winter 1	N	CN?, GR, RW?			
ST_34	Gas Conditioning Facility to Mile 540	Arctic	Lori Cr	Perennial Stream/River	open cut	Winter 2	N	GR			
ST_85	Gas Conditioning Facility to Mile 540	Arctic	Waterhole Cr.	Intermittent Stream/River	open cut	Winter 2	N	GR			
ST_232	Gas Conditioning Facility to Mile 540	Interior	Caribou Mtn. Cr	Perennial Stream/River	open cut	Summer 1	N	GR			
ST_238	Gas Conditioning Facility to Mile 540	Interior	Finger Mtn Cr	Intermittent Stream/River	open cut	Summer 1	N	GR			
ST_261	Gas Conditioning Facility to Mile 540	Interior	Phelps Cr	Perennial Stream/River	open cut	Winter 2	N	GR			
ST_268	Gas Conditioning Facility to Mile 540	Interior	Isom Cr	Perennial Stream/River	open cut	Summer 1	N	GR			

TABLE E-3 Stream Crossings of the Proposed Project Known to Contain Resident Fish

Stream Crossing ID	Segment	Hydro Unit	Stream Name	Description	Cross Mode	Construction	Anadramous * a, b, c, d	TAP Fish Species[e]	AFFI Resident Fish**[f]	Life Stage[f]	Life History[f]
ST_273	Gas Conditioning Facility to Mile 540	Interior	Hot Cat Cr	Perennial Stream/River	open cut	Summer 1	N	GR			
ST_149	Gas Conditioning Facility to Mile 540	Interior	Sahr's Slough	Intermittent Stream/River	open cut	Winter 1	N	GR, CN			
ST_160_ 1	Gas Conditioning Facility to Mile 540	Interior	Cushing Cr	Stream	open cut	Winter 1	N	GR?			
ST_68	Gas Conditioning Facility to Mile 540	Arctic	Galbraith L. trib	Artificial Path	open cut	Winter 2	N	LT, GR, BB?, RW?, AC?			
ST_7	Gas Conditioning Facility to Mile 540	Arctic	Low-life Cr.	Perennial Stream/River	open cut	Winter 1	N	S9			
ST_164	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N		CN	juv/adult	resident
ST_352	Gas Conditioning Facility to Mile 540	Interior	Nenana River	Artificial Path	open cut	Summer 1	Y		CN	adult	resident
ST_366	Mile 540 to Mile 555	Interior	Yanert Fork	Artificial Path	open cut	Summer 1	N		CN	juv/adult	resident
ST_379	Mile 555 to Cook Inlet NGLEP Facility	Interior	Name Unknown	Perennial Stream/River	open cut	Summer 1	N		CN	juv/adult	resident
ST_394	Mile 555 to Cook Inlet NGLEP Facility	South-central	Pass Creek	Perennial Stream/River	TT	Winter 1	Y		CN	juv/adult	resident
ST_447	Mile 555 to Cook Inlet NGLEP Facility	South-central	Rolly Creek	Perennial Stream/River	TT	Winter 2	Y		DV, S9	juv, juv	unknown
ST_441	Mile 555 to Cook Inlet NGLEP Facility	South-central	Half Mile Creek	Perennial Stream/River	TT	Winter 2	Y		DV, SB, lamprey, SS, CN	juv	unknown, anadromous
ST_87	Gas Conditioning Facility to Mile 540	Arctic	Name Unknown	Intermittent Stream/River	open cut	Winter 2	N		GR	juv/adult	resident
ST_108	Gas Conditioning Facility to Mile 540	Interior	Unnamed	Perennial Stream/River	open cut	Summer 2	N		GR	juv/adult	resident
ST_131	Gas Conditioning Facility to Mile 540	Interior	Unnamed	Perennial Stream/River	open cut	Winter 1	N		GR	juv/adult	resident
ST_335	Gas Conditioning Facility to Mile 540	Interior	Glacier Creek	Perennial Stream/River	open cut	Winter 2	N		GR, chum salmon	adult, adult spawning	resident, anadromous
ST_144	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Intermittent Stream/River	open cut	Winter 1	N		GR, CN	juv/adult, juv/adult	resident, resident

TABLE E-3 Stream Crossings of the Proposed Project Known to Contain Resident Fish

Stream Crossing ID	Segment	Hydro Unit	Stream Name	Description	Cross Mode	Construction	Anadramous * a, b, c, d	TAP Fish Species[e]	AFFI Resident Fish**[f]	Life Stage[f]	Life History[f]
ST_192	Gas Conditioning Facility to Mile 540	Interior	Name Unknown	Perennial Stream/River	open cut	Winter 2	Y		GR, CN	juv/adult, juv/adult	residents
ST_422	Mile 555 to Cook Inlet NGLEP Facility	South-central	Sawmill Cr	Perennial Stream/River	open cut	Winter 1	Y		GR, SB, lamprey	chniook, coho, sculpin	
ST_48	Gas Conditioning Facility to Mile 540	Arctic	Unnamed	Perennial Stream/River	open cut	Winter 2	N		S9	juv/adult	unknown
ST_412	Mile 555 to Cook Inlet NGLEP Facility	South-central	Name Unknown	Perennial Stream/River	open cut	Winter 1	Y		SB, CN	juv/adult, juv/adult	residents
ST_425	Mile 555 to Cook Inlet NGLEP Facility	South-central	Queer Cr	Perennial Stream/River	open cut	Winter 1	Y		SB, lamprey, KS, SS	juv	unknown, andaromous
ST_423	Mile 555 to Cook Inlet NGLEP Facility	South-central	Name Unknown	Perennial Stream/River	open cut	Winter 1	Y		SB, lamprey, SS, CN	juv, juv/adult, juv/adult, juv	
ST_446	Mile 555 to Cook Inlet NGLEP Facility	South-central	unnamed	Perennial Stream/River	open cut	Winter 2	Y		SS, CN	juv, juv	anadromous, resident
ST_456	Mile 555 to Cook Inlet NGLEP Facility	South-central	Name Unknown	Perennial Stream/River	TT	Winter 2	Y		SS, CN	juv	adadromous, resident
ST_407	Mile 555 to Cook Inlet NGLEP Facility	South-central	Name Unknown	Perennial Stream/River	open cut	Winter 1	Y		SS, LS	adult spawning, adult	anadromous, resident

Key: N = No; Y = Yes; Y-NOM = nominated anadromous stream ; TT = Trenchless Technology

*Streams that have been nominated as anadromous were considered anadromous. ** Resident fish data is incomplete.

[a] Johnson and Blanche 2010.

[b] Johnson et al. 2004.

[c] Johnson and Klein 2009.

[d] AGDC 2009.

[e] ADF&G 2011a.

[f] USBLM 2002.

Abbreviations:

AB = Alaska blackfish (*Dallia pectoralis*)

AC = Arctic char (*Salvelinus alpinus*)

AL = Arctic lamprey (*Lampetra japonica*)
BB = Burbot (*Lota lota*)
BL = Amercian brook lamprey (*Lampetra* sp.)
BW = Braod whitefish (*Coregonus nasus*)
CA = Arctic cisco (*Coregonus autumnalis*)
CD = Sculpin (Family *Cottidae*)
CI = Cisco (*Coregonus* sp.)
CN = Slimy sculpin (*Cottus congnatus*)
CS = Least cisco (*Coregonus sardinella*)
DS = Chum (dog) salmon (*Oncorhynchus keta*)
DV = Dolly Varden (*Salvelinus malma*)
GR = Arctic grayling (*Thymallus arcticus*)
HO = Pond smelt (*Hypomesus olidus*)
HW = Humpback whitefish (*Coregonus pidschian*)
IN = Inconnu (sheefish) (*Stenodus leucichthys*)
KS = Chinook (king) salmon (*Onchorhynchus tshawytscha*)
LC = Lake chub (*Couesius plumbeus*)
LS = Longnose sucker (*Catostomus catostomus*)
LT = Lake trout (*Salvelinus namaycush*)
LW = Lake whitefish (*Coregonus clupeaformis*)
NP = Northern pike (*Esox lucius*)
PS = Pink (humpback) salmon (*Oncorhynchus gorbuscha*)
PW = Pygmy whitefish (*Prosopium coulten*)
RB = Rainbow trout (*Oncorhynchus gorbuscha*)
RS = Sockeye (red) salmon (*Oncorhynchus nerka*)
RW = Round whitefish (*Prosopium coulteri*)
SB = Stickleback (Family *Gasterosteidae*)
S9 = Ninespine stickleback (*Pungitius pungitius*)
SH = Steelhead trout (*Oncorhynchus mykiss*)
SK = Sucker (Family *Catostomidae*)
SS = Coho (silver) salmon (*Oncorhynchus kisutch*)
WF = Whitefish (*Coregonus* sp.)

Appendix F

National Hydrologic Dataset –
Waterbodies within 1 Mile of the Proposed Project

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chena River	Lake/Pond: Hydrographic Category = Perennial	443	118352.947	64° 52' 20.199" N	147° 56' 42.989" W	0.364	0.001	0	19040506007001	39004	Perennial	19040506	Fairbanks Lateral
Chena River	Lake/Pond: Hydrographic Category = Perennial	443	117258.111	64° 52' 50.838" N	147° 56' 50.339" W	0.610	0.002	0	19040506006989	39004	Perennial	19040506	Fairbanks Lateral
Chena River	Lake/Pond: Hydrographic Category = Perennial	443	119962.265	64° 52' 55.106" N	147° 55' 43.909" W	0.383	0.002	0	19040506006987	39004	Perennial	19040506	Fairbanks Lateral
Chena River	Lake/Pond: Hydrographic Category = Perennial	443	118396.391	64° 52' 23.460" N	147° 56' 33.860" W	3.135	0.013	0	19040506007000	39004	Perennial	19040506	Fairbanks Lateral
Chena River	Lake/Pond: Hydrographic Category = Perennial	443	120255.736	64° 52' 57.755" N	147° 55' 35.699" W	0.183	0.001	0	19040506006985	39004	Perennial	19040506	Fairbanks Lateral
Chena River	Lake/Pond: Hydrographic Category = Perennial	443	122540.355	64° 52' 5.863" N	147° 55' 9.031" W	1.558	0.006	0	19040506007007	39004	Perennial	19040506	Fairbanks Lateral
Chena River	Lake/Pond: Hydrographic Category = Perennial	443	125145.529	64° 52' 11.153" N	147° 54' 3.868" W	1.901	0.008	0	19040506007002	39004	Perennial	19040506	Fairbanks Lateral
Chena River	Lake/Pond: Hydrographic Category = Perennial	443	119996.198	64° 52' 52.845" N	147° 55' 43.020" W	0.440	0.002	0	19040506006988	39004	Perennial	19040506	Fairbanks Lateral
Chena River	Lake/Pond: Hydrographic Category = Perennial	443	130141.758	64° 51' 55.289" N	147° 51' 59.217" W	23.273	0.094	0	19040506007010	39004	Perennial	19040506	Fairbanks Lateral
Chena River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	447	120107.518	64° 51' 44.537" N	147° 56' 6.537" W	19.033	0.077	576	19040506007013	39009	Perennial	19040506	Fairbanks Lateral
Chena River	Lake/Pond: Hydrographic Category = Perennial	447	125052.408	64° 51' 18.381" N	147° 54' 19.501" W	1.424	0.006	0	19040506007196	39004	Perennial	19040506	Fairbanks Lateral
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	577	4953.996	63° 18' 24.547" N	149° 8' 5.901" W	0.761	0.003	0	19020502005734	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	577	4266.720	63° 18' 34.980" N	149° 7' 52.739" W	1.109	0.004	0	19020502005735	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	577	5388.519	63° 18' 27.277" N	149° 7' 29.266" W	7.987	0.032	0	19020502005736	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	577	4856.009	63° 18' 26.495" N	149° 7' 52.415" W	2.810	0.011	0	19020502005737	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	577	4811.278	63° 18' 36.628" N	149° 7' 31.590" W	0.390	0.002	0	19020502005733	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	577	4306.902	63° 18' 29.928" N	149° 8' 6.826" W	1.101	0.004	0	19020502005738	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	578	4510.772	63° 17' 53.827" N	149° 9' 44.974" W	0.452	0.002	0	19020502005744	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	578	4180.522	63° 17' 58.073" N	149° 9' 31.240" W	4.906	0.020	0	19020502005742	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	578	4715.172	63° 18' 19.862" N	149° 8' 32.127" W	4.424	0.018	0	19020502005739	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	578	4108.870	63° 18' 3.276" N	149° 9' 22.894" W	1.196	0.005	0	19020502005743	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	578	4163.382	63° 18' 10.229" N	149° 9' 2.405" W	3.557	0.014	0	19020502005740	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	578	4123.376	63° 18' 7.114" N	149° 9' 13.518" W	0.308	0.001	0	19020502005741	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	579	5276.434	63° 17' 35.870" N	149° 10' 0.591" W	2.612	0.011	0	19020502004151	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	579	5326.416	63° 17' 32.602" N	149° 10' 5.574" W	0.280	0.001	0	19020502004155	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	579	5453.656	63° 17' 39.478" N	149° 9' 54.273" W	0.373	0.002	0	19020502004148	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	579	5111.079	63° 17' 38.667" N	149° 10' 3.896" W	0.462	0.002	0	19020502004149	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	580	1762.077	63° 17' 30.069" N	149° 12' 14.456" W	0.400	0.002	0	19020502005746	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	580	975.020	63° 17' 34.096" N	149° 12' 58.016" W	13.546	0.055	0	19020502005747	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	580	2178.451	63° 17' 33.293" N	149° 12' 7.330" W	0.773	0.003	0	19020502005745	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	580	2199.233	63° 17' 39.336" N	149° 13' 19.136" W	1.732	0.007	0	19020502005749	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	580	941.008	63° 17' 10.693" N	149° 13' 2.708" W	3.517	0.014	0	19020502004165	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	580	2818.083	63° 17' 3.903" N	149° 13' 41.612" W	0.850	0.003	0	19020502004173	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	580	1142.984	63° 17' 25.519" N	149° 12' 21.882" W	1.686	0.007	0	19020502005748	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	581	2638.763	63° 16' 9.383" N	149° 12' 40.233" W	0.828	0.003	0	19020502004207	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	582	2003.088	63° 15' 31.918" N	149° 14' 42.610" W	0.261	0.001	0	19020502004237	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	582	2195.238	63° 15' 30.236" N	149° 14' 46.340" W	0.331	0.001	0	19020502004238	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	583	2437.242	63░ 15' 27.422" N	149░ 14' 51.778" W	0.369	0.001	0	19020502004242	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	583	1928.497	63░ 14' 50.275" N	149░ 14' 48.297" W	6.644	0.027	0	19020502004280	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	583	2012.169	63░ 15' 25.173" N	149░ 14' 56.768" W	0.858	0.003	0	19020502004245	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	583	1786.498	63░ 15' 26.952" N	149░ 15' 16.349" W	1.860	0.008	0	19020502004240	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	584	5515.471	63░ 14' 41.501" N	149░ 13' 27.063" W	0.729	0.003	0	19020502004291	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	584	2547.432	63░ 13' 58.655" N	149░ 15' 22.637" W	2.087	0.008	0	19020502004320	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	584	3887.053	63░ 14' 23.506" N	149░ 16' 51.820" W	0.378	0.002	0	19020502004299	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	584	1879.180	63░ 14' 11.859" N	149░ 14' 56.372" W	0.548	0.002	0	19020502004310	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	584	2235.172	63░ 14' 3.999" N	149░ 15' 11.841" W	0.730	0.003	0	19020502004315	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	584	833.426	63░ 14' 43.637" N	149░ 15' 24.262" W	11.498	0.047	0	19020502004281	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	584	2764.346	63░ 14' 20.327" N	149░ 14' 23.960" W	0.864	0.003	0	19020502004303	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	584	1962.093	63░ 14' 23.912" N	149░ 14' 39.962" W	1.193	0.005	0	19020502004301	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	585	4820.560	63░ 14' 2.543" N	149░ 18' 11.006" W	0.570	0.002	0	19020502004312	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	585	1413.294	63░ 13' 52.257" N	149░ 17' 2.672" W	2.609	0.011	0	19020502004325	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	586	188.507	63░ 13' 12.410" N	149░ 17' 45.127" W	7.684	0.031	0	19020502004342	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	586	1607.255	63░ 13' 1.439" N	149░ 18' 27.170" W	0.340	0.001	0	19020502004349	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	586	3264.050	63░ 12' 33.319" N	149░ 17' 21.178" W	8.924	0.036	0	19020502004359	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	586	1226.465	63░ 12' 54.598" N	149░ 18' 4.204" W	0.441	0.002	0	19020502004352	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	586	2030.193	63░ 12' 46.743" N	149░ 17' 26.628" W	0.826	0.003	0	19020502004354	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	586	4855.592	63° 12' 18.034" N	149° 17' 23.017" W	1.031	0.004	0	19020502004362	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	587	4704.221	63° 11' 50.107" N	149° 18' 30.420" W	0.969	0.004	0	19020502004371	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	587	3365.948	63° 12' 2.949" N	149° 18' 31.164" W	4.283	0.017	0	19020502004366	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	587	4296.613	63° 11' 57.092" N	149° 18' 25.085" W	0.397	0.002	0	19020502004370	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	587	5011.616	63° 11' 44.278" N	149° 18' 44.892" W	0.972	0.004	0	19020502004375	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	587	3570.339	63° 12' 16.630" N	149° 18' 4.196" W	2.101	0.009	0	19020502004363	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	587	1336.585	63° 12' 35.092" N	149° 18' 47.864" W	0.427	0.002	0	19020502004358	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	587	3865.130	63° 12' 10.519" N	149° 18' 7.282" W	0.909	0.004	0	19020502004365	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	587	5077.111	63° 11' 56.658" N	149° 17' 48.148" W	37.423	0.151	0	19020502004367	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	587	5269.107	63° 13' 8.389" N	149° 20' 46.940" W	4.550	0.018	0	19020502004344	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	588	3854.885	63° 11' 33.919" N	149° 19' 21.248" W	2.225	0.009	0	19020502004378	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	588	5115.959	63° 12' 34.510" N	149° 21' 46.833" W	1.456	0.006	0	19020502004356	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	588	5484.582	63° 11' 34.938" N	149° 18' 42.365" W	1.112	0.005	0	19020502004379	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	589	3743.865	63° 10' 56.054" N	149° 20' 36.456" W	0.833	0.003	0	19020502004388	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	589	5068.329	63° 11' 53.287" N	149° 23' 11.325" W	1.396	0.006	0	19020502004369	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	589	3884.325	63° 10' 58.382" N	149° 20' 31.564" W	0.437	0.002	0	19020502004387	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	589	4837.248	63° 11' 30.809" N	149° 23' 33.729" W	2.361	0.010	0	19020502004377	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	589	3810.379	63° 11' 4.410" N	149° 20' 28.192" W	1.043	0.004	0	19020502004386	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	590	2503.691	63° 10' 13.144" N	149° 23' 30.156" W	0.892	0.004	0	19020502004396	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	590	1999.695	63° 10' 16.509" N	149° 23' 24.021" W	1.367	0.006	0	19020502004393	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	591	2976.513	63° 9' 48.814" N	149° 24' 39.001" W	0.673	0.003	0	19020502004401	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	591	3327.678	63° 9' 42.321" N	149° 24' 47.955" W	1.410	0.006	0	19020502004404	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	591	4145.089	63° 9' 46.848" N	149° 25' 35.954" W	33.684	0.136	0	19020502004399	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	591	4193.351	63° 9' 17.486" N	149° 22' 20.885" W	1.030	0.004	0	19020502004415	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	591	2715.221	63° 10' 12.626" N	149° 23' 46.574" W	1.681	0.007	0	19020502004395	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	592	5687.483	63° 9' 21.869" N	149° 26' 43.415" W	0.323	0.001	0	19020502004409	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	592	1764.415	63° 9' 7.701" N	149° 25' 27.597" W	3.190	0.013	0	19020502004419	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	592	3598.110	63° 9' 36.128" N	149° 25' 28.395" W	2.985	0.012	0	19020502004407	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	592	5364.729	63° 9' 15.012" N	149° 26' 41.881" W	0.867	0.004	0	19020502004414	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	592	2398.902	63° 9' 5.685" N	149° 25' 39.199" W	0.667	0.003	0	19020502004421	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	592	4407.179	63° 9' 33.389" N	149° 25' 57.915" W	0.469	0.002	0	19020502004408	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	592	4241.620	63° 9' 38.822" N	149° 25' 41.914" W	4.954	0.020	0	19020502004405	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	592	1992.961	63° 9' 16.224" N	149° 25' 24.282" W	1.576	0.006	0	19020502004413	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	593	5268.708	63° 9' 4.395" N	149° 27' 7.839" W	1.768	0.007	0	19020502004420	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	593	5503.313	63° 9' 8.657" N	149° 27' 0.350" W	0.362	0.001	0	19020502004418	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	594	4746.862	63° 8' 27.690" N	149° 28' 21.994" W	1.176	0.005	0	19020502004435	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	594	4342.905	63° 8' 31.524" N	149° 27' 50.164" W	1.054	0.004	0	19020502004434	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	594	5059.318	63° 8' 24.042" N	149° 28' 37.784" W	0.751	0.003	0	19020502004436	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	594	2900.125	63° 8' 2.035" N	149° 28' 13.247" W	2.069	0.008	0	19020502004445	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	594	5153.687	63° 8' 36.227" N	149° 28' 9.358" W	0.840	0.003	0	19020502004433	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	594	4497.799	63° 8' 14.112" N	149° 28' 43.480" W	7.032	0.028	0	19020502004438	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	594	5572.570	63° 8' 42.512" N	149° 28' 1.087" W	0.682	0.003	0	19020502004429	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	594	3520.774	63° 7' 46.199" N	149° 28' 29.888" W	0.714	0.003	0	19020502004449	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	594	2167.842	63° 8' 6.199" N	149° 27' 51.180" W	1.974	0.008	0	19020502004441	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	594	4580.108	63° 8' 1.341" N	149° 28' 51.147" W	0.506	0.002	0	19020502004446	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	594	5173.289	63° 8' 40.642" N	149° 27' 44.360" W	0.551	0.002	0	19020502004430	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	594	3460.170	63° 8' 12.073" N	149° 28' 20.504" W	10.861	0.044	0	19020502004439	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	595	3851.688	63° 7' 29.173" N	149° 29' 17.887" W	0.596	0.002	0	19020502004452	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	595	4348.058	63° 7' 11.804" N	149° 29' 42.752" W	1.064	0.004	0	19020502004462	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	595	4020.536	63° 7' 24.837" N	149° 29' 28.967" W	1.926	0.008	0	19020502004453	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	595	5908.432	63° 7' 23.369" N	149° 30' 12.380" W	0.487	0.002	0	19020502004816	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	595	669.407	63° 7' 14.007" N	149° 28' 16.760" W	4.084	0.017	0	19020502004460	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	597	1977.222	63° 5' 23.927" N	149° 30' 32.677" W	0.647	0.003	0	19020502004886	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	597	1386.943	63° 5' 36.129" N	149° 30' 40.727" W	1.086	0.004	0	19020502004873	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	597	3280.731	63° 5' 37.491" N	149° 31' 24.271" W	1.194	0.005	0	19020502004871	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	597	2291.981	63° 5' 43.996" N	149° 29' 18.972" W	1.029	0.004	0	19020502004471	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	598	4237.591	63° 5' 36.155" N	149° 32' 14.708" W	2.030	0.008	0	19020502004874	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	598	290.813	63° 5' 10.865" N	149° 31' 14.750" W	26.419	0.107	0	19020502004888	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	598	2587.285	63° 5' 20.710" N	149° 31' 58.261" W	1.482	0.006	0	19020502004892	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	598	3961.834	63° 4' 34.730" N	149° 30' 11.933" W	0.589	0.002	0	19020502004923	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	599	1755.790	63° 4' 36.749" N	149° 32' 47.373" W	2.748	0.011	0	19020502004918	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	599	2320.180	63° 4' 47.115" N	149° 32' 35.081" W	4.312	0.017	0	19020502004909	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	600	4404.892	63° 3' 44.405" N	149° 31' 29.018" W	0.448	0.002	0	19020502004960	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	600	3193.733	63° 3' 37.977" N	149° 31' 52.606" W	1.261	0.005	0	19020502004968	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	600	4609.373	63° 3' 35.444" N	149° 31' 16.761" W	6.138	0.025	0	19020502004964	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	600	3554.298	63° 3' 40.187" N	149° 31' 44.087" W	2.327	0.009	0	19020502004962	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	600	2888.458	63° 3' 27.397" N	149° 32' 2.238" W	0.560	0.002	0	19020502004981	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	601	5035.272	63° 2' 46.136" N	149° 32' 13.105" W	3.012	0.012	0	19020502005018	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	601	2564.117	63° 2' 23.903" N	149° 33' 54.058" W	3.368	0.014	0	19020502005042	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	601	1757.569	63° 2' 30.859" N	149° 34' 8.792" W	3.382	0.014	0	19020502005035	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	601	2967.425	63° 2' 46.531" N	149° 33' 0.399" W	1.309	0.005	0	19020502005020	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	602	3339.877	63° 2' 5.189" N	149° 34' 2.295" W	0.804	0.003	0	19020502005069	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	602	1316.294	63° 2' 17.495" N	149° 34' 37.220" W	4.612	0.019	0	19020502005052	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	602	684.018	63° 1' 59.152" N	149° 35' 31.226" W	16.941	0.069	0	19020502005067	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	602	2727.437	63° 2' 19.367" N	149° 34' 13.521" W	0.246	0.001	0	19020502005054	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	603	1205.681	63° 1' 21.285" N	149° 34' 55.353" W	0.988	0.004	0	19020502005131	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	603	1780.934	63° 1' 42.360" N	149° 35' 45.684" W	4.755	0.019	0	19020502005096	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	603	2862.100	63° 0' 59.740" N	149° 34' 48.422" W	0.319	0.001	0	19020502005158	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	603	3001.862	63° 1' 19.693" N	149° 36' 37.642" W	15.505	0.063	0	19020502005127	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	603	4163.894	63° 1' 33.294" N	149° 33' 53.465" W	0.304	0.001	0	19020502005113	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	603	1251.774	63° 1' 46.986" N	149° 34' 54.863" W	15.415	0.062	0	19020502005084	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	603	4666.957	63° 1' 45.552" N	149° 36' 53.835" W	0.312	0.001	0	19020502005099	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	603	4078.178	63° 1' 9.694" N	149° 36' 51.464" W	3.185	0.013	0	19020502005148	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	603	1220.412	63° 1' 14.433" N	149° 35' 3.346" W	1.115	0.005	0	19020502005139	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	604	1486.555	63° 0' 21.762" N	149° 35' 31.241" W	0.374	0.002	0	19020502005190	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	604	3883.204	62° 59' 55.664" N	149° 34' 39.387" W	25.011	0.101	0	19020502005197	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	605	5076.876	62° 59' 45.973" N	149° 38' 45.526" W	2.030	0.008	0	19020502004556	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	605	5070.556	62° 59' 50.494" N	149° 38' 41.731" W	0.625	0.003	0	19020502004555	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	605	3434.579	62° 59' 26.668" N	149° 35' 57.086" W	1.193	0.005	0	19020502004570	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	605	1325.446	62° 59' 57.067" N	149° 36' 19.756" W	0.246	0.001	0	19020502004548	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	606	3868.172	62° 59' 40.294" N	149° 38' 15.006" W	0.492	0.002	0	19020502004563	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	606	3152.194	62° 58' 49.029" N	149° 36' 29.057" W	2.983	0.012	0	19020502004588	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	606	2427.633	62° 59' 17.885" N	149° 38' 20.796" W	0.718	0.003	0	19020502004573	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	606	1929.892	62° 59' 11.838" N	149° 38' 16.199" W	2.060	0.008	0	19020502004574	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	606	3193.366	62° 58' 47.627" N	149° 38' 33.497" W	1.920	0.008	0	19020502004590	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	606	2056.389	62° 59' 19.880" N	149° 38' 8.215" W	0.488	0.002	0	19020502004571	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	606	3752.651	62° 58' 52.719" N	149° 38' 51.499" W	0.701	0.003	0	19020502004585	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	607	3125.323	62° 58' 40.218" N	149° 38' 41.985" W	1.706	0.007	0	19020502004599	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	607	5152.429	62° 58' 24.980" N	149° 39' 46.035" W	0.800	0.003	0	19020502004614	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	607	1830.323	62° 58' 4.205" N	149° 37' 16.172" W	4.639	0.019	0	19020502004631	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	607	3391.520	62° 58' 18.935" N	149° 39' 8.822" W	1.004	0.004	0	19020502004620	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	608	2691.169	62° 57' 59.464" N	149° 38' 45.984" W	1.561	0.006	0	19020502004635	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	608	2424.446	62° 57' 50.901" N	149° 39' 15.228" W	1.012	0.004	0	19020502004648	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	609	5098.698	62° 56' 34.358" N	149° 38' 19.790" W	0.322	0.001	0	19020502004705	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	611	5260.232	62° 55' 39.691" N	149° 43' 50.056" W	1.275	0.005	0	19020502004733	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	612	5219.672	62° 54' 16.685" N	149° 41' 3.858" W	3.779	0.015	0	19020502004806	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	612	1346.645	62° 54' 27.556" N	149° 42' 44.716" W	1.334	0.005	1319	19020502004796	39009	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	613	5439.658	62° 53' 12.051" N	149° 43' 15.491" W	0.300	0.001	0	19020502004836	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	613	4628.283	62° 53' 52.163" N	149° 41' 52.528" W	57.486	0.233	0	19020502004817	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	613	4734.134	62° 53' 33.736" N	149° 42' 32.411" W	8.646	0.035	0	19020502004829	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	613	1246.739	62° 54' 4.376" N	149° 43' 14.641" W	28.266	0.114	0	19020502004807	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	613	4031.164	62° 53' 39.340" N	149° 42' 41.706" W	2.691	0.011	0	19020502004825	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	613	4723.132	62° 53' 42.718" N	149° 42' 27.427" W	1.378	0.006	0	19020502004823	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	613	3128.512	62° 54' 33.748" N	149° 44' 12.645" W	0.721	0.003	0	19020502004787	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	615	4473.921	62° 52' 27.482" N	149° 46' 10.172" W	16.416	0.066	0	19020502004858	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	616	3014.317	62° 53' 2.963" N	149° 49' 18.358" W	0.783	0.003	0	19020502004839	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	616	2772.799	62° 53' 5.190" N	149° 49' 3.452" W	2.131	0.009	0	19020502004834	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	617	2220.161	62° 52' 6.316" N	149° 50' 20.770" W	1.232	0.005	0	19020502004877	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	617	1455.178	62° 52' 16.680" N	149° 50' 2.951" W	0.201	0.001	0	19020502004865	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	617	1527.802	62° 52' 13.542" N	149° 50' 14.174" W	0.577	0.002	0	19020502004868	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	617	2707.228	62° 52' 57.200" N	149° 49' 54.446" W	1.488	0.006	0	19020502004842	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	617	2929.535	62° 52' 57.763" N	149° 49' 46.246" W	2.336	0.009	0	19020502004844	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	617	5740.831	62° 53' 29.275" N	149° 50' 1.696" W	4.437	0.018	0	19020502004827	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	617	1114.349	62° 52' 21.756" N	149° 49' 59.827" W	0.476	0.002	0	19020502004862	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	618	3344.370	62° 51' 55.877" N	149° 52' 56.283" W	1.941	0.008	0	19020502004885	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	618	4824.943	62° 51' 37.223" N	149° 50' 5.018" W	1.821	0.007	0	19020502004908	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	618	5352.472	62° 51' 15.999" N	149° 50' 28.898" W	0.896	0.004	0	19020502004935	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	618	4561.201	62° 51' 42.999" N	149° 50' 5.623" W	1.003	0.004	0	19020502004901	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	618	1846.858	62° 51' 51.852" N	149° 52' 22.073" W	1.461	0.006	0	19020502004893	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	619	895.938	62° 51' 19.190" N	149° 52' 59.934" W	0.997	0.004	0	19020502004926	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	619	5174.076	62° 50' 43.418" N	149° 51' 10.120" W	2.879	0.012	0	19020502004974	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	619	1422.984	62° 51' 7.810" N	149° 52' 9.577" W	2.004	0.008	0	19020502004951	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	619	3778.304	62° 51' 53.774" N	149° 53' 6.119" W	0.930	0.004	0	19020502004890	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	619	2568.083	62° 51' 0.399" N	149° 53' 32.337" W	6.259	0.025	0	19020502004955	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	619	2003.944	62° 51' 33.859" N	149° 52' 9.753" W	0.711	0.003	0	19020502004910	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	619	1603.699	62° 51' 10.499" N	149° 53' 14.107" W	1.597	0.006	0	19020502004939	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	619	1629.342	62° 51' 13.522" N	149° 53' 16.898" W	1.410	0.006	0	19020502004931	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	619	1398.554	62° 51' 13.647" N	149° 53' 9.124" W	1.489	0.006	0	19020502004929	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	619	2168.595	62° 50' 55.610" N	149° 52' 53.609" W	0.983	0.004	0	19020502004959	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	619	1986.937	62° 51' 7.003" N	149° 53' 19.803" W	2.789	0.011	0	19020502004945	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	619	2275.324	62° 51' 6.561" N	149° 51' 51.169" W	1.117	0.005	0	19020502004953	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	619	1291.124	62° 51' 29.879" N	149° 52' 19.589" W	2.548	0.010	0	19020502004914	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	619	1385.977	62° 51' 12.087" N	149° 52' 6.202" W	1.548	0.006	0	19020502004937	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	620	1935.481	62° 50' 11.236" N	149° 53' 48.758" W	3.833	0.016	0	19020502004988	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	620	2257.412	62° 50' 45.314" N	149° 53' 54.798" W	2.423	0.010	0	19020502004971	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	620	2227.766	62° 50' 46.935" N	149° 53' 50.483" W	1.666	0.007	0	19020502004967	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	620	2222.722	62° 50' 48.229" N	149° 53' 43.134" W	1.177	0.005	0	19020502004965	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	620	2177.154	62° 50' 46.032" N	149° 53' 45.011" W	0.585	0.002	0	19020502004972	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	620	4841.370	62° 50' 39.106" N	149° 51' 23.437" W	2.772	0.011	0	19020502004979	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	620	2611.389	62° 50' 54.826" N	149° 53' 28.848" W	0.635	0.003	0	19020502004961	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	621	2752.111	62° 49' 16.308" N	149° 54' 13.052" W	0.281	0.001	0	19020502005024	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	622	1660.190	62° 48' 54.292" N	149° 55' 43.615" W	0.735	0.003	0	19020502005036	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	622	4273.826	62° 48' 28.763" N	149° 55' 10.761" W	2.374	0.010	0	19020502005049	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	622	1685.855	62° 49' 19.087" N	149° 54' 39.003" W	28.794	0.117	0	19020502005016	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	622	1627.747	62° 49' 25.730" N	149° 55' 13.164" W	1.868	0.008	0	19020502005013	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	622	1376.025	62° 49' 22.793" N	149° 55' 54.609" W	0.426	0.002	0	19020502005021	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	622	1914.603	62° 49' 4.940" N	149° 54' 52.219" W	2.616	0.011	0	19020502005027	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	622	1520.556	62° 49' 0.583" N	149° 55' 10.033" W	1.019	0.004	0	19020502005030	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	623	3533.632	62° 48' 5.715" N	149° 56' 29.838" W	0.957	0.004	0	19020502005055	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	623	304.394	62° 48' 42.364" N	149° 57' 8.457" W	1.022	0.004	0	19020502005041	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	624	2914.130	62° 48' 3.538" N	149° 57' 27.801" W	1.581	0.006	0	19020502005059	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	624	3468.685	62° 47' 34.213" N	149° 58' 17.595" W	0.894	0.004	0	19020502005078	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	625	2253.234	62° 47' 59.112" N	149° 59' 55.240" W	1.328	0.005	0	19020502005061	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	625	2614.880	62° 47' 30.301" N	149° 59' 1.822" W	8.055	0.033	0	19020502005076	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	625	1834.653	62° 47' 56.018" N	150° 0' 2.947" W	1.818	0.007	0	19020502005064	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	625	2556.066	62° 47' 30.411" N	150° 1' 2.360" W	4.819	0.020	0	19020502005367	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	625	4142.395	62° 48' 9.418" N	150° 0' 57.656" W	1.133	0.005	0	19020502005358	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	625	2241.027	62° 47' 52.374" N	150° 0' 38.214" W	1.321	0.005	0	19020502005362	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	626	1946.901	62° 47' 21.436" N	150° 1' 10.417" W	1.453	0.006	0	19020502005371	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	626	1926.833	62° 47' 20.966" N	150° 1' 6.024" W	1.492	0.006	0	19020502005370	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	626	846.211	62° 47' 10.969" N	150° 1' 20.623" W	0.650	0.003	0	19020502005372	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	627	2839.523	62° 46' 38.052" N	150° 3' 48.692" W	1.353	0.005	0	19020502005381	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	627	2957.712	62° 46' 51.576" N	150° 3' 25.704" W	2.105	0.009	0	19020502005378	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	627	1696.267	62° 46' 43.278" N	150° 2' 54.402" W	1.017	0.004	0	19020502005379	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	627	4386.884	62° 46' 14.326" N	150° 1' 17.351" W	1.182	0.005	0	19020502005383	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	627	4294.333	62° 45' 56.806" N	150° 1' 38.525" W	2.316	0.009	0	19020502005386	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	627	2765.699	62° 45' 58.666" N	150° 2' 28.030" W	4.183	0.017	0	19020502005387	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	627	3493.120	62° 45' 44.347" N	150° 2' 34.730" W	26.414	0.107	0	19020502005390	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	627	3272.889	62° 45' 51.171" N	150° 3' 2.167" W	3.743	0.015	853	19020502005391	39009	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	627	2822.876	62° 46' 41.510" N	150° 3' 43.032" W	0.564	0.002	0	19020502005380	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	628	2172.562	62° 45' 39.459" N	150° 3' 49.880" W	0.907	0.004	0	19020502005396	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	628	3783.351	62° 45' 35.253" N	150° 3' 6.942" W	6.358	0.026	0	19020502005398	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	628	2317.242	62° 45' 31.872" N	150° 4' 9.954" W	1.405	0.006	0	19020502005399	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	628	4873.173	62° 45' 26.549" N	150° 2' 53.333" W	3.787	0.015	0	19020502005400	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	628	4372.296	62° 45' 12.245" N	150° 4' 3.436" W	1.367	0.006	0	19020502005407	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	628	844.390	62° 45' 46.521" N	150° 4' 31.927" W	0.861	0.003	0	19020502005395	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	628	2484.771	62° 45' 49.026" N	150° 3' 28.407" W	3.133	0.013	0	19020502005392	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	629	440.366	62° 45' 25.182" N	150° 5' 57.706" W	0.245	0.001	0	19020502005402	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	629	2580.255	62° 45' 8.588" N	150° 6' 34.319" W	0.433	0.002	0	19020502005411	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	629	523.704	62° 45' 25.477" N	150° 5' 51.112" W	0.935	0.004	0	19020502005401	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	629	1479.793	62° 45' 20.616" N	150° 5' 34.876" W	0.369	0.001	0	19020502005403	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	629	1854.373	62° 45' 19.970" N	150° 5' 26.418" W	0.284	0.001	0	19020502005404	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	629	1629.583	62° 45' 12.636" N	150° 6' 10.807" W	1.405	0.006	0	19020502005408	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	629	2169.251	62° 45' 20.172" N	150° 6' 45.039" W	0.253	0.001	0	19020502005406	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	629	2097.079	62° 45' 10.833" N	150° 6' 22.983" W	0.463	0.002	0	19020502005409	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	630	3189.750	62° 44' 56.214" N	150° 6' 15.507" W	2.073	0.008	0	19020502003548	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	630	1397.033	62° 45' 9.083" N	150° 7' 9.058" W	0.559	0.002	0	19020502005410	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	630	1973.389	62° 44' 13.081" N	150° 7' 0.000" W	350.819	1.420	816	19020502003357	39009	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	630	3975.858	62° 44' 42.579" N	150° 6' 8.295" W	0.748	0.003	0	19020502003552	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	631	1279.316	62° 44' 14.514" N	150° 9' 17.013" W	1.367	0.006	0	19020502003555	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	631	2637.482	62° 43' 54.884" N	150° 8' 16.811" W	10.592	0.043	0	19020502003561	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	631	3345.326	62° 44' 12.679" N	150° 7' 35.896" W	1.000	0.004	0	19020502003558	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	631	1780.053	62° 44' 11.052" N	150° 9' 25.020" W	1.024	0.004	895	19020502003557	39009	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	632	4930.766	62° 43' 7.938" N	150° 9' 11.920" W	0.343	0.001	0	19020502003590	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water	632	2214.471	62° 43' 24.969" N	150° 10' 16.119" W	0.514	0.002	890	19020502003566	39009	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
	Elevation												
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	632	2266.251	62° 43' 39.189" N	150° 9' 29.489" W	0.388	0.002	0	19020502003562	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	633	3308.450	62° 42' 54.176" N	150° 10' 52.825" W	0.614	0.002	0	19020502003599	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	633	2789.226	62° 42' 50.813" N	150° 11' 14.224" W	2.038	0.008	0	19020502003600	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	633	294.306	62° 43' 22.126" N	150° 11' 51.731" W	7.023	0.028	0	19020502003565	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	634	1003.619	62° 42' 26.958" N	150° 12' 39.385" W	0.270	0.001	0	19020502003614	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	635	4991.212	62° 41' 24.996" N	150° 12' 34.064" W	1.299	0.005	0	19020502003640	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	635	3910.308	62° 41' 31.613" N	150° 12' 53.841" W	0.405	0.002	0	19020502003638	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	636	2124.451	62° 40' 41.892" N	150° 14' 54.162" W	7.003	0.028	0	19020502003665	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	636	4835.539	62° 41' 4.220" N	150° 12' 48.589" W	12.671	0.051	0	19020502003659	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	636	3968.413	62° 41' 9.425" N	150° 13' 8.246" W	4.134	0.017	0	19020502003654	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	636	1533.782	62° 41' 7.477" N	150° 15' 21.649" W	6.075	0.025	0	19020502003655	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	638	3959.214	62° 39' 39.629" N	150° 12' 9.408" W	0.445	0.002	0	19020502003691	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	639	619.476	62° 38' 44.206" N	150° 13' 31.183" W	1.184	0.005	0	19020502003716	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	641	4350.786	62° 36' 49.536" N	150° 11' 52.848" W	3.078	0.012	0	19020502003746	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	642	1868.111	62° 36' 34.419" N	150° 13' 48.526" W	4.672	0.019	0	19020502003751	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	643	1992.313	62° 35' 37.564" N	150° 13' 43.783" W	0.360	0.001	0	19020502003776	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	643	2095.030	62° 35' 37.497" N	150° 13' 38.213" W	0.727	0.003	0	19020502003775	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	644	5575.365	62° 34' 14.117" N	150° 16' 7.612" W	0.308	0.001	0	19020502003812	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	644	5287.517	62░ 34' 10.101" N	150░ 15' 58.711" W	0.867	0.004	0	19020502003815	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	644	5015.874	62░ 34' 51.239" N	150░ 12' 32.510" W	1.159	0.005	0	19020502003796	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	645	5208.313	62░ 33' 31.389" N	150░ 15' 57.912" W	0.282	0.001	0	19020502003851	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	645	5571.231	62░ 33' 57.356" N	150░ 16' 7.152" W	0.330	0.001	0	19020502003818	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	645	5288.882	62░ 33' 50.924" N	150░ 16' 3.391" W	0.256	0.001	0	19020502003819	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	645	5337.754	62░ 33' 31.796" N	150░ 16' 1.782" W	0.438	0.002	0	19020502003849	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	646	5679.729	62░ 33' 18.025" N	150░ 16' 29.935" W	5.428	0.022	776	19020502003869	39009	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	647	1683.089	62░ 31' 59.761" N	150░ 14' 49.890" W	10.551	0.043	0	19020502003935	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	647	641.682	62░ 32' 5.334" N	150░ 14' 18.924" W	0.595	0.002	0	19020502003942	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	647	1773.849	62░ 31' 52.229" N	150░ 14' 24.676" W	3.688	0.015	0	19020502003969	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	647	3317.161	62░ 32' 4.756" N	150░ 12' 56.433" W	1.372	0.006	0	19020502003949	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	647	3630.053	62░ 32' 10.122" N	150░ 12' 50.622" W	0.933	0.004	0	19020502003933	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	647	3742.374	62░ 32' 20.346" N	150░ 12' 50.012" W	0.938	0.004	0	19020502003918	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	647	4201.560	62░ 32' 32.223" N	150░ 12' 51.359" W	0.218	0.001	0	19020502003907	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	647	2624.810	62░ 31' 56.124" N	150░ 15' 9.986" W	12.348	0.050	0	19020502003951	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	648	4656.426	62░ 30' 50.276" N	150░ 13' 8.848" W	1.971	0.008	0	19020502004049	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	648	4831.348	62░ 31' 12.354" N	150░ 12' 41.690" W	1.100	0.004	0	19020502004022	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	648	995.260	62░ 31' 38.576" N	150░ 14' 42.638" W	18.164	0.074	0	19020502003975	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	648	1917.514	62° 31' 26.034" N	150° 15' 8.118" W	0.954	0.004	0	19020502004004	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	648	1617.246	62° 31' 13.124" N	150° 15' 1.760" W	4.346	0.018	0	19020502004016	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	648	2487.664	62° 31' 7.651" N	150° 15' 14.624" W	2.420	0.010	0	19020502004021	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	648	4877.603	62° 31' 3.057" N	150° 12' 47.241" W	0.419	0.002	0	19020502004035	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	648	3763.553	62° 31' 49.237" N	150° 15' 31.512" W	11.495	0.047	0	19020502003960	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	648	5201.502	62° 31' 1.028" N	150° 12' 41.651" W	0.685	0.003	0	19020502004039	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	649	5037.004	62° 30' 49.330" N	150° 17' 22.447" W	16.876	0.068	0	19020502004033	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	649	2577.860	62° 31' 4.188" N	150° 15' 23.627" W	1.813	0.007	0	19020502004028	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	649	5087.417	62° 31' 25.838" N	150° 16' 34.874" W	57.517	0.233	0	19020502003983	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	649	2485.939	62° 30' 14.623" N	150° 14' 53.928" W	4.326	0.018	0	19020502004077	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	649	2583.539	62° 30' 22.803" N	150° 16' 14.619" W	0.697	0.003	0	19020502004072	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	649	2156.979	62° 31' 0.065" N	150° 15' 15.569" W	1.719	0.007	0	19020502004031	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	649	3550.868	62° 30' 43.571" N	150° 16' 41.118" W	0.393	0.002	0	19020502004055	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	650	3457.745	62° 30' 26.438" N	150° 16' 48.231" W	2.003	0.008	0	19020502004066	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	650	2695.702	62° 29' 41.352" N	150° 17' 16.714" W	1.263	0.005	0	19020502003392	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	650	2183.046	62° 30' 12.482" N	150° 16' 41.590" W	1.286	0.005	0	19020502004078	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	650	5045.308	62° 30' 2.956" N	150° 18' 8.350" W	0.773	0.003	0	19020502004086	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	650	3656.613	62° 29' 45.029" N	150° 17' 46.389" W	5.253	0.021	729	19020502003388	39009	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	650	1823.041	62° 29' 56.743" N	150° 17' 0.310" W	0.586	0.002	0	19020502003383	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	650	5412.628	62° 30' 34.509" N	150° 17' 33.383" W	0.483	0.002	0	19020502004061	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	650	2761.602	62° 29' 45.140" N	150° 17' 19.365" W	0.350	0.001	0	19020502003390	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	650	4996.650	62° 30' 5.719" N	150° 18' 5.636" W	0.494	0.002	0	19020502004084	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	650	3215.954	62° 29' 54.507" N	150° 15' 12.025" W	0.387	0.002	0	19020502003386	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	650	4638.181	62° 30' 32.970" N	150° 17' 8.816" W	0.774	0.003	0	19020502004063	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	650	2524.049	62° 30' 17.115" N	150° 16' 9.424" W	0.497	0.002	0	19020502004076	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	650	1985.594	62° 30' 10.023" N	150° 16' 41.066" W	0.417	0.002	0	19020502004081	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	650	5140.441	62° 30' 27.441" N	150° 18' 15.124" W	77.159	0.312	730	19020502004056	39009	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	650	1707.491	62° 30' 9.674" N	150° 16' 13.094" W	0.819	0.003	0	19020502004082	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	650	2664.484	62° 29' 47.261" N	150° 17' 18.555" W	0.231	0.001	0	19020502003389	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	651	4164.019	62° 29' 25.498" N	150° 17' 46.767" W	0.633	0.003	0	19020502003399	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	651	4455.550	62° 28' 56.324" N	150° 18' 10.253" W	0.325	0.001	0	19020502003404	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	651	3870.013	62° 29' 15.034" N	150° 17' 51.722" W	0.931	0.004	0	19020502003402	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	651	4452.929	62° 29' 14.549" N	150° 18' 7.640" W	3.224	0.013	0	19020502003401	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	651	4391.116	62° 29' 29.228" N	150° 17' 47.756" W	0.750	0.003	0	19020502003396	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	651	4165.885	62° 29' 22.842" N	150° 17' 49.857" W	0.486	0.002	0	19020502003400	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	652	5040.887	62° 27' 51.579" N	150° 17' 59.148" W	0.368	0.001	0	19020502003420	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	652	4348.330	62° 27' 50.527" N	150° 17' 41.817" W	0.383	0.002	0	19020502003421	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	652	5182.214	62° 27' 49.456" N	150° 18' 0.176" W	0.270	0.001	0	19020502003423	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	653	1579.951	62° 27' 32.544" N	150° 16' 38.927" W	0.901	0.004	0	19020502003433	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	653	2405.851	62° 27' 7.001" N	150° 15' 33.292" W	2.427	0.010	0	19020502003451	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	653	4427.877	62° 27' 46.172" N	150° 17' 39.918" W	1.569	0.006	0	19020502003425	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	653	4390.214	62° 27' 7.057" N	150° 17' 57.566" W	0.745	0.003	0	19020502003449	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	653	5383.292	62° 26' 54.963" N	150° 18' 11.384" W	0.906	0.004	0	19020502003459	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	653	4863.000	62° 26' 45.372" N	150° 17' 44.504" W	1.215	0.005	0	19020502003467	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	653	2707.986	62° 26' 59.971" N	150° 15' 37.746" W	0.360	0.001	0	19020502003457	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	653	3901.217	62° 27' 3.507" N	150° 17' 44.208" W	0.343	0.001	0	19020502003454	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	653	4379.721	62° 27' 37.828" N	150° 17' 47.900" W	0.477	0.002	0	19020502003430	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	653	1999.768	62° 27' 13.717" N	150° 17' 7.582" W	0.632	0.003	0	19020502003448	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	653	1795.451	62° 27' 6.980" N	150° 17' 2.409" W	1.241	0.005	0	19020502003450	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	653	4733.701	62° 26' 50.278" N	150° 17' 47.971" W	0.509	0.002	0	19020502003464	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	653	4636.865	62° 27' 38.755" N	150° 17' 53.048" W	0.401	0.002	0	19020502003429	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	653	4257.789	62° 27' 42.951" N	150° 17' 36.804" W	0.327	0.001	0	19020502003427	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	653	5174.962	62° 26' 56.878" N	150° 18' 6.420" W	0.322	0.001	0	19020502003456	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	653	3905.914	62° 27' 39.298" N	150° 17' 35.629" W	0.995	0.004	0	19020502003428	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	654	3056.159	62° 26' 30.716" N	150° 17' 6.610" W	1.498	0.006	0	19020502003474	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	654	2802.460	62° 26' 6.846" N	150° 16' 41.045" W	0.383	0.002	0	19020502003482	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	654	1135.003	62° 26' 26.806" N	150° 16' 23.682" W	0.498	0.002	0	19020502003477	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	654	2817.705	62° 26' 15.898" N	150° 16' 56.686" W	2.226	0.009	0	19020502003478	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	654	3927.369	62° 26' 2.270" N	150° 17' 6.416" W	0.854	0.003	0	19020502003486	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	654	4170.875	62° 26' 31.955" N	150° 17' 27.856" W	0.567	0.002	0	19020502003473	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	654	282.720	62° 26' 23.801" N	150° 15' 45.468" W	12.225	0.049	570	19020502003476	39009	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	655	4327.555	62° 25' 15.839" N	150° 17' 18.509" W	0.237	0.001	0	19020502003516	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	655	3943.186	62° 25' 41.109" N	150° 17' 19.389" W	0.356	0.001	0	19020502003497	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	655	5280.886	62° 25' 25.030" N	150° 17' 50.412" W	1.664	0.007	0	19020502003511	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	655	1757.548	62° 25' 26.318" N	150° 16' 29.804" W	0.602	0.002	0	19020502003512	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	655	3282.773	62° 25' 56.747" N	150° 16' 51.248" W	6.580	0.027	0	19020502003489	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	655	3497.804	62° 25' 10.341" N	150° 17' 0.556" W	6.425	0.026	0	19020502003517	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	655	4492.453	62° 25' 40.573" N	150° 17' 31.637" W	0.365	0.001	0	19020502003498	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	655	2481.615	62° 25' 28.508" N	150° 16' 48.889" W	1.061	0.004	0	19020502003508	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	655	4290.943	62° 25' 39.235" N	150° 17' 26.432" W	0.379	0.002	0	19020502003499	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	655	1714.036	62° 25' 51.597" N	150° 16' 8.711" W	0.383	0.002	0	19020502003492	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	655	5152.641	62° 25' 43.511" N	150° 17' 47.110" W	1.293	0.005	0	19020502003495	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	655	4435.272	62° 25' 13.892" N	150° 17' 18.359" W	0.261	0.001	0	19020502003519	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	655	2324.955	62° 25' 15.710" N	150° 16' 23.799" W	0.354	0.001	0	19020502003518	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	655	5144.881	62° 25' 41.469" N	150° 17' 43.570" W	0.187	0.001	0	19020502003496	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	655	2408.575	62° 25' 22.143" N	150° 16' 39.178" W	0.261	0.001	0	19020502003514	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	656	4467.843	62° 24' 35.840" N	150° 17' 20.194" W	23.857	0.097	557	19020502003526	39009	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	656	3680.825	62° 24' 23.246" N	150° 16' 43.062" W	3.949	0.016	0	19020502003529	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	656	2120.732	62° 25' 4.153" N	150° 15' 51.608" W	0.345	0.001	0	19020502003521	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	656	3793.904	62° 25' 3.912" N	150° 16' 47.286" W	1.407	0.006	0	19020502003520	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	657	2381.760	62° 23' 38.302" N	150° 16' 27.443" W	0.239	0.001	0	19020502003537	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	657	2609.039	62° 23' 34.041" N	150° 16' 27.601" W	0.441	0.002	0	19020502003540	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	657	2314.136	62° 23' 39.765" N	150° 16' 27.645" W	0.240	0.001	0	19020502003536	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	657	4406.500	62° 23' 59.185" N	150° 17' 18.913" W	0.429	0.002	0	19020502005873	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	657	4488.030	62° 24' 10.317" N	150° 17' 13.718" W	0.446	0.002	0	19020502003532	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	657	3302.003	62° 23' 54.687" N	150° 16' 56.978" W	1.355	0.005	0	19020502003534	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	657	3275.713	62° 24' 9.847" N	150° 16' 45.199" W	0.260	0.001	0	19020502003533	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	657	3404.128	62° 24' 12.826" N	150° 16' 45.728" W	0.517	0.002	0	19020502003531	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	657	2530.664	62° 23' 36.139" N	150° 16' 27.631" W	0.172	0.001	0	19020502003538	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	657	2678.976	62° 23' 35.578" N	150° 16' 31.029" W	0.200	0.001	0	19020502003539	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	657	1297.761	62° 23' 56.417" N	150° 16' 12.640" W	0.207	0.001	0	19020502003535	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	659	897.613	62° 22' 21.770" N	150° 15' 41.770" W	2.011	0.008	0	19020502005874	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Chulitna River	Lake/Pond: Hydrographic Category = Perennial	659	1482.285	62° 22' 28.591" N	150° 15' 44.582" W	4.405	0.018	0	19020502003541	39004	Perennial	19020502	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	312	5019.616	66° 26' 11.259" N	150° 39' 42.415" W	1.428	0.006	0	19040604005623	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	312	2402.800	66° 26' 36.706" N	150° 36' 50.681" W	1.511	0.006	0	19040604005611	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	312	4243.020	66° 26' 25.129" N	150° 35' 51.586" W	0.654	0.003	0	19040604005616	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	312	3466.815	66° 26' 23.123" N	150° 36' 10.160" W	0.571	0.002	0	19040604005619	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	313	4331.215	66° 26' 7.629" N	150° 34' 51.498" W	2.119	0.009	0	19040604005622	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	314	4142.767	66° 25' 35.966" N	150° 33' 11.020" W	15.806	0.064	0	19040604005631	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	314	4252.363	66° 25' 42.989" N	150° 33' 44.993" W	10.308	0.042	0	19040604005630	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	314	3752.523	66° 25' 40.212" N	150° 34' 13.853" W	2.733	0.011	0	19040604005632	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	314	3467.760	66° 25' 33.461" N	150° 33' 52.076" W	3.456	0.014	0	19040604005635	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	314	4086.335	66° 25' 40.524" N	150° 33' 58.741" W	0.911	0.004	0	19040604005633	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	315	5024.489	66° 25' 18.012" N	150° 32' 19.129" W	21.512	0.087	0	19040604005638	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	315	5020.307	66° 25' 0.473" N	150° 31' 24.344" W	2.660	0.011	0	19040604005640	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	316	4608.856	66° 24' 8.484" N	150° 29' 32.382" W	2.651	0.011	0	19040604005590	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	316	4371.021	66° 24' 34.414" N	150° 30' 43.583" W	0.326	0.001	0	19040604005643	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	316	3843.376	66° 24' 21.631" N	150° 30' 18.013" W	0.417	0.002	0	19040604005644	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	316	4122.213	66° 23' 50.185" N	150° 29' 42.819" W	1.015	0.004	0	19040604005591	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	316	1647.138	66° 24' 10.668" N	150° 31' 9.375" W	1.637	0.007	0	19040604005648	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	316	2041.724	66° 24' 12.009" N	150° 30' 35.319" W	9.580	0.039	0	19040604005645	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	316	4596.775	66° 24' 13.140" N	150° 29' 39.919" W	1.205	0.005	0	19040604005589	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	316	3402.703	66° 24' 14.821" N	150° 30' 18.003" W	0.369	0.001	0	19040604005646	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	316	1833.535	66° 24' 10.384" N	150° 30' 57.156" W	2.252	0.009	0	19040604005647	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	316	3763.723	66° 23' 50.078" N	150° 29' 51.399" W	0.747	0.003	0	19040604005592	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	316	5360.587	66° 24' 45.683" N	150° 30' 33.309" W	3.772	0.015	0	19040604005641	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	316	4647.584	66° 24' 38.844" N	150° 30' 51.306" W	0.419	0.002	0	19040604005642	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kanuti River	Lake/Pond: Hydrographic Category = Perennial	317	4097.884	66° 23' 45.182" N	150° 29' 39.190" W	0.747	0.003	0	19040604005593	39004	Perennial	19040604	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	0	3485.045	70° 19' 42.080" N	148° 30' 50.836" W	43.486	0.176	0	19060401010144	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	0	2994.214	70° 19' 10.865" N	148° 32' 10.438" W	6.823	0.028	0	19060401010184	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	0	2608.134	70° 19' 0.715" N	148° 32' 7.554" W	9.116	0.037	0	19060401010197	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	0	3643.784	70° 19' 30.761" N	148° 31' 53.379" W	2.207	0.009	0	19060401010165	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	0	3912.907	70° 19' 40.116" N	148° 31' 23.534" W	4.725	0.019	0	19060401010154	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	0	2135.194	70° 18' 47.807" N	148° 31' 38.611" W	2.721	0.011	0	19060401010217	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	0	3402.343	70° 19' 31.332" N	148° 29' 31.104" W	19.928	0.081	0	19060401010162	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	0	1981.122	70° 18' 53.124" N	148° 31' 43.572" W	2.833	0.011	0	19060401010207	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	0	2932.640	70° 19' 16.332" N	148° 31' 58.449" W	2.282	0.009	0	19060401010181	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	0	3148.224	70° 19' 25.262" N	148° 31' 45.225" W	2.260	0.009	0	19060401010170	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	0	3299.308	70° 19' 3.308" N	148° 29' 2.980" W	1.931	0.008	0	19060401010198	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	0	3421.347	70° 19' 37.444" N	148° 30' 11.135" W	4.342	0.018	0	19060401010157	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	0	3591.609	70° 19' 31.296" N	148° 31' 46.231" W	3.005	0.012	0	19060401010164	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	1	4322.259	70° 18' 46.443" N	148° 33' 33.106" W	1.570	0.006	0	19060401010218	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	1	2432.909	70° 17' 50.617" N	148° 30' 52.749" W	15.529	0.063	0	19060401010287	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	1	2844.129	70° 18' 3.000" N	148° 33' 57.638" W	105.040	0.425	0	19060401010256	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	1	3513.857	70° 18' 34.043" N	148° 33' 30.781" W	2.713	0.011	0	19060401010233	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	1	3256.832	70° 18' 48.763" N	148° 32' 41.420" W	3.881	0.016	0	19060401010213	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	1	3089.515	70° 18' 41.004" N	148° 33' 1.578" W	2.393	0.010	0	19060401010224	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	1	2353.281	70° 18' 7.932" N	148° 33' 7.374" W	2.603	0.011	0	19060401010269	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	1	1437.495	70° 18' 10.729" N	148° 32' 45.130" W	5.541	0.022	0	19060401010261	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	1	2051.496	70° 18' 14.037" N	148° 30' 50.541" W	2.048	0.008	0	19060401010260	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	1	3306.332	70° 18' 38.390" N	148° 33' 20.045" W	3.122	0.013	0	19060401010225	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	2	2972.191	70° 17' 7.445" N	148° 31' 51.423" W	2.325	0.009	0	19060401010359	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	2	539.202	70° 17' 35.008" N	148° 33' 9.012" W	4.537	0.018	0	19060401010318	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	2	2889.179	70° 17' 43.982" N	148° 34' 12.205" W	0.662	0.003	0	19060401010304	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	2	3070.494	70° 17' 2.496" N	148° 32' 3.588" W	2.013	0.008	0	19060401010365	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	2	2184.503	70° 17' 25.569" N	148° 34' 13.674" W	8.789	0.036	0	19060401010331	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	2	3724.513	70° 17' 41.819" N	148° 34' 46.519" W	2.760	0.011	0	19060401010301	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	2	3020.124	70° 17' 59.224" N	148° 33' 19.651" W	3.293	0.013	0	19060401010282	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	2	5215.448	70░ 16' 44.750" N	148░ 31' 31.220" W	10.269	0.042	0	19060401010385	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	2	1447.003	70░ 17' 25.969" N	148░ 31' 28.335" W	65.754	0.266	0	19060401010326	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	2	3877.356	70░ 17' 39.101" N	148░ 34' 52.820" W	3.297	0.013	0	19060401010307	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	2	3729.374	70░ 17' 45.672" N	148░ 34' 40.971" W	2.430	0.010	0	19060401010298	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	2	3118.803	70░ 17' 43.754" N	148░ 34' 20.314" W	0.868	0.004	0	19060401010303	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	3	5931.598	70░ 17' 5.424" N	148░ 37' 55.799" W	12.660	0.051	0	19060401010355	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	3	2855.252	70░ 16' 44.355" N	148░ 33' 28.033" W	1.655	0.007	0	19060401010388	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	3	4999.014	70░ 16' 56.786" N	148░ 37' 42.089" W	32.294	0.131	0	19060401010363	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	3	3292.313	70░ 16' 48.063" N	148░ 36' 45.851" W	9.085	0.037	0	19060401010377	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	3	1735.211	70░ 16' 57.403" N	148░ 36' 0.005" W	4.210	0.017	0	19060401010367	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	3	3585.568	70░ 17' 29.768" N	148░ 35' 51.756" W	8.362	0.034	0	19060401010324	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	3	3556.510	70░ 17' 30.777" N	148░ 35' 33.850" W	2.442	0.010	0	19060401010325	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	3	2168.211	70░ 16' 36.059" N	148░ 34' 18.884" W	1.642	0.007	0	19060401010404	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	3	5462.512	70░ 17' 9.571" N	148░ 37' 31.424" W	3.771	0.015	0	19060401010349	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	3	2270.318	70░ 16' 36.762" N	148░ 34' 1.531" W	6.511	0.026	0	19060401010394	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	3	4880.834	70░ 17' 10.866" N	148░ 37' 12.358" W	2.561	0.010	0	19060401010348	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	3	3194.107	70░ 16' 23.665" N	148░ 34' 10.333" W	2.987	0.012	0	19060401010432	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	3	4191.797	70░ 17' 39.481" N	148░ 35' 3.576" W	1.907	0.008	0	19060401010308	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	3	3718.105	70░ 16' 22.419" N	148░ 33' 43.083" W	4.079	0.017	0	19060401010433	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	3	1362.539	70° 16' 56.075" N	148° 34' 4.165" W	2.499	0.010	0	19060401010371	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	3	3694.558	70° 16' 43.576" N	148° 32' 46.594" W	41.253	0.167	0	19060401010380	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	3	4657.644	70° 17' 2.914" N	148° 37' 12.009" W	4.079	0.017	0	19060401010358	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	4	3687.226	70° 16' 13.977" N	148° 34' 6.191" W	1.802	0.007	0	19060401010457	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	4	1269.951	70° 16' 1.847" N	148° 35' 24.001" W	4.319	0.017	0	19060401010489	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	4	933.932	70° 16' 22.508" N	148° 35' 51.190" W	1.621	0.007	0	19060401010439	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	4	5148.347	70° 15' 32.781" N	148° 38' 34.500" W	17.501	0.071	0	19060401010518	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	4	1510.095	70° 16' 19.008" N	148° 34' 49.756" W	9.702	0.039	0	19060401010429	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	4	2280.273	70° 16' 38.899" N	148° 36' 13.144" W	4.020	0.016	0	19060401010392	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	4	5138.868	70° 16' 9.651" N	148° 33' 25.180" W	1.613	0.007	0	19060401010471	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	4	3810.804	70° 16' 10.624" N	148° 37' 54.564" W	1.764	0.007	0	19060401010462	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	4	1167.376	70° 16' 27.938" N	148° 35' 30.250" W	5.908	0.024	0	19060401010415	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	4	3200.740	70° 15' 59.286" N	148° 37' 28.413" W	1.603	0.006	0	19060401010492	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	4	2218.745	70° 15' 59.455" N	148° 35' 0.484" W	2.075	0.008	0	19060401010495	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	4	1276.774	70° 15' 57.701" N	148° 36' 2.634" W	5.210	0.021	0	19060401010499	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	5	2145.853	70° 15' 16.224" N	148° 34' 3.121" W	1.312	0.005	0	19060401010556	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	5	4107.746	70° 15' 32.422" N	148° 32' 45.748" W	10.286	0.042	0	19060401010529	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	5	2158.401	70° 15' 56.117" N	148° 33' 56.231" W	72.847	0.295	0	19060401010474	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	5	1872.824	70° 15' 49.579" N	148° 35' 9.081" W	14.058	0.057	0	19060401010512	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	5	2628.891	70░ 15' 9.465" N	148░ 33' 42.671" W	6.113	0.025	0	19060401010561	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	5	2583.175	70░ 15' 29.976" N	148░ 33' 43.192" W	2.168	0.009	0	19060401010534	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	5	2922.191	70░ 15' 15.449" N	148░ 36' 25.223" W	2.111	0.009	0	19060401010555	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	5	3124.112	70░ 15' 18.033" N	148░ 36' 37.029" W	4.107	0.017	0	19060401010549	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	5	4043.534	70░ 14' 55.677" N	148░ 32' 45.556" W	98.696	0.399	0	19060401009289	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	5	4254.695	70░ 15' 57.262" N	148░ 33' 15.954" W	10.787	0.044	0	19060401010501	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	5	2298.525	70░ 15' 11.180" N	148░ 34' 10.586" W	1.062	0.004	0	19060401010567	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	5	2239.583	70░ 15' 42.355" N	148░ 35' 55.593" W	1.505	0.006	0	19060401010520	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	5	733.742	70░ 15' 33.099" N	148░ 35' 43.848" W	58.484	0.237	29	19060401010523	39009	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	5	2668.018	70░ 15' 19.753" N	148░ 33' 45.462" W	1.157	0.005	0	19060401010551	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	5	2832.439	70░ 15' 27.560" N	148░ 36' 29.602" W	1.540	0.006	0	19060401010535	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	5	2891.738	70░ 15' 19.102" N	148░ 33' 0.477" W	58.388	0.236	0	19060401010536	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	6	2300.909	70░ 14' 28.480" N	148░ 35' 26.252" W	2.216	0.009	0	19060401009313	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	6	1559.429	70░ 14' 41.747" N	148░ 35' 36.233" W	2.222	0.009	0	19060401009306	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	6	2082.539	70░ 14' 27.224" N	148░ 35' 41.033" W	3.680	0.015	0	19060401009315	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	6	4711.090	70░ 14' 14.587" N	148░ 34' 32.951" W	2.076	0.008	0	19060401009331	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	6	4305.137	70░ 14' 34.215" N	148░ 33' 41.287" W	65.980	0.267	0	19060401009307	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	6	4130.866	70░ 14' 8.545" N	148░ 35' 13.320" W	2.351	0.010	0	19060401009339	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	6	5327.681	70° 15' 18.424" N	148° 38' 30.133" W	2.982	0.012	0	19060401010548	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	6	5088.403	70° 14' 11.891" N	148° 34' 15.572" W	7.442	0.030	0	19060401009327	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	6	2472.526	70° 15' 10.827" N	148° 36' 41.198" W	3.301	0.013	0	19060401010564	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	6	2769.536	70° 14' 26.943" N	148° 35' 14.148" W	1.639	0.007	0	19060401009317	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	7	5266.195	70° 13' 37.854" N	148° 40' 17.860" W	15.741	0.064	0	19060401009373	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	7	804.768	70° 14' 6.917" N	148° 37' 35.284" W	1.803	0.007	0	19060401009341	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	7	962.802	70° 13' 52.713" N	148° 36' 6.068" W	190.402	0.771	0	19060401009342	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	7	1422.383	70° 14' 1.553" N	148° 38' 15.140" W	1.956	0.008	0	19060401009346	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	7	3380.498	70° 14' 22.921" N	148° 38' 45.195" W	3.832	0.016	0	19060401009316	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	7	4679.587	70° 14' 18.191" N	148° 39' 40.524" W	4.002	0.016	0	19060401009319	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	7	4459.990	70° 14' 23.942" N	148° 39' 41.489" W	17.947	0.073	0	19060401009314	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	7	3015.196	70° 14' 15.880" N	148° 38' 43.703" W	1.752	0.007	0	19060401009322	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	7	3520.264	70° 13' 54.645" N	148° 39' 18.219" W	1.944	0.008	0	19060401009357	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	7	1176.585	70° 13' 41.556" N	148° 37' 18.888" W	8.968	0.036	0	19060401009374	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	7	524.641	70° 13' 51.501" N	148° 37' 59.162" W	22.452	0.091	0	19060401009355	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	7	1919.129	70° 14' 13.830" N	148° 36' 40.564" W	9.860	0.040	0	19060401009326	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	8	4802.898	70° 13' 10.317" N	148° 35' 12.510" W	2.029	0.008	0	19060401009418	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	8	2267.382	70° 12' 44.582" N	148° 37' 36.106" W	7.825	0.032	0	19060401009443	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	8	5132.527	70° 13' 3.459" N	148° 35' 3.933" W	1.533	0.006	0	19060401009424	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	8	5797.436	70░ 13' 3.118" N	148░ 40' 27.381" W	2.826	0.011	0	19060401009421	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	8	2793.202	70░ 13' 15.475" N	148░ 36' 15.029" W	2.163	0.009	0	19060401009408	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	8	4280.919	70░ 13' 6.520" N	148░ 35' 25.731" W	5.719	0.023	0	19060401009422	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	8	2267.551	70░ 12' 39.594" N	148░ 35' 57.117" W	346.895	1.404	0	19060401020847	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	8	809.810	70░ 13' 21.611" N	148░ 37' 40.913" W	4.652	0.019	0	19060401009394	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	8	347.602	70░ 13' 12.493" N	148░ 38' 46.293" W	417.710	1.691	45	19060401009376	39009	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	8	3598.448	70░ 13' 28.424" N	148░ 35' 27.862" W	54.458	0.220	0	19060401020846	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	9	2987.663	70░ 12' 16.913" N	148░ 39' 34.953" W	2.163	0.009	0	19060401009468	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	9	1872.148	70░ 11' 58.496" N	148░ 37' 48.229" W	2.399	0.010	0	19060401009489	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	9	4455.336	70░ 11' 54.063" N	148░ 40' 5.424" W	3.944	0.016	0	19060401009491	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	9	3925.067	70░ 11' 59.392" N	148░ 39' 47.446" W	1.554	0.006	0	19060401009488	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	9	1639.538	70░ 12' 33.911" N	148░ 38' 29.309" W	1.486	0.006	0	19060401009451	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	9	3904.721	70░ 12' 2.751" N	148░ 39' 56.472" W	4.454	0.018	0	19060401009485	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	9	3119.765	70░ 12' 9.831" N	148░ 39' 39.839" W	4.491	0.018	0	19060401009476	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	9	5130.398	70░ 12' 22.232" N	148░ 40' 35.786" W	1.554	0.006	0	19060401009458	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	9	2191.162	70░ 12' 16.999" N	148░ 39' 10.639" W	2.927	0.012	0	19060401009467	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	9	1330.730	70░ 12' 29.088" N	148░ 38' 49.779" W	16.821	0.068	0	19060401009454	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	9	1206.971	70░ 11' 59.548" N	148░ 38' 17.405" W	24.907	0.101	0	19060401009483	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	9	908.403	70░ 12' 18.897" N	148░ 38' 32.904" W	1.590	0.006	0	19060401009466	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	9	2467.178	70░ 12' 14.026" N	148░ 39' 21.621" W	3.743	0.015	0	19060401009470	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	9	1601.756	70░ 12' 9.759" N	148░ 37' 16.652" W	3.751	0.015	0	19060401009479	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	10	2274.378	70░ 11' 3.514" N	148░ 37' 25.961" W	2.318	0.009	0	19060401009553	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	10	1344.936	70░ 11' 42.189" N	148░ 36' 41.522" W	266.880	1.080	46	19060401009486	39009	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	10	3328.485	70░ 11' 47.403" N	148░ 39' 12.921" W	3.952	0.016	0	19060401009497	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	10	926.295	70░ 11' 38.172" N	148░ 37' 36.538" W	1.560	0.006	0	19060401009514	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	10	3683.065	70░ 11' 25.257" N	148░ 39' 34.557" W	1.583	0.006	0	19060401009523	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	10	408.931	70░ 11' 28.113" N	148░ 37' 27.678" W	9.472	0.038	0	19060401009519	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	10	2149.144	70░ 11' 3.637" N	148░ 37' 17.687" W	3.902	0.016	0	19060401009551	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	10	2828.099	70░ 11' 48.370" N	148░ 38' 47.371" W	1.698	0.007	0	19060401009499	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	10	1617.112	70░ 11' 15.128" N	148░ 37' 9.174" W	1.851	0.007	0	19060401009537	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	10	2224.384	70░ 11' 37.315" N	148░ 38' 50.811" W	2.520	0.010	0	19060401009513	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	10	954.033	70░ 11' 26.469" N	148░ 37' 12.975" W	2.463	0.010	0	19060401009526	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	10	4237.212	70░ 11' 35.538" N	148░ 35' 41.116" W	1.517	0.006	0	19060401009517	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	10	968.826	70░ 11' 37.578" N	148░ 37' 25.123" W	4.508	0.018	0	19060401009510	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	10	3780.300	70░ 11' 46.158" N	148░ 39' 31.290" W	6.096	0.025	0	19060401009498	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	10	1065.067	70░ 11' 6.591" N	148░ 38' 20.110" W	103.379	0.418	0	19060401009532	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	10	3841.053	70° 11' 12.397" N	148° 39' 31.917" W	1.874	0.008	0	19060401009539	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	10	4990.298	70° 11' 25.233" N	148° 40' 13.936" W	1.932	0.008	0	19060401009525	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	10	3235.792	70° 11' 17.322" N	148° 39' 23.015" W	5.522	0.022	0	19060401009534	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	11	5300.335	70° 10' 55.670" N	148° 40' 7.482" W	4.641	0.019	0	19060401009561	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	11	5538.933	70° 10' 46.688" N	148° 40' 19.989" W	3.405	0.014	0	19060401009568	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	11	1657.271	70° 10' 52.216" N	148° 37' 1.954" W	5.609	0.023	0	19060401009565	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	11	4627.314	70° 10' 39.984" N	148° 35' 8.054" W	11.421	0.046	0	19060401009576	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	11	2016.609	70° 10' 17.230" N	148° 37' 0.163" W	2.537	0.010	0	19060401009595	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	11	5117.145	70° 10' 56.153" N	148° 35' 12.857" W	3.191	0.013	0	19060401009564	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	11	1091.131	70° 10' 25.050" N	148° 37' 54.181" W	1.888	0.008	0	19060401009588	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	11	5179.901	70° 10' 38.414" N	148° 40' 11.163" W	5.405	0.022	0	19060401009573	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	11	5338.185	70° 10' 50.171" N	148° 40' 11.134" W	2.043	0.008	0	19060401009566	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	11	2284.639	70° 10' 11.921" N	148° 38' 3.059" W	7.778	0.031	0	19060401009602	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	11	2438.844	70° 10' 14.207" N	148° 38' 22.133" W	8.145	0.033	0	19060401009592	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	11	2167.087	70° 10' 11.151" N	148° 37' 48.646" W	4.086	0.017	0	19060401009604	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	11	1581.889	70° 10' 38.882" N	148° 36' 23.634" W	75.095	0.304	0	19060401009567	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	11	2370.443	70° 10' 10.221" N	148° 37' 33.651" W	1.938	0.008	0	19060401009606	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	11	4211.835	70° 10' 55.074" N	148° 39' 33.163" W	2.662	0.011	0	19060401009562	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	11	1107.715	70° 10' 21.077" N	148° 37' 41.033" W	3.548	0.014	0	19060401009590	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	2214.905	70° 9' 41.977" N	148° 38' 10.146" W	1.487	0.006	0	19060401009631	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	1105.926	70° 9' 38.171" N	148° 37' 36.916" W	4.694	0.019	0	19060401009635	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	12	4196.898	70° 9' 54.798" N	148° 34' 11.099" W	115.700	0.468	61	19060401009610	39009	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	2172.700	70° 10' 2.448" N	148° 37' 48.580" W	2.294	0.009	0	19060401009616	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	4068.325	70° 9' 27.356" N	148° 38' 54.366" W	3.248	0.013	0	19060401009645	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	2979.962	70° 9' 16.259" N	148° 37' 33.703" W	2.411	0.010	0	19060401009665	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	5300.451	70° 10' 10.107" N	148° 34' 42.600" W	1.556	0.006	0	19060401009609	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	659.841	70° 9' 36.451" N	148° 37' 7.087" W	3.034	0.012	0	19060401009637	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	2369.413	70° 10' 12.859" N	148° 35' 59.917" W	59.592	0.241	0	19060401009591	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	3504.273	70° 9' 25.599" N	148° 38' 31.787" W	2.100	0.008	0	19060401009648	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	886.690	70° 9' 38.820" N	148° 36' 36.608" W	2.475	0.010	0	19060401009633	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	1710.214	70° 9' 30.326" N	148° 37' 33.715" W	1.886	0.008	0	19060401009642	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	5150.475	70° 9' 27.287" N	148° 39' 24.713" W	2.970	0.012	0	19060401009643	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	1109.631	70° 9' 54.380" N	148° 36' 34.254" W	3.230	0.013	0	19060401009624	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	577.940	70° 9' 52.967" N	148° 37' 14.343" W	2.900	0.012	0	19060401009625	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	2721.159	70° 9' 26.530" N	148° 38' 3.685" W	1.496	0.006	0	19060401009647	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	4888.471	70° 9' 16.361" N	148° 39' 5.042" W	3.529	0.014	0	19060401009659	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	4532.001	70° 10' 2.970" N	148° 34' 55.008" W	2.547	0.010	0	19060401009617	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	3818.197	70° 9' 32.375" N	148° 35' 12.225" W	1.905	0.008	0	19060401009641	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	1874.268	70° 9' 23.349" N	148° 36' 40.327" W	9.798	0.040	0	19060401009652	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	1681.324	70° 9' 46.968" N	148° 36' 3.961" W	17.606	0.071	0	19060401009627	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	4641.852	70° 9' 24.419" N	148° 39' 8.577" W	2.249	0.009	0	19060401009649	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	3326.202	70° 9' 52.651" N	148° 38' 42.050" W	1.619	0.007	0	19060401009626	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	12	3790.619	70° 10' 3.744" N	148° 40' 8.786" W	316.060	1.279	65	19060401009589	39009	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	4480.801	70° 10' 16.185" N	148° 35' 21.691" W	1.663	0.007	0	19060401009598	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	3876.448	70° 9' 32.645" N	148° 38' 52.236" W	1.757	0.007	0	19060401009640	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	4377.560	70° 9' 34.958" N	148° 39' 7.599" W	1.713	0.007	0	19060401009638	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	12	46.671	70° 9' 47.391" N	148° 37' 6.897" W	2.278	0.009	0	19060401009629	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	13	2682.926	70° 9' 17.187" N	148° 35' 10.572" W	3.535	0.014	0	19060401009664	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	13	3376.768	70° 9' 22.025" N	148° 34' 55.746" W	2.193	0.009	0	19060401009658	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	13	5659.223	70° 8' 52.274" N	148° 39' 47.671" W	251.415	1.018	65	19060401009673	39009	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	13	2645.498	70° 9' 25.573" N	148° 35' 52.270" W	4.713	0.019	0	19060401009650	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	13	4821.372	70° 9' 1.799" N	148° 38' 36.638" W	6.121	0.025	0	19060401009676	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	13	3800.873	70° 9' 25.707" N	148° 34' 50.145" W	2.698	0.011	0	19060401009654	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	13	1631.811	70° 9' 15.512" N	148° 36' 13.600" W	1.574	0.006	0	19060401009670	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	13	1247.114	70° 8' 49.077" N	148° 36' 42.827" W	1.761	0.007	0	19060401009683	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	13	3063.969	70° 9' 25.362" N	148° 35' 20.098" W	4.572	0.019	0	19060401009651	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	13	2507.080	70° 9' 18.514" N	148° 35' 21.925" W	2.931	0.012	0	19060401009660	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	13	4829.862	70° 8' 42.828" N	148° 38' 29.503" W	1.673	0.007	0	19060401009685	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	13	2802.772	70° 9' 22.849" N	148° 35' 27.841" W	1.987	0.008	0	19060401009656	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	14	461.666	70° 7' 44.206" N	148° 35' 36.132" W	527.186	2.134	80	19060401009709	39009	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	15	4993.511	70° 7' 24.819" N	148° 36' 38.719" W	1.680	0.007	0	19060401009735	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	28	3419.420	69° 57' 20.966" N	148° 46' 31.098" W	174.554	0.707	166	19060401021822	39009	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	45	5469.312	69° 42' 54.542" N	148° 45' 35.090" W	70.120	0.284	0	19060401009148	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	46	4879.990	69° 42' 35.046" N	148° 45' 13.631" W	25.247	0.102	0	19060401009152	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	47	4789.866	69° 41' 54.654" N	148° 44' 44.904" W	3.688	0.015	0	19060401009156	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	47	5105.354	69° 41' 36.607" N	148° 45' 6.488" W	2.730	0.011	0	19060401009157	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	49	5472.493	69° 40' 1.327" N	148° 45' 21.739" W	60.926	0.247	392	19060401009166	39009	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	51	2486.402	69° 37' 59.239" N	148° 41' 50.565" W	2.973	0.012	0	19060401009183	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	51	5067.961	69° 38' 3.852" N	148° 43' 10.635" W	1.770	0.007	0	19060401009182	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	51	2583.911	69° 38' 21.688" N	148° 42' 6.999" W	2.304	0.009	0	19060401009174	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic	51	4587.722	69° 38' 7.475" N	148° 43' 1.564" W	3.736	0.015	0	19060401009179	39004	Perennial	19060401	Gas Conditioning Facility

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
	Category = Perennial												Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	52	3483.946	69░ 37' 19.496" N	148░ 41' 33.146" W	3.179	0.013	0	19060401009188	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	53	4549.134	69░ 36' 12.192" N	148░ 40' 51.794" W	4.941	0.020	0	19060401009212	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	53	5086.475	69░ 36' 14.783" N	148░ 41' 10.982" W	3.233	0.013	0	19060401009209	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	53	5600.451	69░ 35' 50.574" N	148░ 41' 37.132" W	135.359	0.548	0	19060401009214	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	54	1887.031	69░ 35' 34.223" N	148░ 39' 8.455" W	2.924	0.012	0	19060401009222	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	54	2746.282	69░ 35' 20.479" N	148░ 39' 0.571" W	1.640	0.007	0	19060401009226	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	54	3070.025	69░ 35' 29.099" N	148░ 39' 45.456" W	3.875	0.016	0	19060401009224	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	55	3350.775	69░ 34' 43.080" N	148░ 39' 30.323" W	3.885	0.016	0	19060401009231	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	55	3099.691	69░ 35' 15.082" N	148░ 39' 14.150" W	2.473	0.010	0	19060401009227	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	55	3651.249	69░ 35' 9.922" N	148░ 40' 43.925" W	249.951	1.012	470	19060401009225	39009	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	55	139.520	69░ 34' 50.321" N	148░ 38' 15.595" W	86.107	0.349	0	19060401009229	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	56	3038.193	69░ 34' 5.584" N	148░ 38' 52.881" W	16.594	0.067	0	19060401009238	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	56	1287.783	69░ 34' 6.709" N	148░ 37' 54.803" W	2.589	0.010	0	19060401009240	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	57	1059.946	69░ 33' 23.169" N	148░ 36' 59.517" W	1.815	0.007	0	19060401009248	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	59	4174.734	69░ 31' 9.413" N	148░ 37' 2.406" W	2.847	0.012	0	19060401021823	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	59	4482.831	69░ 31' 28.831" N	148░ 37' 32.102" W	1.712	0.007	0	19060401009272	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	60	4956.685	69░ 30' 56.768" N	148░ 37' 11.090" W	1.692	0.007	0	19060401009279	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic	61	5218.535	69░ 29' 43.706" N	148░ 37' 21.106" W	56.261	0.228	0	19060401021826	39004	Perennial	19060401	Gas Conditioning Facility

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
	Category = Perennial												Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	61	5708.786	69° 30' 6.651" N	148° 37' 0.179" W	2.597	0.011	0	19060401021829	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	63	2295.538	69° 28' 40.256" N	148° 34' 57.400" W	121.185	0.490	590	19060401021827	39009	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	73	3053.635	69° 20' 48.472" N	148° 46' 45.064" W	15.534	0.063	0	19060401009133	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	126	2636.308	68° 41' 13.261" N	149° 9' 49.994" W	0.905	0.004	0	19060401010586	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	126	4191.164	68° 41' 26.933" N	149° 10' 16.084" W	0.846	0.003	0	19060401010583	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	127	2931.434	68° 41' 11.779" N	149° 11' 7.830" W	2.544	0.010	0	19060401010585	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	128	2891.650	68° 40' 45.808" N	149° 13' 47.628" W	9.869	0.040	0	19060401010587	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	128	3824.315	68° 40' 45.757" N	149° 14' 22.504" W	3.718	0.015	0	19060401010588	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	129	2082.939	68° 39' 53.722" N	149° 16' 0.009" W	1.025	0.004	0	19060401021831	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	129	1772.433	68° 39' 49.426" N	149° 15' 53.264" W	2.404	0.010	0	19060401021832	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	129	4939.724	68° 40' 37.450" N	149° 15' 52.215" W	1.642	0.007	0	19060401010589	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	129	2318.739	68° 40' 18.693" N	149° 14' 53.178" W	6.292	0.025	0	19060401010590	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	133	4457.061	68° 38' 3.638" N	149° 22' 59.391" W	0.849	0.003	0	19060401010600	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	133	1586.857	68° 38' 33.107" N	149° 23' 46.457" W	0.661	0.003	0	19060401010593	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	133	4216.721	68° 38' 6.784" N	149° 22' 53.158" W	0.258	0.001	0	19060401010599	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	133	4114.067	68° 38' 7.333" N	149° 22' 59.574" W	0.338	0.001	0	19060401010598	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	133	2012.406	68° 38' 29.661" N	149° 23' 53.934" W	0.972	0.004	0	19060401010594	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic	133	4650.724	68° 38' 1.714" N	149° 23' 4.142" W	0.305	0.001	0	19060401010601	39004	Perennial	19060401	Gas Conditioning Facility

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
	Category = Perennial												Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	133	1892.040	68° 38' 44.967" N	149° 24' 17.179" W	0.337	0.001	0	19060401013044	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	133	2649.695	68° 38' 20.044" N	149° 23' 13.090" W	1.138	0.005	0	19060401010596	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	133	3717.714	68° 38' 10.743" N	149° 23' 7.336" W	0.375	0.002	0	19060401010597	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	133	4813.102	68° 37' 59.518" N	149° 23' 12.352" W	0.310	0.001	0	19060401010602	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	133	1947.657	68° 38' 29.043" N	149° 23' 45.667" W	0.383	0.002	0	19060401010595	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	134	4806.023	68° 39' 24.243" N	149° 25' 32.768" W	0.485	0.002	0	19060401013027	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	134	2535.863	68° 38' 12.788" N	149° 24' 52.607" W	1.723	0.007	0	19060401013052	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	134	4888.957	68° 37' 48.565" N	149° 24' 55.030" W	0.874	0.004	0	19060401013065	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	134	5409.442	68° 37' 42.957" N	149° 24' 47.838" W	2.571	0.010	0	19060401013068	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	134	3112.436	68° 39' 6.408" N	149° 25' 4.353" W	0.240	0.001	0	19060401013038	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	134	5625.012	68° 39' 32.195" N	149° 25' 33.742" W	0.301	0.001	0	19060401013024	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	134	5502.270	68° 39' 30.929" N	149° 25' 39.871" W	0.286	0.001	0	19060401013025	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	134	2653.442	68° 38' 59.721" N	149° 24' 51.953" W	0.262	0.001	0	19060401013041	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	134	1589.634	68° 38' 36.710" N	149° 26' 24.449" W	6.652	0.027	0	19060401013047	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	134	3060.759	68° 39' 6.687" N	149° 25' 14.901" W	0.350	0.001	0	19060401013037	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	134	3523.783	68° 37' 56.759" N	149° 25' 7.047" W	9.384	0.038	0	19060401013056	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	134	3327.792	68° 38' 50.004" N	149° 26' 59.244" W	1.394	0.006	0	19060401013042	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	135	1603.339	68° 38' 32.233" N	149° 27' 28.740" W	28.758	0.116	0	19060401013045	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	136	2053.985	68° 37' 10.724" N	149° 29' 32.566" W	8.397	0.034	0	19060401013078	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	136	2511.003	68° 37' 52.802" N	149° 30' 1.787" W	3.114	0.013	0	19060401013060	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	136	973.016	68° 37' 40.520" N	149° 29' 51.279" W	18.467	0.075	2942	19060401013064	39009	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	136	2163.302	68° 37' 25.904" N	149° 28' 10.028" W	5.519	0.022	0	19060401013073	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	137	4065.059	68° 37' 26.065" N	149° 31' 52.219" W	0.978	0.004	0	19060401013072	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	137	5076.506	68° 37' 22.426" N	149° 32' 35.724" W	0.762	0.003	0	19060401013074	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Kuparuk River	Lake/Pond: Hydrographic Category = Perennial	138	4606.161	68° 35' 53.019" N	149° 33' 54.787" W	1.813	0.007	0	19060401013092	39004	Perennial	19060401	Gas Conditioning Facility Mile 0 to Mile 540
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	657	5275.272	62° 23' 40.862" N	150° 17' 35.789" W	0.455	0.002	0	19020505005313	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	657	4828.101	62° 23' 52.970" N	150° 17' 29.218" W	0.447	0.002	0	19020505005296	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	657	4747.856	62° 23' 55.054" N	150° 17' 27.477" W	0.375	0.002	0	19020505005293	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	657	4880.815	62° 23' 49.503" N	150° 17' 30.004" W	0.322	0.001	0	19020505005306	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	657	4672.107	62° 23' 59.607" N	150° 17' 24.234" W	0.265	0.001	0	19020505005286	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	657	4762.366	62° 23' 56.652" N	150° 17' 27.346" W	0.211	0.001	0	19020505005292	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	658	5222.422	62° 23' 28.249" N	150° 17' 33.066" W	0.291	0.001	0	19020505005330	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	658	5295.986	62° 23' 31.645" N	150° 17' 33.218" W	1.018	0.004	0	19020505005323	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	658	3265.209	62° 22' 56.366" N	150° 17' 10.476" W	4.240	0.017	0	19020505005367	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	658	3224.679	62° 23' 3.744" N	150° 17' 7.596" W	0.507	0.002	0	19020505005362	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	658	3651.786	62° 23' 2.848" N	150° 17' 16.508" W	0.558	0.002	0	19020505005363	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	658	5722.674	62° 22' 40.790" N	150° 18' 2.733" W	13.042	0.053	0	19020505005380	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	658	4912.186	62° 23' 15.614" N	150° 17' 40.015" W	0.687	0.003	0	19020505005341	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	659	3667.865	62° 22' 16.065" N	150° 17' 4.345" W	0.222	0.001	0	19020505005429	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	659	3732.669	62° 22' 30.664" N	150° 16' 59.665" W	3.573	0.014	0	19020505005406	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	660	3247.640	62° 21' 10.907" N	150° 16' 23.032" W	0.716	0.003	0	19020505005500	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	660	3701.043	62° 21' 25.190" N	150° 16' 33.875" W	0.236	0.001	0	19020505005481	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	660	4807.140	62° 21' 7.184" N	150° 16' 55.161" W	1.388	0.006	0	19020505005504	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	660	3320.046	62° 21' 13.004" N	150° 16' 24.326" W	0.380	0.002	0	19020505005497	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	660	3705.390	62° 21' 33.665" N	150° 16' 30.352" W	0.503	0.002	0	19020505005471	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	660	5255.269	62° 20' 54.165" N	150° 16' 50.892" W	0.598	0.002	0	19020505005515	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	660	3653.842	62° 21' 29.610" N	150° 16' 32.503" W	1.036	0.004	0	19020505005475	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	660	5473.378	62° 20' 54.535" N	150° 16' 56.785" W	0.342	0.001	0	19020505005514	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	660	5062.048	62° 21' 27.474" N	150° 17' 5.781" W	2.617	0.011	0	19020505005477	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	661	1019.318	62° 20' 36.829" N	150° 14' 39.435" W	2.123	0.009	0	19020505005534	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	661	2026.256	62° 20' 40.602" N	150° 15' 45.501" W	1.389	0.006	0	19020505005531	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	661	1732.204	62° 20' 46.212" N	150° 14' 42.388" W	0.459	0.002	0	19020505005529	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	661	1547.082	62° 20' 45.970" N	150° 14' 53.488" W	0.319	0.001	0	19020505005528	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	661	911.809	62° 20' 31.168" N	150° 14' 37.269" W	2.259	0.009	0	19020505005546	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	662	4838.043	62° 19' 22.451" N	150° 16' 7.669" W	2.115	0.009	0	19020505005640	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	662	4364.050	62° 19' 32.776" N	150° 16' 3.335" W	5.139	0.021	0	19020505005621	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	662	2679.428	62° 20' 8.534" N	150° 14' 14.033" W	1.195	0.005	0	19020505005567	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	662	5342.276	62° 19' 25.239" N	150° 16' 16.992" W	0.226	0.001	0	19020505005636	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	664	3045.065	62° 18' 21.175" N	150° 13' 37.960" W	0.222	0.001	0	19020505005686	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	664	2422.801	62° 18' 14.320" N	150° 13' 39.110" W	3.243	0.013	315	19020505005693	39009	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	664	1091.259	62° 17' 47.047" N	150° 14' 2.684" W	10.887	0.044	0	19020505005712	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	664	2021.200	62° 17' 36.420" N	150° 14' 48.298" W	7.914	0.032	0	19020505005735	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	665	4049.724	62° 17' 16.351" N	150° 16' 21.368" W	0.187	0.001	0	19020505005770	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	665	4010.443	62° 17' 10.302" N	150° 16' 20.793" W	0.220	0.001	0	19020505005794	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	665	3936.542	62° 17' 11.255" N	150° 16' 19.255" W	0.210	0.001	0	19020505005791	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	665	5414.054	62° 17' 4.978" N	150° 16' 51.774" W	0.757	0.003	0	19020505005800	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	665	3837.595	62° 17' 14.171" N	150° 16' 19.277" W	0.878	0.004	0	19020505005782	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	666	1348.746	62° 16' 9.689" N	150° 15' 4.734" W	0.332	0.001	0	19020505005877	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	666	1065.806	62° 16' 6.433" N	150° 14' 44.673" W	4.144	0.017	0	19020505005881	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	666	1572.038	62° 16' 2.668" N	150° 14' 44.625" W	1.329	0.005	0	19020505005891	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	666	811.937	62° 16' 9.357" N	150° 14' 48.458" W	2.563	0.010	0	19020505005876	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	667	4409.699	62° 15' 27.071" N	150° 16' 27.471" W	0.178	0.001	0	19020505005978	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	667	5542.525	62° 15' 19.662" N	150° 16' 50.349" W	0.426	0.002	0	19020505005999	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	667	5088.362	62° 15' 22.593" N	150° 16' 43.629" W	1.268	0.005	0	19020505005991	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	667	4598.530	62° 15' 27.664" N	150° 16' 31.647" W	0.186	0.001	0	19020505005975	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	667	4378.269	62° 15' 26.083" N	150° 16' 26.830" W	0.224	0.001	0	19020505005983	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	667	5556.271	62° 15' 22.340" N	150° 16' 52.772" W	1.102	0.004	0	19020505005990	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	669	4556.304	62° 13' 55.734" N	150° 12' 52.313" W	1.438	0.006	0	19020505008968	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	670	5131.702	62° 12' 40.968" N	150° 15' 33.910" W	11.364	0.046	0	19020505009013	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	672	2715.564	62° 11' 24.081" N	150° 13' 45.084" W	2.813	0.011	372	19020505009082	39009	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	673	3134.349	62° 11' 18.173" N	150° 11' 12.692" W	7.433	0.030	367	19020505009089	39009	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	673	4472.868	62° 10' 4.490" N	150° 12' 35.788" W	5.231	0.021	387	19020505009148	39009	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	676	1600.158	62° 10' 11.525" N	150° 6' 23.363" W	7.968	0.032	0	19020505009149	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	676	2609.596	62° 10' 17.346" N	150° 6' 5.507" W	6.837	0.028	335	19020505009145	39009	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	676	1209.014	62° 10' 3.441" N	150° 7' 16.416" W	11.172	0.045	0	19020505009154	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	676	1187.249	62° 10' 8.611" N	150° 6' 50.396" W	6.622	0.027	0	19020505009152	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	676	1615.179	62° 10' 4.296" N	150° 6' 18.807" W	0.450	0.002	0	19020505009155	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	677	1903.120	62° 9' 31.522" N	150° 5' 53.805" W	0.843	0.003	0	19020505009187	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	677	3059.436	62° 9' 13.395" N	150° 6' 51.324" W	2.540	0.010	0	19020505009194	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	677	4744.040	62░ 9' 46.755" N	150░ 4' 16.731" W	42.709	0.173	335	19020505009167	39009	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	677	1571.054	62░ 8' 55.281" N	150░ 5' 46.972" W	1.294	0.005	305	19020505009212	39009	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	678	516.964	62░ 8' 35.022" N	150░ 4' 24.902" W	4.052	0.016	0	19020505009223	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	678	3829.206	62░ 9' 20.705" N	150░ 4' 9.640" W	2.573	0.010	0	19020505009191	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	678	1285.016	62░ 8' 27.991" N	150░ 4' 28.993" W	2.721	0.011	0	19020505009233	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	678	1853.284	62░ 8' 25.235" N	150░ 3' 51.688" W	1.567	0.006	0	19020505009236	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	678	2662.888	62░ 9' 7.485" N	150░ 4' 41.612" W	4.808	0.019	0	19020505009203	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	678	2774.779	62░ 8' 15.926" N	150░ 4' 49.050" W	4.568	0.018	0	19020505009240	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	678	3865.999	62░ 8' 13.383" N	150░ 5' 16.396" W	1.249	0.005	0	19020505009248	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	679	2778.973	62░ 8' 43.876" N	150░ 3' 10.938" W	2.785	0.011	0	19020505009218	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	679	592.500	62░ 8' 9.331" N	150░ 3' 17.225" W	43.041	0.174	0	19020505009244	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	679	915.732	62░ 8' 7.555" N	150░ 2' 55.357" W	0.777	0.003	0	19020505009259	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	679	1064.672	62░ 8' 34.673" N	150░ 3' 2.439" W	74.080	0.300	335	19020505009221	39009	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	680	1145.678	62░ 7' 43.224" N	150░ 2' 43.396" W	3.079	0.012	0	19020505009290	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	680	4248.912	62░ 7' 32.265" N	150░ 4' 11.181" W	4.052	0.016	0	19020505009303	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	680	2024.494	62░ 7' 39.816" N	150░ 3' 21.590" W	4.751	0.019	0	19020505009294	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna	Lake/Pond: Hydrographic	680	4274.709	62░ 7' 46.553" N	150░ 4' 16.560" W	43.315	0.175	320	19020505009275	39009	Perennial	19020505	Mile 555 to Cook Inlet

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
River	Category = Perennial; Stage = Average Water Elevation												NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	681	2690.687	62° 6' 41.073" N	150° 2' 15.734" W	2.627	0.011	0	19020505009369	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	681	170.682	62° 6' 47.361" N	150° 3' 25.547" W	7.701	0.031	0	19020505009351	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	681	2965.867	62° 7' 10.829" N	150° 3' 31.986" W	0.796	0.003	0	19020505009328	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	682	4729.394	62° 6' 2.797" N	150° 2' 1.499" W	2.413	0.010	0	19020505009418	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	682	1490.609	62° 5' 31.027" N	150° 3' 32.608" W	7.431	0.030	0	19020505009437	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	683	1779.525	62° 5' 18.206" N	150° 3' 32.841" W	1.191	0.005	0	19020505009463	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	684	2714.313	62° 4' 32.627" N	150° 4' 8.064" W	2.656	0.011	0	19020505009519	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	685	4852.212	62° 2' 56.674" N	150° 2' 8.111" W	0.332	0.001	0	19020505009652	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	685	4764.940	62° 2' 59.235" N	150° 2' 7.542" W	0.624	0.003	0	19020505009648	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	685	2741.387	62° 3' 35.508" N	150° 2' 58.036" W	1.658	0.007	0	19020505009594	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	686	2627.243	62° 2' 7.112" N	150° 2' 51.254" W	2.399	0.010	0	19020505009717	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	686	1600.577	62° 2' 41.708" N	150° 3' 41.614" W	0.957	0.004	0	19020505009677	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	686	5650.167	62° 2' 49.774" N	150° 1' 51.683" W	0.719	0.003	0	19020505009662	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	686	4724.243	62° 2' 41.869" N	150° 2' 7.061" W	0.297	0.001	0	19020505009678	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	686	3404.393	62° 2' 40.450" N	150° 2' 32.783" W	0.933	0.004	0	19020505009679	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	686	2719.875	62° 2' 10.091" N	150° 2' 50.138" W	0.634	0.003	0	19020505009712	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	686	4030.800	62° 2' 32.126" N	150° 2' 14.907" W	1.850	0.007	0	19020505009686	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	686	4818.861	62° 2' 44.284" N	150° 2' 6.459" W	0.607	0.002	0	19020505009676	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	686	4268.196	62░ 2' 35.778" N	150░ 2' 12.779" W	0.347	0.001	0	19020505009684	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	686	5113.094	62░ 2' 44.692" N	150░ 1' 59.129" W	1.080	0.004	0	19020505009673	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	686	4704.487	62░ 2' 32.974" N	150░ 1' 57.878" W	3.881	0.016	0	19020505009685	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	686	3230.899	62░ 2' 26.698" N	150░ 2' 31.236" W	0.417	0.002	0	19020505009692	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	686	2637.322	62░ 2' 45.063" N	150░ 3' 3.690" W	0.903	0.004	0	19020505009670	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	686	3902.646	62░ 2' 35.054" N	150░ 5' 3.157" W	0.927	0.004	0	19020505009681	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	686	4569.494	62░ 2' 30.544" N	150░ 2' 3.940" W	0.378	0.002	0	19020505009688	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	688	5363.981	62░ 0' 47.219" N	150░ 1' 45.588" W	21.855	0.088	0	19020505009778	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	696	4041.441	61░ 53' 57.475" N	150░ 2' 43.396" W	10.333	0.042	0	19020505008864	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	698	2204.303	61░ 52' 26.332" N	150░ 4' 44.081" W	0.804	0.003	0	19020505008876	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	698	3147.697	61░ 52' 51.447" N	150░ 4' 14.714" W	5.145	0.021	0	19020505008870	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	698	4204.933	61░ 52' 34.349" N	150░ 3' 52.256" W	1.082	0.004	0	19020505008874	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	699	989.075	61░ 51' 59.292" N	150░ 4' 49.949" W	17.336	0.070	0	19020505008879	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	699	2625.391	61░ 52' 2.124" N	150░ 4' 21.103" W	0.804	0.003	0	19020505008880	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	699	1992.032	61░ 52' 6.571" N	150░ 4' 45.076" W	2.077	0.008	0	19020505008878	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	699	1794.573	61░ 51' 57.785" N	150░ 4' 30.824" W	9.229	0.037	0	19020505008881	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	700	2509.529	61░ 50' 39.294" N	150░ 4' 8.313" W	0.671	0.003	0	19020505008890	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	701	237.382	61░ 50' 1.542" N	150░ 4' 48.475" W	151.812	0.614	184	19020505008898	39009	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	701	3265.026	61° 50' 23.431" N	150° 2' 51.911" W	7.118	0.029	0	19020505008894	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	701	1229.877	61° 49' 54.750" N	150° 3' 54.007" W	8.134	0.033	0	19020505008900	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	701	2734.227	61° 50' 4.131" N	150° 3' 11.748" W	5.614	0.023	0	19020505008899	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	701	815.409	61° 50' 20.448" N	150° 4' 23.842" W	3.204	0.013	0	19020505008896	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	702	2674.986	61° 48' 51.213" N	150° 4' 32.494" W	3.045	0.012	0	19020505008905	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	707	4799.652	61° 45' 0.809" N	150° 2' 22.010" W	18.152	0.073	0	19020505008456	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	707	4568.989	61° 44' 50.045" N	150° 4' 39.380" W	1.377	0.006	0	19020505008457	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	707	3185.107	61° 44' 39.031" N	150° 3' 32.604" W	144.346	0.584	0	19020505008455	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	707	808.454	61° 45' 17.820" N	150° 4' 0.950" W	6.893	0.028	0	19020505008912	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	707	5152.082	61° 45' 14.812" N	150° 2' 0.515" W	5.515	0.022	0	19020505008914	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	708	5466.898	61° 44' 33.112" N	150° 4' 57.003" W	15.191	0.061	0	19020505008460	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	708	4676.798	61° 44' 28.882" N	150° 6' 12.512" W	118.230	0.479	0	19020505008458	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	708	613.000	61° 45' 25.229" N	150° 5' 35.043" W	2.941	0.012	0	19020505008910	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	710	1817.973	61° 45' 8.256" N	150° 7' 58.085" W	30.436	0.123	0	19020505008913	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	710	2499.721	61° 45' 30.071" N	150° 8' 32.799" W	6.837	0.028	0	19020505008909	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	710	2085.826	61° 44' 53.332" N	150° 8' 0.567" W	7.413	0.030	0	19020505008454	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	711	4675.382	61° 43' 46.640" N	150° 8' 7.808" W	2.013	0.008	0	19020505008473	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	711	2464.034	61° 44' 2.059" N	150° 8' 42.619" W	0.766	0.003	0	19020505008466	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	711	3550.928	61° 43' 47.539" N	150° 8' 39.378" W	0.789	0.003	0	19020505008472	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	711	2725.177	61° 44' 4.228" N	150° 8' 36.058" W	0.895	0.004	0	19020505008465	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	712	3554.285	61° 43' 6.263" N	150° 9' 4.681" W	7.902	0.032	0	19020505008485	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	713	3273.216	61° 42' 42.235" N	150° 8' 25.791" W	136.399	0.552	0	19020505008487	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	713	273.070	61° 42' 35.944" N	150° 10' 0.146" W	3.222	0.013	0	19020505008496	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	713	4335.455	61° 42' 27.214" N	150° 8' 37.183" W	2.888	0.012	0	19020505008502	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	713	4118.195	61° 42' 33.724" N	150° 8' 40.453" W	1.101	0.004	0	19020505008501	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	714	4931.685	61° 41' 54.285" N	150° 12' 0.646" W	29.738	0.120	157	19020505008511	39009	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	714	5076.809	61° 41' 39.344" N	150° 8' 9.084" W	45.680	0.185	171	19020505008518	39009	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	715	4162.286	61° 41' 4.354" N	150° 8' 30.366" W	13.175	0.053	0	19020505008538	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	715	1522.727	61° 41' 12.536" N	150° 9' 55.457" W	9.443	0.038	0	19020505008533	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	716	1420.945	61° 39' 49.815" N	150° 10' 33.255" W	1.964	0.008	0	19020505008572	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	716	3964.368	61° 39' 25.336" N	150° 9' 18.346" W	9.095	0.037	0	19020505008584	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	716	5046.427	61° 40' 24.334" N	150° 8' 32.007" W	3.997	0.016	0	19020505008557	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	716	1881.840	61° 40' 15.961" N	150° 9' 32.602" W	16.575	0.067	165	19020505008558	39009	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	716	5691.128	61° 39' 14.893" N	150° 9' 3.807" W	0.583	0.002	0	19020505008595	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	716	5175.500	61° 40' 5.283" N	150° 7' 44.270" W	107.611	0.436	0	19020505008562	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna	Lake/Pond: Hydrographic	716	3054.378	61° 40' 18.926" N	150° 9' 15.527" W	1.688	0.007	0	19020505008560	39004	Perennial	19020505	Mile 555 to Cook Inlet

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
River	Category = Perennial												NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	717	5585.498	61° 39' 1.397" N	150° 9' 32.697" W	6.994	0.028	0	19020505008601	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	717	1559.022	61° 39' 12.916" N	150° 10' 58.132" W	0.338	0.001	0	19020505008594	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	718	1325.003	61° 39' 1.765" N	150° 12' 46.830" W	0.479	0.002	0	19020505008599	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	718	861.137	61° 38' 48.121" N	150° 12' 19.444" W	1.183	0.005	0	19020505008610	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	720	5029.346	61° 37' 19.978" N	150° 11' 46.497" W	1.744	0.007	0	19020505008642	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	721	2714.369	61° 36' 11.168" N	150° 13' 12.107" W	7.429	0.030	0	19020505008683	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	721	3604.988	61° 35' 58.574" N	150° 13' 10.615" W	3.183	0.013	210	19020505008689	39009	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	721	3881.241	61° 36' 27.528" N	150° 15' 42.660" W	48.954	0.198	0	19020505008662	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	721	3724.614	61° 36' 14.522" N	150° 12' 42.723" W	32.089	0.130	0	19020505008674	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	722	1924.466	61° 35' 51.917" N	150° 15' 29.180" W	16.191	0.066	0	19020505008687	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	723	3742.848	61° 35' 11.615" N	150° 13' 39.602" W	3.411	0.014	0	19020505008703	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	724	1186.008	61° 33' 41.854" N	150° 14' 11.055" W	0.841	0.003	0	19020505008729	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	726	4066.107	61° 32' 0.147" N	150° 14' 41.987" W	0.951	0.004	0	19020505008760	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	727	3900.088	61° 31' 8.680" N	150° 14' 21.781" W	0.681	0.003	0	19020505008792	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	727	3688.727	61° 31' 12.417" N	150° 14' 18.991" W	0.443	0.002	0	19020505008789	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	727	3835.240	61° 31' 27.469" N	150° 11' 17.031" W	94.241	0.381	0	19020505008773	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	727	3961.993	61° 30' 53.695" N	150° 14' 3.206" W	0.579	0.002	0	19020505008797	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna	Lake/Pond: Hydrographic	729	3338.797	61° 29' 19.180" N	150° 12' 0.002" W	10.719	0.043	0	19020505008195	39004	Perennial	19020505	Mile 555 to Cook Inlet

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
River	Category = Perennial												NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	729	2775.237	61° 29' 49.863" N	150° 12' 33.577" W	3.432	0.014	0	19020505008175	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	729	4638.327	61° 30' 38.675" N	150° 10' 58.042" W	1.188	0.005	0	19020505008807	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	729	2582.777	61° 29' 41.106" N	150° 12' 29.224" W	12.556	0.051	0	19020505008178	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	729	3296.734	61° 30' 1.982" N	150° 10' 24.014" W	1.397	0.006	0	19020505008827	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	729	2957.296	61° 29' 24.894" N	150° 11' 51.029" W	2.374	0.010	0	19020505008193	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	730	1791.098	61° 29' 23.604" N	150° 10' 44.998" W	14.869	0.060	0	19020505008192	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	730	1812.787	61° 29' 17.904" N	150° 9' 25.718" W	1.422	0.006	0	19020505008204	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	730	4802.019	61° 28' 42.813" N	150° 10' 41.779" W	2.493	0.010	0	19020505008237	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	730	820.293	61° 29' 17.984" N	150° 9' 50.328" W	5.989	0.024	0	19020505008201	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	730	1702.505	61° 29' 38.514" N	150° 10' 30.415" W	2.204	0.009	0	19020505008183	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	730	2667.260	61° 30' 10.028" N	150° 9' 59.539" W	59.304	0.240	0	19020505008174	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	730	459.136	61° 29' 24.499" N	150° 9' 51.527" W	0.756	0.003	0	19020505008198	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	730	4439.343	61° 28' 42.734" N	150° 10' 10.958" W	4.020	0.016	0	19020505008239	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	731	692.109	61° 29' 10.071" N	150° 7' 46.637" W	25.234	0.102	0	19020505008210	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	731	4757.746	61° 29' 23.992" N	150° 6' 40.446" W	1.134	0.005	0	19020505008203	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	731	4174.207	61° 29' 9.826" N	150° 6' 40.630" W	16.798	0.068	105	19020505008213	39009	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	731	4745.771	61° 29' 52.772" N	150° 7' 33.450" W	1.692	0.007	0	19020505008177	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna	Lake/Pond: Hydrographic	731	1888.054	61° 29' 28.827" N	150° 8' 1.921" W	1.705	0.007	0	19020505008197	39004	Perennial	19020505	Mile 555 to Cook Inlet

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
River	Category = Perennial												NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	731	4172.036	61° 29' 50.871" N	150° 7' 55.010" W	0.441	0.002	0	19020505008179	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	731	4030.985	61° 29' 22.549" N	150° 6' 55.982" W	2.757	0.011	0	19020505008202	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	731	3904.690	61° 28' 38.614" N	150° 9' 6.978" W	1.165	0.005	0	19020505008247	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	731	2940.659	61° 28' 59.746" N	150° 9' 24.295" W	2.038	0.008	0	19020505008221	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	732	4573.501	61° 28' 46.262" N	150° 6' 2.532" W	2.766	0.011	0	19020505008244	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	732	5780.982	61° 29' 12.750" N	150° 5' 59.349" W	36.369	0.147	0	19020505008206	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	732	3501.416	61° 28' 56.833" N	150° 6' 58.783" W	0.147	0.001	0	19020505008233	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	732	3403.881	61° 28' 34.056" N	150° 6' 19.843" W	6.134	0.025	0	19020505008254	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	732	4136.358	61° 28' 59.091" N	150° 6' 37.217" W	3.310	0.013	0	19020505008227	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	732	1175.170	61° 28' 33.412" N	150° 7' 1.203" W	18.668	0.076	85	19020505008250	39009	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	732	5230.566	61° 28' 53.190" N	150° 5' 55.244" W	3.388	0.014	0	19020505008236	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	732	3269.462	61° 28' 56.699" N	150° 7' 6.096" W	1.038	0.004	0	19020505008231	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	733	4092.537	61° 27' 35.914" N	150° 6' 2.493" W	0.757	0.003	0	19020505008291	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	733	3138.885	61° 27' 2.018" N	150° 6' 26.610" W	72.636	0.294	85	19020505008301	39009	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	733	2059.146	61° 27' 54.675" N	150° 7' 41.602" W	0.602	0.002	0	19020505008282	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	733	797.490	61° 27' 27.319" N	150° 7' 48.184" W	4.437	0.018	0	19020505008294	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna	Lake/Pond: Hydrographic	733	2376.038	61° 27' 13.758" N	150° 6' 59.342" W	0.931	0.004	0	19020505008302	39004	Perennial	19020505	Mile 555 to Cook Inlet

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
River	Category = Perennial												NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	733	2068.088	61° 27' 15.837" N	150° 7' 52.912" W	0.690	0.003	0	19020505008299	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	734	300.951	61° 26' 44.572" N	150° 7' 36.670" W	1.932	0.008	0	19020505008312	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	734	1734.636	61° 27' 1.331" N	150° 7' 44.170" W	1.254	0.005	0	19020505008305	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	734	893.616	61° 26' 42.931" N	150° 7' 17.273" W	27.091	0.110	85	19020505008308	39009	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	734	1467.479	61° 26' 53.450" N	150° 8' 16.435" W	5.616	0.023	0	19020505008307	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	734	1928.470	61° 26' 22.793" N	150° 7' 53.913" W	1.298	0.005	0	19020505008316	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	735	1845.722	61° 26' 10.207" N	150° 6' 3.204" W	2.454	0.010	0	19020505008318	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	735	5541.633	61° 25' 15.897" N	150° 7' 49.596" W	16.857	0.068	0	19020505008330	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	736	937.772	61° 25' 41.146" N	150° 4' 23.270" W	7.410	0.030	140	19020505008327	39009	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	736	1136.894	61° 25' 52.104" N	150° 5' 8.997" W	36.447	0.148	0	19020505008321	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	736	4854.700	61° 26' 29.080" N	150° 4' 18.472" W	23.902	0.097	0	19020505008314	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	736	2188.952	61° 25' 47.170" N	150° 3' 59.891" W	6.831	0.028	0	19020505008326	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Susitna River	Lake/Pond: Hydrographic Category = Perennial	736	3964.771	61° 26' 14.988" N	150° 4' 41.972" W	0.491	0.002	0	19020505008317	39004	Perennial	19020505	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Lower Tanana River	Lake/Pond: Hydrographic Category = Perennial	470	4946.152	64° 38' 38.275" N	149° 2' 59.898" W	0.770	0.003	0	19040511006135	39004	Perennial	19040511	Gas Conditioning Facility Mile 0 to Mile 540
Lower Tanana River	Lake/Pond: Hydrographic Category = Perennial	470	5218.535	64° 38' 35.004" N	149° 4' 17.061" W	6.253	0.025	0	19040511006133	39004	Perennial	19040511	Gas Conditioning Facility Mile 0 to Mile 540
Lower Tanana River	Lake/Pond: Hydrographic Category = Perennial	471	2182.968	64° 37' 7.188" N	149° 4' 57.554" W	1.183	0.005	0	19040511006147	39004	Perennial	19040511	Gas Conditioning Facility Mile 0 to Mile 540
Lower Tanana	Lake/Pond: Hydrographic	471	1624.845	64° 37' 15.344" N	149° 4' 37.929" W	0.637	0.003	0	19040511006146	39004	Perennial	19040511	Gas Conditioning Facility

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
River	Category = Perennial												Mile 0 to Mile 540
Lower Tanana River	Lake/Pond: Hydrographic Category = Perennial	473	839.005	64° 35' 58.782" N	149° 6' 59.183" W	3.499	0.014	0	19040511006155	39004	Perennial	19040511	Gas Conditioning Facility Mile 0 to Mile 540
Lower Tanana River	Lake/Pond: Hydrographic Category = Perennial	473	763.109	64° 36' 4.336" N	149° 6' 50.901" W	3.080	0.012	0	19040511006152	39004	Perennial	19040511	Gas Conditioning Facility Mile 0 to Mile 540
Lower Tanana River	Lake/Pond: Hydrographic Category = Perennial	473	1550.301	64° 35' 54.712" N	149° 7' 14.004" W	6.025	0.024	0	19040511006156	39004	Perennial	19040511	Gas Conditioning Facility Mile 0 to Mile 540
Lower Tanana River	Lake/Pond: Hydrographic Category = Perennial	473	5502.043	64° 36' 37.345" N	149° 8' 10.177" W	6.390	0.026	0	19040511006149	39004	Perennial	19040511	Gas Conditioning Facility Mile 0 to Mile 540
Lower Tanana River	Lake/Pond: Hydrographic Category = Perennial	473	1187.808	64° 35' 45.980" N	149° 6' 26.445" W	1.042	0.004	0	19040511006157	39004	Perennial	19040511	Gas Conditioning Facility Mile 0 to Mile 540
Middle Fork-North Fork Ch	Lake/Pond: Hydrographic Category = Perennial	177	2044.588	68° 6' 52.000" N	149° 32' 4.637" W	0.668	0.003	0	19040301011448	39004	Perennial	19040301	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	477	2313.647	64° 32' 16.689" N	149° 6' 17.851" W	8.058	0.033	0	19040508009025	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	478	2508.264	64° 32' 11.540" N	149° 6' 30.295" W	3.225	0.013	0	19040508009026	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	478	1667.741	64° 32' 7.123" N	149° 6' 24.443" W	18.828	0.076	0	19040508009027	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	481	4384.848	64° 29' 7.065" N	149° 3' 55.445" W	0.441	0.002	0	19040508008973	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	481	2627.230	64° 29' 6.753" N	149° 4' 25.187" W	9.713	0.039	0	19040508008972	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	483	4542.285	64° 27' 43.209" N	149° 2' 44.526" W	4.651	0.019	0	19040508008975	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	484	4624.781	64° 26' 52.588" N	149° 2' 26.134" W	1.567	0.006	0	19040508008976	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	484	3021.566	64° 26' 49.776" N	149° 3' 4.369" W	1.131	0.005	0	19040508008977	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	485	3879.905	64° 26' 7.871" N	149° 3' 6.514" W	2.778	0.011	0	19040508008978	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	495	123.828	64° 17' 57.642" N	149° 11' 57.528" W	8.077	0.033	0	19040508009003	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	495	3423.253	64° 17' 43.376" N	149° 10' 46.023" W	9.499	0.038	0	19040508009005	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	511	558.731	64° 5' 24.100" N	149° 13' 40.201" W	2.785	0.011	0	19040508008962	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Nenana River	Lake/Pond: Hydrographic Category = Perennial	512	5282.040	64░ 5' 15.275" N	149░ 10' 41.334" W	3.754	0.015	0	19040508008963	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	516	984.017	64░ 1' 45.960" N	149░ 8' 44.260" W	1.686	0.007	0	19040508008965	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	517	4075.546	64░ 1' 32.639" N	149░ 7' 11.042" W	2.291	0.009	0	19040508008966	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	518	1932.216	64░ 0' 16.965" N	149░ 7' 28.431" W	0.586	0.002	0	19040508008967	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	519	1544.369	63░ 59' 9.761" N	149░ 7' 33.398" W	1.524	0.006	0	19040508008912	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	520	2150.461	63░ 59' 4.830" N	149░ 7' 17.988" W	1.473	0.006	0	19040508008913	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	525	3286.392	63░ 54' 8.967" N	149░ 5' 5.348" W	3.388	0.014	0	19040508008923	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	526	5268.761	63░ 54' 50.121" N	149░ 2' 28.938" W	4.540	0.018	0	19040508008918	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	527	5019.197	63░ 54' 6.274" N	149░ 1' 19.835" W	3.714	0.015	0	19040508008924	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	530	4546.818	63░ 50' 48.480" N	148░ 59' 4.030" W	4.534	0.018	0	19040508008715	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	531	2872.074	63░ 50' 30.942" N	149░ 2' 9.094" W	127.198	0.515	0	19040508008931	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	531	3314.908	63░ 50' 26.716" N	149░ 1' 44.127" W	0.670	0.003	0	19040508008932	39004	Perennial	19040508	Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	539	2361.029	63░ 44' 28.581" N	148░ 54' 39.396" W	5.686	0.023	0	19040508008518	39004	Perennial	19040508	Mile 540 to Mile 555, The Denali National Park Route Variation, Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Reservoir: Reservoir Type = Water Storage; Construction Material = Nonearthen	540	2982.986	63░ 43' 55.542" N	148░ 53' 14.964" W	0.968	0.004	0	19040508009544	43613		19040508	Mile 540 to Mile 555, The Denali National Park Route Variation, Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Reservoir: Reservoir Type = Water Storage; Construction Material = Nonearthen	540	3272.776	63░ 43' 53.869" N	148░ 53' 20.353" W	0.973	0.004	0	19040508009545	43613		19040508	Mile 540 to Mile 555, The Denali National Park Route Variation, Gas Conditioning Facility Mile 0 to Mile 540
Nenana River	Lake/Pond: Hydrographic Category = Perennial	542	7950.174	63░ 41' 41.418" N	148░ 51' 56.960" W	15.101	0.061	0	19040508008546	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic	542	2941.254	63░ 43' 16.205" N	148░ 49' 49.027" W	0.497	0.002	0	19040508008523	39004	Perennial	19040508	Mile 540 to Mile 555

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
	Category = Perennial												
Nenana River	Lake/Pond: Hydrographic Category = Perennial	542	8097.830	63° 42' 3.217" N	148° 52' 41.057" W	2.068	0.008	0	19040508008538	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	542	7870.196	63° 41' 48.192" N	148° 52' 2.076" W	0.213	0.001	0	19040508008542	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	542	11084.809	63° 41' 2.568" N	148° 51' 37.416" W	6.826	0.028	0	19040508008559	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	542	8170.352	63° 41' 47.598" N	148° 52' 12.980" W	0.343	0.001	0	19040508008543	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	542	8870.923	63° 41' 27.749" N	148° 51' 38.964" W	5.336	0.022	0	19040508008553	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	542	10218.113	63° 41' 14.500" N	148° 51' 39.326" W	1.322	0.005	0	19040508008558	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	542	1623.386	63° 43' 4.634" N	148° 50' 10.165" W	0.902	0.004	0	19040508008524	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	542	8945.611	63° 41' 34.223" N	148° 52' 1.149" W	0.614	0.002	0	19040508008551	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	542	2710.907	63° 43' 15.966" N	148° 50' 29.682" W	4.423	0.018	0	19040508008521	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	543	1850.463	63° 42' 2.507" N	148° 48' 14.523" W	2.745	0.011	0	19040508008539	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	543	10505.297	63° 40' 58.768" N	148° 50' 58.132" W	1.316	0.005	0	19040508008561	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	543	12242.347	63° 40' 43.115" N	148° 51' 12.643" W	0.476	0.002	0	19040508008563	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	545	11608.807	63° 40' 42.436" N	148° 50' 51.245" W	7.568	0.031	0	19040508008562	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	545	12199.891	63° 40' 12.109" N	148° 50' 37.825" W	0.635	0.003	0	19040508008572	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	545	12400.718	63° 40' 8.066" N	148° 50' 38.419" W	0.634	0.003	0	19040508008576	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	545	12293.945	63° 40' 36.160" N	148° 51' 0.190" W	4.072	0.016	0	19040508008564	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	545	9402.901	63° 40' 33.496" N	148° 49' 51.661" W	1.678	0.007	0	19040508008565	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	545	12140.363	63° 40' 23.291" N	148° 50' 46.774" W	2.016	0.008	0	19040508008567	39004	Perennial	19040508	The Denali National Park Route Variation

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Nenana River	Lake/Pond: Hydrographic Category = Perennial	545	9801.081	63° 40' 16.398" N	148° 49' 42.883" W	0.539	0.002	0	19040508008569	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	546	1570.372	63° 40' 0.299" N	148° 45' 28.348" W	0.622	0.003	0	19040508008583	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	546	2801.066	63° 40' 17.062" N	148° 44' 40.276" W	3.191	0.013	0	19040508008571	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	546	7517.302	63° 39' 32.011" N	148° 48' 16.365" W	4.867	0.020	0	19040508008601	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	546	4615.949	63° 39' 39.873" N	148° 47' 4.876" W	1.999	0.008	0	19040508008596	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	546	12170.095	63° 39' 56.633" N	148° 50' 24.504" W	5.218	0.021	0	19040508008581	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	546	1018.499	63° 40' 5.016" N	148° 46' 12.067" W	1.933	0.008	0	19040508008579	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	546	3962.673	63° 39' 56.504" N	148° 47' 16.197" W	2.589	0.010	0	19040508008585	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	546	16611.321	63° 39' 11.062" N	148° 51' 37.276" W	5.994	0.024	0	19040508008611	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	546	3381.964	63° 40' 34.445" N	148° 44' 47.787" W	0.975	0.004	0	19040508008566	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	546	1849.541	63° 40' 2.062" N	148° 44' 54.819" W	38.612	0.156	0	19040508008577	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	546	3786.292	63° 40' 16.896" N	148° 44' 25.063" W	0.600	0.002	0	19040508008573	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	546	3226.186	63° 40' 24.463" N	148° 44' 20.528" W	15.508	0.063	0	19040508008568	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	546	683.816	63° 40' 3.806" N	148° 46' 1.166" W	5.994	0.024	0	19040508008580	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	546	17563.908	63° 39' 30.326" N	148° 52' 22.202" W	23.069	0.093	0	19040508008591	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	546	3307.254	63° 39' 43.161" N	148° 46' 25.966" W	0.860	0.003	0	19040508008594	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	546	1512.263	63° 39' 58.042" N	148° 46' 8.654" W	1.872	0.008	0	19040508008584	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	546	383.285	63° 40' 7.274" N	148° 45' 48.741" W	2.627	0.011	0	19040508008578	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	546	2354.022	63° 39' 45.220" N	148° 45' 57.036" W	7.373	0.030	0	19040508008588	39004	Perennial	19040508	Mile 540 to Mile 555

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Nenana River	Lake/Pond: Hydrographic Category = Perennial	547	4740.395	63░ 39' 30.116" N	148░ 43' 24.200" W	0.339	0.001	0	19040508008605	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	547	4899.831	63░ 39' 7.808" N	148░ 46' 53.265" W	0.290	0.001	0	19040508008612	39004	Perennial	19040508	Mile 540 to Mile 555, The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	547	4189.473	63░ 39' 42.986" N	148░ 43' 39.643" W	6.001	0.024	0	19040508008595	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	547	5449.036	63░ 38' 52.874" N	148░ 46' 57.799" W	5.056	0.020	0	19040508008615	39004	Perennial	19040508	The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	547	4498.538	63░ 39' 48.213" N	148░ 43' 44.324" W	0.564	0.002	0	19040508008590	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	547	1744.637	63░ 39' 27.116" N	148░ 45' 50.989" W	1.511	0.006	0	19040508008606	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	547	2390.417	63░ 39' 33.703" N	148░ 46' 2.206" W	0.583	0.002	0	19040508008603	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	547	3512.320	63░ 39' 28.456" N	148░ 43' 50.437" W	0.426	0.002	0	19040508008608	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	547	2823.686	63░ 39' 34.274" N	148░ 46' 10.431" W	0.306	0.001	0	19040508008602	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	547	3764.862	63░ 39' 56.461" N	148░ 44' 15.400" W	3.094	0.013	0	19040508008586	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	547	2915.713	63░ 39' 33.279" N	148░ 44' 7.218" W	0.289	0.001	0	19040508008604	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	548	4289.846	63░ 38' 48.792" N	148░ 42' 57.244" W	0.365	0.001	0	19040508008617	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	548	2674.562	63░ 38' 36.043" N	148░ 45' 31.073" W	0.878	0.004	0	19040508008625	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	548	3892.880	63░ 38' 39.756" N	148░ 42' 58.436" W	1.766	0.007	0	19040508008623	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	548	2585.718	63░ 38' 42.281" N	148░ 45' 29.900" W	1.882	0.008	0	19040508008622	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	548	3965.815	63░ 38' 25.001" N	148░ 42' 59.130" W	1.635	0.007	0	19040508008626	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	548	2340.434	63░ 38' 48.127" N	148░ 45' 15.056" W	0.605	0.002	0	19040508008616	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	548	4071.328	63░ 38' 20.879" N	148░ 43' 3.414" W	0.501	0.002	0	19040508008627	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	548	2620.009	63░ 38' 59.858" N	148░ 44' 0.884" W	1.594	0.006	0	19040508008614	39004	Perennial	19040508	Mile 540 to Mile 555

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Nenana River	Lake/Pond: Hydrographic Category = Perennial	548	4902.633	63░38' 46.794" N	148░42' 39.787" W	0.732	0.003	0	19040508008620	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	548	4555.283	63░38' 48.767" N	148░42' 50.039" W	0.520	0.002	0	19040508008618	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	549	5046.044	63░37' 23.587" N	148░42' 54.788" W	4.856	0.020	0	19040508008657	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	549	3231.948	63░37' 22.954" N	148░43' 44.489" W	10.138	0.041	0	19040508008655	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	549	3107.060	63░37' 17.323" N	148░44' 9.022" W	4.799	0.019	0	19040508008660	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	549	4353.242	63░37' 33.829" N	148░43' 5.323" W	0.480	0.002	0	19040508008649	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	549	4474.741	63░37' 22.225" N	148░43' 14.905" W	4.220	0.017	0	19040508008658	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	549	2724.751	63░38' 8.606" N	148░43' 56.379" W	0.483	0.002	0	19040508008631	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	549	4825.613	63░37' 36.494" N	148░42' 51.744" W	1.399	0.006	0	19040508008645	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	549	4555.365	63░37' 10.582" N	148░43' 37.599" W	2.447	0.010	0	19040508008664	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	549	4544.549	63░37' 32.673" N	148░43' 2.088" W	0.848	0.003	0	19040508008650	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	550	3683.464	63░36' 54.810" N	148░44' 11.782" W	0.843	0.003	0	19040508008669	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	550	3408.403	63░37' 1.207" N	148░44' 16.334" W	0.865	0.003	0	19040508008666	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	550	4761.824	63░36' 42.904" N	148░43' 56.954" W	0.286	0.001	0	19040508008671	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	550	2917.067	63░36' 58.688" N	148░44' 27.703" W	1.233	0.005	0	19040508008667	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	551	2064.269	63░36' 39.346" N	148░46' 56.739" W	7.152	0.029	0	19040508008670	39004	Perennial	19040508	Mile 540 to Mile 555, The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	551	4935.050	63░36' 17.357" N	148░44' 35.754" W	2.555	0.010	0	19040508008676	39004	Perennial	19040508	Mile 540 to Mile 555
Nenana River	Lake/Pond: Hydrographic Category = Perennial	551	1933.873	63░36' 33.033" N	148░47' 5.654" W	5.489	0.022	0	19040508008672	39004	Perennial	19040508	Mile 540 to Mile 555, The Denali National Park Route Variation

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Nenana River	Lake/Pond: Hydrographic Category = Perennial	551	1791.955	63° 36' 24.192" N	148° 47' 8.500" W	0.659	0.003	0	19040508008675	39004	Perennial	19040508	Mile 540 to Mile 555, The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	552	2130.936	63° 35' 53.622" N	148° 47' 34.556" W	1.467	0.006	0	19040508008681	39004	Perennial	19040508	Mile 540 to Mile 555, The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	553	1839.150	63° 34' 59.415" N	148° 48' 16.535" W	2.356	0.010	0	19040508008690	39004	Perennial	19040508	Mile 540 to Mile 555, The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	553	3871.573	63° 35' 6.868" N	148° 49' 0.293" W	0.235	0.001	0	19040508008687	39004	Perennial	19040508	Mile 540 to Mile 555, The Denali National Park Route Variation
Nenana River	Lake/Pond: Hydrographic Category = Perennial	559	2615.690	63° 29' 23.189" N	148° 49' 44.712" W	1.799	0.007	0	19040508008378	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	560	1219.726	63° 28' 38.140" N	148° 49' 23.194" W	3.523	0.014	0	19040508008386	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	562	2370.736	63° 26' 52.661" N	148° 48' 11.559" W	3.547	0.014	0	19040508008411	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	562	1824.593	63° 26' 57.654" N	148° 48' 24.032" W	4.419	0.018	0	19040508008408	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	563	533.689	63° 26' 46.682" N	148° 49' 37.448" W	3.411	0.014	0	19040508008415	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	563	322.209	63° 26' 56.625" N	148° 49' 55.803" W	5.088	0.021	0	19040508008409	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	563	170.407	63° 26' 48.051" N	148° 49' 59.091" W	0.649	0.003	0	19040508008413	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	563	558.809	63° 26' 50.039" N	148° 50' 18.163" W	5.219	0.021	0	19040508008412	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	564	2088.275	63° 26' 3.341" N	148° 52' 7.307" W	1.388	0.006	0	19040508008419	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	564	1972.088	63° 26' 6.282" N	148° 52' 9.620" W	2.109	0.009	0	19040508008418	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	565	3749.003	63° 25' 33.914" N	148° 51' 10.851" W	0.490	0.002	0	19040508008421	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	565	2690.217	63° 25' 16.495" N	148° 51' 43.282" W	7.576	0.031	0	19040508008423	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	568	991.530	63° 23' 6.710" N	148° 54' 2.268" W	1.408	0.006	0	19040508008443	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Nenana River	Lake/Pond: Hydrographic Category = Perennial	568	1068.506	63° 23' 0.373" N	148° 54' 37.631" W	2.075	0.008	0	19040508008448	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	568	73.058	63° 23' 9.074" N	148° 54' 23.779" W	2.236	0.009	0	19040508008440	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	568	1232.087	63° 23' 8.300" N	148° 53' 52.720" W	2.441	0.010	0	19040508008441	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	570	5256.032	63° 21' 49.822" N	148° 56' 22.472" W	1.363	0.006	0	19040508008489	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	570	2752.529	63° 22' 11.965" N	148° 56' 55.063" W	0.716	0.003	0	19040508008476	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	570	2531.810	63° 22' 5.804" N	148° 57' 15.039" W	0.853	0.003	0	19040508008479	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	570	4472.071	63° 21' 46.417" N	148° 56' 59.873" W	2.660	0.011	0	19040508008491	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	570	3071.104	63° 22' 11.926" N	148° 56' 47.759" W	0.540	0.002	0	19040508008477	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	570	5267.956	63° 21' 40.089" N	148° 56' 54.322" W	0.301	0.001	0	19040508008499	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	570	5901.520	63° 21' 44.772" N	148° 56' 16.060" W	0.750	0.003	0	19040508008493	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	571	1026.271	63° 22' 3.002" N	148° 59' 24.123" W	1.917	0.008	0	19040508008480	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	571	620.947	63° 22' 3.176" N	148° 59' 41.794" W	5.363	0.022	0	19040508008478	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	572	787.592	63° 21' 29.664" N	149° 1' 10.412" W	23.723	0.096	0	19040508008755	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	572	1154.646	63° 21' 56.571" N	149° 0' 44.387" W	21.585	0.087	0	19040508008751	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	572	2363.043	63° 21' 40.852" N	149° 2' 5.908" W	3.013	0.012	0	19040508008752	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	572	2357.163	63° 22' 3.180" N	149° 0' 50.609" W	0.369	0.001	0	19040508008750	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	573	2316.792	63° 20' 55.554" N	149° 2' 15.174" W	55.485	0.225	0	19040508008757	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	573	2296.752	63° 21' 37.560" N	149° 2' 20.717" W	1.438	0.006	0	19040508008753	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	573	2686.567	63° 21' 38.129" N	149° 2' 11.720" W	0.410	0.002	0	19040508008754	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Nenana River	Lake/Pond: Hydrographic Category = Perennial	574	4646.982	63° 20' 14.196" N	149° 2' 47.417" W	132.856	0.538	0	19040508008761	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	575	3825.890	63° 20' 51.470" N	149° 6' 54.970" W	1.838	0.007	0	19040508008758	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	575	2814.375	63° 19' 58.379" N	149° 5' 20.563" W	0.570	0.002	0	19040508008770	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	575	729.604	63° 20' 5.597" N	149° 6' 4.632" W	80.884	0.327	0	19040508008763	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	575	4073.591	63° 19' 55.980" N	149° 4' 46.495" W	1.659	0.007	0	19040508008773	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	575	2942.634	63° 20' 1.931" N	149° 5' 5.993" W	3.597	0.015	0	19040508008768	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	575	2729.825	63° 19' 53.848" N	149° 5' 38.970" W	4.466	0.018	0	19040508008771	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	575	345.149	63° 20' 15.411" N	149° 6' 44.110" W	29.861	0.121	0	19040508008762	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	575	3372.797	63° 20' 52.244" N	149° 6' 25.531" W	1.133	0.005	0	19040508008759	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	576	2945.302	63° 19' 36.299" N	149° 5' 58.600" W	108.870	0.441	2304	19040508008774	39009	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	576	1599.621	63° 19' 55.141" N	149° 8' 0.057" W	0.267	0.001	0	19040508008772	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	576	1652.501	63° 19' 39.756" N	149° 6' 52.928" W	0.791	0.003	0	19040508008778	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	576	2735.885	63° 20' 5.653" N	149° 8' 17.048" W	4.655	0.019	0	19040508008767	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	576	1990.367	63° 19' 22.542" N	149° 7' 38.752" W	4.169	0.017	0	19040508008781	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	576	5261.167	63° 19' 9.472" N	149° 5' 56.293" W	16.073	0.065	0	19040508008784	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	577	1930.081	63° 19' 25.300" N	149° 9' 19.615" W	3.991	0.016	0	19040508008780	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	578	1500.522	63° 18' 20.486" N	149° 9' 35.061" W	403.912	1.635	2329	19040508008786	39009	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Nenana River	Lake/Pond: Hydrographic Category = Perennial	578	722.251	63° 18' 27.060" N	149° 10' 12.339" W	4.690	0.019	0	19040508008798	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	578	1080.362	63° 18' 50.943" N	149° 10' 9.593" W	5.616	0.023	0	19040508008789	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	579	769.433	63° 18' 11.800" N	149° 11' 46.331" W	1.237	0.005	0	19040508008804	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	579	2153.911	63° 17' 40.682" N	149° 11' 49.771" W	0.605	0.002	0	19040508008819	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	579	2031.070	63° 18' 16.706" N	149° 12' 11.206" W	21.761	0.088	0	19040508008792	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	579	1189.166	63° 17' 57.513" N	149° 12' 14.201" W	2.325	0.009	0	19040508008809	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	579	1005.945	63° 17' 54.588" N	149° 11' 27.159" W	1.092	0.004	0	19040508008811	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	579	1199.819	63° 17' 50.262" N	149° 11' 35.668" W	0.415	0.002	0	19040508008815	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	579	2107.758	63° 17' 51.498" N	149° 12' 26.116" W	0.790	0.003	0	19040508008812	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	579	1428.344	63° 17' 47.475" N	149° 11' 42.957" W	0.715	0.003	0	19040508008816	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	579	3719.046	63° 17' 33.929" N	149° 10' 50.956" W	0.332	0.001	0	19040508008821	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	579	1135.764	63° 17' 51.874" N	149° 11' 32.691" W	0.267	0.001	0	19040508008814	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	579	1648.293	63° 18' 6.618" N	149° 11' 0.245" W	3.128	0.013	0	19040508008806	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Nenana River	Lake/Pond: Hydrographic Category = Perennial	580	2239.335	63° 17' 31.767" N	149° 12' 3.484" W	0.329	0.001	0	19040508009899	39004	Perennial	19040508	Mile 555 to Cook Inlet NGLEP Facility (Mile 737)
Ramparts	Lake/Pond: Hydrographic Category = Perennial	338	4289.390	66° 7' 34.850" N	150° 8' 17.687" W	0.244	0.001	0	19040404003392	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	339	2061.100	66° 7' 3.995" N	150° 10' 7.138" W	1.494	0.006	0	19040404003394	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	340	2828.232	66° 5' 41.287" N	150° 10' 6.040" W	1.366	0.006	0	19040404003398	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	340	3398.797	66° 5' 43.980" N	150° 7' 34.796" W	9.461	0.038	0	19040404003397	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	341	1709.949	66° 5' 25.216" N	150° 10' 3.076" W	1.535	0.006	0	19040404003400	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Ramparts	Lake/Pond: Hydrographic Category = Perennial	341	3440.757	66° 4' 44.093" N	150° 8' 43.313" W	1.302	0.005	0	19040404003403	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	341	1485.949	66° 5' 29.567" N	150° 10' 9.173" W	6.020	0.024	0	19040404003399	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	342	3634.179	66° 4' 26.903" N	150° 11' 21.239" W	1.039	0.004	0	19040404003406	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	342	3004.665	66° 4' 35.159" N	150° 8' 40.467" W	11.663	0.047	0	19040404003405	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	342	3894.589	66° 4' 21.184" N	150° 11' 33.230" W	2.393	0.010	0	19040404003408	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	344	2426.705	66° 2' 16.182" N	150° 9' 23.523" W	2.536	0.010	0	19040404003419	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	345	5340.584	66° 1' 27.857" N	150° 10' 8.635" W	2.951	0.012	0	19040404003424	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	345	5252.311	66° 0' 59.597" N	150° 8' 39.253" W	1.539	0.006	0	19040404003433	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	345	4848.437	66° 1' 4.670" N	150° 8' 51.161" W	3.011	0.012	0	19040404003431	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	345	4783.385	66° 1' 30.831" N	150° 9' 46.043" W	1.912	0.008	0	19040404003425	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	346	5386.137	66° 0' 33.463" N	150° 7' 55.388" W	2.983	0.012	0	19040404003449	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	346	3071.922	66° 0' 48.788" N	150° 7' 14.854" W	2.613	0.011	0	19040404003440	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	346	5612.555	66° 0' 49.153" N	150° 8' 26.227" W	0.182	0.001	0	19040404003442	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	347	2835.235	66° 0' 12.336" N	150° 6' 5.462" W	1.537	0.006	0	19040404003459	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	347	2469.817	66° 0' 42.815" N	150° 6' 16.768" W	1.445	0.006	0	19040404003447	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	347	4045.949	65° 59' 59.281" N	150° 6' 19.811" W	6.942	0.028	0	19040404003329	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	347	2589.655	66° 0' 28.126" N	150° 6' 26.345" W	2.427	0.010	0	19040404003452	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	347	2565.673	66° 0' 49.654" N	150° 6' 11.811" W	0.272	0.001	0	19040404003445	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	347	5516.591	66° 0' 24.295" N	150° 7' 32.022" W	0.745	0.003	0	19040404003457	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Ramparts	Lake/Pond: Hydrographic Category = Perennial	347	3505.761	65░ 59' 58.729" N	150░ 5' 31.255" W	4.259	0.017	0	19040404003330	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	347	1704.779	66░ 0' 25.025" N	150░ 6' 0.955" W	6.697	0.027	0	19040404003453	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	347	3106.234	66░ 0' 4.462" N	150░ 5' 43.291" W	2.903	0.012	0	19040404003460	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	348	2905.590	65░ 59' 33.267" N	150░ 4' 24.620" W	3.087	0.012	355	19040404003348	39009	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	348	3838.541	65░ 59' 22.678" N	150░ 3' 25.486" W	1.718	0.007	0	19040404003349	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	348	1645.969	65░ 59' 57.841" N	150░ 4' 37.418" W	1.925	0.008	0	19040404003343	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	348	1367.557	65░ 59' 55.324" N	150░ 4' 25.662" W	1.202	0.005	0	19040404003346	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	349	5023.806	65░ 59' 4.882" N	150░ 3' 14.432" W	0.927	0.004	0	19040404003351	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	355	4344.325	65░ 55' 58.038" N	149░ 54' 19.269" W	3.037	0.012	0	19040404003192	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	358	2313.856	65░ 54' 27.566" N	149░ 48' 28.635" W	2.129	0.009	0	19040404003157	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	359	675.525	65░ 54' 18.785" N	149░ 46' 11.753" W	1.113	0.005	0	19040404003161	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	359	4042.162	65░ 54' 0.168" N	149░ 48' 1.380" W	0.480	0.002	0	19040404003166	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	359	4887.004	65░ 53' 47.713" N	149░ 48' 9.717" W	1.803	0.007	0	19040404003169	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	359	1800.454	65░ 54' 17.809" N	149░ 47' 41.657" W	61.431	0.249	0	19040404003208	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	359	1123.584	65░ 54' 25.423" N	149░ 46' 8.481" W	1.507	0.006	0	19040404003159	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	361	1217.508	65░ 53' 2.582" N	149░ 44' 2.767" W	23.921	0.097	0	19040404003176	39004	Perennial	19040404	Yukon River Bridge Option, Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	361	6928.444	65░ 52' 36.202" N	149░ 41' 45.749" W	1.576	0.006	0	19040404003234	39004	Perennial	19040404	Yukon River Bridge Option
Ramparts	Lake/Pond: Hydrographic Category = Perennial	361	2140.436	65░ 53' 15.078" N	149░ 44' 21.731" W	7.516	0.030	0	19040404003171	39004	Perennial	19040404	Yukon River Bridge Option, Gas Conditioning Facility

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
													Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	364	5340.468	65° 50' 14.139" N	149° 43' 41.292" W	4.296	0.017	1160	19040404003235	39009	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	366	294.852	65° 50' 3.243" N	149° 37' 51.616" W	6.635	0.027	1160	19040404003236	39009	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	382	3413.512	65° 42' 34.268" N	149° 12' 32.697" W	0.417	0.002	0	19040404002968	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	386	4134.928	65° 40' 1.537" N	149° 5' 30.061" W	3.176	0.013	0	19040404003025	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	387	1289.827	65° 40' 10.527" N	149° 4' 6.006" W	1.618	0.007	0	19040404003023	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	387	1291.832	65° 40' 14.563" N	149° 3' 39.236" W	1.566	0.006	0	19040404003020	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	387	1506.163	65° 40' 11.515" N	149° 3' 4.264" W	2.266	0.009	0	19040404003022	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	388	5436.783	65° 40' 2.864" N	149° 0' 53.050" W	0.503	0.002	0	19040404003027	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial	388	4760.497	65° 40' 3.805" N	149° 1' 5.254" W	9.857	0.040	0	19040404003024	39004	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Ramparts	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	392	3900.201	65° 37' 21.915" N	148° 56' 18.511" W	11.992	0.049	735	19040404002917	39009	Perennial	19040404	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	14	3781.738	70° 8' 20.826" N	148° 32' 54.093" W	3.435	0.014	0	19060402015966	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	14	1777.893	70° 8' 13.152" N	148° 33' 43.996" W	6.802	0.028	0	19060402015977	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	14	3116.728	70° 8' 12.329" N	148° 33' 10.345" W	7.863	0.032	0	19060402015973	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	14	5115.306	70° 8' 4.219" N	148° 32' 12.984" W	14.990	0.061	0	19060402015981	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	14	1105.631	70° 8' 8.542" N	148° 34' 12.076" W	4.044	0.016	0	19060402017314	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	14	2391.628	70° 8' 0.600" N	148° 33' 39.636" W	4.538	0.018	0	19060402015991	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	14	4266.956	70░ 8' 33.507" N	148░ 32' 53.406" W	1.869	0.008	0	19060402015956	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	14	2712.930	70░ 8' 14.099" N	148░ 33' 24.314" W	5.051	0.020	0	19060402015974	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	14	1743.767	70░ 7' 58.906" N	148░ 34' 3.247" W	8.075	0.033	0	19060402017313	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	14	3378.353	70░ 8' 15.401" N	148░ 33' 1.265" W	6.317	0.026	0	19060402015970	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	15	2359.939	70░ 7' 42.422" N	148░ 32' 53.041" W	35.743	0.145	0	19060402016002	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	15	4251.950	70░ 7' 56.231" N	148░ 32' 39.741" W	6.478	0.026	0	19060402015997	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	15	5941.766	70░ 8' 1.761" N	148░ 31' 53.820" W	2.620	0.011	0	19060402015993	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	15	4960.054	70░ 7' 6.950" N	148░ 31' 47.000" W	4.310	0.017	0	19060402016036	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	16	2540.894	70░ 6' 49.709" N	148░ 32' 19.186" W	13.778	0.056	0	19060402016051	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	16	2903.792	70░ 6' 18.790" N	148░ 34' 59.851" W	2.119	0.009	0	19060402016072	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	16	2271.643	70░ 6' 9.432" N	148░ 33' 28.441" W	2.253	0.009	0	19060402016077	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	16	1834.877	70░ 6' 53.114" N	148░ 33' 8.240" W	19.983	0.081	0	19060402016048	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	16	358.136	70░ 6' 22.549" N	148░ 33' 17.710" W	17.952	0.073	0	19060402016068	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	16	3383.510	70░ 6' 18.890" N	148░ 35' 27.844" W	20.292	0.082	0	19060402016070	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	16	1426.771	70░ 6' 46.959" N	148░ 33' 20.513" W	2.540	0.010	0	19060402016057	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	16	3847.122	70░ 6' 36.297" N	148░ 35' 36.723" W	1.849	0.007	0	19060402016064	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	17	1220.736	70░ 5' 56.994" N	148░ 33' 12.362" W	1.922	0.008	0	19060402016088	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	17	1941.765	70░ 6' 4.978" N	148░ 32' 56.568" W	3.708	0.015	0	19060402016081	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	17	706.970	70░ 5' 57.307" N	148░ 34' 21.204" W	80.586	0.326	0	19060402016080	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	17	3265.012	70░ 5' 36.901" N	148░ 34' 52.361" W	2.160	0.009	0	19060402016098	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	17	1171.354	70░ 5' 54.916" N	148░ 33' 35.177" W	1.923	0.008	0	19060402016089	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	17	2601.153	70░ 5' 42.065" N	148░ 31' 36.657" W	37.450	0.152	0	19060402016093	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	17	3658.795	70░ 6' 2.319" N	148░ 31' 18.638" W	44.202	0.179	0	19060402016079	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	17	1816.937	70░ 6' 1.880" N	148░ 33' 33.794" W	2.389	0.010	0	19060402016084	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	18	1335.141	70░ 5' 18.164" N	148░ 34' 9.910" W	26.981	0.109	0	19060402016103	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	18	1368.459	70░ 4' 42.779" N	148░ 34' 0.560" W	42.234	0.171	0	19060402016117	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	18	3702.172	70░ 4' 55.739" N	148░ 36' 12.500" W	1.572	0.006	0	19060402016113	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	18	3554.893	70░ 5' 32.386" N	148░ 35' 6.537" W	3.745	0.015	0	19060402016099	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	18	1822.944	70░ 5' 14.345" N	148░ 35' 9.932" W	19.382	0.078	0	19060402016105	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	18	1825.047	70░ 5' 18.322" N	148░ 32' 50.442" W	133.558	0.541	80	19060402016100	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	18	2705.107	70░ 5' 26.336" N	148░ 34' 39.054" W	3.156	0.013	0	19060402016101	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	18	2877.939	70░ 5' 11.224" N	148░ 36' 6.949" W	107.078	0.433	83	19060402016104	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	18	5101.684	70░ 4' 53.810" N	148░ 36' 51.211" W	2.520	0.010	0	19060402016114	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	19	1512.914	70░ 3' 54.133" N	148░ 35' 1.042" W	3.281	0.013	0	19060402016131	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	19	3024.869	70░ 4' 15.395" N	148░ 36' 47.294" W	8.884	0.036	0	19060402016124	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	19	4220.330	70░ 4' 6.348" N	148░ 37' 30.877" W	8.655	0.035	0	19060402016126	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	19	2190.715	70░ 3' 46.422" N	148░ 35' 33.819" W	5.827	0.024	0	19060402016132	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	19	909.962	70░ 4' 8.742" N	148░ 34' 37.938" W	5.655	0.023	0	19060402016125	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	19	3707.148	70░ 4' 43.162" N	148░ 36' 28.234" W	7.962	0.032	0	19060402016116	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	20	1484.802	70░ 3' 7.156" N	148░ 36' 15.498" W	5.700	0.023	0	19060402016142	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	21	2160.826	70░ 3' 1.705" N	148░ 36' 46.284" W	8.319	0.034	0	19060402016144	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	22	3105.423	70░ 2' 1.137" N	148░ 40' 21.539" W	22.996	0.093	0	19060402016160	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	22	1727.242	70░ 1' 50.007" N	148░ 39' 29.547" W	7.782	0.031	0	19060402016162	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	22	1456.805	70░ 2' 15.061" N	148░ 38' 56.639" W	26.594	0.108	0	19060402016153	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	23	182.848	70░ 0' 59.806" N	148░ 39' 26.322" W	7.849	0.032	0	19060402016175	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	23	268.899	70░ 1' 14.024" N	148░ 38' 39.768" W	16.358	0.066	0	19060402016172	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	23	1063.971	70░ 0' 53.876" N	148░ 39' 14.013" W	5.509	0.022	0	19060402016177	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	23	1237.770	70░ 1' 9.068" N	148░ 38' 37.019" W	1.498	0.006	0	19060402016174	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	23	1807.859	70░ 0' 47.760" N	148░ 39' 47.503" W	4.400	0.018	0	19060402016178	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	24	245.478	70░ 0' 27.249" N	148░ 39' 51.880" W	9.574	0.039	0	19060402016185	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	24	2737.185	70░ 0' 32.430" N	148░ 41' 25.084" W	13.310	0.054	0	19060402016184	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	24	3740.877	70░ 0' 39.554" N	148░ 41' 33.479" W	3.356	0.014	0	19060402016182	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	24	2314.985	70░ 0' 41.301" N	148░ 40' 35.736" W	18.993	0.077	0	19060402016180	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	25	888.092	69░ 59' 39.037" N	148░ 41' 42.537" W	9.970	0.040	0	19060402015747	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	25	1919.761	69░ 59' 25.737" N	148░ 42' 26.334" W	19.213	0.078	0	19060402015748	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	25	2062.398	70° 0' 4.273" N	148° 41' 25.274" W	28.963	0.117	0	19060402015746	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	26	1074.578	69° 58' 58.369" N	148° 42' 39.087" W	21.374	0.087	0	19060402015750	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	26	3299.035	69° 58' 48.016" N	148° 44' 3.458" W	43.427	0.176	167	19060402015752	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	26	1888.507	69° 59' 1.275" N	148° 43' 6.932" W	10.978	0.044	0	19060402015751	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	27	915.791	69° 58' 13.401" N	148° 43' 43.026" W	2.076	0.008	0	19060402015755	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	27	4792.730	69° 58' 35.042" N	148° 45' 24.367" W	9.778	0.040	0	19060402015753	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	27	3738.938	69° 58' 25.148" N	148° 45' 6.188" W	5.945	0.024	0	19060402015754	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	27	1591.133	69° 58' 4.605" N	148° 44' 14.968" W	2.865	0.012	0	19060402015756	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	27	1413.009	69° 57' 47.944" N	148° 44' 3.431" W	32.282	0.131	0	19060402015757	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	28	1433.429	69° 57' 31.113" N	148° 44' 35.552" W	69.407	0.281	188	19060402015758	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	29	2235.115	69° 56' 39.362" N	148° 46' 12.100" W	9.908	0.040	0	19060402015763	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	29	3516.082	69° 56' 43.219" N	148° 46' 45.929" W	6.114	0.025	0	19060402015761	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	29	655.056	69° 56' 18.410" N	148° 44' 49.075" W	20.568	0.083	0	19060402015765	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	29	1328.796	69° 56' 22.749" N	148° 46' 12.074" W	34.610	0.140	0	19060402015764	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	29	2291.367	69° 56' 52.123" N	148° 46' 10.628" W	24.651	0.100	0	19060402015760	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	30	2526.084	69° 55' 23.895" N	148° 45' 7.881" W	7.123	0.029	0	19060402015768	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	30	1993.522	69° 55' 23.093" N	148° 46' 50.791" W	2.424	0.010	0	19060402015770	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	30	2912.899	69° 55' 50.000" N	148° 48' 1.926" W	17.588	0.071	0	19060402015766	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	30	2936.885	69° 55' 36.788" N	148° 44' 37.137" W	13.744	0.056	0	19060402015767	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	31	3990.311	69° 54' 38.825" N	148° 49' 8.755" W	13.434	0.054	0	19060402016816	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	31	4778.204	69° 55' 0.872" N	148° 49' 22.374" W	6.874	0.028	0	19060402016815	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	31	2187.162	69° 54' 46.075" N	148° 45' 49.395" W	10.017	0.041	0	19060402015771	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	31	4153.409	69° 54' 14.760" N	148° 45' 50.878" W	3.288	0.013	0	19060402015773	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	31	3222.689	69° 55' 18.248" N	148° 48' 27.049" W	62.847	0.254	0	19060402015769	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	31	4028.651	69° 54' 23.156" N	148° 45' 37.254" W	4.421	0.018	0	19060402015772	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	32	4053.152	69° 53' 52.373" N	148° 45' 58.915" W	11.806	0.048	0	19060402015775	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	32	1903.493	69° 54' 7.264" N	148° 46' 35.111" W	17.152	0.069	0	19060402015774	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	33	2075.725	69° 52' 57.643" N	148° 48' 21.673" W	6.617	0.027	0	19060402016817	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	33	2839.176	69° 52' 44.960" N	148° 48' 14.274" W	2.978	0.012	0	19060402016818	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	34	2096.958	69° 52' 1.644" N	148° 47' 1.067" W	2.781	0.011	0	19060402015778	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	34	2069.072	69° 52' 5.238" N	148° 47' 28.451" W	4.668	0.019	0	19060402015777	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	34	5110.916	69° 52' 12.130" N	148° 50' 22.800" W	186.311	0.754	0	19060402017322	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	34	2733.838	69° 52' 22.437" N	148° 48' 16.063" W	2.963	0.012	0	19060402016819	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	35	2311.948	69° 51' 50.756" N	148° 47' 4.695" W	7.733	0.031	0	19060402015779	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	35	2007.680	69° 51' 31.714" N	148° 47' 24.317" W	13.097	0.053	0	19060402015780	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	36	2123.137	69° 50' 19.357" N	148° 45' 44.067" W	1.651	0.007	0	19060402015782	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	36	1342.809	69° 50' 38.795" N	148° 46' 55.579" W	91.248	0.369	269	19060402015781	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	37	2718.600	69° 50' 4.681" N	148° 47' 6.761" W	48.225	0.195	0	19060402015783	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	37	1275.969	69° 49' 46.610" N	148° 46' 24.919" W	9.157	0.037	0	19060402015785	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	37	2499.448	69° 49' 43.359" N	148° 46' 52.248" W	1.290	0.005	0	19060402015787	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	37	3098.856	69° 49' 44.215" N	148° 47' 17.016" W	2.101	0.009	0	19060402015786	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	37	719.571	69° 49' 58.884" N	148° 45' 44.245" W	2.423	0.010	0	19060402015784	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	38	5428.544	69° 48' 23.543" N	148° 47' 41.639" W	1.811	0.007	0	19060402015788	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	39	2007.160	69° 47' 41.432" N	148° 45' 19.683" W	9.360	0.038	0	19060402015791	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	39	1805.494	69° 47' 56.280" N	148° 45' 32.419" W	3.305	0.013	0	19060402015790	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	39	1982.435	69° 48' 15.760" N	148° 45' 40.959" W	3.349	0.014	0	19060402015789	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	40	648.065	69° 47' 25.381" N	148° 43' 41.785" W	2.059	0.008	0	19060402015792	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	41	4192.021	69° 46' 22.620" N	148° 44' 53.777" W	7.611	0.031	0	19060402015796	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	41	3501.479	69° 46' 52.304" N	148° 44' 23.745" W	4.658	0.019	0	19060402015794	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	43	2684.663	69° 44' 49.754" N	148° 43' 8.054" W	3.917	0.016	0	19060402015649	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	43	3285.765	69° 44' 46.171" N	148° 43' 27.959" W	9.771	0.040	0	19060402015650	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	44	3178.507	69° 43' 49.840" N	148° 43' 12.652" W	1.986	0.008	0	19060402015655	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	44	1471.667	69° 44' 21.519" N	148° 41' 24.774" W	1.750	0.007	0	19060402015653	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	44	707.091	69° 44' 12.064" N	148° 41' 9.115" W	4.805	0.019	0	19060402015654	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	45	4739.204	69° 43' 47.379" N	148° 44' 24.774" W	1.510	0.006	0	19060402017328	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	45	2647.799	69° 43' 10.796" N	148° 44' 6.797" W	24.745	0.100	352	19060402017327	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	46	1211.546	69° 42' 40.169" N	148° 42' 58.206" W	4.358	0.018	0	19060402015659	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	46	767.028	69° 42' 29.516" N	148° 43' 10.528" W	4.299	0.017	0	19060402015661	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	46	1736.205	69° 42' 39.346" N	148° 43' 23.618" W	3.189	0.013	0	19060402015660	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	47	3769.598	69° 41' 55.250" N	148° 44' 16.078" W	4.443	0.018	0	19060402017329	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	47	3874.998	69° 41' 21.338" N	148° 40' 47.092" W	2.256	0.009	0	19060402015743	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	48	1830.471	69° 40' 35.665" N	148° 41' 27.399" W	2.937	0.012	0	19060402015669	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	48	2782.616	69° 40' 54.544" N	148° 41' 10.883" W	2.851	0.012	0	19060402015668	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	48	2433.259	69° 41' 2.963" N	148° 43' 29.958" W	5.682	0.023	0	19060402017330	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	48	2141.346	69° 41' 0.828" N	148° 43' 14.811" W	3.885	0.016	0	19060402017331	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	49	676.810	69° 39' 58.499" N	148° 42' 29.064" W	2.459	0.010	0	19060402017332	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	49	5395.405	69° 40' 10.170" N	148° 39' 35.663" W	4.961	0.020	0	19060402015670	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	49	2365.504	69° 40' 4.544" N	148° 41' 10.280" W	2.551	0.010	0	19060402015672	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	50	2270.739	69° 38' 57.244" N	148° 40' 32.527" W	1.911	0.008	0	19060402015678	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	50	1021.089	69° 39' 5.559" N	148° 41' 11.078" W	1.635	0.007	0	19060402015677	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	50	2348.342	69° 39' 24.694" N	148° 41' 5.141" W	5.249	0.021	0	19060402015676	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	51	2465.992	69° 38' 10.288" N	148° 39' 32.459" W	4.359	0.018	0	19060402015683	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	51	2451.935	69° 38' 20.313" N	148° 39' 35.060" W	3.495	0.014	0	19060402015680	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	57	414.195	69° 33' 8.825" N	148° 36' 35.748" W	5.279	0.021	0	19060402015711	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	58	1949.053	69° 32' 3.292" N	148° 36' 4.458" W	3.466	0.014	0	19060402015722	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	58	2498.821	69° 32' 28.954" N	148° 37' 10.227" W	1.776	0.007	0	19060402015716	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	58	2874.463	69° 32' 5.705" N	148° 37' 2.535" W	3.271	0.013	0	19060402015721	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	58	1880.495	69° 32' 8.544" N	148° 36' 35.749" W	2.946	0.012	0	19060402015720	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	58	2313.402	69° 32' 18.327" N	148° 34' 43.022" W	4.967	0.020	0	19060402015719	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	58	3686.227	69° 32' 16.039" N	148° 37' 42.321" W	1.488	0.006	0	19060402017333	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	59	2533.855	69° 31' 32.025" N	148° 36' 40.204" W	2.138	0.009	0	19060402015728	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	59	3106.783	69° 32' 1.192" N	148° 34' 30.271" W	3.451	0.014	0	19060402015723	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	59	2878.823	69° 32' 2.096" N	148° 34' 47.273" W	1.190	0.005	0	19060402015724	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	59	2805.246	69° 31' 28.303" N	148° 36' 46.308" W	2.326	0.009	0	19060402015731	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	59	336.151	69° 31' 35.263" N	148° 35' 37.350" W	2.371	0.010	0	19060402015727	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	60	3362.449	69° 30' 44.451" N	148° 33' 7.912" W	1.853	0.007	0	19060402015737	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	60	2809.605	69° 30' 54.188" N	148° 33' 32.050" W	3.978	0.016	0	19060402015735	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	60	4792.089	69° 30' 32.818" N	148° 32' 32.079" W	3.054	0.012	0	19060402015739	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	60	2885.471	69° 31' 8.870" N	148° 34' 4.046" W	2.097	0.008	0	19060402015733	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	75	2738.107	69° 19' 25.938" N	148° 42' 15.305" W	2.472	0.010	0	19060402015620	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	76	2650.621	69° 19' 3.974" N	148° 44' 32.193" W	2.908	0.012	0	19060402015622	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	78	2131.240	69° 17' 33.466" N	148° 46' 14.795" W	1.764	0.007	0	19060402015635	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	78	2203.232	69° 17' 22.091" N	148° 46' 30.331" W	1.266	0.005	0	19060402015636	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	79	2108.830	69° 16' 49.790" N	148° 46' 46.821" W	1.365	0.006	0	19060402015638	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	80	2884.527	69° 15' 37.299" N	148° 47' 29.102" W	1.315	0.005	840	19060402015647	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	80	3980.795	69° 15' 18.922" N	148° 47' 46.499" W	1.917	0.008	0	19060402015648	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	82	3094.729	69° 13' 38.472" N	148° 48' 15.332" W	35.417	0.143	0	19060402015419	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	82	954.690	69° 13' 54.965" N	148° 47' 20.191" W	2.652	0.011	0	19060402015417	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	83	1138.240	69° 13' 17.981" N	148° 47' 26.387" W	1.688	0.007	0	19060402015421	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	83	1106.984	69° 13' 16.400" N	148° 47' 34.117" W	1.388	0.006	0	19060402015423	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	85	1040.416	69° 11' 26.482" N	148° 48' 44.844" W	5.311	0.021	0	19060402016737	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	85	1053.911	69° 11' 23.154" N	148° 48' 56.934" W	1.884	0.008	0	19060402016738	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	86	2502.590	69° 10' 31.634" N	148° 51' 28.349" W	24.777	0.100	1046	19060402016740	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	87	3331.368	69° 9' 56.495" N	148° 51' 25.965" W	1.650	0.007	0	19060402016744	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	87	3650.380	69° 10' 3.335" N	148° 51' 38.204" W	5.145	0.021	0	19060402016742	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	91	4036.766	69° 6' 31.795" N	148° 53' 0.127" W	31.873	0.129	1030	19060402016753	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	91	2799.530	69° 6' 47.725" N	148° 52' 3.914" W	4.805	0.019	0	19060402016751	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok	Lake/Pond: Hydrographic	91	2978.518	69° 6' 25.793" N	148° 52' 16.588" W	2.422	0.010	0	19060402016754	39004	Perennial	19060402	Gas Conditioning Facility

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River	Category = Perennial												Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	91	1979.006	69° 6' 45.041" N	148° 51' 45.522" W	13.943	0.056	0	19060402016750	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	94	4506.855	69° 3' 37.337" N	148° 47' 25.012" W	1.781	0.007	0	19060402015469	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	95	4577.630	69° 3' 33.701" N	148° 47' 13.879" W	10.534	0.043	0	19060402015471	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	96	4822.766	69° 2' 10.743" N	148° 47' 34.750" W	3.503	0.014	0	19060402015486	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	96	3948.911	69° 2' 44.672" N	148° 51' 30.382" W	2.050	0.008	0	19060402016778	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	97	1816.654	69° 2' 9.212" N	148° 51' 6.653" W	67.999	0.275	1255	19060402016785	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	97	5396.855	69° 1' 29.340" N	148° 48' 6.223" W	11.207	0.045	0	19060402015489	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	98	2109.848	69° 0' 45.129" N	148° 49' 29.296" W	2.635	0.011	0	19060402016801	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	99	22.184	69° 0' 22.598" N	148° 49' 5.658" W	2.898	0.012	0	19060402016808	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	99	598.263	69° 0' 29.031" N	148° 49' 25.855" W	9.070	0.037	0	19060402016806	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	99	1037.746	69° 0' 10.792" N	148° 49' 20.479" W	3.326	0.013	0	19060402016809	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	100	1123.139	68° 59' 30.703" N	148° 48' 31.680" W	0.504	0.002	0	19060402016602	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	100	4574.663	68° 59' 13.698" N	148° 47' 2.912" W	1.799	0.007	0	19060402015098	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	100	1980.120	68° 59' 12.079" N	148° 49' 39.777" W	0.800	0.003	0	19060402016607	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	100	1984.627	68° 59' 52.083" N	148° 49' 10.923" W	1.838	0.007	0	19060402016595	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	101	1484.813	68° 58' 54.202" N	148° 49' 39.417" W	3.137	0.013	0	19060402016611	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water	101	1755.608	68° 58' 48.997" N	148° 49' 28.814" W	1.208	0.005	1148	19060402016612	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540

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Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
	Elevation												
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	102	3314.325	68░ 58' 9.646" N	148░ 49' 43.486" W	0.572	0.002	0	19060402016624	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	102	2195.662	68░ 57' 42.219" N	148░ 50' 22.210" W	0.918	0.004	1178	19060402016630	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	104	3829.644	68░ 56' 36.482" N	148░ 54' 13.610" W	1.353	0.005	0	19060402016634	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	104	2511.879	68░ 56' 38.799" N	148░ 53' 37.296" W	10.487	0.042	1353	19060402016633	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	107	3294.791	68░ 54' 8.811" N	148░ 51' 21.412" W	0.231	0.001	0	19060402016659	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	107	3465.342	68░ 53' 33.695" N	148░ 50' 54.972" W	0.322	0.001	0	19060402016664	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	107	1618.653	68░ 53' 39.801" N	148░ 51' 29.635" W	7.755	0.031	0	19060402016663	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	107	1532.900	68░ 53' 49.754" N	148░ 51' 45.517" W	0.179	0.001	0	19060402016661	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	107	3278.136	68░ 53' 31.521" N	148░ 51' 2.816" W	0.342	0.001	0	19060402016665	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	108	230.240	68░ 52' 52.976" N	148░ 51' 59.078" W	7.830	0.032	0	19060402016670	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	109	3437.731	68░ 51' 43.305" N	148░ 52' 22.729" W	1.554	0.006	0	19060402016685	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	109	2487.211	68░ 51' 41.041" N	148░ 51' 54.027" W	5.346	0.022	0	19060402016684	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	109	4312.300	68░ 51' 31.702" N	148░ 53' 10.363" W	57.736	0.234	1443	19060402016686	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	109	2374.311	68░ 51' 48.185" N	148░ 51' 50.824" W	0.530	0.002	0	19060402016683	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	110	1332.586	68░ 51' 37.444" N	148░ 50' 4.541" W	1.480	0.006	0	19060402016687	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	110	2318.223	68░ 51' 22.551" N	148░ 51' 11.390" W	1.259	0.005	0	19060402016693	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540

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Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	110	2475.798	68° 51' 0.177" N	148° 50' 42.932" W	0.885	0.004	0	19060402016700	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	110	452.519	68° 51' 25.366" N	148° 49' 51.360" W	1.393	0.006	0	19060402016692	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	110	929.633	68° 51' 31.884" N	148° 49' 59.678" W	0.972	0.004	0	19060402016690	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	110	2244.695	68° 51' 35.099" N	148° 50' 55.910" W	0.266	0.001	0	19060402016688	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	110	2538.419	68° 51' 31.434" N	148° 51' 12.123" W	1.678	0.007	0	19060402016689	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	110	2640.687	68° 51' 13.814" N	148° 51' 18.116" W	1.536	0.006	0	19060402016697	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	110	1769.319	68° 51' 26.845" N	148° 50' 53.155" W	0.314	0.001	0	19060402016691	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	111	74.920	68° 50' 29.924" N	148° 49' 29.985" W	1.609	0.007	0	19060402016708	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	113	1166.358	68° 48' 40.033" N	148° 50' 30.098" W	2.382	0.010	0	19060402016720	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	113	242.674	68° 48' 51.721" N	148° 50' 26.474" W	4.708	0.019	0	19060402016718	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	113	1194.841	68° 48' 41.655" N	148° 50' 16.493" W	2.796	0.011	0	19060402016719	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	113	4036.470	68° 49' 20.066" N	148° 52' 18.259" W	18.830	0.076	1455	19060402016716	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	114	3332.963	68° 47' 41.780" N	148° 49' 53.517" W	1.223	0.005	0	19060402016722	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	114	2100.447	68° 47' 43.048" N	148° 50' 35.883" W	2.574	0.010	0	19060402016721	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	116	1792.809	68° 46' 35.736" N	148° 51' 2.282" W	1.754	0.007	0	19060402016723	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	117	4130.877	68° 45' 39.963" N	148° 51' 8.772" W	1.262	0.005	0	19060402016731	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	117	856.799	68° 45' 33.911" N	148° 53' 23.846" W	1.967	0.008	0	19060402016733	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	117	4874.374	68° 46' 16.796" N	148° 54' 39.435" W	1.793	0.007	0	19060402016724	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	117	4694.469	68° 46' 12.804" N	148° 54' 41.811" W	1.128	0.005	0	19060402016725	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	117	5228.917	68° 45' 54.814" N	148° 55' 28.100" W	2.641	0.011	0	19060402016730	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	118	5146.909	68° 44' 40.330" N	148° 51' 41.219" W	55.121	0.223	0	19060402016361	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	118	541.800	68° 44' 54.314" N	148° 53' 59.333" W	2.576	0.010	0	19060402016359	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	118	3584.931	68° 44' 31.700" N	148° 53' 1.328" W	4.830	0.020	0	19060402016363	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	118	4195.236	68° 44' 21.559" N	148° 53' 7.186" W	7.348	0.030	0	19060402016366	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	118	3743.020	68° 44' 18.980" N	148° 53' 50.701" W	2.482	0.010	0	19060402016367	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	118	3000.944	68° 44' 55.544" N	148° 52' 55.513" W	1.798	0.007	0	19060402016357	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	118	3255.026	68° 44' 23.419" N	148° 53' 56.967" W	1.531	0.006	0	19060402016365	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	119	4603.561	68° 44' 52.988" N	148° 56' 47.391" W	0.405	0.002	0	19060402016358	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	119	1340.703	68° 43' 52.529" N	148° 55' 45.918" W	21.339	0.086	0	19060402016383	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	119	4760.715	68° 43' 34.235" N	148° 54' 27.959" W	0.929	0.004	0	19060402016391	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	119	3310.640	68° 44' 47.593" N	148° 55' 56.612" W	1.076	0.004	0	19060402016360	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	119	5302.070	68° 43' 55.776" N	148° 53' 16.263" W	11.109	0.045	0	19060402016385	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	119	3311.206	68° 43' 36.457" N	148° 55' 37.268" W	21.029	0.085	0	19060402016390	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	119	5019.482	68° 44' 8.230" N	148° 53' 21.267" W	2.245	0.009	0	19060402016375	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	119	3342.751	68° 44' 32.250" N	148° 56' 59.799" W	1.380	0.006	0	19060402016362	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	119	5177.184	68° 43' 28.155" N	148° 54' 24.637" W	2.205	0.009	0	19060402016394	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	119	4786.137	68° 44' 30.245" N	148° 57' 45.304" W	0.594	0.002	0	19060402016364	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	120	4736.303	68° 44' 11.818" N	148° 59' 1.407" W	0.877	0.004	0	19060402016368	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	120	3825.835	68° 44' 7.552" N	148° 58' 39.656" W	1.368	0.006	0	19060402016371	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	120	1757.424	68° 43' 40.553" N	148° 56' 32.272" W	1.188	0.005	0	19060402016389	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	120	1226.270	68° 43' 26.302" N	148° 57' 13.613" W	3.446	0.014	0	19060402016393	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	120	2475.541	68° 43' 15.987" N	148° 56' 55.093" W	1.405	0.006	0	19060402016396	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	120	3251.717	68° 43' 5.877" N	148° 57' 23.054" W	1.674	0.007	0	19060402016400	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	120	3852.370	68° 44' 3.252" N	148° 58' 53.832" W	3.097	0.013	0	19060402016379	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	120	4232.911	68° 44' 8.743" N	148° 58' 49.039" W	0.571	0.002	0	19060402016370	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	120	1064.502	68° 43' 49.762" N	148° 58' 0.177" W	18.512	0.075	1958	19060402016387	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	5541.540	68° 44' 10.222" N	148° 59' 51.830" W	1.137	0.005	0	19060402016369	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	3827.938	68° 43' 52.247" N	149° 0' 7.667" W	1.431	0.006	0	19060402016386	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	2932.810	68° 43' 4.908" N	148° 58' 9.798" W	2.870	0.012	0	19060402016399	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	4976.195	68° 42' 27.194" N	148° 58' 53.870" W	0.726	0.003	0	19060402016422	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	4745.521	68° 44' 2.579" N	148° 59' 54.096" W	0.961	0.004	0	19060402016378	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	3296.512	68° 43' 42.685" N	149° 0' 31.718" W	10.004	0.040	0	19060402016388	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	4568.399	68° 44' 0.101" N	149° 0' 18.866" W	2.472	0.010	0	19060402016377	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	3995.511	68° 42' 44.082" N	148° 58' 21.317" W	1.187	0.005	0	19060402016414	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	2362.355	68° 42' 57.961" N	148° 58' 42.897" W	1.839	0.007	0	19060402016403	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	5051.584	68░ 42' 47.889" N	148░ 57' 32.585" W	1.259	0.005	0	19060402016411	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	2335.093	68░ 42' 51.758" N	148░ 59' 13.619" W	2.185	0.009	0	19060402016408	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	3176.630	68░ 43' 29.691" N	149░ 0' 50.632" W	0.743	0.003	0	19060402016392	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	3108.843	68░ 42' 44.615" N	148░ 59' 9.629" W	0.649	0.003	0	19060402016412	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	4564.663	68░ 44' 1.086" N	148░ 59' 19.765" W	0.698	0.003	0	19060402016380	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	4215.197	68░ 42' 53.536" N	148░ 57' 49.497" W	0.860	0.003	0	19060402016407	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	3101.105	68░ 42' 48.785" N	148░ 58' 35.183" W	5.726	0.023	0	19060402016409	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	5381.521	68░ 42' 23.504" N	148░ 58' 50.730" W	0.386	0.002	0	19060402016425	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	2034.600	68░ 42' 52.902" N	148░ 59' 30.223" W	2.219	0.009	0	19060402016405	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	5019.512	68░ 42' 41.864" N	148░ 57' 36.917" W	6.435	0.026	0	19060402016413	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	121	4170.857	68░ 42' 39.526" N	148░ 58' 30.464" W	0.866	0.004	0	19060402016416	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	122	5201.477	68░ 42' 19.190" N	148░ 59' 29.828" W	2.107	0.009	0	19060402016429	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	122	4531.029	68░ 42' 11.791" N	149░ 0' 11.127" W	5.840	0.024	1996	19060402016433	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	122	2147.066	68░ 42' 50.686" N	149░ 2' 31.902" W	0.413	0.002	0	19060402016406	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	122	4061.817	68░ 42' 30.037" N	148░ 59' 47.403" W	2.280	0.009	0	19060402016419	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	122	5227.024	68░ 42' 13.257" N	148░ 59' 43.719" W	0.783	0.003	0	19060402016435	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	123	2668.243	68░ 41' 41.461" N	149░ 2' 38.791" W	7.298	0.030	0	19060402016444	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	123	5041.614	68░ 41' 38.355" N	149░ 1' 3.079" W	11.220	0.045	0	19060402016446	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	124	2349.889	68° 41' 1.333" N	149° 4' 54.504" W	7.966	0.032	0	19060402016457	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	124	3629.364	68° 40' 47.780" N	149° 4' 30.751" W	5.407	0.022	0	19060402016461	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	124	4362.531	68° 40' 42.652" N	149° 3' 52.564" W	2.536	0.010	0	19060402016463	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	125	3095.249	68° 40' 46.475" N	149° 5' 34.584" W	15.352	0.062	0	19060402016460	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	125	6098.071	68° 40' 22.427" N	149° 5' 16.549" W	9.650	0.039	0	19060402016465	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	128	2744.878	68° 40' 18.666" N	149° 14' 17.668" W	1.116	0.005	0	19060402017334	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	129	653.220	68° 39' 47.276" N	149° 14' 39.813" W	3.031	0.012	0	19060402016475	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	129	3702.331	68° 39' 29.561" N	149° 13' 28.929" W	4.204	0.017	0	19060402016478	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	129	5277.945	68° 39' 14.200" N	149° 13' 16.925" W	0.638	0.003	0	19060402016488	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	129	4019.723	68° 39' 17.379" N	149° 13' 57.507" W	1.367	0.006	0	19060402016485	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	130	4395.089	68° 38' 41.249" N	149° 16' 16.958" W	1.280	0.005	0	19060402016490	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	144	721.708	68° 31' 24.931" N	149° 28' 52.382" W	158.024	0.640	2892	19060402016871	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	146	4560.790	68° 29' 39.945" N	149° 29' 49.985" W	1.042	0.004	0	19060402016824	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	146	573.120	68° 29' 40.062" N	149° 28' 18.085" W	136.066	0.551	0	19060402016821	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	146	4918.318	68° 29' 39.730" N	149° 29' 57.335" W	0.328	0.001	0	19060402016825	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	146	3707.311	68° 29' 13.708" N	149° 29' 9.823" W	18.949	0.077	2660	19060402016827	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	146	4220.255	68° 29' 9.300" N	149° 28' 50.282" W	0.916	0.004	0	19060402016829	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	147	3329.513	68° 29' 3.606" N	149° 28' 8.620" W	7.097	0.029	0	19060402016830	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	147	2524.701	68° 29' 11.747" N	149° 27' 43.820" W	6.482	0.026	0	19060402016828	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	147	4995.991	68° 28' 42.844" N	149° 28' 36.745" W	1.952	0.008	0	19060402016836	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	147	4954.884	68° 28' 47.901" N	149° 28' 39.847" W	1.202	0.005	0	19060402016834	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	147	5282.049	68° 28' 52.936" N	149° 28' 54.936" W	5.308	0.021	0	19060402016832	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	148	1660.552	68° 27' 30.728" N	149° 25' 56.392" W	991.897	4.015	2622	19060402016835	39009	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	148	3990.284	68° 28' 1.151" N	149° 26' 31.425" W	4.474	0.018	0	19060402016837	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	149	742.359	68° 27' 48.539" N	149° 23' 34.640" W	0.312	0.001	0	19060402016266	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	149	316.643	68° 27' 42.472" N	149° 23' 32.008" W	13.988	0.057	0	19060402016267	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	149	2288.942	68° 27' 38.846" N	149° 24' 9.424" W	0.033	0.000	0	19060402016838	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	149	527.597	68° 27' 40.046" N	149° 23' 7.137" W	6.019	0.024	0	19060402016268	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	150	5896.524	68° 26' 37.593" N	149° 24' 3.681" W	0.394	0.002	0	19060402016843	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	150	4658.854	68° 26' 50.577" N	149° 23' 45.367" W	0.726	0.003	0	19060402016275	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	150	376.281	68° 27' 13.279" N	149° 21' 40.339" W	0.594	0.002	0	19060402016270	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	150	3131.687	68° 26' 51.072" N	149° 23' 2.193" W	2.131	0.009	0	19060402016273	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	150	5237.171	68° 26' 38.849" N	149° 23' 47.781" W	2.902	0.012	0	19060402016279	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	150	5028.947	68° 26' 50.082" N	149° 24' 1.082" W	7.191	0.029	0	19060402016274	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	150	3697.214	68° 27' 0.448" N	149° 23' 27.617" W	0.424	0.002	0	19060402016271	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	150	5851.601	68░ 26' 35.297" N	149░ 23' 57.629" W	0.733	0.003	0	19060402016283	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	150	3530.529	68░ 26' 44.386" N	149░ 22' 59.431" W	0.645	0.003	0	19060402016277	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	150	4605.878	68░ 26' 46.587" N	149░ 23' 37.343" W	0.583	0.002	0	19060402016276	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	150	1649.859	68░ 26' 50.569" N	149░ 22' 5.110" W	12.645	0.051	0	19060402016272	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	151	4700.428	68░ 26' 28.972" N	149░ 23' 32.343" W	16.756	0.068	0	19060402016282	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	151	4851.381	68░ 26' 3.728" N	149░ 23' 32.005" W	30.724	0.124	0	19060402016287	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	151	5177.304	68░ 25' 55.552" N	149░ 23' 14.357" W	0.478	0.002	0	19060402016291	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	151	2691.516	68░ 26' 25.295" N	149░ 22' 34.524" W	2.371	0.010	0	19060402016284	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	151	3717.298	68░ 26' 12.844" N	149░ 22' 54.812" W	1.512	0.006	0	19060402016286	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	151	3367.563	68░ 26' 37.993" N	149░ 22' 51.821" W	4.962	0.020	0	19060402016280	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	151	2289.806	68░ 26' 43.549" N	149░ 21' 57.789" W	0.376	0.002	0	19060402016278	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	151	2178.069	68░ 26' 40.465" N	149░ 22' 0.694" W	0.392	0.002	0	19060402016281	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	151	3942.991	68░ 26' 7.388" N	149░ 22' 55.944" W	2.189	0.009	0	19060402016288	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	151	6122.004	68░ 26' 24.182" N	149░ 24' 3.737" W	0.445	0.002	0	19060402016846	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	151	4080.268	68░ 26' 13.685" N	149░ 23' 20.817" W	31.720	0.128	0	19060402016285	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	152	4277.459	68░ 25' 1.512" N	149░ 21' 57.157" W	1.714	0.007	0	19060402016311	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	152	2145.650	68░ 25' 34.625" N	149░ 22' 10.905" W	65.939	0.267	0	19060402016295	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	152	4840.551	68░ 25' 9.772" N	149░ 22' 35.751" W	0.909	0.004	0	19060402016305	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	152	1351.405	68░ 25' 20.694" N	149░ 20' 47.236" W	0.376	0.002	0	19060402016299	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	152	4166.125	68° 25' 12.965" N	149° 22' 21.384" W	1.192	0.005	0	19060402016303	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	152	5031.775	68° 25' 2.567" N	149° 22' 31.055" W	3.099	0.013	0	19060402016310	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	152	3750.030	68° 25' 47.297" N	149° 22' 19.649" W	0.574	0.002	0	19060402016293	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	152	3263.330	68° 25' 15.268" N	149° 21' 55.000" W	0.683	0.003	0	19060402016301	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	152	762.528	68° 25' 29.649" N	149° 20' 59.730" W	2.574	0.010	0	19060402016297	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	152	4443.619	68° 25' 3.875" N	149° 22' 12.364" W	1.338	0.005	0	19060402016309	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	152	4066.158	68° 25' 9.052" N	149° 22' 11.495" W	2.152	0.009	0	19060402016304	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	152	3592.859	68° 25' 14.454" N	149° 22' 3.568" W	0.440	0.002	0	19060402016302	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	152	4578.502	68° 25' 16.998" N	149° 22' 40.532" W	1.486	0.006	0	19060402016300	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	152	4823.880	68° 25' 26.079" N	149° 22' 52.636" W	1.451	0.006	0	19060402016298	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	153	3851.777	68° 24' 38.772" N	149° 21' 45.351" W	20.987	0.085	0	19060402016315	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	153	2556.222	68° 25' 4.879" N	149° 20' 53.462" W	5.531	0.022	0	19060402016307	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	153	4425.321	68° 24' 50.403" N	149° 21' 57.225" W	0.948	0.004	0	19060402016314	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	154	2676.159	68° 23' 32.374" N	149° 19' 49.914" W	0.312	0.001	0	19060402016329	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	154	2765.821	68° 23' 55.406" N	149° 20' 37.056" W	0.470	0.002	0	19060402016323	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	154	3595.191	68° 23' 32.461" N	149° 20' 40.648" W	4.922	0.020	0	19060402016327	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	154	2354.430	68° 23' 35.843" N	149° 20' 8.062" W	18.983	0.077	0	19060402016326	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	154	3933.981	68° 24' 3.109" N	149° 21' 15.065" W	9.740	0.039	0	19060402016320	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	155	4563.656	68° 22' 49.766" N	149° 21' 7.353" W	0.416	0.002	0	19060402016341	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	155	4951.172	68° 22' 57.445" N	149° 21' 31.041" W	3.581	0.014	0	19060402016333	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	155	1669.085	68° 23' 12.486" N	149° 20' 1.178" W	9.309	0.038	0	19060402016331	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	155	2039.704	68° 22' 59.060" N	149° 20' 5.380" W	1.319	0.005	0	19060402016339	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	155	5010.975	68° 22' 45.476" N	149° 21' 23.530" W	10.967	0.044	0	19060402016340	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	156	4827.227	68° 22' 6.210" N	149° 21' 4.245" W	0.708	0.003	0	19060402016345	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	156	4631.583	68° 22' 1.333" N	149° 20' 54.456" W	1.135	0.005	0	19060402016346	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	156	2624.773	68° 22' 34.295" N	149° 19' 48.111" W	1.884	0.008	0	19060402016343	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	158	2193.721	68° 20' 46.666" N	149° 21' 24.627" W	1.315	0.005	0	19060402016349	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
Sagavanirktok River	Lake/Pond: Hydrographic Category = Perennial	171	570.761	68° 10' 17.101" N	149° 25' 55.034" W	1.608	0.007	0	19060402013648	39004	Perennial	19060402	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	263	2112.927	67° 3' 0.376" N	150° 20' 9.395" W	0.366	0.001	0	19040602005669	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	263	2287.427	67° 3' 1.768" N	150° 20' 13.820" W	0.480	0.002	0	19040602005667	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	265	1894.643	67° 1' 15.293" N	150° 17' 52.886" W	0.636	0.003	0	19040602005711	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	265	3301.683	67° 1' 11.266" N	150° 15' 53.408" W	0.912	0.004	0	19040602005713	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	270	1340.972	66° 57' 59.045" N	150° 22' 34.435" W	0.624	0.003	0	19040602005530	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	270	616.603	66° 58' 0.226" N	150° 22' 9.877" W	1.815	0.007	0	19040602005529	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	270	689.501	66° 57' 56.096" N	150° 22' 18.518" W	0.379	0.002	0	19040602005531	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	271	531.153	66° 57' 15.915" N	150° 23' 30.576" W	99.055	0.401	1295	19040602005534	39009	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	271	2303.968	66° 57' 2.670" N	150° 23' 32.423" W	2.157	0.009	0	19040602005536	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	271	2046.477	66° 57' 34.889" N	150° 22' 58.420" W	2.653	0.011	0	19040602005532	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	271	868.768	66° 57' 32.935" N	150° 23' 34.978" W	0.405	0.002	0	19040602005533	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	271	2191.904	66° 57' 22.588" N	150° 22' 52.877" W	0.531	0.002	0	19040602005535	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	272	852.346	66° 56' 44.484" N	150° 24' 34.806" W	1.221	0.005	0	19040602005537	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	274	2460.967	66° 55' 29.729" N	150° 26' 38.032" W	0.564	0.002	0	19040602005538	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	274	1801.270	66° 55' 21.044" N	150° 26' 45.407" W	0.655	0.003	0	19040602005540	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	274	1851.449	66° 55' 9.800" N	150° 27' 7.337" W	2.132	0.009	0	19040602005541	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	276	3415.043	66° 53' 11.209" N	150° 29' 8.378" W	0.554	0.002	0	19040602005543	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	277	582.174	66° 53' 7.588" N	150° 30' 24.799" W	9.337	0.038	0	19040602005822	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	277	4988.171	66° 53' 58.645" N	150° 31' 45.226" W	8.892	0.036	0	19040602005818	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	278	5430.193	66° 52' 39.819" N	150° 32' 56.140" W	2.780	0.011	0	19040602005836	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	278	2359.981	66° 52' 13.558" N	150° 29' 34.291" W	8.039	0.033	0	19040602005544	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	279	3875.693	66° 51' 42.369" N	150° 29' 56.675" W	3.123	0.013	0	19040602005545	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	279	3480.207	66° 51' 39.260" N	150° 30' 10.207" W	1.237	0.005	0	19040602005867	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	281	2290.198	66° 50' 22.499" N	150° 34' 56.415" W	0.684	0.003	0	19040602005876	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	283	5243.952	66° 49' 53.754" N	150° 38' 53.984" W	0.239	0.001	0	19040602005896	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	283	4667.951	66° 49' 50.317" N	150° 38' 42.054" W	0.143	0.001	0	19040602005898	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	283	4926.818	66° 49' 51.934" N	150° 38' 47.729" W	0.268	0.001	0	19040602005897	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	284	2823.723	66° 48' 59.810" N	150° 39' 2.602" W	2.721	0.011	0	19040602005909	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	284	6066.000	66° 49' 24.400" N	150° 39' 49.768" W	0.828	0.003	0	19040602005903	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	285	3518.518	66° 48' 17.164" N	150° 40' 19.506" W	4.745	0.019	0	19040602005923	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	285	4945.749	66° 48' 35.300" N	150° 40' 28.880" W	4.338	0.018	0	19040602005918	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	286	4614.533	66° 47' 58.545" N	150° 41' 14.266" W	4.557	0.018	0	19040602005929	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	286	3934.483	66° 47' 41.339" N	150° 41' 32.787" W	1.856	0.008	0	19040602005936	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	286	5098.506	66° 47' 54.663" N	150° 41' 37.064" W	11.423	0.046	0	19040602005930	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	287	3037.986	66° 46' 46.317" N	150° 40' 54.966" W	3.026	0.012	0	19040602005944	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	295	1549.996	66° 40' 5.111" N	150° 39' 24.343" W	4.921	0.020	0	19040602005642	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
South Fork Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	296	5593.223	66° 39' 21.457" N	150° 41' 35.302" W	2.020	0.008	0	19040602005707	39004	Perennial	19040602	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	405	2983.712	65° 28' 17.488" N	148° 40' 2.628" W	1.380	0.006	0	19040509004531	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	406	1962.134	65° 28' 0.773" N	148° 37' 49.670" W	1.411	0.006	0	19040509004532	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	408	3305.169	65° 26' 1.525" N	148° 38' 14.067" W	1.314	0.005	0	19040509004537	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	408	2105.776	65° 26' 10.157" N	148° 37' 35.662" W	0.513	0.002	0	19040509004536	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	409	1968.861	65° 26' 1.875" N	148° 37' 14.711" W	1.710	0.007	0	19040509004538	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	409	3719.829	65° 25' 33.268" N	148° 38' 36.230" W	1.016	0.004	0	19040509004541	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	409	1321.329	65° 25' 51.180" N	148° 37' 33.958" W	1.666	0.007	0	19040509004540	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	409	998.016	65° 25' 33.250" N	148° 37' 29.214" W	2.212	0.009	0	19040509004542	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	409	1658.821	65° 25' 47.770" N	148° 37' 58.861" W	6.763	0.027	0	19040509004539	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	410	1371.072	65° 24' 37.475" N	148° 37' 14.565" W	0.897	0.004	0	19040509004548	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	410	2151.981	65° 25' 4.317" N	148° 37' 39.090" W	0.968	0.004	0	19040509004545	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	410	3684.828	65° 25' 4.749" N	148° 38' 23.618" W	2.661	0.011	0	19040509004544	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	410	2603.721	65° 24' 28.150" N	148° 37' 32.842" W	1.172	0.005	0	19040509004551	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	410	2219.925	65° 24' 37.618" N	148° 37' 48.890" W	1.036	0.004	0	19040509004547	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	410	3221.219	65° 24' 42.571" N	148° 38' 15.927" W	1.491	0.006	0	19040509004546	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	410	3461.722	65° 25' 12.780" N	148° 38' 5.595" W	0.963	0.004	0	19040509004543	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	410	3837.312	65° 24' 35.624" N	148° 38' 24.797" W	1.913	0.008	0	19040509004549	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	411	2347.770	65° 24' 12.718" N	148° 38' 24.982" W	5.157	0.021	0	19040509004554	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	411	3503.689	65° 24' 24.949" N	148° 38' 28.463" W	4.562	0.018	0	19040509004550	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	411	2698.049	65° 23' 59.412" N	148° 38' 37.367" W	2.784	0.011	0	19040509004555	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	411	3431.649	65° 24' 15.723" N	148° 38' 40.925" W	1.377	0.006	0	19040509004553	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	412	4150.734	65° 23' 50.247" N	148° 39' 6.395" W	1.558	0.006	0	19040509004556	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	412	4090.995	65° 23' 37.259" N	148° 39' 35.623" W	0.904	0.004	0	19040509004560	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	412	4267.634	65° 23' 32.280" N	148° 39' 49.286" W	1.496	0.006	0	19040509004562	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	412	4644.339	65° 23' 30.245" N	148° 40' 6.050" W	3.370	0.014	0	19040509004563	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	412	4304.731	65° 23' 44.752" N	148° 39' 23.209" W	0.778	0.003	0	19040509004557	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	412	2227.100	65° 23' 31.409" N	148° 38' 52.176" W	1.643	0.007	0	19040509004564	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	412	2789.314	65° 23' 21.267" N	148° 39' 31.583" W	5.397	0.022	0	19040509004567	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	413	2189.021	65° 22' 47.866" N	148° 39' 32.732" W	2.899	0.012	0	19040509004573	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	413	1525.645	65° 22' 38.591" N	148° 39' 37.263" W	3.144	0.013	0	19040509004577	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	413	2534.657	65° 22' 32.246" N	148° 40' 6.269" W	0.349	0.001	0	19040509004579	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	413	1405.423	65° 22' 16.327" N	148° 39' 39.164" W	1.822	0.007	0	19040509004584	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	413	3726.864	65° 22' 57.539" N	148° 40' 0.884" W	1.495	0.006	0	19040509004571	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	413	1756.673	65° 22' 24.538" N	148° 39' 53.197" W	1.702	0.007	0	19040509004582	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	413	1996.945	65° 22' 28.311" N	148° 39' 58.415" W	0.877	0.004	0	19040509004581	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	413	4064.647	65° 22' 43.072" N	148° 40' 34.788" W	0.662	0.003	0	19040509004575	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	413	3697.436	65° 23' 3.354" N	148° 39' 52.199" W	5.124	0.021	0	19040509004569	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	413	3060.458	65° 22' 54.500" N	148° 39' 45.346" W	2.097	0.008	0	19040509004572	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	414	2655.623	65° 21' 35.505" N	148° 40' 35.747" W	1.242	0.005	0	19040509004596	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	414	5319.717	65° 21' 58.112" N	148° 41' 26.989" W	1.806	0.007	0	19040509004590	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	414	2522.010	65° 22' 0.570" N	148° 39' 43.776" W	1.441	0.006	0	19040509004589	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	414	4931.398	65° 21' 16.733" N	148° 41' 25.250" W	5.926	0.024	0	19040509004600	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	414	4520.205	65° 21' 23.464" N	148° 41' 17.350" W	1.141	0.005	0	19040509004599	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	414	2662.773	65° 21' 40.638" N	148° 40' 35.257" W	3.062	0.012	0	19040509004595	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	415	4744.571	65° 20' 32.526" N	148° 41' 33.182" W	8.707	0.035	0	19040509004603	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	415	2505.884	65° 20' 18.088" N	148° 39' 22.884" W	0.927	0.004	0	19040509004605	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	416	876.391	65° 19' 42.027" N	148° 40' 3.881" W	5.521	0.022	0	19040509004612	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	416	2554.644	65° 19' 49.998" N	148° 40' 55.572" W	12.367	0.050	0	19040509004608	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	416	1557.107	65° 19' 56.366" N	148° 40' 33.489" W	7.248	0.029	0	19040509004609	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	416	2799.321	65° 19' 40.026" N	148° 40' 52.653" W	1.581	0.006	0	19040509004613	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	416	3533.781	65° 19' 29.921" N	148° 41' 2.191" W	3.989	0.016	0	19040509004614	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	416	962.573	65° 19' 45.867" N	148° 40' 15.149" W	1.937	0.008	0	19040509004611	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	417	4915.330	65° 19' 10.347" N	148° 41' 55.655" W	4.230	0.017	0	19040509004615	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	418	4081.962	65° 17' 58.338" N	148° 41' 41.350" W	0.237	0.001	0	19040509004628	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	418	4275.958	65° 18' 1.020" N	148° 41' 50.475" W	3.341	0.014	0	19040509004624	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	419	2672.914	65° 17' 19.380" N	148° 41' 22.779" W	15.420	0.062	0	19040509004638	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	419	5359.854	65° 17' 6.696" N	148° 42' 15.302" W	0.212	0.001	0	19040509004646	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	419	3804.390	65° 17' 21.989" N	148° 41' 43.070" W	2.002	0.008	0	19040509004637	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	419	4111.431	65° 17' 40.272" N	148° 41' 33.367" W	2.272	0.009	0	19040509004633	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	419	5148.256	65° 17' 5.177" N	148° 42' 10.487" W	0.491	0.002	0	19040509004647	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	419	4883.800	65° 17' 30.446" N	148° 42' 33.526" W	73.825	0.299	0	19040509004632	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	419	3979.456	65° 17' 13.230" N	148° 41' 46.746" W	1.663	0.007	0	19040509004642	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	420	4019.491	65° 16' 20.395" N	148° 41' 59.297" W	3.129	0.013	0	19040509004659	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	421	2637.147	65° 15' 29.407" N	148° 42' 42.348" W	95.128	0.385	0	19040509004665	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	421	5079.393	65° 16' 11.246" N	148° 42' 53.199" W	2.757	0.011	0	19040509004661	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	422	5214.302	65° 14' 59.500" N	148° 43' 27.466" W	3.641	0.015	0	19040509004677	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	422	3886.675	65° 14' 26.099" N	148° 42' 39.430" W	0.359	0.001	0	19040509007450	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	422	3608.095	65° 14' 23.902" N	148° 42' 27.470" W	0.340	0.001	0	19040509007451	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	422	5225.287	65° 14' 51.980" N	148° 43' 27.167" W	2.543	0.010	0	19040509007426	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	422	5042.389	65° 14' 44.216" N	148° 43' 23.416" W	3.297	0.013	0	19040509007432	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	422	4139.355	65° 14' 24.602" N	148° 42' 51.557" W	7.913	0.032	0	19040509007447	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	422	4829.485	65° 14' 45.545" N	148° 43' 14.913" W	0.304	0.001	0	19040509007433	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	422	2890.001	65° 14' 37.212" N	148° 42' 32.735" W	13.556	0.055	0	19040509007435	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	2419.404	65° 14' 9.693" N	148° 42' 4.875" W	0.620	0.003	0	19040509007460	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	4075.505	65° 13' 33.009" N	148° 42' 42.439" W	1.099	0.004	0	19040509007487	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	1807.637	65° 13' 54.782" N	148° 42' 6.656" W	4.256	0.017	0	19040509007472	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	3220.327	65° 13' 44.805" N	148° 42' 32.867" W	0.457	0.002	0	19040509007480	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	4350.025	65° 13' 38.741" N	148° 42' 57.567" W	1.911	0.008	0	19040509007482	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	2111.242	65° 14' 2.864" N	148° 42' 9.272" W	1.592	0.006	0	19040509007464	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	3659.527	65° 14' 17.439" N	148° 42' 27.723" W	0.801	0.003	0	19040509007458	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	4678.173	65° 13' 25.666" N	148° 43' 10.759" W	29.356	0.119	0	19040509007489	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	3175.522	65° 14' 20.644" N	148° 42' 13.232" W	4.457	0.018	0	19040509007452	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	3523.909	65° 13' 57.323" N	148° 42' 44.193" W	1.632	0.007	0	19040509007471	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	2470.332	65° 14' 0.626" N	148° 42' 16.921" W	0.373	0.002	0	19040509007469	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	3460.784	65° 14' 2.897" N	148° 42' 43.711" W	5.014	0.020	0	19040509007463	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	3460.635	65° 13' 34.481" N	148° 42' 29.168" W	1.253	0.005	0	19040509007486	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	2081.819	65° 13' 43.534" N	148° 42' 7.444" W	8.943	0.036	0	19040509007476	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	2705.951	65° 14' 2.152" N	148° 42' 21.198" W	0.288	0.001	0	19040509007467	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	4681.749	65° 13' 44.777" N	148° 44' 41.003" W	83.959	0.340	0	19040509007466	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	4717.728	65° 13' 51.891" N	148° 43' 25.546" W	15.351	0.062	0	19040509007473	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	2623.939	65° 13' 45.955" N	148° 42' 19.602" W	0.646	0.003	0	19040509007479	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	3970.247	65° 14' 18.717" N	148° 42' 33.522" W	0.209	0.001	0	19040509007457	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	2914.978	65° 13' 49.672" N	148° 42' 34.037" W	5.380	0.022	0	19040509007474	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	423	4214.717	65° 13' 47.719" N	148° 43' 1.552" W	3.830	0.015	0	19040509007477	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	424	1815.078	65° 13' 3.990" N	148° 42' 2.967" W	0.363	0.001	0	19040509007515	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	424	5024.294	65° 13' 6.271" N	148° 43' 17.895" W	0.509	0.002	0	19040509007506	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	424	3008.723	65° 12' 47.066" N	148° 42' 22.012" W	1.050	0.004	0	19040509007546	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	424	1554.566	65° 13' 4.781" N	148° 41' 57.362" W	0.491	0.002	0	19040509007512	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	424	1009.402	65° 13' 12.849" N	148° 41' 58.989" W	82.265	0.333	0	19040509007490	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	424	1602.060	65° 13' 2.788" N	148° 41' 58.019" W	0.645	0.003	0	19040509007520	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	424	3776.308	65° 12' 42.038" N	148° 42' 41.109" W	6.569	0.027	0	19040509007550	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	424	1781.283	65° 13' 9.882" N	148° 42' 1.863" W	1.112	0.005	0	19040509007503	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	424	4844.478	65° 12' 53.641" N	148° 43' 13.847" W	1.700	0.007	0	19040509007529	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	424	4373.742	65° 12' 48.936" N	148° 43' 5.556" W	4.317	0.017	0	19040509007539	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	424	2586.105	65° 12' 52.555" N	148° 42' 20.275" W	2.034	0.008	0	19040509007535	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	424	3610.381	65° 13' 5.082" N	148° 42' 45.635" W	1.168	0.005	0	19040509007509	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	424	2686.425	65° 12' 42.167" N	148° 42' 1.043" W	0.514	0.002	0	19040509007555	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	424	1906.503	65° 13' 6.338" N	148° 42' 3.520" W	0.439	0.002	0	19040509007507	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	424	4445.361	65° 13' 3.070" N	148° 43' 4.820" W	0.537	0.002	0	19040509007516	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	424	3249.859	65° 12' 57.080" N	148° 42' 37.679" W	1.777	0.007	0	19040509007525	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	424	4722.395	65° 13' 11.481" N	148° 43' 11.484" W	3.163	0.013	0	19040509007500	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	425	3764.797	65° 12' 22.594" N	148° 43' 2.201" W	6.545	0.026	0	19040509007601	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	425	4638.044	65° 12' 38.771" N	148° 43' 8.728" W	10.040	0.041	0	19040509007557	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	425	3679.749	65° 12' 31.951" N	148° 42' 48.735" W	2.535	0.010	0	19040509007567	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	425	4913.557	65° 12' 4.076" N	148° 43' 34.935" W	8.420	0.034	0	19040509007648	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	425	1515.899	65° 12' 28.000" N	148° 41' 36.171" W	4.514	0.018	0	19040509007585	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	425	4761.726	65° 12' 21.900" N	148° 43' 21.898" W	1.077	0.004	0	19040509007607	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	425	1755.714	65° 12' 17.285" N	148° 42' 10.760" W	0.226	0.001	0	19040509007625	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	425	5188.286	65° 12' 28.053" N	148° 43' 31.713" W	2.253	0.009	0	19040509007574	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	425	2455.160	65° 12' 25.225" N	148° 42' 22.155" W	2.809	0.011	0	19040509007596	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	426	4736.967	65° 11' 19.542" N	148° 44' 5.525" W	1.702	0.007	0	19040509007739	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	426	4631.503	65° 11' 24.950" N	148° 44' 0.367" W	0.233	0.001	0	19040509007731	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	426	4872.232	65° 11' 41.055" N	148° 43' 57.716" W	0.358	0.001	0	19040509007700	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	426	4712.140	65° 11' 36.935" N	148° 43' 57.692" W	0.491	0.002	0	19040509007705	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	426	5601.526	65° 11' 58.231" N	148° 43' 50.853" W	0.308	0.001	0	19040509007669	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	426	4513.744	65° 11' 32.264" N	148° 43' 59.697" W	3.585	0.015	0	19040509007712	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	426	4180.796	65° 11' 41.427" N	148° 43' 40.775" W	1.308	0.005	0	19040509007696	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	426	5287.776	65° 11' 15.356" N	148° 44' 17.790" W	1.349	0.005	0	19040509007747	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	426	5090.785	65° 11' 36.781" N	148° 44' 15.441" W	13.354	0.054	0	19040509007699	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	426	5374.288	65° 11' 20.252" N	148° 44' 19.423" W	0.682	0.003	0	19040509007740	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	426	4830.489	65° 11' 55.531" N	148° 43' 39.766" W	6.090	0.025	0	19040509007670	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	427	5286.792	65° 11' 9.467" N	148° 44' 29.868" W	6.865	0.028	0	19040509007756	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	427	4059.913	65° 10' 32.949" N	148° 44' 28.468" W	0.445	0.002	0	19040509007835	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	428	2822.958	65° 9' 19.129" N	148° 42' 56.865" W	0.908	0.004	0	19040509007941	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	428	2588.900	65° 9' 19.357" N	148° 43' 9.930" W	0.385	0.002	0	19040509007942	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	431	4087.793	65° 7' 22.168" N	148° 45' 53.026" W	0.298	0.001	0	19040509008016	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	431	4035.726	65° 7' 20.108" N	148° 46' 10.491" W	34.895	0.141	0	19040509008013	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	431	1839.115	65° 7' 7.032" N	148° 45' 7.438" W	29.637	0.120	0	19040509008021	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	431	1876.326	65° 7' 7.283" N	148° 44' 57.681" W	0.473	0.002	0	19040509008029	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	431	2934.365	65° 7' 23.587" N	148° 45' 26.455" W	0.410	0.002	0	19040509008015	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	431	5312.282	65° 6' 42.981" N	148° 45' 59.258" W	5.441	0.022	0	19040509008040	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	431	3270.925	65° 6' 43.374" N	148° 45' 2.590" W	10.007	0.041	0	19040509008042	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	431	3224.580	65° 7' 24.351" N	148° 45' 32.741" W	0.339	0.001	0	19040509008014	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	431	3264.347	65° 7' 19.685" N	148° 45' 35.344" W	0.305	0.001	0	19040509008022	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	431	3754.925	65° 7' 20.526" N	148° 45' 47.118" W	0.518	0.002	0	19040509008019	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	431	3214.103	65° 6' 50.048" N	148° 45' 5.802" W	1.221	0.005	0	19040509008037	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	431	5040.821	65° 6' 46.719" N	148° 45' 53.478" W	0.151	0.001	0	19040509008039	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	431	3180.676	65° 7' 21.550" N	148° 45' 32.973" W	0.494	0.002	0	19040509008018	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	431	3175.863	65° 6' 53.501" N	148° 45' 10.998" W	0.250	0.001	0	19040509008035	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	431	2952.048	65° 7' 17.034" N	148° 45' 31.199" W	1.836	0.007	0	19040509008023	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	431	3785.252	65° 7' 17.769" N	148° 45' 48.101" W	0.458	0.002	0	19040509008024	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	431	5084.230	65° 6' 50.832" N	148° 46' 4.342" W	1.086	0.004	0	19040509008036	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	431	3483.436	65° 6' 43.898" N	148° 44' 49.981" W	0.359	0.001	0	19040509008044	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	431	4552.766	65° 6' 41.696" N	148° 45' 38.455" W	11.926	0.048	0	19040509008043	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	432	5461.741	65° 6' 28.627" N	148° 45' 33.366" W	0.296	0.001	0	19040509008057	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	432	3652.780	65° 6' 10.165" N	148° 44' 48.550" W	9.420	0.038	0	19040509008069	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	432	4441.705	65° 5' 59.346" N	148° 44' 50.560" W	5.745	0.023	0	19040509008083	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	432	367.488	65° 6' 29.542" N	148° 43' 41.482" W	9.110	0.037	0	19040509008055	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	432	1472.015	65° 6' 34.124" N	148° 44' 3.750" W	3.002	0.012	0	19040509008052	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	432	5082.302	65° 6' 31.052" N	148° 45' 30.599" W	3.096	0.013	0	19040509008056	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	432	5259.393	65° 6' 5.838" N	148° 45' 15.973" W	0.380	0.002	0	19040509008078	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	432	1878.818	65° 6' 22.044" N	148° 44' 19.684" W	19.453	0.079	0	19040509008061	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	432	4577.752	65° 6' 25.834" N	148° 45' 15.936" W	1.777	0.007	0	19040509008060	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	432	4974.783	65° 6' 2.756" N	148° 45' 5.922" W	0.500	0.002	0	19040509008082	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	432	4236.068	65° 6' 20.222" N	148° 45' 4.098" W	1.906	0.008	0	19040509008063	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	432	2229.786	65° 6' 5.114" N	148° 43' 25.616" W	2.435	0.010	0	19040509008080	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	432	3448.705	65° 6' 3.861" N	148° 44' 24.043" W	1.791	0.007	0	19040509008081	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	433	4114.667	65° 5' 53.746" N	148° 44' 33.617" W	0.314	0.001	0	19040509008091	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	433	5103.791	65° 5' 42.634" N	148° 45' 16.755" W	20.196	0.082	0	19040509008104	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	433	2427.047	65° 5' 30.929" N	148° 44' 2.374" W	3.396	0.014	0	19040509008124	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	433	1034.902	65° 5' 28.950" N	148° 42' 50.481" W	0.480	0.002	0	19040509008128	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	433	3443.047	65° 5' 59.838" N	148° 44' 11.489" W	1.651	0.007	0	19040509008085	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	433	2661.954	65° 5' 45.808" N	148° 44' 21.906" W	42.984	0.174	0	19040509008090	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	433	3584.404	65° 5' 32.540" N	148° 44' 27.283" W	0.486	0.002	0	19040509008122	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	433	4033.747	65° 5' 30.470" N	148° 44' 41.955" W	6.242	0.025	0	19040509008123	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	434	3621.929	65° 4' 47.695" N	148° 41' 11.272" W	0.337	0.001	0	19040509008187	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	434	5179.254	65° 4' 42.529" N	148° 44' 41.540" W	1.552	0.006	0	19040509008194	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	434	5101.274	65° 4' 44.677" N	148° 44' 41.318" W	0.465	0.002	0	19040509008190	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	434	1540.109	65° 4' 37.541" N	148° 42' 3.570" W	3.877	0.016	0	19040509008204	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	434	5564.332	65° 5' 22.738" N	148° 40' 52.787" W	0.631	0.003	0	19040509008140	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	434	4011.803	65° 4' 43.135" N	148° 41' 2.949" W	0.585	0.002	0	19040509008197	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	434	4960.559	65° 4' 42.204" N	148° 44' 34.352" W	0.418	0.002	0	19040509008195	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	434	5429.649	65° 5' 18.663" N	148° 40' 53.372" W	0.060	0.000	0	19040509008146	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	434	3834.302	65° 5' 18.447" N	148° 41' 41.732" W	0.528	0.002	0	19040509008143	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	434	2106.394	65° 4' 27.138" N	148° 43' 0.203" W	1.052	0.004	0	19040509008213	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	435	2810.786	65° 4' 0.381" N	148° 40' 41.885" W	0.791	0.003	0	19040509008246	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	435	1887.749	65° 3' 55.403" N	148° 42' 35.698" W	1.274	0.005	0	19040509008250	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	435	4883.493	65° 4' 15.987" N	148° 39' 54.396" W	1.883	0.008	0	19040509008230	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	435	2003.836	65° 3' 48.828" N	148° 41' 5.017" W	2.577	0.010	0	19040509008260	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	435	2081.950	65° 3' 39.133" N	148° 41' 35.117" W	1.535	0.006	0	19040509008276	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	435	2383.431	65° 3' 52.802" N	148° 42' 45.607" W	0.544	0.002	0	19040509008256	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	435	3591.390	65° 3' 33.516" N	148° 42' 51.372" W	1.559	0.006	0	19040509008284	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	435	1331.133	65° 3' 59.723" N	148° 41' 13.817" W	1.857	0.008	0	19040509008245	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	435	2246.994	65° 3' 55.061" N	148° 42' 43.182" W	0.140	0.001	0	19040509008254	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	435	3375.105	65° 3' 51.207" N	148° 40' 32.370" W	0.275	0.001	0	19040509008259	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	436	3414.014	65° 3' 24.552" N	148° 42' 15.737" W	0.568	0.002	0	19040509008301	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	436	4091.767	65° 2' 49.967" N	148° 42' 18.434" W	3.053	0.012	0	19040509008365	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	436	2652.260	65° 3' 2.489" N	148° 41' 53.824" W	1.552	0.006	0	19040509008342	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	436	5434.117	65° 3' 1.654" N	148° 43' 23.728" W	22.603	0.091	0	19040509008337	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	436	3354.037	65° 3' 20.722" N	148° 42' 17.414" W	1.176	0.005	0	19040509008308	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	437	4881.338	65° 2' 3.168" N	148° 38' 50.656" W	1.556	0.006	0	19040509008447	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	437	4860.693	65° 2' 9.324" N	148° 38' 47.550" W	0.642	0.003	0	19040509008442	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	437	1467.246	65° 2' 9.009" N	148° 41' 7.695" W	12.714	0.051	0	19040509008428	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	438	2368.454	65° 1' 22.776" N	148° 41' 18.413" W	0.968	0.004	0	19040509008493	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	438	3165.427	65° 1' 27.516" N	148° 41' 39.033" W	0.325	0.001	0	19040509008487	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	438	3047.370	65° 1' 25.385" N	148° 41' 35.316" W	0.411	0.002	0	19040509008489	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	438	3119.600	65° 1' 24.429" N	148° 41' 44.506" W	8.628	0.035	0	19040509008488	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	438	5234.823	65° 1' 7.268" N	148° 42' 15.796" W	0.457	0.002	0	19040509008516	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	439	2992.893	65° 0' 52.552" N	148° 41' 27.743" W	1.650	0.007	0	19040509008527	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	439	4127.239	65° 0' 35.199" N	148° 42' 25.261" W	92.674	0.375	330	19040509008540	39009	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	439	3759.509	65° 0' 30.093" N	148° 41' 44.491" W	0.472	0.002	0	19040509008555	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	439	3944.425	65° 0' 26.644" N	148° 41' 46.670" W	0.573	0.002	0	19040509008563	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	439	4148.601	65° 0' 24.836" N	148° 41' 49.893" W	0.362	0.001	0	19040509008569	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	439	2330.953	65° 0' 49.268" N	148° 39' 25.162" W	0.583	0.002	0	19040509008539	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	439	3554.792	65° 0' 53.314" N	148° 41' 36.250" W	0.323	0.001	0	19040509008528	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	440	4230.822	65° 0' 11.362" N	148° 42' 0.481" W	7.230	0.029	0	19040509008589	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	440	1610.756	64° 59' 40.958" N	148° 41' 0.796" W	2.025	0.008	0	19040509004729	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	440	3592.091	64° 59' 40.744" N	148° 42' 16.012" W	34.481	0.140	0	19040509004723	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	440	4189.711	65° 0' 6.887" N	148° 42' 13.088" W	9.474	0.038	0	19040509008600	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	441	2693.602	64° 58' 36.369" N	148° 39' 51.904" W	1.703	0.007	0	19040509004807	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	441	2226.990	64° 58' 34.430" N	148° 40' 12.823" W	1.658	0.007	0	19040509004811	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	441	2793.820	64° 59' 22.748" N	148° 41' 14.673" W	3.233	0.013	0	19040509004750	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	441	2201.857	64° 58' 55.771" N	148° 41' 32.718" W	1.959	0.008	0	19040509004782	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	441	4039.108	64° 59' 17.552" N	148° 42' 3.071" W	6.958	0.028	0	19040509004753	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	442	4897.174	64° 58' 38.323" N	148° 42' 57.076" W	16.740	0.068	0	19040509004797	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	442	493.510	64° 58' 11.089" N	148° 40' 34.632" W	4.735	0.019	0	19040509004842	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	443	938.251	64° 57' 25.572" N	148° 40' 32.775" W	5.478	0.022	0	19040509004890	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	443	88316.611	64° 55' 7.151" N	148° 7' 6.397" W	1.781	0.007	0	19040509009026	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	443	1982.058	64° 56' 53.211" N	148° 40' 48.609" W	6.391	0.026	0	19040509004923	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	443	112915.159	64° 55' 3.694" N	147° 57' 35.076" W	0.460	0.002	0	19040509009017	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	443	108302.743	64° 54' 36.556" N	147° 59' 31.004" W	0.925	0.004	0	19040509009010	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	443	121527.374	64° 53' 53.522" N	147° 54' 31.863" W	8.609	0.035	0	19040509009029	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	443	91127.819	64° 55' 18.237" N	148° 5' 56.320" W	1.514	0.006	0	19040509009028	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	443	117719.868	64° 54' 29.791" N	147° 55' 52.343" W	0.608	0.002	0	19040509009036	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	443	116515.398	64° 54' 9.555" N	147° 56' 28.853" W	0.699	0.003	0	19040509009031	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	443	85018.794	64° 54' 58.928" N	148° 8' 29.495" W	1.159	0.005	0	19040509009057	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	443	84651.300	64° 54' 56.440" N	148° 8' 38.382" W	2.188	0.009	0	19040509009056	39004	Perennial	19040509	Fairbanks Lateral

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	443	108198.693	64° 54' 17.904" N	147° 59' 40.487" W	0.845	0.003	0	19040509009034	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	443	106822.174	64° 54' 53.066" N	147° 59' 52.980" W	10.725	0.043	0	19040509008978	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	443	116117.185	64° 54' 30.837" N	147° 56' 24.910" W	3.474	0.014	0	19040509009038	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	443	91960.183	64° 55' 15.761" N	148° 5' 38.178" W	1.150	0.005	0	19040509009027	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	443	114749.204	64° 54' 6.623" N	147° 57' 12.431" W	0.537	0.002	0	19040509009030	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	443	4202.299	64° 57' 43.137" N	148° 42' 21.307" W	1.775	0.007	0	19040509004878	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	443	2362.306	64° 57' 8.058" N	148° 41' 53.644" W	1.382	0.006	0	19040509004908	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	445	1401.384	64° 55' 25.812" N	148° 42' 10.891" W	5.851	0.024	0	19040509005039	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	447	3047.601	64° 54' 18.742" N	148° 46' 22.501" W	2400.029	9.714	308	19040509005027	39009	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	447	73123.549	64° 52' 34.105" N	148° 14' 15.120" W	1.322	0.005	0	19040509009049	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	447	76367.347	64° 52' 49.917" N	148° 12' 55.787" W	1.485	0.006	0	19040509009052	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	447	75590.615	64° 52' 50.403" N	148° 13' 13.433" W	1.406	0.006	0	19040509009053	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	447	75933.149	64° 52' 40.509" N	148° 13' 9.380" W	ï.379	0.002	0	19040509009050	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	447	73257.235	64° 52' 24.964" N	148° 14' 15.366" W	0.362	0.001	0	19040509009047	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	447	74128.640	64° 52' 44.210" N	148° 13' 45.803" W	2.381	0.010	0	19040509009051	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	447	70017.623	64° 52' 0.325" N	148° 15' 40.071" W	0.958	0.004	0	19040509009046	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	447	73716.272	64° 52' 28.322" N	148° 14' 5.644" W	0.313	0.001	0	19040509009048	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	53241.821	64° 49' 34.282" N	148° 23' 44.593" W	6.396	0.026	0	19040509009082	39004	Perennial	19040509	Fairbanks Lateral

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	59874.615	64° 48' 57.752" N	148° 21' 40.002" W	0.760	0.003	0	19040509008921	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	57878.062	64° 50' 20.677" N	148° 21' 12.663" W	0.997	0.004	0	19040509009062	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	72075.234	64° 51' 44.712" N	148° 14' 55.174" W	2.881	0.012	0	19040509009042	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	60009.277	64° 49' 50.899" N	148° 20' 45.868" W	0.255	0.001	0	19040509009086	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	68243.752	64° 51' 48.959" N	148° 16' 21.154" W	2.128	0.009	0	19040509009045	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	71963.705	64° 51' 48.361" N	148° 14' 59.158" W	0.891	0.004	0	19040509009044	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	68550.540	64° 51' 28.278" N	148° 16' 23.779" W	2.078	0.008	0	19040509009071	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	52087.207	64° 49' 33.340" N	148° 24' 17.219" W	2.572	0.010	0	19040509009081	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	59612.265	64° 48' 45.511" N	148° 21' 57.996" W	2.701	0.011	0	19040509009098	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	70896.147	64° 51' 39.043" N	148° 15' 26.962" W	1.369	0.006	0	19040509009073	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	50542.319	64° 49' 38.311" N	148° 24' 52.169" W	2.068	0.008	0	19040509009084	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	65532.428	64° 50' 1.898" N	148° 18' 22.043" W	1.073	0.004	0	19040509009087	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	63576.253	64° 50' 12.391" N	148° 19' 1.528" W	1.984	0.008	0	19040509009060	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	70489.273	64° 51' 44.994" N	148° 15' 25.932" W	9.352	0.038	0	19040509009043	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	65763.085	64° 50' 5.106" N	148° 18' 14.391" W	1.369	0.006	0	19040509009088	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	50286.085	64° 49' 36.307" N	148° 25' 1.057" W	0.534	0.002	0	19040509009083	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	2929.497	64° 52' 56.801" N	148° 43' 45.221" W	2.088	0.008	0	19040509005179	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	68288.647	64° 50' 45.924" N	148° 16' 47.600" W	2.122	0.009	0	19040509009067	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	60456.021	64° 48' 37.804" N	148° 21' 48.628" W	0.277	0.001	0	19040509009097	39004	Perennial	19040509	Fairbanks Lateral

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	61159.643	64° 50' 34.099" N	148° 19' 40.758" W	5.331	0.022	0	19040509009065	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	67133.057	64° 51' 16.215" N	148° 17' 1.356" W	1.184	0.005	0	19040509009069	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	56775.924	64° 50' 37.258" N	148° 21' 29.931" W	0.559	0.002	0	19040509009066	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	61018.486	64° 50' 8.742" N	148° 20' 3.982" W	3.351	0.014	0	19040509009058	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	67419.325	64° 50' 24.726" N	148° 17' 21.804" W	1.629	0.007	0	19040509009063	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	54384.712	64° 49' 45.168" N	148° 23' 7.542" W	0.833	0.003	0	19040509009085	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	68014.365	64° 51' 26.619" N	148° 16' 37.653" W	1.642	0.007	0	19040509009070	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	448	68417.313	64° 51' 33.318" N	148° 16' 27.589" W	0.657	0.003	0	19040509009072	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	45265.489	64° 48' 27.769" N	148° 28' 30.815" W	2.412	0.010	0	19040509009096	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	44774.802	64° 48' 23.499" N	148° 28' 53.162" W	0.802	0.003	0	19040509009091	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	51053.462	64° 48' 7.490" N	148° 26' 21.336" W	3.471	0.014	0	19040509008938	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	2415.006	64° 52' 8.321" N	148° 44' 21.968" W	2.071	0.008	0	19040509005219	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	55936.825	64° 48' 27.659" N	148° 23' 54.479" W	0.710	0.003	0	19040509009093	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	43090.114	64° 48' 13.538" N	148° 29' 48.514" W	4.120	0.017	0	19040509008937	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	47972.550	64° 47' 58.289" N	148° 27' 50.926" W	11.187	0.045	0	19040509008939	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	45618.500	64° 48' 19.962" N	148° 28' 33.400" W	1.148	0.005	0	19040509009090	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	44649.881	64° 47' 57.275" N	148° 29' 36.022" W	2.449	0.010	0	19040509008941	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	52722.288	64° 47' 30.607" N	148° 26' 29.635" W	5.362	0.022	0	19040509008955	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	47669.902	64° 48' 16.531" N	148° 27' 37.967" W	2.090	0.008	0	19040509008935	39004	Perennial	19040509	Fairbanks Lateral

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

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Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	54236.052	64° 47' 29.284" N	148° 25' 56.003" W	0.255	0.001	0	19040509008957	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	47386.692	64° 48' 48.234" N	148° 27' 1.368" W	3.830	0.016	0	19040509009100	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	46208.255	64° 48' 18.085" N	148° 28' 21.753" W	0.809	0.003	0	19040509008934	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	47062.465	64° 48' 54.178" N	148° 27' 12.446" W	0.333	0.001	0	19040509008922	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	46629.774	64° 47' 49.758" N	148° 28' 54.735" W	0.757	0.003	0	19040509008944	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	49724.152	64° 47' 37.221" N	148° 27' 47.232" W	0.943	0.004	0	19040509008953	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	2225.039	64° 52' 18.228" N	148° 44' 29.091" W	8.594	0.035	0	19040509005206	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	46315.266	64° 48' 26.138" N	148° 28' 8.765" W	0.518	0.002	0	19040509009095	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	52141.549	64° 48' 0.182" N	148° 26' 4.272" W	1.507	0.006	0	19040509008940	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	3198.028	64° 52' 49.956" N	148° 44' 10.379" W	1.835	0.007	0	19040509005189	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	46914.852	64° 48' 47.374" N	148° 27' 21.306" W	3.236	0.013	0	19040509009099	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	53960.263	64° 47' 45.784" N	148° 25' 36.925" W	1.113	0.005	0	19040509008948	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	52639.062	64° 48' 17.968" N	148° 25' 30.567" W	0.867	0.004	0	19040509008936	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	449	45440.955	64° 47' 44.349" N	148° 29' 37.042" W	2.539	0.010	0	19040509008946	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	451	1886.489	64° 50' 52.563" N	148° 46' 55.210" W	1.304	0.005	0	19040509005250	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	451	4952.019	64° 51' 48.716" N	148° 47' 15.951" W	1.177	0.005	0	19040509005229	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	451	1016.116	64° 51' 1.642" N	148° 46' 50.466" W	11.435	0.046	0	19040509005246	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	452	867.272	64° 50' 21.376" N	148° 47' 10.654" W	51.782	0.210	341	19040509005256	39009	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

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Tolovana River	Lake/Pond: Hydrographic Category = Perennial	452	5100.994	64° 50' 18.307" N	148° 48' 40.280" W	1.942	0.008	0	19040509005264	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	452	4277.785	64° 50' 0.913" N	148° 48' 18.482" W	3.120	0.013	0	19040509005272	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	452	3712.910	64° 50' 2.541" N	148° 48' 2.541" W	1.049	0.004	0	19040509005273	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	452	3624.400	64° 50' 9.398" N	148° 48' 10.799" W	8.464	0.034	0	19040509005267	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	453	2082.238	64° 49' 39.382" N	148° 48' 8.321" W	58.874	0.238	0	19040509005279	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	42502.060	64° 46' 34.803" N	148° 31' 22.904" W	0.262	0.001	0	19040509005359	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	43043.091	64° 46' 37.568" N	148° 31' 7.516" W	0.531	0.002	0	19040509005353	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	39099.788	64° 46' 40.243" N	148° 32' 41.306" W	0.419	0.002	0	19040509005352	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	37969.193	64° 46' 38.494" N	148° 33' 9.316" W	0.326	0.001	0	19040509005357	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	37570.498	64° 46' 36.752" N	148° 33' 18.789" W	0.963	0.004	0	19040509005361	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	44325.430	64° 46' 57.948" N	148° 30' 23.358" W	0.578	0.002	0	19040509005340	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	44209.888	64° 46' 43.243" N	148° 30' 36.329" W	0.982	0.004	0	19040509005344	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	35788.498	64° 46' 34.329" N	148° 34' 6.144" W	0.375	0.002	0	19040509005366	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	44695.661	64° 46' 59.006" N	148° 30' 16.329" W	0.342	0.001	0	19040509005339	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	37978.919	64° 46' 36.199" N	148° 33' 11.167" W	0.394	0.002	0	19040509005362	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	43201.103	64° 46' 34.227" N	148° 31' 6.260" W	0.399	0.002	0	19040509005358	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	43205.567	64° 46' 45.414" N	148° 30' 55.864" W	1.901	0.008	0	19040509005343	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	46332.074	64° 47' 3.614" N	148° 29' 32.600" W	1.127	0.005	0	19040509008963	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	39473.995	64° 46' 37.158" N	148° 32' 30.217" W	1.100	0.004	0	19040509005354	39004	Perennial	19040509	Fairbanks Lateral

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

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Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	40242.012	64° 46' 37.536" N	148° 32' 14.474" W	0.435	0.002	0	19040509005355	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	44678.450	64° 47' 3.868" N	148° 30' 11.836" W	0.646	0.003	0	19040509005334	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	42179.447	64° 46' 42.594" N	148° 31' 24.859" W	0.451	0.002	0	19040509005348	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	45044.048	64° 47' 21.393" N	148° 29' 58.184" W	0.152	0.001	0	19040509008959	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	45380.706	64° 47' 19.199" N	148° 29' 44.710" W	3.683	0.015	0	19040509008960	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	44988.049	64° 47' 25.414" N	148° 29' 55.140" W	1.011	0.004	0	19040509008958	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	43218.210	64° 47' 32.993" N	148° 30' 32.328" W	2.587	0.010	0	19040509005321	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	40657.388	64° 47' 27.898" N	148° 31' 37.998" W	0.541	0.002	0	19040509005325	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	49671.315	64° 47' 15.412" N	148° 28' 10.704" W	0.405	0.002	0	19040509008962	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	48746.337	64° 47' 17.025" N	148° 28' 32.552" W	0.573	0.002	0	19040509008961	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	44858.401	64° 46' 58.967" N	148° 30' 10.612" W	0.529	0.002	0	19040509005338	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	39702.492	64° 47' 36.031" N	148° 31' 51.969" W	4.379	0.018	0	19040509005320	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	4926.453	64° 48' 42.276" N	148° 49' 1.781" W	2.076	0.008	0	19040509005299	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	3127.275	64° 48' 54.026" N	148° 48' 14.189" W	18.109	0.073	0	19040509005291	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	43717.757	64° 46' 35.546" N	148° 30' 48.573" W	1.532	0.006	0	19040509005351	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	36917.175	64° 46' 37.329" N	148° 33' 35.248" W	0.721	0.003	0	19040509005360	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	454	42702.328	64° 47' 18.303" N	148° 30' 52.563" W	1.318	0.005	0	19040509005328	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	455	5313.027	64° 48' 25.117" N	148° 49' 17.028" W	0.849	0.003	0	19040509005311	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	455	1704.469	64° 47' 43.827" N	148° 47' 9.630" W	3.318	0.013	0	19040509005330	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	456	3269.052	64° 47' 2.754" N	148° 50' 24.250" W	3.676	0.015	0	19040509005364	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	456	580.685	64° 46' 57.652" N	148° 49' 20.764" W	2.193	0.009	0	19040509005368	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	456	2777.774	64° 47' 15.272" N	148° 50' 6.545" W	2.471	0.010	0	19040509005346	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	456	2284.636	64° 47' 12.473" N	148° 49' 51.939" W	1.924	0.008	0	19040509005350	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	456	1355.336	64° 46' 59.371" N	148° 49' 39.006" W	1.894	0.008	0	19040509005367	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	456	1061.996	64° 46' 47.959" N	148° 49' 8.714" W	4.903	0.020	0	19040509005375	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	457	471.177	64° 46' 7.788" N	148° 48' 11.043" W	11.941	0.048	0	19040509005411	39004	Perennial	19040509	Fairbanks Lateral, Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	457	2354.912	64° 46' 7.647" N	148° 49' 1.406" W	0.864	0.003	0	19040509005421	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	457	2951.709	64° 45' 47.052" N	148° 48' 37.041" W	1.425	0.006	0	19040509005442	39004	Perennial	19040509	Fairbanks Lateral, Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	457	2572.777	64° 46' 17.181" N	148° 49' 10.297" W	1.424	0.006	0	19040509005407	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	457	997.459	64° 46' 14.141" N	148° 48' 31.454" W	0.878	0.004	0	19040509005409	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	457	3545.595	64° 45' 56.790" N	148° 46' 56.119" W	0.786	0.003	0	19040509005428	39004	Perennial	19040509	Fairbanks Lateral, Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	457	2447.266	64° 46' 27.690" N	148° 49' 1.038" W	1.009	0.004	0	19040509005395	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	457	1275.057	64° 46' 6.500" N	148° 48' 32.332" W	0.554	0.002	0	19040509005420	39004	Perennial	19040509	Fairbanks Lateral, Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	28117.603	64° 45' 34.808" N	148° 36' 50.988" W	0.643	0.003	0	19040509005433	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	32650.025	64° 46' 9.506" N	148° 35' 12.840" W	0.512	0.002	0	19040509005390	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	22212.167	64° 45' 56.208" N	148° 39' 12.036" W	0.468	0.002	0	19040509005413	39004	Perennial	19040509	Fairbanks Lateral

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	11509.372	64░ 45' 45.534" N	148░ 43' 17.244" W	0.473	0.002	0	19040509005435	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	20562.626	64░ 45' 36.191" N	148░ 39' 41.364" W	1.919	0.008	0	19040509005440	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	9551.041	64░ 45' 47.406" N	148░ 44' 0.677" W	2.487	0.010	0	19040509005431	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	22766.182	64░ 46' 26.235" N	148░ 39' 9.007" W	1.896	0.008	0	19040509005380	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	39763.746	64░ 46' 24.463" N	148░ 32' 28.674" W	5.417	0.022	0	19040509005371	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	41963.060	64░ 46' 23.471" N	148░ 31' 41.251" W	0.329	0.001	0	19040509005374	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	19037.737	64░ 45' 49.927" N	148░ 40' 23.279" W	1.002	0.004	0	19040509005423	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	17682.815	64░ 45' 41.582" N	148░ 40' 52.975" W	0.334	0.001	0	19040509005434	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	28006.242	64░ 45' 32.307" N	148░ 36' 53.578" W	0.601	0.002	0	19040509005439	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	12708.938	64░ 45' 3.379" N	148░ 42' 48.774" W	0.821	0.003	0	19040509005469	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	10658.440	64░ 45' 22.519" N	148░ 43' 29.634" W	4.030	0.016	0	19040509005457	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	25511.113	64░ 46' 16.772" N	148░ 37' 58.036" W	2.986	0.012	0	19040509005386	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	21868.629	64░ 45' 37.288" N	148░ 39' 13.985" W	0.747	0.003	0	19040509005436	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	8862.152	64░ 45' 39.653" N	148░ 44' 16.815" W	0.632	0.003	0	19040509005443	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	30762.494	64░ 45' 38.610" N	148░ 35' 45.224" W	3.020	0.012	0	19040509005426	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	49270.314	64░ 46' 21.249" N	148░ 28' 40.506" W	5.236	0.021	0	19040509008971	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	29378.409	64░ 45' 59.132" N	148░ 36' 25.784" W	0.380	0.002	0	19040509005404	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	12907.200	64░ 45' 44.835" N	148░ 42' 36.775" W	7.535	0.030	0	19040509005430	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	2241.543	64░ 45' 38.685" N	148░ 46' 48.793" W	2.683	0.011	0	19040509005448	39004	Perennial	19040509	Fairbanks Lateral, Gas Conditioning Facility Mile 0 to Mile 540

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	18757.201	64° 45' 45.290" N	148° 40' 29.280" W	0.383	0.002	0	19040509005429	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	19685.506	64° 45' 36.712" N	148° 40' 3.216" W	2.755	0.011	0	19040509005438	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	24903.518	64° 45' 46.550" N	148° 38' 5.207" W	3.120	0.013	0	19040509005419	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	2813.213	64° 44' 56.587" N	148° 47' 43.864" W	0.550	0.002	0	19040509004711	39004	Perennial	19040509	Fairbanks Lateral, Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	28204.122	64° 46' 0.333" N	148° 36' 54.195" W	0.235	0.001	0	19040509005403	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	33679.105	64° 46' 13.927" N	148° 34' 48.666" W	1.375	0.006	0	19040509005383	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	28434.691	64° 46' 10.821" N	148° 36' 51.842" W	0.412	0.002	0	19040509005392	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	36723.763	64° 46' 28.473" N	148° 33' 44.355" W	0.548	0.002	0	19040509005372	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	27381.009	64° 46' 18.825" N	148° 37' 20.034" W	0.353	0.001	0	19040509005384	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	19929.857	64° 46' 16.804" N	148° 40' 15.033" W	1.130	0.005	0	19040509005391	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	1787.049	64° 45' 42.940" N	148° 48' 7.454" W	2.858	0.012	0	19040509005444	39004	Perennial	19040509	Fairbanks Lateral, Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	25715.466	64° 46' 24.244" N	148° 38' 2.287" W	0.314	0.001	0	19040509005381	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	22725.148	64° 45' 59.420" N	148° 38' 54.603" W	4.762	0.019	0	19040509005405	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	21219.772	64° 45' 57.732" N	148° 39' 35.444" W	0.356	0.001	0	19040509005412	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	29486.612	64° 46' 7.557" N	148° 36' 24.143" W	1.091	0.004	0	19040509005393	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	12454.095	64° 45' 46.856" N	148° 42' 55.881" W	0.592	0.002	0	19040509005432	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	35257.056	64° 45' 56.433" N	148° 34' 9.738" W	0.370	0.001	0	19040509005401	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	38432.017	64° 45' 52.845" N	148° 32' 52.531" W	2.969	0.012	0	19040509005400	39004	Perennial	19040509	Fairbanks Lateral

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

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Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	23579.386	64° 46' 1.884" N	148° 38' 40.219" W	1.693	0.007	0	19040509005402	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	40527.195	64° 46' 18.540" N	148° 32' 13.284" W	0.364	0.001	0	19040509005376	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	2332.452	64° 45' 40.243" N	148° 46' 56.119" W	0.618	0.002	0	19040509005447	39004	Perennial	19040509	Fairbanks Lateral, Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	20550.117	64° 46' 28.164" N	148° 40' 5.742" W	1.933	0.008	0	19040509005378	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	23603.561	64° 46' 7.957" N	148° 38' 40.802" W	1.993	0.008	0	19040509005396	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	31303.075	64° 46' 1.712" N	148° 35' 41.406" W	0.729	0.003	0	19040509005397	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	30056.881	64° 45' 56.462" N	148° 36' 9.143" W	0.544	0.002	0	19040509005406	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	21104.581	64° 45' 48.333" N	148° 39' 34.992" W	0.883	0.004	0	19040509005424	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	36855.936	64° 45' 56.248" N	148° 33' 31.424" W	0.539	0.002	0	19040509005399	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	31815.318	64° 45' 59.496" N	148° 35' 29.173" W	1.452	0.006	0	19040509005398	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	18704.145	64° 46' 25.039" N	148° 40' 46.813" W	2.508	0.010	0	19040509005382	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	36644.270	64° 45' 50.076" N	148° 33' 35.575" W	0.882	0.004	0	19040509005408	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	18209.656	64° 45' 51.304" N	148° 40' 43.160" W	0.722	0.003	0	19040509005422	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	4691.218	64° 45' 23.549" N	148° 45' 49.413" W	0.776	0.003	0	19040509005458	39004	Perennial	19040509	Fairbanks Lateral, Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	34711.158	64° 46' 26.514" N	148° 34' 25.525" W	3.910	0.016	0	19040509005373	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	458	17963.017	64° 45' 47.361" N	148° 40' 45.580" W	1.133	0.005	0	19040509005427	39004	Perennial	19040509	Fairbanks Lateral
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	459	2892.874	64° 44' 51.018" N	148° 47' 58.066" W	0.780	0.003	0	19040509004713	39004	Perennial	19040509	Fairbanks Lateral, Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	460	3383.408	64° 44' 4.275" N	148° 51' 29.606" W	0.595	0.002	0	19040509009488	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

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Tolovana River	Lake/Pond: Hydrographic Category = Perennial	460	4672.407	64░ 44' 8.009" N	148░ 52' 0.367" W	0.600	0.002	0	19040509009483	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	460	3898.330	64░ 44' 8.663" N	148░ 51' 45.055" W	2.308	0.009	0	19040509009486	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	460	3710.342	64░ 44' 6.402" N	148░ 51' 39.336" W	0.762	0.003	0	19040509009487	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	461	2179.883	64░ 43' 29.702" N	148░ 52' 2.651" W	0.687	0.003	0	19040509009479	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	461	2514.931	64░ 43' 46.229" N	148░ 52' 22.203" W	194.650	0.788	336	19040509009480	39009	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	461	3768.946	64░ 43' 21.802" N	148░ 52' 41.684" W	0.635	0.003	0	19040509009478	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	462	2700.749	64░ 42' 59.561" N	148░ 52' 54.492" W	0.334	0.001	0	19040509009475	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	462	2560.620	64░ 42' 54.453" N	148░ 53' 1.992" W	0.421	0.002	0	19040509009476	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	462	3162.582	64░ 43' 5.026" N	148░ 52' 53.572" W	0.287	0.001	0	19040509009474	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	462	1918.432	64░ 42' 42.756" N	148░ 53' 3.091" W	1.158	0.005	0	19040509009473	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	463	3663.735	64░ 42' 7.092" N	148░ 54' 55.703" W	0.949	0.004	0	19040509009456	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	463	1990.559	64░ 41' 54.982" N	148░ 54' 18.938" W	0.550	0.002	0	19040509009469	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	463	1648.481	64░ 42' 14.611" N	148░ 53' 21.944" W	0.702	0.003	0	19040509009470	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	463	5463.411	64░ 42' 26.261" N	148░ 55' 23.938" W	3.694	0.015	0	19040509009461	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	464	4452.528	64░ 42' 3.579" N	148░ 55' 30.921" W	0.229	0.001	0	19040509009459	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	464	3214.825	64░ 41' 54.168" N	148░ 54' 56.198" W	0.697	0.003	0	19040509009453	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	464	2137.245	64░ 41' 42.640" N	148░ 54' 41.668" W	0.973	0.004	0	19040509009455	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	464	2875.593	64░ 41' 19.484" N	148░ 56' 6.969" W	0.517	0.002	0	19040509009449	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	464	1858.884	64° 41' 15.036" N	148° 55' 40.972" W	0.552	0.002	0	19040509009450	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	464	3204.612	64° 41' 51.223" N	148° 55' 26.763" W	0.260	0.001	0	19040509009460	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	464	4287.242	64° 42' 1.761" N	148° 55' 30.686" W	0.173	0.001	0	19040509009458	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	464	1381.147	64° 41' 23.641" N	148° 55' 32.629" W	2.543	0.010	0	19040509009451	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	464	2693.173	64° 41' 48.812" N	148° 55' 6.410" W	0.650	0.003	0	19040509009454	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	464	2192.776	64° 41' 43.907" N	148° 55' 11.106" W	1.005	0.004	0	19040509009457	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	464	769.211	64° 41' 28.283" N	148° 55' 8.504" W	0.494	0.002	0	19040509009452	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	465	2329.305	64° 40' 49.420" N	148° 55' 30.245" W	0.781	0.003	0	19040509009445	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Tolovana River	Lake/Pond: Hydrographic Category = Perennial	469	4425.566	64° 38' 48.439" N	149° 2' 15.367" W	0.709	0.003	0	19040509009379	39004	Perennial	19040509	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	193	2609.375	67° 55' 46.223" N	149° 50' 38.349" W	0.464	0.002	0	19040601016019	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	193	2316.880	67° 55' 45.466" N	149° 50' 28.005" W	0.358	0.001	0	19040601016020	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	194	274.628	67° 54' 49.010" N	149° 49' 4.815" W	1.301	0.005	0	19040601016022	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	194	795.173	67° 54' 57.454" N	149° 48' 59.527" W	3.070	0.012	0	19040601016021	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	198	1529.326	67° 51' 35.787" N	149° 49' 53.479" W	4.072	0.016	0	19040601016023	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	205	1088.661	67° 45' 47.237" N	149° 46' 23.002" W	12.705	0.051	1545	19040601016024	39009	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	205	568.569	67° 45' 32.385" N	149° 46' 8.780" W	14.680	0.059	0	19040601016025	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	206	624.656	67° 44' 52.801" N	149° 45' 49.181" W	2.891	0.012	0	19040601015434	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	209	3014.339	67° 42' 26.045" N	149° 45' 20.365" W	4.467	0.018	0	19040601015388	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	209	3622.276	67° 42' 34.795" N	149° 45' 27.175" W	0.733	0.003	0	19040601015387	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	209	857.444	67° 42' 20.222" N	149° 43' 32.836" W	7.623	0.031	1644	19040601015390	39009	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	211	1613.733	67° 40' 27.840" N	149° 43' 53.979" W	2.951	0.012	0	19040601015444	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	211	1720.118	67° 40' 41.242" N	149° 44' 3.366" W	3.922	0.016	0	19040601015393	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	211	2486.991	67° 40' 44.361" N	149° 44' 23.502" W	3.712	0.015	0	19040601015443	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	212	448.717	67° 39' 58.711" N	149° 42' 57.761" W	13.985	0.057	1446	19040601015396	39009	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	212	1909.748	67° 40' 0.129" N	149° 43' 33.169" W	0.587	0.002	0	19040601015398	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	213	530.951	67° 39' 7.450" N	149° 43' 28.097" W	2.462	0.010	0	19040601015400	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	213	1755.606	67° 38' 42.916" N	149° 43' 39.051" W	0.313	0.001	0	19040601015404	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	213	354.793	67° 38' 46.827" N	149° 43' 21.453" W	42.095	0.170	1415	19040601015402	39009	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	213	3733.411	67° 38' 21.064" N	149° 43' 29.548" W	3.407	0.014	0	19040601015408	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	213	2507.505	67° 38' 35.081" N	149° 43' 44.007" W	0.780	0.003	0	19040601015406	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	213	1976.297	67° 38' 40.691" N	149° 43' 40.122" W	0.330	0.001	0	19040601015405	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	213	3165.311	67° 38' 28.007" N	149° 43' 37.329" W	1.003	0.004	0	19040601015407	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	214	4618.704	67° 37' 50.678" N	149° 44' 11.811" W	0.751	0.003	0	19040601015409	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	215	1049.980	67° 37' 48.309" N	149° 47' 6.340" W	1.036	0.004	0	19040601015410	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk	Lake/Pond: Hydrographic	216	1308.998	67° 36' 47.124" N	149° 47' 8.681" W	6.067	0.025	0	19040601015445	39004	Perennial	19040601	Gas Conditioning Facility

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
River	Category = Perennial												Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	216	3070.074	67° 37' 9.852" N	149° 45' 40.151" W	0.544	0.002	0	19040601015418	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	218	1611.042	67° 35' 38.722" N	149° 47' 17.829" W	0.319	0.001	0	19040601015421	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	218	1994.139	67° 35' 39.174" N	149° 47' 50.423" W	0.579	0.002	0	19040601015420	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	218	1428.077	67° 35' 31.887" N	149° 47' 48.404" W	0.556	0.002	0	19040601015423	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	218	1687.559	67° 35' 34.470" N	149° 47' 50.602" W	0.319	0.001	0	19040601015422	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	219	1522.055	67° 34' 53.887" N	149° 48' 20.412" W	0.317	0.001	0	19040601015424	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	222	3363.859	67° 32' 20.447" N	149° 52' 51.875" W	1.387	0.006	0	19040601015428	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	222	4516.283	67° 32' 25.555" N	149° 53' 20.935" W	2.534	0.010	0	19040601015427	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	222	3944.817	67° 32' 20.176" N	149° 53' 3.554" W	0.276	0.001	0	19040601015430	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	225	2107.975	67° 29' 29.012" N	149° 52' 3.633" W	2.332	0.009	0	19040601015361	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	227	1038.967	67° 28' 35.334" N	149° 54' 26.646" W	0.357	0.001	0	19040601015362	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	227	1958.242	67° 28' 20.245" N	149° 55' 25.060" W	1.248	0.005	0	19040601015363	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	228	2243.127	67° 27' 59.064" N	149° 57' 41.074" W	3.673	0.015	0	19040601015364	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	229	2014.711	67° 27' 49.938" N	149° 58' 30.259" W	4.355	0.018	0	19040601015370	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	230	1062.862	67° 28' 0.766" N	150° 1' 6.300" W	4.868	0.020	0	19040601016327	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	231	2642.610	67° 27' 28.765" N	150° 4' 0.661" W	0.221	0.001	0	19040601016334	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	231	2258.071	67° 27' 27.554" N	150° 3' 54.161" W	2.455	0.010	0	19040601016332	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	231	596.169	67° 27' 32.205" N	150° 3' 5.350" W	0.833	0.003	0	19040601016331	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	231	2100.182	67° 27' 14.192" N	150° 3' 35.718" W	0.600	0.002	0	19040601016338	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	231	1281.277	67° 27' 36.139" N	150° 3' 19.113" W	0.813	0.003	0	19040601016330	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	231	1367.114	67° 27' 26.700" N	150° 3' 32.915" W	2.878	0.012	0	19040601016333	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	232	1834.928	67° 27' 7.427" N	150° 4' 0.516" W	2.020	0.008	0	19040601016340	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	232	2584.078	67° 27' 14.354" N	150° 4' 14.207" W	2.263	0.009	0	19040601016337	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	232	2428.729	67° 27' 9.643" N	150° 3' 42.078" W	1.106	0.004	0	19040601016339	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	232	1748.313	67° 27' 5.173" N	150° 4' 18.294" W	0.712	0.003	0	19040601016342	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	233	4595.145	67° 26' 13.327" N	150° 6' 24.881" W	0.833	0.003	0	19040601016350	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	234	3271.081	67° 24' 46.344" N	150° 3' 39.853" W	0.368	0.001	0	19040601016353	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	234	3393.554	67° 24' 42.004" N	150° 3' 50.025" W	0.228	0.001	0	19040601016355	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	235	1087.889	67° 24' 31.955" N	150° 5' 4.352" W	0.681	0.003	0	19040601016357	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	235	1875.594	67° 24' 42.029" N	150° 5' 19.793" W	4.566	0.018	0	19040601016354	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	235	1499.454	67° 24' 33.454" N	150° 4' 51.068" W	0.366	0.001	0	19040601016356	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	236	1659.686	67° 23' 48.092" N	150° 5' 38.962" W	0.533	0.002	0	19040601016358	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	240	301.024	67° 20' 14.933" N	150° 8' 29.545" W	3.685	0.015	0	19040601016359	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	241	3839.231	67° 19' 42.934" N	150° 11' 2.052" W	1.994	0.008	0	19040601016360	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	241	3207.468	67° 19' 30.219" N	150° 10' 52.293" W	0.867	0.004	0	19040601016362	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	241	3404.767	67° 19' 28.039" N	150° 10' 59.991" W	1.963	0.008	0	19040601016363	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	241	3028.407	67° 19' 32.918" N	150° 10' 47.570" W	1.808	0.007	0	19040601016361	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	243	2643.165	67° 17' 23.687" N	150° 10' 16.947" W	0.725	0.003	0	19040601016365	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	245	4078.645	67° 15' 44.334" N	150° 8' 52.924" W	6.441	0.026	1065	19040601016366	39009	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	246	4129.909	67° 14' 46.440" N	150° 9' 26.806" W	1.786	0.007	0	19040601015452	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	246	1791.988	67° 14' 58.901" N	150° 10' 48.119" W	4.506	0.018	0	19040601015451	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	246	1774.463	67° 15' 1.138" N	150° 10' 42.039" W	0.071	0.001	0	19040601016368	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	246	2893.109	67° 15' 16.982" N	150° 9' 14.800" W	3.018	0.012	0	19040601016367	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	248	844.034	67° 13' 51.045" N	150° 13' 49.532" W	13.174	0.053	0	19040601015458	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	248	2187.571	67° 14' 13.086" N	150° 13' 59.178" W	0.600	0.002	0	19040601015457	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	248	1181.544	67° 14' 15.179" N	150° 13' 27.832" W	5.720	0.023	0	19040601015456	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	248	2183.994	67° 14' 24.651" N	150° 13' 20.557" W	3.256	0.013	0	19040601015455	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	248	3372.951	67° 13' 55.809" N	150° 14' 39.005" W	0.348	0.001	0	19040601015459	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	249	2610.505	67° 13' 39.492" N	150° 14' 39.508" W	0.550	0.002	0	19040601015460	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	250	988.850	67° 12' 53.215" N	150° 14' 57.021" W	45.859	0.186	1220	19040601015463	39009	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	254	5315.900	67° 10' 40.540" N	150° 22' 10.192" W	0.438	0.002	0	19040601015497	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	255	4058.875	67° 8' 54.987" N	150° 22' 19.939" W	0.670	0.003	0	19040601015499	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	255	5093.533	67° 9' 10.229" N	150° 23' 9.389" W	0.618	0.003	0	19040601015498	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	256	1167.468	67° 8' 43.625" N	150° 21' 4.685" W	8.711	0.035	0	19040601015500	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	256	962.559	67° 8' 31.153" N	150° 20' 5.637" W	15.489	0.063	0	19040601015502	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	256	2623.114	67° 8' 8.959" N	150° 19' 56.625" W	2.955	0.012	0	19040601015507	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	256	2104.884	67° 8' 17.331" N	150° 21' 34.571" W	9.066	0.037	0	19040601015503	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	256	1358.496	67° 8' 14.945" N	150° 20' 57.929" W	16.944	0.069	0	19040601015504	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	256	3453.276	67° 8' 9.105" N	150° 22' 6.563" W	25.234	0.102	0	19040601015506	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	256	5109.502	67° 8' 8.771" N	150° 22' 39.242" W	1.618	0.007	0	19040601015508	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	257	4239.832	67° 7' 44.678" N	150° 22' 31.658" W	12.349	0.050	0	19040601015518	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	257	4358.933	67° 7' 35.673" N	150° 18' 41.379" W	1.145	0.005	0	19040601015521	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	257	1852.066	67° 7' 51.209" N	150° 21' 22.604" W	5.769	0.023	0	19040601015514	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	257	4730.603	67° 8' 2.489" N	150° 22' 22.145" W	0.636	0.003	0	19040601015511	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	257	3189.139	67° 7' 36.253" N	150° 19' 11.782" W	0.714	0.003	0	19040601015522	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	257	4248.243	67° 7' 28.903" N	150° 18' 47.557" W	0.760	0.003	0	19040601015525	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	257	5761.028	67° 7' 42.253" N	150° 23' 14.979" W	14.781	0.060	0	19040601015519	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	257	764.877	67° 7' 33.712" N	150° 20' 4.530" W	17.296	0.070	0	19040601015520	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	257	579.709	67° 7' 45.580" N	150° 20' 23.084" W	3.880	0.016	0	19040601015517	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	258	990.232	67° 6' 59.760" N	150° 21' 21.628" W	13.834	0.056	0	19040601015533	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	258	2188.587	67° 6' 37.273" N	150° 19' 52.849" W	2.236	0.009	0	19040601015535	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	258	5070.698	67° 6' 33.929" N	150° 22' 47.085" W	6.391	0.026	0	19040601015537	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	258	1083.436	67° 6' 56.252" N	150° 20' 0.897" W	18.769	0.076	0	19040601015532	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

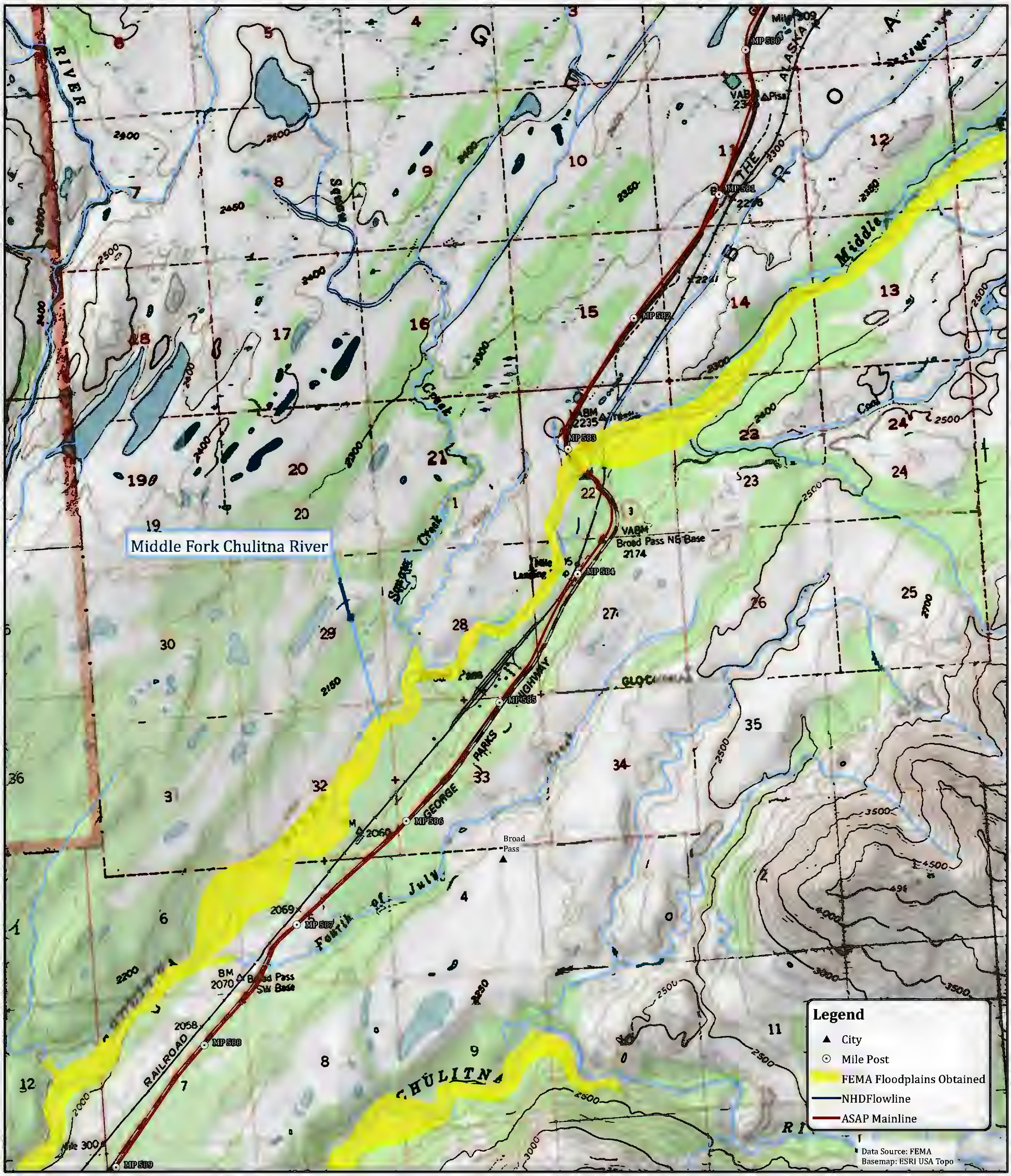
Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	258	2946.350	67° 7' 6.675" N	150° 19' 19.973" W	7.038	0.028	0	19040601015530	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	258	2576.797	67° 6' 27.710" N	150° 20' 27.360" W	0.736	0.003	0	19040601015540	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	259	5160.651	67° 5' 57.428" N	150° 23' 5.787" W	1.321	0.005	0	19040601015557	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	259	4262.345	67° 6' 29.365" N	150° 22' 19.600" W	1.493	0.006	0	19040601015539	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	259	5045.487	67° 6' 2.291" N	150° 23' 5.726" W	2.226	0.009	0	19040601015555	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	259	2541.691	67° 6' 25.464" N	150° 20' 22.029" W	0.592	0.002	0	19040601015542	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	259	2547.093	67° 6' 17.789" N	150° 21' 53.412" W	5.122	0.021	0	19040601015544	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	260	1126.075	67° 5' 22.082" N	150° 20' 31.876" W	6.940	0.028	0	19040601015572	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	260	4765.430	67° 5' 13.274" N	150° 18' 35.562" W	30.256	0.122	1140	19040601015574	39009	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	260	4285.992	67° 5' 17.937" N	150° 23' 30.320" W	154.958	0.627	1035	19040601015568	39009	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	260	2715.070	67° 5' 14.137" N	150° 19' 48.801" W	0.670	0.003	0	19040601015576	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	261	3238.728	67° 4' 23.323" N	150° 22' 32.666" W	7.424	0.030	0	19040601015597	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	261	2376.217	67° 4' 41.206" N	150° 21' 43.541" W	7.695	0.031	0	19040601015583	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial; Stage = Average Water Elevation	261	1916.233	67° 4' 25.496" N	150° 19' 58.010" W	28.691	0.116	1155	19040601015586	39009	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	262	3471.516	67° 3' 28.886" N	150° 22' 13.697" W	0.828	0.003	0	19040601015608	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	262	1938.064	67° 3' 9.169" N	150° 20' 48.037" W	0.215	0.001	0	19040601015612	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk	Lake/Pond: Hydrographic	262	3739.490	67° 3' 54.791" N	150° 19' 27.355" W	2.327	0.009	0	19040601015599	39004	Perennial	19040601	Gas Conditioning Facility

National Hydrologic Dataset – Waterbodies within 1 Mile of the Proposed Project

Watershed Name	Description of Waterbody	Closest Mile Post to Water-body	Distance to Closest Mile Post (feet)	Latitude	Longitude	Waterbody Acres (GIS)	Area (Sq Km)	Elevation	Reach Code	F Code	Hydro-graphic Category	HUCLINK	Segment
River	Category = Perennial												Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	262	2224.943	67° 3' 6.320" N	150° 20' 32.062" W	0.627	0.003	0	19040601015613	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	262	1505.259	67° 3' 42.460" N	150° 21' 6.636" W	1.747	0.007	0	19040601015606	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	262	2367.000	67° 3' 52.792" N	150° 20' 38.844" W	0.417	0.002	0	19040601015601	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	262	705.245	67° 3' 21.246" N	150° 20' 55.269" W	1.092	0.004	0	19040601015610	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	262	1967.580	67° 3' 49.325" N	150° 20' 52.810" W	1.289	0.005	0	19040601015602	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	262	1918.131	67° 3' 45.744" N	150° 21' 12.607" W	2.563	0.010	0	19040601015604	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Upper Koyukuk River	Lake/Pond: Hydrographic Category = Perennial	262	4279.322	67° 3' 24.703" N	150° 22' 32.607" W	0.849	0.003	0	19040601015609	39004	Perennial	19040601	Gas Conditioning Facility Mile 0 to Mile 540
Yukon Flats	Lake/Pond: Hydrographic Category = Perennial	321	3916.541	66° 19' 53.704" N	150° 28' 20.356" W	11.503	0.047	0	19040403011129	39004	Perennial	19040403	Gas Conditioning Facility Mile 0 to Mile 540
Yukon Flats	Lake/Pond: Hydrographic Category = Perennial	326	3467.906	66° 16' 36.963" N	150° 19' 51.796" W	0.730	0.003	0	19040403011128	39004	Perennial	19040403	Gas Conditioning Facility Mile 0 to Mile 540
Yukon Flats	Lake/Pond: Hydrographic Category = Perennial	328	3582.636	66° 14' 32.055" N	150° 19' 47.363" W	0.148	0.001	0	19040403011881	39004	Perennial	19040403	Gas Conditioning Facility Mile 0 to Mile 540
Yukon Flats	Lake/Pond: Hydrographic Category = Perennial	328	4608.500	66° 14' 43.484" N	150° 20' 53.942" W	1.125	0.005	0	19040403011877	39004	Perennial	19040403	Gas Conditioning Facility Mile 0 to Mile 540
Yukon Flats	Lake/Pond: Hydrographic Category = Perennial	328	5137.035	66° 14' 36.927" N	150° 21' 1.009" W	1.833	0.007	0	19040403011878	39004	Perennial	19040403	Gas Conditioning Facility Mile 0 to Mile 540
Yukon Flats	Lake/Pond: Hydrographic Category = Perennial	329	3473.618	66° 14' 25.429" N	150° 19' 52.473" W	4.022	0.016	0	19040403011883	39004	Perennial	19040403	Gas Conditioning Facility Mile 0 to Mile 540
Yukon Flats	Lake/Pond: Hydrographic Category = Perennial	329	5014.485	66° 14' 23.244" N	150° 20' 32.174" W	1.677	0.007	0	19040403011884	39004	Perennial	19040403	Gas Conditioning Facility Mile 0 to Mile 540
Yukon Flats	Lake/Pond: Hydrographic Category = Perennial	329	4837.015	66° 14' 24.411" N	150° 20' 23.632" W	0.171	0.001	0	19040403011886	39004	Perennial	19040403	Gas Conditioning Facility Mile 0 to Mile 540
Yukon Flats	Lake/Pond: Hydrographic Category = Perennial	329	4897.736	66° 14' 9.557" N	150° 20' 28.583" W	3.212	0.013	0	19040403011888	39004	Perennial	19040403	Gas Conditioning Facility Mile 0 to Mile 540
Yukon Flats	Lake/Pond: Hydrographic Category = Perennial	329	3075.308	66° 14' 32.668" N	150° 19' 33.499" W	0.851	0.003	0	19040403011880	39004	Perennial	19040403	Gas Conditioning Facility Mile 0 to Mile 540
Yukon Flats	Lake/Pond: Hydrographic Category = Perennial	329	3935.293	66° 14' 22.269" N	150° 20' 6.069" W	2.406	0.010	0	19040403011885	39004	Perennial	19040403	Gas Conditioning Facility Mile 0 to Mile 540

Appendix G

FEMA Floodplain Data Maps
Surface Water and Ground Water Monitoring Sites
USGS Surface Water Quality Sampling Sites



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Map 1 of 6

Alaska Stand Alone Gas Pipeline
FEMA Floodplain Data Available

0 0.5 1 Miles

AK

October 2011

Map Projection: NAD 1983 State Plane Alaska

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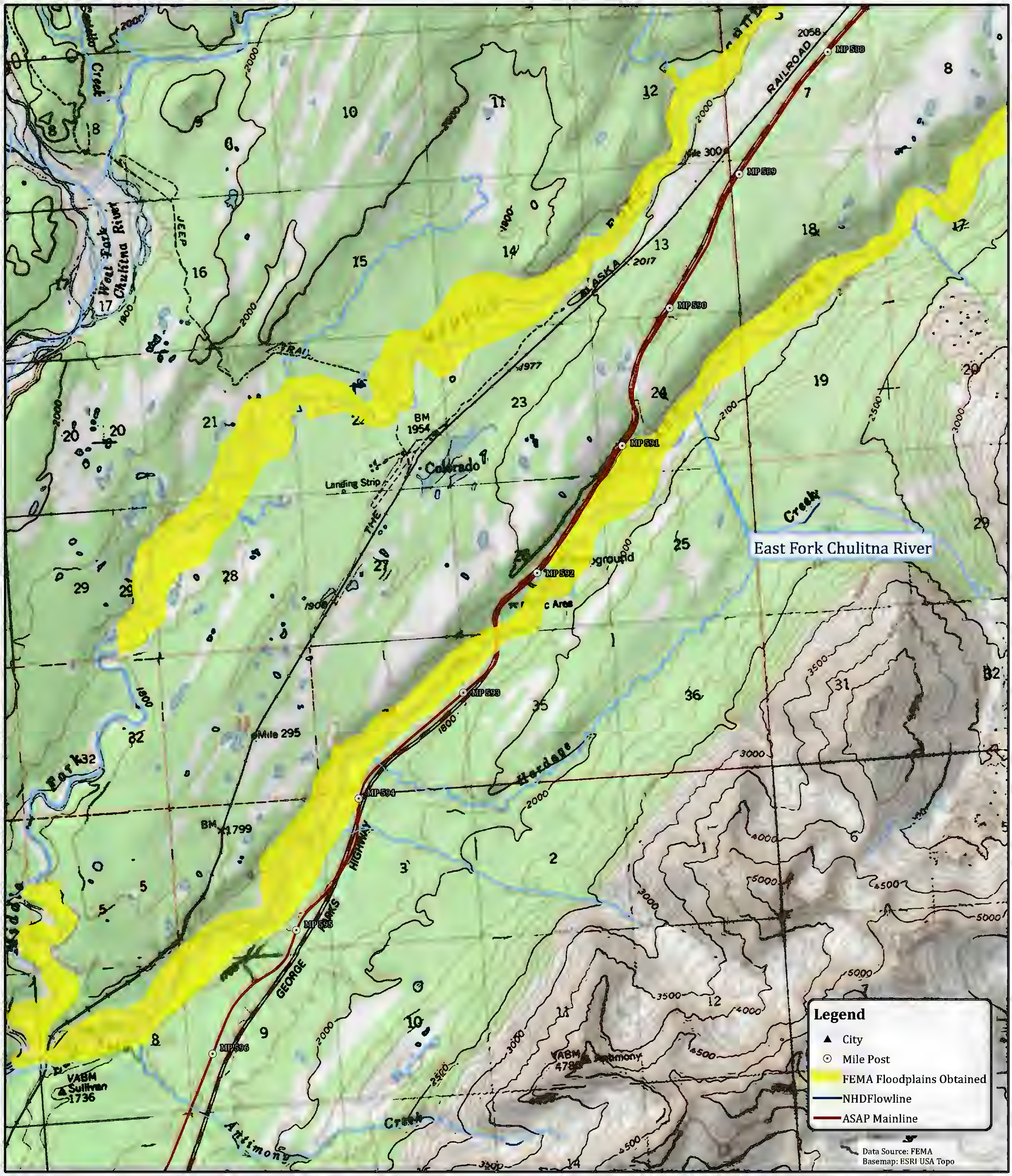

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Map 2 of 6

Alaska Stand Alone Gas Pipeline
FEMA Floodplain Data Available

0 0.5 1 Miles

October 2011

Map Projection: NAD 1983 State Plane Alaska

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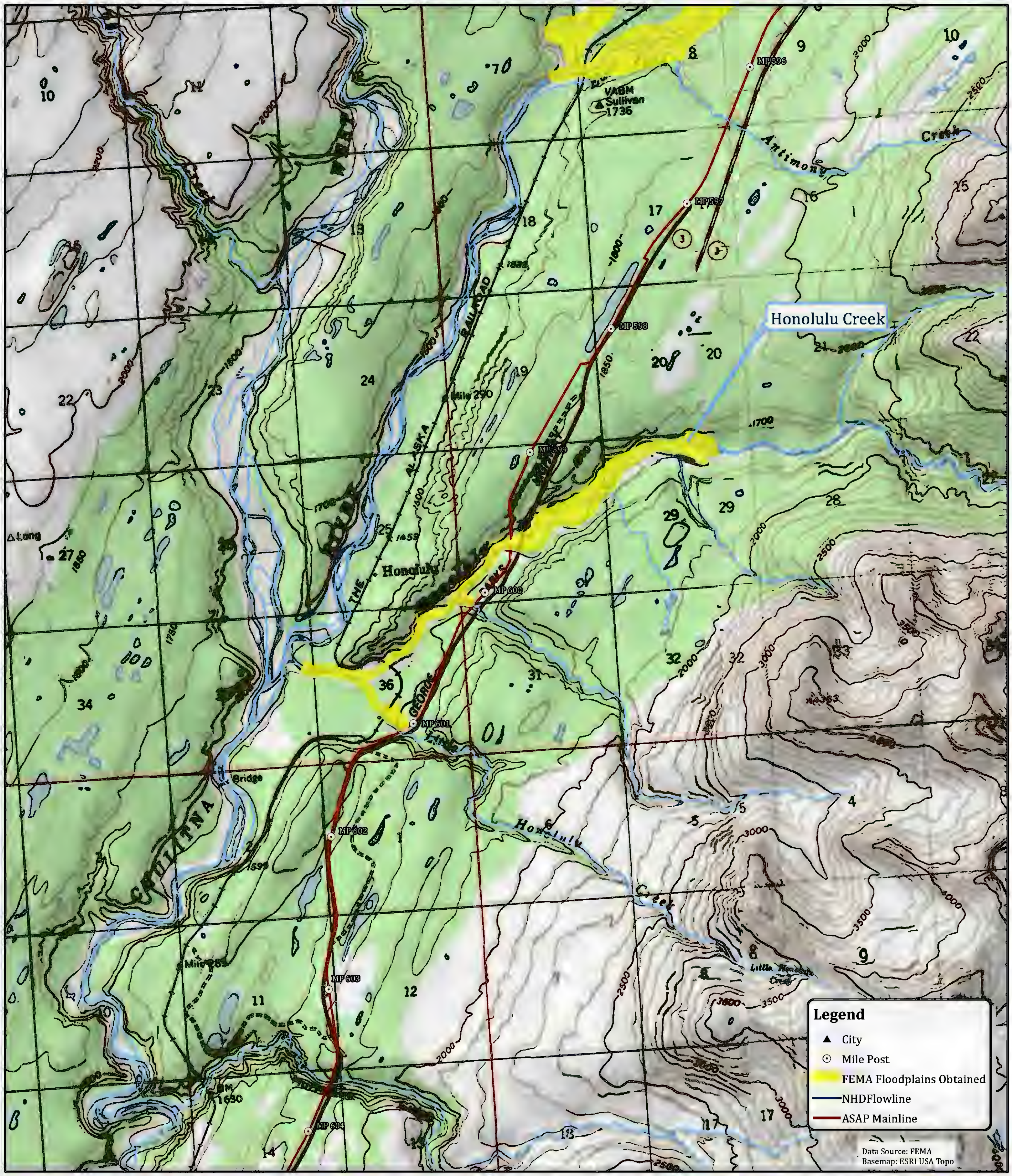

Map 3 of 6

Alaska Stand Alone Gas Pipeline

FEMA Floodplain Data Available

0 0.5 1 Miles

October 2011

Map Projection: NAD 1983 State Plane Alaska

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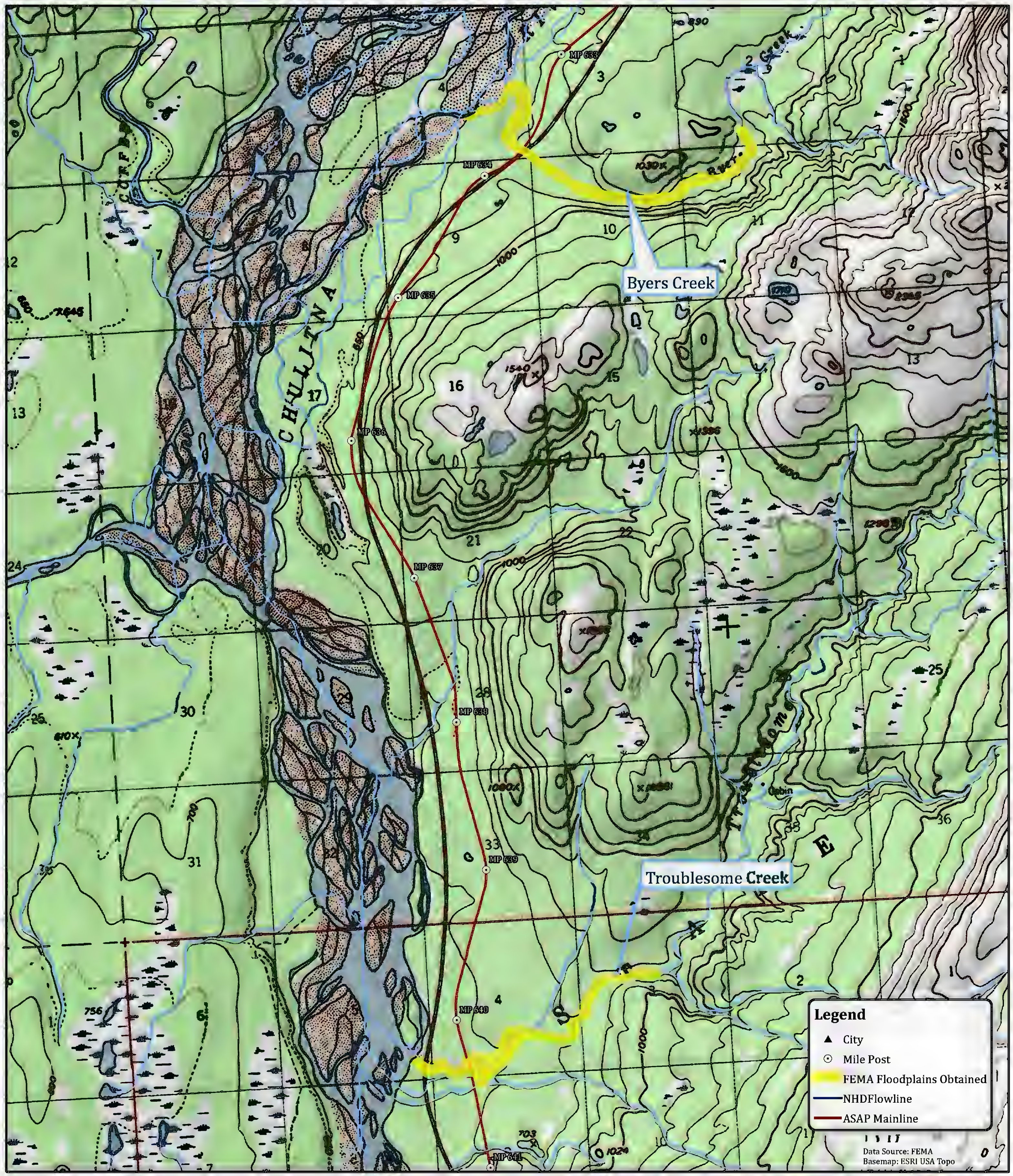

Map 4 of 6

Alaska Stand Alone Gas Pipeline
FEMA Floodplain Data Available

0 0.5 1 Miles

October 2011

Map Projection: NAD 1983 State Plane Alaska

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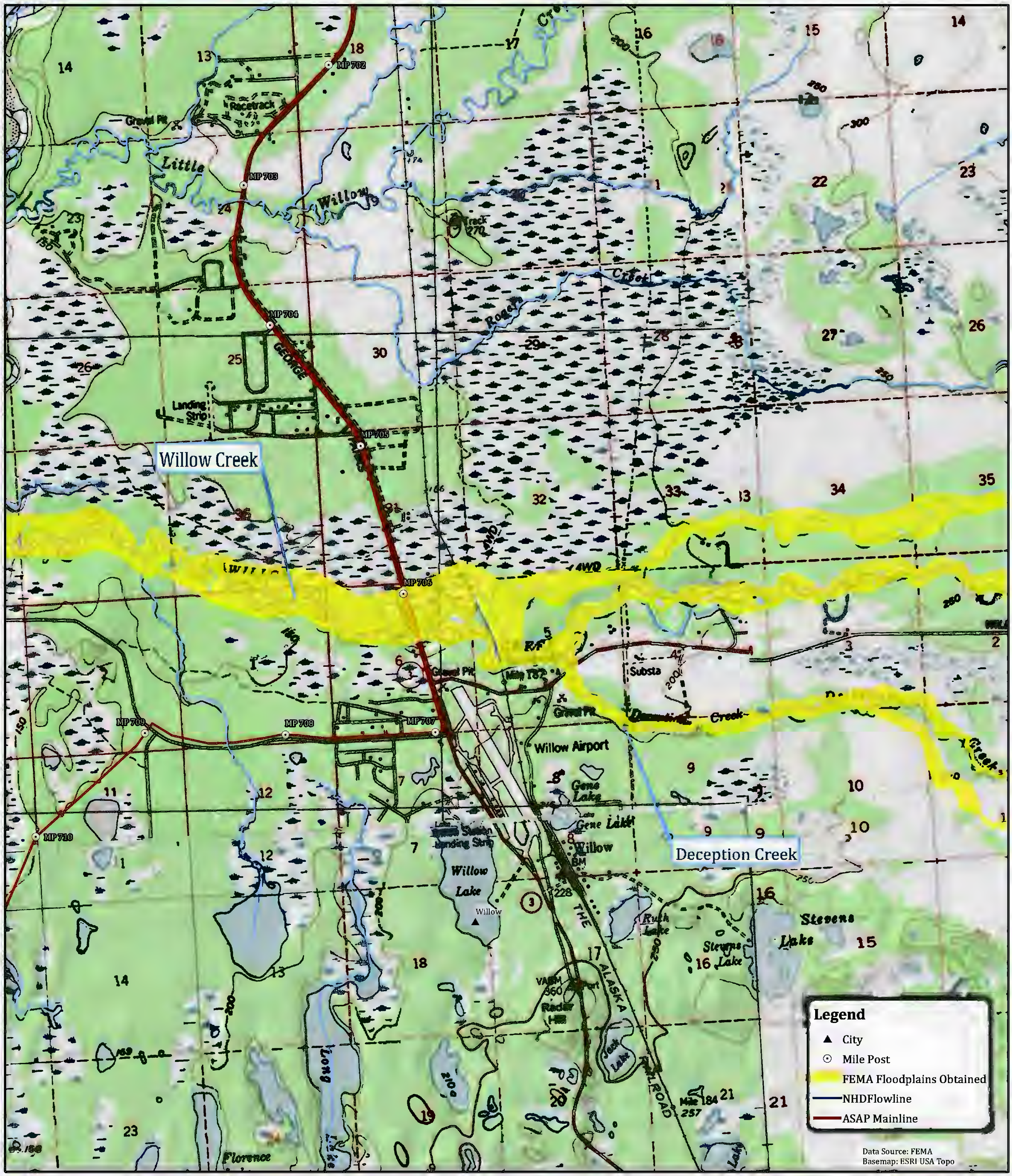

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Map 5 of 6

Alaska Stand Alone Gas Pipeline
FEMA Floodplain Data Available

0 0.5 1 Miles

October 2011

Map Projection: NAD 1983 State Plane Alaska

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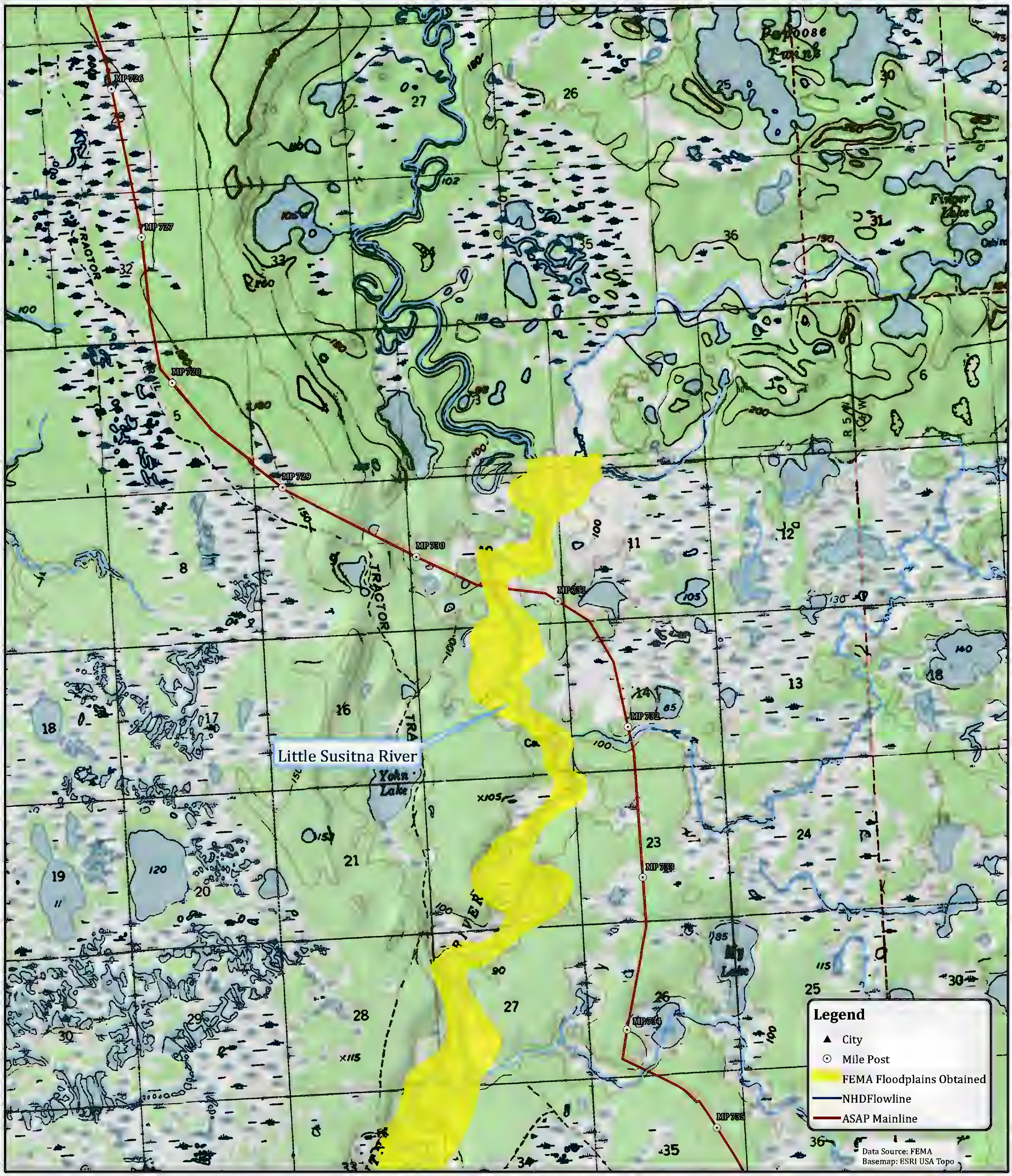

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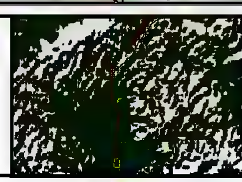
Map 6 of 6

Alaska Stand Alone Gas Pipeline
FEMA Floodplain Data Available

0 0.5 1 Miles



October 2011

Map Projection: NAD 1983 State Plane Alaska

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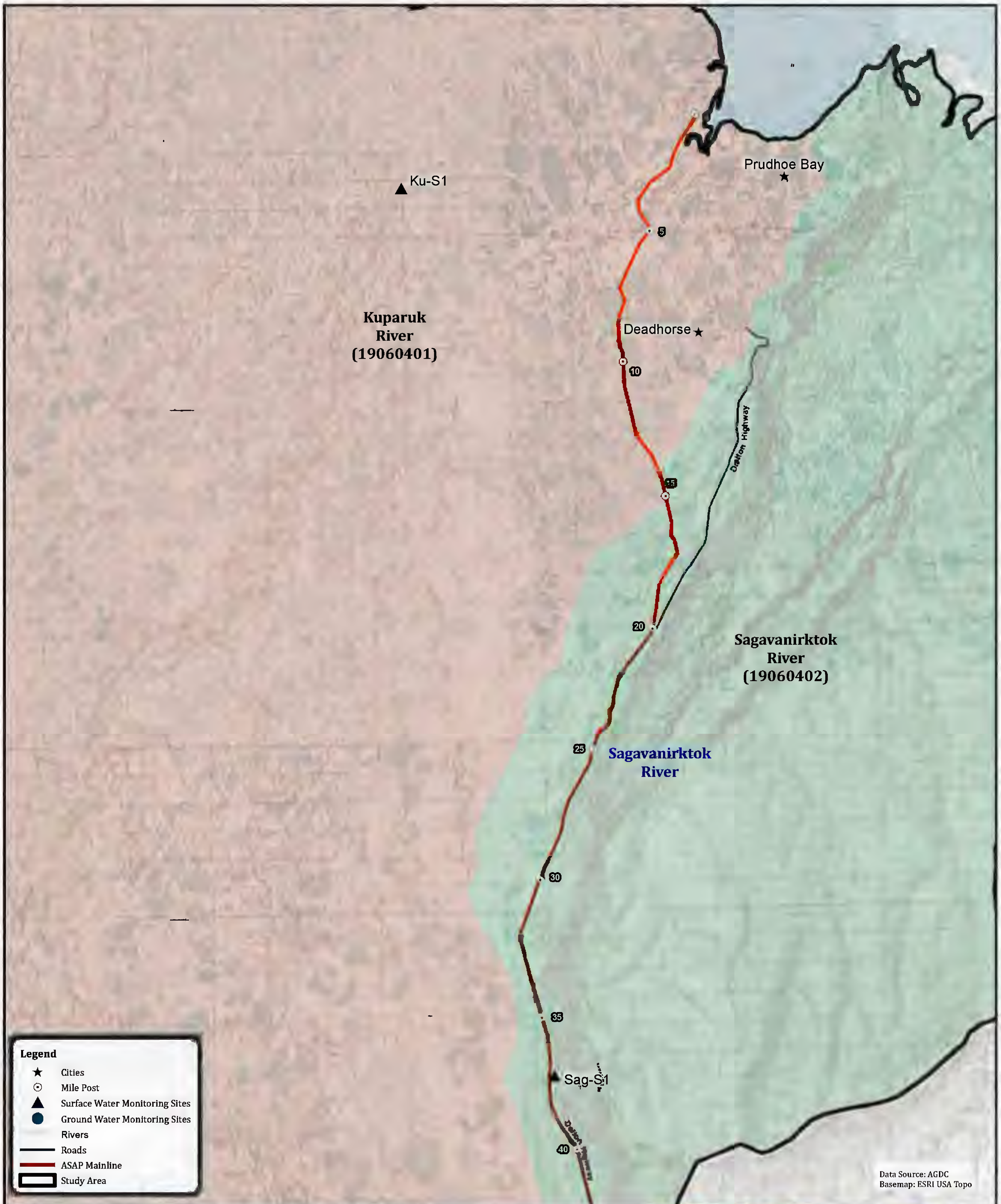
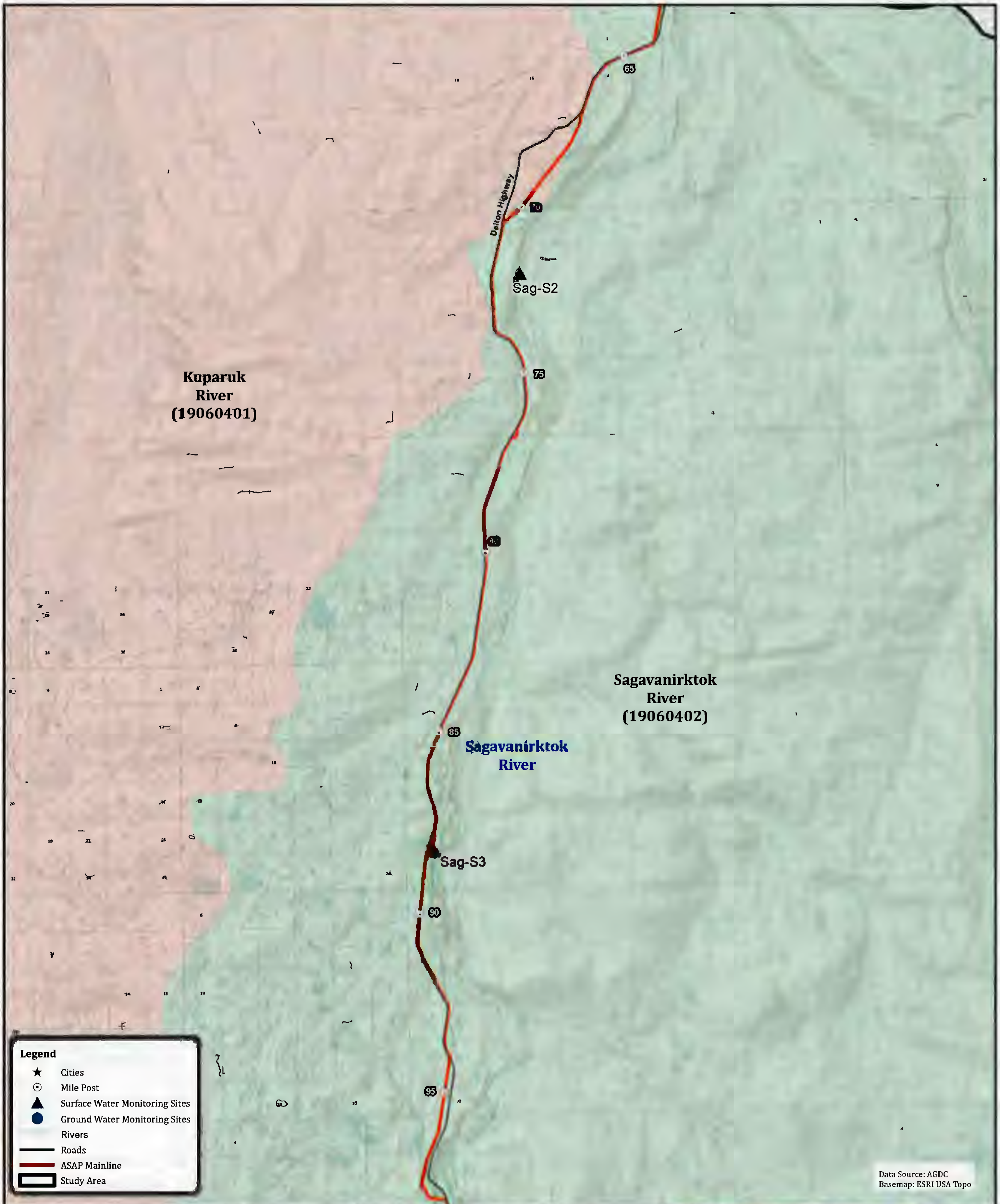


Alaska Stand Alone Gas Pipeline
Surface Water and Ground
Water Monitoring Sites

0 3 6 Miles

October 2011

Map Projection: NAD 1983 State Plane Alaska



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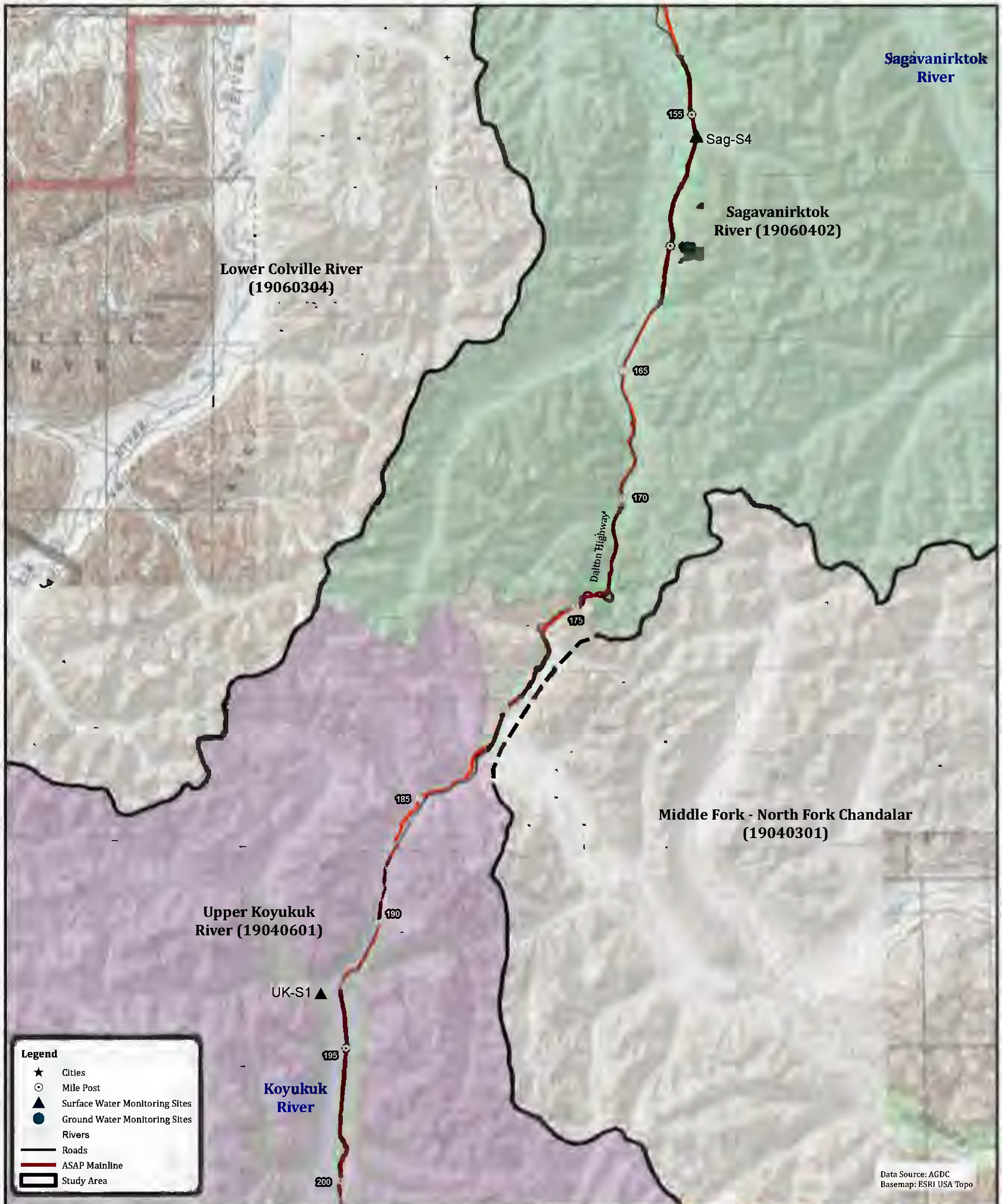
Page No. 2

Alaska Stand Alone Gas Pipeline
Surface Water and Ground Water Monitoring Sites

0 2.5 5 Miles

October 2011

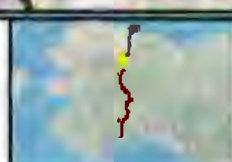
Map Projection: NAD 1983 State Plane Alaska



Alaska Stand Alone Gas Pipeline

Surface Water and Ground Water Monitoring Sites

0 3 6 Miles



October 2011

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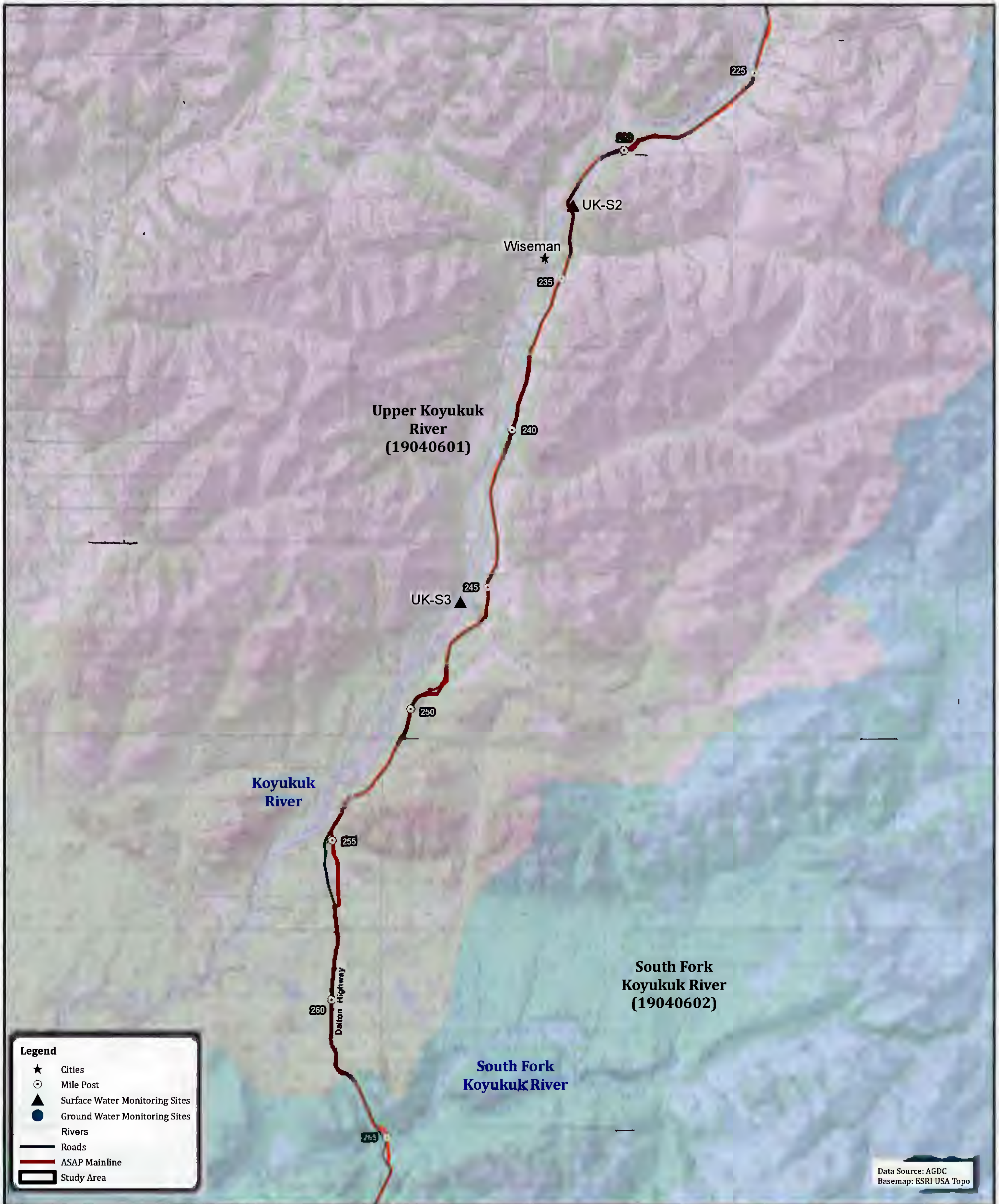

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Page No. 4

Alaska Stand Alone Gas Pipeline
Surface Water and Ground Water Monitoring Sites

0 2.5 5 Miles

October 2011

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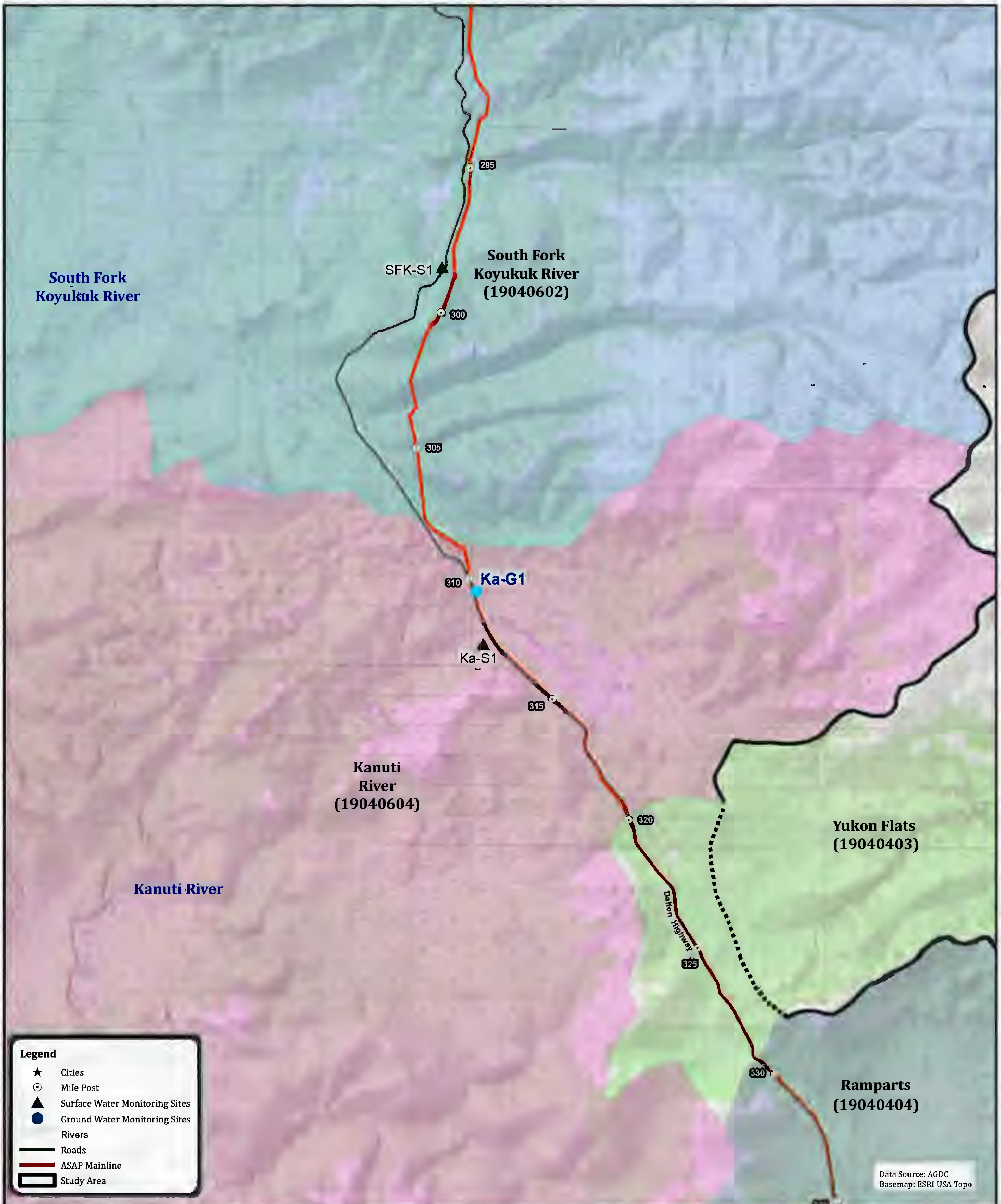

Alaska Stand Alone Gas Pipeline
Surface Water and Ground
Water Monitoring Sites

0 3 6 Miles

October 2011

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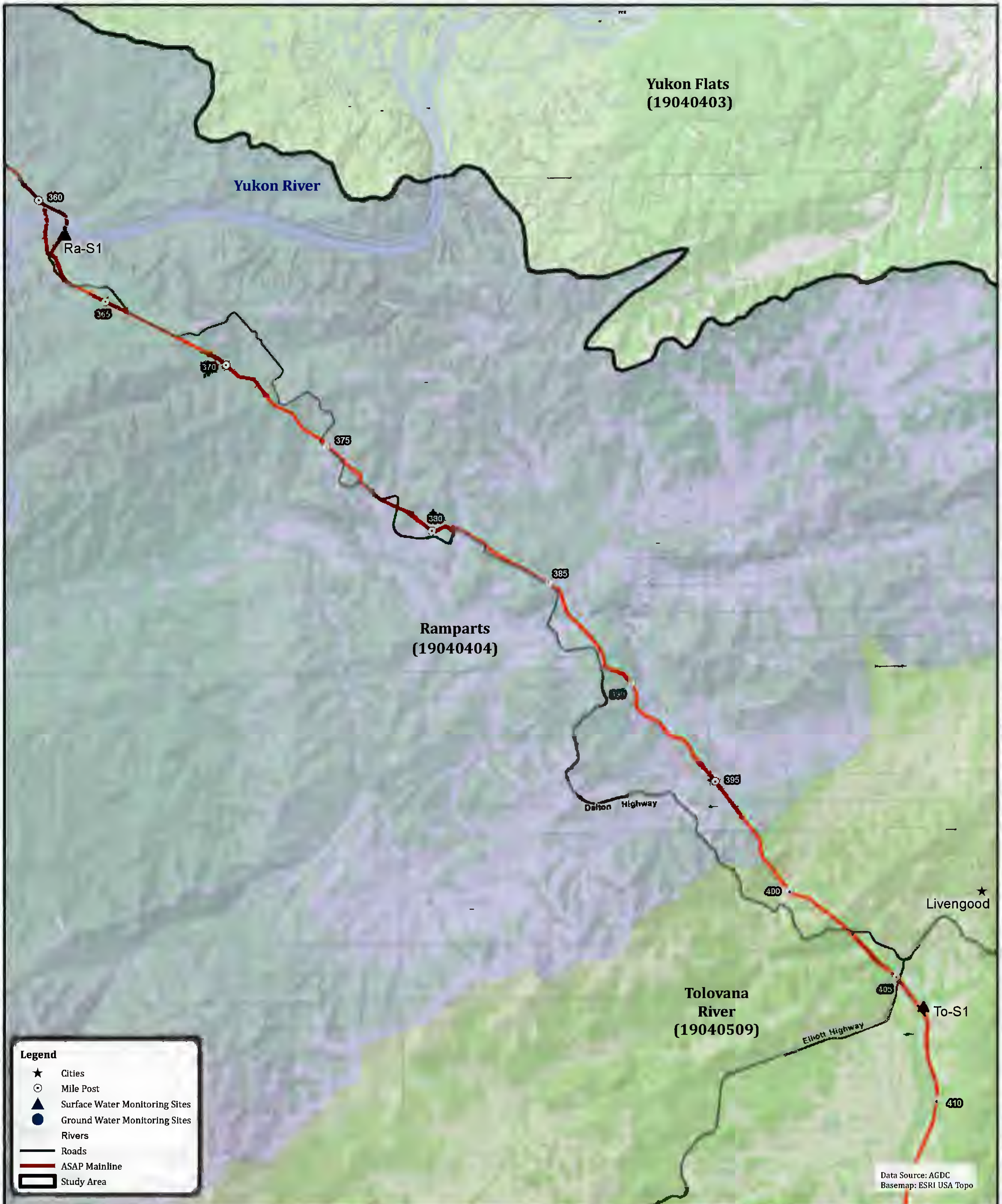

Alaska Stand Alone Gas Pipeline
Surface Water and Ground Water Monitoring Sites

0 3.5 7 Miles

October 2011

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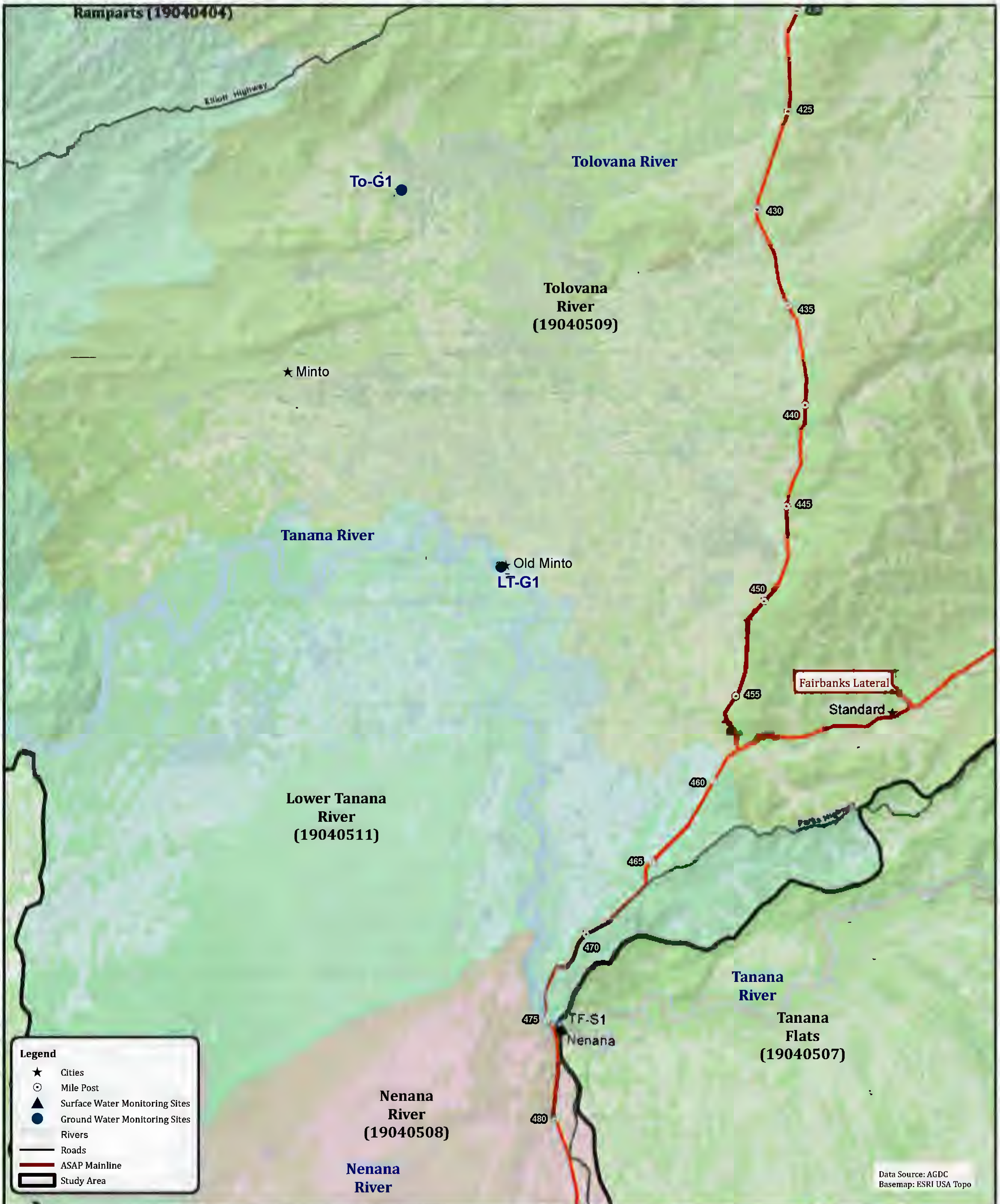

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Alaska Stand Alone Gas Pipeline
Surface Water and Ground Water Monitoring Sites

0 4.5 9 Miles

October 2011

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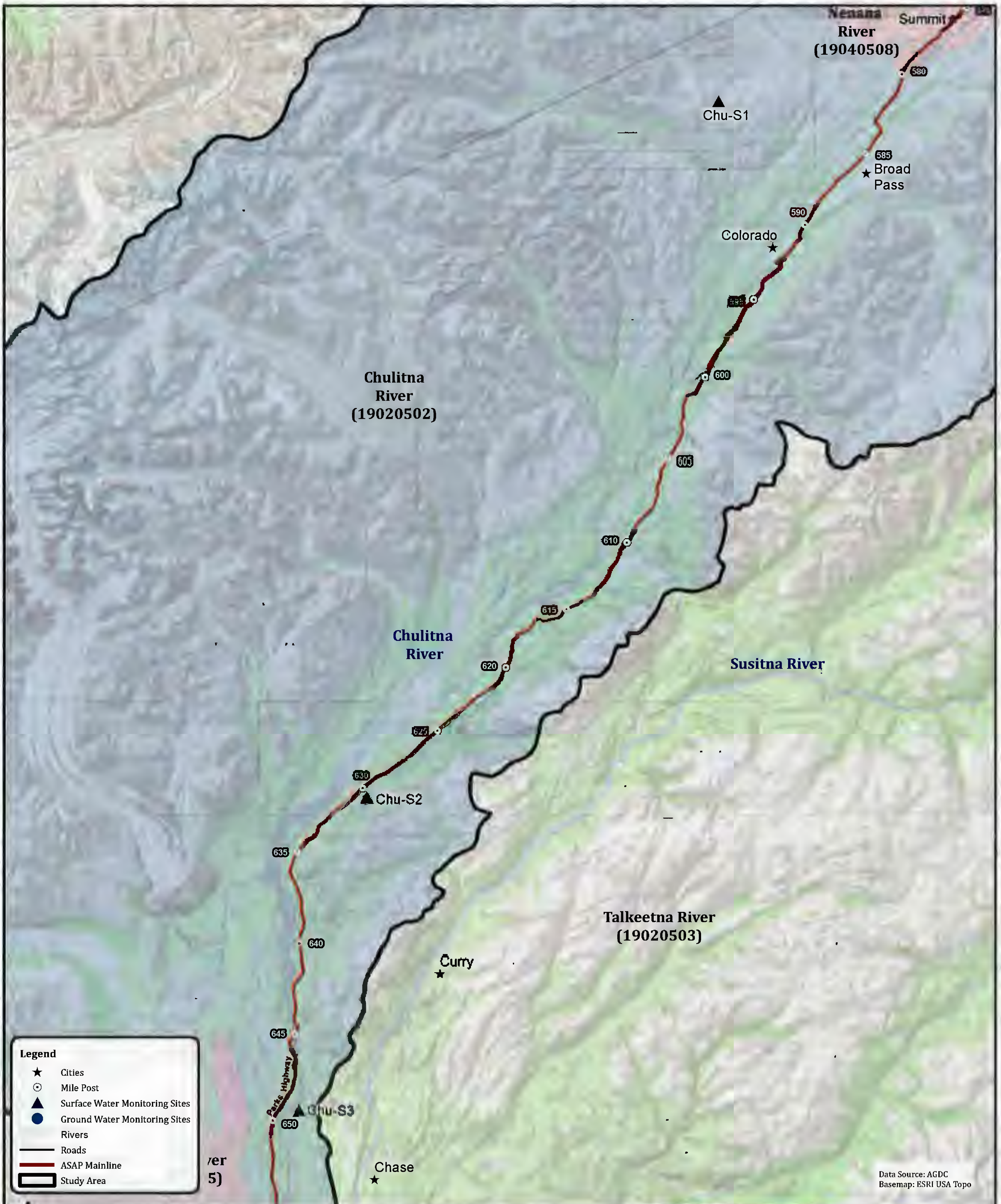
Alaska Stand Alone Gas Pipeline
Surface Water and Ground Water Monitoring Sites

0 3 6 Miles

October 2011

Map Projection: NAD 1983 State Plane Alaska



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Page No. 9

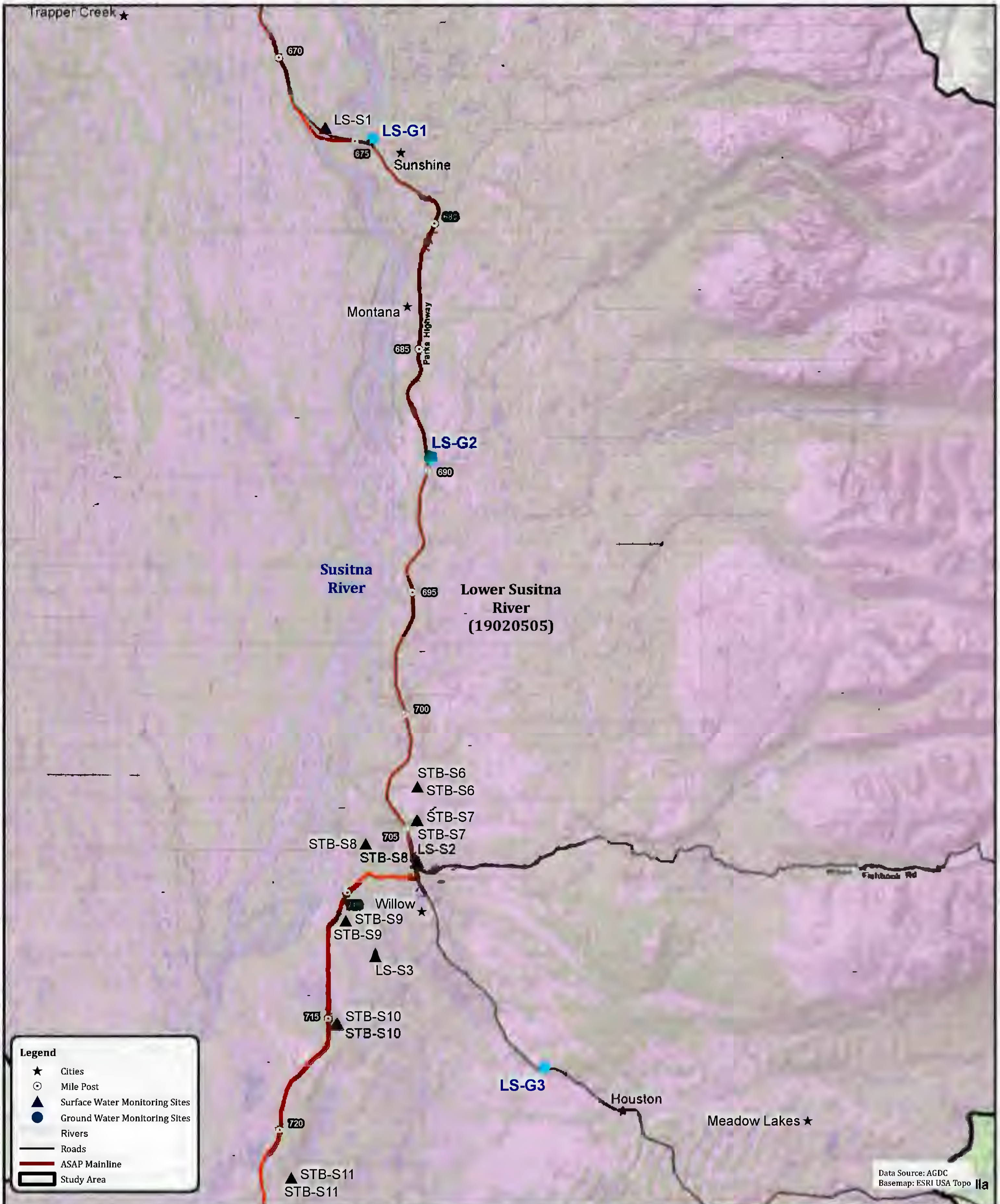
Alaska Stand Alone Gas Pipeline

Surface Water and Ground Water Monitoring Sites

0 5 10 Miles

October 2011

Map Projection: NAD 1983 State Plane Alaska



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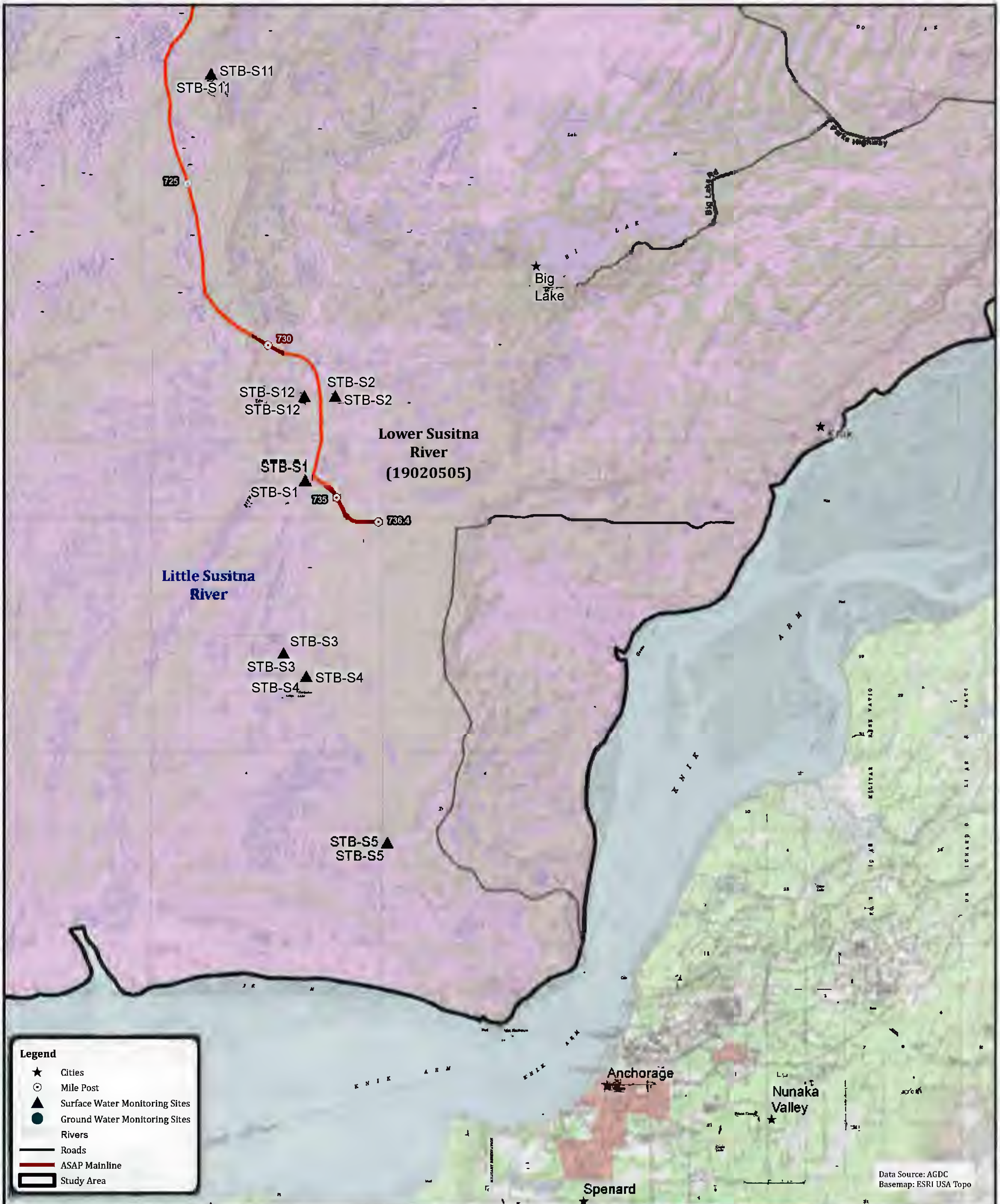
Page No. 10

Alaska Stand Alone Gas Pipeline
Surface Water and Ground Water Monitoring Sites

0 3.5 7 Miles

October 2011

Map Projection: NAD 1983 State Plane Alaska



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Page No. 11

Alaska Stand Alone Gas Pipeline

Surface Water and Ground Water Monitoring Sites

0 2 4 Miles

October 2011

Map Projection: NAD 1983 State Plane Alaska

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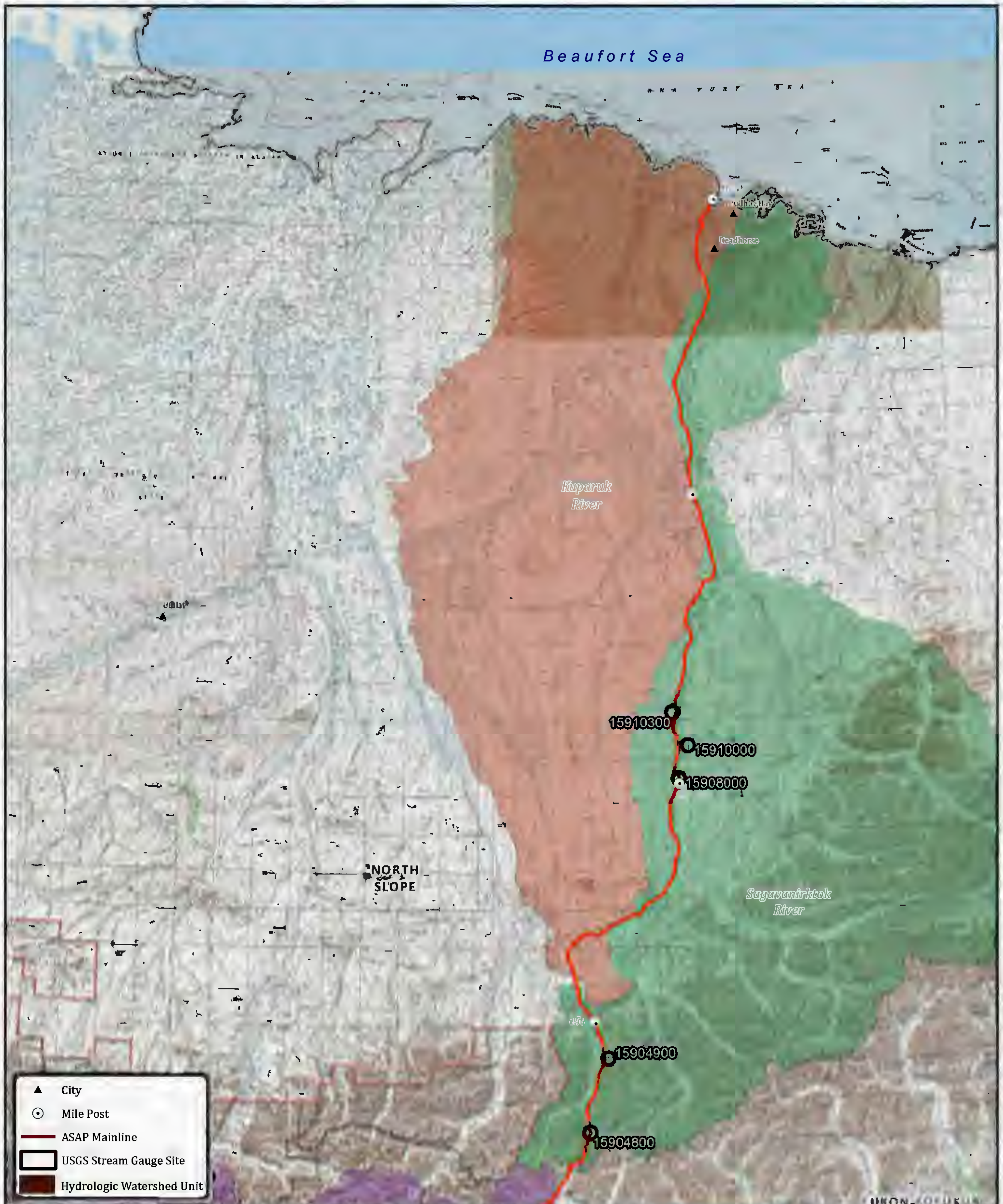
Alaska Stand Alone Gas Pipeline
Surface Water and Ground Water Monitoring Sites

0 1.5 3 Miles

October 2011

Map Projection: NAD 1983 State Plane Alaska



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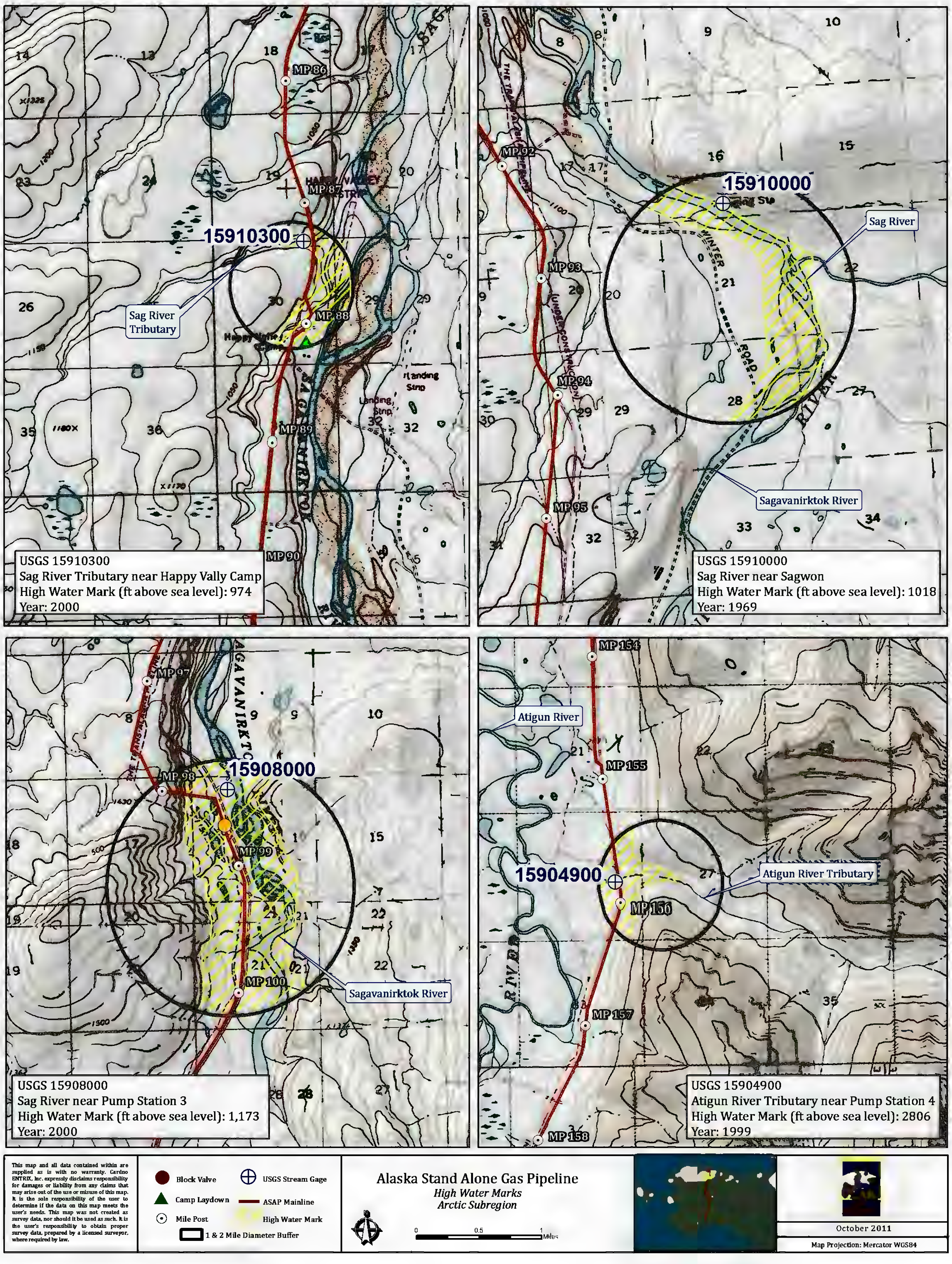
Alaska Stand Alone Gas Pipeline
High Water Mark Index

0 12.5 25 Miles

October 2011

Map Projection: NAD 1983 State Plane Alaska


15910300
Sag River Tributary
USGS 15910300
Sag River Tributary near Happy Vally Camp
High Water Mark (ft above sea level): 974
Year: 2000
15910000
Sag River
Sagavanirktok River
USGS 15910000
Sag River near Sagwon
High Water Mark (ft above sea level): 1018
Year: 1969
15908000
Sagavanirktok River
USGS 15908000
Sag River near Pump Station 3
High Water Mark (ft above sea level): 1,173
Year: 2000
Atigun River
15904900
Atigun River Tributary
USGS 15904900
Atigun River Tributary near Pump Station 4
High Water Mark (ft above sea level): 2806
Year: 1999
MP 86
MP 87
MP 88
MP 89
MP 90
MP 92
MP 93
MP 94
MP 95
MP 97
MP 98
MP 99
MP 100
MP 154
MP 155
MP 156
MP 157
MP 158
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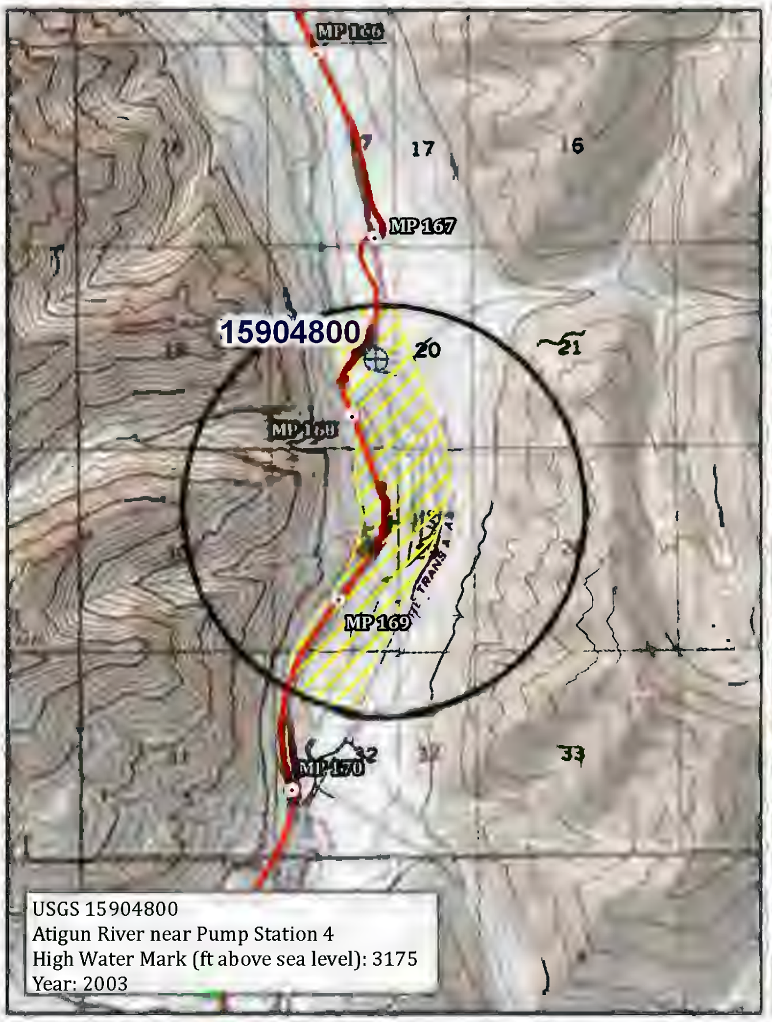
Block Valve
USGS Stream Gage
Camp Laydown
ASAP Mainline
Mile Post
High Water Mark
1 & 2 Mile Diameter Buffer
Alaska Stand Alone Gas Pipeline
High Water Marks
Arctic Subregion
0
0.5
1
Miles
October 2011
Map Projection: Mercator WGS84



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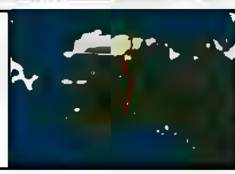
Block Valve
Camp Laydown
Mile Post
USGS Stream Gage
ASAP Mainline
High Water Mark
2 Mile Diamter Buffer

Alaska Stand Alone Gas Pipeline

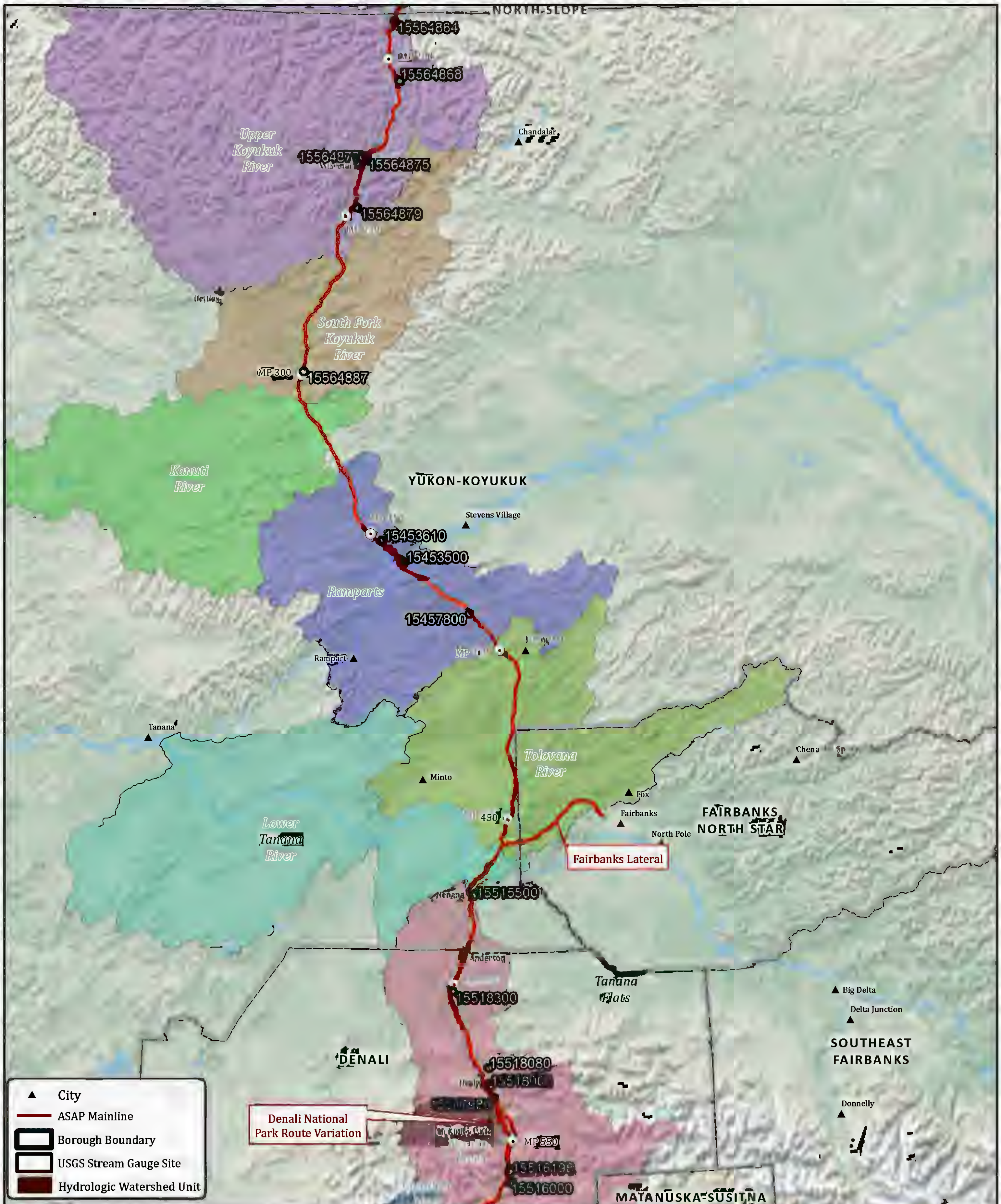
High Water Marks
Arctic Subregion

0 0.5 1 Miles



October 2011

Map Projection: NAD 1983 State Plane Alaska



Alaska Stand Alone Gas Pipeline
High Water Mark Index

0 25 50 Miles

October 2011

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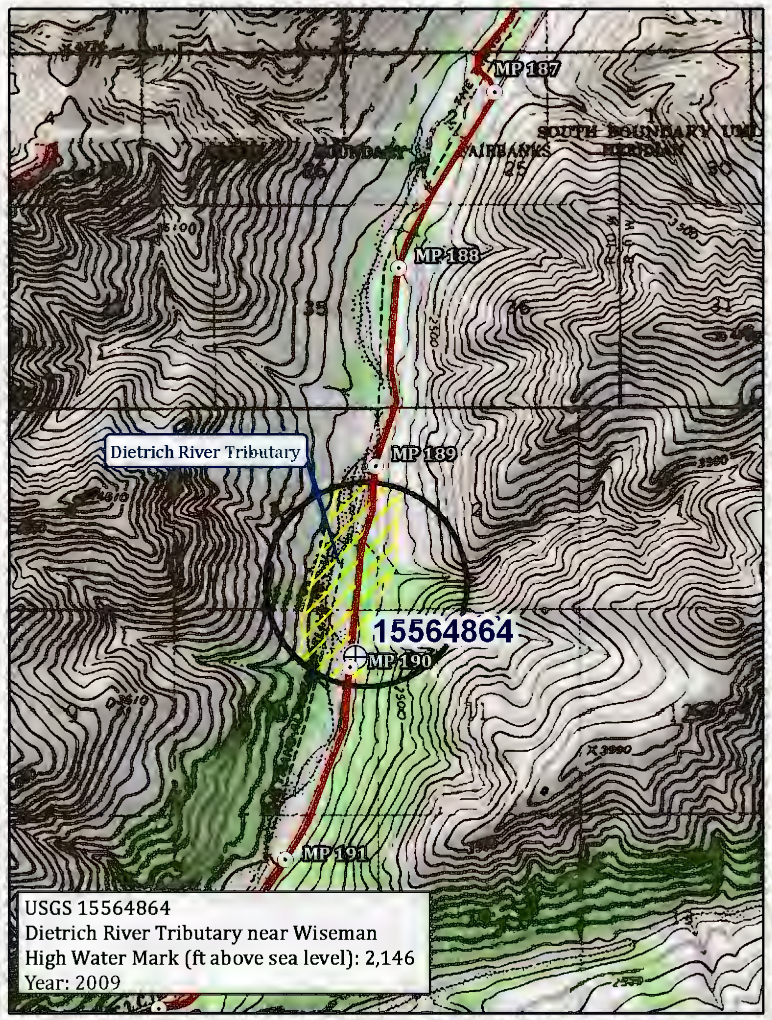

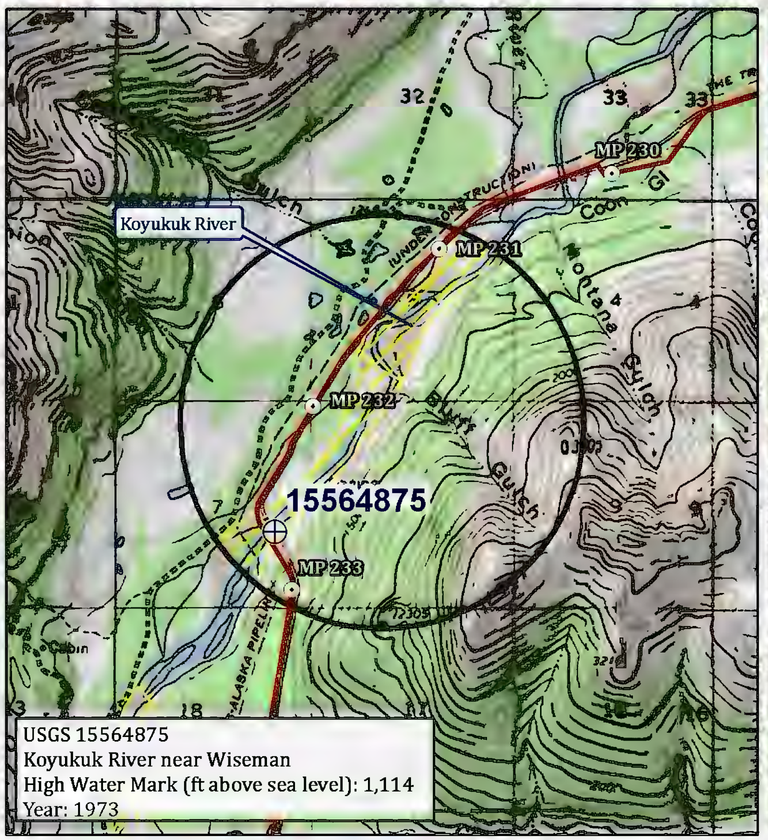

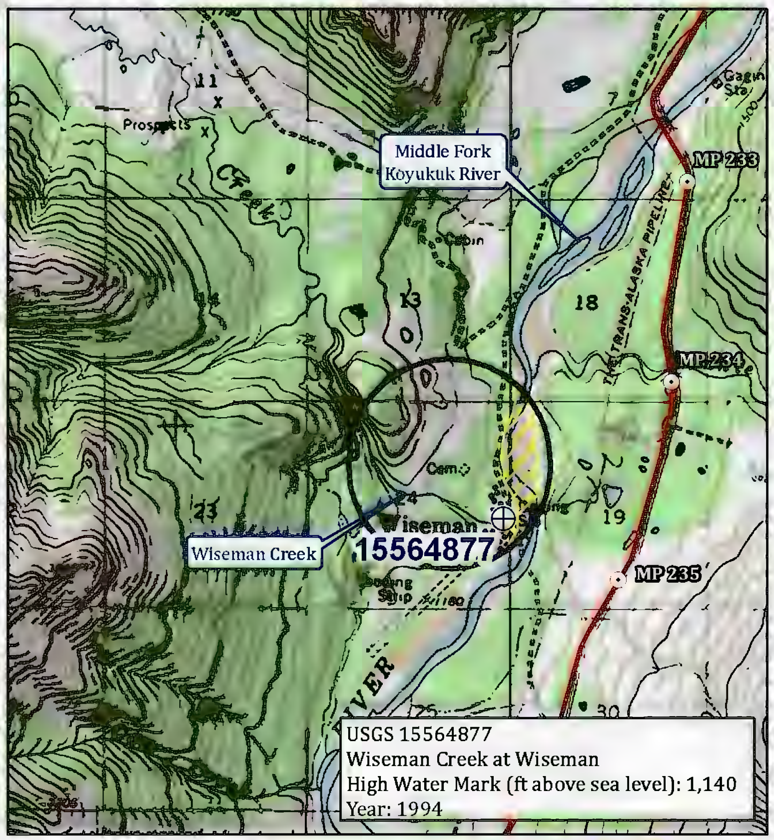

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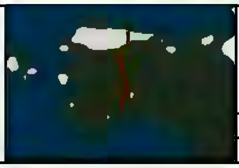
Block Valve
USGS Stream Gage
Camp Laydown
ASAP Mainline
Mile Post
High Water Mark
2 Mile Diameter Buffer

Alaska Stand Alone Gas Pipeline

High Water Marks

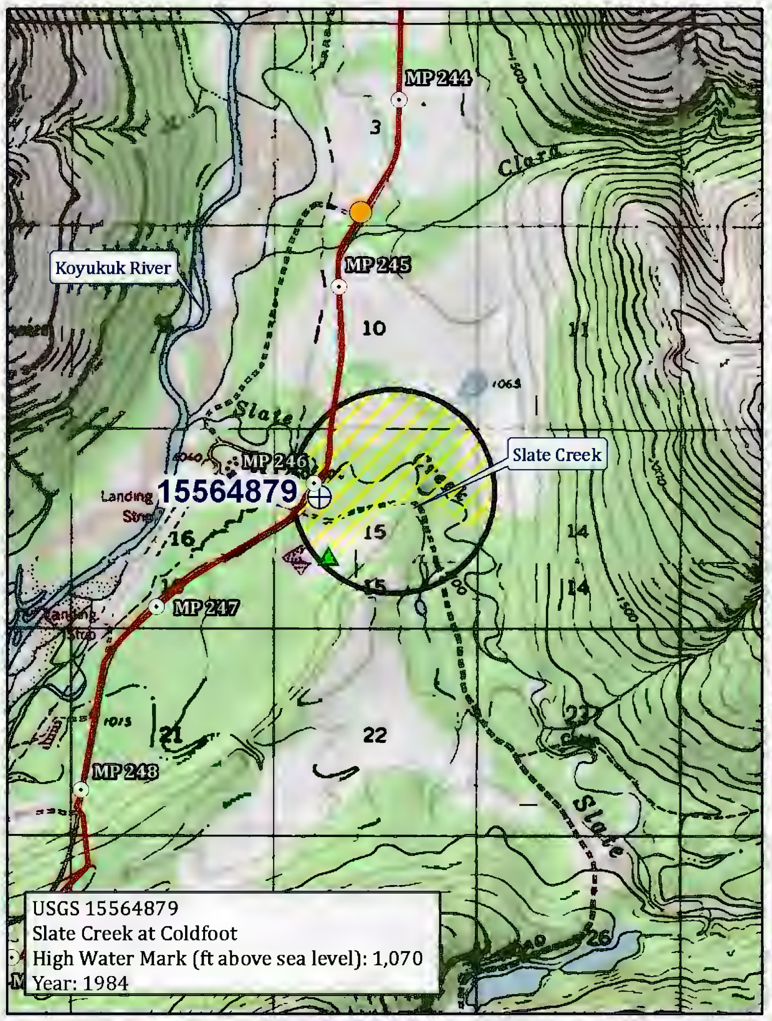
Interior Yukon Subregion

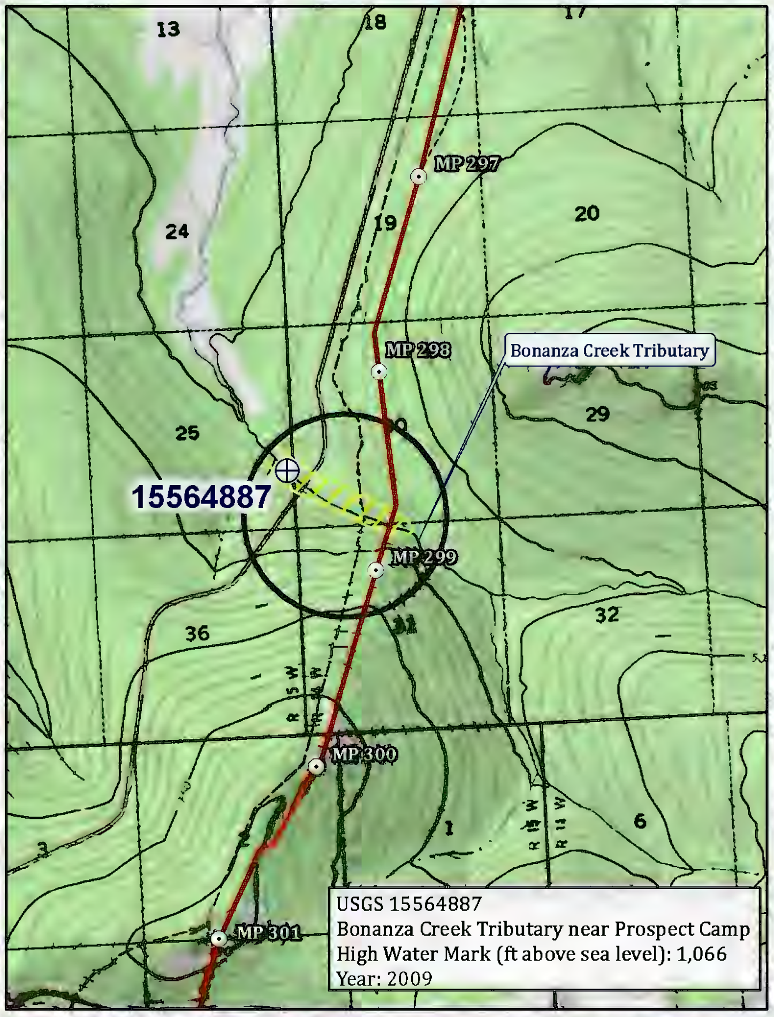
0 0.5 1 Miles

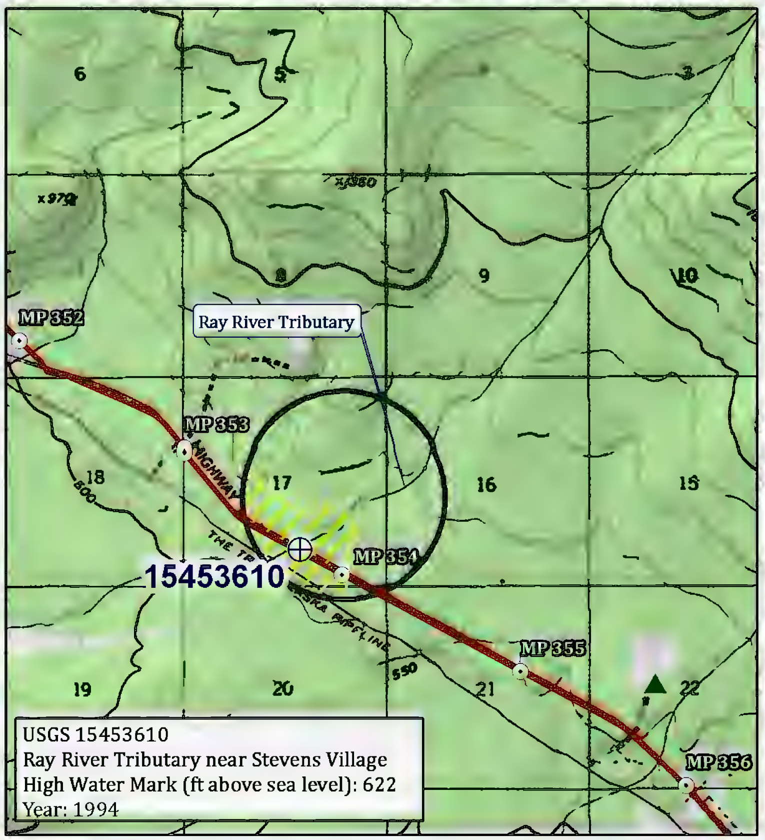


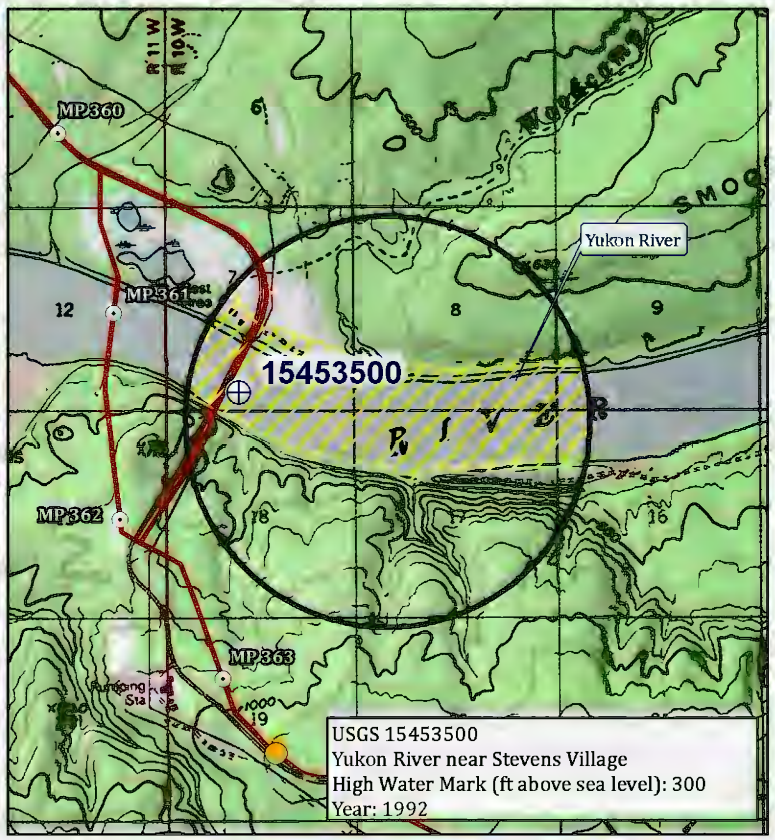
October 2011

Map Projection: NAD 1983 State Plane Alaska









Block Valve
USGS Stream Gage
Camp Laydown
ASAP Mainline
Mile Post
High Water Mark
1 & 2 Mile Diameter Buffer

Alaska Stand Alone Gas Pipeline

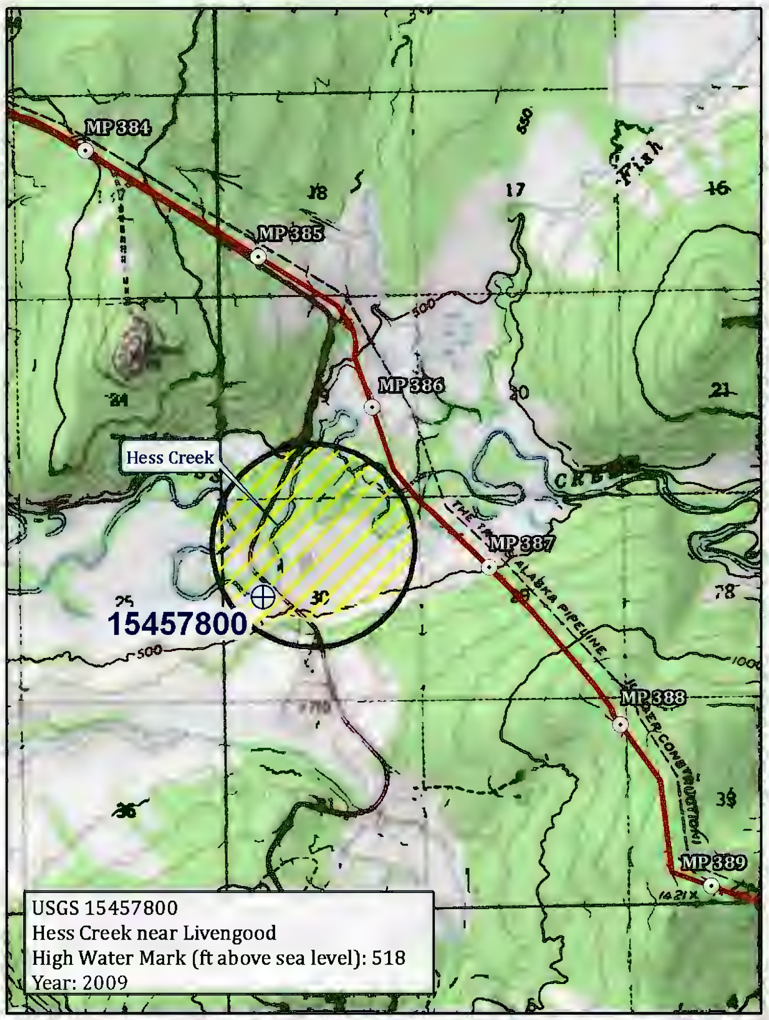
High Water Marks

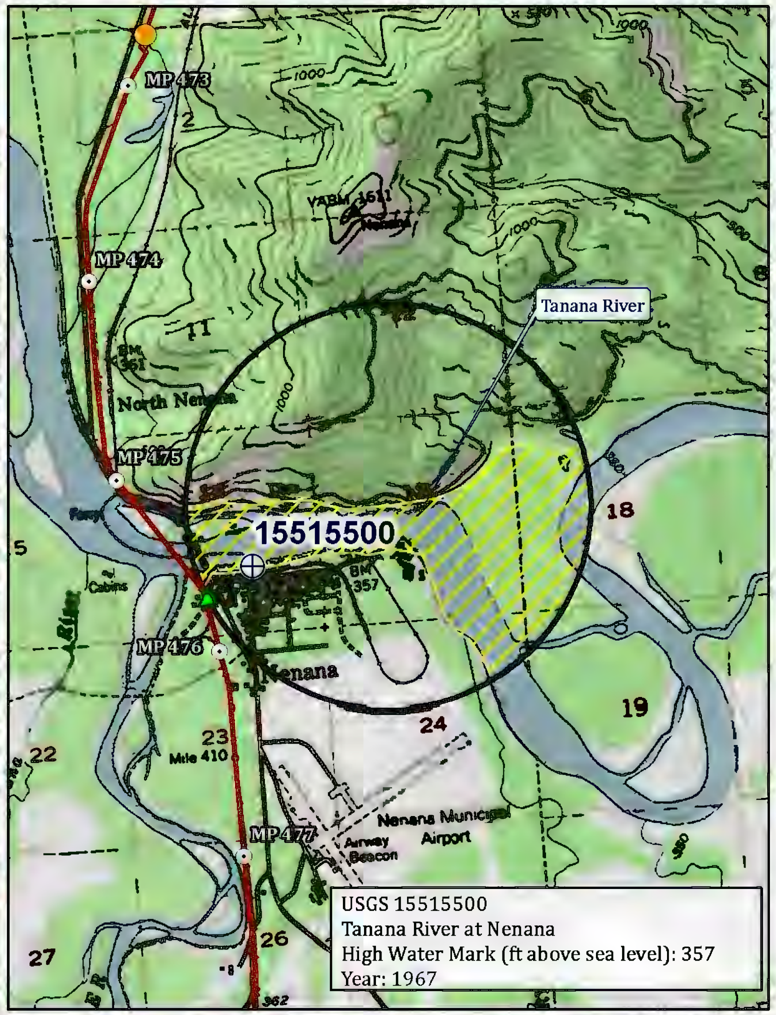
Interior Yukon Subregion

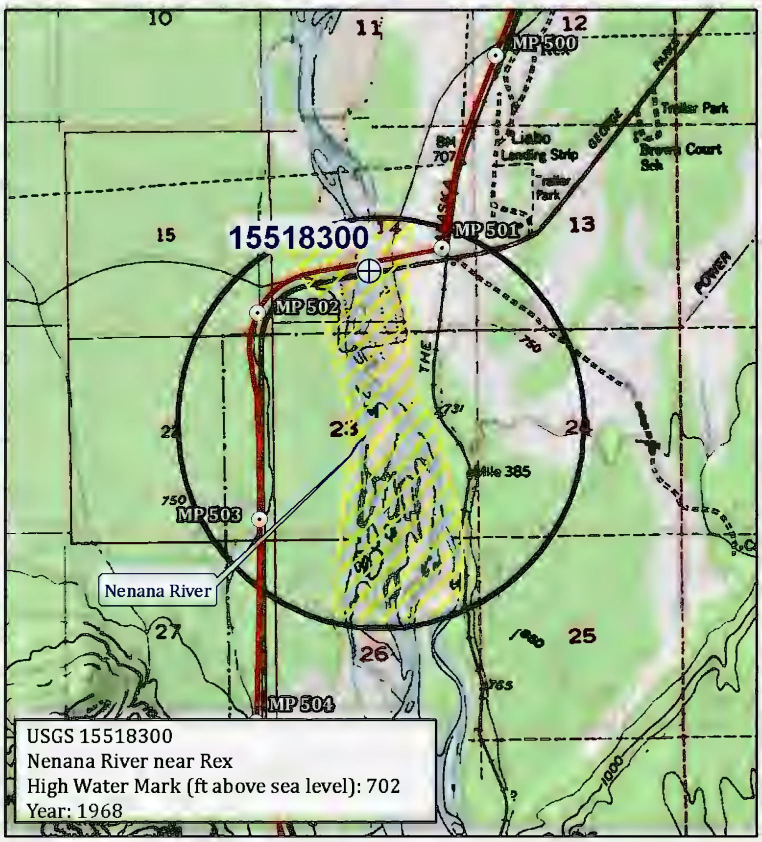
0 0.5 1 Miles

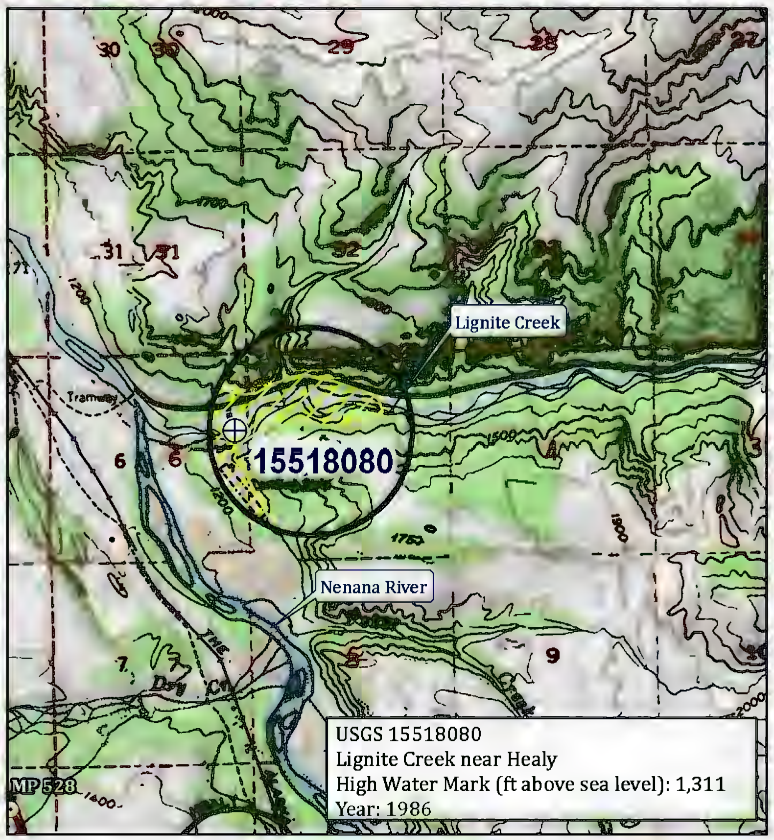
October 2011

Map Projection: NAD 1983 State Plane Alaska









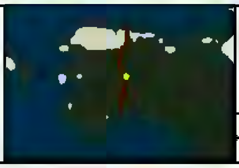
Block Valve
USGS Stream Gage
Camp Laydown
ASAP Mainline
Mile Post
High Water Mark
1 & 2 Mile Diameter Buffer

Alaska Stand Alone Gas Pipeline

High Water Marks

Interior Yukon Subregion

0 0.5 1 Miles



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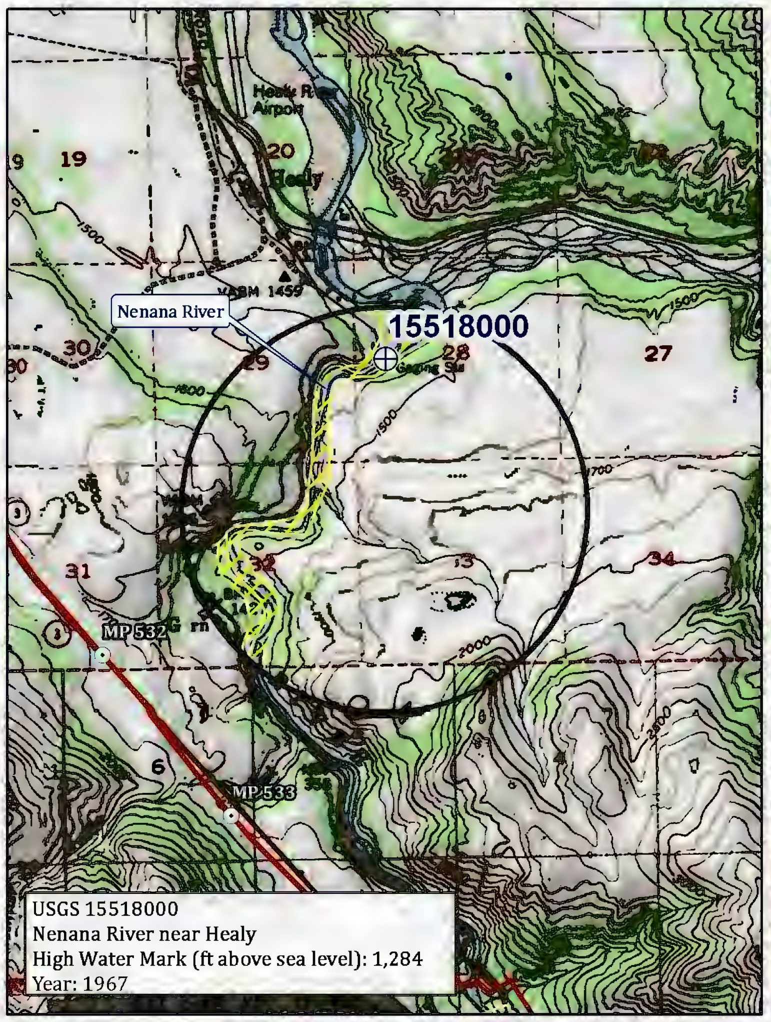

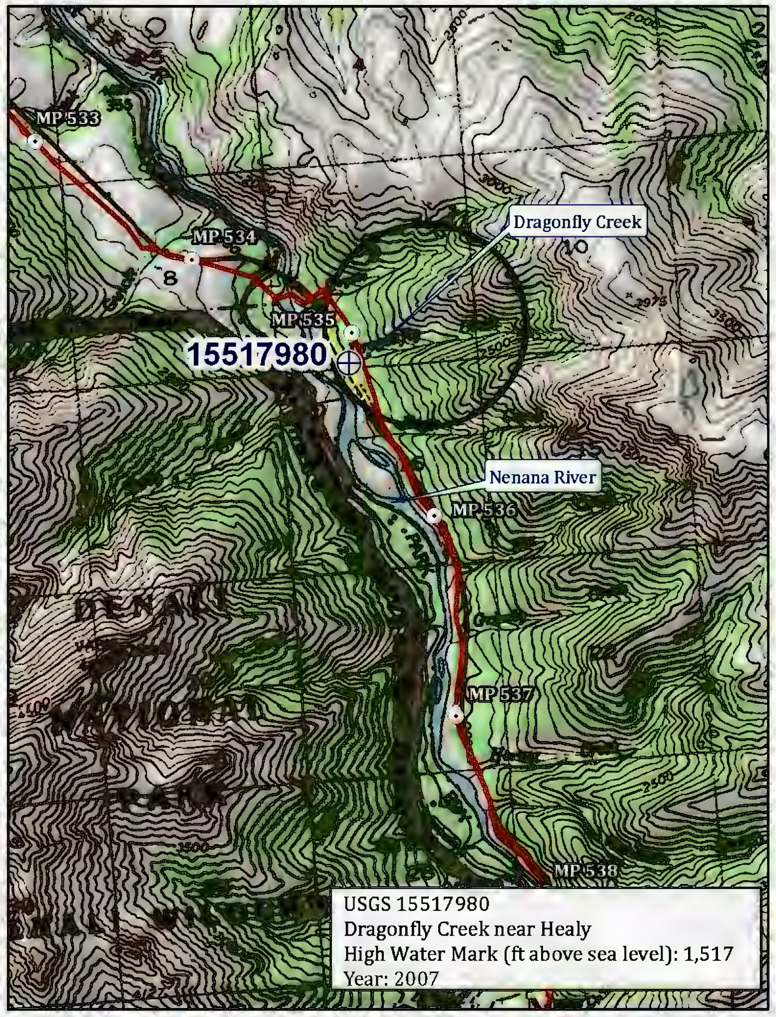

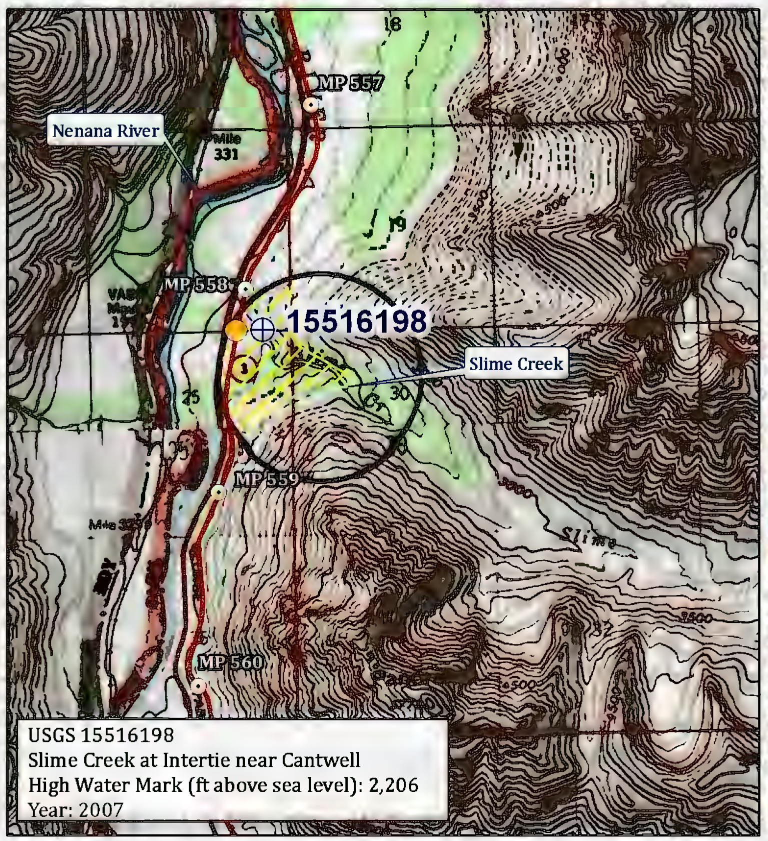

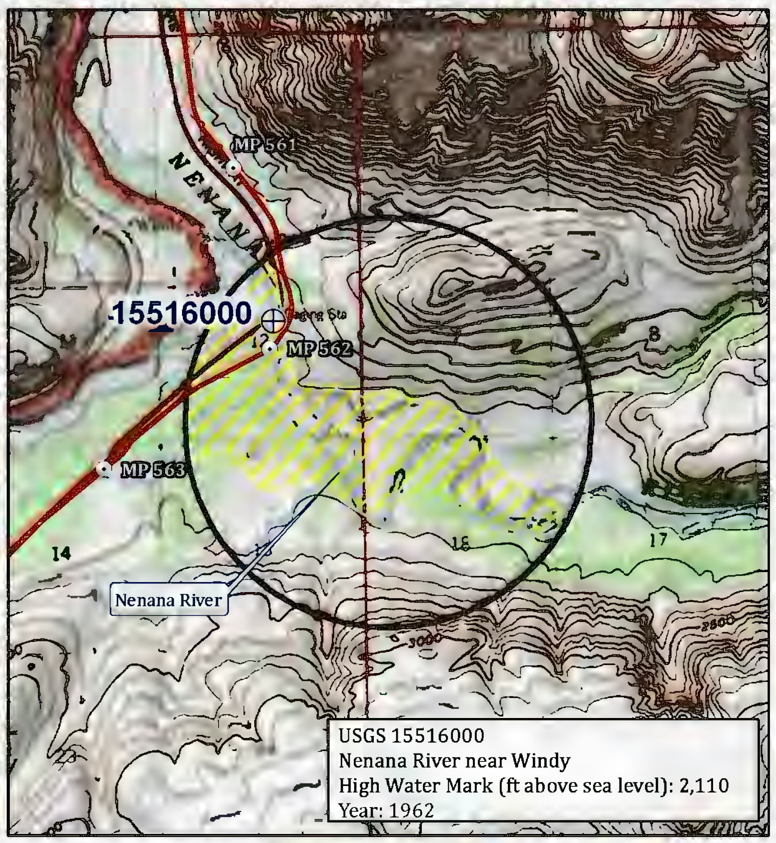

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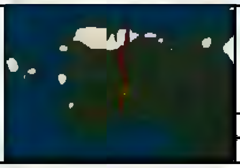
Block Valve
USGS Stream Gage
Camp Laydown
ASAP Mainline
Mile Post
High Water Mark
1 & 2 Mile Diameter Buffer

Alaska Stand Alone Gas Pipeline

High Water Marks

Interior Yukon Subregion

0 0.5 1 Miles



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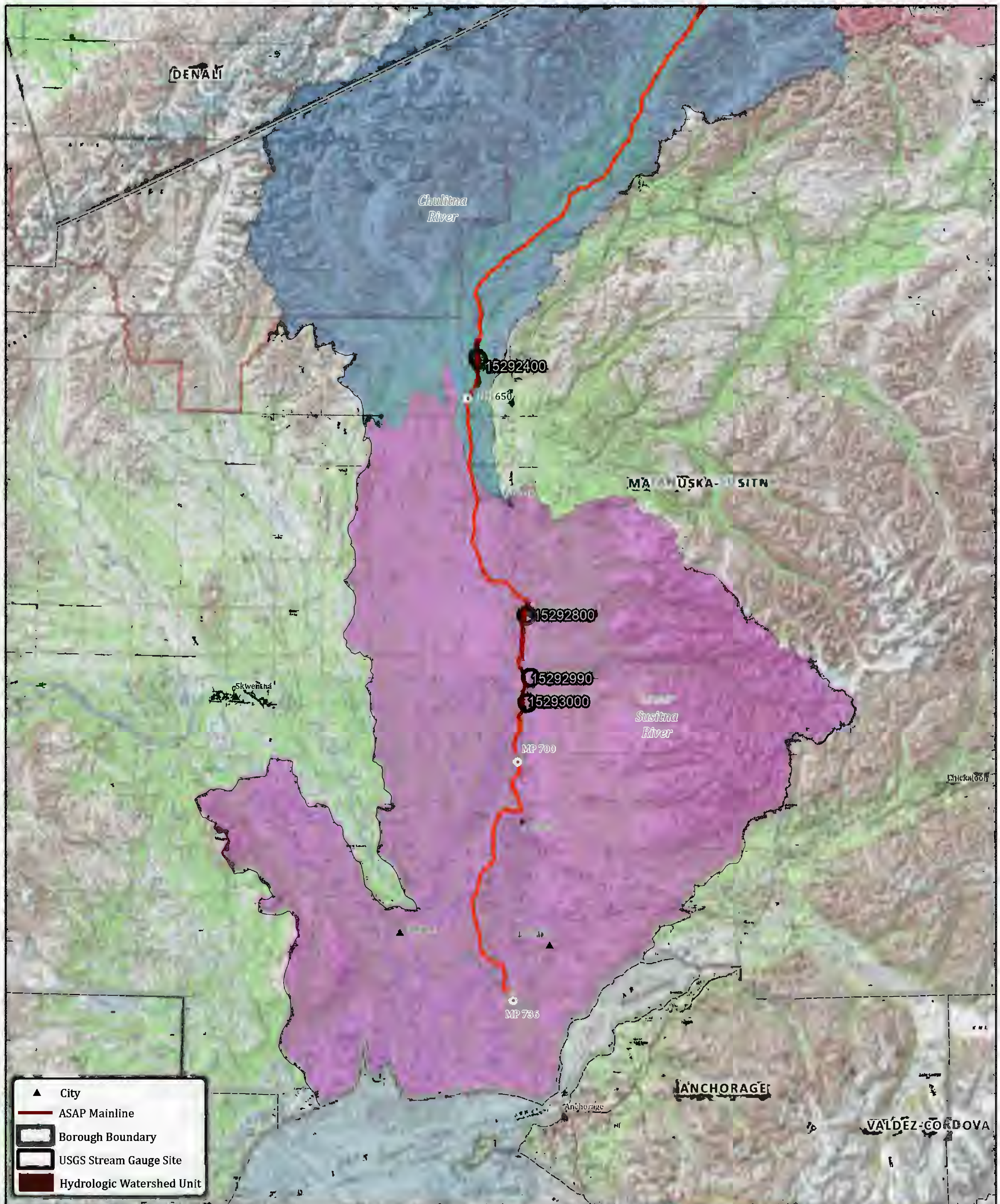
Map Projection: NAD 1983 State Plane Alaska



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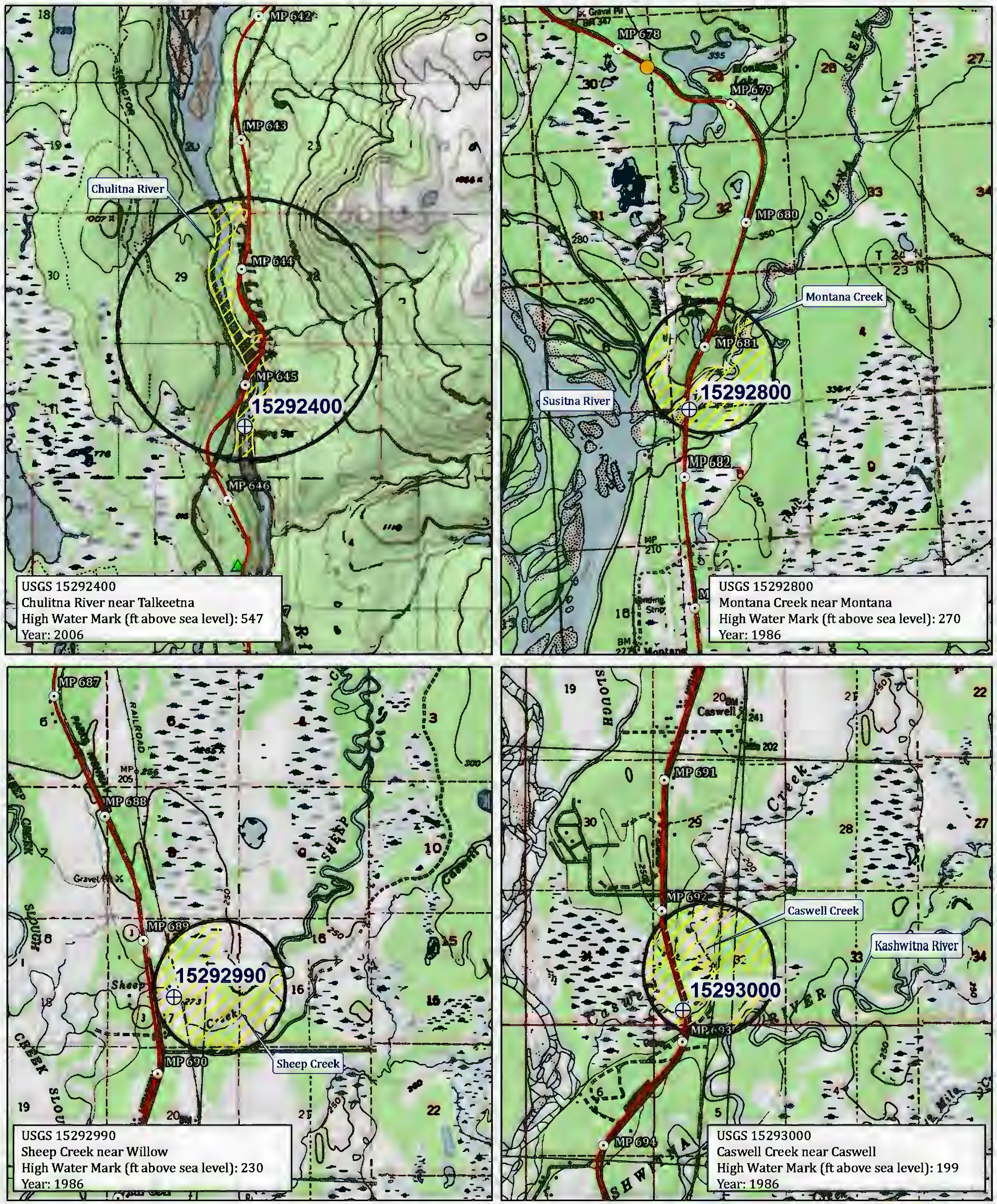
Alaska Stand Alone Gas Pipeline
High Water Mark Index

October 2011

Map Projection: NAD 1983 State Plane Alaska



Block Valve
Camp Laydown
Mile Post
USGS Stream Gage
ASAP Mainline
High Water Mark
1 & 2 Mile Diameter Buffer

Alaska Stand Alone Gas Pipeline
High Water Marks
South Central Subregion

0 0.5 1 Miles

October 2011

Map Projection: Mercator WGS84

Appendix H

Mitigation Measures

ALASKA STAND ALONE GAS PIPELINE/*ASAP*

Applicant Proposed Mitigation Measures

March 2011

Alaska Gasline Development Corporation
PO Box 101020
Anchorage, AK 99510

NOTICE

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Table of Contents

Page

ACRONYMS AND ABBREVIATIONS

ADF&G	Alaska Department of Fish and Game
AGDC	Alaska Gasline Development Corporation
ASAP	Alaska Stand Alone Gas Pipeline
BACT	best available control technology
BMP	Best Management Practices
CO	carbon monoxide
GHG	Greenhouse Gas
HABS/HAER	Historic American Building/Historic American Engineering Record
HDD	horizontal directional drilling
MP	milepost
NEPA	National Environmental Policy Act
NO_x	nitrogen oxides
NIPs	non-native invasive plants
O&M	Operation and Maintenance
POD, Rev. 1	Plan of Development, Revision 1
ROW	right-of-way
SHPO	State Historic Preservation Officer
SO_2	sulfur dioxide
TAPS	Trans Alaska Pipeline System
VOC	volatile organic compound

1.0 INTRODUCTION

This Applicant-Proposed Mitigation Measures document has been prepared by the Alaska Gasline Development Corporation (AGDC) to support the planning and development of the Alaska Stand Alone Gas Pipeline/***ASAP*** (ASAP) and provide detailed information on applicant-proposed mitigation measures to support the preparation of required National Environmental Policy Act (NEPA) documents.

The proposed project is a 24-inch-diameter natural gas pipeline with a natural gas flow rate of 500 million standard cubic feet per day (MMscfd) at peak capacity. The proposed pipeline will be buried except from milepost (MP) 0 to 6, and at elevated-bridge stream crossings, compressor stations, possible fault crossings, pigging facilities, and off-take valve locations. The pipeline system will be designed to transport a highly-conditioned natural gas highly-enriched in non-methane hydrocarbons.

The routing of ASAP is from Prudhoe Bay following the Trans Alaska Pipeline System (TAPS) and Dalton Highway corridors, generally paralleling the highway corridor from the North Slope to near Livengood, northwest of Fairbanks. At Livengood, the pipeline route heads south, joining the Parks Highway corridor west of Fairbanks near Nenana. From there it continues south and terminates at MP 737. It will connect at MP 39 of the Beluga Pipeline (ENSTAR's distribution system) near Wasilla. A lateral pipeline to Fairbanks (Fairbanks Lateral) will take off from the main pipeline just a few miles north of Nenana at Dunbar. The Fairbanks Lateral will travel northeast to Fairbanks, a distance of approximately 35 miles.

The AGDC can implement mitigation measures to reduce the risk of environmental degradation, the chances of injury or harassment of animals, and the risk of negative effects on people who live, work, and recreate near the pipeline corridor that may result from the construction and operation and maintenance (O&M) of the ASAP.

The Plan of Development, Revision 1 (POD) published in March 2011 describes the proposed ASAP. Construction and O&M techniques described in the POD were chosen in large part to limit negative effects on resources within the project area. In addition, this document identifies specific mitigation measures that the applicant proposes and commits to follow as part of the ASAP.

2.0 AIR

Mitigation measures that will be implemented to address effects on public health and safety include:

- Implementation of Best Management Practices (BMPs) during construction activities to mitigate fugitive dust and reduce particulate matter emissions.
- Utilization of Best Available Control Technology (BACT) for combustion equipment to mitigate nitrogen oxides (NO_X) and carbon monoxide (CO) emissions.
- Utilization of ultra low sulfur diesel fuel for construction equipment and non natural gas combustion equipment to mitigate sulfur dioxide (SO_2) emissions, particulate matter emissions and volatile organic compound (VOC) emissions.
- Operate all combustion equipment in accordance with manufacturer's specifications to mitigate NO_x, CO, VOC and particulate emissions resulting from incomplete combustion.
- Maintain emissions control equipment in accordance with manufacturer's specifications to mitigate emissions and maintain emission control efficiency.

At the present time, there are no Environmental Protection Agency-approved control technologies available for Greenhouse Gas (GHG) emissions mitigation on construction equipment and combustion equipment. These technologies are currently in the research and development phase and can be utilized for GHG mitigation once these technologies are available and can be evaluated as part of BACT.

3.0 NOISE

Mitigation measures that will be implemented to address effects on noise include:

- Development and implementation of an Noise Abatement Program
- Development and implementation of a Construction Communications Plan to inform adjacent residences of construction activities

4.0 GEOLOGIC HAZARDS

Mitigation measures that will be implemented during construction and operations and maintenance to address effects of geologic hazards on the integrity of the project include:

- Design Considerations
  - Special installation techniques and foundations
  - Earthquake mitigation measures and special design considerations at fault crossings
  - Special design considerations at river crossings
  - Erosion control measures
- Operational Considerations
  - Slope stability monitoring
  - Seismic/earthquake monitoring
  - River hydrology monitoring
  - O&M Manuals
  - Quality Assurance Manual
  - Inspection Services Manual
  - Design Basis Updates
  - Surveillance Manual
  - Environmental Management System Compliance Manual
  - Other controls to be determined

5.0 MINERAL AND ENERGY RESOURCES

A Construction Access Plan and Traffic Control Plan will be developed and implemented to address effects on mineral and energy resource development activities. Development of these plans will include coordination with mining operators and adjacent landowners.

6.0 PALEONTOLOGICAL RESOURCES

Avoidance is the preferred mitigation measure. To the extent practical, ASAP will be sited to avoid impacts to paleontological resources. If permanent effects are unavoidable, they will be mitigated in accordance with requirements of the appropriate agencies and applicable laws. If any known or previously undiscovered paleontological resources are encountered during construction activities, the owner/operator will contact the State Historic Preservation Officer (SHPO

) (if on state lands) and the Authorized Officer as responsible for paleontological and cultural resources if on public land. A qualified paleontological monitor may be required to be on-site during construction near known paleontological resources, or areas where the likelihood of finding such resources is high as determined in consultation with SHPO or the Authorized Officer.

While paleontological studies will be performed prior to beginning construction activities, there is always the possibility that cultural resources will be discovered during the project. An Unanticipated Cultural Discoveries Plan will be developed to outline the exact procedures that will be followed in the event of an unanticipated paleontological discovery.

7.0 SOILS

Mitigation measures that will be implemented to address effects on soils include:

- Development and implementation of an Erosion Control Plan (as addressed in Section 7.4.3 of the POD, Rev. 1)
- Development and implementation of a Storm Water Pollution Prevention Plan (as addressed in Section 7.4.3 of the POD, Rev.1)

8.0 WATER RESOURCES

Mitigation measures that will be implemented to avoid or minimize adverse effects on surface and ground waters include:

- Minimize the number of river and stream crossings
  - Use existing bridges where feasible
  - Use horizontal directional drilling (HDD) or other trenchless technology to minimize disturbance to water bodies as proposed in Attachment 4 of the POD, Rev. 1.
- Maintain, to maximum extent practicable, the existing surface hydrology at all water body crossings
  - Prevent discharges that have the potential to adversely affect water bodies
  - Stabilize cut slopes immediately when the designed grade is obtained
  - Initiate reclamation of disturbed areas as soon as practicable
  - Ensure water withdrawals meet federal and state standards and guidelines
- Keep construction activities within the footprint of the pipeline right-of-way (ROW) and the disturbed area of the adjacent construction zone to the maximum extent practicable
- Minimize the construction of new permanent access roads by emphasizing winter construction using snow-ice roads
- Perform water crossings in a manner that minimizes effects on water quality
  - Use materials for dam construction that do not introduce sediment or other harmful substances into waters when using the open-cut isolation method
  - Use materials for flume pipe system that do not introduce sediment or other harmful substances into waters when using the open-cut isolation method
  - Position flume pipe system discharges to prevent erosion or scouring
- Minimize the effect of the pipeline on the existing thermal regime
  - Design the pipeline and component to take into account the thermal regime, including placement and size of compressor stations and chillers.

    - Use engineering controls such as insulation and non-frost susceptible fill to control the thermal signature of the pipeline.
- Implement dewatering practices that avoid adverse effects to vegetation and to existing quality of surface waters, including erosion and scouring
- Locate fuel storage, equipment refueling, and equipment maintenance operations at least 100 feet from surface waters
- Avoid contaminated sites
- Use temporary bridges for transportation of construction equipment and materials

9.0 WETLANDS AND VEGETATION

The permitting process for placing fill in wetlands requires compliance with the mitigation steps outlined in NEPA to maintain wetland functions. These steps include:

- Avoid: A wetland should not be affected if there is a less environmentally damaging practicable alternative.
- Minimize: Unavoidable effects should be minimized to the extent possible.
- Compensate: Any remaining effects should be offset, if practicable and appropriate, through restoration, enhancement, creation, and/or preservation actions.

Mitigation options will be developed collaboratively with the U.S. Army Corps of Engineers upon their review of the 2011 Preliminary Jurisdictional Determination. At that time, site-specific BMPs will be defined and applied as means of mitigation. Overall, mitigation measures will likely be geographically dependent, as some procedures will have a greater efficacy toward the northern end of the proposed pipeline corridor, whereas others might be better suited to the southern portions. Traditional construction methods can help avoid significant effects on wetland habitats and will likewise avoid long-term effects on wetland functions and values if mitigation measures are implemented. Traditional wetland mitigation measures that will be implemented include the following:

- Schedule pipeline construction across wetlands during the winter to the maximum extent practicable
- Avoid and minimize ground-disturbing activity in wetland habitats
    - Limit grading except for trenching, to the maximum extent practicable to preserve root systems
    - Maintain slope stability
    - Use mats or other types of mitigation during non-winter construction to prevent rutting
    - When possible, locate permanent facilities including compressor stations, access roads, and workpads outside of wetlands
    - Reduce construction ROW width across wetlands as practical
- Maintain existing hydrologic systems
- Reestablish vegetation that is typical of the general area, where practicable
    - Segregate topsoil and use as top trench fill to the greatest extend practicable
    - Reseed and revegetate affected areas upon completion of construction activities
- Minimize the number of stream crossings
- Use existing bridges or HDD or other trenchless technology as proposed in Attachment 4 of the POD, Rev. 1

- Contain fuel and lubricant spills during construction
- During ditch excavation, the top vegetated mat wetland layer will be removed with a backhoe or similar equipment and set aside separately from the subsoil spoils. After pipeline installation and during backfill activities, the vegetative mat will be placed back in the ditch as the last (i.e., top) item with the top of the vegetative mat at the surface of the backfilled ditch.

Mitigation measures that will be implemented to prevent the introduction and spread of non-native invasive plants (NIPs) include a NIP Prevention Plan. The NIP Prevention Plan will address procedures to reduce or eliminate the spread of NIPs at project locations such as airports, particularly at gravel airstrips, material sites, temporary use areas such as laydown yards and camps. Restoration of cleared areas will also be addressed in the NIP Prevention Plan. Leaving cleared areas un-restored may present an opportunity for NIPs to establish a foothold without competition from local species. More information about rehabilitation and restoration is provided in the POD, Rev. 1, Section 9.0. The NIP Prevention Plan will provide details of the measures to be used to control invasive species through appropriate site preparation, monitoring, revegetation of disturbed areas with native species, and performance standards.

10.0 FISHERIES RESOURCES

Mitigation measures that will be implemented to minimize effects on fish include:

- Follow mitigation measures for water quality identified in Section 8.0, water resources.
- Minimize the number of fish stream crossings where practicable.
- Use open-cut isolation methods for stream crossings at locations where an open-cut is prevented by overwintering and spawning fish, or where stream flow conditions make open-cut impractical.
- A Blasting Control Plan as identified in the POD, Rev. 1 Section 7.6.3 will be developed in accordance with Alaska Department of Fish and Game (ADF&G) blasting standards to protect adult fish, juvenile fish and developing fish eggs when blasting activities occur in or near streams.
- Use existing bridges or HDD as proposed in Attachment 4 of the POD, Rev.1
- Use pipeline designs and construction scheduling that minimize disruption of fish passage and spawning fish and effects to fish habitat.
- Develop supplemental site-specific fishery data to fill data gaps for the design of fish stream crossings and for lakes where water will be withdrawn during the winter for snow/ice road construction and maintenance during pipeline construction.
- Maintain to the maximum extent practicable existing stream hydrologic regimes at fish stream crossings.
- Maintain to the maximum extent practicable existing temperature regimes along corridor.
- Use construction methods and reclamation of disturbed areas that eliminates or reduces the potential for erosion and sedimentation reaching fish streams.
- Minimize cumulative effects to surface hydrology, stream bottom, and stream bank habitats when the pipeline crossing of a fish stream is downstream from an existing stream crossing by the highway, the TAPS, or other buried utility system.
- Use temporary bridges for transportation of construction equipment and materials
- To the maximum extent practicable, locate material storage, refueling activity, fuel, and related liquid storage at least 100 feet from the bank of a fish stream.
- Implement hydrostatic testing in a manner that minimizes the potential that freeze depressants could be inadvertently discharged to fish bearing waters.

- Assure water withdrawals use appropriately-sized fish screens and other state and federal guidelines for fish protection.

11.0 WILDLIFE RESOURCES

Mitigation measures that will be implemented to address wildlife resources include:

- Avoid locating pipeline facilities in sensitive wildlife habitats to the maximum extent practicable.
- Schedule construction activities to avoid effects during sensitive periods in the life cycle of wildlife to the extent practicable, including scheduling excavation activities during times of the year when major movements across the ROW occur (i.e., migrations).
- Minimize the duration of open-ditch construction activities to mitigate the risk of animal entrapment in an open ditch.
- Develop systems or mechanisms to facilitate escape of wildlife from the pipeline trench in the event wildlife becomes trapped (e.g., escape ramps)
- Develop a Blasting Control Plan as identified in Section 7.6.3 in accordance with ADF&G blasting standards to protect wildlife. A Blasting Control Plan is particularly necessary if blasting is required in sensitive areas or during sensitive life stages for wildlife.
- Ensure construction camp operations and pipeline facility construction activities comply with measures that avoid attracting wildlife.
- Adopt motor vehicle and aircraft procedures that minimize disturbances to wildlife.
- Identify and then avoid or minimize situations where wildlife may be killed in defense of life or property.
- Avoid or minimize construction and operational activities during sensitive periods in life cycles such as moose and caribou calving, bear denning, raptor nesting, and nesting migratory birds.
- Limit public accessing to ROW for recreation or hunting by blocking entry areas with large boulders, berms, or fencing.
- Rehabilitate pipeline construction access roads in a manner that allows public access and consistent safe operation of the pipeline system and that is in accordance with the plans of the landowner/land manager.
- The following plans will be developed prior to construction activities and followed during construction and operations to minimize human interactions with wildlife:
  - Wildlife Interaction and Habitat Protection Plan
  - Blasting Control Plan identified in Section 7.6.3 which follows ADF&G standards protective of wildlife in sensitive areas or during sensitive life stages
  - Bear Avoidance and Human Encounter/Interaction Plan
- To minimize human/carnivore interaction and discourage wildlife presence and feeding opportunities the following plans will be developed to assure the appropriate handling and disposal of wastes:
  - Comprehensive Waste Management Plan
  - Hazardous Materials Emergency Contingency Plan
- Where vertical support members are used to elevate pipe, a minimum of 7 feet of clearance from ground surface to the bottom of pipe will be maintained for wildlife movement.

12.0 SENSITIVE, TREATENED AND ENDANGERED SPECIES

Mitigation measures that will be implemented to address Sensitive, Threatened, and Endangered Species are those identified in Sections 9.0, Wetlands and Vegetation; 10.0, Fisheries Resources; and 11.0, Wildlife Resources. In addition, mitigation measures identified in the Section 7 consultation as part of the NEPA process and included in permits as stipulations will be followed.

13.0 CULTURAL RESOURCES

Avoidance is generally the preferred mitigation measure for cultural resources eligible for the National Register. To the extent practical, ASAP will be sited to avoid impacts to cultural resources. If negative effects are unavoidable, they will be mitigated in accordance with Section 106 and in coordination with the appropriate agencies, entities, and individuals. Mitigation measures will be specific to each cultural resource and will be determined and conducted in accordance with AS 41.35 and Section 106. More than one field season of archaeological survey may be required for determining the necessary level of mitigation.

Some areas within the pipeline ROW may be determined "high priority" areas for containing cultural resources. High priority areas are those areas that are known to contain high densities of cultural resources. These areas are defined through analysis of previous cultural resource studies, existing data on file at the Alaska Office of History and Archaeology's Alaska Heritage Resource Survey (AHRS) database, consultation with SHPO and other interested parties, and through current archaeological fieldwork completed for ASAP. In high priority areas, an archaeological monitor may be required during construction.

Alternatively, after the archaeological surveys have been conducted, the contractor may wish to avoid certain areas containing cultural resource sites rather than pay for lengthy and expensive excavations. Measures mitigating adverse effects may vary by specific cultural resource, but may include one or a combination of the following:

- Archaeological excavation, analysis, and documentation of all or part of the cultural resource site
- Perform Historic American Building Survey/Historic American Engineering Record (HABS/HAER)-level documentation for historic buildings and structures
- Perform archaeological monitoring of construction activities
- Provide interpretation for and involvement of the public. Some examples include brochures, signage, or partnering with local schools, museums, and/or heritage preservation groups, among others.
- Consultation with state and federal agency historic preservation officers
- Consultation with Alaska Native Tribes

The HABS/HAER documentation would be completed for historic structures prior to pipeline construction and support activities. Archaeological monitoring, as implied above, may be conducted during construction activities. Interpretation for the public can be initiated as soon as appropriate information is gathered. Interpretive material does not generally have to be completed prior to the activity that causes adverse effects. Public interpretive signage, for example, is most often installed after an activity is complete or near its completion.

While cultural studies will be performed prior to beginning construction activities, there is always the possibility that cultural resources will be discovered during the project. An Unanticipated Cultural

Discoveries Plan will be developed to outline the exact procedures that will be followed in the event of an unanticipated cultural discovery.

14.0 VISUAL RESOURCES

Mitigation measures that will be implemented to address effects on visual resources include:

- Review the practicality of avoiding or minimizing significant adverse effects on visual resources created by the construction and operation of ASAP and incorporate proven mitigation measures into the design and location of the project where appropriate.
- Minimize the construction of new permanent access roads by using snow/ice roads during construction.
- Restore the construction zone in a manner that facilitates reestablishment of the adjacent natural vegetation.
- Use root balls, salvaged native plant materials, and topsoil removed from the construction footprint for redistribution on disturbed areas where feasible.
- Maintain a screening of existing natural vegetation when the pipeline is offset from a highway.
- Use existing disturbed areas to the maximum extent practicable for temporary construction activities such as construction camps, material stockpiling, pipe jointing, and pipe bending.
- Minimize locating pipeline facilities, new material sites, and construction material stockpiling in places with special visual resource values that would be visible to the general public.
- Blend the pipeline system into the natural setting to the extent practicable when crossing places with high visual resource values.
- Use revegetation species that are appropriate for the general area.
- Regrade construction disturbances to a condition that blends with the surrounding terrain and surface drainage patterns.
- Monitor reclaimed, disturbed construction areas and take remedial action where expected revegetation success is not achieved.

15.0 SOCIAL AND ECONOMIC

Mitigation measures that will be implemented to address effects on socioeconomics include:

- Time construction activities to minimize impacts to subsistence activities where possible.
- Time construction activities to minimize impacts to high-use tourist and local recreation seasons (e.g., wildlife viewing, hunting, snowmachining, fishing, dog sledding)
- Time construction activities to minimize impacts to local business (i.e., avoid summer and fall construction for recreational and tourist areas)
- Develop and implement traffic control plans to minimize negative impacts to local businesses by blocking access during construction
- Identify and promote work opportunities for local residents
    - Prepare an Economic Opportunity Plan to describe how the project will operate to enhance locally based economic and employment opportunities for Alaska residents and businesses. Coordinate with the local village corporation, tribal government, and city government, and other groups to identify qualified individuals that are interested in working on the project.

  - Promote use of local businesses to support the project (lodging, food, services, sundries)
- Develop training programs for local residents so that they can be employed during construction and O&M
  - Coordinate with Alaska training centers and universities on workforce development and training opportunities, which may include, but are not limited to, future job fairs in the region.

16.0 SUBSISTENCE

Mitigation measures that will be implemented to address effects on subsistence activities include:

- Identifying locations and times when subsistence activities occur, and minimizing work during these times and in these areas to the maximum extent practicable
- Scheduling work (e.g., blasting) to avoid conflict with subsistence activities when possible.
- Notifying workers that subsistence activities are ongoing in the area and directing them to avoid activities that may affect the activities (e.g., not removing trap line markers)
- A Wildlife Avoidance and Human Encounter/Interaction Plan will be developed and implemented for the construction and operation of ASAP to avoid impacts to subsistence species
- Develop a Subsistence Plan of Cooperation to mitigate potential conflicts between ASAP activities and subsistence activities.

17.0 RECREATION ACTIVITIES

Mitigation measures that can be implemented to address effects on tourism and recreation use areas include:

- Retain existing public access routes and uses.
- Minimize activities in areas with tourist-related facilities during high use periods to the extent practical.
- Minimize activities in areas with public recreation facilities during high use periods to the extent practical.
- Minimize creating new public vehicular access to remote areas.
- Minimize impacts to the existing natural landscape to the extent practicable.
- Schedule pre-construction work to minimize activity during peak periods of tourism and recreation
- Conduct early and continuing consultation with the public, tourism, and recreation businesses.
- Collocate with existing and planned transportation and utility system where practicable.

18.0 WILDERNESS

In order to mitigate potential effects on wilderness, a Communications Plan for fieldwork, construction, and O&M activities will be developed and implemented. The Communications Plan will require close coordination with the applicable local, state, and federal agencies to minimize unnecessary noise that could affect the wilderness experience.

Appendix I

Biological Assessment

ALASKA STAND ALONE GAS PIPELINE/*ASAP*

Biological Assessment

May 2011

Alaska Gasline Development Corporation
P.O. Box 101020
Anchorage, AK 99510

NOTICE

THE INFORMATION CONTAINED IN THIS DOCUMENT IS PART OF AN APPLICATION FOR A PIPELINE EASEMENT. AGDC MAKES NO REPRESENTATION OR WARRANTY THAT THIS EASEMENT WILL BE GRANTED OR THAT ANY PIPELINE WILL BE AUTHORIZED. ANY ACTION TAKEN OR NOT TAKEN OR EXPENDITURE MADE BY ANY PERSON BASED ON THE INFORMATION INCLUDED HEREIN IS AT HIS OWN RISK AND RESPONSIBILITY AND NO LIABILITY SHALL ARISE AGAINST AGDC AS A CONSEQUENCE THEREOF.

Table of Contents

Page

Tables

Figures

Appendices

ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
ACP	Arctic Coastal Plain
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ADOT&PF	Alaska Department of Transportation and Public Facilities
AES	ASRC Energy Services Alaska, Inc.
AEWC	Alaska Eskimo Whaling Commission
AGDC	Alaska Gasline Development Corporation
AOOS	Alaska Ocean Observing System
ARRC	Alaska Railroad Corporation
ASAP	Alaska Stand Alone Gas Pipeline
ASME	American Society of Mechanical Engineers
BA	Biological Assessment
BACT	Best Available Control Technology
BLM	U.S. Department of Interior, Bureau of Land Management
BMP	best management practices
BOEMRE	Bureau of Ocean Energy Management, Regulation and Enforcement
BOWFEST	Bowhead Whale Feeding Ecology Study
BP	British Petroleum
bscfd	billion standard cubic feet per day
CFR	Code of Federal Regulations
CH_4	Methane
CO_2	carbon dioxide

CO_2 eq	CO_2 equivalent
CS	compressor station
Delta	Yukon-Kuskokwim Delta
DNP&P	Denali National Park and Preserve
DPS	distinct population segment
EDPS	Eastern distinct population segment
EIS	environmental impact statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FLIR	forward-looking infrared
FR	Federal Register
GCF	gas conditioning facility
GHG	greenhouse gas
GIS	geographic information systems
H_2S	hydrogen sulfide
HAPs	Hazardous Air Pollutants
HB	House Bill
HDD	horizontal directional drilling
Hz	hertz
IPCC	Intergovernmental Panel on Climate Change
ITR	incidental take regulations
IUCN	International Union for Conservation of Nature
IWC	International Whaling Commission
LOA	letter of authorization
MLV	mainline valve

MMBtu	million British thermal units
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
MMscfd	million standard cubic feet per day
MP	milepost
N/A	not applicable
N_2O	Nitrous Oxide
NEPA	National Environmental Policy Act
NGL	natural gas liquids
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_x	Criteria Pollutants
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service
NSB	North Slope Borough
NWT	Northwest Territories
O&M	operations and maintenance
OC	organochlorine
OCS	Outer Continental Shelf
PAH	poly-aromatic hydrocarbons
PCE	primary constituent elements
POD	Plan of Development, Rev. 1
POP	Persistent organic pollutants
ROW	right-of-way
SB	Southern Beaufort Population

SPCC	spill prevention control and countermeasure
SPCO	State Pipeline Coordinator Office
SWPPP	Storm Water Pollution Prevention Plan
TAPS	Trans-Alaska Pipeline System
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VSM	vertical support members
WDPS	Western distinct population segment

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1.0 EXECUTIVE SUMMARY

Pursuant to House Bill (HB) 369 passed by the Alaska Legislature in July 2010, the Alaska Gasline Development Corporation (AGDC) has initiated federal permitting processes for the Alaska Stand Alone Gas Pipeline/***ASAP*** (ASAP), including application for a Clean Water Act § 404 permit from the U.S. Army Corps of Engineers (USACE), and a federal grant and state lease for the respective federal and state portions of the associated ASAP right-of-way. By agreement among the stakeholder federal agencies, USACE has been designated the lead federal agency for the ASAP Environmental Impact Statement (EIS) process being undertaken pursuant to the National Environmental Policy Act (NEPA). The ASAP EIS cooperating agencies are the U.S. Environmental Protection Agency (EPA), the U.S. Department of Interior, Bureau of Land Management (BLM) and the National Park Service (NPS), and the Alaska Pipeline Coordinator's Office (SPCO). USACE has initiated consultation regarding the ASAP project under Section 7 of the Endangered Species Act (ESA) with both the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) (collectively, the Services). AGDC, acting through ASRC Energy Services Alaska, Inc. (AES) has been designated as the Non-Federal Representative, and has prepared this draft biological assessment (BA) for USACE's review.

As described in more detail in Section 2.0 of this BA and the applicant's Plan for Development, Rev. 1 (POD), the ASAP entails construction and operation of (i) a 737-mile, 24-inch-diameter mostly buried natural gas pipeline extending from Prudhoe Bay on the North Slope of Alaska to a connection point at milepost (MP) 39 of the existing ENSTAR Beluga Pipeline near Wasilla, Alaska, (ii) a 35-mile, 12-inch-diameter lateral pipeline spur from MP 458 of the ASAP to Fairbanks, and (iii) associated surface facilities. Construction activities include the transport of materials via barge through the Port of Seward and the Port of Anchorage to West Dock located on the North Slope. Accordingly, the action area addressed in this BA encompasses both the pipeline and surface facilities' construction and operations right-of-way, and port facilities and areas involved in transportation of construction materials.

The ASAP action area encompasses areas occupied by ESA-listed threatened and endangered species, designated critical habitat areas, and areas occupied by ESA candidate and proposed species. Table 1.0-1 provides a list of the species addressed in this BA, their ESA status and the action agency's initial effects determination.

TABLE 1.0-1 POTENTIALLY AFFECTED SPECIES AND CRITICAL HABITAT

Agency	Common Name	Scientific Name	Federal Status	Determination of Effect
USFWS	Spectacled Eider	*Somateria fischeri*	Threatened	Likely to adversely affect
	Steller's Eider	*Polysticta stelleri*	Threatened	Likely to adversely affect
	Polar Bear	*Ursus maritimus*	Threatened	Likely to adversely affect
	Polar Bear Critical Habitat	N/A	N/A	Likely to adversely affect
	Pacific Walrus	*Odobenus rosmarus divergens*	Warranted but Precluded	May affect, but not likely to adversely affect
NMFS	Bowhead Whale	*Balaena mysticetus*	Endangered	May affect, but not likely to adversely affect
	Fin Whale	*Balaenoptera physalus*	Endangered	May affect, but not likely to adversely affect
	Humpback Whale	*Megaptera novaengliea*	Endangered	May affect, but not likely to adversely affect
	Cook Inlet DPS Beluga Whale	*Delphinapterus leucas*	Endangered	May affect, but not likely to adversely affect
	Cook Inlet DPS Beluga Whale Critical Habitat	N/A	N/A	No effect
	Steller Sea Lion	*Umatopias jubatus*	Threatened	May affect, but not likely to adversely affect
	Ringed Seal	*Phoca hispida*	Proposed	May affect, but not likely to adversely affect
	Bearded Seal	*Erignathus barbatus*	Proposed	May affect, but not likely to adversely affect

In general, the vast majority of the proposed pipeline and associated surface facilities will not effect ESA-listed or ESA-proposed species and critical habitat. The potential for effects on species or critical habitat are limited to the polar bear and polar bear critical habitat, and to two eider species, and pertain to either port areas, through which ASAP construction materials will be transported, or to nearshore activities adjacent to the Beaufort Sea on the North Slope of Alaska.

2.0 PROJECT DESCRIPTION

The proposed project is a 24-inch-diameter natural gas pipeline with a natural gas flow rate of 500 million standard cubic feet per day (MMscfd) at peak capacity. The proposed pipeline will be buried except from MP 0 to 6, and at elevated-bridge stream crossings, compressor stations, possible fault crossings, pigging facilities, and off-take valve locations. The pipeline system will be designed to transport a highly-conditioned natural gas highly-enriched in non-methane hydrocarbons (i.e., natural gas liquids [NGLs]).

The purpose of the project is to provide a long-term, stable supply of up to 500 MMscfd of natural gas and NGLs from North Slope gas fields to markets in Fairbanks and Cook Inlet areas by 2016.

The routing of ASAP is from Prudhoe Bay following the Trans Alaska Pipeline System (TAPS) and Dalton Highway corridors, generally paralleling the highway corridor from the North Slope to near Livengood, northwest of Fairbanks. At Livengood, the pipeline route heads south, joining the Parks Highway corridor west of Fairbanks near Nenana. From there it continues south and terminates at MP 737. The ASAP will connect to ENSTAR's existing natural gas distribution system at MP 39 of the Beluga Pipeline near Wasilla. A lateral pipeline to Fairbanks (Fairbanks Lateral) will take off from the main pipeline just a few miles north of Nenana at Dunbar. The Fairbanks Lateral will travel northeast to Fairbanks, a distance of approximately 35 miles. Figure 2.0-1 provides the ASAP route overview.

2.1 *Primary Project Components*

The primary structures, facilities, and related project components are listed below.

Pipeline

- The 24-inch-diameter mainline is 737 miles in length.
- The 12-inch-diameter Fairbanks Lateral pipeline is 35 miles in length and will tie-in with the main pipeline at MP 458 of the ASAP.

Gas Conditioning Facility

- A 70-acre gas conditioning facility (GCF) will be located on the North Slope at Prudhoe Bay to provide conditioning necessary to remove carbon dioxide (CO_2), hydrogen sulfide (H_2S) and other impurities from the source gas stream.
- Natural gas will be obtained from the existing Central Gas Facility located approximately 1,000 feet north of the planned GCF.

Compressor Stations

- A maximum of two compressor stations will be required. Design optimization may allow construction using a single compressor station.
- Gas turbine-driven centrifugal compressors are proposed.
- Propane-cycle gas-chiller plants will be installed at compressor stations located north of Minto Flats.
- There will be two gas-turbine-driven electric-power generators per station.
- Each compressor station site will be on a gravel pad.
- Compressor station sites will be fenced.

Straddle and Off-Take Facility

- The Straddle and Off-Take Facility will be located at the Fairbanks Lateral Tie-In at MP 458 near Dunbar.
- The Straddle and Off-Take Facility will separate natural gas liquids (NGL[s]) from the gas stream to Fairbanks, providing 60 MMscfd of utility-grade gas to Fairbanks. NGLs extracted from the gas stream to Fairbanks will be re-injected into the main pipeline.
- A custody transfer gas metering station will be collocated with the Straddle and Off-Take Facility.

Cook Inlet NGL Extraction Facility and Terminus

- The Cook Inlet NGL Extraction Facility and Terminus will be located at MP 737. It will connect at MP 39 of the ENSTAR Beluga Pipeline.
- The Cook Inlet NGL Extraction Facility will separate NGLs from the gas stream and inject utility-grade gas into the ENSTAR Beluga pipeline. NGLs extracted from the gas stream will be sold separately.
- A custody transfer gas metering station will be collocated with the Cook Inlet NGL Extraction Facility and Terminus.

Other Permanent Facilities

- Mainline block valves will be set at a maximum of every 20 miles. It is expected that 30 mainline block valves and two valves along the Fairbanks Lateral will be required.
- A pig launcher will be located at the GCF. Pig launcher/receiver assemblies will be located at the compressor stations. A pig receiver will be located at the pipeline terminus. A pig launcher will be located at the tie-in for the Fairbanks Lateral and a receiver at the end of the alignment.
- Operation and maintenance (O&M) facilities will be located in Prudhoe Bay, Fairbanks, and Wasilla.

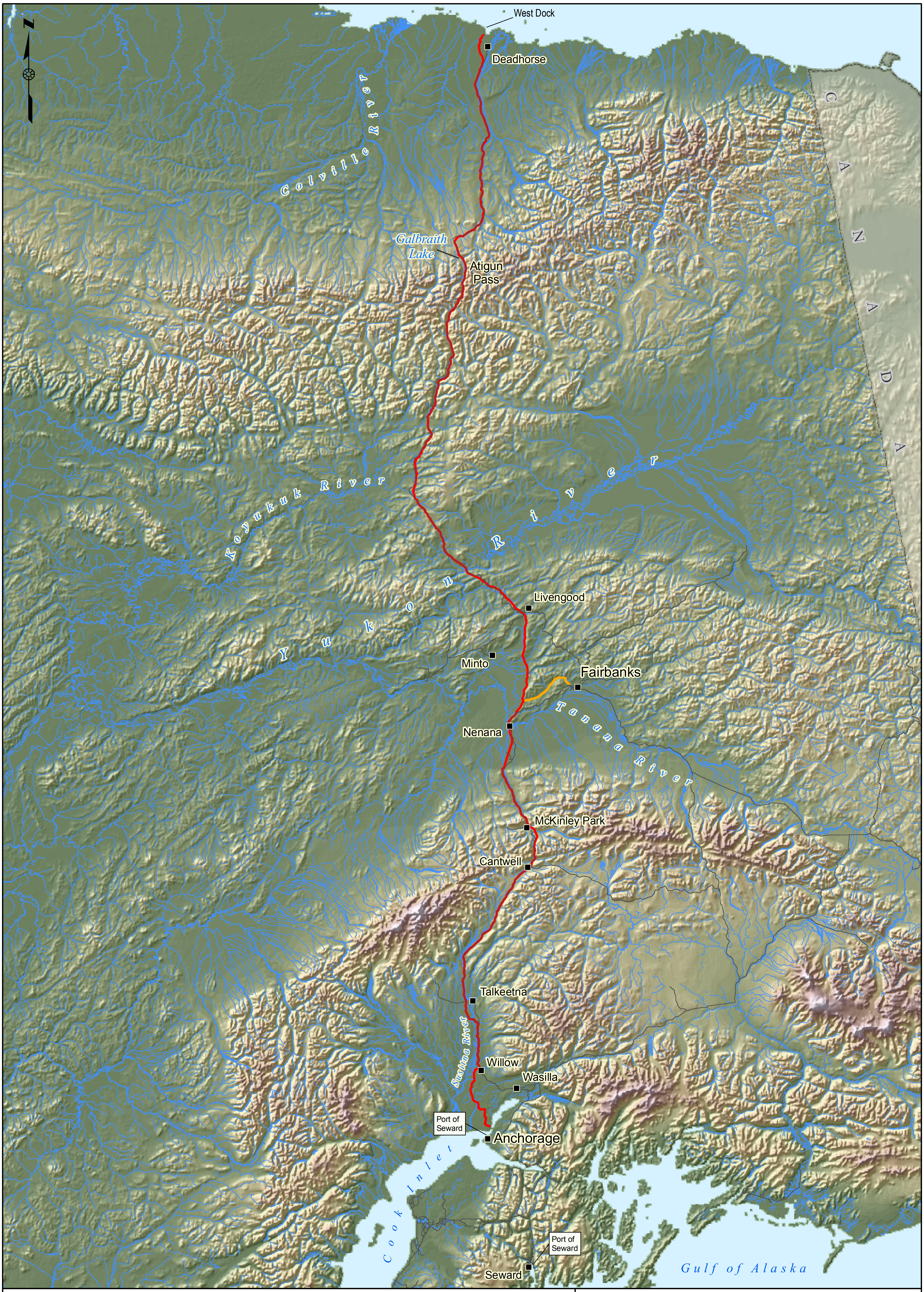
Material and Water Sources

- Material sites (gravel pits) will be distributed along the route to minimize hauling distances. Existing material sites will be used whenever possible.
- Water sources used for construction needs will be collected from surface water sources such as lakes and streams.

Construction Support Facilities

The facilities will include the following:

- Project Offices
- Logistics Support Sites
- Personnel Housing and Support
- Port Facilities
- Access Roads
- Construction Workpads (gravel, ice or snow, and grade)
- Laydown Yards and Storage Facilities
- Airports and Airstrips



Alaska Stand Alone Gas Pipeline Route

Fairbanks Lateral

Road

River

Town

NAD83, Alaska Albers

ASRC Energy Services
a subsidiary of Arctic Slope Regional Corporation
REGULATORY AND TECHNICAL SERVICES

ALASKA GASLINE DEVELOPMENT CORP.
GAS FOR ALASKANS

PROJECT AREA OVERVIEW
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE: 0 30 60 120 Miles

FIGURE: 2.0-1

AES-RTS: 11-001-001.mxd, 04/06/11, R00

A detailed description of the entire proposed project is provided in the POD published in March 2011, included here as Appendix B.

2.2 *Action Area and Scope of Biological Assessment*

The ASAP action area includes the complete 737-mile-long pipeline corridor and all associated facilities, existing port facilities in Alaska through which construction materials will be transported, and an area one-quarter-mile seaward from ship docking facilities at these port facilities. In order to focus efforts of this BA on the aspects of the proposed action that are likely to affect ESA species within the action area, the geographic areas evaluated focus on designated critical habitat or other portions of the action area where there is a likelihood of finding ESA-listed or ESA-proposed species. The northern portion of the action area is depicted in Figure 2.2-1. The southern portion of the action area for the Port of Anchorage is depicted in Figure 2.2-2 and the southern portion of the action area including the Port of Seward is depicted in Figure 2.2-3.

All of the ESA-protected species that may be affected by the ASAP are found exclusively in the marine environment or in nearshore areas. With the exception of the two eider species, all of these species are marine mammals (i.e., whales, walrus, seals, sea lions, and polar bear). Within the ASAP action area, the range for three species – Spectacled and Steller's eiders and the polar bear – includes both marine areas of the Beaufort Sea and terrestrial nearshore areas of the Arctic Coastal Plain (ACP) of Alaska's North Slope.

Critical habitat has been designated for the polar bear, Steller sea lions, spectacled and Steller's eiders, and Cook Inlet beluga whales. However, only portions of polar bear critical habitat and Cook Inlet beluga whale critical habitat are located within the ASAP action area.

Because of the concentration of ESA species and critical habitat within the ASAP action area on or adjacent to the ACP, a brief description of the proposed action occurring on the ACP and the adjacent Beaufort Sea is provided below.

2.2.1 Gas Conditioning Facility

The GCF will be located on the North Slope at Prudhoe Bay within an existing developed industrial area The GCF will remove CO_2, H_2S, and other impurities. NGLs (propane, butane, and pentanes) will be injected to enrich the gas, then compressed and cooled to maintain the existing thermal regime in permafrost soils, and injected into the proposed ASAP.

The GCF will be located on a 70-acre gravel pad and access to it will be via a permanent gravel road accessible from existing Prudhoe Bay roads. Module sections of the GCF will be transported to the facility site via barge to West Dock, then transported on existing roads and assembled on-site.

2.2.2 Aerial Pipeline Mode

The first six miles (MP 0–6) of the pipeline will be constructed aboveground on steel vertical support members (VSMs) spaced at approximately 20-foot increments at a minimum height of 7 feet above the tundra. This section of the pipeline is slated for winter construction. Once the necessary right-of-way (ROW) preparations have been made VSM locations will be surveyed, marked, and foundations drilled. Installation of VSMs will include standing and bracing the member, then backfilling around the VSM column with concrete slurry. Once VSMs have been installed, welded sections of pipe will be lifted and placed using sidebooms. Tie-ins will be accomplished in a manner similar to the remainder of the pipeline.

2.2.3 Buried Pipeline Mode

In general, the pipeline will be buried south of MP 6. The pipeline from MP 6 to the Atigun River Valley at MP 163 is slated for winter construction. The construction ROW will be cleared to remove vegetation and graded. Sections of pipe will be hauled from storage yards and distributed along the construction ROW, strung and placed into a trench, and the trench backfilled.

Alaska Stand Alone Gas Pipeline Route

Pipeline

Road

Facility

ALASKA GASLINE DEVELOPMENT CORP.
GAS FOR ALASKANS

NORTHERN PORTION OF THE ACTION AREA
WEST DOCK
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE:
0 0.7 1.4 2.1 2.8 Miles

FIGURE:
2.2-1

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NAD83, Alaska Albers

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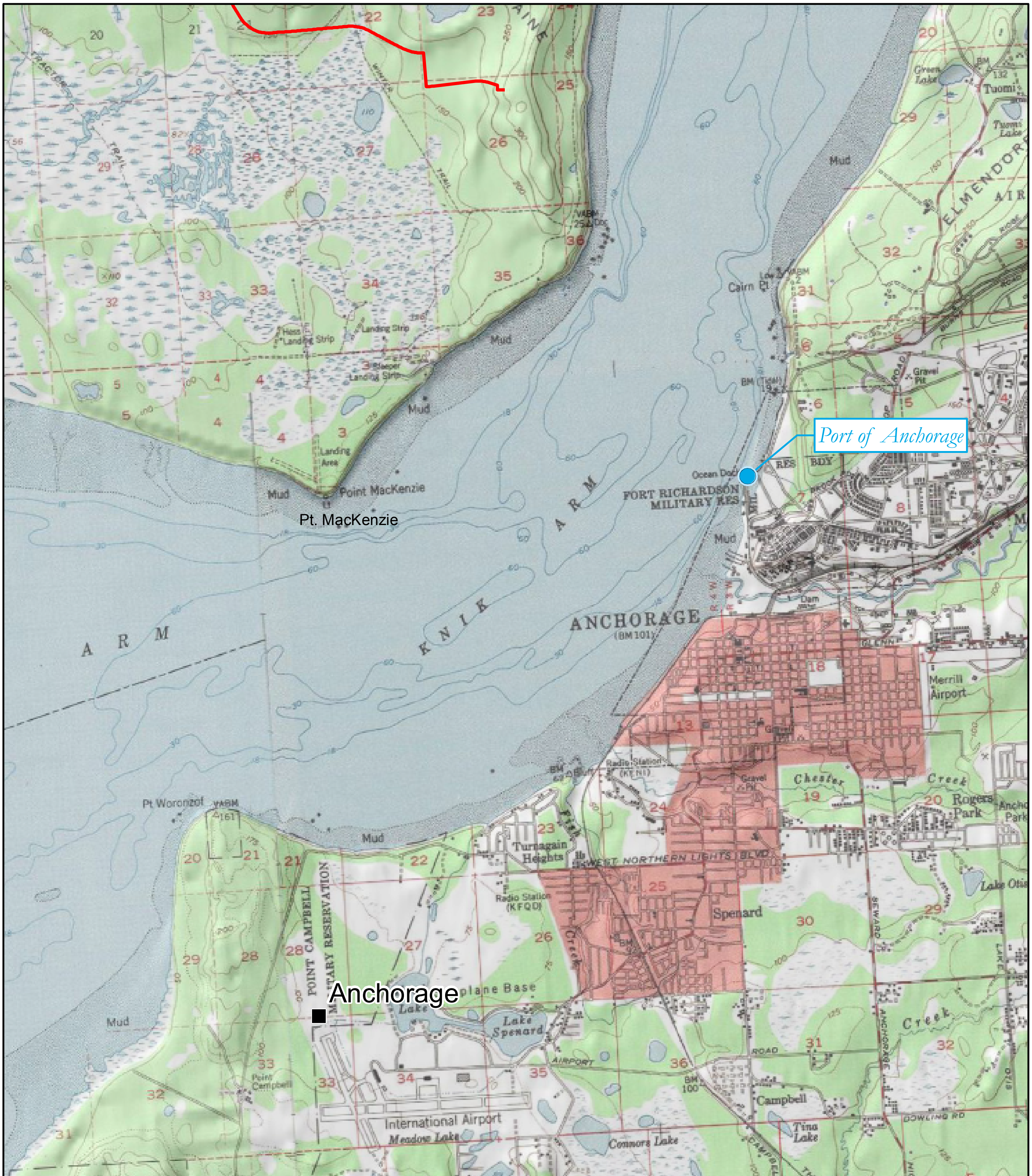

Alaska Stand Alone Gas Pipeline Route

Port of Anchorage

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ALASKA GASLINE DEVELOPMENT CORP.
GAS FOR ALASKANS

SOUTHERN PORTION OF THE ACTION AREA
PORT OF ANCHORAGE
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE: 0 0.5 1 1.5 Miles

FIGURE: 2.2-2

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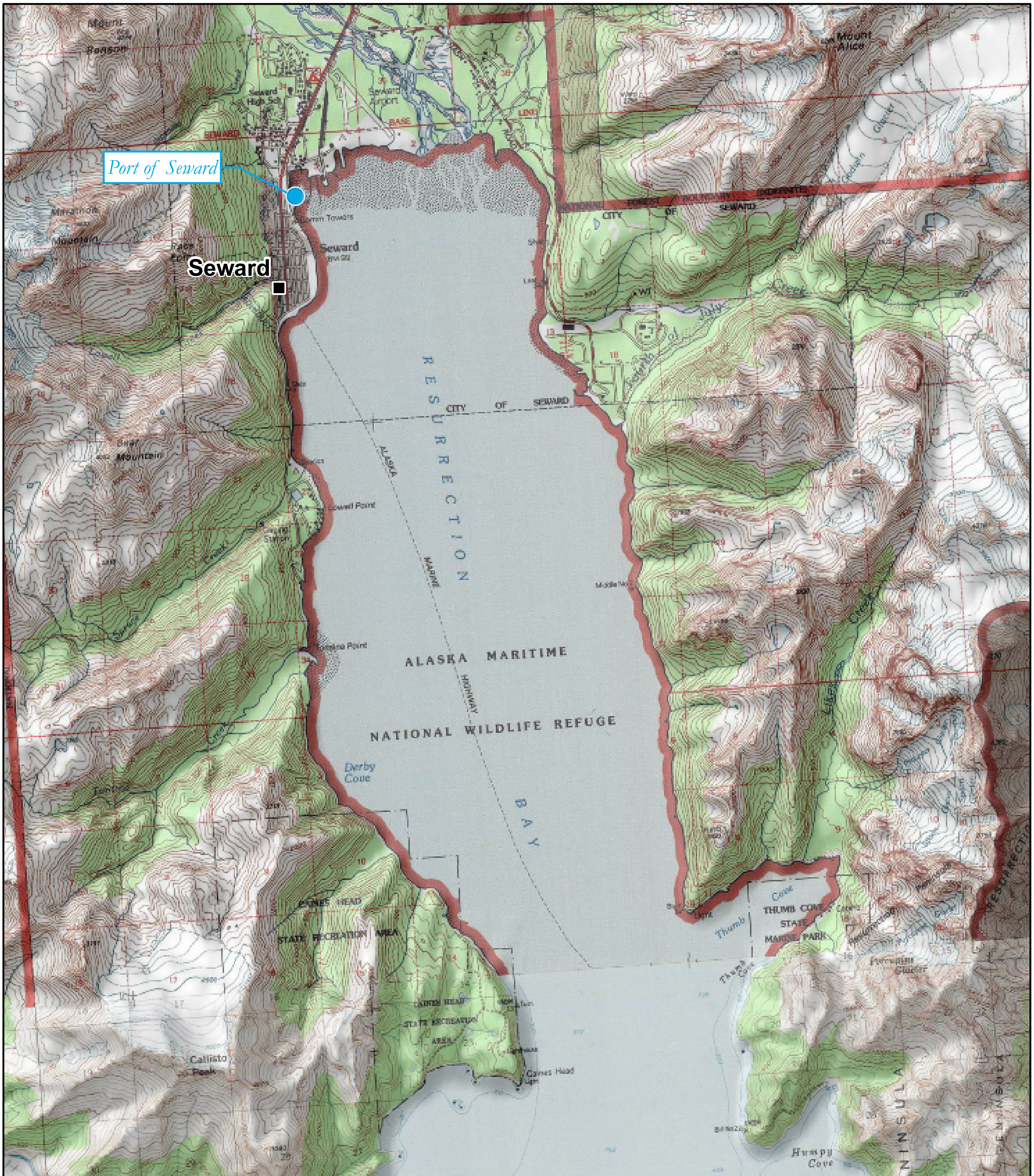

Port of Seward

NAD83, Alaska Albers

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Regulatory and Technical Services

ALASKA GASLINE DEVELOPMENT CORP.
GAS FOR ALASKANS

SOUTHERN PORTION OF THE ACTION AREA
PORT OF SEWARD
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE:
0 0.5 1 1.5 2 Miles

FIGURE:
2.2-3

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3.0 DESCRIPTION OF THE SPECIES AND THEIR HABITATS

The species and critical habitats discussed in this BA are those identified as a result of a USACE-initiated consultation with USFWS and NMFS. On 2 November 2010, the USACE forwarded letters to USFWS and NMFS that described the ASAP project, including action area, and requested a list of threatened and endangered species and critical habitat that may be present.

The USFWS responded with a letter dated 17 December 2010, stating that the project is within the range of the spectacled eider (*Somateria fischeri*), Steller's eider (*Polysticta stelleri*), and polar bear (*Ursus maritimus*), and that critical habitat for the polar bear was designated on 7 December 2010, which includes sea ice habitat, denning habitat, terrestrial denning habitat, and barrier island habitat. Since the receipt of the USFWS's letter, on 8 February 2011, the Pacific walrus was designated a candidate species based on the USFWS's determination that the Pacific walrus warrants protection under the ESA, but that its listing is currently precluded by limited agency resources and higher priorities. Accordingly, this BA addresses Pacific walrus, which may seasonally occur in very small numbers in the ASAP action area.

The NMFS responded with a letter dated 10 December 2010, stating that bowhead whales may be found in or adjacent to the action area near West Dock and that their presence would be considered seasonal or occasional occurrences. NMFS further stated that Cook Inlet beluga whales (*Delphinapterus leucas*), fin whales (*Balaenoptera physalus*), humpback whales (*Megaptera novaengliae*), and Steller sea lions (*Eumetopias jubatus*) may be found in or adjacent to portions of the action area in Cook Inlet, near Anchorage, and that fin whales, humpback whales, and Steller sea lions may be present in or adjacent to the action area around the Port of Seward. Although not identified in NMFS's species letter, the agency has proposed listing as threatened species, distinct population segments (DPSs) of bearded seals (*Erignathus barbatus*) and ringed seals (*Phoca hispida*) that occur in the Alaskan Arctic and that may be present in or adjacent to the action area near West Dock. In addition, NMFS has designated critical habitat for the Cook Inlet beluga whale that encompasses that portion of the ASAP action area located adjacent to the Port of Anchorage. Accordingly, this BA addresses potential effects on the proposed bearded and ringed seal DPSs, and to the Cook Inlet beluga whale critical habitat.

Descriptions of these species and critical habitats are provided below.

3.1 *Threatened and Endangered Species*

3.1.1 Steller's Eider

Biological Populations and Listing Status

The Steller's eider is a small sea duck with a Holarctic distribution in Russia and Alaska. Three distinct breeding populations are recognized: the Alaska breeding population, the Russian-Atlantic breeding population, and the Russian-Pacific breeding population. These breeding populations mix in wintering areas such as the Bering Sea.

USFWS was petitioned in December 1990 to list the Steller's eider as endangered under the ESA, and they concluded after a status review that listing the Steller's eider was warranted but precluded by higher listing priorities. Status of the species was subsequently reconsidered and USFWS concluded in August 1993 that available information did not support listing the species range-wide, but did support listing the Alaska-breeding population. Listing the species across its entire range was considered to be unwarranted because counts in 1992 indicated that at least 138,000 Steller's eiders wintered in southwest Alaska, and because indications of decline were based upon imprecise population size estimates. Although population size estimates for the Alaska-breeding population were also imprecise, it was clear that Steller's eiders had essentially disappeared as a breeding species from the Yukon-Kuskokwim Delta (Delta), where they had historically occurred, possibly in significant numbers.

On June 11, 1997, the Alaska-breeding population of the Steller's eider was listed as threatened based on the observed contraction in the breeding range in Alaska and the resulting increased vulnerability of the remaining breeding population to extirpation (Federal Register [FR] 62:31748–31757). Causes for the decline were not identified when the listing occurred; potential causes referenced included hunting, ingestion of lead shot, predation, and changes in the marine environment that may be affecting eider food resources, Causes of the decline are still poorly understood (USFWS 2002a). The Alaska-breeding population is the only population listed under the ESA.

Population Status, Trends, and Abundance

The current world population of Steller's eiders is estimated to be about 150,000 to 200,000 birds, but is thought to have declined by as much as 50 percent in the 1960s, 1970s and 1980s (ADFG 2011). Currently, most of the world's Steller's eiders nest in Russia, with the Alaskan breeding population being much smaller than the Russia population. The species has undergone near extirpation in western Alaska. It still breeds on the ACP (Dau et al. 2000), but populations may number as low as 1,000 birds. Mallek et al. (2007), reporting the results of 21 consecutive years of aerial surveys, provided estimates of breeding Steller's eiders on the ACP that ranged from 0 to 2,543 with an average of 631. Based on these aerial surveys, Larned et al. (2010) reported a positive growth rate of 1.010 percent annually for the North Slope subpopulation of Steller's eiders from 1992–2009, and 1.056 percent annually for 2001–2010.

Range

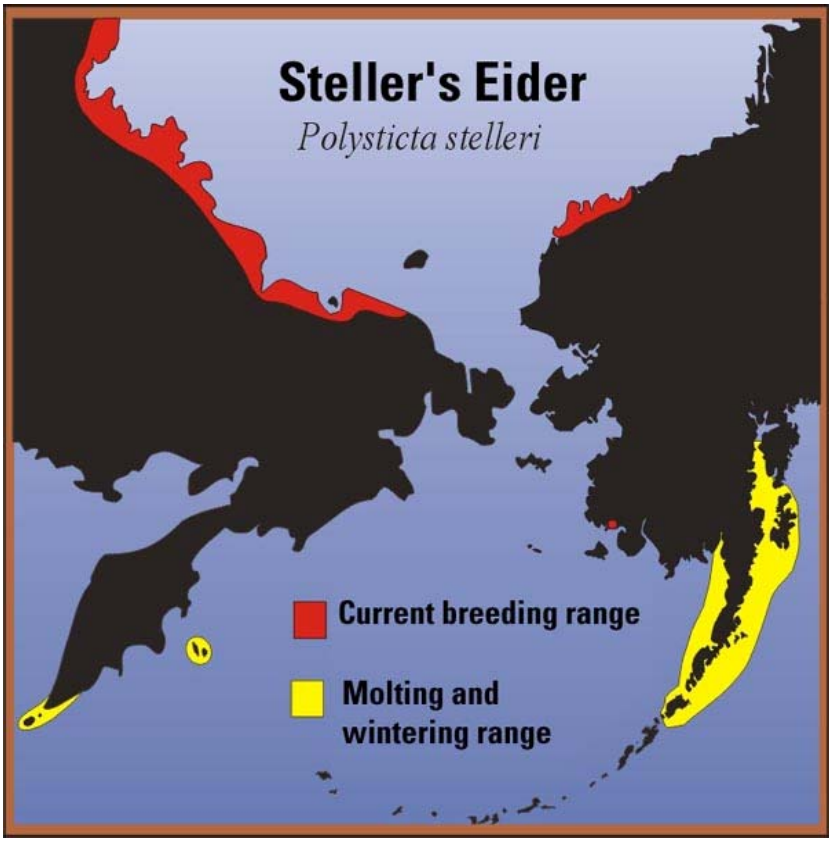
Range of the Steller's eider in the Pacific is indicated below in Figure 3.1-1. The nesting distribution for the Alaska breeding population of Steller's eider includes much of the ACP in Alaska. A very small population also nests in the Delta. The majority of sightings of nesting Steller's eiders observed during annual aerial surveys of breeding pairs of waterfowl (e.g. Mallek et al. 2007) since 1986, and eider breeding population surveys (e.g. Larned et al. 2006) conducted across the ACP annually since 1992, have occurred east of Point Lay and west of Prudhoe Bay, and within about 50 miles of the coast (USFWS 2002a). The largest concentrations of breeding Steller's eiders in Alaska are found in the Barrow area, which is considered to be the core of the nesting area (USFWS 2002a), east to the Colville River Delta (USFWS 2005). Steller's eiders winter in coastal waters along the Aleutian Islands, Kodiak Island, and lower Cook Inlet.

Life History and Habitat Use

Breeding pairs are formed on wintering grounds. The birds congregate in large numbers in estuaries along the north side of the Alaska Peninsula in the spring, and then migrate north and east to the breeding grounds using coastal waters and offshore leads (Roseneau and Herter 1984, USFWS 2002a). Steller's eiders begin migrating into the ACP in late May or early June, when ponds and tundra begin to thaw. Steller's eiders that have arrived on the North Slope but have not begun to nest are often associated with deep to shallow Arctophila and Carex ponds (Rojek 2006, 2007, 2008).

Nesting in the Barrow area began 10 June – 1 July in 2005, 2006, and 2007 (Rojek 2006, 2007, 2008). Nest sites are chosen in open tundra or within shrub communities near ponds (Deygtyarev et al. 1999), often on slightly elevated areas near ponds (Murie 1924, Brandt 1943, Cramp et al. 1977). USFWS reported that most observed nests in the Barrow area have been found on the rims of low-centered polygons within partially-drained lake basins that contain a mosaic of shallow ponds with emergent sedges, and most are within 330 feet of permanent water (unpublished data summarized in FR 65:13262–13283).

Figure 3.1-1 Range of the Steller's Eider in the Pacific



Source: USFWS 2002

Steller's eiders hatch in late June and the female and brood move from the nest site to brood habitat in nearby ponds and wetlands, where they feed on aquatic insects and plants until they are capable of flight (Solovieva 1997). In the Barrow area, hatching was determined to occur 12 July – 2 August in 2005, 2006, and 2007 and the distance traveled from the nest to the brooding area was found to range from 328 feet to 2 miles (Rojek 2006, 2007, 2008). Steller's eiders and their broods forage on insect larvae and beetle species in emergent vegetation in shallow ponds.

Females and their broods move to coastal marine waters as the broods fledge. Rojek (2006, 2007, and 2008) reported that broods are fledged in the Barrow area anywhere from the second half of August to early September. Males and unsuccessful hens leave the tundra earlier, being found at small ponds on the tundra nesting ground until the middle or end of July, at which time they move to coastal waters (Rojek 2006, 2007, 2008). In successful years, males move to nearshore waters prior to molting body feathers and forage prior to fall migration. Unsuccessful females may congregate near incubating females until departure (Solovieva 1997). In unsuccessful years, all birds generally depart the breeding grounds sometime in July (Fredrickson 2001) or even mid-June (Rojek 2008).

The birds move to molting areas in Western Alaska, such as the Alaska Peninsula, Izembek Lagoon, Nelson Lagoon, Port Heiden, and the Seal Islands (Petersen 1981). As sea ice forms in the Arctic Ocean, flocks move south through open leads and eventually arrive at ice-free lagoons along the north and south side of the Alaska Peninsula, Cook Inlet, and the eastern Aleutian Islands (USFWS 2005). Winter habitat consists of waters typically less than 30 feet deep, so most birds are found within about 1,312 feet of the shore, except where shallows extend further (USFWS 2002a). In these areas they dive for mollusks, crustaceans, small fish, and other invertebrates (Petersen 1981). These prey items are often associated with eelgrass meadows, which provide a substrate for invertebrates (Metzner 1993).

Critical Habitat

Approximately 2,830 square miles of land and coastal waters in five units were designated as critical habitat for the Alaskan breeding population of Steller's eiders in 2001 (FR 66:8849). These areas include the historic breeding range on the Delta (Unit 1), and molting or wintering grounds at the Kuskokwim Shoals (Unit 2), Seal Islands (Unit 3), Nelson Lagoon (Unit 4), and Izembek Lagoon (Unit 5). All designated critical habitat for Steller's eiders is located more than 100 miles from the action area.

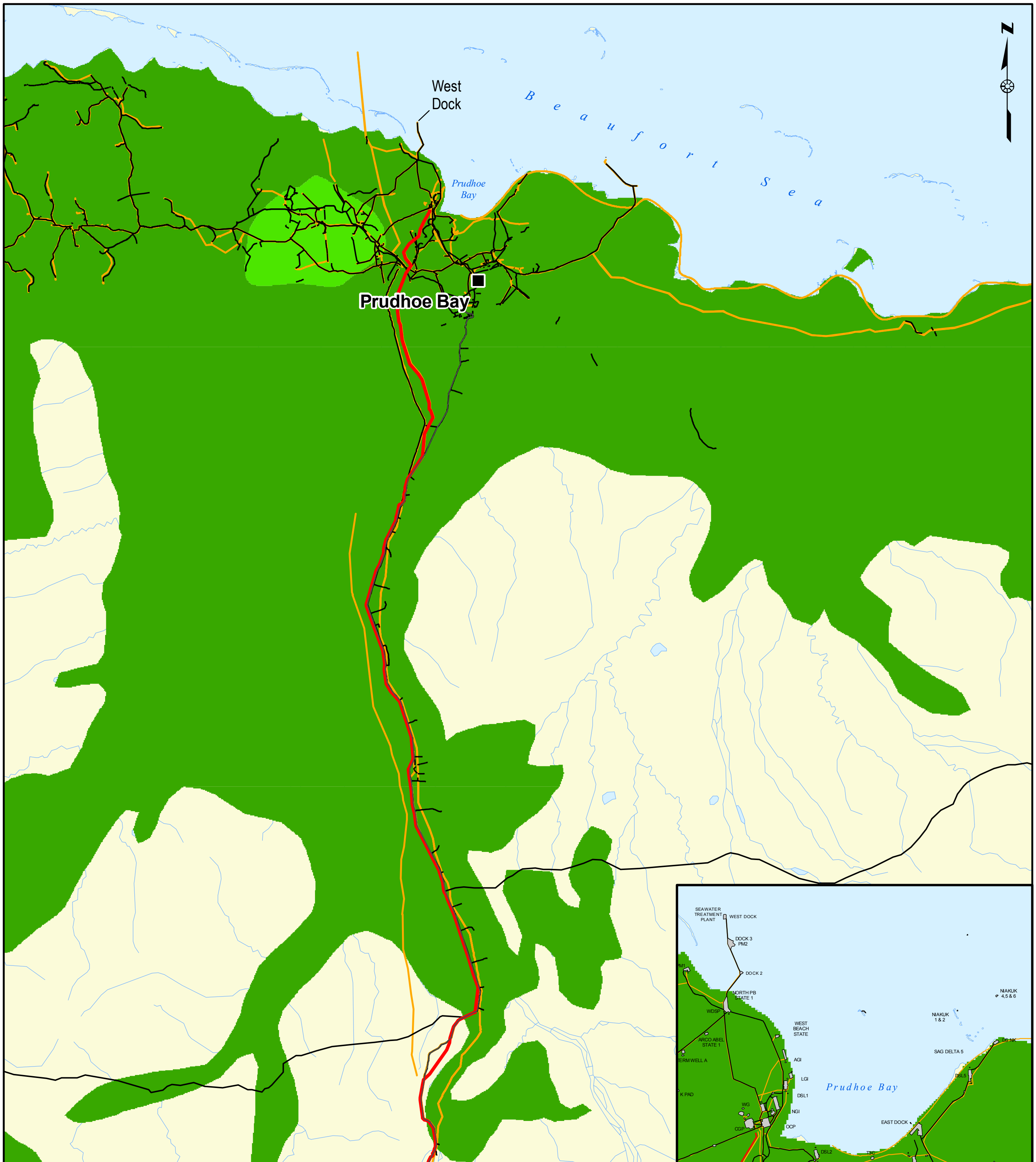
Steller's Eiders in the Action Area

From late May through early September, Steller's eiders may be found within or near portions of the action area located on the ACP, and in coastal waters near West Dock in the Beaufort Sea (See Figure 3.1-2). All other portions of the action area, including other terrestrial portions of the action area, and coastal waters adjacent to the Ports of Anchorage or Seward are not within the range of the species according to published maps, and the eiders would not be expected to occur in these areas.

The USFWS conducted annual aerial population surveys for breeding pairs of waterfowl on the entire ACP, including the Prudhoe Bay area, from 1986–2006 (Mallek et al. 2007), and conducted separate aerial surveys in the same area specifically for eiders from 1992 to 2006 (Larned et al. 2006). Since 2007, the two survey programs have been combined (Larned et al. 2010). The action area lies within areas documented by these survey programs as having low densities of nesting or breeding eiders. Since 1986 these surveys have resulted in observations of only four pairs of Steller's eiders in the Prudhoe Bay area. The USFWS survey data also indicate a mean positive annual population growth rate for Steller's eiders on the North Slope over the last 20 years of 1.010 percent annually, but the trend estimate is not considered to be meaningful because it is based on so few observations (Larned et al. 2010).

Site-specific surveys for Steller's eider's have not been conducted in the action area for the ASAP. However, Troy and Johnson (1987) reported the results of intensive avian surveys conducted for shorebirds and waterfowl in the lagoon waters on either side of West Dock and on the adjacent tundra in July–September 1981 that were part of a monitoring study for the Prudhoe Bay waterflood project. No Steller's eiders were observed along transects in the lagoon waters, but one Steller's eider was observed on the tundra. It was also reported in the FR 62:31750 (citing Troy personal communication) that a few pairs of Steller's eiders were observed on the tundra in the Prudhoe Bay oil fields each year from 1992 to 1994.

Extensive aerial surveys of the bird use of nearshore and offshore waters extended from Barrow to the Canadian border and from the shoreline offshore for distances of up to 62 miles in 1991, 2000, and 2001 (Fischer and Larned 2004). Only three Steller's eiders were observed, representing about 0.01 percent of all observed birds. The observed Steller's eiders were in Smith Bay more than 100 miles to the west of the action area.



Steller's Eider Densities:

- Low
- Medium Low
- Medium
- Medium High
- High

- Alaska Stand Alone Gas Pipeline Route
- Pipeline
- Road

Bird Density data source: U.S. Fish and Wildlife Service, Arctic Coastal Plain Survey 1993-2005.

NAD83, Alaska Albers Equal Area.

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STELLER'S EIDER DENSITY ON THE EASTERN NORTH SLOPE
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE: 0 3 6 9 12 Miles

FIGURE: 3.1-2

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Threats

Toxic Contamination of Habitat

Lead poisoning from the deposition of lead shot in nearshore habitats is a threat to spectacled and Steller's eiders. Lead poisoning of spectacled eiders has been documented on the North Slope of Alaska. Use of lead shot for hunting all birds on the North Slope is prohibited. Hunter outreach programs are being conducted to educate hunters and prevent the use of lead shot on the North Slope. Development of the proposed project will not increase hunting of spectacled or Steller's eiders or the use of lead shot in the action area.

Increased Predator Populations

Predator and scavenger populations may be increasing on the North Slope near industrial development and human infrastructure. Increased fox, gull, and raven populations (due to anthropogenic food sources and increased denning and nest sites) may have affected eider populations, although this has not been proven (USFWS 2009a).

Harvest

Hunting for spectacled and Steller‘s eiders was closed in 1991, however harvest data indicates that listed eiders continue to be hunted on the North Slope. Efforts are being conducted by BLM, North Slope Borough and USFWS to curtail this activity. Much of this activity has taken place near Barrow and other villages, not in the project action area. Intra-service consultations for the Migratory Bird Subsistence Hunting Regulations are conducted annually and the harvest of listed eiders is being monitored.

Impacts from Development

Alteration of North Slope nesting habitat of listed eiders has not been extensive to date. Some areas of breeding habitat have been altered by wetland fill and human infrastructure that may disturb individual birds, increase nesting or denning predators, or present collision obstacles. However, human activities on the ACP are not thought to have played a significant role in population declines of listed eiders, and, accordingly, Steller's eiders were not listed as a result of the impacts of development. Development and other activities that may adversely affect listed eiders undergo a Section 7 consultation, and the amount of impact is estimated in order to issue an Incidental Take Statement and a non-jeopardy conclusion (USFWS 2009a).

Climate Change

The North Slope of Alaska is especially sensitive to climate fluctuations. How this will likely affect individual organisms, species, or communities is difficult to assess, due to the large number of variables affecting and affected by climate change. Lakes and ponds used by eiders for forage and nesting are affected by warmer temperatures and longer growing seasons. Changes in precipitation patterns, air and soil temperature, and water chemistry are also affecting tundra communities (Hinzman et al. 2005). The comprehensive effects of global climate change that will impact both the habitats of spectacled and Steller's eiders are unknown at this time (USFWS 2009a).

3.1.2 Spectacled Eider

Biological Populations and Listing Status

The spectacled eider *(Somateria fischeri)* is a sea duck that inhabits the northern extent of the Pacific Ocean in the Chukchi and Bering Seas. Three primary breeding populations have been identified, the Russian arctic population, the ACP of Alaska population, and the Delta population in western Alaska.

The spectacled eider was listed as threatened throughout its range under the ESA in 1993 (FR 58:27474). It is believed that large declines in the populations were due to exposure to lead shot, increased predation, and changes in forage quality in wintering areas of the Bering Sea (USFWS 2002a).

Populations Status, Trends, and Abundance

The world-wide population of spectacled eiders was estimated by Larned and Tiplady (1999) to be about 330,000–390,000 birds. This estimate was based on survey counts of birds wintering in the Bering Sea, and therefore presumably includes many non-breeding birds. It has been estimated that about 4,000 pairs nest annually in the Delta, another 3,000–4,000 pairs nest on the ACP, and perhaps 40,000 or more pairs nest in arctic Russia (USFWS 2009a). Populations in the Delta declined by about 96 percent in the 1970s, 1980s, and 1990s, to the present 4,000 pairs. Due to the scarcity of historical data, it is unknown whether such declines ever occurred in Russia or on the ACP. Current survey data suggest that the spectacled eider population on the ACP is generally stable (Larned et al. 2006).

Range

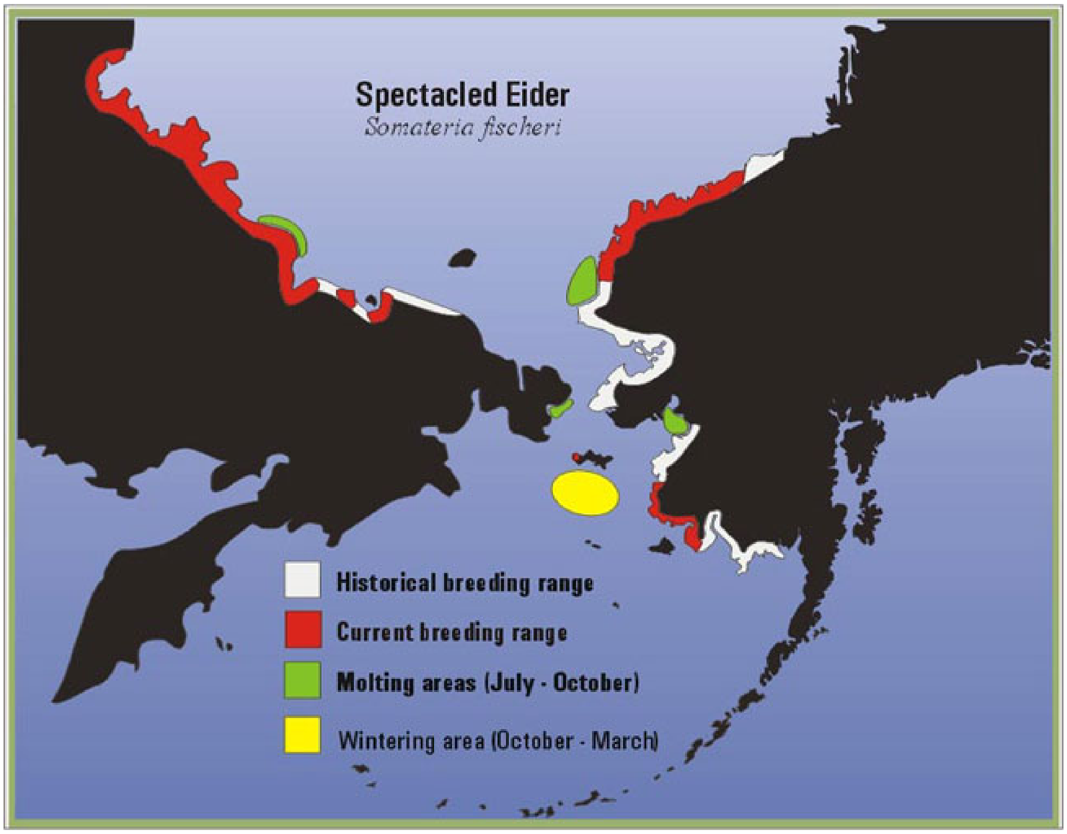
The range of the spectacled eider in the Pacific is indicated below in Figure 3.1-3. Although the historical nesting range was considerably larger, today spectacled eiders nest in three primary locations, the central coast of the Delta, the ACP of Alaska, and the eastern ACP of Russia (Petersen et al. 1999).

Nesting occurs on the ACP from about the Utukok River just south of Icy Cape, north and west to the Shaviovik River, and within this area most of the nesting takes place between Cape Simpson and the Sagavanirktok River (USFWS 2000), and primarily north of latitude of 70 degrees (USFWS 2000) or within about 50 miles of the coast (Larned and Balogh 1997).

Four principal molting areas have been identified: Ledyard Bay along the northeastern Chukchi Sea, Norton Sound in the northeastern Bering Sea, and Mechigmenskiy Bay and the Indigirka-Kolyma Delta in Russia. Most females from the North Slope molt in Ledyard Bay and Mechigmenskiy Bay, while the males molt in all three areas with about equal numbers molting at Ledyard Bay, Mechigmenskiy Bay, and the Indigirka-Kolyma Delta (Peterson et al. 1999).

The only known wintering area used by spectacled eiders is located in the Bering Sea south of Saint Lawrence Island, in water depths of 165–200 feet. Thousands of spectacled eiders are known to congregate in open areas in the pack ice in this area.

Figure 3.1-3 Range of the Spectacled Eider in the Pacific



Source: USFWS 2002

Life History and Habitat Use

Spectacled eiders spend most of their life in the marine environment where they dive to feed on bottom-dwelling prey such as mollusks, bivalves, and crustaceans (Petersen et al. 1998). These prey items are part of a benthic community that is highly variable, being influenced by seasonal and decadal weather systems in the North Pacific (Peterson and Douglas 2004; Grebmeier and Dunton 2000). This variability, coupled with the extreme energetic requirements of their habitats, may explain as much as 50 percent of winter mortality of female spectacled eiders (Flint et al. 2000).

Spectacled eiders return from wintering areas in the Bering Sea in late May or early June and nest in coastal wetlands near relatively shallow lakes and ponded areas dominated by emergent vegetation. Densities of spectacled eiders vary across the ACP, with larger densities west of the proposed action area (Figure 3.1-4). Surveys conducted since 1992 by the USFWS have recorded higher densities in recent years near Teshekpuk Lake. In the action area, the breeding population density of spectacled eiders is between 0.05 and 0.4 eiders per square mile (Larned et al. 2006).

Males depart the nesting grounds once females begin to incubate their clutch of eggs from mid- to late June. Depending upon breeding success, females will leave nesting areas between late June and early September (USFWS 2009a). As the annual sea ice forms, open water, or leads, provide molting and foraging habitat for spectacled eiders in northeast Russia and Ledyard Bay in the Chukchi Sea prior to winter migration (USFWS 2002a).

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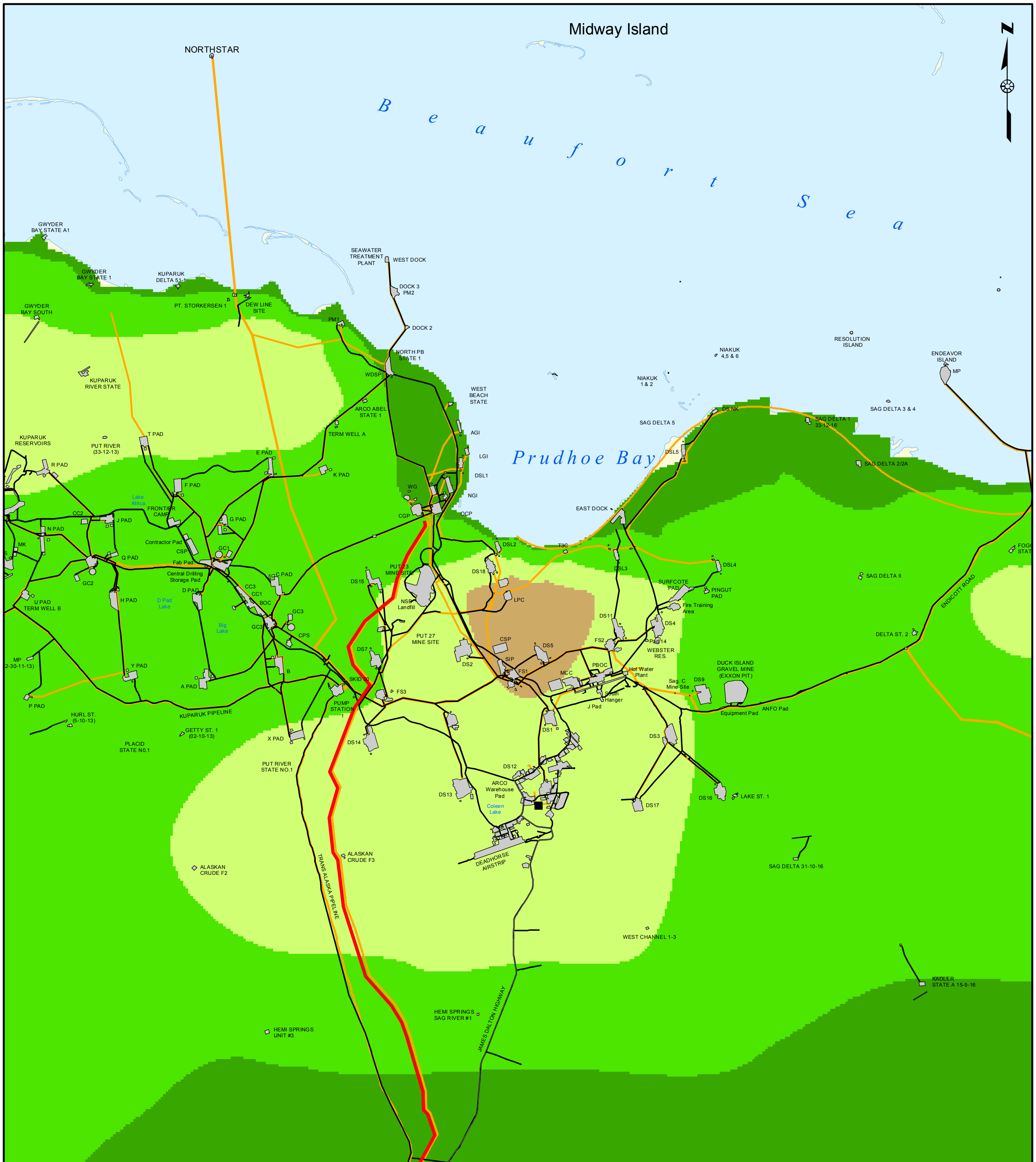

Spectacled Eider Densities:

- Low
- Medium Low
- Medium
- Medium High
- High

- Alaska Stand Alone Gas Pipeline Route
- Pipeline
- Road
- Facility

Bird Density data source: U.S. Fish and Wildlife Service, Arctic Coastal Plain Survey 1993-2005.

NAD83, Alaska Albers Equal Area.

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GAS FOR ALASKANS

SPECTACLED EIDER DENSITY ON THE EASTERN NORTH SLOPE
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE: 0 1 2 3 4 Miles

FIGURE: 3.1-4

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All three breeding populations congregate in a 3,000-square mile area south of St. Lawrence Island (Peterson and Douglas 2004; FR 66:9146).

Critical Habitat

Critical habitat for spectacled eiders was designated by the USFWS in 2001 (FR 66:9146) and comprises nesting habitat in the Delta, molting areas in Norton Sound and Ledyard Bay, and wintering habitat south of St. Lawrence Island (Figure 3.1-3). All designated critical habitat is located more than 400 miles from the action area.

Spectacled Eiders in the Action Area

Spectacled eiders may be present in or near the action area near the northern coast of Alaska and West Dock but are not expected near the action areas in Seward or Anchorage or along the pipeline corridor further than approximately 50 miles from the northern coast.

Surveys were conducted in offshore waters of the Beaufort Sea in order to determine the composition and distribution of birds in June, July, and August 1999–2001 (Fischer and Larned 2004). In 1999 and 2000 the area near West Dock at Prudhoe Bay was surveyed. Spectacled eider density was low throughout the entire survey area. In 2001, 15 spectacled eiders were seen between Prudhoe Bay and Barrow, and the density in the area encompassing West Dock was 0.0 (Fischer and Larned 2004).

Threats

Toxic Contamination of Habitat

Lead poisoning from the deposition of lead shot in nearshore habitats is a threat to spectacled and Steller’s eiders. Lead poisoning of spectacled eiders has been documented on the North Slope of Alaska. Use of lead shot for hunting all birds on the North Slope is prohibited. Hunter outreach programs are being conducted to educate hunters and prevent the use of lead shot on the North Slope. Development of the proposed project will not increase hunting of spectacled or Steller’s eiders or the use of lead shot in the action area.

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Predator and scavenger populations may be increasing on the North Slope near industrial development and human infrastructure. Increased fox, gull, and raven populations (due to anthropogenic food sources and increased denning and nest sites) may have affected eider populations, although this has not been proven (USFWS 2009a).

Harvest

Hunting for spectacled and Steller’s eiders was closed in 1991, however harvest data indicates that listed eiders continue to be hunted on the North Slope. Efforts are being conducted by BLM, North Slope Borough and USFWS to curtail this activity. Much of this activity has taken place near Barrow and other villages, not in the project action area. Intra-service consultations for the Migratory Bird Subsistence Hunting Regulations are conducted annually and the harvest of listed eiders is being monitored.

Impacts from Development

Alteration of North Slope nesting habitat of listed eiders has not been extensive to date Some areas of breeding habitat have been altered by wetland fill and human infrastructure that may disturb individual birds, increase nesting or denning predators, or present collision obstacles. However, human activities on the ACP are not thought to have played a significant role in population declines of listed eiders, and, accordingly, spectacled eiders were not listed as a result of the impacts of development. Development and other activities that may adversely affect listed eiders undergo a Section 7 consultation, and the amount of impact is estimated in order to issue an Incidental Take Statement and a non-jeopardy conclusion (USFWS 2009a).

Climate Change

The North Slope of Alaska is especially sensitive to climate fluctuations. How this will likely affect individual organisms, species, or communities is difficult to assess, due to the large number of variables affecting and affected by climate change. Lakes and ponds used by eiders for forage and nesting are affected by warmer temperatures and longer growing seasons. Changes in precipitation patterns, air and soil temperature, and water chemistry are also affecting tundra communities (Hinzman et al. 2005). The comprehensive effects of global climate change that will impact both the habitats of spectacled and Steller’s eiders are unknown at this time (USFWS 2009a).

3.1.3 Bowhead Whale

Biological Populations and Listing Status

Five stocks of bowhead whales are recognized worldwide (Angliss and Allen 2009b): the Western Arctic, Sea of Okhotsk, Spitsbergen, Davis Strait, and Hudson Bay stocks or populations. The Western Arctic stock of bowhead whales is the only stock found within U.S. waters. The bowhead whale is federally designated as endangered. The species was listed as an endangered species on 2 June 1970 (FR35:8495). It is also an Alaska Species of Special Concern. The Western Arctic stock is classified by NMFS as a strategic stock because the bowhead whale is listed as endangered under the ESA and therefore also designated as depleted under the Marine Mammal Protection Act (MMPA) (Angliss and Allen 2009b).

Populations Status, Trends, and Abundance

Small stocks occur in the Sea of Okhotsk and the offshore waters of Spitsbergen. These are composed of only tens to hundreds of individuals (Shelden and Rugh 1995, Zeh et al. 1993). Until recently, available evidence indicated that only a few hundred bowheads were in the Hudson Bay and Davis Strait stocks, but it now appears these should be considered one instead of two stocks based on genetics (Postma et al. 2006), aerial surveys (Cosens et al. 2006), and tagging data (Dueck et al. 2006; Heide-Jørgensen et al. 2006), and the abundance may be over a thousand (Heide-Jørgensen et al. 2007).

Based on the most recent abundance estimates, approximately 10,545 bowhead whales make up the Western Arctic stock (Angliss and Outlaw 2008). In the late 19th and early 20th century, this stock was overwhelmed by highly successful commercial whaling. The number of bowhead whales plummeted from an estimated population, in 1848, of 10,400–23,000 whales to a rough count of 1,000–3,000 individuals in the mid-20th century (Woodby and Botkin 1993). Commercial whaling of bowheads was outlawed in 1996 by a moratorium from the International Whaling Commission (IWC), although specific exemptions for certain countries exist and limited modern subsistence whaling continues with oversight and quotas regulated by the IWC.

Studies and surveys indicate the bowhead whale population has slowly increased at an annual rate of 3.4 percent between 1978 and 2001 to the current estimated number of 10,470 individuals (George et al. 2004), despite regulated harvests by subsistence hunters. The 1993 population was estimated at 8,200 (Zeh et al. 1995). Calf counts in 2001 were the highest on record, 121 individuals, confirming a growing population (George et al. 2004). Today, some reports suggest Western Arctic stock bowhead whales are approaching the carrying capacity of their habitat (Brandon and Wade 2004).

Range

Bowhead whales are distributed seasonally in ice-covered waters of the Arctic and near-Arctic, generally between 60 degrees and 75 degrees North latitude in the Western Arctic Basin (Moore and Reeves 1993). The majority of bowhead whales overwinter in the central and northwestern Bering Sea (November to March), migrate through the Chukchi Sea in the spring (March through June) following offshore ice leads around the coast of Alaska in continental shelf waters, and spend summers in the Canadian Beaufort Sea (mid-May through September) (Braham et al. 1980; Moore and Reeves 1993).

Life History and Habitat Use

Most bowheads of the Western Arctic population overwinter in the central and western Bering Sea, where they are associated with polynyas and the marginal ice zone. The amount of feeding that takes place in the Bering Sea is unknown (Richardson and Thomson 2002), however most mating is thought to occur there

(MMS and NMFS 2008). The whales congregate in polynyas before migrating in the spring (Moore and Reeves 1993), passing through the Bering Strait and into the Chukchi Sea from late March to mid-June (NMFS 2008a). Migration through the eastern Chukchi Sea takes place largely in open leads, some or most calving occurs at this time in the Chukchi Sea. Spring whaling takes place at this time by residents of Point Hope, Point Lay, Wainwright, and Barrow. Bowheads have been observed to pass Barrow, entering into the Beaufort Sea from early April to late May (IWC 2004). Migration through the Beaufort Sea occurs through lead systems offshore of the barrier islands. The whales arrive on their summering grounds in near Banks Island in Canada from Mid-May through June (IWC 2005). Bowheads move back out of the Canadian Beaufort and into the Alaska Beaufort Sea in August and September, with migration in the Central Beaufort and Prudhoe Bay area continuing from late August through late October (Moore and Reeves 1993).

Bowheads frequently interrupt their migration to feed (Ljungblad et al. 1986; Lowry 1993; Lowry et al. 2004) and their stops vary in duration from a few hours to a few weeks (MMS 2002). A commonly used feeding area is in and near Smith Bay, east of Barrow. Less consistently used feeding areas are in coastal and shelf waters near and east of Kaktovik. In 2007 and 2008, bowhead whales also used areas near Camden Bay to feed during their migration (Ireland et al. 2008, Funk et al. 2008). More research is being funded by the former Minerals Management Service (MMS) (now the Bureau of Ocean Energy Management, Regulation and Enforcement [BOEMRE]) Bowhead Whale Feeding Ecology Study (BOWFEST) to determine the extent to which bowheads might feed in the western Beaufort Sea.

During the fall migration (September–November) bowhead whales typically travel in continental shelf waters that are less than 164 feet deep on their way back to the Bering Sea. Ice cover influences the timing, duration, and path that the whales follow (Treacy 2002). In heavy ice conditions, bowhead whales divert north and migrate in deeper water further offshore (Moore et al. 2000).

Fall whaling for Kaktovik and Nuiqsut residents occurs from late August to mid-September. Traditional Knowledge gathered from local Iñupiat residents suggests that migration pods are segregated by sex and age (Braham et al. 1980). Bowhead whales typically reach the Barrow area in mid-September to late October during their westward migration from the feeding grounds in the Canadian Beaufort. Fall bowhead whaling near Barrow normally begins in mid-September, but may begin as early as August if whales are present and ice conditions are favorable (BLM 2005). Whaling near Barrow may continue into October, depending on the quota and conditions.

Fall surveys of bowhead whales in the Beaufort Sea have been conducted annually by MMS since 1979 (Ljungblad et al. 1986, 1987; Moore et al. 1989; Treacy 1988-1998, 2000, 2002a,b). Results of those surveys show that bowhead whales tend to migrate to deeper water (farther offshore) in the fall during years with higher-than-average ice coverage (Moore et al. 2000b). Most bowhead whales migrate west in water ranging from 50 to 650 feet deep (Miller and Davis 2002), though some individuals enter shallower water, particularly in light ice years. Ice cover influences the timing, duration, and path that the whales follow (Treacy 2002).

Bowhead whales feed primarily on copepods and euphausiids (Lowry 1993; Lowry and Sheffield 2002). To satisfy energy requirements, bowheads may need to find areas with above-average concentrations of zooplankton (Lowry 1993).

Bowhead whales are long-lived, slow-growing, late-maturing, and reproduce infrequently (Koski et al. 1993). Females and males become sexually mature around 25 years of age (George et al. 2007). Bowhead whales mate and calve during spring migration (Nerini et al. 1984), and calving occurs every three to four years (Koski et al. 1993). Gestation lasts between 12 and 16 months (Nerini et al. 1984). The majority of bowhead whale mating occurs in March and April (IWC 2004).

Critical Habitat

No critical habitat has been designated for the bowhead whale. The NMFS was petitioned by the Center for Biological Diversity and Marine Biodiversity Protection Center on 22 February 2000, to designate critical habitat for the Western Arctic bowhead stock. Petitioners asserted that the nearshore areas from the U.S.–Canada border to Barrow, Alaska should be considered critical habitat. Upon review, NMFS found the petition to have merit (FR 66:28141), but subsequently on 30 August 2002 (FR 67:55767), they announced the decision to not designate critical habitat for this population. In this decision, NMFS reported that they believed designation of critical habitat was not necessary because the population is known to be approaching its pre-commercial whaling population size, the population is increasing, there are no known habitat issues which are slowing the growth of the population, and activities that occur in the petitioned area are already managed to minimize impacts to the population (Angliss and Allen 2000b).

Bowhead Whales in the Action Area

Bowheads do not occur in Cook Inlet or the Gulf of Alaska and therefore would not be expected to occur in marine portions of the action area at Anchorage or Seward. Most of the bowhead whale population migrates through the Beaufort Sea offshore of West Dock during spring and fall (late August through late October) migrations to and from the summer feeding grounds. The migrations have been monitored by BOEMRE and NMFS since 1982 (Treacy et al. 2006, Clarke and Ferguson 2010) and industry (Blackwell et al. 2007, Ireland et al. 2009) over a number of years. A small number of bowhead whales have been seen or heard offshore near Prudhoe Bay in late August. (LGL and Greenridge 1996, Greene et al. 1999, Blackwell and Greene 2004, Blackwell et al. 2008, Goeta et al. 2008). Figure 3.1-5 shows bowhead whale sightings by the former MMS in the Beaufort Sea. However, these survey data indicate that the fall migration off northern Alaska occurs primarily over the continental shelf, mainly in waters 66–197 feet deep (Moore et al. 1989, Moore and Reeves 1993, Treacy 2002), e.g., generally 12–37 miles offshore (Treacy 2002, Monnett and Treacy 2005, Treacy et al. 2006).

Monitoring surveys have been conducted annually at the Northstar offshore oil and gas facility since 2001, and the survey area is just offshore of West Dock. Over 95 percent of the bowheads observed during these fall surveys occurred more than 13.9 miles offshore in 2001, 14.2 miles in 2002, 8.4 miles in 2003, and 10.1 miles in 2004 (Blackwell et al. 2007). West Dock extends out from the shoreline a total distance of 2.7 miles to water depths 7 feet. The occurrence of bowhead whales in the action area is therefore highly unlikely.

Threats

Known actions that have had an effect on bowhead whales in the past or are having an effect now in the proposed action area include historic commercial whaling, subsistence hunting, oil and gas-related activity, non-oil and gas industrial development, research activities, marine vessel traffic and commercial fishing, pollution and contaminants baseline, and climate change. Other than historic commercial whaling, no data is available to signify that any previous or current human activity has had population-level negative effects on bowhead whales or the recovery of the species (MMS and NMFS 2008).

The following documents have more detailed information regarding threats to bowhead whales and are incorporated here by reference:

Biological Opinion on Issuance of Annual Quotas Authorizing the Harvest of Bowhead Whales to the Alaska Eskimo Whaling Commission for the Period 2008 through 2012 (NMFS 2008a)

Final Environmental Assessment for Issuing Subsistence Quotas to the Alaska Eskimo Whaling Commission for a Subsistence Hunt on Bowhead Whales for the Years 2003 through 2007 (NMFS, 2003).

Biological Opinion on Oil and Gas Leasing and Exploration Activities in the U.S. Beaufort and Chukchi Seas, Alaska, and Authorization of Small Takes under the Marine Mammal Protection Act (NMFS 2008c).

Historical Commercial Whaling

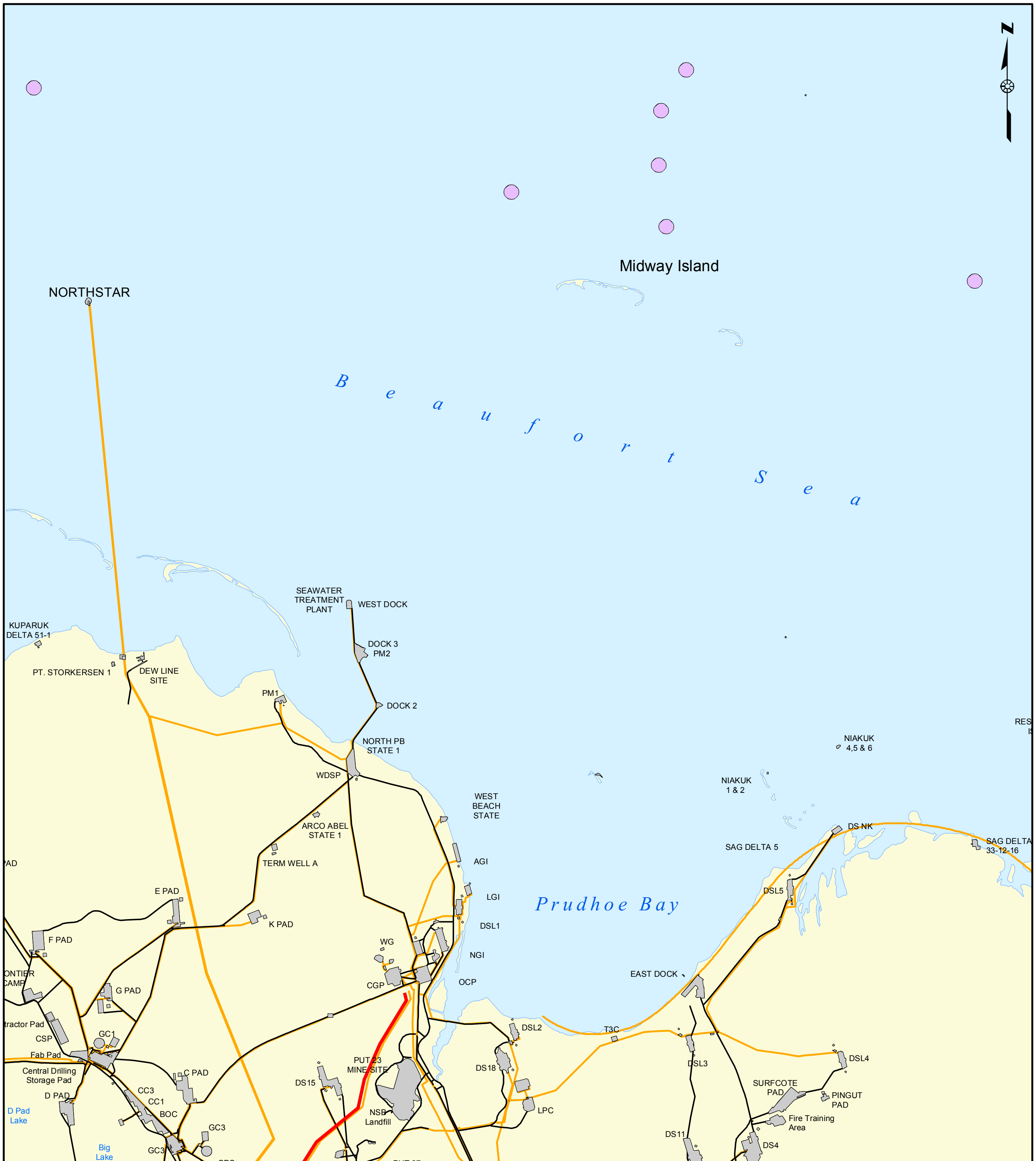
Current information suggests that bowhead whales in the Chukchi and Beaufort Sea planning areas are resilient at least to the level of human-caused mortality and disturbance that has existed after the cessation of commercial whaling (MMS and NMFS 2008).

Historic commercial whaling has had the greatest negative impact on bowhead whales of all past and present human industrial activities (NMFS 2008). Prior to the onset of commercial whaling activity in the late 1800s, it is estimated that the bowhead whale population was between 10,400 and 23,000 whales (Woodby and Botkin 1993). Near the end of commercial whaling, it is estimated that between 1,000 and 3,000 animals remained (Woodby and Botkin 1993). The Western Arctic population has increased in abundance significantly since the end of commercial whaling.

Subsistence Hunting

Alaska Native communities harvest bowhead whales for subsistence and cultural purposes as they have been doing for over 2,000 years (Stoker and Krupnik 1993). Currently, ten Alaskan villages participate in the bowhead whale hunt. There is no evidence that subsistence harvesting caused a significant negative impact on the Western Arctic population of bowhead whales prior to commercial whaling (MMS and NMFS 2008). However, as technological advances have been made, bowhead whales have become more accessible and easier to harvest, creating a possibility of over-harvest if unregulated (MMS and NMFS 2008).

Since 1977, the IWC has implemented a quota system to regulate the harvest of this population. There is currently a co-management agreement between the Alaska Eskimo Whaling Commission (AEWC), and the National Oceanic and Atmospheric Administration (NOAA). The IWC establishes strike limits for Russian and Alaskan communities. Over a period of five years 280 landings are currently allowed. Because the quota is dependent upon the population size of bowhead whales, it is unlikely that subsistence activities will cause a significant impact on the recovery of the Western Arctic population in the future.



Bowhead Whale Sighting

Alaska Stand Alone Gas Pipeline Route

Pipeline

Road

Facility

Sighting data obtained from Minerals Management Service Bowhead Whale Aerial Survey Project Historical Database, 1979-2007.

NAD83, Alaska Albers Equal Area.

ASRC Energy Services
a subsidiary of Arctic Slope Regional Corporation
REGULATORY AND TECHNICAL SERVICES

ALASKA GASLINE DEVELOPMENT CORP.
GAS FOR ALASKANS

BOWHEAD WHALE SIGHTINGS IN THE BEAUFORT SEA 1979-2007

Alaska Stand Alone Gas Pipeline/***ASAP***

Biological Assessment

SCALE:
0 1 2 3 4 Miles

FIGURE:
3.1-5

AES-RTS: 11-001-006.mxd, 04/06/11, R00

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Oil and Gas Activity

Offshore oil and gas activity, including seismic surveys, has occurred in the Chukchi and Beaufort Seas since the late 1960s (MMS and NMFS 2008). Two- and three-dimensional seismic programs have been conducted in both program areas. Twenty-three Geological and Geophysical permits were issued in the Beaufort Sea by the MMS in 1982 and 24 in 1983. There has been more seismic survey activity in the Beaufort Sea than in the Chukchi Sea. Between 1981 and 2002, 30 exploratory wells were drilled in the Beaufort Sea. Offshore oil and gas operations often require support operations that can also cause impacts to bowhead whales, such as ice-breaking, aircraft traffic, and vessel traffic.

More information on the history of oil and gas activity between 1979 and 1999 in the Beaufort Sea can be found in MMS Study 2002-071, *GIS Geospatial Data Base of Oil-Industry and Other Human Activity (1979-1999)* in the Alaskan Beaufort Sea (MMS 2002).

There is no indication that oil and gas activity in the Beaufort and Chukchi Seas have had any detectable long-term negative impacts on the health, status, or recovery of bowhead whale populations (MMS and NMFS 2008). The Western Arctic population has continued to increase over the period of time that oil and gas activities have been conducted offshore in the Alaskan Arctic.

The NMFS previously consulted with the MMS on the potential impacts of oil and gas leasing and exploration in the Beaufort and Chukchi Seas. NMFS issued seven Biological Opinions related to Outer Continental Shelf (OCS) lease sales. The Arctic Regional Biological Opinion was issued in 1988 on the potential effects of leasing and exploration activities in the Arctic Region and reinitiated in 1999. By 1999, oil and gas emphasis was placed on the Beaufort Sea. Therefore, the Biological Opinion issued in 1988 focused on the Beaufort Sea and presented newly available information on the potential effects of oil and gas-related noise on the bowhead whale. The Biological Opinion was revised in 2001 and concluded that oil and gas leasing and exploration in the Beaufort Sea was not likely to jeopardize the continued existence of bowhead whales.

With renewed industry interest in oil and gas exploration in the Chukchi Sea, the MMS reinitiated consultation with the NMFS in 2006 to include the Beaufort and Chukchi Seas. A revised opinion was issued in March 2006. After new information about the presence of humpback and fin whales in the Chukchi and Beaufort Seas, NMFS published a Biological Opinion of the potential impacts of oil and gas activities on those species along with the bowhead whale. They concluded that oil and gas activities in the Alaskan Beaufort and Chukchi Seas may affect but are not likely to jeopardize the continued existence of Western Arctic bowhead whales (MMS and NMFS 2008).

Vessel and Aircraft Traffic

Vessel traffic, in general, can impact bowhead whales due to disturbances by noise and vessel strikes. There are few documented records of vessel strikes of bowhead whales. There is speculation that vessel strikes could become more common in the future as vessel traffic is projected to increase due to receding ice levels (MMS and NMFS 2008). Noise disturbances could result in temporary changes in behavior, such as deflection or avoidance, of individual whales from a highly-localized area (MMS and NMFS 2008). Noises from vessels that could affect bowhead whales are generally associated with motors, seismic airguns, sonar, and ice-breaking (MMS and NMFS 2008). All disturbance effects on bowhead whales from marine vessels are expected to be short duration.

Low-flying aircraft could also produce noise that could temporarily disturb individual bowhead whales in a highly-localized area (MMS and NMFS 2008). Aircraft are generally flown at heights that do not cause harassment.

Fuel spills from either vessels or aircraft would introduce contaminants into the environment which could potentially impact bowhead whales if ingested, inhaled, or if physical contact occurred.

Commercial Fishing

Commercial fishing activities could impact whales via incidental take, entanglement in fishing gear, behavioral changes due to disturbances by associated activities, and vessel strikes. The association of bowhead whales with habitat associated with sea ice limits its exposure to commercial fishing activities (MMS and NMFS 2008). If commercial activity increases in the arctic and subarctic environments due to a reduction in sea ice, disturbances of bowhead whales by commercial fishing activities will increase. There have been no reports by marine mammal observers on commercial fishing vessels of bowhead whale mortalities due to commercial fish operations (Angliss and Lodge 2002). There have been few documented incidents of bowhead whales interacting with commercial crab pot gear, but, according to preliminary results of the examination of harvest records, there are slightly more incidents associated with ropes (Angliss and Outlaw 2008). The annual rate of bowhead entanglement in marine debris or gear between 2003 and 2008 is 0.4 percent annually (Angliss and Outlaw 2008.)

Climate Change

The current trend of warming in the arctic environment is attributed to the changes in sea ice extent, thickness, distribution, age, and melt duration (MMS and NMFS 2008). Sea ice extent is becoming less in both the summer and winter, although the reduction is more pronounced in the summer (Intergovernmental Panel on Climate Change [IPCC] 2001). Ice thickness is also decreasing, while the melt duration is increasing. It is uncertain whether non-ice-obligate arctic species, such as baleen whales, will be adversely influenced by diminishing sea ice (MMS and NMFS 2008). Moreover, the reduction in sea ice extent could beneficially increase the availability of prey for the Bering-Chukchi-Beaufort Sea Stock of bowhead whales (Moore and Laidre 2006). The reduction of sea ice over the past 20 years could be related to the recovery trend of bowhead whales (Walsh 2008), and the trend is expected to continue as the ice extent retreats further (Sheldon et al. 2003). Bowhead whales may alter routes used for migration and change feeding areas as the ice extent changes due to climate change (Moore and Huntington 2008).

3.1.4 Fin Whale

Biological Populations and Listing Status

Three individual ocean-basin populations have been identified: North Atlantic, North Pacific, and Southern Ocean. Individuals within each ocean-basin population rarely, if ever, mix. Additionally, within each ocean-basin population, geographical populations (stocks) also exist. In U.S. waters, three stocks are recognized: Alaska, California/Washington/Oregon, and Hawaii (Ohsumi and Wada 1974).

The fin whale was listed as endangered under the ESA in 1970 (FR 35:8495) and as depleted under the MMPA throughout their range. No critical habitat has been designated. Since 2007, fin whales have also been listed as endangered on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species.

Populations Status, Trends, and Abundance

The worldwide population of fin whales is estimated to be 120,000 (MMS and NMFS 2008). The North Pacific population is estimated to include 15,000 individual fin whales (Angliss et al. 2001), down from their pre-commercial whaling population estimate of 42,000 to 45,000 (Ohsumi and Wada 1974). Currently, the population of fin whales in Alaskan waters west of Kodiak Island is estimated to be a minimum of 5,700 (Angliss and Outlaw 2009).

Range

Fin whales appear to be limited by tropical waters and sea ice. Fin whales prefer temperate or cool waters, and tend to avoid areas with very warm water (approximately 60 degrees Fahrenheit [°F] [15 degrees Celsius (°C)]), areas at the poles close to the ice pack, and small areas of water separated from the open ocean (NMFS 2006a; MMS and NMFS 2008). The North Pacific population distribution ranges from British Columbia, along the northern Pacific Rim, and to the far eastern Russian coast. The summer distribution of fin whales extends from Baja California to the northern Bering Sea or southern Chukchi Sea and over to Japan (MMS and NMFS 2008).

The Alaska stock of fin whales can be found in the deep waters of Prince William Sound, the Bering Sea, and the Gulf of Alaska. The highest densities of Alaska stock fin whales can be found in the northern part of the Gulf of Alaska and southeastern part of the Bering Sea during the summer (May through October) (MMS and NMFS 2008). The majority Alaska stock fin whales tend to aggregate along the mixing zones between coastal and oceanic waters that correspond roughly with the 656-feet isobaths, or shelf edge, in the northern North Pacific and Bering Sea (NMFS 2006a). Fin whales may be seen seasonally in the southwestern Chukchi Sea, although there is no indication that such occurrences are typical (MMS and NMFS 2008). There are no reports of fin whales in the Beaufort Sea (MMS and NMFS 2008), which is outside the published species range (Angliss and Outlaw 2009).

Life History and Habitat Use

The migratory status of the North Pacific fin whales is not well known; however, in the winter they have been seen off the southern coast of California and near the Hawaiian Islands (Angliss et al. 2001). Age, reproductive state, and stock affinity can all affect migration, as well as their movement inshore or offshore and north or south (NMFS 2006a).

Known fin whale feeding habitats extend through the Bering Sea into the southern Chukchi Sea, especially the southwestern Chukchi Sea near the Asian coast. Fin whales travel through the Aleutian Islands entering and exiting the Bering Sea to access their summer feeding grounds. They have also been known to travel from the northern Gulf of Alaska through the Shelikof Strait to reach the southeastern and northern Bering Sea (MMS and NMFS 2008). In recent years fin whales have been seen regularly around Pribilof Islands (NMFS 2006a).

Oceanographic changes may become favorable to the expansion of fin whale distribution into more northern waters if arctic warming continues. Availability of food sources will be the determining factor. The possibility of their distribution expanding into the Chukchi and Beaufort seas could result from long-term continued arctic warming (MMS and NMFS 2008).

Fin whales feed primarily on krill or euphausiids, as well as substantial quantities of fish (MMS and NMFS 2008). North Pacific fin whales favor *Euphausia pacifica, Thysanoessa longpipes, T. spinifera, and T. inermis* species of euphausiids. A significant portion of their diet also consists of large copepods, principally *Calanus cristatus*. A smaller portion of their diet is made up of herring, walleye pollock, and capelin (Nemoto 1970). In the northern Bering Sea, *Thyanoessa raschii* is the only species of euphausiid that the fin whale is known to feed on. In the Arctic and Subarctic, fin whales are thought to feed chiefly on capelin, Alaska pollock, herring, and saffron cod. Above 58 degrees North latitude in the Bering Sea, fish are the primary food source, consisting almost entirely of capelin, pollock, and herring (MMS and NMFS 2008).

The gestation period for fin whales is less than one year and calving intervals are estimated, based on whaling data, to be two years (NMFS 2006a). Calves are nursed for six to seven months, and mortality rates are estimated to be between 0.04 and 0.06 percent annually. Ice entrapment, attack by killer whales, disease, shark attacks on young and/or weak fin whales, and crassicaudiosis in the urinary tract are likely the principal causes of natural mortality among fin whales, though relatively little is actually known and most studies have been focused on the North Atlantic population (NMFS 2006a).

Low-frequency vocalizations from fin whales occur in the 10 to 200 hertz (Hz) band. The low-frequency sounds have potential to travel a great distance, allowing for the possibility of long-distance communication (Edds-Walton 1997). The most common vocalizations are in the 18 to 35 Hz band and are long, patterned sequences of short-duration infrasonic pulses (Patterson and Hamilton 1964). Bouts of long patterned sounds are common in temperate waters and can also occur to a lesser extent in high latitude feeding areas (Clark and Charif 1998). Fin whales in social groups tend to vocalize rapid pulses in short sequences in the 20 to 70 Hz range. While male reproductive displays typically are vocalized by a series of pulses in a regular repeating pattern that may last for more than a day (Tyack 1999).

While no studies have been done to directly measure fin whales' sound sensitivity, it is reasonable to assume that fin whales are similar to other large mysticetes and have acute infrasonic hearing (Ketten 1997).

Critical Habitat

No critical habitat has been designated for the fin whale.

Fin Whales in the Action Area

Fin whales are not known to occur in the Beaufort Sea. Fin whales are frequently observed in the northern Gulf of Alaska and southeastern Bering Sea from May to October, but do not commonly occur in Upper Cook Inlet or the Anchorage area, as they generally congregate near the 656-foot isobath which is approximately 190 miles from shore according to Alaska Ocean Observing System (AOOS) bathymetry data from 2010. Resurrection Bay is significantly deeper than the waters surrounding the Port of Anchorage, the 656 foot-isobath is only about seven miles from the Port of Seward, so fin whales may occur in closer proximity.

Threats

There are a number of actions that have effects on fin whales in the proposed action area. They include historic commercial whaling, subsistence hunting, oil and gas-related activity, non-oil and gas industrial development, research activities, marine vessel traffic and commercial fishing. Other than historic commercial whaling, no data is available to establish that any previous or current human activity has had negative effects on fin whale populations (MMS and NMFS 2008).

Historic Commercial Whaling

Throughout the 19th century, whalers on sailing vessels hunted fin whales in relatively small numbers (Mitchell and Reeves 1983). Steam-powered boats and harpoon guns in the latter part of the 19th century heightened the hunting success of fin whales. The eventual invention of deck-mounted cannons allowed commercial fin whale hunting and harvest to occur at much higher success, or mortality, rates (MMS and NMFS 2008). The first three-quarters of the 20th century saw a great deal of commercial fin whale hunting in all of the world's oceans. The estimated catch in the Southern Hemisphere from 1904 to 1979 is almost 750,000 individuals (IWC 1995:129B30). Commercial overharvesting from the 1940s through the 1960s led the Fin whale to be placed on the threatened and endangered species list, as well as listed as depleted and protected under the MMPA. In the 1950s and 1960s estimated numbers of 1,000 to 1,500 North Pacific fin were harvested annually, though not all Soviet catches were reported (MMS and NMFS 2008).

The 1946 International Convention for the Regulation of Whaling first began regulation of fin whale commercial hunting by enforcing a size limit on commercially hunted North Pacific fin whales; they had to be longer than 55 feet (Allen 1980). The IWC began management of commercial whaling of North Pacific fin whales in 1969, and later in 1976 for the North Atlantic fin whales. Full protection from hunting was granted by the IWC in 1976 for the North Pacific and Southern Ocean fin populations and in 1987 for the North Atlantic population.

Subsistence Hunting

In Alaska, subsistence hunters have not reported hunting or taking fin whales. Currently, Greenland is the only area in the Northern Hemisphere where fin whales are allowed to be hunted and taken for local nutritional subsistence. The IWC has granted approximately 20 takes per year as part of their aboriginal subsistence whaling scheme (Gambell 1993; Caulfield 1993). Japan has recently begun taking fin whales for research purposes in the Southern Ocean region; total catches have been minimal each year. They also import fin whale meat from an Icelandic company, Hvalur H/F, which takes approximately 125 fin whales each year (IWPO 2011).

Commercial Fishing

Each year North Atlantic fin whales are occasionally hurt or taken by inshore fishing gear, however prior to 1999 there were no observed or reported North Pacific fin whale takes incidental to commercial fishing operations (Read 1994; Angliss and Outlaw 2008). In 1999, one fin whale was reported killed incidental to the pollock trawl fishery in the Gulf of Alaska (Angliss and Outlaw 2008). Currently, fin whale fatalities incidental to commercial activity in Alaska are estimated at 0.6 individuals per year (Angliss et al. 2001).

Vessel Traffic

Marine vessel traffic also has the possibility to pose a threat to fin whales. In Alaska, there are 14 stranding records in the Alaska Region marine mammal stranding database between 1981 and 2009; two are a result of ship strikes. One of the ship strikes occurred in Uyak Bay near Kodiak in 2000, and the other occurred in Resurrection Bay near Seward in 2006. The cause of stranding for the majority could not be determined (MMSN 2010). Short term changes in dive behaviors have been documented when fin whales are disturbed by the presence of vessels. This may include reduced dive times, decreased dive and surface times, and a reduced number of blows per surface (Stone et al. 1992).

Fin whales that may occur near the Port of Seward are likely to have habituated to the vessel traffic in the area. There are a number of vessel-based activities that occur in the area, including whale-watching tours, recreational boating, cruises, and commercial shipping. Commercial vessel traffic has mitigation measures in place, as required by state and federal law, to prevent significant adverse effects on any marine mammal, including fin whales. The vessel traffic in Resurrection Bay, and specifically near the Port of Seward, does not pose a threat with population-level effects.

Oil and Gas-Related Activity

Oil and gas activities have had a minimal impact on fin whales. The oil and gas activity areas have relatively little overlap with fin whale habitat. Possible effects of oil and gas activity include interruption by loud ship noises, seismic testing, and sources of low-frequency communication, and possible courtship sounds from fin whales. Like the bowhead whale, the fin has a low-frequency hearing range, and effects are expected to be similar to that of the bowhead whale (MMS and NMFS 2008). Fin whales, in a study off Oregon, continued to produce normal sounds regardless of the presence of seismic air gun pulses (McDonald et al. 1993).

In Alaska, current human impacts that may result in serious injury or the fatality of fin whales are not known to be at a level that would incur population level effects (MMS and NMFS 2008).

Climate Change

It is uncertain whether non-ice-obligate arctic species, such as baleen whales, will be adversely influenced by diminishing sea ice resulting from climate change (MMS and NMFS 2008). The arctic range of fin whales may beneficially expand northward as their prey does. In the future, climate change may allow for increased vessel traffic, fishing, or other activities that could adversely affect fin whales in their existing or expanded range.

3.1.5 Humpback Whale

Biological Populations and Listing Status

Worldwide, approximately 13 different humpback whale stocks are recognized. Five stocks are found in U.S. waters: the Gulf of Maine, the Western North Pacific, the Central North Pacific, the California/Oregon/Washington, and the American Samoa. Three of these stocks occur within the North Pacific Stock: the Central North Pacific Stock, Western North Pacific Stock, and California/Oregon/Washington stocks. Stocks commonly return to traditional sites for reproduction, and there is very little interchange between stocks, though on rare occasion it does occur (NMFS 1991). Only the Central North Pacific and Western North Pacific stocks could be expected to occur near the action area.

The humpback whale is listed as endangered under the ESA, and as depleted under the MMPA. In 2008, the IUCN upgraded the status of the humpback whale from a vulnerable species to a species of least concern. A status review of humpback whales was initiated on 12 August 2009, seeking public comment on potential changes to their listing under the ESA.

Populations Status, Trends, and Abundance

Prior to exploitation, the worldwide population of humpback whales totaled around 125,000 and the North Pacific population was estimated to be 15,000. Post-exploitation, the status (both in numbers and range), was considerably reduced, primarily as a result of intensive commercial whaling (NMFS 1991).

There are an estimated 80,000 humpback whales worldwide currently. The North Pacific population is currently estimated to be 12,000 whales, up from an estimated low of 1,500 when commercial whaling was banned. The Western Pacific population was last estimated at 394 (Calambokidis et al. 1997); however, its thought this might be an underestimation in light of the low geographic coverage of sampling effort (Angliss and Allen 2009).

Range

Humpback whales are present in all of the world's oceans, though less so in arctic waters. Their winter range includes temperate and tropical waters in both hemispheres, generally between 10 degrees and 23 degrees North latitude, where they typically mate and calve. Their summer range is usually in areas with high biological diversity between higher latitudes of 35 degrees and 75 degrees North. This is where they do the majority of their feeding. Humpback whales prefer waters of continental shelves, along their edges, and near some oceanic islands (NMFS 1991). Humpback whales in the high latitudes of the North Pacific are seasonal migrants. In Alaska, humpback whales are found from southeastern Alaska, north and west through the Gulf of Alaska, Bering Sea, and into the southern Chukchi Sea. Most of the humpback whales that summer in Alaskan waters are thought to winter on the wintering grounds surrounding the Hawaiian Islands.

In the summer, the Western North Pacific stock occupies areas along the continental shelf off the Aleutian Islands and the Alaska Peninsula. Some individuals in this stock may still summer along the Asian coast, particularly around Kamchatka Peninsula and the Sea of Okhotsk (Tomlin 1967). This stock was once considered the center of the entire North Pacific population (Berzin and Rovnin 1966; Nishiwaki 1966). The northern range of this stock now extends throughout the Bering Sea, through the Bering Strait, and into the southern Chukchi Sea. Historically, sightings in the Western North Pacific stock's range have been most common south of Nunivak Island and east of the Pribilof Islands (MMS and NMFS 2008). They have not been documented in the Beaufort Sea. This migratory stock winters on the wintering grounds around the Hawaiian Islands or at the Asian wintering grounds from the Marshall Islands to the Philippines (Angliss and Allen 2009).

The Central North Pacific stock can be found throughout southeast Alaska in the summer, as well as in central and western portions of the Gulf of Alaska. This area includes Prince William Sound, around Kodiak Island, the Shelikof Strait, the Barren Islands, and the southern coastline of the Alaska Peninsula (MMS and NMFS 2008). Sightings in offshore waters of the Gulf of Alaska are generally attributed to migration into coastal waters, some feeding may also be occurring on offshore banks (Morris et al. 1983).

Life History and Habitat Use

The majority of humpback whales that summer in Alaska waters migrate to wintering grounds in the Hawaiian Islands. Six to 11 percent of the whales in the Hawaiian wintering grounds are calves (Herman et al. 1980). A smaller number of individuals may migrate to wintering grounds along the Pacific coast of Baja California and Mexico. Most that migrate to this area summer in southeast Alaska and migrate along the relatively shallow coastal waters rather than through deeper, offshore waters as is the case in migration to the Hawaiian Islands. The majority of animals that winter offshore of Baja California and the Pacific coast of California spend their summers off the central California coast. An even smaller number of individuals within the North Pacific population winter near Mariana, Bonin, and Ryukyu Islands and near Taiwan (Nishiwaki 1966; Ivashin and Rovnin 1967; Townsend 1935). The total number that winter in this area is expected to be in the low 100s, though at one point this area did support a shore-based whaling station near Ryukyu Island in the late 1950s and 1960s (NMFS 1991).

Humpback whales feed primarily on small schooling fish and large zooplankton, mainly krill. Species of humpback prey include: capelin, walleye pollock, atka mackerel, eulachon, sand lance, Pacific cod, saffron cod, arctic cod, salmon, pollock, haddock, rockfish, shrimps, euphausiids, mysids, and pelagic amphipods. In the Bering Strait and southern Chukchi Sea, the main source of prey are mysids (NMFS 1991). Physical oceanographic factors that contribute to productivity and local distribution of prey (and thus likely feeding areas), are upwelling, converging currents, continental shelves, offshore banks, and edges of continental shelves (NMFS 1991). Feeding occurs almost entirely on humpback whales' summer range. On average, humpback whales will dive 135−197 feet to catch their prey (Dolphin 1987a,b). While they may stay submerged for 21 minutes, the average dive time is 2.8 minutes for feeding whales, 3.0 minutes for non-feeding whales, and 4.3 minutes for resting whales (Dolphin 1987a,b). They also use the most diverse techniques to obtain their prey of any baleen whale.

Female humpback whales reach sexual maturity between four and six years of age, while male humpback whales reach sexual maturity between seven and 15 years of age. Conception is usually between December and March and the average gestation period is between 10 and 12 months. Birthing will occur during the same time frame the next year. Sexually mature females typically breed every two to three years. Females live to be an average of 61 years old, and males live to be an average of 57 years old. Females make up roughly one-quarter of the total population (NMFS 1991).

The primary causes of natural mortality among humpback whales are parasites, predation, red-tide toxins, and ice entrapment. Killer whales have been known to prey on humpbacks, usually on young or disabled individuals. However, the two species have also been known to peacefully coexist and feed in close proximity. Humpback whales have also been observed with shark bites. Ice entrapment is a concern in Newfoundland for the most part (NMFS 1991). Collisions with vessels and entanglement in fishing gear and collision with vessels are causes of injury and mortality worldwide.

Critical Habitat

No critical habitat has been designated for the humpback whale.

Humpback Whales in the Action Area

Humpback whales are not known to occur in the Beaufort Sea (Angliss and Allen 2009, MMS and NMFS 2008). Humpback whales are frequently observed in Lower Cook Inlet during May–September (MMS 1995), but do not commonly occur in Upper Cook Inlet or the Anchorage area. Humpback whales are also found in waters of the Gulf of Alaska and lower Resurrection Bay. Humpback whales are not expected to be found in near proximity to the Port of Anchorage, and while they do exist in Resurrection Bay, they have become habituated to vessel traffic in the area. They are not expected to be in direct proximity to the Port of Seward.

Threats

Known actions that have an effect on humpback whales in the proposed action area include historic commercial whaling, subsistence hunting, oil-and-gas-related activity, non-oil and gas industrial development, research activities, marine vessel traffic and commercial fishing. Other than historic commercial whaling, no data is available to establish that any previous or current human activity has had negative effects on humpback whale populations.

Historic Commercial Whaling

Historic commercial whaling decimated the humpback whale population to approximately 10 percent of its original population. At the time of the IWC moratorium on commercial whaling, humpback whales were feared to be in danger of extinction. Nearest to the project area, there was a whaling station at Port Hobron off of Kodiak Island and in Akutan on Akutan Island in the eastern Aleutians. Port Hobron operated from 1926 to 1937 and Akutan operated until 1939 (Brueggeman et al. 1986). Since the IWC's moratorium on commercial whaling in 1966, their numbers and distribution have risen and expanded, though the Soviets did continue hunting until the 1980s (Perry et al. 1999).

Subsistence Hunting

Worldwide, a limited amount of subsistence hunting for humpback whales occurs. The only areas where subsistence hunts for humpbacks whales are currently conducted are in Bequia (Grenadines) and Greenland. No subsistence hunt for humpbacks currently takes place in Alaska. Subsistence hunting of humpbacks has never been at a level known to cause population level effects.

Oil and Gas-Related Activity

The effects of oil-and-gas-related activity are relatively minimal. The primary concern attributed to oil-and-gas-related activity is the noise associated with seismic acquisition. Mitigation measures are in place to avoid negative interaction and harassment of humpback whales. Oil and gas activity is known to have no negative effects on population levels.

Vessel Traffic

The concern for vessel collisions with humpback whales is shared amongst oil and gas vessel traffic, non-oil and gas industry traffic, marine vessel traffic, research activities, and commercial fishing. Of all vessel traffic, commercial fishing is responsible for the largest number of collisions, as well as entanglements.

Worldwide, humpback whales are second only to fin whales in the number of ship strikes (Jensen and Silber 2003). Within Alaska, between the years of 1986 and 2007, there were 54 confirmed or suspected ship strikes listed in the NMFS Alaska Regional Stranding Database. The fate of the animals is not always known. The types of vessels that struck a humpback whale during this period include cruise ships, recreational cruisers, whale watching catamarans, fishing vessels, and skiffs. The lengths of these vessels have ranged from 20 feet to 250 feet (Jensen and Silber 2003). This shows that neither the type nor the length of the vessel makes it more or less likely to be party to humpback ship strike.

Cruise ships are of particular concern within the waters of southeast Alaska where humpback whales concentrate in shallower waters. Oil tankers generally transit further offshore in water where fewer concentrations of humpback whales can be found. Charter and private vessels run the same risks as cruise ships, as they operate in areas overlapping with nearshore distributions of humpback whales (NMFS 1991).

Commercial Fishing

In the Central North Pacific stock, humpback whales are killed incidental to federal groundfish and longline fisheries and state managed commercial salmon fisheries. The average annual mortality rate prior to 2004 was 1.5 individuals. Between the years of 2001 and 2005, incidental injuries and mortalities within the Central North Pacific stock were also attributed to sablefish pot fisheries (MMS and NMFS 2008). In the Western North Pacific stock, the annual mortality rate from fisheries is 0.20. Serious injuries and mortalities have occurred incidental to sablefish pot fisheries in the Bering Sea and Aleutian Islands (MMS and NMFS 2008).

Humpback whales can usually get out of entanglements in fishing gear (they are large enough to break through the netting), but sometimes they get entangled in the lead anchor which they cannot break (NMFS 1991). Between 1997 and 2007, Alaska reported 97 humpback entanglements. The majority of these involved southeast Alaska humpbacks (NMFS Alaska Regional Stranding Data). The gear involved in these reports was primarily from crab, ship, and unidentifiable pot gear.

Neither ship strikes nor entanglements are known to be at a level that would cause population-level negative effects on humpback whales. However, continued arctic warming and melting sea ice may allow industry to move north. Increased traffic and shipping, combined with an increased summer feeding-ground-range for humpback whales, may result in a greater possibility of interaction (NMFS 1991).

Climate Change

It is uncertain whether non-ice-obligate arctic species, such as baleen whales, will be adversely influenced by diminishing sea ice resulting from climate change (MMS and NMFS 2008). The range of humpback whales may beneficially expand northward as their prey does. In the future, climate change may allow for increased vessel traffic, fishing or other activities that could adversely affect humpback whales in their existing or expanded range.

3.1.6 Cook Inlet Beluga Whale

Biological Populations and Listing Status

Beluga whales are distributed throughout waters seasonally covered in ice in arctic and subarctic regions (Gurevich 1980) and are associated with leads and polynyas in the ice (Hazard 1988). Five recognized stocks of beluga whales occur in U.S. waters: the Beaufort Sea stock, Eastern Chukchi stock, Eastern Bering Sea stock, Bristol Bay stock, and the Cook Inlet stock. All of these stocks occur exclusively in Alaska. Only the Cook Inlet beluga whale has been listed under the ESA, and is discussed below. The NMFS listed the DPS of the beluga whale found in Cook Inlet, Alaska, as endangered under the ESA on 22 October 2008, effective 22 December 2008 (FR 73:62919–62930). The NMFS designated the Cook Inlet beluga as depleted under the MMPA on 31 May 2000 (FR 65:34590).

Population Status, Trends, and Abundance

Results from the most recent abundance survey by the NMFS indicated a population size of 375 in 2008, which was the same as the estimate derived from the 2007 survey (Hobbs and Shelden 2008). Most early surveys of belugas in Cook Inlet were incomplete in coverage of the area, and can therefore not be used to provide an estimate of the total population. Analysis of the most complete survey prior to 1994 resulted in a population estimate of 1,293 beluga in Cook Inlet in 1979 (Calkins 1989). The NMFS (2008a) now considers this estimate of approximately 1,300 beluga whales to be a good indicator of historical abundance, and therefore the carrying capacity of Cook Inlet. More complete surveys of the inlet were conducted by the NMFS beginning in 1993. According to the NMFS (Hobbs et al. 2000 in NMFS 2008b), these surveys, which included lower, middle, and upper Cook Inlet, documented a 47 percent decline in the population from between 1994 (653 belugas) and 1998 (347 belugas). The NMFS (73 FR 6219) has also reported that the population trend for the Cook Inlet beluga from 1999 to 2008 was a -1.45 percent per year (Table 3.1-2); they added that while this trend is not significantly different from zero, it is significantly less than the expected growth of an unharvested population of 2–4 percent.

TABLE 3.1-1 ESTIMATED POPULATION OF COOK INLET BELUGA WHALES 1999-2008 BASED ON AERIAL SURVEYS.

Species	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Beluga Whales[1]	367	435	386	313	357	366	278	302	375	375

[1] Hobbs et al. 2000; Rugh et al. 2003, 2004a, 2004b, 2005a, 2005b, 2005c, 2006, 2007; FR 73:62919).

A definitive cause of the sharp decline in beluga whale abundance in Cook Inlet has not been determined. Mortalities of belugas from subsistence, strandings, and predation have been indicated as contributing causes.

Local villages in the Cook Inlet region have been harvesting belugas for subsistence for decades, but there was a significant increase in the number of whales taken in the 1990s (NMFS 2008b). Following the relatively sharp decline in beluga whale abundance in the Cook Inlet, a conditional moratorium on the subsistence harvesting of beluga whales was implemented by the NMFS in 1999 and 2000 (Public Laws 106-31 and 106-553). Subsistence harvests of beluga whales are authorized only under co-management agreements between Native subsistence groups and the NMFS. Harvest levels are set in five-year increments based upon the average abundance estimate for the previous five-year period. Since the five-year abundance estimate for the period between 2003 and 2007 was below 350 belugas, no harvest of belugas will be authorized in Cook Inlet through 2012 (FR 73:60976; 15 October 2008).

Range

The range of the Cook Inlet beluga DPS is restricted to the Cook Inlet. Most, if not all, of the stock is thought to reside in Cook Inlet year-round and it does not seem to interbreed with other stocks of belugas outside of Cook Inlet (Hansen and Hubbard 1999, Rugh et al. 2000). There seems to have been some historical contraction of the summer range. In the 1970s, the summer distribution of Cook Inlet belugas included the upper, middle, and lower Cook Inlet (NMFS 2008b). Calkins (1989) reported that belugas were observed throughout Cook Inlet during a 1979 survey. Although the NMFS has received a few reports of belugas in the Lower Cook Inlet during summer, they have not been observed there during NMFS's annual summer surveys since 2001 (NMFS 2008b); However Belugas may still disperse throughout Cook Inlet during winter (NMFS 2008b). The contraction of the summer range is thought to be due to the reduced size of the population, with the more favorable habitats of the Upper Cook Inlet being able to accommodate the smaller population (NMFS 2008b).

Life History and Habitat Use

Within Cook Inlet, beluga whales typically inhabit shallow, coastal waters (Ridgway and Harrison 1981). Satellite tagging studies, aerial surveys, and boat- and land-based observations have shown that the beluga whales remain in the inlet year-round (Hobbs et al. 2005; Rugh et al. 1999, 2000, 2004a,b, 2005a,b,c, 2007; Cornick and Kendall 2008; McGuire et al 2008). Cook Inlet beluga whales frequent Knik Arm, Turnagain Arm, Chikaloon Bay, and the Susitna River delta area in upper Cook Inlet (NMFS 2008b). Data received from satellite transmitters attached to 14 beluga whales in Cook Inlet between 2000 and 2002 indicated that in the summer and fall they concentrated in upper Cook Inlet near rivers and bays (Hobbs et al. 2005), dispersing further south and offshore in the winter.

Seasonal use of Cook Inlet habitats by belugas appears to be strongly correlated with the movements and availability of prey. Within Cook Inlet, the distribution of beluga whales is closely tied to the distribution of prey and waterbody bathymetry (NMFS 2008b). Known feeding grounds in Cook Inlet include the Big and Little Susitna Rivers, Eagle Bay to Eklutna River, Ivan Slough, Theodore River, Lewis River, and

Chickaloon River and Bay (NMFS 2008b). The dramatic tidal influx and efflux in Cook Inlet are also major factors that dictate the whales distribution throughout the day (Hobbs et al. 2005; Huntington 2000; Funk et al. 2005).

In the spring and summer, observations of belugas frequently coincide with runs of eulachon and salmon. Beginning in late April and May they are associated with eulachon runs in the Susitna and Twenty Mile Rivers in Turnagain Arm. They arrive in the Knik Arm in May, where they tend to be concentrated near the Susitna River Delta feeding on various salmon runs (NMFS 2008b). Throughout the summer they frequent the Susitna and Little Susitna Rivers, as well as smaller streams along the west side of the Inlet south to Chinitna Bay (NMFS 2008b).

Belugas use waters of the Knik Arm intensively in the fall apparently preying on runs of coho salmon. They have been observed to congregate in Eagle Bay and elsewhere on the east side of Cook Inlet at this time, and sometimes in Goose Bay on the west side of Knik Arm. In the fall the whales start to disperse to locations further offshore including Trading, Tuxedni, and Chinitna Bays. In winter, the whales moved offshore and to the upper- and mid-inlet including Knik Arm and Turnagain Arm (Hobbs et al. 2005) but also Cook Inlet waters at least as far south as Redoubt Bay and Kalgin Island (NMFS 2008b). NMFS (2008a) concluded that they probably move throughout most of Cook Inlet during winter.

Calves are born in the summer and are grey in color that lightens with age. Beluga whales typically care for their calves for about two years. Beluga whales use echolocation to hunt for prey in the turbid waters of Cook Inlet. It is now thought that beluga whales may live more than 60 years (NMFS 2008b).

Cook Inlet beluga whales hunt both individually and cooperatively (NMFS 2008b). They are opportunistic feeders and prey upon a variety of fish depending on the species available during their seasonal movements. Analysis of the stomach contents of beluga whales in Cook Inlet has shown that belugas also feed on available marine invertebrates (Klinkhart 1966; Haley 1986; Perez 1990). The euchalon is an important prey species in early spring (NMFS 2008). In the summer, belugas rely primarily on salmon (NMFS 2008b). Little is known about the winter diet of Cook Inlet beluga whales (NMFS 2008b).

Critical Habitat

Critical habitat has been proposed for the Cook Inlet beluga and is discussed below in Section 3.2.1.

Cook Inlet Beluga Whales in the Action Area

Cook Inlet belugas commonly use waters in the action area at the Port of Anchorage. Waters around the Port of Anchorage area are used by prey species of beluga whales for migration, rearing, and foraging (Pentec 2005). During the late fall, when beluga whales concentrate at the mouth of Ship Creek, they are commonly seen within 300 feet of the docks at the Port of Anchorage (Great Land Trust 2000; Blackwell and Greene 2002; NMML 2004; Port of Anchorage et al. 2009). Markowitz and McGuire (2007) reported that belugas were commonly seen traveling and feeding within 5,000 feet of the Port, and beluga whales have been seen following the tidal influx and outflux close to the Port of Anchorage in October and November (Cornick and Kendall 2008). During pre-construction surveys at the Port of Anchorage between August and November 2005, scientists observed belugas adjacent to the port and within the footprint of the planned expansion of the port on a regular basis (Prevel Ramos et al. 2006). They were also seen swimming and feeding near the mouth of Ship Creek and off of Cairn Point (Prevel Ramos et al. 2006). Table 3.1-2 shows beluga whale observations recorded by Cornick and Saxon-Kendall (2009) in the action area from June to November in 2008.

TABLE 3.1-2 BELUGA WHALE OBSERVATIONS IN THE ACTION AREA FROM JUNE TO NOVEMBER 2008

Month	Total Sightings	Total Count of Beluga Whales
June	0	0
July	1	7
August	34	262
September	12	50
October	3	10
November	10	102
Cumulative Totals	**60**	**431**

(Source: Cornick and Saxon-Kendall 2009)

Threats

Subsistence Hunting

Limited Cook Inlet beluga whale subsistence hunting occurs today. Since 1999, zero to two whales have been allowed to be harvested each year, which is substantially different than the unsustainable levels seen in the 1980s and the majority of the 1990s (NMFS 2008b). Harvest levels prior to 1980 are unknown, but they are thought to have been significantly less than those between 1980 and 1999. The reported subsistence harvest numbers between 1994 and 1998 account for the estimated decline in Cook Inlet belugas during that period. In 1996, the takes from subsistence harvest totaled nearly 20 percent of the Cook Inlet beluga population, highlighting the significant impact that subsistence hunting was having on the stock (NMFS 2008b).

Between the years of 1995 and 1998, the annual subsistence harvest of Cook Inlet belugas was 77 individuals (NMFS 2008b). In 1999, there was a voluntary moratorium on beluga whale subsistence hunting, and from 2000 to 2010 only five beluga whales were harvested for subsistence purposes. Subsistence hunting is currently well-regulated and has minimal impact on the Cook Inlet beluga whale population.

Oil-and-Gas-Related Activity

The oil and gas industry in the Cook Inlet presents a number of potential dangers to the belugas in residence there. Threats include: seismic surveys; vessel operations; low-altitude aircraft operations; well drilling and logging; the marine discharge of drilling fluids; produced waters; gray waters; and sanitary wastes (NMFS 2008b). An oil spill represents the biggest danger, but is also least the likely to occur. Seismic activities require federal permits and mitigation measures. All discharges are regulated by the EPA, and NMFS reviews and comments on all oil and gas activities.

Vessel Traffic

Vessel traffic in the Cook Inlet occurs year round, but is most pronounced during the late spring, summer, and early fall months. The port facilities in Cook Inlet include Anchorage, Point MacKenzie, Tyonek, Drift River, Nikiski, Kenai, Anchor Point, and Homer. To date, there have been no confirmed mortalities incidental to vessel traffic in the Cook Inlet (NMFS 2008b).

Commercial vessel traffic and other large vessel traffic do not pose a significant threat to Cook Inlet beluga whales because of their slower speed and straight line movement. Smaller boats that travel at quicker speeds and less direct routes offer more of a threat. The likely response to vessels in general is avoidance behavior, but the smaller, faster boats may elicit a more pronounced response (NMFS 2008b).

Commercial Fishing

The MMPA requires all fisheries operators to maintain logbooks and participate in a reporting program which provides information concerning fishing effort, interactions with marine mammals, and if the interaction resulted in determent, entanglement, injury or mortality. Based on these reports, the mortality rate of Cook Inlet belugas incidental to commercial fisheries is zero (NMFS 2008b). Additionally, observations in the upper Cook Inlet in 1999 and 2000 showed evidence that neither set gillnet fisheries nor drift gillnet fisheries were responsible for any beluga whale injury or mortality. The current commercial fishing level in the Cook Inlet is such that it should not delay the recovery of Cook Inlet beluga whales (NMFS 2008b).

Climate Change

Climate change models expect effects to be most pronounced in the high northern latitudes, but effects to a lesser magnitude may also be seen in the Cook Inlet (NMFS 2008b). It is uncertain whether diminishing sea ice or other climate effects will result in adverse effects to non-ice-obligate species, such as the Cook Inlet beluga whale.

3.1.7 Steller Sea Lion

Biological Populations and Listing Status

Because of their decline, NMFS listed the Steller sea lion as threatened range-wide under the ESA in April 1990. Critical habitat has been defined for Steller sea lions as a 20-nautical-mile buffer around all major haul-outs and rookeries, as well as associated terrestrial, air and aquatic zones, and three large offshore foraging areas (50 CFR 226.202 on Aug. 27, 1993).

Prior to 1997, only one population of Steller sea lions was recognized in Alaskan waters— the Eastern U.S. DPS. Based largely on differences in genetics, morphology, and population trends, this single population was split into two DPSs (Baker et al. 2005, Phillips et al. 2009, FR 62:30772). The Western DPS (WDPS) inhabits an area of Alaska from Prince William Sound westward to the end of the Aleutian Island chain and into Russian waters (NOAA 2010a). This segment occurs from 144 degrees W (Cape Suckling, east of Prince William Sound), westward to Russia and Japan. The Eastern DPS (EDPS) of Steller sea lions occurs from southeast Alaska southward to California (NMFS 2004; NMML 2010).

Because of a pattern of continued decline in the WDPS, it was listed as endangered on 5 May 1997 (FR 62:30772), while the EDPS remained under threatened status (NOAA 2010a). Population surveys suggest that a portion of the EDPS in the northern part of its range (Southeast Alaskan and British Columbia) is stable or increasing, while the remainder of the EDPS and all the WDPS is declining (NOAA 2010b).

Population Status, Trends, and Abundance

There are approximately 39,000–45,000 Steller sea lions in the Western U.S. and 44,500–48,000 in the Eastern U.S. The WDPS declined by 75 percent between 1976 and 1990, and decreased another 40 percent between 1991 and 2000 (the average annual decline during this period was 5.4 percent). Since the 1970s, the most significant drop in numbers occurred in the eastern Aleutian Islands and the western Gulf of Alaska (NOAA 2010b).

Based on non-pup counts of Steller sea lions on trend-sites throughout the Gulf of Alaska and Aleutian Islands, the overall WDPS population trend is stable and may be insignificantly increasing. The number of non-pups counted at trend-sites between 2000 and 2008 increased 12 percent. The increase in counts between 2004 and 2008 is 1 percent (NOAA 2010a).

Range

Steller sea lions range along the North Pacific Ocean rim from northern Japan to California (Loughlin et al. 1984), with centers of abundance and distribution in the Gulf of Alaska and Aleutian Islands. The northernmost rookery in the Bering Sea is on Walrus Island near the Pribilof Islands. In the Gulf of Alaska the northernmost rookery is on Seal Rocks just outside of Prince William Sound (Kenyon and Rice 1961).

Steller sea lions are distributed across the North Pacific Ocean rim from northern Hokkaido, Japan, through the Kuril Islands, Okhotsk Sea, and Commander Islands in Russia, the Aleutian Islands, central Bering Sea, and southern coast of Alaska, and south to the Channel Islands off California (NMML 2010).

Life History and Habitat Use

Steller sea lions prefer the colder, temperate to sub-arctic waters of the North Pacific Ocean. Haul-outs and rookeries usually consist of beaches (gravel, rocky, or sand), ledges, and rocky reefs. In the Bering Sea and Okhotsk Sea, sea lions may also haul-out on sea ice, but this is considered atypical behavior (NOAA 2010b). During the May–July breeding season, Steller sea lions congregate at more than 40 rookeries, where adult males defend territories, pups are born, and mating takes place. Non-reproductive animals congregate to rest at more than 200 haul-out sites where little or no breeding takes place. Sea lions continue to gather at both rookeries and haul-out sites outside of the breeding season (NMML 2010).

Steller sea lions forage near shore and in pelagic waters. They are capable of traveling long distances in a season and can dive to approximately 1,300 feet in depth. Steller sea lions are opportunistic predators, foraging and feeding primarily at night on a wide variety of fishes (e.g., capelin, cod, herring, mackerel, pollock, rockfish, salmon, and sand lance), bivalves, cephalopods (e.g., squid and octopus) and gastropods. Prey varies geographically and seasonally. They may disperse and range far distances to find prey. Steller sea lions have been known to prey on harbor seal, fur seal, ringed seal, and possibly sea otter pups, but this would represent only a supplemental component to their diet (NMML 2010).

Critical Habitat

Critical habitat has been designated for Steller sea lions and is discussed below in Section 3.2.2.

Sea Lions in the Action Area

Sea lions do frequently occur in the action area of the Port of Seward, as well as the greater Resurrection Bay. Vessel traffic is common in the area and sea lions have become accustomed to the disturbances of this local traffic.

Threats

Subsistence Hunting

Under the ESA and the MMPA, Coastal Alaska Natives are allowed to harvest threatened and endangered species for subsistence purposes. The annual subsistence harvest has decreased substantially from approximately 550 sea lions in 1992 to annual takes of between 165 and 215 from 1997 to 2004 (Wolfe et al. 2005). The greatest numbers of sea lions harvested were in the Pribilof Islands and the Aleutian Islands (Wolfe et al. 2005). The surveys that produced these estimates covered all Alaskan communities that regularly hunt Steller sea lions. Males of all ages are the most vulnerable to subsistence harvests; however, the threat of hunting occurs at a medium frequency. Therefore, the relative impact on the recovery of the WDPS due to the Alaska Native subsistence harvest is considered low, with a high-feasibility of mitigation. The proposed action will not impact the annual harvest of Steller sea lions, which are not hunted in the action area.

Contaminants

Aside from the Exxon Valdez Oil Spill in 1989, which occurred well after the Steller sea lion decline was underway, no events have been recorded that support the theory of acute toxicity leading to Steller sea lion decline (Calkins et al. 1994). Steller sea lions have shown relatively low levels of toxic substances as well as heavy metals (Lee et al. 1996). However, there are no studies on the effects of toxic substances at the population level to determine their impact on vital rates and population trends. Sea lions exposed to oil spills may become contaminated with polycyclic aromatic hydrocarbons (PAHs) through inhalation, dermal contact and absorption, direct ingestion, or by ingestion of contaminated prey. Overall, there is still some concern that toxic substances may have indirect impacts on individual vital rates, however, relative impact on the recovery of the western DPS of Steller sea lion due to toxic substances is not considered high.

Climate Change

The potential impact of environmental change, through a reduction in quality and quantity of Steller sea lion prey species, has received substantial attention from the scientific community. Periodic shifts in oceanic and atmospheric conditions may have major effects on some prey fish populations. Precisely how the “regime shifts” alter fish populations and affect Steller sea lions, is poorly understood and has not been resolved.

The change in North Pacific fish community structure stemming from the regime shift in 1976–77 may have been substantial enough to alter the quality and availability of prey, such as pollock and other gadids for Steller sea lions, across the North Pacific Ocean (NMFS 2008). This may have resulted in part to nutritional stress of juvenile Steller sea lions. It is likely that, although oceanographic and atmospheric conditions have changed over the last several decades, those changes have not been outside the range of natural fluctuation previously experienced by Steller sea lions (NMFS 2008). Further, available evidence indicates that the current fish community structure is very similar to that just prior to the 1976–77 regime shift, and changes in Steller sea lion diets between regimes were unremarkable (NMFS 2008). Thus, the potential impact of environmental variability on recovery in the near term is minimal. A threat to recovery, nonetheless, will persist until the environment and associated fish distributions and populations change again to favor Steller sea lions, increasing their carrying capacity and subsequently Steller sea lion survivorship and birth rates.

Vessel Disturbance

The possible impacts of various types of disturbance on Steller sea lions have not been well studied, yet the response by sea lions to disturbance will likely depend on season and their stage in the reproductive cycle. Vessels that approach rookeries and haul-outs at slow speed, in a manner that allows sea lions to observe the approach, have less effect than vessels that appear suddenly and approach fast. Sea lions may become accustomed to repeated slow vessel approaches, resulting in minimal response. There are no rookeries in the action area. Routine vessel traffic into Seward is not known to have resulted in adverse effects on Steller sea lions.

Commercial Fishing

The potential impact of competition with fisheries, through a reduction in the biomass and quality of Steller sea lion prey species, is a highly debated topic among the scientific community. The effect of fisheries on the Steller sea lion prey field over time is largely unknown. As noted above, it is likely that no one factor accounts for the dramatic shifts in Steller sea lion abundance in the WDPS, and there are different theories as to the reasons for the period of steep decline (e.g., 1980s), slow decline (e.g., 1990s), and slow recovery (e.g., 2000s).

Fishing may have contributed to changes in the location, density, distribution, availability, quality, and energy value of the Steller sea lion prey field. While it seems reasonable to conclude that commercial fisheries for primary prey species of Steller sea lions have led to a reduction in the carrying capacity of the environment, it is much less clear how commercial fisheries are currently affecting the recovery of the WDPS. Nonetheless, regarding the indirect effects of commercial fisheries on the WDPS, it seems reasonable to conclude that such activities may be a continuing stressor.

Commercial fisheries can directly affect Steller sea lions in the Gulf of Alaska, by injuring and killing them in fishing gear or in vessel collision or being killed by fishermen. In general, the current level of direct impact to Steller sea lions is relatively small. However, it is likely that historical direct impacts influenced the rapid decline rate observed in the 1980s, but by the mid-1990s was no longer an important factor in the decline and lack of recovery (NMFS 2010). Commercial fishing regulations are in place to protect endangered Steller sea lions.

3.1.8 Polar Bear

Biological Populations and Listing Status

Evidence from telemetry surveys, tagging studies, and traditional knowledge has resulted in the recognition of 19 partially-discrete polar bear populations (IUCN 2006). Two recognized polar bear populations occur in Alaska: the Southern Beaufort Sea stock and the Chukchi/Bering Seas stock. Only the Southern Beaufort Sea Stock is found in or near the action area.

Because the principal habitat of polar bears is sea ice, it is considered a marine mammal, and included in the species protected under the MMPA. On 15 May 2008, the polar bear was listed as a threatened species range-wide under the ESA (FR 73:28212). This listing is based on the best available science showing that a loss of sea ice threatens polar bear habitat. The polar bear was listed as a threatened species which is defined as a species likely to become endangered in the foreseeable future.

The Southern Beaufort Sea (SB) population occurs between Icy Cape, Alaska on the western boundary and Pearce Point, Northwest Territory (NWT), Canada (Amstrup et al. 1986, Amstrup and DeMaster 1988, Stirling 1988). The size of the SB population was estimated to be approximately 1,800 animals in

1986 (Amstrup et al. 1986). A new population assessment derived from capture-recapture data collected during 2001 to 2006 estimated 1,526 (with a 95 percent confidence interval equal to 1,211–1,841) polar bears in the region in 2006 (Regehr et al. 2006). Because the precision of the earlier estimate was low, the two estimates cannot be statistically differentiated. The harvest of polar bears in the SB region is shared between Canada and the United States and since 1988 has been managed under the “Polar Bear Management Agreement for the Southern Beaufort Sea” by the Inuvialuit Game Council of Canada, and the North Slope Borough of Alaska. The harvest quota for the SB is 80 animals (40 for Alaska and 40 for NWT). In 2004/2005 the joint harvest was 46 bears (Schliebe et al. 2006, Branigan et al. 2006). The status of the SB population is designated as reduced (FR 73:28212, 15 May 2008; page 28217) and the predicted trend is declining (Aars et al. 2006).

Populations Status, Trends, and Abundance

The total number of polar bears worldwide is estimated to be about 20,000–25,000 bears (Schliebe et al. 2006). The most recent stock assessment estimated a population size of 1,526 bears (USFWS 2009a; USFWS 2010a). The SB population of polar bears was thought to be low and declining in the 1960s due to excessive harvest, and to have increased dramatically, (perhaps doubling) between the 1960s and the 1990s (Amstrup et al. 1998, Amstrup 2000,). The size of the SB population was estimated to be approximately 1,800 animals in 1986 (Amstrup et al. 1986, Amstrup 2000), and may have been as high as 2,500 in the late 1990s (Amstrup et al. 2001).

In 2006, results from an intensive five-year mark-recapture study indicated that the SB subpopulation included 1,526 polar bears (Regehr et al. 2006) suggesting a decline between the late 1990s and 2006, although low precision in the previous estimate of 1,800 precluded a statistical determination. Subsequent analyses of the 2001–2006 data indicates that the survival and breeding of polar bears during this period were affected by sea ice conditions. The population is currently considered to be declining.

Range

Polar bears are the apical predators of the Arctic marine ecosystem (Amstrup 2003) and are distributed throughout regions of arctic and subarctic waters where the sea is ice-covered for large portions of the year. The SB population is found from Icy Cape, Alaska east to Pearce Point, NWT, Canada (Amstrup et al. 1986, Amstrup and DeMaster 1988, Stirling 1988).

Life History and Habitat Use

Polar bears are common in the Beaufort Sea and are known to occur in small, widely-distributed numbers in the proposed project area. Over most of their range, polar bears remain on the sea ice year round, as the sea ice is where their prey (mostly ringed seals [*Phoca hispida*]) is accessible. Polar bears visit land only for short periods, however, polar bear use of coastal areas during the fall open-water period has increased in recent years and is projected to continue to increase (Kochnev et al. 2003; Schliebe et al. 2005).

Female polar bears will come ashore to den and give birth to young. In the northern Alaska coastal areas, pregnant females enter maternity dens by late November and emerge as late as early April. Maternal dens typically are located in snow drifts in coastal areas, stable parts of the offshore pack ice, or on landfast ice (Amstrup and Gardner, 1994). Studies have shown that more bears are now denning nearshore rather than in far offshore regions (Fischbach et al. 2007). The highest density of land dens in Alaska occur along the coastal barrier islands of the eastern Beaufort Sea and within the Arctic National Wildlife Refuge (USFWS 2009a). See Figure 3.1-6.

Polar Bear Sighting

Polar Bear Critical Habitat

Alaska Stand Alone Gas Pipeline Route

Pipeline

Road

Facility

Sighting data obtained from Minerals Management Service Bowhead Whale Aerial Survey Project Historical Database, 1979-2007.

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GAS FOR ALASKANS

POLAR BEAR SIGHTINGS AND CRITICAL HABITAT IN THE BEAUFORT SEA
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE:
0 1 2 3 4 Miles

FIGURE:
3.1-6

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Only pregnant female polar bears den; other members of the population (males, solitary females, females with older cubs) remain active throughout winter. Pregnant females from the SB stock may den in the action area. Durner et al. (2006) found approximately 50 percent of pregnant females in the Beaufort Sea came ashore to construct maternity dens, while Amstrup and Gardner (1994) found 42 percent of females observed in the Alaskan Chukchi and Beaufort seas and Canadian Beaufort Sea from 1983–1991 denned on land. Fishbach et al. (2007) suggest 60 percent of females in these areas den on land, while the remaining females denned on shorefast ice, or drifting pack ice (USFWS 2009a).

Pregnant females come ashore to den in late October/early November depending upon ice movements and timing of freeze up (Lentfer and Hensel 1980). In Alaska, dens are sparsely distributed along a narrow coastal strip with sightings reported up to 30 miles inland (Lentfer and Hensel 1980) and 38 miles inland (Amstrup and Gardner 1994). Denning habitat includes areas such as coastal and river banks and bluffs where snow accumulates early.

Polar bears derive essentially all their sustenance from marine mammal prey obtained on sea ice habitat. The high fat intake from specializing on marine mammal prey allows polar bears to thrive in the harsh arctic environment (Stirling and Derocher 1990; Amstrup 2003; USFWS 2009a). Over much of their range, polar bears are dependent on ringed seals (Smith 1980) and where common, bearded seals (Derocher et al. 2002).

Polar Bears in the Action Area

Polar bears are expected to occur in the action area infrequently (Figure 3.1-6). As mentioned above, they spend the majority of time on sea ice, coming on land only occasionally. Some pregnant females from the SB stock come on land to enter dens in late fall. Maternal polar bear denning habitat exists in the action area, however there are few documented den sites found in that area (Figure 3.1-7).

Amstrup and Garner (1994) studied fidelity to denning locations and found that bears that denned once on pack ice were more likely to den on pack ice than on land in subsequent years. Bears were also found to be faithful to general areas. They are more likely to return to the eastern coastal area to den (if that is where they previously denned), earlier than to the western half of the Alaska coast. Annual variations in weather, ice conditions, prey availability, and the long-distance movements of polar bears (Amstrup et al. 1986, Garner et al. 1990) make recurrence of exact denning locations unlikely. If there are documented historical den sites found in the action area, there is no evidence indicating that a particular den site will be used again.

Threats

Historical and present potential threats effecting polar bears in the Beaufort Sea area include subsistence and sport hunting, environmental contaminants, climate change and development.

Hunting

Since passage of the MMPA, the sport hunting of polar bears in the United States has ceased. Alaska Natives that live on the North Slope of Alaska still harvest polar bears for subsistence purposes. There is a Native-to-Native agreement between the Iñupiat people of Alaska and the Inuvialuit people of Canada, developed in 1988, that establishes quotas and recommendations concerning hunting practices (USFWS 2009a). The current harvest levels, which have averaged 36 bears per year since 1980, are thought not to impact the rate of recovery of the species (USFWS 2006). Subsistence hunting for polar bears occurs near the villages of Barrow, Kaktovik, and Nuiqsut, the closest being Nuiqsut, located 59 miles from West Dock.

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- Maternal Polar Bear Den Location
- Maternal Bear Denning Habitat
- Alaska Stand Alone Gas Pipeline Route
- Pipeline
- Road
- Facility

Maternal Polar Bear Den Location data obtained from:
USGS Catalogue of Polar Bear Maternal Den Locations in the Beaufort Sea and Neighboring Regions, Alaska 1910-2010 [Data Series 568].

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MATERNAL POLAR BEAR DEN LOCATIONS/HABITAT IN THE BEAUFORT SEA
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE: 0 1 2 3 Miles

FIGURE: 3.1-7

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Environmental Contaminants

The types of contaminants with the greatest potential to be a threat threat to polar bears in the Arctic are petroleum hydrocarbons, persistent organic pollutants (POPs), and heavy metals. The Arctic ecosystem is particularly sensitive to environmental contamination due to the slower rate of breakdown of POPs, including organochlorine compounds (OCs) (Fisk et al. 2001; Lie et al. 2003). The highest concentrations of OCs have been found in species at the top of the marine food chains such as polar bears, which feed primarily on seals (Braune et al. 2005). The SB polar bear populations may also have concentrations of mercury close to the reported toxicological threshold levels of 60 micrograms wet weight for marine mammals (Arctic Monitoring and Assesment Program [AMAP] 2005).

Polar bear ranges overlap with many active oil and gas operations within 25 miles of the coast or offshore (Schliebe et al. 2006). Exposure of polar bears to petroleum hydrocarbons could potentially come from direct contact with oil spill products. To date, no major oil spills have occurred in the Alaska marine environment within the range of polar bears. Industrial development in polar bear habitat may also expose individuals to other hazardous substances through improper storage or spills.

The USFWS determined that contaminants are not a past, present, or future forseeable threat to the survival and recovery of polar bears throughout all or a portion of their range (FR 73:28,288).

Climate Change

The listing of polar bears as a threatened species under ESA is based largely on findings that continuing declines in arctic sea ice, linked to climate change, are likely to threaten the polar bear species within the foreseeable future (FR 73:28212, May 15, 2008). USFWS has determined that ongoing and projected loss of sea ice habitat is likely to result in nutritional stress and reduced productivity as already evidenced in the Western Hudson Bay and Southern Beaufort Sea populations (FR 73:28292). Eventually, at rates and magnitudes that will vary among populations, all polar bear populations are projected to suffer adverse effects, with some populations at risk of becoming extirpated if sea ice declines continue as projected through the end of the century.

Declining sea ice in the arctic marine environment may also lead to changes in polar bear use of their terrestrial environment. Sea ice must be stable for ice denning to be successful. Therefore, if the quality of sea ice decreases, more females may den on land (Durner et al. 2006). An estimate of greater than 60 percent of females from the SB stock currently den on land, while the remaining females den on drifting pack ice (Fischbach et al. 2007). In addition, if large areas of open water persist until late winter females may be unable to access land to den (Stirling and Andriashek 1992). Climate change may also affect the quality of denning habitat on coastal or island bluffs due to rapid erosion and slope failure due to melting permafrost (Durner et al. 2006). Changes in autumn and winter precipitation or wind patterns could significantly alter the availability and quality of denning habitat (Durner et al. 2003).

Polar bears' use of coastal habitats in the fall, during open-water and freeze-up conditions, has increased since 1992 (USFWS 2006). Since the late 1990s, the timing of ice formation in the fall has occurred later in the year (November or early December, as opposed to early or mid-October in the 1980s) resulting in an increased amount of time that the area was not accessible to polar bears. Consequently, bears spent a greater amount of time on land and not feeding. The later formation of nearshore ice increases the probability of bear–human interactions occurring in coastal villages (Schliebe et al. 2006). USGS created a website containing a compilation of new polar bear findings.

Human Development

The primary form of human development near the polar bear range that overlaps the action area has been oil and gas exploration and production-related facilities. Minimal effects have occurred to polar bears from the oil and gas industry in Alaska during the past 30 years. Since 1968 there have been only two known incidents of lethal takes of polar bears by industry in Alaska. Formal Section 7 Consultations have been conducted for the Chukchi Sea and Beaufort Sea Incidental Take Regulations (ITRs), which authorize the incidental taking of a small number of polar bears in these seas and the adjacent ACP during oil and gas activities in the Alaskan Arctic. No lethal take associated with the oil and gas industry has occurred during the period covered by ITRs (1991 until present) in either the Chukchi or Beaufort seas (USFWS 2009a).

Females and cubs denning on land can be vulnerable to disturbance from oil and gas activities; however, most females have been found to be relatively tolerant of human disturbance (Amstrup 1993). If disturbed, females appear more likely to abandon their dens in the fall before cubs are born and relocate, than in the spring when young cubs are less likely to survive if they leave the maternal den early (Lentfer and Hensel 1980, Amstrup 1993, Durner et al. 2006). Polar bears occur at or near most coastal and offshore facilities, and can occur in the project action area. The proposed project and associated activities will be subject to regulations under the MMPA, ITRs, and associated Letters of Authorization (LOAs), therefore minimizing human–bear incidents and interactions.

3.2 *Critical Habitat*

3.2.1 Cook Inlet Beluga Critical Habitat

Designation of Critical Habitat

On April 11, 2011, the NMFS published a final rule to designate 3,013 sq mi of critical habitat for the Cook Inlet beluga whale DPS, effective May 11, 2011 (76 FR 20180). Figure 3.2-1 shows an overview of the critical habitat in Cook Inlet. The NMFS excluded the Port of Anchorage from the final rule in consideration of national security interests. Portions of military lands were determined to be ineligible for designation of critical habitat.

Essential Features and Description of Critical Habitat

The NMFS has categorized Cook Inlet into three habitat types according to their importance to the conservation of the beluga whales. The most northern portion of the inlet is considered Type I habitat and the more southern portion is Type II habitat. Figure 3.2-1 shows the boundaries of the habitat types.

Type I habitat—The southern boundary of the Type I habitat area stretches from three miles southwest of the Beluga River across to Point Possession. It contains essential foraging and nursery habitat intensively used by beluga whales between the spring and fall. It is also the area of the inlet with the greatest potential of impacts from anthropogenic sources, such as industrial activities.

The northern portion of Cook Inlet, which has been designated as Type I habitat, consists of shallow tidal flats, and river mouths. The shallow tidal flats may also aid in molting or escaping predators (NMFS 2008b). The river mouths are important for eulachon and salmon and therefore attract feeding belugas. Following the coho salmon run, belugas spend more time in Type I habitat during the spring and fall (Funk et al. 2005). Type I habitat is the most valuable of the three habitat types.

Type II habitat—The Type II habitat area is primarily used during the fall and winter. However, there are a few isolated spring feeding areas within this habitat. Type II habitat includes the area south of the Type I area to a southern boundary line at 60.2500 N latitude (NMFS 2008b). Type II habitat also includes nearshore areas that extend down the west coast of the inlet following the tidal flats into Kamishak Bay to Douglass Reef, and a section of Kachemak Bay (NMFS 2008b). During the time beluga whales spend in Type II habitat, they tend to be in lower densities and deeper water (NMFS 2008b).

Critical Habitat Relative to the Proposed Action Area

The Port of Anchorage lies within the NMFS-determined Type I habitat (Figure 3.4-1), which is important to beluga whales for feeding and nursing calves. Belugas will likely be present in or near the action area during the construction period in the summer, when barges associated with the project will be arriving at the port.

3.2.2 Polar Bear Critical Habitat

Designation of Critical Habitat

On December 7, 2010, USFWS published a final rule designating critical habitat for the threatened polar bear (FR 75:76086–76137).

Primary Constituent Elements and Description of Critical Habitat

The Primary Constituent Elements of critical habitat for the polar bear in the United States in §17.95 Critical Habitat (FR 75:76137), include the following:

> (*i) Sea ice habitat used for feeding, breeding, denning, and movements, which is sea ice over waters 984 feet (300 m) or less in depth that occur over the continental shelf with adequate prey resources (primarily ringed and bearded seals) to support polar bears.*
>
> *(ii) Terrestrial denning habitat, which includes topographic features such as coastal bluffs and river banks, with the following suitable macrohabitat characteristics:*
>
> > *(A) Steep, stable slopes (range 15.5–50.0°), with heights ranging from 4.3 to 111.6 feet (1.3 to 34 m), and with water or relatively level ground below the slope and relatively flat terrain above the slope;*
> >
> > *(B) Unobstructed, undisturbed access between den sites and the coast;*
> >
> > *(C) Sea ice in proximity to terrestrial denning habitat prior to the onset of denning during the fall to provide access to terrestrial den sites; and*
> >
> > *(D) The absence of disturbance from humans and human activities that might attract other polar bears.*
>
> *(iii) Barrier island habitat used for denning, refuge from human disturbance, and movements along the coast to access maternal den and optimal feeding habitat. This includes all barrier islands along the Alaska coast and their associated spits, within the range of polar bears, in the United States, and the water, ice, and terrestrial habitat within 1 mile (1.6 km) of these islands (no-disturbance zone).*

Designated critical habitat encompasses three areas or units: Unit 1–sea ice, Unit 2–terrestrial denning habitat, and Unit 3–barrier island habitat. The total area designated covers 187,157 square miles, of which about 96 percent is sea ice habitat. The units are:

- *Sea ice habitat*: Extends from the Canadian border in the east to a point south of Hooper Bay, located over the continental shelf; including ice over water out to the 984 feet water depth contour or limits of the U.S. Exclusive Economic Zone;
- *Terrestrial denning habitat*: The lands within 20 miles of the northern coast of Alaska from the Canadian border west to the Kavik River, and the lands within 5 miles of the shoreline between the Kavik River and Barrow.
- *The Barrier Island habitat*: The offshore islands along Alaska's northern coast from the Canadian border west to Barrow, south to Point Hope, southwest to Wales, southeast to Nome, and ending at Hooper Bay, Alaska.

Certain areas were exempted from critical habitat according to the Final Rule designating the critical habitat, these are:

- Five U.S. Air Force (USAF) Radar Sites–located at Point Barrow, Point Lonely, Oliktok Point, Point Bullen, and Barter Island (measures to protect polar bears occurring in habitats within or adjacent to these facilities are included in the rule)
- Townsites at the Native communities of Barrow and Kaktovik
- All existing manmade structures, regardless of land ownership status (USFWS 2010a)

Critical Habitat in the Action Area

The action area of the proposed project includes approximately 1,112 acres located within designated Polar Bear Critical Habitat areas (As noted in Figure 3.1-6 above). This area consists mostly of terrestrial habitat, a small proportion of which may be suitable for, and could be used by, pregnant females for maternal denning in the winter months (As noted in Figure 3.1-7 above). Terrestrial dens provide pregnant polar bears with a safe environment away from predatory polar bears, human disturbance, and harsh weather, all of which threaten cub survival. In addition, Barrier Island habitat is used by polar bears for denning, as a corridor for traveling, a refuge from human disturbances, and for access to dens and feeding (USFWS 2010a). West Dock is located 1 mile from the nearest barrier island. West Dock is an existing facility and is exempted in the final critical habitat designation.

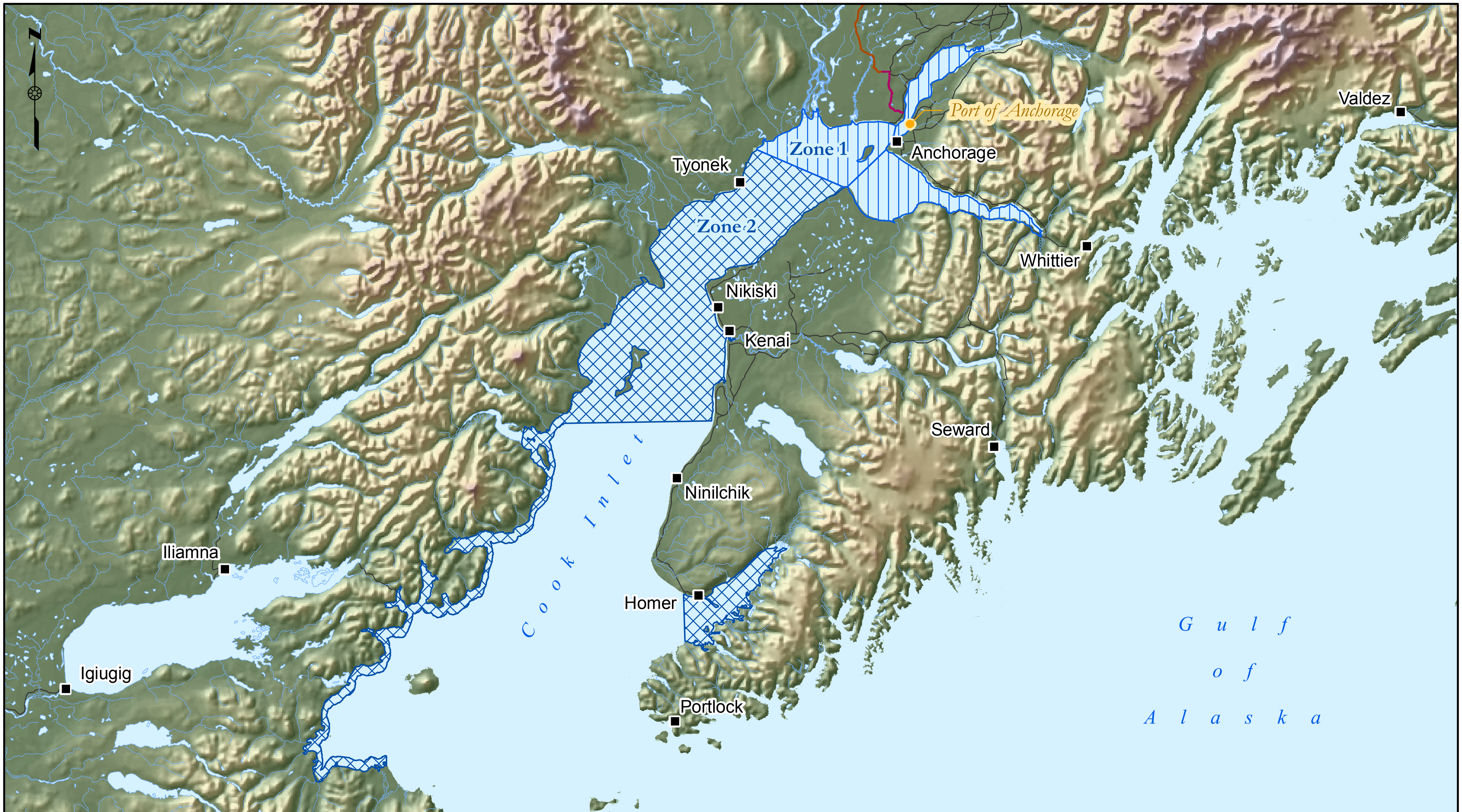
Sea ice habitat provides a platform for polar bears to hunt, breed, rest, move to terrestrial denning areas, and for long-distance travel. Polar bears require a stable ice platform from which to hunt seals, as this platform provides access to seals either at breathing holes, the ice edge, or near leads and polynyas. Sea ice habitat adjacent to open water areas over the shallower waters, where the highest densities of seals occur, is preferred polar bear habitat (USFWS 2010a).

3.2.3 Steller Sea Lion Critical Habitat

Designation of Critical Habitat

On 27 August 1993 NMFS published a final rule to designate critical habitat for the threatened and endangered populations of Steller sea lions (FR 58:45269).

However, there is no designated Steller sea lion critical habitat in the ASAP action areas, including action areas within Cook Inlet or Resurrection Bay (Figure 3.2-2). Critical habitat nearest to the Port of Seward is associated with the major haul-out at Outer Island and haul-outs at Gore Point located in Gulf of Alaska waters outside Resurrection Bay.



Beluga Whale Proposed Critical Habitat - Zone 1

Beluga Whale Proposed Critical Habitat - Zone 2

Alaska Stand Alone Gas Pipeline Route

Road

Town

NAD83, Alaska Albers Equal Area

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Gas for Alaskans

BELUGA WHALE
CRITICAL HABITAT IN COOK INLET
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE:
0 12.5 25 50 Miles

FIGURE:
3.2-1

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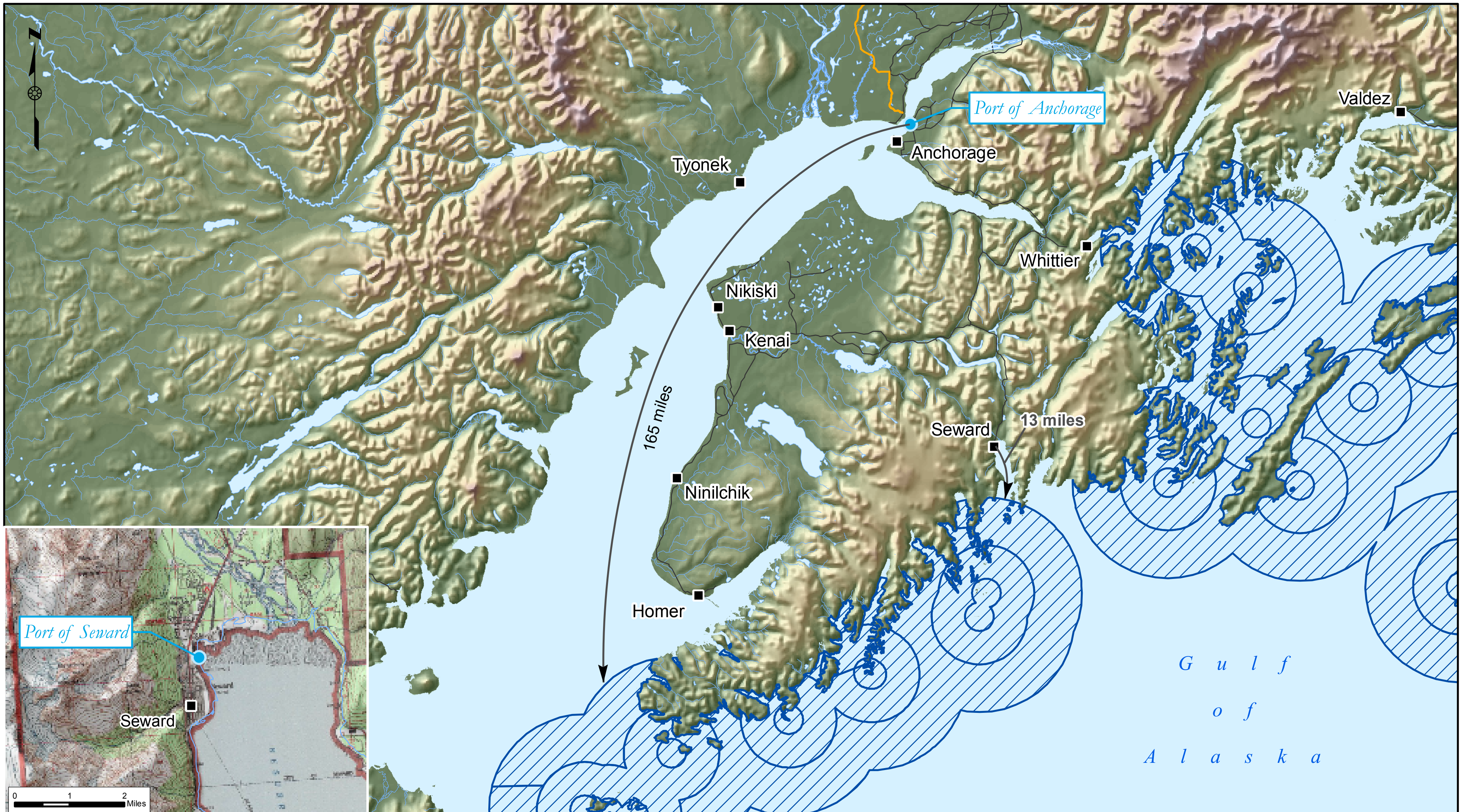

Stellar Sea Lion Critical Habitat

Alaska Stand Alone Gas Pipeline Route

Road

Town

NAD83, Alaska Albers Equal Area

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Alaska Gasline Development Corp.
Gas for Alaskans

STELLER SEA LION CRITICAL HABITAT NEAR THE ACTION AREA
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE: 0 12.5 25 50 Miles

FIGURE: 3.2-2

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3.3 *Candidate and Proposed Species*

3.3.1 Pacific Walrus

Biological Populations and Listing Status

On 8 September 2009, the USFWS announced a finding on a petition to list the Pacific walrus as threatened or endangered under the ESA and to designate critical habitat. The USFWS found that the petition presented scientific information indicating that listing a subspecies may be warranted. On February 8, 2011, the USFWS designated the Pacific walrus as a candidate for ESA protection. The 12-month finding indicated that, while the Pacific walrus warrants protection under the ESA, there are higher priority species that need to be addressed prior to the walrus. The walrus' status will be reviewed annually and a proposed rule to protect the species under the ESA will be developed in the future.

Populations Status, Trends, and Abundance

There is no reliable estimate for the size of the Pacific walrus population. Aerial surveys conducted by the U.S. and Russia between 1975 and 1990 produced population estimates ranging from 201,039 to 234,020 animals. However, these estimates are considered minimum values and are not suitable for detecting trends in population size (Gilbert, et al. 1992).

The number of Pacific walrus surveyed within a 122,860 square mile area was estimated at 129,000 with 95 percent confidence limits of 55,000 to 507,000 individuals in 2006. This estimate does not account for areas that were not surveyed, some of which are known to have had walruses present. Therefore the estimate was negatively biased to an unknown degree (Fay 1982; Burn, et al. 2009; USFWS 2010b) which provides assurance that walrus population size was greater than the estimate (NMFS 2005). Considering this, more surveys will be required to verify any trends in population size and to quantify such changes.

Range

The Pacific walrus is distributed in Russian and Alaskan waters over the continental shelves of the Chukchi and Bering seas, and ranges in the north from the eastern East Siberian Sea to the western Beaufort Sea. Migrations are directly related to the seasonal advance and retreat of the sea ice (Fay 1982, ADF&G 2009). Walruses are found in waters less than 656 feet deep along the pack ice margin where ice concentrations are less than 80 percent (Fay 1982). This ice-covered, shallow continental shelf is important for walruses, as they use this for rest and for calves incapable of deep or long-term diving (MMS 2007). Walruses use floating sea ice for birthing, nursing, resting, isolation from predators, and for passive transport to new feeding areas (USFWS 2009b). Reduced summer sea ice over the continental shelf in the Chukchi Sea in the past decade has resulted in increased use of land haul-outs by adult females and young during ice-free periods (Jay and Fischbach 2008).

Life History and Habitat Use

Walruses feed on benthic macroinvertebrates and prefer to forage in areas less than 262-feet-deep (Fay 1982). Walruses feed on a wide variety of organisms including worms, snails, clams, marine birds, and seals; but most frequently on clams, snails, and polychaete worms (Fay 1982; Sheffield and Grebmeier 2009).

Walruses in the Action Area

The Pacific walrus is found in low numbers in the Beaufort Sea (USFWS 2010b) (See Figure 3.3-1). Some walruses have hauled-out onshore near Kaktovik in the past, but this is not a frequent event.

The Beaufort Sea does not provide the optimal habitat for walruses. The probability of walruses occurring in or near the proposed action area offshore of Prudhoe Bay is very low, as is the probability of walruses hauled-out on the coast in the action area (Fischbach, personal comm. 2010).

Threats

Subsistence Hunting

Walruses have an intrinsically low rate of reproduction and are therefore limited in their capacity to respond to exploitation (Fay 1982). In the late 19th century, American whalers intensively harvested walruses in the northern Bering and southern Chukchi seas. The population was substantially depleted by the end of the century (Fay et al. 1989). Since 1930, the combined U.S. and Russia walrus harvests have ranged from 2,300–9,500 animals per year. These harvest levels were thought to be of sufficient scale to result in subsequent population declines (Fay et al. 1989; Fay et al. 1997). Since 1992, harvest levels have been limited; through the 1990s harvests ranged from approximately 2,400–4,700 animals per year. Current assessment of sustainable harvest rate is unknown (Garlich-Miller et al. 2006).

Climate Change

Pacific walrus is an ice-dependent species. Individuals use ice for many aspects of their life history throughout the year. Because of the projected loss of sea ice over the 21st century, USFWS has identified the loss of sea ice and associated effects to be a threat to the Pacific walrus population. Although USFWS anticipates that sufficient ice will remain, so that breeding behavior and calving will still occur in association with sea ice, the locations of these activities are expected to change in response to changing ice patterns. The greatest change in sea ice, walrus distribution, and behavioral responses is expected to occur in the summer (June–August) and fall (October–November), when sea ice loss is projected to be the greatest. USFWS has concluded that loss of sea ice, with its concomitant changes to walrus distribution and life-history patterns, will lead to a population decline, and is a threat to Pacific walrus in the foreseeable future because, over time, walruses will be forced to rely on terrestrial haul-outs to an increasingly greater extent.

Although USFWS determined that threats resulting from climate change warrant listing Pacific walrus under the ESA, the agency also determined that such a listing is precluded by limited resources and higher priority species. USFWS has assigned the Pacific walrus a priority listing of 9, on a scale of 1 to 12, with 1 representing the highest priority species for ESA listing and protection. USFWS assigned Pacific walrus a lower priority ranking because of its relatively high present abundance and its ability to rely on terrestrial haul-outs as sea ice diminishes.

Walrus Sighting

Alaska Stand Alone Gas Pipeline Route

Pipeline

Road

Facility

Sighting data obtained from Minerals Management Service Bowhead Whale Aerial Survey Project Historical Database, 1979-2007.

NAD83, Alaska Albers Equal Area.

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WALRUS SIGHTINGS IN THE BEAUFORT SEA 1979-2007
Alaska Stand Alone Gas Pipeline/***ASAP***
Bilogical Assessment

SCALE: 0 1 2 3 4 Miles

FIGURE: 3.3-1

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Commercial Fishing and Marine Vessel Traffic

As walruses are normally closely associated with sea ice, their interaction with commercial fishing and marine vessel traffic in the Arctic is very limited.

Offshore Oil and Gas related activities

Oil-and-gas-related activities have been conducted in the Chukchi and Beaufort Seas since the late 1960s. Much of this activity has occurred in the Beaufort Sea OCS rather than the Chukchi Sea OCS.

Pacific walruses do not normally range into the Beaufort Sea (USFWS 2002b), though individuals and small groups are occasionally observed. During the history of the incidental take regulations in the Beaufort Sea interactions with walruses have been minimal. From 1994 to 2004, a total of nine sightings, involving 10 walruses were recorded by Industry during the open water seasons.

3.3.2 Ringed Seal

Biological Populations and Listing Status

The range of the ringed seal is circumpolar with five subspecies being recognized: the Arctic ringed seal (*Phoca hispida hispida*), the Baltic ringed seal (*Phoca hispida botnica*), the Okhotsk ringed seal (*Phoca hispida ochotensis*), the Ladoga ringed seal (*Phoca hispida ladogensis*), and the Saimaa ringed seal (*Phoca hispida saimensis*). On 10 December 2010, NMFS published a proposed rule to list the Arctic, Okhotsk, Baltic, and Ladoga subspecies as threatened and the Saimaa subspecies as endangered under the ESA (FR 75:77476). The only subspecies occurring in the action area, and addressed in this BA, is the Arctic subspecies. No critical habitat has been proposed for the ringed seal. A detailed comprehensive description of the distribution, life history, and abundance of ringed seals is included in the status review of the ringed seal recently published by the NMFS (NMFS 2010).

Populations Status, Trends, and Abundance

Specific estimates of the Arctic ringed seal population are not available but NMFS suggested that the population numbers are in the millions (FR 75:77492). Bengston et al. (2005) conducted ringed seal surveys in the Chukchi Sea in 1999 and 2000 and found densities higher at nearshore locations. They estimated the Chukchi population at 252,488 animals in 1999 and 208,857 in 2000. Frost et al. (2002) conducted surveys in the Beaufort Sea and estimated the density of ringed seals was 2.65 seals per square mile. Combining the estimated population sizes with the densities from previous surveys (Bengston et al. 2005, Frost et al. 2002), Angliss and Allen (2009a) estimated that there are at least 249,000 Arctic ringed seals in the Chukchi and Beaufort Seas (Angliss and Allen 2009a). This is considered to be a very conservative estimate given that some surveys did not correct the density for seals that were not visible during the survey because they were in the water, and because the survey did not include the entire range of the ringed seal habitat. Considering that these surveys were restricted to U.S. and Canadian waters, and did not include large areas of pack ice, Kelly et al. (2010) provided a reasonable estimate for the total population of Arctic ringed seals in the Chukchi and Beaufort Seas of 1,000,000 seals.

Reliable data on population abundance trends for the Arctic stock of ringed seals do not presently exist (Angliss and Allen 2009a). Frost et al. (2002) reported that trend analyses based on comparisons of observed seal densities in the central Beaufort Sea suggested a marginally significant but substantial decline of 31 percent from 1980–1987 to 1996–1999; however, Angliss and Allen (2009a) concluded that the apparent decline between the 1980s and the 1990s may have been due to a difference in the timing of surveys rather than an actual decline.

Range

In Alaska, the range of the ringed seal encompasses the Beaufort, Chukchi, and Bering Seas and can reach as far south as Bristol Bay in Alaska in years with extensive ice coverage. Throughout their range, ringed seals exhibit an affinity for ice-covered waters.

Life History and Habitat Use

The seals excavate subnivean lairs in the snow above some of the holes, in which they have their pups between March and April. The lair protects the pup against hypothermia and predation by Arctic foxes and polar bears (Smith et al. 1991). Once the pup is born, it is nursed there for five to eight weeks during which time the pup stays in the lair. There is a positive relationship between lack of maternal experience and increased predation by polar bear, which could account for poor reproductive success of less experienced females (Eley 1994). The primary food sources for ringed seals are arctic cod, saffron cod, shrimp, amphipods, and euphausiids (Reeves et al. 1992).

Ringed seals tend to prefer large floes (i.e., greater than 147 feet in diameter) and are often found in the interior ice pack where the sea ice coverage is greater than 90 percent (Simpkins et al. 2003). They remain in contact with ice most of the year and pup on the ice in late winter to early spring. During late April through June, ringed seals are distributed throughout their range from the southern ice edge northward (Burns and Harbo 1972, Burns et al. 1981, Braham et al. 1984). Ringed seals overwinter on pack and shorefast ice (Bengston et al. 2005). They create breathing holes in the newly formed ice and maintain them throughout the year by scraping the sides using the nails on their foreflippers (Smith and Hamill 1981).

The density of ringed seals is dependent upon the availability of food, ice conditions, and water depth. Frost et al. (2004) conducted aerial surveys over the Beaufort Sea coast between Barrow and Kaktovik to assess what variables such as water depth, distance from fast ice, and ice quality have on distribution. They determined that ringed seal density was greatest in intermediate water depths of 16.4–115 feet and in areas of smooth ice nearest to the edge of fast ice. Ringed seal densities were estimated from similar surveys flown in 1996–1999 in the Alaska Beaufort Sea from Barrow to Kaktovik. Observed seal densities in that region ranged from 0.81 to 1.17 per square kilometer (Frost et al. 2002, 2004). Results of surveys conducted by Frost and Lowry (1999) indicate that, in the Alaskan Beaufort Sea, the density of ringed seals in May–June is higher to the east than to the west of Flaxman Island. These surveys are conducted in the spring when seals are visible on ice, less is known of their distribution during summer months.

Ringed Seals in the Action Area

British Petroleum (BP) conducted seal surveys near the Northstar Unit located approximately 6 miles from West Dock offshore of Prudhoe Bay to determine baseline conditions prior to the construction of the satellite drilling island. Ringed seal densities close to the Northstar site ranged from 0.39 to 0.63 seals per square kilometer (Moulton et al. 2002.) These numbers did not indicate a decline in densities during 1997 to 1999 (Moulton et al. 2003).

Ringed seals are associated with sea ice and typically remain with the ice throughout the year (Angliss and Allen 2009a; Bengston et al. 2005), although in the summer, ringed seals are commonly seen alone or in small groups in open water (Harwood and Stirling 1992). Large concentrations of ringed seals are not expected near West Dock during activities associated with the proposed project, partly because they do not tend to travel in large groups and partly due to the normal industrial activity present at West Dock

(Figure 3.3-2). They are, however, the most frequently-encountered seal species in the Prudhoe Bay region (Simpkins et al. 2003).

Threats

Pollution and Contaminants

Contaminants accumulate in the Arctic and can adversely affect marine mammals. Contaminant loads have been studied in ringed seals, because they are the main prey for polar bears and they are an important subsistence species for Alaskan Natives (Dietz et al. 1995, Zhu et al. 1995, Muir et al. 1999, Fisk et al. 2001, Fisk et al. 2005, Kovacs et al. 2007, Dietz 2008).

Contaminant loads of pollutants such as organochlorine compounds and heavy metals in ringed seals that live in the Alaskan Arctic are lower than those found in ringed seals in Europe (Borga et al. 2005). High levels of mercury have been found in the liver and muscles of ringed seals in the Canadian Arctic, although no toxic effect of the metal was observed (Smith and Armstrong 1978). Mercury concentration becomes higher as seals age (Dehn et al. 2005). POP levels measured in ringed seals taken from Barrow were similar to those found in the Canadian Arctic and lower than those in Svalbard and the Kara Sea in the Russian Arctic (Nakata et al. 1998) (Kucklick et al. 2002). Levels of perfluorononanoic acid were higher and levels of perfluorooctane sulfonate were higher in ringed seals from the Bering and Chukchi Seas than in Canada and Greenland (Quakenbush and Citta 2008).

Section 4.2.5.1 in *The Status Review of the Ringed Seal (Phoca hispida)* contains more detailed information on contaminants in ringed seals and is incorporated in this document by reference (NMFS 2010).

Subsistence Hunting

Ringed seals are an important subsistence resource for Native Alaskans living in communities along the Beaufort Sea coast. Harvest levels decreased during the 1970s from 7,000–15,000 to 2,000–3,000 by 1979 (Frost 1985). In 2000, Alaska Department of Fish and Game (ADF&G) estimated that 9,500 ringed seals were being harvested per year, but there is no current estimate of the number of seals being harvested (Allen and Angliss 2010).

Oil and Gas Activities

Offshore oil and gas exploration, development, and production activities, have occurred in the Chukchi and Beaufort Seas since the late 1960s (MMS and NMFS 2008). Oil and gas activities may include artificial island construction, drilling operations, pipeline construction and operation, seismic surveys, and vessel and aircraft support operations. Among these activities, the effects of noise, physical disturbance and potential oil spills have the greatest potential to effect ringed seals. (FR 75:77487). However, long term research and monitoring results on ice seals, including ringed seals, in the Alaskan Arctic have shown no evidence of more than limited and transitory effects, resulting in no detectable injury to individual seals and seal lairs, and no more than a negligible impact on the affected Arctic subpopulation. As a result, NMFS has determined that oil and gas activities are not a foreseeable threat, individually or cumulatively, to the conservation status of the Arctic ringed seal. (FR 75:77489).

Climate Change

The proposed listing of ringed seals as a threatened species is primarily premised upon the potential adverse effects of modification of their sea ice habitat resulting from a warming climate projected out through the end of the century. (NMFS 2010). Although the Arctic ringed seal remains abundant and there have been no detected effects of climate change on ringed seals to date, NMFS has inferred that future ice and snow conditions threaten this subspecies with becoming endangered by 2100. The effects of climate change may be ameliorated if the Arctic ringed seal retracts northward with sea ice habitats; however, NMFS has projected that snow depths will be insufficient for lair formation and maintenance throughout most of the subspecies' range by the end of the century. (75 Fed. Reg. 77490). The timing for the onset of potential impacts from climate change on the Arctic ringed seal is uncertain.

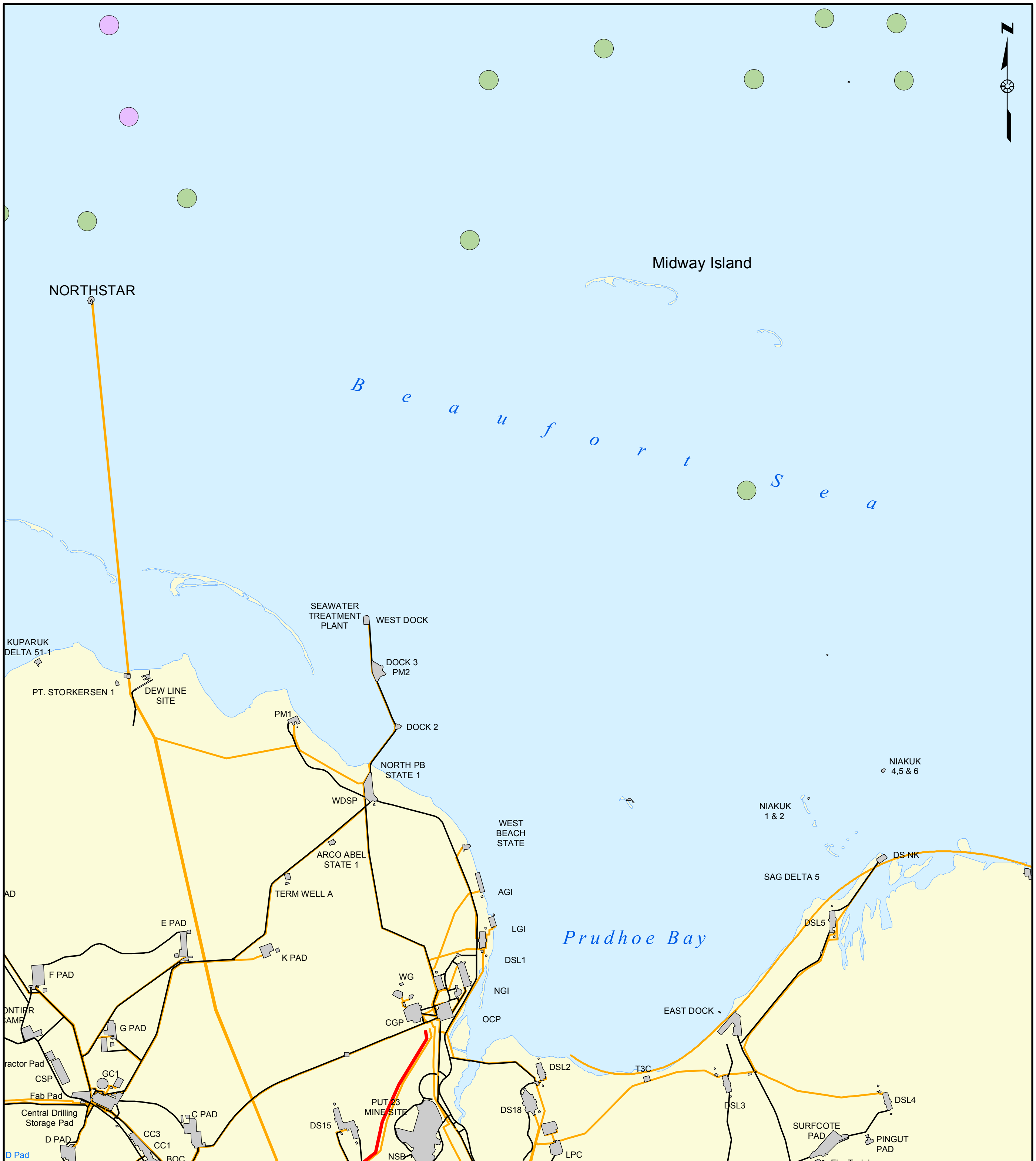
3.3.3 Bearded Seal

Biological Populations and Listing Status

The bearded seal is a circumpolar, ice-associated seal. There are two widely recognized subspecies of bearded seals, one (*Erignathus barbatus barbatus*) inhabiting the Atlantic sector of the species range, and the other (*Erignathus barbatus nauticus*) occupying the Pacific sector (Rice 1998). There is not a discrete geographical gap between the distributions of the two subspecies, but the general determination is that the Pacific sector subspecies is found to the west of longitude 112 degrees in the Canadian archipelago (NMFS 2010), and the only subspecies found in Alaska. In response to a petition, NMFS conducted a status review of the bearded sea, in which the Biological Review Team further delineated the subspecies found in the Pacific sector into an Okhotsk DPS and a Beringia DPS. The Okhotsk DPS is found in the Sea of Okhotsk and the Beringia DPS is found in the Bering, Chukchi, and Beaufort Seas, and is therefore, the DPS of interest described below. NMFS subsequently promulgated a proposed rule to list the Beringia DPS and the Okhotsk DPS of bearded seals as threatened throughout their ranges under the ESA on 10 December 2010 (FR 75:77496). Listing of the Atlantic sector subspecies was determined to be unwarranted. NMFS has not proposed to designate critical habitat for either the Beringia DPS or the Okhotsk DPS of bearded seals, because it is not currently determinable. A detailed comprehensive description of the distribution, life history, and abundance of bearded seals is included in the status review of the bearded seal recently published by NMFS (2010).

Populations Status, Trends, and Abundance

While no accurate estimates of the worldwide population of bearded seals exist, various authors have suggested populations of 500,000 to 1,000,000 (Bychkov 1971; Burns et al. 1981; Stirling and Archibald 1979; Blix 2005 in NMFS 2010b). Perhaps 450,000 of these are *Erignathus barbatus nauticus* in the Pacific sector (NMFS 2010b). Early estimates of the Beringian DPS in Alaska range from 250,000 to 300,000 (Popov, 1976; Burns J. 1981). There are no reliable estimates of the bearded seal population in the Beaufort Sea because correction factors to account for bearded seals not seen due to their submerged state in the water have not been developed (Angliss and Allen 2009). Uncorrected estimates of bearded seals in the eastern Beaufort Sea averaged 2,100 seals in 1974–1979 (Stirling et al. 1982 in NMFS 2010). These are considered to be substantial underestimates due to the lack of correction factors (NMFS 2010) and the limited area that was surveyed (Kelly 1988). There are also no reliable quantitative estimates of population trends due to the imprecision and incompleteness of the surveys (Taylor et al. 2007 in NMFS 2010)



Species

- Bearded Seal
- Ringed Seal
- Alaska Stand Alone Gas Pipeline Route

- Pipeline
- Road
- Facility

Sighting data obtained from Minerals Management Service Bowhead Whale Aerial Survey Project Historical Database, 1979-2007.

NAD83, Alaska Albers Equal Area.

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RINGED AND BEARDED SEAL SIGHTINGS IN THE BEAUFORT SEA 1979-2007
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE:
0 1 2 3 Miles

FIGURE:
3.3-2

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Range

Bearded seals, the largest of the ice seals, are associated with sea ice (Burns et al. 1981, Smith 1981, Kelly 1988, NMFS 2010b, Angliss and Allen 2009). In Alaska, their range extends from the Bering Sea north and east through the Chukchi and Beaufort Seas. Bearded seals are found in the Beaufort Sea year-round but in fewer numbers during the winter when habitat is limited to areas of open leads and active ice pack. Seasonal movements of bearded seals are related to the advance and retreat of sea ice (Kelly 1988). Ice platforms are needed for resting, reproduction, and molting (Fay 1974, Burns and Frost 1979, Burns 1981, Nelson et al. 1984, NMFS 2010.) They migrate throughout the year following the pack ice edge south into the Bering Sea in the winter and north into the Chukchi and Beaufort Seas in areas with high ice coverage in the summer (Burns et al. 1981; Simpkins et al. 2003; Bengston et al. 2000).

Life History and Habitat Use

Bearded seals primarily feed on benthic organisms on or in the sediments on the seafloor, including crabs, shrimp, and clams (Kelly 1988; Reeves et al. 1992; Finley and Evans 1983; Antonelis et al. 1994; NMFS 2010). They are therefore typically distributed in areas with sea ice cover over water less than 656 feet where they can effectively reach the seafloor to forage (Burns and Frost 1979; Fedoseev 2000; Kovacs 2002; NMFS 2010b), although they are also seen swimming in open water (Burns et al. 1981). Surveys in the Beaufort Sea indicated that bearded seals prefer areas with relatively open ice cover over water depths of less than 246 feet (Stirling 1977; Stirling et al. 1982). Preferred bearded seal habitat in the summer months in the Beaufort Sea is in water with fragmented multi-year ice over the continental shelf seaward of the scour zone (LGL 2007).

Bearded seals are the largest of the northern seals, weighing up to 750 pounds. They give birth to a single pup. Pupping occurs on drifting ice flows between late March through May (Kovacs et al. 1996). Pups are typically weaned when they are around 24 days old (Kovacs et al. 1996).

Bearded Seals in the Action Area

Aerial surveys indicated that bearded seals of the Beringia DPS are commonly found in Beaufort Sea waters offshore and, therefore, could approach the action area at West Dock (Refer to Figure 3.3-2). However, they would not be expected to occur there commonly due to the lack of ice, and the normal level of industrial activity. Bearded seals in the Beaufort Sea have been found to prefer areas close to the pack ice over water between 82 and 246 feet deep (Stirling 1977, Sterling et al. 1982). However, when the pack ice recedes north to areas over water depths greater than 656 feet, bearded seals tend to move further inshore to areas where they have access to the seafloor where they forage.

In the summer, the preferred habitat is in the central and northern Chukchi Sea. Habitat in the Beaufort Sea is more limited, because the edge of the pack ice is often over waters depths that are too deep for foraging (greater than 656 feet) (LGL 2007).

During spring seal surveys conducted in Prudhoe Bay, nine bearded seals were seen hauled-out on ice, only two of which were seen south of the barrier islands (Moulton et al. 2002). Several bearded seals were recorded during surveys in Prudhoe Bay between 1999 and 2001, but none were seen during surveys between 1997 and 1998 (Moulton et al. 2002). Although bearded, ringed, and spotted seals were observed during a marine mammal survey for an ocean bottom cable survey west of the Liberty Satellite Drilling Island (SDI) site and approximately 14 miles west of West Dock, only 7 percent of those seals were bearded seals. LGL estimated an average summer density of .0214 seals per square kilometer for bearded seals near Liberty (LGL 2002). Few bearded seals are expected to be near West Dock during vessel-related activities associated with the proposed project.

Threats

Pollution and Contaminants

There is little information available regarding contaminants in bearded seals. Contaminant loads of organochlorine compounds in bearded seals are lower in the U.S. and Canadian Arctic than in the European Arctic (Borga et al. 2005). High levels of mercury have been found in the liver and muscles of bearded seals, although no toxic effect of the metal was observed (Smith and Armstrong 1978). The rate of accumulation of heavy metals in bearded seals, appear to be higher than that seen in ringed seals (Smith and Armstrong 1978). Mercury concentration becomes higher as seals age (Dehn et al. 2005).

Oil and Gas Activities

Offshore oil and gas exploration, development, and production activities, have occurred in the Chukchi and Beaufort Seas since the late 1960s (MMS and NMFS 2008). Oil and gas activities may include artificial island construction, drilling operations, pipeline construction and operation, seismic surveys, and vessel and aircraft support operations. Among these activities, the effects of noise, physical disturbance and potential oil spills have the greatest potential to effect ringed seals (FR 75:77509). However, long-term research and monitoring results on ice seals, including ringed seals, in the Alaskan Arctic have shown no evidence of more than limited and transitory effects, resulting in no detectable injury to individual seals and seal lairs, and no more than a negligible impact on the affected subpopulation. As a result, NMFS has determined that oil and gas activities are not a foreseeable threat, individually or cumulatively, to the conservation status of the bearded seal (FR 75:77510).

Offshore oil and gas operations often require support operations, such as ice-breaking, aircraft traffic, and vessel traffic, which can also cause impacts to bearded seals.

More information on the history of oil and gas activity between 1979 to 1999 in the Beaufort Sea can be found in the MMS Study 2002-071 Geographic Information System (GIS) Geospatial Data Base of Oil-Industry and Other Human Activity (1979–1999) in the Alaskan Beaufort Sea (MMS 2002).

Climate Change

The proposed listing of bearded seals as a threatened species is primarily premised upon the potential adverse effects of modification of their sea ice habitat resulting from a warming climate projected out through the end of the century (NMFS 2010). Although the bearded ringed seal remains abundant and there have been no detected effects of climate change on bearded seals to date, NMFS has inferred that future ice and snow conditions threaten this subspecies with becoming endangered by 2100. The effects of climate change may be ameliorated if the bearded seal retracts northward with sea ice habitats; however, NMFS has projected that snow depths will be insufficient for lair formation and maintenance throughout most of the subspecies' range by the end of the century. The timing for the onset of potential impacts from climate change on the bearded seal is uncertain.

4.0 EFFECTS OF THE ACTION

The following sections provide an analysis of the potential effects of the proposed action on the threatened and endangered species, critical habitat, and proposed or candidate species identified in Section 3.0. The analyzed effects include direct, indirect, and cumulative effects. Direct and indirect effects are discussed in Section 4.1 and cumulative effects are analyzed in Section 4.2.

4.1 *Direct and Indirect Effects*

Direct effects are the immediate effects of the proposed project in the action area. Disturbance stemming from noise and habitat loss associated with construction, operation, and maintenance are considered direct effects. Indirect effects are reasonably foreseeable results from activities associated with the project that occur at a later time or at a distance removed from the immediate project area, such as effects on a prey species or changes in a pattern of land use.

4.1.1 Threatened and Endangered Species

4.1.1.1 Spectacled and Steller's Eiders

The proposed action would result in construction, maintenance, and operation of a pipeline with raised and buried sections through potential breeding habitat of spectacled and Steller's eiders.

Habitat Loss

Suitable breeding habitat for spectacled and Steller's eiders is found within the action area from the shoreline of Prudhoe Bay south for a distance of approximately 50 miles. Project facilities and appurtenances that would occur within this area during construction and operation are listed below in Table 4.1-1.

TABLE 4.1-1 PROJECT COMPONENTS WITHIN THE ACTION AREA

Project Phase	Facilities	Land Development/ Habitat Disturbance
Construction	Laydown Yards	6 acres
	Camp - 250 Persons	existing
	Fuel storage	existing
	Airport	existing
	West Dock	existing
	Right-of-way	5 acres (44 miles x 100 feet)
	Gas Conditioning Facility	70 acres
Operation	Right-of-way	158 acres (44 miles x 30 feet)
	Pipeline	2 acres buried, elevated
	Gas Conditioning Facility	70 acres

Construction of the ASAP and associated GCF may result in the disturbance of a maximum of 81 acres of potential eider breeding habitat within the action area. This is a conservative worst case estimate based on an assumption that all habitats within the right-of-way (ROW) would be disturbed. Construction in this area is expected to take place during a single winter; however, the effects on habitat would remain until any areas that are not to be maintained through operations would revegetate and recover sufficiently to provide breeding or nesting habitat for the birds.

Most (72 acres) of these habitat losses would be permanent as they consist of the footprint of the GCF and the buried and elevated portions of the pipeline, which would be operated for at least the lifetime of the project (possibly in excess of 50 years). Some of the remaining habitat losses would be regained over time as the permanent operations ROW is narrowed to approximately 30 feet or less, and disturbed areas outside of this ROW would be restored and become available to the birds as they are revegetated.

The habitat loss is not likely to adversely affect the spectacled eider or Steller's eider. There are scattered reports of Steller's eiders using habitats in the area in the past, but they have not been known to use the area for breeding or nesting in recent years. The only location on the North Slope where Steller's eider's are known to nest consistently is the Barrow area. The use of the Prudhoe Bay area by spectacled eiders has been documented in recent years; however, observed densities of breeding spectacled eiders in the area have been relatively low, with most observed breeding pairs being reported west of the Colville River. Suitable habitat is found across the North Slope so any eiders that are displaced could use habitats in the same area or elsewhere. The habitats that would be disturbed are within the Prudhoe Bay oilfield and the corridor of the TAPS and the Dalton Highway, and therefore have undergone some disturbance.

Construction will occur in the winter. Winter-time construction and the use of special methods for pipeline installation in wetlands will minimize the area of habitat that is affected.

Disturbance

Disturbance could potentially occur in the portion of the action area encompassed by coastal waters near West Dock in Prudhoe Bay, and in the portions of the action area that hold terrestrial breeding or nesting habitats.

Spectacled eiders are known to use the coastal waters of the Beaufort Sea for staging and migration. Males and non-breeding or unsuccessful females may be found in the waters from June to August; successful females and their broods may be found in these waters from August to early October. Construction of the ASAP would involve nine trips with barges through the Beaufort Sea to West Dock during these same open-water periods. Disturbance could result from the movement and noise associated with the barge traffic, and with the human and equipment activity at the dock; however, observed densities of spectacled eider's and Steller's eiders in these coastal waters are so low that disturbance from these barge trips is unlikely. Any disturbance that would occur is expected to consist of flushing and brief displacement from the path of the barge, and would not be expected to have deleterious effects on the birds.

Construction of the proposed pipeline and appurtenances in this portion of the action area would occur during a single winter. Spectacled and Steller's eiders are absent from the Beaufort Sea and North Slope breeding habitats (including the action area) from October through May. Therefore construction of the ASAP would not result in any disturbance effects on spectacled eiders or Steller's eiders.

Activities associated with the Operations and Maintenance (O&M) of ASAP could result in the disturbance and or displacement of spectacled or Steller's eiders from available breeding, nesting, or brooding habitat. However, research conducted at oil and gas facilities on the North Slope indicate that any such effects would be minimal. The distribution of spectacled eiders in the Kuparuk Oilfield has been investigated annually since 1993. Disturbance associated with noise, vehicle traffic on roads, and general human activity associated with O&M could result in discontinued use of some available habitats adjacent or near facilities, roads, or other sites where the activities occur.

Equipment contained within the GCF will generate continuous noise over the life of the proposed action. Birds, and particularly nesting birds, can be negatively impacted by noise emitted at continuous or irregular intervals during sensitive times of the year (Drewitt and Langston 2006; Burton et al. 2002). The impacts of noise from the BP Endicott oil production facilities on nearby birds have been minimal, likely due to individuals becoming habituated to the sound (Noel et al. 2003). The noise levels at the GCF are anticipated to be much lower, as equipment will be housed within the facility and fitted with sound baffles to minimize noise generation.

Collisions and Direct Mortality

Land-clearing and habitat disturbance associated with construction of the GCF and proposed pipeline in portions of the action area where there is potential spectacled and Steller's eiders nesting habitat, would take place during a single winter. Neither species of eider occurs on the tundra during the months that construction or land clearing would take place. Therefore there is no opportunity for destruction of eider nests, eggs, broods, or nesting adults.

Eider mortalities due to potential collisions between the birds and vehicles, vessels, or structures may occur. The presence of the GCF will increase the potential for spectacled and Steller's eiders to collide with a structure within their habitat over the life of the proposed action. Collisions are most likely to occur during migrations and periods of low visibility; however, collisions are expected to be rare events because of the very low densities of both these species in the project area.

Increased Predation

Increased human activity from the operation of the GCF may attract predators such as Arctic foxes and ravens. It has been hypothesized that increases in subsidized predators are due to availability of anthropogenic food subsidies (i.e., dumpsters and landfills) and also to increased availability of nesting and den sites (NAS 2003). Foxes and ravens are known to feed on the eggs or newborn chicks of sea ducks. Currently, facilities near the action area in Prudhoe Bay adhere to strict protocols to minimize waste that may attract predators and monitor areas that provide nesting habitat. The proposed GCF will operate under these protocols and workers will be trained to remain in compliance. These measures will ensure that O&M activities that increase human activity at the GCF and along the pipeline are not likely to adversely affect spectacled and Steller's eiders. In recent years, the availability of food subsidies to nest predators have been curtailed by the oil industry and are probably not as large a problem as they were previously (Liebezeit 2010).

Spectacled and Steller's eider nesting habitat may be disturbed by trenching that is required to bury the pipeline within the continuous permafrost of the ACP. Site clearance and trenching may alter permafrost present in the action area over time, which could lead to drying of wetland areas (Walker and Everett 1987). Significant drying of small ponds or lakes could lead to a loss of foraging habitat, which is important for breeding spectacled and Steller's Eiders and their fledglings.

The effect of trenching in potential spectacled and Steller's eiders breeding habit will be minimal. As discussed above, spectacled eiders have not been observed south of TAPS MP 12, and the proposed buried section of pipeline begins approximately three miles north of this point. Combined with the low densities of both species in the action area, potential drying of small ponds and lakes from trenching is unlikely to have an adverse effect on Spectacled or Steller's eiders.

To mitigate the impact of permafrost thaw and subsequent wetland drying, the buried sections of pipeline are engineered with chilling units. This will ensure that the buried pipeline will remain very close to the ambient soil temperature and minimize any effects on the habitats of listed species.

4.1.1.2 Whales

The proposed action would result in vessel transit and noise associated with vessel traffic in known beluga, fin, humpback, and bowhead whale habitat. The potential direct and indirect effects of the proposed action on these listed species are discussed together in this section.

Vessel traffic during the two-year construction phase will be the primary cause of effect on whales in the action area. Because O&M will have no effect, construction is the only phase that will be discussed in this section.

In addition to the visual disturbance a transiting vessel may cause, low frequency sound energy from transiting vessels may result in avoidance behaviors from whales in the vicinity of the vessel. All disturbances as a result of vessel transit and associated noise are expected to be minor, temporary, and localized to the immediate area of the transiting vessel (MMS 2009a).

There are a number of factors that influence how a species hears a sound. The fate of sound resulting from vessel transit is site-, season-, and weather-specific (USDOC, NOAA, NMFS 2008). Oceanographic differences in bathymetry and seafloor characteristics play an enormous role in how a sound is carried. In addition, the frequency, intensity, and pressure of a sound will affect its propagation and resulting effects, meaning that the same sound could in fact differ greatly among different sites (USDOC, NOAA, NMFS 2008). These variables make it extremely difficult to estimate how vessel transit sound will be heard by and effect whales in the area. However, noise from a transiting vessel is relatively minimal and all data suggests that, in general, impacts will be limited to temporary deflection away from the transiting vessel (MMS 2009a).

Collisions with whales during vessel transit are also a concern. While increased vessel traffic in habitats occupied by endangered whales has the potential to increase vessel collisions, all available data indicates that vessel collisions are not an important source of injury or mortality (USDOC, NOAA, NMFS 2008). The proposed actions would not represent a significant increase in the volume of marine traffic.

Transiting vessels will take several proactive steps to mitigate any adverse effects and reduce the sound energy received by any marine mammal. Speed will be reduced when marine mammals come within a short distance of a transiting vessel, and in such a case the vessel will refrain from making multiple course changes in an attempt to avoid separating members of a group. Additionally, vessel speed will be reduced during inclement weather to avoid the chance of an accidental collision with a marine mammal. Transiting vessels will also never intentionally approach a marine mammal. Lastly, the transiting vessels will abide by all state and federal regulations regarding safety radii and maintaining a safe distance between the transiting vessel and any know marine mammals when operating under the scope of the proposed activities.

Fin, Humpback, and Bowhead Whale

Baleen whales are expected to have very similar reactions to transiting vessels and the associated noise, and as such fin, humpback, and bowhead whales will be discussed collectively. Bowhead reactions may be a bit more intense than fin or humpback because they are still hunted annually for subsistence. In addition, bowhead whales have been commercially hunted within some individuals' lifetimes. The typical reaction of a baleen whale to a vessel is to swim away, though a bowhead whale may begin swimming away at a further distance from the vessel than fin or humpback generally do. Bowhead avoidance of a vessel may begin at 0.6 to 2.5 miles, while fin and humpback avoidance of a vessel may begin at 1.2 to 2.5 miles away (MMS 2009b).

Endangered whales have been shown to react more strongly to vessels with outboard motors than those with diesel motors, as well as to vessels that approach quickly and directly rather than slower vessels moving in a direction other than toward the whale (MMS 2009a). Additionally, fin, humpback, and bowhead whales have fewer or less intense avoidance reactions when they are actively engaged in feeding or another activity (USDOC, NOAA, NMFS 2008).

In the event of fin, humpback, or bowhead whale disturbance, feeding or other behaviors resume relatively quickly after the disturbance event, usually within minutes or hours. Some individuals may return to the exact same location, though scattering may last a little longer, but displacement should also be short-term (MMS 2009a).

Data from past studies have indicated that behavioral effects on bowhead whales from oil and gas activities have been "primarily, but not exclusively avoidance." No such data have indicated that "such avoidance is long-lasting after cessation of the activity" (USDOC, NOAA, NMFS 2008). Bowhead whales in the vicinity of a transiting vessel are expected to slightly change their swimming speed and direction in an effort to avoid closely approaching the vessel or noise source (USDOC, NOAA, NMFS 2008).

Data from a study that Wartzok et al. (1989) did in the Canadian Beaufort showed that bowheads generally ignore small vessels at distances greater than 547 yards. In the bowheads tagged and studied, 180 whales voluntarily approached within 547 yards of small vessels. Little response was observed in these cases unless there was a sudden change in sound level resulting from a vessel accelerating. A separate Canadian study also found that data do not support the theory of decreased use of a zone due to oil and gas activities, including vessel transit (USDOC, NOAA, NMFS 2008).

Sound energy coming from transiting vessels does have the potential to mask whale sounds that would otherwise be heard. Masking may disrupt communication and detection of important resources. Due to the transient nature of the vessels in the area, this would be temporary and localized, and would thus not significantly effect the exposed whales (MMS 2009b).

No mortalities or injuries are likely as a result of ASAP activities. At most, vessel traffic associated with the proposed action may result in undetectable transitory avoidance behavior by very small numbers of whales with no biological consequence. Thus, the proposed actions are not likely to adversely affect fin, humpback, or bowhead whales.

Cook Inlet Beluga Whale

Disturbance

Noise from barging activities associated with ASAP could affect whale behavior by causing temporary avoidance. Startle responses were observed when vessels moved in areas with high concentrations of beluga whales (Fraker et al. 1978).

The extent of disturbance or harassment effects on the Cook Inlet beluga whale DPS by vessel traffic associated with the construction phase of the proposed project are likely to be temporary and localized. Noise from vessel traffic may affect, but is not likely to adversely affect, the Cook Inlet DPS of beluga whales.

Increased shipping could displace beluga whales from the Port of Anchorage area due to noise and disturbance. However, barges move slowly, and injuries to beluga whales from strikes by ships calling at the Port of Anchorage would be highly unlikely. Furthermore, barge traffic associated with the proposed project is temporary, and the relatively small increase in vessel traffic will span a two-year period. The number of vessel calls per year to the Port of Anchorage between 2002 and 2008 averaged 219 (USDOT 2009).

Noise from vessels at the Port of Anchorage could interfere with behavior and communications by masking natural sounds or calls from other beluga whales. However, vessel activity associated with the proposed project would be low and within the current scope of normal activities in the area.

Beluga whales may habituate to constant noises when the noise is not associated with hunting (Huntington et al. 1999). The additional noise from the relatively low number of barges expected to be added to existing vessel traffic in Cook Inlet will not likely cause more masking than what already may be occurring in the area.

Indirect Effects

Projects that cause changes in anadromous fish runs in streams that feed into Cook Inlet could also adversely affect beluga whales (NMFS 2008b). Anadromous streams are important to beluga whales, because they provide habitat that supports salmon species. Construction of the proposed pipeline could adversely affect anadromous streams if habitat or hydrology is altered, water quality is degraded, fish passage is impeded, or if fish are injured or killed.

All state and federal laws will be followed to mitigate potential negative effects from crossing anadromous streams. Therefore, no indirect effects from crossing anadromous streams are anticipated on beluga whales in Cook Inlet.

4.1.1.3 Polar Bears

Habitat Loss

Project facilities located within the terrestrial nearshore range of the polar bear within the ACP are identified above in Table 4.1-1. The proposed action would result in construction, maintenance, and operation of both the GCF and a segment of pipeline with raised and buried sections within the terrestrial range of the polar bear. Habitat losses within the footprint of the GCF and the buried and elevated portions of the pipeline would be permanent; however, suitable alternative terrestrial habitat is widespread across the North Slope and not a limiting factor for the species.

The location of the GCF and the proposed pipeline have not been surveyed to determine whether any areas contain the features necessary for polar bear denning. However, the proposed GCF facility location was selected within the existing Prudhoe Bay oilfield based upon its close proximity to existing oil and gas infrastructure and activity, and its relatively flat terrain, and the pipeline route closely follows the existing TAPS and Dalton Highway corridor. Accordingly, the area is unlikely to exhibit necessary macrohabitat characteristics for maternal denning, such as steep slopes (e.g., coastal bluffs and river banks), unobstructed access to the coast and the absence of disturbance from humans and human activities. No material dens are known to have been previously located within the proposed project footprint.

The habitat loss associated with the proposed ASAP project is not likely to adversely affect the polar bear species.

Disturbance

The construction and operation of the GCF and the proposed pipeline, and associated traffic, may cause temporary behavior changes in polar bears, due to loud noise and temporary or permanent physical obstruction. Disturbance from activities resulting from the proposed project could elicit several different responses in polar bears. Noise may act as a deterrent or attraction to bears. However, there is evidence that disturbance from stationary sources results in minor changes in behavior of polar bears. Observations to-date include numerous instances of polar bears who encounter facilities and then change their direction of movement and leave the area. Bears are frequently observed climbing over and crossing gravel roads and causeways in Prudhoe Bay oilfields, and appear to have little fear of manmade structures (USFWS 2009a). The proposed facilities in the action area may present a small-scale, local obstruction to some individual bears' movements but the effect on the species would be negligible.

Denning females are expected to avoid the construction and operations areas due to the lack of suitable habitat and human presence. Although denning females are not expected to occur in close proximity to ASAP project construction and operations activities, the potential to disturb a denning female exists.

The best available scientific information indicates that female polar bears entering dens, or females in dens with cubs, are more sensitive to noise than other age and sex groups (USFWS 2009a). According to Smith et al. (2007) noise from stationary activities may potentially deter females from denning nearby; however, polar bears have been known to den near industrial activities without any observed effect. On average, female polar bears den in the Beaufort Sea area in mid-November and emerge in early April (Amstrup and Gardner 1994); however, these dates can vary year-to-year depending upon sea ice, snow, and weather conditions. (Messier et al.

1994). The oil and gas industry, operating pursuant to MMPA authorizations, has successfully conducted annual den detection surveys and has implemented appropriate monitoring and protection measures, including maintenance of a one-mile radius buffer around maternal dens, such that effects on polar bears have been minimal. Similar measures will be implemented for the ASAP project activities through the MMPA authorization process and, accordingly, no more than a negligible effect is anticipated to occur.

Human-Bear Interactions

The proposed action may result in human-polar bear interactions that occur in the action area. Bears may be attracted or repelled by industry actions, depending on the circumstances. Industry activities are subject to the MMPA which prohibits the taking of polar bears without authorization. Mitigation measures required for all oil and gas projects include a site-specific plan of operation and human-bear interaction plan, to minimize impacts on both species.

There are several mechanisms through which the incidental takes of small numbers of polar bears can be authorized under the MMPA. The most commonly used is through the issuance of ITRs. Before USFWS can provide ITRs for polar bears under the ESA, take of marine mammals must first be authorized under the MMPA (MMS 2009a). For example, under this authorization the deterrence of bears from the facilities and structures is allowed, so that bear-human interactions are prevented. This type of deterrent or “harassment” may include using vehicles to make noise, using flashing lights, or firing cracker shells.

Under the MMPA, the oil and gas industry has received LOAs for development operations on the North Slope and the Beaufort Sea, regarding protection of polar bears. These LOAs have required mitigation measures, such as Polar Bear Interaction Plans, which include a range of measures such as:

- Use of detection systems, such as bear monitors
- Use of safety gates and fences
- Implementation of appropriate garbage, hazardous waste, and snow management plans
- Identifying the chain of command for responding to a polar bear sighting
- Employee training programs to educate field personnel regarding bear safety procedures

The above measures will be implemented prior to construction activities and followed during construction and operation activities to minimize human interactions with polar bears. As a result, small numbers of incidental interactions with polar bears, resulting in no mortality or injury, and causing only temporary deflection and minor changes in behavior, are likely to occur. The effects of these interactions, individually and cumulatively, is likely to be negligible.

Indirect effects to polar bears are not expected as a result of the proposed project during development or operation. Polar bears are expected to occur in the action area during the lifetime of the project and will not be adversely effected by project activities, except for temporary and minor disturbances to some individual bears, during construction.

4.1.2 Critical Habitat

4.1.2.1 Cook Inlet Beluga Whale

The NMFS has proposed but not yet designated critical habitat for the Cook Inlet DPS of beluga whales on April 11, 2011, effective May 11, 2011 (76FR 20180). The Port of Anchorage was excluded from the final rule in consideration of national security interests.

The proposed project activities in the action area in Cook Inlet will include vessel transit and docking at the Port of Anchorage. Several barge companies regularly use the Port of Anchorage for the transfer of products. The number of vessel calls per year to the Port of Anchorage between 2002 and 2008 averaged 219 annually (USDOT 2009). Transportation of ASAP materials via barge to the Port of Anchorage is within the scope and present volume of normal daily activities at this facility. Noise from transiting barges is not expected to cause beluga whales to abandon areas within the critical habitat.

The proposed project is not likely to have a detectable adverse effect on beluga whale critical habitat. Accordingly, beluga whale critical habitat will not be adversely modified or destroyed as a consequence of the proposed project.

4.1.2.2 Polar Bear Critical Habitat

Marine transportation activities associated with GCF and pipeline construction will occur during the summer open water season within the boundaries of Unit 1 (sea ice) of designated polar bear critical habitat, and in close proximity to the boundaries of Unit 3 (barrier island) critical habitat. However, polar bears are not expected to be present during open water conditions or in close proximity to West Dock facilities and activities during the summer, and no effects to these critical habitat units are anticipated.

As previously addressed above, the GCF and a portion of the pipeline will be located within the boundaries of Unit 2 (maternal denning) critical habitat. However, the areas directly affected by construction and operation are not known to have been used for maternal denning and are not likely to contain the essential macrohabitat elements for polar bear denning because of the flat terrain, prior disturbance, and ongoing human activity characteristics of these areas. Moreover, the availability of suitable denning habitat is widespread across the ACP and is not a limiting factor for polar bear recruitment and survival.

Although a small proportion of the Unit 2 area will be altered by construction and operations activities associated with the proposed project, such activities are not likely to adversely modify or destroy polar bear critical habitat.

No indirect effects are expected to occur to polar bear designated critical habitat, as a result of this project.

4.1.3 Candidate and Proposed Species - Pinnipeds

Vessel traffic during the two year construction phase is the only project activity that may effect pinnipeds in the action area. Because O&M will have no effect, construction is the only phase that will be discussed in this section.

4.1.3.1 Steller Sea Lion

The only project activity with the potential to effect Steller sea lions will be noise from the transit of a small number of vessels to and from the Port of Seward.

Calkins and Pitcher (1982) found that disturbance from aircraft and vessel traffic has variable effects on hauled-out Steller sea lions. Steller sea lion reaction to occasional disturbances ranges from no reaction at all to complete and immediate departure from the haul-out area. Low levels of occasional disturbance may have little long-term effect on sea lions. (Kenyon and Rice 1961).

Since Steller sea lions were afforded ESA protection in 1990, regulations have been in place to minimize disturbance of animals by humans. There are no sea lion haul-outs within, or in the immediate vicinity of, the action area at the Port of Seward. Moreover, vessel traffic associated with the Port of Seward is not known to have adverse effects on Steller sea lions. Due to limited vessel traffic associated with this project, and concurrent with the existence of vessel traffic already in the action area at the Port of Seward, the potential for adverse effects is discountable and, accordingly, proposed action is not likely to adversely affect Steller sea lions.

4.1.3.2 Pacific Walrus

Vessel noise associated with marine transportation of construction materials to West Dock has the potential to result in transient disturbance of very small numbers of Pacific walrus. However, the presence of Pacific walrus in the action area is rare, and no detectable effects are likely to occur.

Pacific walrus are known to use the central Beaufort Sea; however, their presence within the action area has been rare. Richardson et al. (1995) found that vessel noise does not seem to strongly affect pinnipeds (seals, sea lions, fur seals, and walruses) that are already in the water. Walruses may avoid moving vessels, with most reactions occurring within 0.29 miles (Richardson et al. 1995) or they may approach vessels out of curiosity. The impact of vessel traffic on marine mammals generally is expected to be transient and localized. Because of the low number of walrus expected to occur in the central Beaufort Sea, and the limited amount of vessel transit occurring in the proposed action area from project activities, the potential for effects from vessel traffic are discountable. Moreover, were there to be any effect, the consequences are expected to result in no detectable adverse impact on the Pacific walrus. Therefore, the ASAP may affect, but is not likely to adversely affect, the Pacific walrus.

There are no indirect effects on Pacific walrus anticipated as a result of the proposed project.

4.1.3.3 Ringed and Bearded Seals

Because the effects of vessel traffic are similar for all ice seals, effects on ringed and bearded seals will be addressed together in this section.

Direct effects on ringed and bearded seals could result from the presence of vessels at West Dock. However, no more than temporary and localized disturbance effects would occur. Disturbance effects exhibited by seals due to vessel traffic include moving away from the vessel or diving into the water if hauled-out on floating ice. Local effects would not change seal abundance or distribution near West Dock.

Vessels associated with the proposed project will only be at West Dock during summer months when water is typically ice-free in the action area. Seals prefer water near ice platforms on which they can haul-out. However, seals do also swim in areas of open water. Seals swimming in the water are not strongly affected by vessel noise (Richardson et al. 1995). Seals hauled-out respond more strongly to vessel noise and often respond by diving into the water (Richardson et al. 1995). It is not likely that there will be ice available for seals at West Dock during the summer when vessels associated with the project will be transiting. MMS has previously determined that increasing vessel traffic in the entire Beaufort Sea has no more than a negligible effect on ice seals (MMS 2008).

Although the potential for disturbance of very small numbers of ringed or bearded seals from vessel traffic exists, the effects, if any, are likely to be so negligible as to be undetectable individually or cumulatively. Vessel activity associated with the proposed project would be low and within the current scope of normal activities at West Dock. Accordingly, while the proposed project may affect ringed and bearded seals, it is not likely to adversely affect these species.

There are no likely indirect effects on seals anticipated as a result of the proposed action.

4.2 *Cumulative Effects*

Cumulative effects include the effects of future state, tribal, local or private actions, not involving federal activities, that are reasonably certain to occur in the action area for the proposed federal project (50 C.F.R. 402.02). Future federal actions that are unrelated to the proposed action are not considered in this section because such action will require separate consultation pursuant to Section 7 of the ESA.

All of the activities occurring within the action area are present actions that contribute to the existing environmental baseline and that are expected to continue into the future. These activities include oil and gas exploration and development on and adjacent to the North Slope; human habitation and development; vessel transportation into and use of the Port of Anchorage, the Port of Seward and West Dock; subsistence activities on the North Slope; and tourism. Oil and gas development activities are not subject to this cumulative effects analysis because they would be subject to federal permitting requirements and, thus, would require future Section 7 consultation. There are no data or information indicating that the extent or magnitude of the other identified state, tribal, local or private activities are likely to increase beyond their current levels. Accordingly, future state, tribal, local and private actions are likely to consist of a continuation of those currently contributing to the environmental baseline in the action area, and the effects are expected to remain stable and within the range of effects experienced in the past and present. Because there is no indication that the extent or magnitude of state, tribal, local or private actions will increase in the foreseeable future within the action area beyond their current levels, cumulative effects are not likely to adversely affect any of the listed or proposed for listing species, or any designated critical habitat occurring within the action area.

4.2.1 Climate Change

4.2.1.1 Global Climate Change

Global Climate Change, sometimes referred to as "Global Warming," refers to long-term fluctuations in temperature and other elements of the Earth's climate system. Natural processes such as solar-irradiance and volcanic activity can produce variations in climate. However, the IPCC has linked global climate change and the "greenhouse effect" to steep rises in atmospheric concentrations of CO_2, methane (CH_4), nitrous oxide (N_20), and synthetic halocarbons (chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, halons and sulphur hexafluoride) (IPCC 2007). Although scientific debate continues regarding the contributing factors to observed climate change and projections of trends and effects under various future scenarios, there is a current scientific consensus that increasing levels of carbon dioxide and other atmospheric greenhouse gases are a significant cause and ongoing contributing factor (IPCC 2007). At current rates of greenhouse gas release, average global surface temperatures could increase by 2.5 to 10 ºF (1.4 to 5.8 ºC) by the year 2100 (IPCC 2007).

General predictions of increasing climate change include, in addition to an increase in average surface temperatures, a rise in sea level, changes in oceanography (including changes in temperature, salinity, pH and sea ice), and increases in the severity of storms, floods, droughts, rainfall, heat waves and other weather anomalies. Some areas are expected to experience greater effects than other areas, however, prediction models are not sophisticated enough at the present time to make accurate regional predictions of such effects.

4.2.1.2 Arctic Climate Change

Although regional predictions of climate change based upon existing climate models are not considered reliable, there is a scientific consensus that the Arctic is already experiencing important climate changes and is expected to be one of the regions where climate change effects may be greatest. To date, many of the documented and most important effects have concerned reductions in sea ice extent and thickness in recent years. Analysis of long-term data sets indicates substantial reductions in both the extent and thickness of the arctic sea ice cover during the past 20-40 years, with record minimums in several recent years. Within the Artic, the Beaufort Sea has experienced some of the largest declines in ice extent during the summer. Other observed Arctic changes include decreased precipitation (particularly drier summers and falls), forest decline, permafrost degradation, increased storms and coastal erosion, and changes in ocean salinity, pH and temperature.

4.2.1.3 Potential Effects of the ASAP Project on Climate Change

In 2005, the U.S. emissions of CO_2 equivalent (CO_2 eq) totaled 7,147.2 million metric tons. Alaska currently emits approximately 53 million metric tons of CO_2 eq, and by the year 2020 is expected to emit 60 million metric tons (ADEC 2007).

There is no present scientific or policy (local, state, national or global) consensus regarding methodology, reliability, or relevance of estimating project-specific contributions to global climate change, or of attributing environmental impact significance to project-specific emissions of greenhouse gases. Accordingly, projected ASAP emissions cannot be quantified or causally linked in any scientifically accepted way to global climate change generally, or to climate change effects in the action area on listed species and critical habitat.

Qualitatively, probable effects of the ASAP project are likely to be indiscernible given projected emissions, the uniform distribution of greenhouse gas concentrations globally, and the absence of any meaningful nexus between the ASAP project and global oil and gas production and consumption rates. Moreover:

- The proposed project facilities would combust natural gas which is a lower emitter of carbon CO_2 with a rate of 117 lbs/(million British thermal units (MMBtu) versus 161 lbs/MMBtu for fuel oil combustion or 215 lbs/MMBtu for coal combustion (Energy Information Administration 2008).
- The proposed project would likely facilitate conversion from wood-, coal- and fuel-oil-based residential comfort heating in the Fairbanks North Star Borough, thus reducing overall greenhouse gas (GHG) emissions locally.

- The proposed project facilities will likely require air quality permits which incorporate emissions reduction control technology evaluations as part of the permitting process. EPA has currently promulgated Best Available Control Technology (BACT) requirements for GHG emissions for new sources (EPA 2010).
- Stricter EPA regulation of criteria pollutants (NOx) and certain hazardous air pollutants (HAP's) that also contribute to climate change would affect the proposed project facilities and require BACT.
- Newer technologies for emissions control of GHGs are being developed and may become available at the time the proposed project facilities are permitted and constructed.

There are no generally-applicable requirements, policies or guidance regarding appropriate mitigation measures for GHG emissions on a project-specific basis. In significant part, this is because there are no established Alaska or federal climate change or GHG emissions reduction or mitigation plans. Currently available information does not establish that solutions to these global problems may be effectively managed on an ad hoc, project-by-project, basis. Moreover, currently, there are no legal requirements or specific policies that impose restrictions on the ASAP project regarding GHG emissions, that limit or discourage production and consumption of domestic natural gas reserves, or that limit the production and consumption of natural gas from other domestic and foreign sources were the ASAP project not approved, for the purpose of limiting or mitigating global climate change effects.

Emissions from the proposed project are not expected to contribute in any discernable way to climate change, to climate change effects within the action area, or to effects upon listed species or critical habitat. Construction and operation of project facilities, and transiting vessel traffic in support of the proposed activities, is expected to contribute an extremely small amount of the overall GHG emissions into the planet's atmosphere and may, in some respects, ameliorate or reduce GHG emissions and climate effects that might otherwise result from the use of energy sources that produce larger amounts of GHGs than natural gas.

5.0 DETERMINATION OF EFFECT

5.1 *Steller's and Spectacled Eiders*

The construction and O&M of the ASAP are likely to adversely affect Steller's and spectacled eiders at the individual level of a very small number of takes as defined in the ESA, but with no detectable population level effects. Bird collisions with pipeline facilities, vehicles, and vessels are likely to occur in very small numbers during periods of migration and low visibility over the life of the project. Construction activities associated with the project are expected to produce very temporary and local disturbances to eiders and eider habitat, and are expected to occur primarily in winter outside of nesting season. During the operation and maintenance phase of the proposed project, strict protocols will be enforced that reduce waste and deter predators from facilities, thus minimizing disturbance to breeding and nesting eiders. No detectable effects to Steller's or spectacled eider populations are expected to occur from this proposed project.

5.2 *Whales*

5.2.1 Bowhead, Fin, and Humpback Whales

The construction and O&M of the proposed ASAP may affect but is not likely to adversely affect bowhead, fin, or humpback whales in the Beaufort Sea in the action area around West Dock. Vessel traffic associated with the proposed project will fall within the range of normal activity on the North Slope and at West Dock. Permit stipulations and mitigation measures will minimize any effects of disturbance from vessel traffic associated with the proposed project. Stipulations required by the NMFS as a result of the Section 7 consultation process will also be adhered to.

5.2.2 Cook Inlet Beluga Whale

Transportation activities associated with construction of the proposed ASAP may affect but are not likely to adversely affect the Cook Inlet beluga whale. Barging activities in and near the Port of Anchorage will be within the range of existing vessel traffic and are not likely to result in any detectable direct adverse effects. In addition, no indirect adverse effects through changes in prey access are likely as a result of anadromous stream crossings by the proposed pipeline. Permit stipulations will be adhered to and mitigation measures will be implemented to eliminate or reduce potential impacts to salmon runs in anadromous streams that will be crossed by the proposed pipeline.

5.2.3 Cook Inlet Beluga Whale Critical Habitat

The proposed project will not destroy or adversely modify critical habitat. Vessel traffic from the proposed project will occur within the range of existing vessel traffic. Although vessel traffic generates noise that has the potential to disturb marine mammals, vessel traffic at the Port of Anchorage is not expected to alter the suitability or use of the area by beluga whales. Because there will be no alteration or modification of habitat in Cook Inlet associated with the proposed project, there will be no effect on the beluga whale critical habitat.

5.3 *Pinnipeds*

5.3.1 Steller Sea Lion

Vessel traffic associated with transportation of construction materials for the proposed ASAP may affect, but is not likely to adversely affect Steller sea lions in or near the Port of Seward. Vessel traffic associated with the proposed project will fall within the range of normal activity near the Port of Seward and the action area does not encompass rookeries or other sensitive areas. Although noise from vessel traffic within the action area has the potential to transitorily disturb individual sea lions, not detectable adverse effects are known to occur in this area due to routine vessel traffic and none are likely as a result of the proposed project. The action area is not located within Steller sea lion designated critical habitat.

5.3.2 Pacific Walrus

As the Pacific walrus does not occur frequently in the Beaufort Sea, the construction and O&M activities associated with the proposed ASAP may affect but are not likely to affect walruses. Vessel traffic associated with the proposed project will fall within the range of normal activity in the action area around West Dock. The probability of a vessel within the action area interacting with an individual or group of walrus and/or adversely affecting the walrus is extremely low and, therefore, discountable. Mitigation practices will be followed to reduce any potential disturbance vessel traffic may have if interaction with walrus occurs, but no detectable adverse effects are anticipated.

5.3.3 Ringed and Bearded Seals

Marine vessel traffic associated with construction of the proposed ASAP may affect but is not likely to adversely affect ringed and bearded seals in the action area around West Dock. Small numbers of seals may be present in the area around West Dock and could be temporarily disturbed by noise associated with project vessel traffic. However, vessel traffic associated with the proposed project will fall within the range of normal activity near West Dock, and such activity is not known to have had adverse impacts on ringed and bearded seals. The NMFS will require certain stipulations be followed to reduce potential disturbance effects on ringed and bearded seals from vessel traffic associated with the proposed project. No detectable adverse effect to ringed or bearded seals is likely to occur.

5.4 *Polar Bears*

The proposed ASAP and the activities associated with the construction and O&M of this project are likely to adversely affect small numbers of individual polar bears at the level of a “take” by harassment as defined in the MMPA and the ESA. Over the life of the project, hazing of a small number of polar bears, resulting in a “take,” will likely occur for personnel safety purposes at some point during the lifetime of the ASAP project, however, the effects are likely to be limited to temporary changes in behavior, such as deflection. No injuries or mortality is likely. Polar bear mitigation measures will be adhered to throughout the lifetime of the project and, accordingly, no significant adverse effects on polar bears and polar bear habitat are likely.

5.4.1 Polar Bear Critical Habitat

Construction of the proposed ASAP is likely to adversely affect but not adversely modify or destroy polar bear critical habitat. The proposed project will not affect designated sea ice or barrier island critical habitat for the polar bear. However, construction activities and permanent project facilities will occupy a small proportion of the area designated as polar bear denning critical habitat (Unit 2). The areas affected by the proposed project are not likely to exhibit the essential habitat requirements for actual polar bear denning, and are not known to have been the location of maternal dens in the past. Moreover, maternal denning habitat is plentiful and widely distributed across the ACP.

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APPENDIX A

USFWS Correspondence - - Species List Letter dated 17 December 2010

NMFS Correspondence - - Species List Letter dated 10 December 2010

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United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Fairbanks Fish and Wildlife Field Office
101 12th Avenue, Room 110
Fairbanks, Alaska 99701

December 17, 2010

U.S. Army Corps of Engineers
Regulatory Division
Attn: Serena Sweet
P.O. Box 6898
Elmendorf AFB, AK 99506-0898

Re: Request for Endangered Species or Critical Habitat list for POA-2009-651 ASAP Project

Dear Ms. Sweet:

Thank you for your November 2, 2010 letter requesting information on endangered and threatened species, and designated critical habitats pursuant to Section 7 of the Endangered Species Act of 1973, as amended (Act).

Based on your letter, we understand the Alaska Gasline Development Corporation (AGDP) is proposing to construct a 24-inch diameter, high pressure natural gas pipeline from Alaska's North Slope to Cook Inlet. North Slope natural gas would be transported to in-state Alaska markets from take-off points in the Fairbanks area and other locations along the route. We also understand that you are preparing an Environmental Impact Statement (EIS) for the project.

This project is within the range of three species listed as threatened under the Act. Spectacled eiders (*Somateria fischeri*), Alaska-breeding Steller's eider (*Polysticta stelleri*), and polar bears (*Ursus maritimus*) occur on the North Slope. Critical habitat for the polar bear was recently designated in the action area (December 7, 2010), and includes sea-ice habitat, terrestrial denning habitat, and barrier island habitat.

This list applies only to endangered and threatened species under the jurisdiction of the Alaska U.S. Fish and Wildlife Service. It does not preclude the need to comply with other environmental legislation or regulations such as the Clean Water Act. Please contact the National Oceanic and Atmospheric Administration to determine the status of listed and proposed species under their jurisdiction in the project area.

Thank you for your cooperation in meeting our joint responsibilities under the Act. If you need further assistance, please contact me at (907) 456-0324.

Sincerely,

Jewel Bennett
Branch Chief
Conservation Planning Assistance

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

December 10, 2010

Colonel Reinhard W. Koenig
U.S. Army Corps of Engineers, Alaska District
P.O. Box 6898
Elmendorf AFB, AK 99506-0898

Re: POA- 2009-651
Alaska Stand Alone Pipeline (ASAP)
Project Request for Species List

Attn: Serena Sweet

Dear Colonel Koenig:

The National Marine Fisheries Service (NMFS) received your letter requesting information on threatened or endangered species and Essential Fish Habitat (EFH) associated with the Alaska Stand Alone Pipeline (ASAP) Proposed Project Area. The Corps of Engineers also provided NMFS with a CD of updated project documents which describe the proposed project in detail.

Background

NMFS provided scoping comments to the Corps for the ASAP project on March 8, 2010. After having recent discussions with the Corps and reviewing updated project descriptions, it is apparent that some aspects of the proposed project have changed and/or may still change somewhat.

The current proposed project involves construction of a 737 mile long, 24-inch diameter pipeline designed to transport natural gas consisting of either a highly conditioned natural gas highly enriched in non-methane hydrocarbons or conditioned natural gas containing mostly methane. The pipeline would start at Prudhoe Bay and follow the Trans-Alaska Pipeline System (TAPS) and Dalton Highway corridors, generally paralleling the highway corridor from the North Slope to near Livengood, northwest of Fairbanks. The pipeline would head south at Livengood and join the Parks Highway corridor west of Fairbanks near Nenana. From Nenana it would continue south to milepost 39 (near Wasilla) of the Beluga Pipeline (ENSTAR's distribution system) providing access to tidewater at Cook Inlet. There would also be a 12-inch diameter lateral pipeline to Fairbanks (Fairbanks Lateral) which would take off from the main pipeline just a few miles north of Nenana at Dunbar. The Fairbanks Lateral would travel approximately 35 miles northeast to Fairbanks.

The Corps has designated ASRC Energy Services, Inc. as the point of contact for the project EIS and biological assessment. In a recent phone conversation with ASRC Energy Services, they noted that marine interactions will be limited to transport. They also stated that existing facilities at West Dock and an existing port in Southcentral Alaska (possibly Anchorage or Seward) would be used for the transport (via barge).

The following information is based on the above project description and accounts for species that may be present in the marine areas off of Prudhoe Bay, Cook Inlet, Anchorage, and Seward.

Essential Fish Habitat

Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to consult with NMFS on all actions or proposed actions authorized, funded, or undertaken by the agency that may adversely affect EFH. If a federal action agency determines that an action will not adversely affect EFH, no consultation is required, and the action agency is not required to contact NMFS about their determination.

EFH has been designated in waters used by anadromous salmon and various life stages of marine fish under NMFS' jurisdiction. Six fishery management plans exist for fisheries in Alaska. They cover groundfish in the Gulf of Alaska, groundfish in the Bering Sea and Aleutian Islands, crab in the Bering Sea and Aleutian Islands, salmon, scallops and federally managed species in the Arctic. Please visit our web site at http://www.fakr.noaa.gov/habitat/efh.htm and our National EFH Mapper at http://www.habitat.noaa.gov/protection/efh/habitatmapper.html for additional information on habitat and EFH.

Threatened and Endangered Species

NMFS has management responsibility for all marine mammals in Alaska except sea otter, walrus, and polar bear and for sea turtles, anadromous fish, marine fish, marine plants, and corals. Section 7(a)(2) of the Endangered Species Act (ESA) directs federal interagency cooperation "to insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species" or result in the destruction or adverse modification of critical habitat. Please visit our web site http://www.nmfs.noaa.gov/pr/species/esa/, for additional information regarding protected species and the ESA and critical habitat within Alaska.

Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) of 1972 prohibits, with few exceptions, injury, harm or harassment of marine mammals. Under the 1994 Amendments to the MMPA, harassment is defined as any act of pursuit, torment, or annoyance which has the potential to injure or disturb a marine mammal causing disruption of behavioral patterns including migration, breathing, nursing, breeding, feeding or sheltering.

Prudhoe Bay

Endangered bowhead whales may be found in or adjacent to the proposed ASAP Project area and their presence would be considered seasonal or occasional occurrences.

NMFS is currently proposing to list a subspecies of ringed seals found in the Arctic and a distinct population segment of bearded seals in the Pacific Ocean (which may be found in this area) as

threatened under ESA. Please visit our web site at
http://alaskafisheries.noaa.gov/protectedresources/seals/ice.htm or 50 CFR Part 223 for further information.

Gray, beluga, and killer whales may also be present in the area and are protected under the MMPA.

Cook Inlet

Endangered Cook Inlet beluga whales, endangered fin whales, endangered humpback whales, and endangered Steller sea lions may be found within Cook Inlet.

Minke, gray, and killer whales, Pacific white-sided dolphins, dall's and harbor porpoises, and harbor seals may also be present in the area and are protected under the MMPA.

Anchorage

Endangered Cook Inlet beluga whales may be found in this area.

Harbor seals may also be present in the area and are protected under the MMPA.

Seward

Endangered fin whales, endangered humpback whales, and endangered Steller sea lions may be found in this area

Minke, gray, and killer whales, Pacific white-sided dolphins, dall's and harbor porpoises, and harbor seals may also be present in the area and are protected under the MMPA.

Critical Habitat

On December 1, 2009, NOAA proposed critical habitat for Cook Inlet beluga whales which may be located in or adjacent to possible project areas in waters near Anchorage or within Cook Inlet. A listing of these areas and further information may be found on our website at http://www.fakr.noaa.gov/protectedresources/whales/beluga.htm.

NMFS has designated rookeries, major haul outs, and marine foraging areas of the Steller sea lion in Alaska as critical habitat. A listing of these areas and further information may be found on our website at http://www.fakr.noaa.gov/protectedresources/stellers/habitat.htm, or in 50 CFR 226.202.

Critical habitat has also been proposed for the northern right whale in the Bering Sea and Gulf of Alaska, but appears to be outside the area associated with the subject plan.

Marine/Anadromous Fish

Several Pacific salmon stocks are also listed under the ESA and occur within Alaskan waters. These include the following Evolutionarily Significant Units (ESA): Lower Columbia River spring Chinook, Upper Columbia River spring Chinook, Lower Columbia River steelhead, Middle Columbia River steelhead, Upper Columbia River steelhead, Puget Sound Chinook, Snake River spring/summer Chinook, Snake River fall Chinook, Snake River basin steelhead, and Upper Willamette River steelhead. These stocks range throughout the North Pacific.

We hope this information is useful in fulfilling your requirements under section 7 of the ESA and section 305(b)(2) of the Magnuson-Stevens Act. Should you have any questions, please contact LT Amy Cox by email at amy.b.cox@noaa.gov, or by telephone at (907) 271-6620.

Sincerely,

FOR James W. Balsiger, Ph.D
Administrator, Alaska Region

cc: brad.smith@noaa.gov
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APPENDIX B

AGDC Plan of Development, Rev. 1

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ALASKA STAND ALONE GAS PIPELINE/*ASAP*

Plan of Development Revision 1

May 2011

Alaska Gasline Development Corporation
PO Box 101020
Anchorage, AK 99510

NOTICE

THE INFORMATION CONTAINED IN THIS DOCUMENT IS PART OF AN APPLICATION FOR A PIPELINE EASEMENT. AGDC MAKES NO REPRESENTATION OR WARRANTY THAT THIS EASEMENT WILL BE GRANTED OR THAT ANY PIPELINE WILL BE AUTHORIZED. ANY ACTION TAKEN OR NOT TAKEN OR EXPENDITURE MADE BY ANY PERSON BASED ON THE INFORMATION INCLUDED HEREIN IS AT HIS OWN RISK AND RESPONSIBILITY AND NO LIABILITY SHALL ARISE AGAINST AGDC AS A CONSEQUENCE THEREOF.

Table of Contents

Page

Tables

Figures in Text

Map Index

Attachments

ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
AAAQS	Alaska Ambient Air Quality Standards
AAC	Alaska Administrative Code
ACMP	Alaska Coastal Management Plan
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ADOT&PF	Alaska Department of Transportation and Public Facilities
AGDC	Alaska Gasline Development Corporation
AGIA	Alaska Gasline Inducement Act
AHPA	Alaska Historic Preservation Act
AHRS	Alaska Heritage Resource Survey
Alyeska	Alyeska Pipeline Service Company
ANILCA	Alaska National Interest Lands Conservation Act
ANSI	American National Standards Institute
API	American Petroleum Institute
APP	Alaska Pipeline Project
ARPA	Archaeological Resources Protection Act
ARRC	Alaska Rail Road Corporation
AS	Alaska Statute
ASAP	Alaska Stand Alone Gas Pipeline
ASRC	Arctic Slope Regional Corporation
ASME	American Society of Mechanical Engineers
BACT	best available control technology
BLM	Bureau of Land Management
BMP	Best Management Practices
Bscfd	Billion standard cubic feet per day
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CIRI	Cook Inlet Regional Corporation
CNG	compressed natural gas
CO	carbon monoxide
CO_2	carbon dioxide
CSU	Conservation System Unit
CWA	Clean Water Act
DB	Denali Borough
DCOM	ADNR Division of Coastal and Ocean Management
DMLW	ADNR Division of Mining Land and Water
DNP&P	Denali National Park and Preserve
DOI	Department of Interior

DSAW	double submerged arc welded
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ERW	electric resistance weld
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FBE	fusion-bonded epoxy
FERC	Federal Energy Regulatory Commission
FNSB	Fairbanks North Star Borough
GCF	Gas Conditioning Facility
GIS	Geographic Information System
H_2S	hydrogen sulfide
HABS/HAER	Historic American Building/Historic American Engineering Record
HAP	hazardous air pollutant
HB	House Bill
HDD	horizontal directional drilling
ICAS	Iñupiat Community of the Arctic Slope
ID	Identification
lb/ft	pounds per foot
LNG	liquefied natural gas
LOA	Letter of Authorization
MAOP	maximum allowable operating pressure
MBTA	Migratory Bird Treaty Act
MLV	mainline valve
MMscfd	million standard cubic feet per day
MMPA	Marine Mammal Protection Act
MMU	minimum mapping unit
MOA	Municipality of Anchorage
MP	milepost
MSB	Matanuska-Susitna Borough
MSDS	Material Safety Data Sheets
mya	million years ago
NAAQS	National Ambient Air Quality Standards
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NGL(s)	natural gas liquids
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_x	nitrogen oxides
NIPs	non-native invasive plants
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NSB	North Slope Borough

NWI	National Wetland Inventory
O&M	Operation and Maintenance
ODPCP	Oil Discharge Prevention and Contingency Plan
OHA	Office of History and Archaeology
OPS	Office of Pipeline Safety
OSHA	Occupational Safety and Health Act
PAL	plantwide applicability limit
PELS	permissible exposure limits
PHMSA/OPS	U.S. Department of Transportation – Pipeline Hazardous Materials Safety Administration/Office of Pipeline Safety
PJD	Preliminary Jurisdictional Determination
PM_{10}	particulate matter of 10 microns in diameter or smaller
$PM_{2.5}$	particulate matter of 2.5 microns in diameter or smaller
POD	Plan of Development
ppm	parts per million
PRPA	Paleontological Resources Preservation Act
PS	Pump Station
PSD	prevention of significant deterioration
psi	pounds per square inch
RCA	Regulatory Commission of Alaska
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
ROW	right-of-way
SARA	Superfund Amendments and Reauthorization Act
SCADA	Supervisory Control and Data Acquisition
SHPO	State Historic Preservation Officer
SO_2	sulfur dioxide
SPCC	Spill Prevention Control and Countermeasure Plan
SPCP	Spill Prevention Control Plan
SPCO	State Pipeline Coordinator Office
SWPPP	Storm Water Pollution Prevention Plan
TAPS	Trans Alaska Pipeline System
TES	Threatened and Endangered Species
TSCA	Toxic Substances Control Act
TUP	Temporary Use Permit
TUS	Transportation and Utility Systems
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USCG	U.S. Coast Guard
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
VOCs	volatile organic compounds
VRM	visual resource management
VSM	vertical support members

INTRODUCTION

This Plan of Development (POD) has been prepared by the Alaska Gasline Development Corporation (AGDC) to support the planning and development of the Alaska Stand Alone Gas Pipeline/***ASAP*** (ASAP). The POD provides the following detailed information to support regulatory processes, permit applications, and preparation of required National Environmental Policy Act (NEPA) documents. The POD includes information on the following:

- Purpose and Need
- Project Description
- Right-of-Way (ROW) Location
- Facility Design Factors
- Government Agency Involvement
- Project Construction
- Resource Values and Environmental Concerns
- Stabilization and Rehabilitation Methods
- Operation and Maintenance (O&M)
- Termination and Restoration

1.0 PURPOSE AND NEED

1.1 Purpose

The Proposed Action is the construction and operation of ASAP from the North Slope to the Cook Inlet Area in Southcentral Alaska. The purpose of the project is to provide a long-term, stable supply of up to 500 million standard cubic feet per day (MMscfd) of natural gas and natural gas liquids (NGLs) from North Slope gas fields to markets in the Fairbanks and Cook Inlet areas by 2016.

1.2 Need

ASAP would fulfill the following needs:

- A shortfall of natural gas supply in the Cook Inlet area, which is the primary fuel source for heating and electrical power generation, is projected in the near future (2013-2015).
- Fairbanks currently is in air pollution non-attainment area status due to particulate matter. Use of oil and wood for heating are major contributors to this problem in winter. Converting from existing heating sources to natural gas would reduce harmful air emissions and assist in achieving attainment status.
- A stable and reliable supply of natural gas is needed to spur economic development of commercial and industrial enterprises in Fairbanks and the Cook Inlet Area.
- A stable and reliable supply of natural gas and NGLs is needed to meet current and future demand of 500MMscfd as follows:
  - 200 MMscfd – Cook Inlet Area current demand
  - 50 MMscfd – Cook Inlet Area future demand (2030)
  - 60 MMscfd – Fairbanks future demand

  - 60 MMscfd – NGL extracted at MP 39
  - 130 MMscfd – Future Commercial and Industrial Use
- A secondary need is to use proven gas supplies that are readily available on the North Slope to provide economic benefit to the State through royalties and taxes.

1.3 Background Information

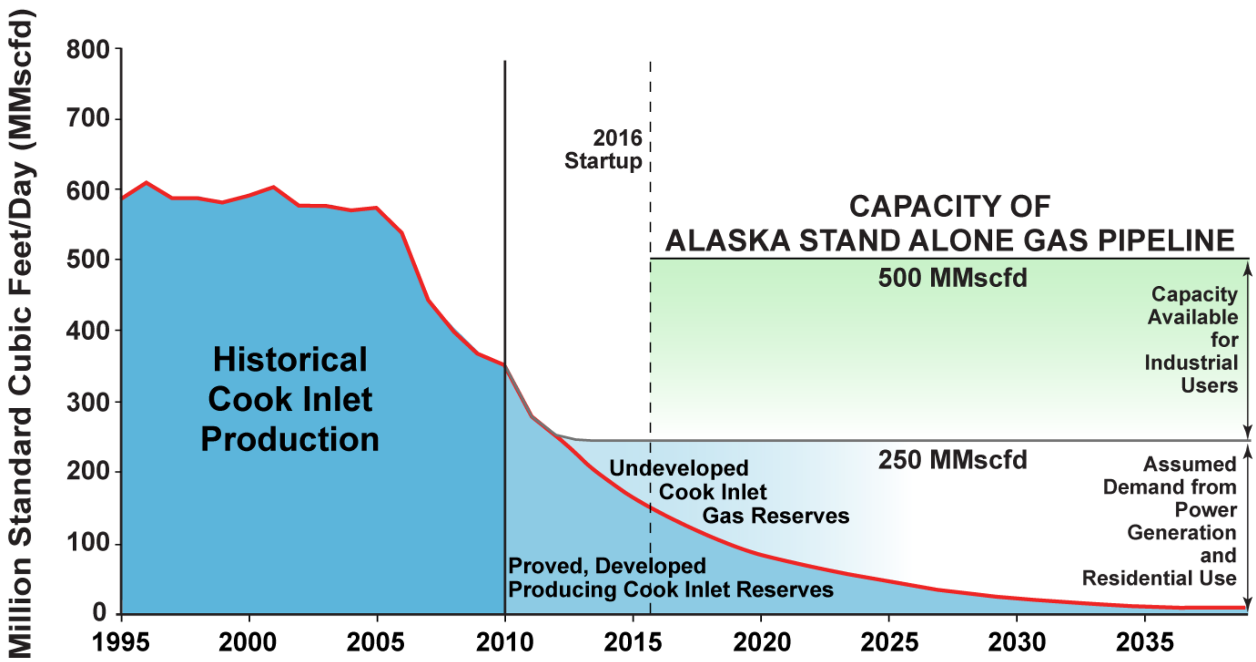
For decades, various sponsors have studied projects to export natural gas from Alaska's North Slope to North America, Asia, or both. To date, none of these projects have advanced past the feasibility study stage. In 2010, House Bill (HB) 369 was passed by the Alaska Legislature. Section 38.34.040 (d) of HB 369 provides the following stipulations for establishing a natural gas pipeline system:

- The route selected is economically feasible.
- Natural gas is made available to residents at the lowest possible cost.
- The project allows for connecting lines along the entire route to serve industrial, residential, and utility customers.
- The project can supply other regions of the state at commercially feasible rates.
- The project uses state land and existing state highway and Alaska Railroad Corporation (ARRC) rights-of-way to the maximum extent feasible.
- The project uses existing highway and ARRC railroad bridges, gravel sources, equipment yards, maintenance facilities, and other existing facilities and resources to the maximum extent feasible.

ASAP is an intrastate project independent of other proposed interstate natural gas pipeline projects. The Alaska Pipeline Project (APP), the project sponsored by the Alaska Gasline Inducement Act (AGIA), and Denali–The Alaska Gas Pipeline project are studying the feasibility of exporting Alaska's North Slope natural gas via a large-diameter pipeline. As these export plans and studies continue, the near-term needs (2013) for additional natural gas supplies to supplement Cook Inlet reserves and to serve developed and developing markets within Alaska remain.

The Cook Inlet gas fields have served the residential and commercial needs of Southcentral Alaska for decades supplying natural gas for heating and electrical power generation (93 percent of generated electricity uses natural gas). These fields also supply large industrial operations like the liquid natural gas (LNG) export plant and the formerly operational Agrium fertilizer facility in Kenai. However, these fields cannot sustain the area's needs without some form of supply expansion. Figure 1.3-1 illustrates this projected drop in production.

Figure 1.3-1 Cook Inlet Historic and Projected Natural Gas Production



Source: Alaska Gasline Development Corporation, 2010

The routing of ASAP will minimize total pipeline length; reduce the amount of challenging terrain and geologic special design areas; avoid and/or minimize impacts to ROWs; and avoid parks, preserves, refuges, and wilderness areas, thereby reducing construction impacts. To the extent feasible, existing state infrastructure and ROWs, including state/borough highways and road systems and the ARRC railroad, will be used for pipeline installation to minimize project impacts.

The Proposed Action will serve developed and developing markets within Alaska, including Fairbanks and the Railbelt. Much of Alaska has no long-term source of fuel other than oil. Currently, LNG is trucked in limited supplies to Fairbanks from Cook Inlet suppliers for a small local distribution system. A long-term, affordable energy source is needed for Fairbanks, the Railbelt, and western Alaska communities. Community, commercial, and industrial development in Interior Alaska could be facilitated with a reliable supply of natural gas. ASAP will provide construction and operational jobs and new business opportunities for Alaska citizens. New jobs and tax revenues will be created. Struggling or marginal businesses will be stimulated and expanded or new industrial activities, including mining, will have access to cost-effective energy.

1.4 Expected Public Benefits

The expected public benefit of ASAP is the potential for delivery of a long-term, reasonably priced supply of natural gas to the Cook Inlet area and to Fairbanks and other communities along the pipeline corridor. Specifically, this supply could be used for:

- Heating homes, public safety facilities, military bases, and businesses
- Generating electrical energy used throughout the region
- Continuing economic stability and growth by supporting industrial users

- Accommodating future population growth and increased commercial usage served by the existing ENSTAR Beluga local distribution system, and for the Fairbanks–North Pole area and other Railbelt communities
- Promoting compressed natural gas (CNG) as a substitute for gasoline and diesel fuel used by cars and trucks in Fairbanks; for use by communities along the Parks Highway, including tour buses in Denali National Park and Preserve (DNP&P); and for use by Anchorage and communities on the Kenai Peninsula
- Potentially providing CNG for distribution to rural Alaska communities via the Yukon and Tanana Rivers and marine barges from Cook Inlet
- Providing infrastructure to allow more economic development of mining and oil/gas projects

2.0 PROJECT DESCRIPTION

The proposed project is a 24-inch-diameter natural gas pipeline with a natural gas flow rate of 500 MMscfd at peak capacity. The proposed pipeline will be buried except from milepost (MP) 0 to 6, and at elevated bridge stream crossings, compressor stations, possible fault crossings, pigging facilities, and off-take valve locations. The pipeline system will be designed to transport a highly-conditioned natural gas highly-enriched in non-methane hydrocarbons.

The routing of ASAP is from Prudhoe Bay following the Trans Alaska Pipeline System (TAPS) and Dalton Highway corridors, generally paralleling the highway corridor from the North Slope to near Livengood, northwest of Fairbanks. At Livengood, the pipeline route heads south, joining the Parks Highway corridor west of Fairbanks near Nenana. From there it continues south and terminates at milepost (MP) 737. It will connect at MP 39 of the Beluga Pipeline (ENSTAR's distribution system) near Wasilla. Figure 2.0-1 shows the ASAP route. A lateral pipeline to Fairbanks (Fairbanks Lateral) will take off from the main pipeline just a few miles north of Nenana at Dunbar. The Fairbanks Lateral will travel northeast to Fairbanks, a distance of approximately 35 miles. Figure 2.0-2 shows the Fairbanks Lateral route.

The structures, facilities, and related project components are listed below. More details are provided in Section 7.0, Project Construction.

Pipeline

- The 24-inch-diameter mainline is 737 miles in length.
- The 12-inch-diameter Fairbanks Lateral pipeline is 35 miles in length and will tie-in with the main pipeline at MP 458 of the ASAP.

Gas Conditioning Facility

- A 70-acre gas conditioning facility (GCF) will be located on the North Slope at Prudhoe Bay to provide conditioning necessary to remove carbon dioxide (CO_2), hydrogen sulfide (H_2S) and other impurities from the source gas stream.
- Natural gas will be obtained from the existing Central Gas Facility located approximately 1,000 feet north of the planned GCF.

Compressor Stations

- A maximum of two compressor stations will be required. Design optimization may allow construction using a single compressor station.
- Gas turbine-driven centrifugal compressors are proposed.
- Propane-cycle gas-chiller plants will be installed at compressor stations located north of Minto Flats.
- There will be two gas-turbine-driven electric-power generators per station.
- Each compressor station site will be on a gravel pad.
- Compressor station sites will be fenced.

Straddle and Off-Take Facility

- The Straddle and Off-Take Facility will be located at the Fairbanks Lateral Tie-In at MP 458 near Dunbar.
- The Straddle and Off-Take Facility will separate natural gas liquids (NGL[s]) from the gas stream to Fairbanks, providing 60 MMscfd of utility-grade gas to Fairbanks. NGLs extracted from the gas stream to Fairbanks will be re-injected into the main pipeline.
- A custody transfer gas metering station will be collocated with the Straddle and Off-Take Facility.

Cook Inlet NGL Extraction Facility and Terminus

- The Cook Inlet NGL Extraction Facility and Terminus will be located at MP 737. It will connect at MP 39 of the ENSTAR Beluga Pipeline.
- The Cook Inlet NGL Extraction Facility will separate NGLs from the gas stream and inject utility-grade gas into the ENSTAR Beluga pipeline. NGLs extracted from the gas stream will be sold separately.
- A custody transfer gas metering station will be collocated with the Cook Inlet NGL Extraction Facility and Terminus.

Other Permanent Facilities

- Mainline block valves will be set at a maximum of every 20 miles. It is expected that 30 mainline block valves and two valves along the Fairbanks Lateral will be required.
- A pig launcher will be located at the GCF. Pig launcher/receiver assemblies will be located at the compressor stations. A pig receiver will be located at the pipeline terminus. A pig launcher will be located at the tie-in for the Fairbanks Lateral and receiver at the end of the alignment.
- O&M facilities will be located in Prudhoe Bay, Fairbanks, and Wasilla.

Material and Water Sources

- Material Sites (gravel pits) will be distributed along the route minimize hauling distances. Existing material sites will be used whenever possible.
- Water Sources used for construction needs will be collected from surface water sources such as lakes and streams.

Construction Support Facilities

The facilities will include the following:

- Project Offices
- Logistics Support Sites
- Personnel Housing and Support
- Port Facilities
- Access Roads
- Construction Workpads (gravel, ice or snow, and grade)
- Laydown Yards and Storage Facilities
- Airports and Airstrips

2.1 Commodity to be Transported and for What Purpose

The proposed pipeline will deliver natural gas, along with NGLs. The proposed pipeline project does not include gas producer facilities to transport, condition, compress, or cool the gas to pipeline gas specifications prior to delivery at the pipeline inlet.

The pipeline will be designed to transport natural gas with compositions ranging from hydrocarbon lean utility-grade gas to natural gas enriched with non-methane hydrocarbons as shown in Table 2.1-1. A minimum pipeline operating pressure will have to be maintained when transporting an enriched natural gas to prevent condensation of liquid hydrocarbons and generation of slug flow. The minimum operating pressure necessary to prevent drop out of liquids condensate varies with gas composition.

TABLE 2.1-1 ASSUMED COMPOSITION OF GAS TO BE TRANSPORTED

Gas composition (mole percent)	Central Gas Facility Residue	Pipeline Gas after Conditioning	Utility-Grade Gas after NGL Extraction
Carbon dioxide	11.55	1.50	1.53
Nitrogen	0.62	0.69	0.71
Methane	80.74	89.92	91.97
Ethane	5.14	5.72	5.74
Propane	1.56	1.74	0.05
I-butane	0.12	0.13	0.00
N-butane	0.19	0.21	0.00
Pentanes	0.08	0.09	0.00
Total	100.00	100.00	100.00

Notes:
NGL = Natural Gas Liquids

The quantity of natural gas that can be transported through the proposed 24-inch-diameter mainline is 500 MMscfd with a maximum allowable operating pressure (MAOP) of 2,500 psi. The quantity of natural gas that can be transported through the proposed 12-inch-diameter Fairbanks Lateral is 60 MMscfd with an MAOP of 1,400 psi.

2.2 *Timeline of Project*

The project timeline is presented in Figure 2.2-1.

Figure 2.2-1 Alaska Stand Alone Gas Pipeline Timeline

Major Tasks and Milestones	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
	2010	2011	2012	2013	2014	2015	2016	2017	2018
Engineering/Environmental/Permitting									
Project Sanction			(6/2012)						
Pre-Construction Preparation									
Construction									
Startup							(10/2016)		
Operations Turnover/Warranty Period, Restoration									
Recurring Operation and Maintenance									

2.2.1 Duration and Timing of Construction

Construction is planned for a two-and-a-half year period. Construction will be completed in separate sections, referred to as spreads. The pipeline is divided into five spreads, with each spread further divided into sections to accommodate varying terrain or seasonal challenges to support an orderly construction sequence, as shown in Table 2.2-1. Pre-construction activities such as ROW development and construction of access roads, laydown yards, and camps will begin in the summer prior to the first season of pipeline construction. Pipeline construction is planned to begin in late 2014 and be completed in late September 2016.

TABLE 2.2-1 CONSTRUCTION SPREAD BY SEASON AND LOCATION

Spread	Section	Location	Start (MP)	End (MP)	Length (Miles)	Construction Season
1	1A	GCF to PS-1	0	6	6	Winter 1
1	1B-1	PS-1 to Happy Valley	6	88	82	Winter 1
1	1B-2	Happy Valley to Atigun River Valley	88	163	75	Winter 2
1	1C-1	Atigun River Valley to North Atigun Pass	163	173	10	Summer 1
1	1C-2	North Atigun Pass to Chandalar Shelf	173	183	10	Summer 2
		Spread 1 Total:			**183**	
2	2A-1	Chandalar Shelf to Coldfoot	183	248	65	Winter 1
2	2A-2	Coldfoot to Prospect River	248	286	38	Winter 2
2	2B	Prospect River to Ray River	286	348	62	Summer 1
2	2C	Ray River to Yukon River	348	360	12	Winter 2
		Spread 2 Total:			**177**	
3	3A	Yukon River to Livengood	360	405	45	Summer 1
3	3B-1	Livengood to Little Goldstream	405	468	63	Winter 1
3	3B-2	Little Goldstream to Healy	468	529	61	Winter 2
		Spread 3 Total:			**169**	
4	4A-1	Healy to Nenana River	529	535	6	Summer 1
4	4A-2	Nenana River to Lynx Creek	535	541	6	Fall 1/Winter 2
4	4B	Lynx Creek to Honolulu Creek	541	602	61	Summer 1
4	4C-1	Honolulu Creek to Susitna River	602	673	71	Winter 1
4	4C-2	Susitna River to Beluga South Terminus	673	737	64	Winter 2
		Spread 4 Total:			**208**	
		Mainline Total:			**737**	
Fairbanks Lateral		Mainline (MP 459) to Fairbanks	0	35	35	Summer 2

Notes:
GCF = Gas Conditioning Facility
MP = milepost
PS = Trans Alaska Pipeline System Pump Station

2.2.2 Duration of Operations

The ASAP is expected to be in operation for the productive life of the natural gas field(s) that supply it. The estimated useful life of the pipeline is the economic life (which is the controlling factor) and is estimated to extend past the maximum duration of the Lease, which is 30 years. With appropriate maintenance, repair, and refurbishment, the physical life of ASAP is indefinite. The design life is a technique used to rationalize cost/benefit of the initial construction cost against future maintenance cost. The project pipeline useful life is a combination of function of economic life, physical life, and design life.

The duration of operations has financial and operational components. The financial term will depend on the pipeline contractor who purchases the project and a payback period, which usually ranges between 15 and 25 years depending on financial agreements. This timing must take into account debt-to-equity ratio, debt outstanding, approved equity or earnings allowed, inflation factors, and additional factors. The operational term is the life of the project. The applicant, AGDC, requests the maximum term available because a modern pipeline is expected to be operational as long as gas is available from the source and that period could exceed 50 years.

2.3 Cost of Proposal (Construction, Operation, and Maintenance)

The July 2010 Cost of Service estimate for the ASAP is described in Table 2.3-1 below.

TABLE 2.3-1 COST OF PROPOSAL

Cost Item	Cost
Pipeline Construction	$4.4 billion
Gas Conditioning Facility	$4.0 billion
Total Construction	$8.4 billion
Operations and Maintenance	$70 million per year

Michael Baker Jr., Inc. July 2010

2.4 Gathering System, Trunk Line, or Distribution Line

The proposed pipeline will connect to a field gathering system at the valve flange at the Prudhoe Bay Central Gas Facility, to the Fairbanks distribution system, and to the ENSTAR distribution system at MP 39 of the Beluga Pipeline near Wasilla.

2.5 Surface and Subsurface Features

The proposed pipeline will be buried except from MP 0 to 6, and at elevated bridge stream crossings, compressor stations, possible fault crossings, pigging facilities, and off-take valve locations.

Burial modes are generally trenches or berms. South of ASAP MP 6 the pipeline will exit the ground only at bridged river crossings, compressor stations, and possible out-take valve locations.

Pipelines are classed based on proximity to inhabited areas and existing infrastructure. Location class was assigned according to American Society of Mechanical Engineers (ASME) B31.8. Using the project Geographic Information System (GIS), buildings fit for human occupancy were identified within a buffer defined as one-quarter-mile either side of the proposed alignment and within a 1-mile segment longitudinally along the alignment.

Depth of cover requirements for Class 1 through 4 pipeline locations are provided in Table 2.5-1. This table also includes depth of cover for parallel encroachment of pipelines on roads, highways, or public streets with hard surfaces, and railroads. Additional project criteria are provided for uncased crossings of roads, highways, and railroads. Site-specific cover criteria may be required for pipeline uplift (frost heave) resistance or by local agencies or property owners. In Attachment 1, typical drawings that include surface and subsurface features illustrate various ditch modes.

TABLE 2.5-1 DEPTH OF COVER REQUIREMENTS FOR CLASS 1 TO 4 PIPELINE LOCATIONS

Location	Minimum Normal Soil (Inches)	Design Depth Normal Soil (Inches)	Consolidated Rock Specifications (Inches)
Class 1 locations	30	36	18
Class 2, 3, and 4 locations	36	42	24
Parallel encroachment of pipelines on roads, highways, or public streets with hard surfaces, and railroads	48	52	36
Uncased crossings of roads, highways, and railroads	48	52	36

Michael Baker Jr., Inc. July 2010

Per the Code of Federal Regulations (CFR), 49 CFR 192.325, the pipeline will be installed with at least 12 inches of clearance from any other underground structure not associated with the pipeline. If this clearance cannot be attained, the pipeline must be protected from damage that might result adjacent infrastructure.

2.6 Length and Width of the Right-of-Way, Area Needed for Related Activities

The construction ROW width for construction activities will generally be 100 feet. Specific construction activities such as horizontal directional drilling (HDD) pads at river and stream crossings, areas of side-hill construction, road and foreign pipeline crossings, and temporary facilities such as construction camps and temporary laydown areas, will require a larger ROW width. Details will be provided when engineering and specific requirements are finalized. Typical drawings are provided in Attachment 1 that depict construction modes and ditching ROW.

Permanent width for the main pipeline ROW will be 52 feet and for the proposed 12-inch lateral pipeline ROW to Fairbanks will be 51 feet through federal lands, and 30 feet through State of Alaska lands. ROW width through other lands is expected to be 30 feet. At certain crossings or other sensitive locations the permanent ROW width may be greater.

2.7 Ancillary to an Existing Right-of-Way

The ASAP route maximizes use of existing or officially designated transportation and utility corridors and minimizes new ground disturbances. The proposed pipeline route parallels the TAPS corridor and the Dalton Highway to Livengood and the Parks Highway from just north of Nenana to approximately MP 708 near Wasilla. The pipeline is not ancillary to any other natural gas pipelines until the pipeline reaches MP 39 of the Beluga Pipeline, where the natural gas will enter the existing ENSTAR system.

2.8 Alternative Routes or Locations

The Council on Environmental Quality (CEQ), per 40 CFR 1502.14, requires that a range of alternatives be considered for any major federal action. As noted in the March 16, 1981 *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations* memorandum, this includes 1) identification of a reasonable a Range of Alternatives, 2) analysis of Alternatives Outside the Capability of the Applicant or Jurisdiction of Agency, and, 3) discussion of a No Action Alternative.

An alternatives analysis of other reasonable routes for ASAP was prepared in September 2009. The alternative routes considered in addition to the preferred ASAP route were the Richardson Highway Pipeline route (Section 2.8.1) and two spur routing options: the Parks Highway Spur and Richardson Highway Spur, as described in Sections 2.8.2 and 2.8.3.

2.8.1 Richardson Highway Pipeline Route Alternative

The alternative route considered, but not selected, was the Richardson Highway Pipeline route. This alternative shares a common routing with the preferred ASAP route as far as Livengood. At Livengood, the alternative route heads southeast along the TAPS and Richardson Highway corridors to Glennallen where it turns to the west along the Glenn Highway to connect with the existing gas distribution system at MP 39 of the Beluga Pipeline. The alternative route is 860 miles long. Also included is an approximately 9-mile-long spur connecting the main pipeline to the local distribution network in Glennallen.

2.8.2 Parks Highway Spur Route Alternative

This alternative route assumes construction of an Alaska–Canada Gasline and a takeoff point at Fairbanks and follows the Parks Highway to MP 39 of the Beluga Pipeline. With this spur line route, a Fairbanks Lateral line from Dunbar is not required.

2.8.3 Richardson Highway Spur Route Alternative

This alternative route assumes construction of an Alaska–Canada Gasline and a takeoff point at Delta Junction and follows the Richardson Highway to Glennallen heading west generally following the Glennallen Highway to MP 39 of the Beluga Pipeline. A lateral connecting the local distribution network in Glennallen would be required.

2.8.4 Why Alternatives Were Not Selected

HB 369 passed by the Alaska State Legislature requires a project plan be developed that includes an analysis of alternative routes and the selection of a route that is economically feasible and makes natural gas available to residents at the lowest possible costs. The alternatives and routing modes discussed in this section were considered but not carried forward as the proposed action because they did not optimize the number of users, minimize pipeline length, minimize engineering constraints and costs, and minimize opportunities that could adversely affect the environment.

3.0 RIGHT-OF-WAY LOCATION

3.1 Legal Description

The proposed ROW for ASAP will cross federal, state, borough, private, and Alaska Native lands. The proposed ROW will also cross several large rivers. `

The POD addresses a 200-foot-wide corridor (100 feet on either side of the alignment centerline). This area will be narrowed as the ASAP route is optimized and more information becomes available. Actual construction will occur within a 100-foot construction ROW.

Table 3.1-1 identifies landowners within a 200-foot-wide corridor by number of parcels. Attachment 2 identifies each parcel by landowner. Given that the construction corridor may vary in width, and the route may change slightly as it is refined, the actual number of parcels crossed may vary slightly. The number of parcels crossed would be determined by a land survey of the final pipeline alignment.

This land ownership information has been obtained from publicly available sources and has been partially title-verified. The number of parcels crossed will be determined by a land survey of the final pipeline alignment. The final alignment and construction right-of-way have not been determined.

A Web Service is available to agencies to provide maps showing the alignment and other features, including existing facilities, stream crossings, temporary land use areas, and material sites. This Web Service is meant to take the place of alignment sheets. A series of route maps are provided in Attachment 3.

TABLE 3.1-1 LAND OWNERSHIP OF PARCELS CROSSED BY THE PROPOSED RIGHT-OF-WAY (ESTIMATED)

Ownership	Total Length (Miles)	Total Land Parcels
Federal	239	310
State	407	629
Municipal/Borough	9	30
Native Allotments/Corporations	42	83
Private	17	195

Michael Baker, Jr., Inc. February 2011
Notes: Land ownership data is not included from the alignment located in the Alaska Department of Transportation Right-of-Way or within the Fairbanks Lateral.

3.2 Site-Specific Engineering Surveys for Critical Areas

Site-specific engineering surveys for critical areas will be completed during detailed engineering. Critical areas are defined as those areas requiring special design or mitigation, such as river crossings, fault crossings, and erosion-prone areas.

3.3 Maps and Drawings Showing River Crossings

A list of potential stream crossings is located in Attachment 4. Typical drawings of stream crossings are included in Attachment 1.

3.4 Right-of-Way Acreage Calculation

The area calculation for the 737-mile-long ASAP construction ROW and the 35-mile-long Fairbanks Lateral is approximately 9,400 acres. The acreage was calculated by assuming a consistent 100-foot construction ROW throughout the alignment. The estimated acreage does not include extra temporary workspaces that will be determined as design progresses.

4.0 FACILITY DESIGN FACTORS

4.1 Technical Summary

Table 4.1-1 identifies the pipeline location classes, wall thickness, and MAOP.

TABLE 4.1-1 PIPELINE PRESSURE STANDARDS

Location Class*	Wall Thickness (inches)	Maximum Allowable Operating Pressure (psi)
Location Class 1 (Div 2)	0.595	2,500
Location Class 2	0.714	2,500
Location Class 3	0.857	2,500
Location Class 4	1.071	2,500

Notes: *Location Class 1, Div. 1 not used.
Michael Baker Jr., Inc. July 2010

4.2 Toxicity of Pipeline Product

Toxicity is the degree to which a substance is able to damage an organism exposed to it. Toxicity can be measured by its effects on the target (organism, organ, tissue, or cell). Toxic and hazardous substances are regulated, generally based upon their use. The regulations relevant to the pipeline product include:

- The Occupational Safety and Health Administration (OSHA) regulates occupational exposures to chemical and physical agents.
- The Toxic Substances Control Act (TSCA) established requirements and authorities for indentifying and controlling toxic chemicals hazardous to human health and the environment. TSCA addresses gathering of information regarding the toxicity of particular chemicals, assessing if they pose an unreasonable risk, and instituting appropriate control actions.

As required under Section 8(b) of TSCA, the U.S. Environmental Protection Agency (EPA) maintains a list of chemicals that are in commercial use within the U.S. called the TSCA Inventory of Chemical Substances (commonly referred to as the TSCA Inventory). Currently there are approximately 84,000 chemicals on the TSCA Inventory.

The product carried by the ASAP is natural gas, composed of over 80 percent methane with minor amounts of light hydrocarbons such as ethane, propane, and butane, and NGLs. Natural gas is colorless and odorless.

Methane, the primary component of natural gas, is biologically inactive and not considered toxic. However, other components, such as isobutene, pentanes, and hexanes have permissible exposure limits (PELs) from OSHA (800 parts per million [ppm], 1,000 ppm, and 500 ppm, based on 8-hour-per-day, 5-day-per-week exposure limits). In addition, many components of natural gas and NGLs are included in the TSCA Inventory. Some natural gas sources also contain significant levels of H_2S. Hydrogen sulfide and the untreated gas are considered toxic. Hydrogen sulfide will be removed from the product during conditioning prior to transportation in ASAP.

Both natural gas and NGLs may be considered hazardous due to their low flash point and flammability. The EPA has applied Acute Health, Fire and Sudden Release of Pressure hazard categories to natural gas.

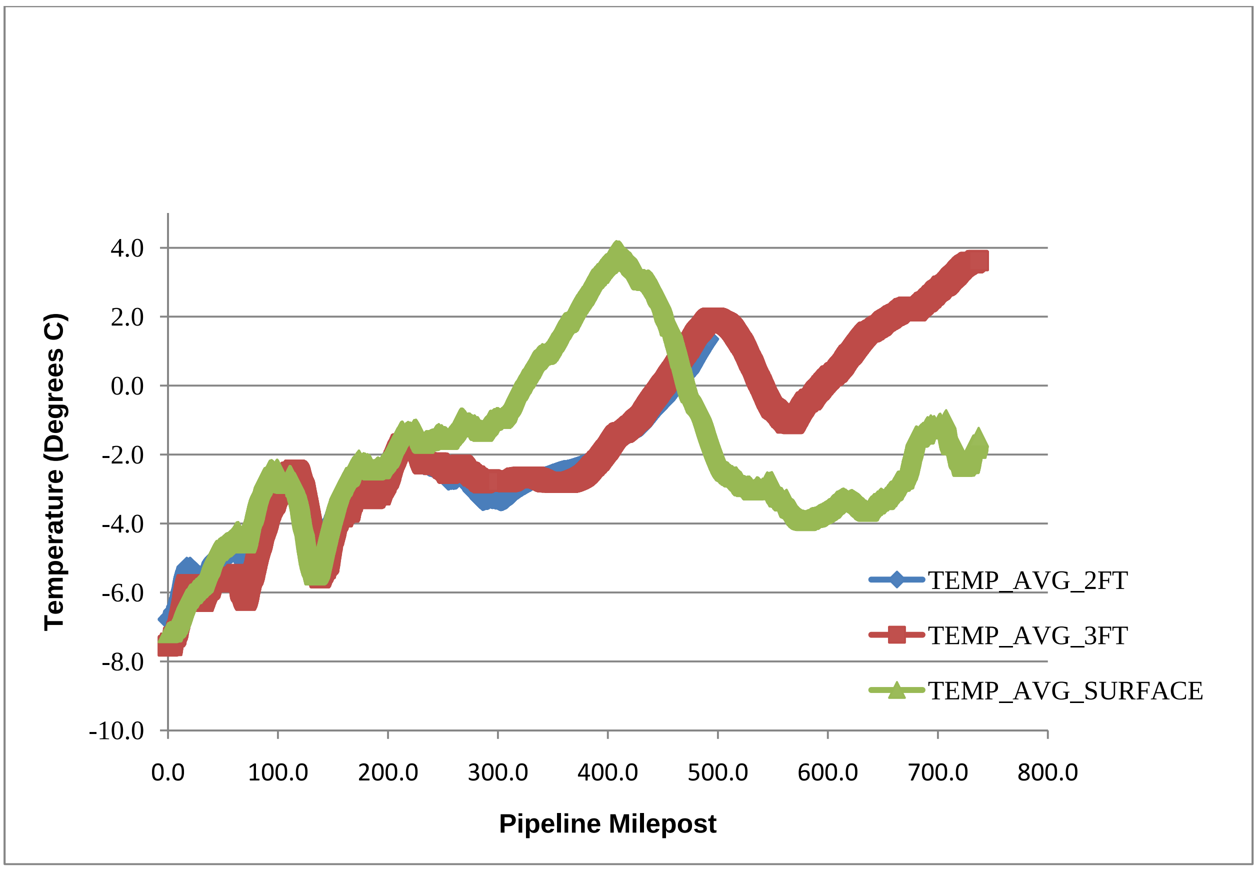
4.3 Anticipated Operating Temperatures

"Anticipated operating temperatures" refers to the pipeline operating temperature and changes along the route, seasonally, and as a function of throughput. The operating temperature of the buried pipeline could affect the frozen/thawed nature of the surrounding subsurface that, in turn, could affect the pipeline trench support conditions as well as potentially cause subsurface expression such as local subsidence or heave.

The pipeline operating temperature will be governed by the combined influence of Joule-Thompson cooling associated with gas pressure drop, pipe wall heat transfer between gas and surrounding soil, and heat input from gas compression. The goal is that the proposed pipeline and lateral pipeline will employ an ambient pipeline over all proposed operating modes. An "ambient pipeline" refers to a pipeline with operating temperatures closely approaching seasonal temperatures of the surrounding ground. Mitigation measures will include maintaining, to the maximum extent practicable, an existing temperature regime along the corridor.

A temperature profile showing preliminary ground and surface temperature profiles over the ASAP route is shown in Figure 4.3-1. It should be noted that data is sparse over the southern half of the alignment and this profile may not accurately reflect site conditions.

Figure 4.3-1 Ground and Surface Temperature Profiles Over the Proposed ASAP Route



The temperature of ASAP will follow seasonal ground temperature at low flow rates. At full capacity it is anticipated that the cooling associated with gas pressure drop is unlikely to result in non-ambient pipeline operation.

As designed, the pipeline will be operated at below freezing temperatures in predominately permafrost terrains to protect the thermal stability of the surrounding ground. Similarly, the pipeline will be operated at above freezing temperatures in predominately thawed settings so as to not create frost bulbs around the pipe that could lead to frost heave displacement of the pipeline or adverse hydraulic impacts on drainages crossed by the pipeline. Pipeline design will use engineering controls such as insulation and strategic use of non-frost-susceptible fill to control the thermal signature of the pipeline in discontinuous permafrost.

Once the gas to be transported leaves the Central Gas Facility, fan-type coolers will reduce the temperature to approximately 20 degrees Fahrenheit (°F) above ambient. Refrigeration units will then lower the temperature further to approximately 30°F at the pipeline inlet. The need to reduce compressor discharge gas temperature leaving a station will be determined via hydraulic analysis and subsequent evaluation of thermal interaction between the pipe and surrounding soil. It is anticipated that mechanical refrigeration will be used to cool compressed gas from approximately half of the stations located along the northern portion of the alignment. No compressor discharge gas cooling will be required along the southern half of the pipeline. No gas heating is planned for the proposed pipeline.

The need to heat or cool the gas stream depends on numerous operational constraints. When additional design is completed and with overall modeling of the system, including compressor station locations/size, elevation, and ambient temperature, the operational characteristics of the pipeline, including the temperature of the gas stream over the length of the alignment, will be determined. The temperature gradient will be compared to the measured ground temperatures and design measures to maintain the current ground temperature as required. Additional details regarding the operating temperatures and maintenance of the existing thermal regime will be developed as the project progresses and will be provided to agencies when available.

4.4 Permanent Width or Size

The permanent width or size of the main pipeline ROW will be 52 feet through federal lands and 30 feet through state lands. The Fairbanks Later will be 51 feet through federal lands and 30 feet through state lands. ROW width through other lands is expected to be 30 feet. At certain crossings or other sensitive locations the permanent ROW width may be greater.

4.5 Temporary Areas Needed

The typical construction ROW width needed for construction activities will be 100 feet. Specific construction requirements such as HDD pads at river and stream crossings, road and foreign pipeline crossings (Section 7.4.5), and temporary facilities, such as construction camps and temporary laydown areas (Section 7.2), will require additional real estate. Attachment 1 presents typical standard drawings for river and stream crossings.

5.0 ADDITIONAL COMPONENTS OF THE RIGHT-OF-WAY

5.1 Connection to an Existing Right-of-Way

See Attachment 3 for a series of pipeline routing maps.

5.1.1 Existing Components On or Off Public Land

The selected route maximizes the use of existing or officially designated transportation/utility corridors and minimizes new ground disturbances.

5.1.2 Possible Future Components

No additional facilities or components are planned to be added at this time. The addition of tie-ins to the pipeline by future gas sources is a possibility; however, these plans will be developed by the pipeline construction contractor and operator.

5.2 Location of Compressor Stations

Compressor station needs are currently being evaluated as the pipeline design is optimized. Based upon current design, a maximum of two compressor stations will be required. It is possible that a single compressor station will provide sufficient compressive ability for the gas throughput.

A total of 11 compressor station locations were identified early in the design process. Locations CS-4 and CS-8 are under evaluation for the two-compressor design option and location CS-5 is under evaluation for the one-compressor design option. Compressor station components will be modularized to minimize on-site construction and commissioning work in remote locations. Compressor stations are listed in Table 5.2-1. Compressor station locations may change slightly if necessary during design optimization. Compressor stations are discussed in more detail in Section 7.3.2.

TABLE 5.2-1 RANGE OF PIPELINE COMPRESSOR STATION LOCATIONS

Compressor Station ID	Station Location	Equipped with Discharge Chilling	Notes
CS-4	MP 225.0	Yes	Two compressor option
CS-5	MP 285.5	Yes	One compressor option
CS-8	MP 466.5	No	Two-compressor option; based upon pipeline hydraulics, chilling is not required for compressor stations located south of Minto Flats.

6.0 GOVERNMENT AGENCY INVOLVEMENT

6.1 Entities That Have Regulatory Authority or That Will Be Affected By Project

Specific federal, state, and local government agencies have regulatory authority over different aspects of ASAP. The scope of regulatory decision-making includes the authorities listed in Table 6.1-1.

TABLE 6.1-1 FEDERAL, STATE, AND LOCAL AGENCIES WITH REGULATORY AUTHORITY

Federal Agencies	U.S. Department of the Interior–Bureau of Land Management (BLM) U.S. Army Corps of Engineers (USACE) U.S. Coast Guard (USCG) U.S. Environmental Protection Agency (EPA) U.S. Department of Transportation (USDOT) –Pipeline and Hazardous Materials Safety Administration (PHMSA)–Office of Pipeline Safety (OPS) U.S. Fish and Wildlife Service (USFWS) National Marine Fisheries Service (NMFS) National Parks Service (NPS) Federal Aviation Administration (FAA)
State Agencies	Alaska Department of Natural Resources (ADNR) • State Pipeline Coordinator Office (SPCO) • Office of History and Archaeology (OHA) • Division of Coastal and Ocean Management (DCOM) • Division of Mining, Land and Water (DMLW) • Mental Health Trust Authority [landowner] Alaska Department of Environmental Conservation (ADEC) Alaska Department of Fish and Game (ADF&G) Alaska Department of Transportation and Public Facilities (ADOT&PF) Regulatory Commission of Alaska (RCA) Alaska Railroad Corporation (ARRC)
Local Agencies	North Slope Borough (NSB) Fairbanks North Star Borough (FNSB) Denali Borough (DB) Matanuska-Susitna Borough (MSB) Municipality of Anchorage (MOA) Nenana Wasilla Houston

There are also a number of federally-recognized tribes along the ASAP route with whom government-to-government consultation will be required during the NEPA process (Table 6.1-2). Entities that may be affected by the project are described in more detail in Section 8.2.14.

TABLE 6.1-2 FEDERALLY-RECOGNIZED TRIBES ALONG THE PIPELINE ROUTE BY REGION

Regional IRA	Region	Community	BIA Recognized Tribe
Inupiat Community of the Arctic Slope (ICAS)	North Slope	Barrow	Native Village of Barrow
		Kaktovik	Native Village of Kaktovik
		Nuiqsut	Native Village of Nuiqsut
		Anaktuvuk Pass	Naqsragmiut Tribal Council
Tanana Chiefs Conference	Interior - Yukon-Tanana Subregion	Alatna	Alatna Traditional Council
		Allakaket	Allakaket Traditional Council
		Evansville	Evansville Tribal Council
		Manley Hot Springs	Manley Hot Springs Traditional Council
		Minto	Minto Traditional Council
		Nenana	Nenana Traditional Council
		Rampart	Rampart Traditional Council
		Stevens Village	Stevens Village IRA Council
		Tanana	Tanana Tribal Council
	Interior - Yukon Flats Subregion	Beaver	Beaver Traditional Council
		Birch Creek	Birch Creek Tribal Council
	Interior - Upper Tanana Subregion	Dot Lake	Dot Lake Village Council
		Healy Lake	Healy Lake Traditional Council
		Tanacross	Tanacross IRA Council
	Interior	Cantwell	Native Village of Cantwell
	Cook Inlet	Chickaloon	Chickaloon Native Village
		Knik	Knik Tribe
		Eklutna	Eklutna Native Village
		Tyonek	Native Village of Tyonek

6.2 Permitting Organization

Permitting for ASAP will focus on two major efforts:

1) Three major permit applications listed in Table 6.2-1 were filed in November, 2009. These major permit applications will allow the U.S. Army Corps of Engineers (USACE), as lead agency, to prepare a NEPA document and complete the NEPA process, proceed to a Record of Decision (ROD), and facilitate a grant of ROW from the U.S. Department of the Interior, Bureau of Land Management (BLM), as well as to gain approvals to use federal and state lands for the project.

2) A subsequent effort is required to obtain all necessary permits prior to beginning construction activities. These permits are included in Table 6.2-2 and are organized by regulatory agency.

TABLE 6.2-1 CURRENTLY FILED REGULATORY APPROVALS

Permit Type	Permitting Agency	Activity
Federal Pipeline Grant of ROW	BLM	Installation of a new pipeline or to convert an existing lease term pipeline into a ROW pipeline. ROWs for pipelines through federal lands.
State Pipeline ROW Lease	ADNR SPCO	Common carrier pipeline
Draft Section 404/401 Approval	USACE ADEC	Placement of fill or dredged material into waters of the U.S. (wetlands)

6.2.1 Federal Agency Involvement

No Federal Energy Regulatory Commission (FERC) Section 7(c) application is required because the proposed action is intrastate and, therefore, outside of FERC's jurisdiction. Table 6.2-2 describes anticipated federal agency involvement.

6.3 List of Authorizations and Pending Applications for Similar Projects

Authorizations and permits for similar projects that may provide information to authorizing agencies relevant to ASAP are listed below.

- The APP application for a certificate of public convenience and necessity is to be filed October 2012 by TransCanada Alaska Company, LLC with the FERC. An application for state ROW lease was filed in 2005 with the ADNR.
- The APP application for a BLM ROW has been filed (TransCanada FF95685) and a certificate of public convenience and necessity is to be filed October 2012 by TransCanada Alaska Company, LLC with the FERC. An application for state ROW lease was filed in 2005 with the ADNR.
- Denali, the Alaska Gas Pipeline filed a SF299 ROW application with the BLM in 2008 (Denali FF95391).
- A ROW application for a smaller-diameter gas pipeline to Donlin Creek was filed with the BLM (Donlin Creek AA92403).
- Foothills West Transportation Access Project is currently under development by the Alaska Department of Transportation and Public Facilities. The purpose of the project is to construct a road from the Dalton Highway to Umiat to provide access to oil and gas resources and the National Petroleum Reserve-Alaska.

TABLE 6.2-2 PERMITTING PLAN TABLE/MATRIX

	Permit Type	Permitting Agency	Citation	Activity	Acquisition Time	Notes
PERMIT APPLICATIONS SUBMITTED AS OF AUGUST 2010						
Land Use						
1.	Approval of Transportation and Utility Systems (TUS) In and Across a Conservation System Unit (CSU) in Alaska	Department of Interior (DOI)	43 Code of Federal Regulation (CFR) 36	Access within any CSU, national recreation area in Alaska managed by Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), or the National Park Service (NPS). Permit application is SF 299.	2 years	Proposed project may not cross a CSU such as Denali National Park and Preserve. U.S. Congressional approval required.
2.	Federal Pipeline Grant of Right-of-Way (ROW) and associated Temporary Use Permits (TUP)	BLM	43 CFR 2880, and the Mineral Leasing Act of 1920	Installation of a new pipeline or to convert an existing lease term pipeline into a ROW pipeline ROWs for pipelines through federal lands	2 years Environmental Impact Statement/ Record of Decision (EIS/ROD) expected to be issued December 2011)	Permit application submitted November 2009. Resubmitted under Alaska Gasline Development Corporation (AGDC) August 2010.
3.	State Pipeline ROW Lease	Alaska Department of Natural Resources (ADNR) State Pipeline Coordinator's Office (SPCO)	11 Alaska Administrative Code (AAC) 80.005	Pipeline ROW	! year	Permit application submitted November 2009. Resubmitted under AGDC August 2010.
Discharge Into Water						
4.	Preliminary Jurisdictional Determination (PJD)	U.S. Army Corps of Engineers (USACE)	33 CFR 331.2	To determine the presence of wetlands (waters of the U.S.)	90 days after submittal of all documents	PJD request was filed November 2009. Associated USACE permit applications are filed during the EIS process.
5.	Dredged or Fill Material	USACE	33 CFR 323 (Section 404 of Clean Water Act (CWA)	Placement of fill or dredged material into waters of the U.S. (wetlands)	2 years (EIS/ROD expected to be issued December 2011)	Permit application submitted November 2009. Resubmitted under AGDC August 2010.

	Permit Type	Permitting Agency	Citation	Activity	Acquisition Time	Notes
Discharge Into Water						
6.	Dredged or Fill Material	Alaska Department of Environmental Conservation (ADEC)	18 AAC 70 (Section 401 of CWA)	Placement of fill or dredged material into waters of the U.S. (wetlands)	2 years (EIS/ROD expected to be issued December 2012)	Section 401 will be obtained concurrent with the Section 404 permit.
PERMIT APPLICATIONS TO BE SUBMITTED DURING EIS PROCESS						
Navigable Waters and Water Use						
7.	Obstruction to Navigable Waters	USACE	33 CFR 322 (Section 10 of the Rivers and Harbors Act 1899)	Construction of any structure in or over any navigable water of the U.S., including excavation/dredging or deposition of material. Activities not requiring a permit include bridges or causeways, aqueducts, aerial tramways, conveyers, and overhead pipelines. It does not include power transmission lines, communication cables, submerged pipelines, or tunnels.	2 years (EIS/ROD expected to be issued December 2011)	Included in section 404 permit application filed November 2009.
8.	Construction of Dams/ Dikes or Bridges/ Causeways in Navigable Waters	U.S. Coast Guard (USCG)	33 CFR Subchapter J Section 9 of the Rivers and Harbors Act of 1899; General Bridge Act of 1946	Construction of any dam or dike in a navigable river or navigable water of the U.S. must be permitted by USACE. Construction of any bridge or causeway in a navigable river or navigable water of the U.S. must be permitted by USDOT.	2 years (EIS/ROD expected to be issued December 2011)	Included in section 404 permit application filed November 2009.
9.	Temporary Water Use	ADNR	11 AAC 93.220	Temporary water use, ice armoring, and pipe testing for period of less than 5 consecutive years.	90 days	
Hazardous Material and Waste						
10.	Oil Discharge Prevention and Contingency Plan (ODPCP)	ADEC	18 AAC 75.400	ODPCP must be approved by ADEC. Discharge of oil from non-transportation-related onshore facilities onto or on navigable waters of the U.S. requires an ODPCP. Includes interstate and intrastate onshore pipeline systems, including pumps and appurtenances as well as in-line or breakout storage tanks needed for continuous operation of a pipeline system.	120 days	This permit is not applicable for natural gas pipelines

	Permit Type	Permitting Agency	Citation	Activity	Acquisition Time	Notes
Wildlife						
11.	Fish Habitat Protection	Alaska Department of Fish and Game (ADF&G)	Alaska Statute (AS) 16.05.871 and AS 16.05.841	Permit is necessary for activities that use, divert, obstruct, pollute, or change natural flow of specified anadromous fish streams	90 days	
12.	Letter of Authorization (LOA)	USFWS	50 CFR 18 Marine Mammal Protection Act (MMPA)	Any activity that has the potential to “take” a marine mammal as defined within MMPA (USFWS trust species, e.g., polar bear and Pacific walrus)	90 days	Letter of Authorization (LOA) for incidental, unintentional take or intentional take of a polar bear
13.	Bald and Golden Eagles	USFWS	50 CFR 22 Bald and Golden Eagle Protection Act	Any activity that could “take” a bald or golden eagle, their eggs, feathers or nest as defined within the Eagle Protection Act	N/A	Not a permit – consultation required
14.	Migratory Bird	USFWS	50 CFR 21 Migratory Bird Treaty Act (MBTA)	“Take” includes any attempt to hunt, pursue, would, kill, possess, or transport any migratory bird, nest, egg, or any part of it	N/A	Not a permit – consultation required
15.	Wildlife Protection Measures	ADF&G	5 AAC 92 5 AAC 95.900	Design and construction of pipeline to avoid significant alteration of caribou and other large ungulate movement and migration patterns	N/A	Not a permit – consultation required under National Environmental Policy Act (NEPA)
16.	Endangered, Threatened, or Candidate Species	USFWS	50 CFR 402 Section 7 of Endangered Species Act (ESA)	If proposed activity affects species listed under ESA then obtain agreement with USFWS re: scope of studies to determine project’s probable effect on Threatened and Endangered Species (TES)	N/A	Not a permit – consultation required under ESA
17.	Essential Fish Habitat (EFH)	National Marine Fisheries Service (NMFS)	50 CFR 600 Magnuson-Stevens Act provisions	Federal agencies are required to consult with NMFS on any action that may result in adverse affects to EFH	N/A	Not a permit – consultation required under NEPA
18.	Fish Resource	ADF&G	AS 16.05.340(b)	Required of anyone who wants to collect or hold alive any live fish, shellfish, or aquatic plants or their gametes (except gold fish and decorative tropical fish) for purposes of science, education, propagation, or exhibition	30 days	Typically required for field studies

	Permit Type	Permitting Agency	Citation	Activity	Acquisition Time	Notes
Air Quality						
19.	Prevention of Significant Deterioration (PSD)	ADEC	18 AAC 50.306 40 CFR 52.21	Obtain PSD permit before beginning construction on a new major source, a major modification, or a plantwide applicability limit (PAL) major modification	1.5 to 3 years	Due to the complexity of air permitting for large-scale projects, required air permits will be clarified during the permitting process. All permits that may be required are included in this table.
20.	Nonattainment area new source review for construction	ADEC	18 AAC 50.311	A construction permit must be obtained before commencing construction of a major stationary source, major modification, or PAL major modification for a nonattainment pollutant in a nonattainment area		
21.	Pre-construction review for a major source of hazardous air pollutants	ADEC	18 AAC 50.316	Authorize plans for construction and assess emission standards and air contamination A construction permit must be obtained before beginning construction of a new major source of hazardous air pollutants or reconstructing a major source of hazardous air pollutants		
22.	Minor Air	ADEC	18 AAC 50.502	A minor permit is required for an air pollutant before construction, operation, or relocation of a minor source if the stationary source needs a Title V permit		
Archaeological						
23.	Alaska Cultural Resource	ADNR	AS 41.35.080	Permit is required for investigation, excavation, gathering, or removal of any historic, prehistoric, or archaeological resources of the state	30 days	Typically required for field studies only
24.	Section 106 Consultation	ADNR	36 CFR Part 800 National Historic Preservation Act (NHPA)	Any project funded, licensed, permitted, or assisted by the federal or state government	N/A	Not a permit – consultation required under NEPA
25.	Section 106 consultation with State Historic Preservation Office (SHPO)	Tribal entities	36 CFR Part 800 NHPA	Any project funded, licensed, permitted, or assisted by the federal government	N/A	Not a permit – consultation required under NEPA

	Permit Type	Permitting Agency	Citation	Activity	Acquisition Time	Notes
Archaeological						
26.	Preservation of Historic, Prehistoric, and Archaeological Resources	ADNR	AS 41.35.070 Alaska Office of History and Archaeology (OHA), SHPO, Alaska Historic Preservation Act (AHPA)	Any project located on state lands	90 days	Concurrence required from OHA and SHPO
Land Use						
27.	Utility on State ROW	Alaska Department of Transportation and Public Facilities (ADOT&PF)	17 AAC 15.011	Permit authorizing the applicant to construct or install utility facilities within a department ROW	90 days	
28.	Special Area	ADF&G	5 AAC 95.420	Activities, except for lawful hunting, trapping, fishing, viewing, and photography occurring in state game refuges, state recreation areas, across designated wild and scenic rivers, or through state parks require a special area permit. Use of helicopter or motorized vehicle requires a permit.	90 days	
29.	Development	North Slope Borough (NSB)	NSB Code of Ordinances Title 19	Activities occurring within NSB and on NSB lands. Note—may also need zoning change depending on route.	60 days	
30.	Land Use, Zoning, and/or Floodplain	Fairbanks North Star Borough (FNSB)	FNSB Code of Ordinances Title 17 and 18	Activities occurring within FNSB and on FNSB lands	60 days	
31.	Land Use and/or Zoning	Denali Borough (DB)		Activities occurring within DB and on DB lands. Consultation with DB required.	60 days	
32.	Land Use and/or Zoning	Matanuska-Susitna Borough (MSB)	MSB Comprehensive Plans and Zoning	Activities occurring within MSB and on MSB lands	60 days	

	Permit Type	Permitting Agency	Citation	Activity	Acquisition Time	Notes
Coastal Zone						
33.	Coastal Consistency Determination	ADNR	11 AAC 110 Alaska Coastal Management Program	Activities within designated coastal zones, including waterways, that may impact coastal waters	50 days	
34.	Local Consistency Determination	MSB	MSB Coastal Management Program	Activities within designated coastal zones, including waterways, that may impact coastal waters	50 days	Determination of consistency with MSB coastal management plan and enforceable policies will be obtained concurrent with the state of Alaska Coastal Zone Consistency Determination
35.	Local Consistency Determination	NSB	N/A	Activities within designated coastal zones, including waterways, that may impact coastal waters	50 days	NSB does not have a Coastal Management Plan in effect. NSB does have opportunity to comment with regard to specially designated area (e.g., for subsistence use).
Miscellaneous - Consultations, Stipulations, and Requirements						
36.	Environmental Justice	All federal agencies	Executive Order (EO) 12898	Activities that may disproportionately affect minorities and low-income populations (e.g., subsistence)	N/A	Not a permit – consultation required under NEPA.
37.	Wetlands Protection Consideration	All federal agencies	EO 11990	Agencies must take action to minimize the destruction, loss, or degradation of wetlands	N/A	Not a permit – consultation required under NEPA.

	Permit Type	Permitting Agency	Citation	Activity	Notes
PRE-CONSTRUCTION, CONSTRUCTION, OPERATION PERMITS					
Water Use					
38.	Floodplain Management	All federal agencies	EO 11988	Agencies must take action to reduce the risk to flood loss; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the beneficial effects served by floodplains.	Not a permit – consultation required under NEPA.
39.	Appropriation of Water and Water Rights	ADNR	11 AAC 93.040–.140	Application for water rights. Normally a permit to appropriate water or temporary water use permit should be obtained before application for water rights.	
40.	Temporary Water Use	ADNR	11 AAC 93.22	Temporary water use, ice armoring, and pipe testing for period of less than 5 consecutive years.	
41.	Fish Habitat Protection	ADF&G	AS 16.05.871 or AS 16.05.841	Water withdrawal from fish bearing waterbodies	
42.	Alaska Pollutant Discharge Elimination System (APDES)	ADEC	18 AAC 70	Discharge of pollutant from a point source into waters of the U.S. Alaska is fully authorized to administer the EPA's NPDES program.	
43.	Non-Domestic Wastewater Disposal	ADEC	18 AAC 72.500–.900	Discharges to land, surface water, or groundwater in Alaska	
Solid Waste					
44.	Solid Waste Management	ADEC	18 AAC 60.210–.215	Permitting a solid waste landfill. Does not include land clearing, woody debris (slash), bricks or cement, asphalt, or waste rock from mining	
Hazardous Material and Waste					
45.	Approval from local landfill operators to deposit non-hazardous solid waste	NSB FNSB DB MSB	NSB, FNSB, DB, and MSB regulations	Handling of solid waste at local landfills	
46.	Generator Identification (ID) Number	EPA	40 CFR 262 Resource Conservation and Recovery Act (RCRA) (18 AAC) 62.210 by reference)	All companies which treat, store, dispose of, transport, or offer for transport regulated waste must obtain an EPA ID number	

	Permit Type	Permitting Agency	Citation	Activity	Notes
47.	Transportation and disposal of hazardous waste	EPA	40 CFR 262 RCRA (18 AAC 62.210 adopted by reference)	Follow requirements regarding transportation, treatment, and disposal of hazardous waste	
48.	Hazardous Chemical Inventories	EPA	40 CFR 302 Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (aka *Superfund*) Title III Superfund Amendments and Reauthorization Act (SARA)	Reporting, planning requirements for facilities that handle, store, and/or manufacture hazardous materials	
49.	Hazardous Chemical Inventories	State Dept of Military Affairs	AS 26.23.073 AS 26.23.077	Reporting, planning requirements for facilities that handle, store, and/or manufacture hazardous materials	
				Wildlife	
50.	Public Safety	ADF&G	5 AAC 92.033	Permit to take, relocate, haze, or destroy birds or their eggs or nests, mammals or reptiles for public safety purposes.	
				Air Quality	
51.	Air quality requirements for open burning (vegetation from ROW)	ADEC	18 AAC 50.065 (b)–(f)	General requirements for open burning Also ensure that 1) material is kept dry, 2) noncombustibles are separated, 3) draft is present, 4) combustibles are separated from grass and peat, and 5) combustibles are not allowed to smolder.	
52.	Air quality control permit to open burn (vegetation from ROW)	ADEC	18 AAC 50.065 (g)	Permit for controlled open burning of forest land, land-clearing operations greater than 40 acres, vegetative cover, fisheries, or wildlife habitat	

	Permit Type	Permitting Agency	Citation	Activity	Notes
Transportation					
53.	Oversized and overweight vehicles (pipe hauling)	ADOT&PF	17 AAC 25.300	Oversized and overweight vehicles permit (such as for construction materials including pipe) and associated attachments (e.g., for flag cars, etc.)	
54.	Transportation of hazardous materials	ADOT&PF	17 AAC 25.200	Transportation of hazardous materials, hazardous substances, or hazardous waste by vehicle	
55.	Airport Operation	Federal Aviation Administration (FAA)	14 CFR 139	An Airport Operating Certificate must be obtained to construct, align a new airport, or activate an airport	This permit may not be applicable for proposed activities.
Camp					
56.	Domestic Wastewater Discharge Permit and Plan Approval	ADEC	40 CFR 122 (APDES)	Permit and plan approval required before domestic wastewater system can be constructed, installed, operated	
57.	Domestic Wastewater Discharge Permit and Plan Approval	ADEC	18 AAC 72.010, 200, and 215	Permit and plan approval required before domestic wastewater system can be constructed, installed, operated	
58.	Drinking Water Plan Approval	ADEC	18 AAC 80.200	Camps—human consumption	
59.	Food Service (camps)	ADEC	18 AAC 31.020	Permit for food service facilities serving 10 or more people per day	
60.	Solid Waste Management	ADEC	18 AAC 60	Handling of solid waste at camp locations and final disposition	
Miscellaneous					
61.	Spill Prevention Control and Countermeasure Plan (SPCC)	EPA	40 CFR 112 Oil Pollution Prevention	SPCC must be available for review. Discharge of oil from non-transportation-related onshore facilities onto or upon navigable waters of the U.S. Includes interstate and intrastate onshore pipeline systems including pumps and appurtenances as well as in-line or breakout storage tanks needed for continuous operation of a pipeline system.	
62.	Natural Gas Pipeline Safety	Pipeline and Hazardous Materials Safety Administration (PHMSA)	49 CFR 190-192	Transportation of Natural Gas by Pipeline Safety and Reporting Requirements	

7.0 PROJECT CONSTRUCTION

7.1 Construction Planning Considerations

In arctic and subarctic Alaska, climatic, hydrologic, topographic, biologic, and geographic factors influence construction methods, schedule, safety, impacts, and cost. Construction plans will consider these factors and identify options to address the uncertainties with regards to logistics, procurement, construction methods, and environmental conditions when operating in remote areas of Alaska.

Construction plans will identify options available for various pipeline segments and construction activities to account for unexpected conditions such as lack of snow or insufficient frost depth during winter construction, or excess water during summer construction.

7.1.1 Construction Execution

To address the technical aspects presented by varying terrain, seasonal extremes, and the overall magnitude of the project, the ASAP has been divided into four spreads along the mainline and one along the Fairbanks Lateral. Each of these spreads has been segmented into smaller sections according to terrain, climate, or complexity of construction. The Fairbanks Lateral alignment is concise and traverses relatively supine terrain and will be contained in a single construction spread. Segmentation of the ASAP route has been carefully planned with the explicit intent of ensuring construction within a given section can be completed in a single construction season. The length, geographical limits, and planned seasons of construction for each spread and section are listed in Table 2.2-1

Construction will be assigned to execution contractors on a spread basis. Each execution contractor will have full control of their respective spread and will be responsible for its progress, costs, construction methods, manpower, and construction equipment. The execution contractors must meet numerous contract performance standards and will be closely monitored throughout construction. These standards include, but are not limited to, the following:

- Progress milestones
- Compliance with design and specifications
- Quality inspection and documentation standards
- Environmental safeguards established by federal and state agencies and included in permit stipulations
- Health, safety, and environmental requirements
- Applicable labor and employment standards

In order to ensure compliance with the standards, all contractors will be pre-qualified to verify that they have an Operations Integrity Management System (or equivalent) in place. In addition a Quality Control Plan will be developed to identify construction related issues and verify that all work is performed in a manner to maintain the quality of the pipeline and related facilities, and to make sure all work is performed in accordance with relevant permit stipulations.

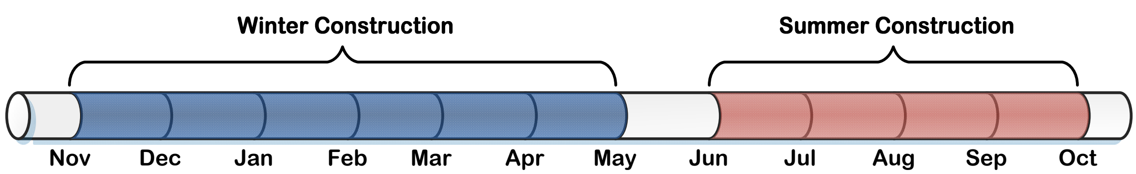
7.1.2 Construction Seasons

Several factors were considered when defining sections of the pipeline as winter or summer construction. In addition to anticipated regulatory requirements, the local terrain’s ability to support construction equipment during the summer months was considered. Winter construction offers the ability to reduce workpad thickness or to eliminate gravel workpads altogether. To contend with varying terrain, climate, and geologic conditions along the route, sections of the pipeline were planned for construction according to the season most conducive to construction of site-specific elements along the pipeline.

Major pipeline construction operations is planned to take place over a two-year period. Approximately three-quarters of the pipeline will be constructed over two winter construction seasons. However, access road construction, construction camp site development, bulk materials logistics, and other preconstruction activities will begin approximately six months in advance of pipeline construction and will continue through the shoulder seasons (spring and fall).

Figure 7.1-1 delineates approximate limits for summer and winter construction seasons. It should be noted that the specific start, finish, and duration of each season is subject to specific site conditions.

Figure 7.1-1 Construction Season Timeline



7.1.3 Construction Labor Requirements

The construction phase of the project will require contractors who are able to meet specific safety, quality, and technical standards, and schedule requirements.

Construction labor during Summer 0 will be dedicated to the development of the ROW, opening of material sites, gravel processing, camp development, and access road construction. The majority of pipeline construction and other infrastructure will occur during winter and summer.

Personnel remaining active during the fall will be limited to those associated with site restoration, hydrotesting, demobilization of equipment and infrastructure, and pipeline start-up activities.

Detailed estimates of pipeline construction labor requirements have yet to be conducted. Preliminary estimates for pipeline construction labor are based on current pipeline construction spreads and construction seasons and are presented in Figures 7.1-2 and 7.1-3. Pipeline construction labor will peak during the Summer 1 construction season at around 5,400 personnel.

An estimate of the labor necessary to construct gas facilities related to the project has not been conducted. Estimates of pipeline labor requirements are preliminary in nature and are expected to change as engineering and planning efforts progress.

Figure 7.1-2 Craft Labor by Season

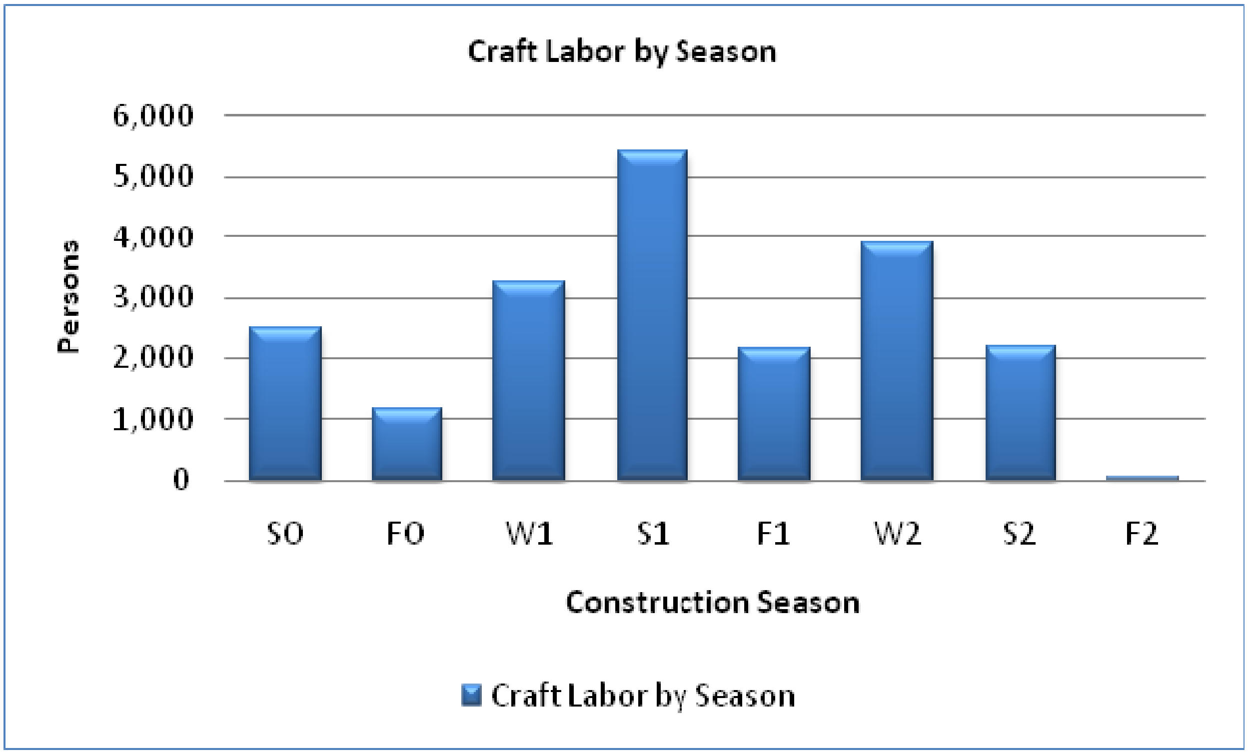
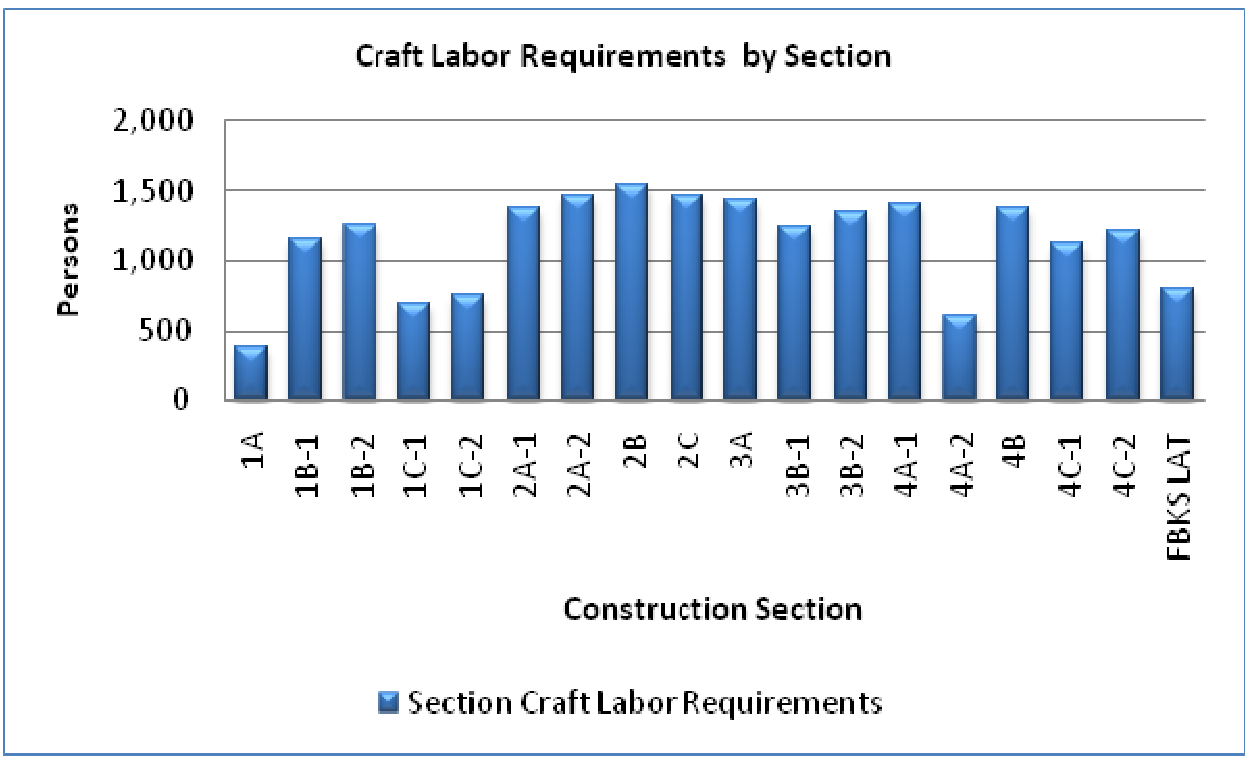


Figure 7.1-3 Craft Labor by Section



7.2 Construction Support Facilities

Significant support activities will be required to successfully construct ASAP given its expansive geographic limits, remoteness, and the challenging terrain over which it will be constructed.

Preliminary construction and logistics planning activities resulted in a conceptual layout of support facilities required to construct the pipeline. These support facilities include:

- Project offices and logistic support sites
- Transportation facilities and hubs, such as port facilities, rail facilities, and airports and airstrips
- Temporary land use areas such as camp locations, pipe laydown yards and storage facilities, remote airports and airstrips, and fuel storage sites

Construction support facilities and temporary land use areas are shown in Figure 7.2-1 and Table 7.2-1.

7.2.1 Project Offices

Project offices will support pre-construction, construction, ROW restoration, pipeline start-up, and the initial operations phase of the pipeline. Project offices include a centralized construction headquarters, logistics support sites, and construction support offices dedicated to individual construction spreads.

Project Headquarters

This plan assumes a project headquarters office will be located near a major airport (Fairbanks or Anchorage). This site serves as the central control center during all phases of project execution. The facility will be used by the owner, program/project management teams, and other project-related personnel, such as government and agency personnel. This site will be operational well in advance of construction startup.

7.2.2 Logistics Support Sites

The project requires two primary logistics support sites. These temporary facility sites will be located in Fairbanks and Seward and serve to:

- Manage the logistics of incoming pipe equipment and other materials
- Oversee the coating and double-jointing process (Fairbanks)
- Oversee the distribution of pipe from the coating/double-jointing facility to respective pipe storage yards (Fairbanks)

Seward Logistics Support Site

Seward is expected to be the port of entry for pipe and other materials, including the majority of large equipment. The Seward Logistics Support Site will be located on or near the AARC railroad's Seward Track Yard. The primary role of this site is to oversee the reception of pipe, valves, and other materials transported by sea as well as their subsequent distribution by rail to the pipe coating and double-jointing facility located in Fairbanks.

Fairbanks Logistics Support Site

The second major logistics support site will be the Fairbanks Logistics Support Site, located near the coating and double-jointing facility and ARRC rail line. This site will facilitate both logistics management personnel and owner quality assurance staff dedicated to ensuring the quality of pipe coatings and double-jointing procedures.

7.2.3 Personnel Housing and Support

Personnel housing and support services will be provided by mobile construction camps, stationary construction camps, and existing commercially available lodging. Fifteen construction camps are planned for the project. All the temporary construction camps planned for this project will be located on previously disturbed sites, most of which were developed during TAPS construction. The two proposed camps that will not be located on previously developed campsites are Chulitna Butte and Sunshine. However, both of these camps are planned for development on previously disturbed sites. Chulitna Butte is located on the existing ARRC Hurricane rail siding and the Sunshine is located at the site of the Talkeetna Bluegrass festival.

TABLE 7.2-1 TEMPORARY LAND USE OVERVIEW

Location	Milepost	Size of Laydown Yard (acres)	Camp Capacity (person) and Area (acres)	Fuel Storage Facilities	Equipment Storage	Other Facilities
Spread 1						
Prudhoe Bay	4	6	N/A	yes	yes	West Dock; Airport (SCC)
Franklin Bluffs	45	7	500 person (8.5 acres)	yes	yes	
Happy Valley	88	7	500 person (8.5 acres)	yes	yes	
Oksrukuyik	117	7	N/A	N/A	N/A	
Galbraith Lake	147	6	500 person (8.5 acres)	yes	yes	Airstrip (GBH)
Atigun	171	2	250 person (8.5 acres)	yes	yes	
Chandalar	180	4	500 person (8.5 acres)	yes	yes	Airstrip (5CD)
Spread 2						
MS 106-1	200	3	N/A	N/A	N/A	
MS 102-1	224	3	N/A	N/A	N/A	
Coldfoot	247	7	500 person (8.5 acres)	yes	yes	Airstrip (CXF)
Prospect	284	7	N/A	N/A	N/A	Airstrip (PPC)
Old Man	313	7	500 person (8.5 acres)	yes	yes	
Seven Mile	356	7	500 person (8.5 acres)	yes	yes	Airstrip (FVM) [Located two miles north of the camp]
Spread 3						
MS 74-2 HR	383	6	N/A	N/A	N/A	
Livengood	406	7	500 person (8.5 acres)	yes	yes	Airstrip (4AK)
Dunbar	459	7	N/A	N/A	N/A	[ARRC MP 431]
Nenana	476	8	500 person (10 acres)	yes	yes	[ARRC MP 412]; Airport (ENN)
Airstrip Z84	NA	N/A	N/A	N/A	N/A	

Location	Milepost	Size of Laydown Yard (acres)	Camp Capacity (person) and Area (acres)	Fuel Storage Facilities	Equipment Storage	Other Facilities
Spread 4						
Healy	531	8	500 person (10 acres)	yes	yes	[ARRC MP 359]; Airstrip (HRR)
Cantwell	570	8	500 person (10 acres)	yes	yes	[ARRC MP 320]; Airstrip (TTW)
Chulitna Butte	607	8	500 person (10 acres)	yes	yes	[ARRC MP 282]
Swan Lake	647	8	N/A	N/A	N/A	
Airstrip TKA	N/A	N/A	N/A	N/A	N/A	Airstrip (TKA)
Sunshine	678	7	500 person (10 acres)	yes	yes	[ARRC MP 215]
Willow	708	7	N/A	N/A	N/A	[ARRC MP 186]
ARRC MP 165	NA	N/A	N/A	N/A	N/A	[ARRC MP 165]
ARRC MP 160	NA	N/A	N/A	N/A	N/A	[ARRC MP 160]
South Terminus	737	1	N/A	N/A	N/A	
Seward Logistics Support Site	NA	15	N/A	N/A	N/A	[ARRC MP 0]; Port of Seward
Fairbanks Lateral						
ARRC MP 451	N/A	N/A	N/A	N/A	N/A	[ARRC MP451]
ARRC MP 459	N/A	N/A	N/A	N/A	N/A	[ARRC MP 459]
Fairbanks Logistics Support Site	N/A	15	N/A	N/A	N/A	[ARRC MP 470]; Airport (FAI)

Notes:
FAA codes for airports are provide in parentheses
ARRC siding locations are presented in brackets

Mobile Construction Camps

Mobile camps typically accommodate small ROW development crews over a short duration. These crews will primarily be involved in ROW preparation activities. Since these activities will occur prior to stationary camps becoming operational, mobile camps will be moved as ROW development progresses.

As pre-construction activities subside and stationary camps become operational, mobile camps will no longer be required. In most situations, these facilities will be absorbed into stationary camp complexes and remain until the construction camp is demobilized.

Stationary Construction Camps

Stationary camps will be established to accommodate pipeline and facility construction crews. Construction camps will house construction labor, management, agency, and support service personnel in numbers ranging from approximately 250 in the minor camps to 500 in the major camps. Camp site footprints will vary from 8.5 to 10 acres. Construction camp sites are subject to site-specific influences such as terrain and environmental conditions and subject to change. Reference Figure 7.2-1 and Table 7.2-1 for construction camp locations.

Existing Available Lodging

Lodging needs for construction of the Fairbanks Lateral and that portion of the mainline south of MP 708 will be satisfied by local lodging provided it meets health and safety requirements for personnel.

Health, Safety, and Emergency Response Facilities

Each camp will have a medical technician on-staff. Camp facilities will include a private examination room and a reception and service area. Equipment will include refrigeration facilities for storage of perishable medicines, sterilization equipment, and storage for medical supplies.

All sleeping quarters will contain fire alarms connected to a central alarm panel in the security offices. Mechanical rooms, kitchens, and furnaces will have automatic fire extinguishing systems. Fire protection stations will be located in central areas of each dormitory and contain both water hose racks and dry powder fire extinguishers. All-purpose, dry powder, and chemical extinguishers will be located in central locations throughout the camp.

Camps will be fenced with wire mesh and steel pole fences for security and animal control. Security guard houses will be located at each camp's major entrance. Site Security Plans will be developed, as required, to address the safety of personnel and security of equipment and materials.

If an emergency develops requiring response greater than that available at the camp, locally available emergency response will be used until regional emergency responders are on site. Table 7.2-2 provides the health, safety, and emergency response facilities located in communities near the project corridor.

TABLE 7.2-2 HEALTH, SAFETY, AND EMERGENCY RESPONSE FACILITIES NEAR RIGHT-OF-WAY

Community	Health Care	Police/State Troopers	Fire/Rescue Services
Prudhoe Bay	Oil company medical staff, Greater Prudhoe Bay Fire Department	North Slope Borough Police Department (NSB PD)	Greater Prudhoe Bay Fire Department. Emergency Medical Services (EMS) have limited highway, coastal, and airport access. Emergency service is provided by paid EMS Service.
Nuiqsut	Nuiqsut Clinic, Community Health Aid Program (CHAP)	NSB PD	Nuiqsut Volunteer Fire Department
Anaktuvuk Pass	Anaktuvuk Pass Clinic (CHAP).	NSB PD	Borough/Anaktuvuk Pass Volunteer Fire Department
Alatna	Alatna Clinic (Primary Health Care facility) (CHAP)	State Troopers in Bethel	No fire services. Use State VPSO in Allakaket.
Coldfoot	Fairbanks hospitals	State Troopers Post	No fire services. Volunteer Emergency Services have highway and air access.
Wiseman	Wiseman Health Clinic (CHAP), Fairbanks hospitals	State Troopers in Fairbanks	No fire services. Emergency services have limited highway, river, and air access. Within 30 minutes of a higher-level satellite health care facility.
Evansville	Evansville/Bettles Clinic (CHAP)	State Troopers in Fairbanks	Emergency Services have summer highway and helicopter access. Emergency service is provided by volunteers and a health aide.
Bettles	Frank Tobuk Sr. Health Clinic in Evansville, health aide and volunteers	State Troopers in Fairbanks	City/Bettles Volunteer Fire Department. Emergency Services include river and air access. Emergency service is provided by volunteers and a health aide.
Allakaket	Allakaket Health Clinic (Primary Health Care facility) (CHAP)	Village Public Safety Officer (VPSO)	VPSO. River and air access
Livengood	No health care facility	State Troopers in Fairbanks	Emergency Services have highway and air access.
Minto	Minto Clinic (CHAP)	VPSO/ State Troopers in Fairbanks	Emergency Services have highway and air access. Emergency service is provided by volunteers, health aide, volunteer Fire Department and Search and Rescue Truck.
Manley Hot Springs	Manley Hot Springs Clinic (CHAP), Manley Rescue Squad.	State Troopers in Fairbanks	Volunteer Fire Department. Emergency services are provided by Manley Rescue Squad, volunteers, and a health aide. Emergency Services have highway, river, and air access.
Fairbanks	Fairbanks Memorial Hospital, Interior Community Health Center, Fairbanks Regional PHN, Chief Andrew Isaac Health Center, and Bassett Army Community Hospital/Ft. Wainwright. Hospitals are qualified acute care facilities and provide state-certified Medevac services.	Fairbanks Police Department, State Troopers	City of Fairbanks Fire Department, Borough Fire Department/EMS Fairbanks Airport Fire Department, Chena-Goldstream Fire and Rescue, Fort Wainwright Fire/EMS, Steese Area Volunteer Fire Department, Fort Wainwright Fire/EMS, BLM Alaska Fire Service Guardian Flight, Inc, Warbelow's Air Ventures, Inc
Nenana	Nenana Clinic	State Troopers Post	Nenana Volunteer Fire/EMS Department. Emergency Services include highway, river, and airport access. Emergency service is provided by 911 Telephone Service, volunteers, and a health aide.
Tanana	Tanana Health Center (CHAP), Tanana Emergency Medical Services. The clinic is qualified Emergency Care Center. X-Ray and pharmacy available.	Tanana PD, VPSO, State Troopers in Fairbanks	Tanana Tribal EMS. Emergency Services have limited highway, river, and airport access. Emergency service is provided by 911 response, volunteers, and a health aide.

Community	Health Care	Police/State Troopers	Fire/Rescue Services
Anderson	Anderson Health Clinic, EMS and Ambulance	State Troopers in Fairbanks	Anderson Volunteer Fire Department, EMS, Ambulance, Clear Air Station Fire/Ambulance. Anderson is an isolated location and is part of the Interior EMS Region. Emergency Services have highway and air access and are within 30 minutes of a higher-level satellite health care facility. Emergency service is provided by 911 response and volunteers.
Healy	Tri-Valley Community Center (private owner). The clinic is a qualified Emergency Care Center.	State Troopers Post	Tri-Valley Volunteer Fire Department/EMS. Healy is an isolated town/Sub-Regional Center and part of the Interior EMS Region. Emergency Services have highway and air access. Emergency service is provided by 911 response and volunteers.
Cantwell	Cantwell Clinic (Primary Health Care facility)(CHAP)	State Troopers Post	Borough/Cantwell Volunteer Fire Department. Cantwell has highway air and helicopter access. Emergency service is provided by 911 response, volunteers, and a health aide.
Talkeetna	Sunshine Community Health Center (private owner). The clinic is a qualified Emergency Care Center. Mat-Su Regional Hospital (Acute Care Facility) is between Palmer and Wasilla on the Parks Highway.	State Troopers Post	Borough/Public Safety Station #111, Talkeetna Ambulance Service. Emergency Services have highway, air and helicopter access. Emergency service is provided by 911 response and volunteers.
Willow	Sunshine Community Health Center (private owner) in Talkeetna. The clinic is a qualified Emergency Care Center. Mat-Su Regional Hospital is between Palmer and Wasilla on the Parks Highway. Willow Ambulance Service	State Troopers in Talkeetna	Borough/Public Safety Station #121, Willow Fire building, Willow Fire Substation, Willow Ambulance Service. Emergency Services have highway and air access. Emergency service is provided by 911 response and volunteers.
Houston	Mat-Su Regional Medical Center in Palmer, Anchorage hospitals	State Troopers in Palmer. Houston PD	City/Houston Volunteer Fire Department. Emergency Services have highway and helicopter access and are within 30 minutes of a higher-level satellite health care facility. Emergency service is provided by 911 response and volunteers.
Big Lake	Mat-Su Regional Medical Center in Palmer, Anchorage hospitals	State Troopers Post	Borough/Big Lake Volunteer Fire Department. Emergency Services have highway and air access and are within 30 minutes of a higher-level satellite health care facility. Emergency service is provided by 911 response and volunteers.
Wasilla	Mat-Su Regional Medical Center in Palmer	Wasilla City PD	Borough/Central Mat-Su Fire Department, Wasilla Lake Fire/EMS
Palmer	Mat-Su Regional Medical Center in Palmer	Palmer City PD	Palmer Ambulance Service, Victory Volunteer Fire Department, Wolverine Volunteer Fire Department, Borough Ambulance
Anchorage	Alaska Regional Hospital, Providence Alaska Medical Center, Alaska Native Medical Center, Elmendorf AFB 3rd Medical Group, U.S. Army Medical Clinic/Fort Richardson	Anchorage PD, State Troopers Post	Municipality/Anchorage Fire Department, Elmendorf AFB Fire Department, Ted Stevens Anchorage International Airport Police and Fire, Fort Richardson Fire/EMS

State of Alaska Community Database, 2009. Department of Commerce, Community and Economic Development (certified/not certified). http://www.commerce.state.ak.us/dca/commdb/CF_BLOCK.htm. Accessed 11/23/2010

7.2.4 Port Facilities

Pipe, materials, and large construction equipment will be shipped to Alaska via marine transport. Alaska has five Southcentral ports that are suitable to receive materials and equipment: Anchorage, Seward, Valdez, Whittier, Port MacKenzie. The Port of Seward was selected as the planned port of entry for pipe and equipment due to available storage and connection to the ARRC railroad. Pipe will be shipped using Small Handy Class cargo ships which are capable of carrying up to 10,000 tons per shipment. Approximately 35 shipments are expected to be required to complete pipe delivery.

Materials and equipment needed for construction of the GCF will be shipped via marine transport to West Dock at Prudhoe Bay. The existing West Dock facilities are sufficient to receive materials without additional construction or dredging activities beyond the currently permitted maintenance. Approximately nine shipments are expected to be required to complete material delivery at West Dock.

7.2.5 Rail Facilities

The ARRC railroad provides rail service between Seward, Whittier, Anchorage, and Fairbanks and is the only rail service in Alaska. The ARRC will be the primary transport of pipeline materials between the Port of Seward and Fairbanks. Pipe offloaded from marine transport at Seward will be placed on rail cars and shipped to Fairbanks for double jointing and coating. Once pipe has been double-jointed and coated, it will be distributed to laydown yards by rail or truck depending upon the final destination.

7.2.6 Roads

Public roads will be used to transport equipment, materials, and personnel to the greatest extent possible where marine and rail transport are not available. The Dalton Highway will be used to transport materials and equipment north of Fairbanks and the Parks Highway will be used to transport materials and equipment between Fairbanks and the South Terminus. Other public access roads will be used to the greatest extent practicable to reduce the construction of temporary access roads.

Access Roads

Roads are necessary for equipment, materials, and personnel to access the pipeline ROW, compressor stations, block valves, camps, laydown yards, material sites, and water sources from existing roads. Access roads consist of both newly constructed gravel roads, improved existing roads, ice roads, and snow roads. Where necessary, snow roads will be armored with ice to reduce the chances for damage to surface vegetation.

Vehicles using the access roads during construction include semi-trailer trucks with lowboy flatbed trailers carrying tracked equipment, pipe trucks, dump trucks, crew buses, and heavy-duty passenger vehicles, such as pickups or sport-utility vehicles.

Typical standard drawings for gravel access roads and culverts can be found in Attachment 1, DB-ACC-01 and DB-ACC-02. A table of existing and new access roads, including ice roads, to be used during construction can be found in Attachment 5.

7.2.7 Construction Workpads

Construction workpads refer to the zone along the alignment from which work is performed, as shown in Attachment 1. Workpads will be installed to support equipment required for pipeline construction. Three main types of workpads are required, including ice/snow workpads, gravel workpads, and graded workpads. Culverts and temporary bridges will be installed, as required, to permit cross drainage during summer months. No temporary bridges are anticipated to be required over USACE or U.S. Coast Guard (USCG) navigable waters. The ROW will be maintained during construction to allow safe passage of construction equipment and to prevent degradation of the ROW and adjacent areas. Additional culverts, riprap embankments, or drainage ditches will be installed during construction as required.

7.2.8 Pipe Laydown Yards and Storage Facilities

Laydown yards (as shown above in Figure 7.2-1 and Table 7.2-1) will store pipe and materials after delivery and before construction. Site dimensions depend on the site location and the type and quantity of materials to be stored. Laydown yards will be developed beginning the summer prior to pipeline construction. In general, laydown yards are collocated with construction camps, equipment storage, and fuel storage.

7.2.9 Airports and Airstrips

Major airport hubs to support project construction include Anchorage and Fairbanks. Existing asphalt and gravel airstrips owned by the Alaska Department of Transportation and Public Facilities (ADOT&PF) located along the pipeline route will provide support during mobilization and demobilization of personnel, emergency evacuations, and delivery of essential equipment to various job sites. Airports approved during the selection/planning process are of adequate size but may require upgrades to improve runways, runway lighting, communications, and navigational aids. Table 7.2-3 provides detailed information regarding airports and airstrips located in project areas.

TABLE 7.2-3 PROJECT AIRPORTS AND AIRSTRIPS

Airports/ Airstrips	FAA Code	Owner	Runway Identification	Length (Feet)	Width (Feet)	Surface Type/ Condition	Project Use
Anchorage	ANN	ADOT/PF	14/32	11,584	150	Asphalt/Good	Hub
Deadhorse	SCC	ADOT/PF	40,321	6,500	150	Asphalt/Good	Hub
Fairbanks	FAI	ADOT/PF	02L/20R	11,800	150	Asphalt/Good	Hub
Galbraith Lake	GBH	ADOT/PF	13/31	5,182	150	Gravel/Good	Primary
Healy River Strip	HRR	ADOT/PF	15/33	2,912	60	Asphalt/Good	Primary
Prospect Creek	PPC	ADOT/PF	40,197	4,968	150	Gravel/Good	Primary
Talkeetna	TKA	ADOT/PF	18/36	3,500	75	Asphalt/Good	Primary
Cantwell	TTW	Private	40,290	2,080	30	Gravel/Fair	Alternate
Clear	Z84	ADOT/PF	40,197	4,000	100	Asphalt/Good	Alternate
Chandalar Shelf	5CD	ADOT/PF	40,197	2,529	70	Gravel/Good	Alternate
Coldfoot	CXF	ADOT/PF	40,197	4,000	100	Gravel/Good	Alternate
Five Mile	FVM	BLM	40,511	2,700	75	Gravel/Good	Alternate
Livengood Camp	4AK	ADOT/PF	15/33	1,415	50	Gravel/Good	Alternate
Nenana Municipal	ENN	Nenana, AK	04L/22R	4,600	100	Asphalt/Good	Alternate

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7.2.10 Fuel Storage Sites

Each camp will have temporary storage facilities for oil, gasoline, diesel fuel, and lubricant to support camp and construction activities. Appropriate measures for handling, storage, and transportation protective of human health and the environment will be maintained at all times. Spill prevention and response is addressed in Section 7.11.

7.3 Pipeline Facilities Construction

This section identifies the pipeline facilities currently planned for construction. This information was developed as a result of preliminary planning and engineering analysis and will continue to evolve and change as the project progresses. The projected construction timelines are listed in Table 7.3-1.

TABLE 7.3-1 CONSTRUCTION TIMELINE FOR MAJOR FACILITIES

Activity	Start Date	Completion Date	Calendar Days
FACILITIES	7/1/2013	7/4/2016	1,099
Modular Sea-Lift	7/2/2015	9/30/2016	99
GAS CONDITIONING PLANT	7/1/2013	7/4/2016	1,099
Fabricate Modules	7/1/2013	6/30/2015	729
Pre-Construction Preparation	4/1/2014	3/31/2015	364
Install & Testing	10/1/2015	7/4/2016	277
STRADDLE and OFF-TAKE FACILITY	7/1/2013	6/30/2016	1,095
Fabricate Skids	7/1/2013	4/1/2015	639
Pre-Construction Preparation	4/1/2014	3/31/2015	364
Construction and Testing	4/1/2015	6/30/2016	456
COMPRESSOR STATIONS	7/1/2016	6/30/2016	1,095
Fabricate Skids	7/1/2013	4/1/2015	639
Pre-Construction Preparation	4/1/2014	3/31/2015	364
Construction and Testing	4/1/2015	6/30/2016	456
COOK INLET NGL EXTRACTION FACILITY	7/1/2013	6/30/2016	1,095
Fabricate Skids	7/1/2013	4/1/2015	639
Pre-Construction Preparation	4/1/2014	3/31/2015	364
Construction and Testing	4/1/2015	6/30/2016	456

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Many facilities will be collocated to maximize efficiency and minimize negative effects on the environment. Table 7.3-2 identifies facilities that will be collocated.

TABLE 7.3-2 COLLOCATION OF ABOVE GROUND FACILITIES

Main Facility	Gas Compressor	Gas Refrigeration	NGL Extraction	Metering	Pig Launcher	Pig Receiver	Mainline Valve	Other
Gas Conditioning Facility	●	●		●	●		●	
CS-4	●	●			●	●	●	
CS-5	●	●			●	●	●	
Straddle/Off-Take Facility	●		●	●	●	●	●	Straddle/Off-Take Facility will be collocated with CS-8, if CS-8 is used
CS-8	●			●	●	●	●	
Cook Inlet NGL Extraction Facility	●		●	●		●	●	

7.3.1 Gas Conditioning Facility

The GCF will be located on the North Slope at Prudhoe Bay, south of the existing Central Gas Facility (Figure 7.3-1) and at MP 0 of ASAP. The GCF will be located in the Umiat Meridian, Township 11 N; Range 14 East; Sections 11 and 14 (U011N014E11 and U011N014E11). The centerpoint of the gravel pad will be located at 70.31293 latitude, -148.514503 longitude in the WGS84 coordinate system.

The GCF will receive gas from the Central Gas Facility, which receives gas from the Prudhoe Bay fields through gathering lines. Upon receipt of gas, the GCF will remove CO_2, H_2S, and other impurities. NGLs (propane, butane, and pentanes) will be injected to enrich the gas, then compressed and cooled to maintain the existing thermal regime in permafrost soils, and injected into the proposed ASAP.

Module sections of the GCF will be transported to the facility site via barge to West Dock, then transported on existing roads and assembled on site. A barge lift of nine barges is expected to be required. No modification to the existing West Dock infrastructure will be required. Additional details regarding the size and assembly/construction of the GCF will be developed as the project progresses.

The GCF will be located on a 70-acre gravel pad. The planned layout of the GCF is included in typical drawings located in Attachment 1. Access to the GCF will be via a permanent gravel road accessible from existing Prudhoe Bay roads.

Site support facilities include those necessary to house equipment, utilities, workspace, and personnel during work hours. A main generator and backup system will be located at the GCF. Off-site housing will be provided for GCF workers, likely at a commercial camp located within Deadhorse. Major waste streams anticipated from compressor stations include emissions from major equipment, wastes generated from O&M (lubricants, cleaners, fuels, etc.), and wastewater and municipal waste from personnel working at the facility. Waste disposal has not yet been determined, but will be performed in accordance with appropriate regulations and permits.

GCF Processes

The gas from the production fields on the North Slope of Alaska contains CO_2 and H_2S at levels above the gas quality specifications for utility-grade gas. To remove these contaminants from the gas, a reversible chemical-reaction removal process will be used. The chemical amine is brought into contact with the raw gas in a special contacting tower. By mixing the raw gas and amine, the CO_2 and H_2S are absorbed into the amine such that the resulting gas in the mixing tower is within the specification requirements for utility-grade gas. The amine, rich with CO_2 and H_2S, goes through a heating process in which the CO_2 and H_2S will be vaporized. This vapor of CO_2 and H_2S (acid gas) is compressed and returned, through a pipe between the pipeline facilities, to the producers for re-injection into the reservoirs to sequester the acid gas. The amine, once the acid gas has been removed, will be returned to absorb more acid gas in the mixing tower.

The produced gas contains levels of water vapor that would freeze if left in the gas going through the pipeline. After the amine process, the gas will go through a glycol dehydration process to remove water from the produced gas. Glycol, a liquid desiccant that will absorb water from gas, is brought into contact with the produced gas in a special mixing tower. Upon leaving the mixing tower, the rich glycol (containing the absorbed water) will be regenerated by applying heat. In this process, the water is vaporized and the glycol, now lean (not containing water) will be returned to absorb more water from the gas. The water vapor is vented to the atmosphere.

NGLs are introduced into the dry produced gas. The gas enriched with NGLs will be cooled and compressed to pipeline operating pressures prior to entering the pipeline at MP 0. A preliminary list of major equipment anticipated to be used at the GCF is provided in Table 7.3-3.

TABLE 7.3-3 GAS CONDITIONING FACILITY EQUIPMENT

Equipment Type	Quantity	Size/Power	Function
Waste Gas Pre-Compressors	2	129 hp	First step in the compression of waste gas (primarily CO_2 & H_2S)
Waste Gas Compressors	2	698 hp each	High pressure compression of the waste gas to pressures adequate for reinjection in the reservoirs for sequestration.
Primary Electrical Generator	1	18,781 KW	Primary source of electrical power generation
Backup Electrical Generator	1		Back-up source of electrical power generation.
Conditioned Gas Compressors	3	12,259 hp each2	Compression of conditioned gas to pipeline operating pressures
Refrigerant Compressors (for conditioned gas)	1	3,901 hp	Cooling of conditioned gas prior to injection into the pipeline.
Refrigerant Compressors (for DeEthanizer feed)	1	12,848 hp	Cooling of rich gas feed to DeEthanizer
Booster Compressors	1	2,465 hp	Boost rich gas to DeEthanizer operating pressure
DeEthanizer Reboiler	1	48.67 mmBTU/hr	Provide heat to remove methane and ethane from NGL stream.
Amine Regenerator Reboiler	2	95.7 mmBTU/hr each	Provide heat to remove the waste gas from the amine
Glycol Regenerator	2	8.6 mmBTU/hr each	Provide heat to remove water from the glycol
Mole Sieve Regenerators	2	6.8 mmBTU/hr each	Provide heat to remove water from the mole sieve absorbent

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7.3.2 Compressor Stations

Compressor stations will be required to compress the natural gas to maintain pressure in the pipeline. The MAOP in the mainline is 2,500 psi and the MAOP in the Fairbanks Lateral is 1,400 psi. The number of compressor stations required is currently being evaluated as the pipeline design is optimized. Based upon current design, a maximum of two compressor stations will be required. It is possible that a single compressor station will provide sufficient compressive ability for the gas throughput.

A total of 11 compressor station locations were identified early within the design process. Locations CS-4 and CS-8 are under evaluation for the two-compressor design option and location CS-5 is under evaluation for the one-compressor design option. Location CS-4 is near Wiseman just south of MP 225 (Fairbanks Meridian F031N010W19; 67.496419 latitude and -149.862978 longitude). CS-5 is located near TAPS Pump Station 5 near MP 285.5 (F023N014W030; 66.792341 latitude and -150.667517 longitude).

Location CS-8 is near Dunbar near MP 466.5 (F002S006W08; 64.75614 latitude and -148.794887 longitude). Compressor station locations may change slightly if necessary during design optimization. However, CS-4 will be located between MP 220 and MP 226.2; CS-5 will be located between MP 280 and MP 287, and CS-8 will be located between MP 461 and MP 466.5. The compressor stations locations are shown on Figure 2.0-2.

Each compressor station will be designed and constructed according to site-specific requirements. Compressor stations located north of Minto Flats (i.e., CS-4 and CS-5) will include refrigeration systems to cool the gas in order to maintain the thermal regime in permafrost soils. CS-8 will be collocated with the Straddle/Off-Take facility.

Each compressor station site will be constructed on a gravel pad designed according to site-specific requirements. Site components will be modularized to minimize construction, logistics, and commissioning activities. The dimensions require approximately 1.5 acres of land as shown in the typical compressor station layout (as noted in typical drawings in Attachment 1). However, a 20-acre area is expected to be requested as part of the ROW to allow for changes or variations from the typical layout. Design and optimization of facilities, including compressor stations is currently ongoing. This may affect required components, layout, and area needed.

A preliminary list of major equipment anticipated to be used at compressor stations is provided in Table 7.3-4.

TABLE 7.3-4 TYPICAL COMPRESSOR STATION EQUIPMENT

Equipment Type	Quantity	Size/Power	Function
Gas Compressors	1	11,714 hp	Compression of conditioned gas to pipeline operating pressures
Primary Electrical Generator	1	663 KW	electrical power generation
Refrigerant Compressor	1	3,977 hp	Cooling of conditioned gas

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A permanent gravel road will be constructed to each compressor station from existing roads to allow easy access. The route of the access road(s) will be determined after the design is optimized and location(s) finalized.

Site support facilities include those necessary to house equipment, utilities, workspace, and personnel. Each compressor station will include a main generator and backup power system. Major waste streams anticipated from compressor stations include emissions from major equipment, wastes generated from O&M (lubricants, cleaners, fuels, etc.), and wastewater and municipal solid waste from personnel working at the facility. Waste disposal has not yet been determined, but will be performed in accordance with appropriate regulations and permits.

Personnel requirements have not yet been determined. If compressor stations are manned, housing will be provided. If compressor stations are not manned on an ongoing basis, facilities appropriate for periodic or emergency residency by maintenance and operations personnel will be provided. Because of this, full camp facilities will be included in the site plans. Camp facilities will include sleeping quarters, kitchen, showering/toilet facilities, and recreational/relaxation areas.

7.3.3 Straddle and Off-Take Facility

A Straddle and Off-Take Facility will be located at the Fairbanks Lateral Tie-In between MP 461.0 and MP 466.5 near Dunbar. This facility will be collocated with CS-8 if this compressor station is constructed. A gas metering station will also be collocated with the Straddle and Off-Take Facility.

The Straddle and Off-Take Facility will remove NGLs from the gas, allow utility-grade gas to enter the Fairbanks Lateral, and re-inject the NGLs into the mainline, thus “straddling” the Fairbanks Lateral. This facility would include the separation and processing equipment to supply 60 MMscfd of utility-grade gas to Fairbanks by taking a side-stream of conditioned residue gas from the pipeline for processing. A map of the planned Straddle and Off-Take Facility location is shown in Figure 7.3-2.

The facility will require less than five acres of land secured by a perimeter fence. The Straddle and Off-Take Facility will be located in the Fairbanks Meridian, F002S006W08. The gravel pad will be located at approximately 64.75614 latitude, -148.794887 longitude. A permanent gravel road will be constructed to the Straddle and Off-Take Facility from existing roads to allow easy access. The route will be determined after the design is optimized and location finalized.

Site support facilities include those necessary to house equipment, utilities, workspace, and personnel. A main generator and backup system will be located at the Straddle and Off-Take Facility. Major waste streams anticipated from the Straddle and Off-Take Facility include emissions from major equipment, wastes generated from O&M (lubricants, cleaners, fuels, etc.), and wastewater and municipal solid waste from personnel working at the facility. Waste disposal has not yet been determined, but will be performed in accordance with appropriate regulations and permits.
Ongoing personnel requirements have not yet been determined. If the Straddle and Off-Take Facility is manned, housing will be provided. If compressor stations are not manned on an ongoing basis, facilities appropriate for periodic or emergency residency by maintenance and operations personnel will be provided. Because of this, full camp facilities will be included in the site plans. Camp facilities will include sleeping quarters, kitchen, showering/toilet facilities, and recreational/relaxation areas.

Straddle and Off-Take Facility Processes

The basic process of the Straddle and Off-Take Facility is extraction of NGLs from the gas stream in the Fairbanks Lateral, and reinjection of the NGLs into the main line. This NGL rich gas would be cooled to temperatures where some of the heaver hydrocarbons (NGLs) start forming a liquid phase. The gas/liquid hydrocarbon would be distilled, allowing utility-quality natural gas to be removed from the top of the column. Liquid NGLs would be removed from the bottom of the column and re-injected into the mainline. In the event of emergency upsets, gases would be removed via a gas flare.

A layout of the Straddle and Off-Take Facility is provided in the typical design drawings located in Attachment 1. A preliminary list of major equipment anticipated to be used at the Straddle and Off-Take Facility GCF is provided in Table 7.3-5.

TABLE 7.3-5 STRADDLE AND OFF-TAKE FACILITY EQUIPMENT

Equipment Type	Quantity	Size/Power	Function
Gas Compressors	2	4,266 hp each	Compression of gas feeding the Fairbanks lateral to pipeline operating pressures
Primary Electrical Generator	1	1,517 KW	electrical power generation
Refrigerant Compressor	1	6,308 hp	Cooling of conditioned gas
DeEthanizer Reboiler	1	10.1 mmBTU/hr	Provide heat to remove methane and ethane from NGL stream
Mole Sieve Regenerator	1	0.8 mmBTU/hr	Provide heat to remove water from the mole sieve absorbent

Michael Baker Jr., Inc, February 2011

7.3.4 Fairbanks Lateral Terminus

The Fairbanks Lateral will terminate at MP 37 of the Fairbanks Lateral. At this time, specific valve, venting, and blinding systems as well (as required equipment) has not been determined. Additional information will be provided as design and optimization progresses.

7.3.5 Cook Inlet NGL Extraction Facility and Pipeline Terminus

An NGL Extraction Facility will be located at the south terminus of the pipeline (ASAP MP 737) near Cook Inlet (Figure 7.3-3). This is near MP 39 of the existing ENSTAR Beluga Pipeline. The Cook Inlet NGL Extraction Facility will be located in the Seward Meridian, S016N005W36. The centerpoint of the gravel pad will be located at 61.427777 latitude, -150.083571 longitude in the WGS84 coordinate system. The Cook Inlet NGL Extraction Facility will separate NGLs from the gas stream and inject utility-grade natural gas into the existing ENSTAR pipeline for distribution. A gas metering station will be located at this site. NGL fractionation is not part of this project.

A layout of the Cook Inlet NGL Extraction Facility is provided in the typical drawings included in Attachment 1. A preliminary list of major equipment anticipated to be used at the Cook Inlet NGL Extraction Facility is provided in Table 7.3-6.

TABLE 7.3-6 COOK INLET NGL EXTRACTION FACILITY EQUIPMENT

Equipment Type	Quantity	Size/Power	Function
Gas Compressors	2	11,729 hp each	Compression of gas prior to injection on the Beluga Pipeline to pipeline operating pressures
Main Facility Generator	1	1,223 KW	Electrical power generation
Refrigerant Compressor	1	13,810 hp	Cooling of gas prior to entering DeEthanizer absorber towers
DeEthanizer Reboiler	1	49.11 mmBTU/hr	Provide heat to remove NGLs from the main gas stream prior to injection of natural gas into Beluga Pipeline
Mole Sieve Regenerator	2	27.3 mmBTU/hr each	Provide heat to remove water from the mole sieve absorbent

Michael Baker Jr., Inc, February 2011

Equipment and construction materials for the Cook Inlet NGL Extraction Facility will be transported to the site using marine transport to a Southcentral Alaska port, then via existing rail and public roads. A permanent gravel road will be constructed to the Cook Inlet NGL Extraction Facility from existing roads to allow easy access. The route of the access road will be determined after the design is optimized and location finalized.

Site support facilities include those necessary to house equipment, utilities, necessary workspace, and personnel. A main generator and backup system will be located at the Cook Inlet NGL Extraction Facility. Major waste streams anticipated from compressor stations include emissions from major equipment, wastes generated from O&M (lubricants, cleaners, fuels, etc.), and wastewater and municipal solid waste from personnel working at the facility. Waste disposal has not yet been determined, but will be performed in accordance with appropriate regulations and permits.

It is expected that personnel at the Cook Inlet NGL Extraction Facility will be responsible for providing their own housing in Wasilla or another nearby communities and would commute to work on a daily basis. Facilities appropriate for long-shift day workers will be provided. These may include kitchen, showering/toilet facilities, sleeping quarters, and recreational/relaxation areas.

7.4 Pre-construction Activities

Pre-construction activities will begin in Summer 0, the summer prior to the first season of pipeline construction (Winter 1). Pre-construction activities will include transportation of equipment and materials to laydown and storage yards, ROW survey and clearing, erosion control activities, material mine site development, gravel processing, and development of water sources.

7.4.1 Transportation of Equipment and Materials

Transport and delivery of construction equipment and materials to support pipeline execution throughout the project corridor will be organized to coordinate with construction spread locations and seasonal construction activities. The main modes of transportation for equipment and materials include:

- Ship and barge transport
- Rail transport
- Truck transport
- Air transport to designated project airstrips

In general, materials and equipment will be transported via ship or barge to an Alaskan port, and then transferred to rail as discussed in Section 7.2.4 and 7.2.5. Public roads and access roads will be used where marine and rail service is not available.

7.4.2 Right-of-Way

Before construction starts (Summer 0), pre-construction efforts will be conducted to prepare for the buildup of equipment, material, and construction personnel and to develop ROW infrastructure such as material sites and access roads.

Survey and Staking

During the pre-construction period, surveys will be completed to locate the alignment, ROW, and temporary construction easement and to complete real estate acquisition. The ROW will be surveyed and staked, clearing limits defined and temporary perimeter controls installed, and existing utility lines will be located and marked. Additional survey support for ROW development includes activities related to workpad, camp sites, laydown yards, and access road construction. Any sensitive areas that should be avoided (e.g., cultural sites) would be demarcated as part of surveying and staking.

Clearing

Clearing crews will remove all brush, timber, and stumps from the construction ROW. Machine clearing will be used in all areas except sensitive slopes. If there is a risk of spreading spruce bark beetles in the area, timber will be either mulched or burned to prevent it from being appropriate habitat for beetle larvae.

To reduce the amount of waste for disposal generated from downed brush and timber (other than marketable timber), the following clearing alternatives and disposal methods may be used. The preferred disposal methods of brush, timber, and stumps are the first two identified.

- Hydroaxing, chipping, or mulching brush and leaving on the ROW
- Stockpiling brush in designated areas to provide firewood for local communities
- Stockpiling brush on the ROW and burning it
- Hauling brush to designated disposal sites

Grading

Grading includes excavation of waste or embankment and may include the stripping of topsoil. In situations where topsoil removal is required, it will be segregated and saved when practical to enhance surface rehabilitation and aid in future revegetation of the area. Table 7.4-1 lists the location and extent of areas where AGDC proposes to implement specialized cut-and-fill (two-tone) grading techniques.

TABLE 7.4-1 APPROXIMATE LOCATIONS OF CUT-AND-FILL GRADING

From Milepost	To Milepost	Length (Miles)	Approximate Location
142	183	41	Atigun Pass Area
183	205	22	Dietrich River/Chandalar Shelf
252	255	3	Cathedral Mountain
263	265	2	N/A
426	429	3	Minto Flat Area
540	541	1	Denali National Park and Preserve
554	556	2	Panorama Peak
564.5	567.5	3	Reindeer Hills–Cantwell Area
	Total	**77**	

Notes: There are short sections within segments that will not require modeling.

Excavation

Excavation is classed as stripping, ditching or trenching of rock or borrow. Stripping excavation consists of the excavation, removal, and disposal of all surface organic material, silt, and unsuitable overburden necessary to expose suitable foundation conditions at the compressor station sites, access roads, and borrow areas.

7.4.3 Temporary Erosion Control

Prevention of erosion to the greatest extent possible is critical to maintain an on-schedule construction program and to reduce impacts to the environment. An Erosion Control Plan will be developed before the start of construction and will specifically define erosion control procedures for each area along the ROW. Also, a Storm Water Pollution Prevention Plan (SWPPP) will be developed as required by the NPDES permit. The SWPPP will address erosion control measures, best management practices, and mitigation measures to control erosion and storm water runoff. Continued ground surveillance and corrective erosion control and vegetation maintenance will be employed throughout the construction phase of the project. Normal drainage patterns will be maintained where practical.

7.4.4 Material Sites

Sand and gravel is required to support construction activities. As with any large pipeline project, there will be a need for substantial amounts of sand and gravel for pipeline bedding and padding, work pad construction, major facility construction (i.e., GCF, compressor stations, Straddle and Off-Take Facility, and NGL Extraction Facility), new temporary and permanent gravel access road construction, and for the expansion and upgrade existing camp and laydown yards. Material will also be needed for meter stations, MLVs; to provide pipeline stability at fault crossings; and as well as other needs. Table 7.4-2 provides a preliminary estimate of the amount of material needed for construction.

TABLE 7.4-2 CUBIC YARDS MATERIAL REQUIRED FOR PROJECT CONSTRUCTION

Bed/Pad/Backfill	Work Pad/Side Fill	Compressor Stations	Access Roads Subbase/Surface	Camps & Yards
3,702,000	6,185,000	1,775,000	377,000	1,061,000
			Total	13,100,000

Michael Baker Jr., Inc. January 2011

Sand and gravel material sites located along the ASAP corridor will provide needed borrow material. Geotechnical data regarding material availability is in development; however a total of 546 existing material sites along the main alignment have been identified using existing ADOT&PF material site information sources. Based upon this preliminary data, it is expected that sufficient material is available along most of the alignment to provide material sufficient for the ASAP project. However, a few areas such as Minto Flats and south of Willow have no developed material sites.

Table 7.4-3 displays material availability along major sections of the route. Additional information on existing material sites, including location, size, and quantity of available material is included in Attachment 6. Additional details will be developed as the project progresses and will be provided to agencies when available.

TABLE 7.4-3 MATERIAL AVAILABILITY AND NEED BY CONSTRUCTION SPREAD

Spread	Location	Length (Miles)	Material Needs (CY)	Available Material (CY)	Number of Material Sites
1	GCF to Chandalar Shelf	183	2,501,000	31,400,000	49
2	Chandalar Shelf to Yukon River	177	5,375,000	42,350,000	76
3	Yukon River to Healy	177	3,410,000	39,923,000	164
4	Healy to South Terminus	208	1,793,000	80,450,000	257
	Mainline Total:	**737**	**13,079,000**	**194,123,000**	**546**
Fairbanks Lateral	MP 459 of mainline to Fairbanks	35	unknown	unknown	unknown
	Project Total:	772	13,079,000	194,123,000	546

Note: material site requirements and availability for the Fairbanks Lateral route have not been studied at this time.
Michael Baker Jr., Inc. January 2011

Sufficient material is expected to be available along most of the alignment to limit hauling distances to under ten miles. Additional stretches of alignment may require increased haul distances from neighboring sites. Table 7.4-4 shows the maximum haul distance for the mainline.

TABLE 7.4-4 MAXIMUM HAUL FOR MATERIAL

ASAP Milepost		Maximum Haul Distance (miles)
Northern	Southern	
0.0	171.1	5
171.1	180.0	7
207.3	223.9	10
270.0	281.0	6
341.9	348.0	6
389.8	399.2	5
405.8	466.9	52
534.0	548.2	8
571.5	586.7	8
607.3	612.6	5
707.6	737.1	20

Michael Baker Jr., Inc. January 2011

Prior to site development, during detailed construction and permitting efforts, Material Site Mining Plans and Reclamation Plans will be developed specific to each material site and submitted for agency approval. These plans will include such as habitat types, access locations, temporary stockpile areas, excavation limits and depths, archaeological and environmental information, and site restoration planning. Reclamation Plans specific to each material site will detail the actions necessary to return the site to a stable condition will be developed and submitted for agency approval. At this time, material sites are not under consideration for waste disposal sites.

7.4.5 Land Temporarily Needed for Construction Activities

The construction ROW for the pipeline and facilities is 100 feet wide. However, lands in addition to the construction 100-foot ROW may be required temporarily for a number of construction-related activities. The activities requiring additional temporary use of lands outside the 100-foot ROW include:

- Major road crossings
- Minor road, trail, and driveway crossings
- Railroad crossings
- Foreign pipeline crossings
- Stream crossings
- Wetland crossings
- Vehicle turnarounds
- Block valve installation sites
- Side hill cut areas
- Pig launcher and receiver sites (not located at major facilities)
- Access roads

7.4.6 Water Source Development

Water is required to support construction activities; hydrostatic testing prior to pipeline operations, and pipeline O&M. Winter construction will require water and ice chips for ice workpads located within the

100-foot construction ROW, ice access road construction, ice armoring of snow roads, cleanup of equipment at camps and material sites, and construction camp usage. Summer construction will require water for earthwork (e.g., dust control and compaction, screening operations at material sites), and construction camp usage. Upon completion of construction activities, water will be needed for hydrostatic testing, to confirm that the pipeline meets design criteria and is leak-free. Additional water will be required for O&M. Alternative construction techniques will be evaluated if sufficient water is not available for man camps, ice roads and snow pads.

The calculations in Table 7.4-5, Water Requirements, are intended to provide a preliminary estimate of water needed during construction and hydrotesting phases of the project.

TABLE 7.4-5 WATER REQUIREMENTS

Water Requirements (million gallons)					
Spread	**Ice Workpads**	**Ice Access Roads**	**Hydrotesting**	**Earthwork**	**Total**
Spread 1	394.94	0.10	15.50	24.50	435.04
Spread 2	0.00	0.00	20.18	187.65	207.83
Spread 3	155.51	0.00	19.27	100.94	275.72
Spread 4	69.39	0.00	23.71	73.45	166.55
Fairbanks Lateral	0.00	0.00	0.88	2.00	2.89
				Total	**1,088.02**

Michael Baker Jr., Inc. June 2010

Available water resources are being evaluated. Alternative construction techniques will be evaluated if sufficient water is not available. Lake studies were conducted during the summer of 2010 to identify water availability between Prudhoe Bay and Galbraith Lake. A desktop study will be completed the winter of 2011 and additional lake studies are scheduled for the summer of 2011.

7.5 Pipeline Preparation

7.5.1 Double-Jointing

Raw, uncoated 40-foot pipe will be delivered to the Seward Logistic Support Site at the Port of Seward by marine vessel. From there, the pipe will be loaded onto rail cars and moved to the Fairbanks Logistics Support Site for double-jointing and coating.

Once the pipe has been coated and double-jointed, it will be delivered by truck or rail, depending on destination, to the appropriate laydown yard. Once delivered to laydown yards, pipe will remain stockpiled until stringing operations begin.

7.5.2 Stringing

Double-jointed, pre-coated pipe will be hauled from pipe storage yards by pipe stringing specialty subcontractors and distributed along the ROW. Ditching operations will be conducted ahead of pipe stringing and scheduled to avoid having an open ditch for extended periods.

7.5.3 Bending and Set-Up

In most cases, the flexibility of the pipe will allow for free stress bending along gentle curves and contours without the need for specialized equipment or techniques. More severe bends will be accomplished using cold bending or induction bending.

Cold bending can be accomplished on the ROW with a bending machine, which is moved along the ROW by a tractor. Sideboom tractors are used for handling pipe in the bending operation.

Induction bends are custom-made for specific locations and will be designed and fabricated according to design requirements and in accordance with pipeline bending criteria.

7.6 Pipe Installation

7.6.1 Signs and Markers

Aerial MP markers and warning signs at roads, trails, streams, rivers, etc., will be installed as soon as practical and as required during the construction phase. They will be constructed and installed to withstand vandalism to the extent feasible.

7.6.2 Ditch Excavation

Ditching crews are required to excavate a trench deep enough to provide the design soil cover depth over the top of the pipe or pipe insulation. The slope of the ditch walls will vary with soil characteristics, thermal conditions, and excavation method.

A chain type excavator, which excavates the ground by pulling a series of excavation buckets in a loop fashion on a mechanized arm, is the most economical method of ditch excavation in most soil types. This method of excavation minimizes the extent of surface disturbance and provides higher progress rates plus lower unit costs when compared to alternative ditching methods. Ditching machines are effective in soils without oversized material (significant cobbles and/or boulders) and without a high water table.

In areas not suited for ditching machines, ditch excavation will be done by track hoe. Blasting may be required in some areas with frozen soils or rock as addressed in Section 7.6.3. Topsoil from pipeline ditch excavation will be segregated when practical and used to enhance surface rehabilitation and aid in future revegetation of the area.

Construction scheduling is the most appropriate way of limiting thaw of open-ditch segments. To the extent possible, thaw-unstable soils will be excavated during winter seasons. In all cases, durations of open-ditch construction activities will be minimized.

Impacts to animal migration will be mitigated by using the measures addressed in Section 8.0, Resource Values and Environmental Concerns. Mitigation measures regarding wildlife movement through construction areas and ditch excavation sites are addressed in Section 8.2.10, Wildlife Resources. Additional information regarding fish and fish habitat mitigation measures resulting from construction activities is provided in Section 8.2.9, Fisheries Resources.

7.6.3 Rock and Frozen Soils Blasting

Blasting may be required to break up and fracture high-density frozen soils or rock during trench excavation. Safety-controlled blasting techniques will be used in all situations where blasting is required within proximity to inhabited areas or existing facilities. A Blasting Control Plan will be developed to mitigate health, safety, and environmental impacts. The Blasting Control Plan will address the following issues:

- Blast hole loading and placing of explosives
- Timing delays, wiring, and use of detonation systems
- Training, and licensing of personnel performing and supervising blasting activities
- Technical support, quality control, and compliance supervision for blasting activities
- Blasting in environmentally sensitive areas such as near fish habitat or in areas and during sensitive life stages of wildlife (e.g., Dall sheep lambing, bear denning, raptor nesting).
- Blasting near existing infrastructure

The Blasting Control Plan will be implemented and used in all locations. Standards identified in the Blasting Control Plan will become more stringent as the pipeline approaches foreign (other) pipelines, structures, and environmentally sensitive areas that may be impacted by blasting activities. The Blasting Control Plan will follow all applicable requirements for health, safety, and environmental protection, including Alaska Department of Fish and Game (ADF&G) blasting standards.

7.6.4 Line-Up and Welding

Mainline welding (excluding tie-ins and other miscellaneous welds) will be performed by either manual or mechanized welding systems that permit consistent, high-quality welding, and provide a desired production rate. Welding will be conducted according to project-specific procedures with qualified welders.

Field welding crews will bevel each joint of pipe to the profile required for automatic welding. Pipe ends will then be preheated prior to welding. Post-weld heat treatment for stress relieving will not be required. Each step of the welding process will be visually inspected by qualified welding inspectors. A combination of nondestructive testing inspection methods will be used to determine weld quality.

7.6.5 Lowering-In

Sideboom tractors with slings will be used for lowering each welded pipe string into the ditch. Longer sections require proportionately additional equipment for handling.

A separate tie-in crew will manually weld the lowered-in pipe strings together to complete the pipeline section. Other locations requiring tie-in welds include valves, road crossings, river crossings, and other special crossing areas.

7.6.6 As-Built Survey

Prior to backfill, an as-built survey will be completed to record the condition of the pipeline as lowered-in. These data are used as a baseline for future operational considerations and include recording the location-specific significant features, such as field joints and valve locations.

7.6.7 Buoyancy Control

For the proposed pipeline diameter and wall thicknesses, some portions of the pipeline may be buoyant in high water table areas, in wetlands, at water crossings, and at directionally drilled crossings.

Pipeline buoyancy control will be provided by saddle bags for ditching in high-water-table areas where the ROW soils are competent, dense, and non-organic. If pumping of the water-filled ditch is not possible, the weights will be installed on the flooded pipe by equipment working on mats adjacent to the ditch line. If saddle bags are used, appropriate measures will be taken to ensure coating integrity.

Concrete coating, bolt-on river weights, or saddle bags will be applied for buoyancy control for pipeline sections that are in poor, sandy soils, and are across high-water-table, open-cut-ditch stream crossings.

Buoyancy control for HDD can be accomplished by installing a small pipe inside the main pipeline. The smaller pipe will be filled with water to provide needed buoyancy control of the pipeline while being pulled into place.

7.6.8 Ditch Breakers, Padding, and Backfill

Ditch plugs will be used wherever slope and soil conditions indicate the probability of excessive erosion along the ditch line.

Coarse-grained material is required around and under the pipe to protect the pipeline whenever the ditch passes through material that could damage the pipe coating, to mitigate buoyancy problems (outside of floodplain areas), and to protect against excessive loss of pipe cover due to erosion. In areas where these potential problems do not exist, ditch spoil will be placed into direct contact with the pipe.

After placement of weights or plugs (where required), backfill crews will fill the trench with either ditch spoil or imported backfill materials to about one foot over the top of the pipe. The remaining ditch spoil material is used to complete ditch backfill and crowned over the ditch and left in place. In sensitive stream areas, excess ditch backfill may be removed to designated spoil disposal areas.

7.6.9 Tie-Ins

Separate welded sections of the pipeline will be connected with tie-in welds. Tie-in welds will also be made to short sections of the pipeline or fittings at river crossings, mainline valves, road crossings, pipeline crossings, and after long sections of the pipeline are hydrostatically tested. Pipe end bevels will be inspected and repaired by end-prep milling machines, by grinding, or by filing.

The pipe ends will be preheated when necessary to maintain weld quality. The weld will be made with successive passes to build up the metal of the beveled ends. Radiographic inspection of the weld will be made, and the pipe coating in the tie-in zone will be applied.

7.7 Special Construction Areas

7.7.1 Road and Railroad Crossings

All arterial roads and railroad crossings will be installed without casings, either by the “slick-bore" or open-cut method. Major road crossings will be accomplished by a boring method that creates no disruption to the road surface and allows traffic to flow unimpeded. In situations where the pipe cannot be installed by boring, a trench will be excavated. This open-cut method may involve building a temporary bypass or bridge to maintain traffic flow.

All TAPS access road crossings will be bored. Because of corrosion control issues, no cased crossings are proposed for the project.

7.7.2 Foreign Pipeline and Utility Crossings

Existing foreign pipelines and utility lines will be crossed by going below the existing pipeline or utility. A minimum clear separation of 12 inches is required between the existing foreign pipeline/utility line and the proposed pipeline. Typical design drawings that illustrate this feature are included in Attachment 1.

It is assumed TAPS has approximately 4 feet of cover. It is also assumed that Alyeska Pipeline Service Company (Alyeska) and TAPS owners will accept the 12-inch minimum clearance between pipelines at crossings; however, more may be required. Minimum pipeline cover depth when crossing a belowground section of TAPS will be approximately 9 feet.

The proposed pipeline route is expected to cross TAPS at seventeen locations within the project area. Table 7.7-1, ASAP Crossings of TAPS, provides crossing locations.

TABLE 7.7-1 ASAP CROSSINGS OF THE TRANS ALASKA PIPELINE SYSTEM

Crossing	ASAP Milepost
1	24.22
2	97.62
3	111.64
4	115.67
5	133.13
6	149.57
7	167.58
8	173.49
9	173.92
10	186.89
11	257.08
12	262.44
13	316.93
14	348.85
15	356.42
16	362.27
17	374.72

Michael Baker Jr., Inc. December 2011

7.7.3 Unstable Soils

Detailed engineering efforts and geotechnical studies will identify areas where permafrost, frost heave, fault crossings, thaw settlement, frost bulbs, slope and soil instability, areas sensitive to erosion, and where unique soil structures are likely to occur. These findings, as well as construction methods to appropriately mitigate these conditions, will be defined during detailed engineering.

7.7.4 Avalanche Hazards

Along sections of the ROW where avalanches are a concern, current construction planning limits construction to the summer months, when slope instability is less prevalent. However, appropriate precautions will be taken and conditions monitored since warming temperatures in avalanche areas present the potential for “slush bursts”.

7.7.5 Pipe Installation Methods For Water Bodies

The placement of the buried pipeline across specific fish-bearing streams is likely to have the greatest potential effect to the fishery resources of the project area. Proposed stream crossing methods have been determined based upon the presence of fish resources and engineering needs and are provided in Attachment 4. Each belowground stream crossing will be conducted in a manner and during a time period that avoids or minimizes potential fishery effects. Stream crossings will be accomplished using one of four crossing modes: open-cut, open-cut isolation, HDD, or bridge crossing.

Open-Cut Method

Open-cut is the most common crossing method used and is accomplished by excavating a trench across a stream or river bed and pulling or carrying the pipe into position. Trench excavation is accomplished using conventional excavation equipment, such as mechanical ditchers, draglines, dredgers, clams, or backhoes operating within the stream bed or from a floating barge. Some river and stream beds may require drilling and blasting that would be controlled and monitored.

Open-Cut Isolation Method

An isolated crossing technique will be used at locations where an open-cut is prevented by overwintering and spawning fish, or where stream flow conditions make open-cut impractical. This method is similar to an open-cut, but involves damming the watercourse to permit excavation while maintaining stream flow using pumps or dams and flumes. This method is limited to locations where stream flows do not exceed the capacity of the dam, flume, or pump equipment.

When a crossing is completed, the watercourse bed will be stabilized and the downstream dam will be removed first, followed by the upstream dam. Flume equipment will be shut down, restoring the stream to natural flows conditions.

Horizontal Directional Drilling

An HDD process may be used where disruption to the banks or bed of the stream is not permitted. With this method, a drilling rig on an inclined plane is set up on one bank and a pilot hole is drilled under the riverbed and to the surface on the other bank. The pipe is then pulled back as the pilot hole is enlarged by reaming.

Equipment typically found on an HDD site includes:

- Rig unit; power unit and generators
- Drill pipe rack and drill pipe
- Water pump
- Drill mud supply, drill mud mixing tank, drill mud pump, and mud handling and cleaning system
- Cuttings settlement tanks and pits
- Rollers and pipeline handling equipment

- Sidebooms and other heavy equipment
- Pipeline, welding, coating, and testing equipment

The availability of a dependable supply of water to the HDD drilling site is required for the following:

- Initial drilling fluid make-up
- Additional drilling fluid as the drill progresses
- Replacement fluid for drilling fluid escaping into the formation due to seepage or hydraulic fracture
- Pre-testing, where warranted, of the pipe string

Water could potentially be pumped from a water body to the drill site or hauled to storage tanks onsite.

Bridge Crossings

The current construction plan assumes the pipeline is attached to the following existing highway bridges:

- Chulitna River Bridge
- Coal Creek Bridge
- Hurricane River Bridge

The crossing of the Yukon River will be accomplished with the construction of a new pipeline bridge. The following items must be considered during construction planning efforts for each bridge location:

- Site accessibility for construction equipment
- Crane pads and pick points for heavy component erection
- Weights and haul routes for prefabricated components and materials
- Environmental restrictions during construction
- Proximity to access roads
- Cold-weather limitations with regard to concrete work

Refer to Attachment 1 for detailed typical design drawings for stream or river crossings.

7.7.6 Wetland Crossings

Wetlands in Alaska are usually defined as areas that are predominantly surface-saturated with water in the summer months. These areas are sometimes referred to as swamps, marshes, bogs, and muskegs. Construction methods used in wetlands will depend largely on the stability of the soils at the time of construction. If wetland soils are not excessively saturated and can support mobile construction equipment such as mats or timber riprap, construction would occur similarly to conventional cross-country construction techniques. Where wetland soils are saturated or inundated, the pipeline may be installed using the push-pull technique.

Push-Pull Technique

This technique involves stringing and welding the pipeline outside of the wetland and excavating and backfilling the trench using a backhoe supported by equipment mats or timber riprap. Platforms for positioning all equipment are constructed on each side of the wetland crossing.

The prefabricated pipeline would be installed by equipping it with buoys and pushing or pulling it on rollers across the water-filled trench. Once the pipeline has been floated into the trench, the buoys would be removed allowing the pipeline to sink to the trench-bottom. Pipe installed in wetlands will typically be fitted with buoyancy control measures.

7.7.7 Mainline Block Valves

The primary function of mainline block valves is to provide a means of restricting or stopping the flow of gas through the pipeline as necessary for safety, maintenance, or operational purposes. Mainline valves (MLVs) will be installed according to the operational needs of the ASAP system and will meet the design and installation requirements defined in 49 CFR §192.179(a) – Transmission Line Valves, at approximately 20-mile intervals.

MLVs will be installed on reinforced concrete pads placed over a compacted subgrade. In some areas fill may have to be imported to meet the subgrade requirements. Prior to construction, the site will be cleared using the same techniques as for the construction ROW. Installation of MLVs will be accomplished by tie-in crews using a sideboom or crane for lifting and setting the valve assembly. Depending on their location, access to MLV sites will be provided by workpads or construction access roads.

7.7.8 Aerial Pipeline Mode

The current construction plan assumes the first six miles (MP 0 to MP 6) of the pipeline will be constructed aboveground on steel vertical support members (VSMs) spaced at approximately 20-foot increments. Once the necessary ROW preparations have been made VSM locations will be surveyed, marked, and foundations drilled. Installation of VSMs will include standing and bracing the member, then backfilling around the VSM column with concrete slurry. Once VSMs have been installed, welded sections of pipe will be lifted and placed using sidebooms. Tie-ins will be accomplished in a manner similar to the remainder of the pipeline.

7.8 Special Design Areas

7.8.1 Denali National Park and Preserve

The segment referred to as Denali National Park and Preserve (DNP&P) begins at MP 534, approximately 5 miles south of Healy, and runs to MP 555, approximately 8 miles south of McKinley Village.

From MP 534, the alignment leaves the Parks Highway, crosses Bison Gulch, and then runs southeast to a crossing of the ARRC railroad. From here, the alignment descends a steep grade to the second Nenana River crossing, approximately 750 feet upstream of the Parks Highway bridge. To avoid the DNP&P, the alignment turns northeast and climbs up to and across the Parks Highway near MP 535. Once across the highway, the pipeline alignment runs south in the east ditch of the highway to pipeline MP 540.

During preliminary route planning, three alternate pipeline alignments were considered between MP 540 and MP 555.

The ASAP route currently planned will diverge from the Parks Highway at pipeline MP 540 and continue southeast of the Nenana River, approximately parallel to an existing power line ROW to MP 555 in a side-hill cut configuration. This route crosses Lynx Creek at MP 541, Montana Creek at MP 542, and Yanert River at MP 546. Option 1 alignment does not enter the DNP&P.

Alignment selection was based on limited engineering and survey data; analysis of aerial imagery; visual survey conducted at the site; and due diligence efforts to identify potential risk and negative implications—such as environmental and regulatory complications—associated with constructing the pipeline near a highly sensitive area such as DNP&P.

As the project progresses and survey and engineering data become available, detailed analysis may necessitate significant revisions to the Option 1 alignment.

7.8.2 Atigun Pass

Atigun Pass is a 10-mile section of the ASAP alignment that traverses, and is surrounded by, dramatic terrain and rocky soils. This portion of the pipeline is located at a pinch point between TAPS and the Dalton Highway. As a result, construction in this area may require an additional 12-foot lane along the Dalton Highway. A retaining wall may also be necessary between MP 175 and MP 176 to facilitate pipeline construction.

Because of the potential for avalanches in the Atigun Pass area, current construction plans assume all construction in this area will take place during the summer months. As a result, extensive maintenance to workpads, access roads, and even the Dalton Highway may be required to mitigate saturated soil conditions resulting from spring breakup and thawing conditions. These conditions could also hinder the movement and maneuverability of heavy, non-tracked equipment used to import construction materials. Specifics of soil conditions and behavior will be developed as detailed engineering progresses.

7.9 Contingency Planning

The construction contractor or developer will be required to prepare contingency plans for development, construction, and O&M. Each plan will address specific contingencies related to the particular aspect of the project. Plans will be developed in accordance with all pertinent regulations and will follow Best Management Practices (BMPs).

7.9.1 Holder Contacts

Daniel R. Fauske, Alaska Gasline Development Corporation, Permit Applicant, (907) 338-6100.

7.9.2 Agency Contacts

- Ron Dunton, BLM Gas Pipeline Project Manager, (907) 271-3132
- Serena Sweet, USACE, (907) 753-2819
- Mike Thompson, State Pipeline Coordinator's Office (SPCO), (907) 257-1330

7.10 Safety Requirements

A Safety Plan will be developed to identify what procedures will be put into place to make sure all operations are performed in a safe manner and that all applicable health and safety laws and regulations are followed. The Safety Plan will address construction, pipeline startup, and O&M. O&M safety is also addressed in Section 10.5.

7.11 Waste Management

7.11.1 Waste Handling and Disposal

Proper waste management is necessary to provide for human safety and environmental protection. A Comprehensive Waste Management Plan will be developed and followed so that hazardous and non-hazardous wastes generated by ASAP construction activities are minimized, identified, handled, stored, transported, and disposed of in a safe and environmentally responsible manner, and in full compliance with applicable state, federal, and local laws and regulations.

Each worker, contractor, and vendor working on ASAP is individually responsible for performing daily work tasks in a manner that conserves resources, limits impacts to the environment, and minimizes the generation of wastes. Details of how wastes are to be handled will be provided in the Comprehensive Waste Management Plan, including the following:

- Waste accumulation areas, including satellite accumulation areas, central accumulation areas, recyclable accumulation areas, and universal waste accumulation areas
- Management of recyclable metals, burnable wastes, and oily wastes
- Waste transport and disposal, including sampling (as necessary), profiling, and manifesting
- Wastewater treatment, including disposal of domestic wastewater and hydrostatic testing water
- Municipal waste treatment
- Waste fluid handling, including fuels and lubricants for equipment

It is anticipated that, where possible, materials will be reused or recycled. Burnable and oily wastes may be burned for heat recovery and to reduce waste volume. Domestic wastewater from camps and hydrostatic testing water will be treated and discharged in accordance with applicable permit stipulations, where possible. Hazardous and toxic wastes will be accumulated and transported offsite for appropriate disposal at a licensed disposal facility. Other wastes will likely be disposed of in an appropriate landfill.

Waste disposal sites, including landfills, or monofills may be permitted for this project; however, requirements and potential locations have not yet been identified.

7.11.2 Industrial Wastes and Toxic Substances

A Spill Prevention and Control Plan (SPCP) is required where hazardous materials are stored or used, including pesticides, paints, solvents, petroleum products or fertilizers. The SPCP will identify potential spill or source areas such as loading, unloading, storage, and processing areas, and areas designated for waste storage and disposal. The SPCP will identify material handling procedures and storage requirements and outline the actions to reduce spill potential. The SPCP is a companion document to the Comprehensive Waste Management Plan.

The construction contractor will be required to have a SPCP approved before beginning construction. The SPCP should include:

- Performance of maintenance, including refueling, of construction vehicles to prevent spills
- Storage of fuels and other hazardous materials containment requirements
- Identify individuals responsible for implementing the SPCP
- Define measures for storage and disposal of each kind of waste
- Specify spill response and cleanup procedures

- Describe spill response equipment to be used, including personal protective equipment
- Reporting requirements
- Periodic inspection and documentation requirements

The SPCP will be developed in accordance with all pertinent regulations and will follow BMPs. It will address specific requirements, such as:

- Refueling of vehicles will not be performed within 100 feet of a wetland, stream, or other water body.
- Fuel storage areas will be lined and bermed to contain 110 percent of the volume of fuel stored.
- Vehicle maintenance trucks will contain small spill response kits.
- Drip trays will be used under vehicles when parked to capture fuel, oil, and grease from vehicle leaks.
- All personnel will be trained in the notification and spill response requirements of the SPCP.
- Personnel will be trained in proper use of freeze depressant during hydrostatic testing.

A Spill Prevention and Control and Countermeasure Plan (SPCC) must be developed for each storage facility (e.g., tank) with a capacity to store in excess of 1,320 gallons of fuel. SPCCs are preventative measures to assure that a spill is contained and countermeasures are established to prevent petroleum spills from reaching navigable waters. The SPCC must be maintained on site.

8.0 RESOURCE VALUES AND ENVIRONMENTAL CONCERNS

Resource values and environmental concerns for the pipeline route are summarized in the following sections. Impacts to resources are expected to be temporary and localized and associated primarily with the construction phase.

8.1 Location with Respect To Existing Corridors

The ASAP route generally follows existing state highway corridors from Prudhoe Bay south. To minimize project impacts to environmental resources, existing infrastructure and ROWs will be used for pipeline installation to the extent feasible.

8.2 Anticipated Conflicts with Resources or Public Health and Safety

8.2.1 Air

The construction and operation of ASAP are not expected to have significant effects on air quality within the project area. The proposed project's emission levels will trigger new-source construction permitting either as minor source or major source permitting.

The proposed project's emission inventory is under development, but the primary air contaminants will include nitrogen oxides (NO_X), carbon monoxide (CO), small-diameter particulate (PM10 and PM2.5), sulfur dioxide (SO_2), and volatile organic compounds (VOCs) collectively known as "criteria pollutants." The level of expected emissions will dictate whether the proposed project is permitted as a minor source or as a major source. The major source regulations require best available control technology (BACT) to reduce emissions. The major source regulations also require the applicant to demonstrate that the proposed project will not significantly adversely affect existing air quality.

Construction Phase

The proposed project will have a localized effect on air quality during the project construction phase primarily due to diesel-powered mobile construction equipment and perhaps some windblown dust during the summer construction season. These potential particulate matter impacts in the Fairbanks non-attainment area for particulate matter (PM) 2.5 from construction of the Fairbanks Lateral will be mitigated by BMP measures for fugitive dust control and the use of ultra-low-sulfur diesel fuel by construction equipment. Since much of the proposed pipeline will parallel or share existing transportation corridors, including the Parks Highway and the ARRC railroad, fugitive dust emissions will be managed as a public safety factor to people traveling on the highway and railroad. Some open burning may be conducted during construction and will be subject to applicable Alaska Department of Environmental Conservation (ADEC) air quality regulations.

Construction activities will require measures to minimize short-term effects to air quality. These include:

- Developing and implementing a quality control/quality assurance program that tracks and assures implementation of all permit conditions associated with eliminating or reducing effects to local air quality
- Scheduling construction activities at times when there will be the fewest number of tourist or local residents engaged in outdoor recreation

- Reducing fugitive dust from construction traffic on unpaved roads
- Minimizing the number and location of permanent access roads
- Maximizing use of snow and ice roads during pipeline construction
- Burning of slash at times that minimizes effects to air quality
- Using construction camp incinerators to dispose of only those materials that the incinerator is designed and permitted to burn

Operation Phase

The stationary facilities associated with the project will be located outside of the Fairbanks non-attainment area for $PM_{2.5}$ and will neither directly nor indirectly impact the National Ambient Air Quality Standards (NAAQS) or Alaska Ambient Air Quality Standards (AAAQS) for particulate matter. Effects from operation of the proposed project on air quality will be due to combustion products from natural-gas-fired equipment located at the GCF, Straddle and Off-Take Facility, Cook Inlet NGL Extraction Facility, compressor stations and the venting of small quantities of hydrocarbon vapor at compressor stations or at other select locations along the pipeline alignment. Likely environmental effects of emissions from these facilities will be minimal because the proposed project will have a maximum of 2 relatively small compressor stations and hydrocarbon venting is expected to occur only during abnormal operations. Additionally, the GCF, Straddle and Off-Take Facility, and Cook Inlet NGL Extraction Facility may likely require implementation of control technologies to reduce emissions and to demonstrate compliance with NAAQS and AAAQS.

The largest air emission sources at the GCF, Straddle and Off-Take Facility, Facility and compressor stations will be combustion products in the exhaust of turbines. It is anticipated that operating compression duty at a given station will be approximately 14,000 horsepower or less. Compression duty at the other facilities will be significantly higher due to conditioning and removal of the gas from the pipeline. Smaller internal combustion equipment will be required for power generation and refrigerant compression. All gas-fired equipment will be fitted with BACT to reduce emissions as appropriate for the particular equipment and governing codes and standards.

The criteria pollutants emitted from the compressors will result in an insignificant regionalized effect on air quality with respect to NAAQS and AAAQS. Hazardous air pollutants (HAPs) from the facilities should be below applicable EPA/ADEC HAP regulatory thresholds. HAP applicability will be confirmed as part of the emissions inventory. The facilities will result in CO_2 emissions and the CO_2 emissions will be quantified as part of the proposed project emission inventory.

The facility emissions, depending on their location and size, could possibly have an effect on visibility by producing a visible vapor cloud during cold weather. Location of permanent facilities will consider local air quality requirements. Special attention has been given to ensure facilities do not cause significant long-term effects on designated Class I airshed for DNP&P and Gates of the Arctic National Park and Preserve, to local communities. This special attention has also been given to public recreation areas such as BLM recreation sites in the Transportation and Utility Corridor through the Brooks Range southward to the Yukon River, similar state and local facilities located along the Elliott and Parks Highways, and to DNP&P.

Project maintenance-related activity, primarily from vehicle traffic, will result in a smaller, localized, insignificant effect on air quality.

Potential Effects

Potential effects from operation of the GCF, Straddle and Off-Take Facility, Cook Inlet NGL Extraction Facility and compressor stations include increases in oxides of nitrogen (NOx) and increases in carbon monoxide from the combustion process. Increases in greenhouse gas (GHG) emissions of carbon dioxide (CO_2) will also occur as a result of the combustion process. Minor increases in particulate matter (PM_{10} and $PM_{2.5}$) emissions will likely occur from construction activities and from operation non natural gas combustion equipment at the facilities. Minor increases in SO_2 and VOC emissions from construction equipment and non-natural-gas-fuel-burning equipment will also occur.

Mitigation

Mitigation measures that can be implemented to address effects on public health and safety include:

- Implementation of BMPs during construction activities to mitigate fugitive dust and reduce particulate matter emissions.
- Utilization of Best Available Control Technology (BACT) for combustion equipment to mitigate NO_x and CO emissions.
- Utilization of ultra low sulfur diesel fuel for construction equipment and non natural gas combustion equipment to mitigate SO_2 emissions, particulate matter emissions and VOC emissions.
- Operate all combustion equipment in accordance with manufacturer's specifications to mitigate NO_x, CO, VOC and particulate emissions resulting from incomplete combustion.
- Maintain emissions control equipment in accordance with manufacturer's specifications to mitigate emissions and maintain emission control efficiency.

At the present time, there are no EPA-approved control technologies available for GHG emissions mitigation on construction equipment and combustion equipment. These technologies are currently in the research and development phase and can be utilized for GHG mitigation once these technologies are available and can be evaluated as part of BACT.

8.2.2 Noise

Noise sources within the boundaries of ASAP are expected to be temporary and localized during construction. Noise sources during operations and maintenance will be limited to activities associated with O&M of the facilities. Measures to ensure compliance with requirements for noise abatement will be implemented.

Construction Phase

Increased noise levels during project construction activity will be localized and transitory as construction activity proceeds along the proposed 737-mile pipeline length. The primary sources of construction-related noise include diesel-powered mobile equipment, pipe installation, and construction worker verbal communication.

Operations and Maintenance Phase

The proposed project should have little to no effect on the surrounding areas. Much of the area adjacent to the route is undeveloped with low ambient noise levels. Noise generated at the GCF, compressor stations, Straddle and Off-Take Facility, and Cook Inlet NGL Extraction Facility may include compressors, boilers, generators, and heaters. In addition, there will be noise during operations and maintenance from vehicles on access roads and nearby highways, and equipment operating at material sites. The project compressor stations may implement noise abatement measures through engineering and design controls. There may be some additional, short-term noise increases resulting from vehicle traffic and small fixed-wing aircraft and helicopters during maintenance and/or surveillance activities.

Potential Effects

The potential effects from noise could include:

- Short-term increases in ambient noise levels from construction activities – trucks bringing materials, heavy equipment trenching and moving pipe, human interactions (radios, conversations), and worker private vehicles
- Minor and localized effects on air quality from project-maintenance-related activity, primarily from vehicle traffic
- Fixed-wing aircraft and helicopter traffic

Mitigation

Mitigation measures that can be implemented to address effects on soils include:

- Development and implementation of an Noise Abatement Program
- Development and implementation of a Construction Communications Plan to inform adjacent residences of construction activities

8.2.3 Geologic Hazards

The benefit of undertaking a geologic hazard assessment of the route is to ensure that effective design, construction, and operational mitigation measures are in place to reduce the potential for pipe integrity issues and to reduce the number of non-routine maintenance interventions. To the extent possible, known geologic hazards will be taken into account in the selection of final pipeline routing and final pipeline and facility design. A geologic hazard is defined as a naturally occurring or project-induced geological, geotechnical, or hydrological phenomenon that could load the pipeline, causing a pipeline integrity concern, or that could impact the ROW, causing an environmental concern.

Potential Effects

The potential effects from geologic hazards could include:

- Freezing of unfrozen ground
- Thawing of permafrost terrain
- Landslides
- Tectonic/seismicity
- Hydrotechnics/watercourse hydraulics
- Erosion
- Geochemical
- Unique soil structure

Mitigation

Mitigation measures that could be implemented during construction and operations and maintenance to address effects of geologic hazards on the integrity of the project include:

- Design Considerations
  - Special installation techniques and foundations
  - Earthquake mitigation measures and special design considerations at fault crossings

  - Special design considerations at river crossings
  - Erosion control measures
- Operational Considerations
  - Slope stability monitoring
  - Seismic/earthquake monitoring
  - River hydrology monitoring
  - O&M Manuals
  - Quality Assurance Manual
  - Inspection Services Manual
  - Design Basis Updates
  - Surveillance Manual
  - Environmental Management System Compliance Manual
  - Other controls to be determined

8.2.4 Mineral and Energy Resources

There are areas along the proposed route that may be used for mining activities, both recreational and commercial. Recent exploration mining by International Tower Hill Mines Ltd. in Interior Alaska near Livengood has identified potential large-scale mineral resources. There are a significant number of mining claims in the vicinity of Wiseman, adjacent to Gates of the Arctic National Park and Preserve. Additional research will be required to identify mining claims along the proposed route and identify active claims. Further coordination with mining interests will occur once the specific route is identified and negotiations for access are filed.

Potential Effects

- Potential gas source to provide energy in support of mining operations
- Potential increased access opportunities should be examined and potential conflicts with mining evaluated

Mitigation

Mitigation measures that can be implemented to address effects on mineral and energy resource development activities include:

- Development and implementation of a Construction Access Plan and Traffic Control Plan, including coordination with mining operators and adjacent landowners

8.2.5 Paleontological Resources

Paleontological resources are fossilized remains, imprints, and trace fossils of plants and animals used to study past ecosystems, evolution, and the origination and destruction of organisms. Effects on paleontological resources are permanent and irreversible. Ground-disturbing activities have the potential to adversely affect paleontological resources, particularly if those activities extend below alluvial deposits or deep soils and into sedimentary bedrock.

Fossils are protected by the Antiquities Act of 1906, as they are non-renewable resources. In addition, fossils on federal lands are protected by the Federal Land Policy and Management Act of 1976. The Paleontological Resources Preservation Act (PRPA) was passed into law on March 30, 2009. PRPA requires the management and protection of paleontological resources on federal land by the Secretaries of the Interior and Agriculture (U.S. Code: 16 USC 470). Specific provisions for the various land-managing agencies reinforce policies regarding the collection and curation of paleontological resources and the confidentiality of location information. Fossils associated with archaeological sites and large caves are protected by the Archaeological Resources Protection Act (ARPA) of 1979 and the Federal Cave Resources Act of 1988. The Alaska Historic Preservation Act (AHPA) protects paleontological resources in Alaska.

According to the TAPS Renewal, all known Pleistocene fossils discovered in the ROW were removed at the time of discovery. There are currently no known paleontological sites listed in the Alaska Heritage Resource Survey (AHRS) database within the proposed corridor. However, for the segments of the project route south of Livengood, studies may be required prior to commencement of construction to determine the presence of bedrock units known to contain fossils within the proposed corridor, as well as evaluations of shallow bedrock and near-surface alluvium for the potential to yield fossils.

Potential Effects

The potential effects on paleontological resources could include:

- Ground-disturbing construction activities such as trenching, grading, and excavation
- Development of workpads, pipeline laydown yards, camps, fuel storage sites, materials storage sites, disposal sites, and the placement of fill materials over the resource

Mitigation

Avoidance is the preferred mitigation measure. If permanent effects are unavoidable, they should be mitigated in accordance with requirements of the appropriate agencies and applicable laws. If any known or previously undiscovered paleontological resources are encountered during construction activities, the owner/operator will be required to contact the SPCO (if on state lands) and the Authorized Officer as responsible for paleontological and cultural resources if on public land. A qualified paleontological monitor may be required to be on-site during construction near known paleontological resources, or areas where the likelihood of finding such resources is high.

While paleontological studies will be performed prior to beginning construction activities, there is always the possibility that cultural resources will be discovered during the project. An Unanticipated Cultural Discoveries Plan will be developed to outline the exact procedures that will be followed in the event of an unanticipated paleontological discovery.

8.2.6 Soils

Soil characteristics along the proposed pipeline consist primarily of weathered bedrock, glacial till and outwash, fluvial sand, silt and clay, lacustrine silt and clay, colluviums, and windblown silt and fine sand. Physiographic regions crossed by the route are:

Arctic Coastal Plain Region

The Arctic Coastal Plain soils are composed primarily of organic silt several feet thick over coarse sands and gravel, with massive ground ice present. The Sagavanirktok River’s braided floodplain is principally unvegetated coarse-grained alluvium. Previously deposited sandy silt may line sand and gravel in the river channel remnant of former floodplains. Cold, continuous permafrost underlies the Arctic Coastal Plain, averaging temperatures less than 19°F and a thickness of 670–2,150 feet. At shallow depths, the soil is ice-rich and primarily frozen, but still susceptible to seasonal thawing. Lakes and river channels with depths greater than 6 feet may insulate the underlying soil enough to develop thaw bulbs (BLM 2002).

Arctic Foothills Region

The Arctic Foothills are composed of coarse-grained, glacial depositions of a mixture of clay, sand, gravel, and boulders. These moraines are often covered with windblown silt, while thaw ponds and basins are partially filled with colluvia, and rich peat and organic rich slopewash deposits partially fill upland, flat-floored depressions (BLM 2002). Cold, continuous permafrost also underlies the Arctic Foothills, again averaging temperatures less than 19°F. Till in the region may be compromised of massive ground ice locally totaling up to 50 percent of its volume. As on the Arctic Coastal Plain, the Sagavanirktok River insulates the surrounding ground, creating discontinuous permafrost adjacent to the active channel and thaw bulbs beneath the water. Permafrost becomes more continuous as distance from the Sagavanirktok River increases (BLM 2002).

Brooks Range Region

The Brooks Range is underlain with coarse-grained sand and gravel in the Atigun and Dietrich River valleys. Cold, continuous permafrost can be found throughout the Brooks Range except in alluvium beneath major active river channels. The depth of permafrost is greater in the northern areas of the Brooks Range than in the southern, and is also greater in soils with larger grain sizes. Ground ice is less than 15 percent of the total volume in fluvial silt and sand, while it may be up to 95 percent of the total volume in lacustrine silt and clay, especially near Galbraith Lake (BLM 2002).

Chandalar Ridge and Lowland Region

Glacial advances during the Pleistocene left deposits of coarse-grained glacial till in the Chandalar Ridge and Lowland region. Near the main channels of the Middle Fork Koyukuk and South Fork Koyukuk Rivers, coarse-grained and glacial fluvial sediment deposits are found, while fine-grained silt and clay of eolian and lacustrine origin are found over coarse-grained till away from the main channel. Discontinuous permafrost with temperatures between 26°F and 30°F is found underlying this section. Permafrost is generally absent under unvegetated floodplains, but old floodplains may be underlain with permafrost 5–50 feet thick. The lowlands between the Koyukuk River forks realize well-developed thaw lakes in the silts present there (BLM 2002).

Kokrine-Hodzana Highlands and Yukon-Tanana Uplands

Residual soils, a few feet thick, from weathering bedrock are dominant on hilltops away from the Tanana and Yukon Rivers. The soil at the bottom of valleys can be up to 40 feet thick and compromised of a combination of colluviums, fluvial sands, gravel, and weathered bedrock. Windblown silt is common over coarse-grained subsoil in the uplands and deposited from floodplains. Discontinuous permafrost is found here with average temperatures between 26°F and 30°F. Permafrost is absent near major streams. Old floodplains may be in the process of creating new permafrost because of the migration of the rivers. Thermokarst lakes are common in valley bottoms, where ice-rich soils witness freezing at depths of up to 50 feet (BLM 2002).

Ray Mountains

The Ray Mountains are composed of an overlapping series of compact ranges that move in an east-west direction and are underlain by the Ruby terrain. Metamorphic bedrock in the area is generally covered in rubble, which results in shallow and rocky soils. Permafrost is primarily discontinuous and varies in thickness from thin to moderate.

Cook Inlet Basin

The Cook Inlet Basin is gradually sloping lowland and was covered by ice and flooded by proglacial lakes several times during the Pleistocene epoch. Accordingly, the Cook Inlet Basin floor is composed of fine-textured lacustrine deposits surrounded by lesser amounts of coarse-textured glacial tills and outwash. The basin contains numerous lakes, ponds, wetlands, and several river systems. The area is generally free of permafrost and has a mix of maritime and continental climates, which means moderate fluctuations of seasonal temperature and abundant precipitation.

Potential Effects

The construction and operation of ASAP is not expected to have significant effects on soils within the project area. Most of the potential effects on expected to be minimal and limited to a short period of time during construction. Effects on soils are likely to be limited to erosion and production of storm water runoff.

Mitigation

Mitigation measures that can be implemented to address effects on soils include:

- Development and implementation of an Erosion Control Plan (Section 7.4.3)
- Development and implementation of a SWPPP (Section 7.4.3)

8.2.7 Water Resources

The construction and operation of ASAP is not expected to have significant effects on surface waters or groundwater within the project area. Most of the potential effects on groundwater and surface waters are expected to be minimal and limited to a short period of time during construction. All disturbed areas will be returned to pre-project contours and revegetated with native vegetation to maintain surface drainage patterns. Groundwater drainage patterns should also reestablish immediately after construction activities and site restoration have been completed. BMPs and mitigation measures will be used to minimize long-term effects on both groundwater and surface water within the project area. The ASAP is not crossing any waterways included on the list of Alaska Impaired Waters.

Direct Effects

The ASAP will cross an estimated 495 waterways and drainages of which 27 are major streams, 75 are anadromous fish streams, and an additional 7 have been nominated for inclusion in Anadromous Waters Catalogue.

Pipeline construction will not result in long-term alterations to stream flow, stream profile, or structural components of streams and other waterbodies crossed by the pipeline. For most stream crossings, short-term disturbances will be limited to the actual construction disturbances. Streambeds, streambanks, and riparian areas will be restored to pre-project contours and configurations to the maximum extent possible. Streambanks and riparian areas will be re-vegetated to prevent erosion and to maintain streambank stability. The pipeline will be buried to a depth that provides a minimum of five feet of cover at each stream crossing to minimize potential for streambed scour.

Large sections of the pipeline route are located within existing transportation and utility corridors that have in-place drainage structures and related structures with a demonstrated ability to avoid long-term adverse effects on water quality or substantial effects on the existing surface water or groundwater regimes. The project developer will adopt these designs and practices where applicable in the design and location of the pipeline project.

Potential Effects

Maintaining the existing thermal regime is an important factor in limiting impacts to water resources and water-dependent resources. A chilled pipeline may create ice damming along streams and waterways or thick layers of ice formed by successive freezing of stream overflow (aufeis fields). This could result in a reduction of water flow downstream, diversion of water outside of existing stream channels, or storage of water in aufeis fields. The chilled pipeline may also reduce the water temperature at stream crossings, affecting fish behavior or causing direct effects on fish habitat (delaying hatching of fish eggs). A pipeline that is maintained at a higher temperature that the surrounding soils and waters it passes through can also result in negative impacts. The most obvious is melting permafrost soils.

The pipeline operating temperature relative to the surrounding ground is recognized as a significant issue and is discussed in Section 4.3. In concept, the pipeline will be operated at below freezing temperatures in predominantly permafrost terrains to protect the thermal stability of the surrounding ground. Similarly, the pipeline will be operated at above freezing temperatures in predominantly thawed ground settings so as not to create frost bulbs around the pipe that could lead to frost heave displacement of the pipeline or adverse hydraulic impacts on drainages crossed by the pipeline.

Mitigation

Mitigation measures that can be implemented to avoid or minimize adverse effects on surface and ground waters include:

- Minimize the number of river and stream crossings
  - Use existing bridges where feasible
  - Use directional drilling to minimize disturbance to water bodies where practicable
- Maintain, to maximum extent practicable, the existing surface hydrology at all water body crossings
  - Prevent discharges that have the potential to adversely affect water bodies
  - Stabilize cut slopes immediately when the designed grade is obtained
  - Initiate reclamation of disturbed areas as soon as practicable
  - Ensure water withdrawals meet federal and state standards and guidelines
- Keep construction activities within the footprint of the pipeline ROW and the disturbed area of the adjacent construction zone to the maximum extent practicable
- Minimize the construction of new permanent access roads by emphasizing winter construction using snow-ice roads
- Perform water crossings in a manner that minimizes effects on water quality
  - Use materials for dam construction that do not introduce sediment or other harmful substances into waters when using the open-cut isolation method
  - Use materials for flume pipe system that do not introduce sediment or other harmful substances into waters when using the open-cut isolation method
  - Position flume pipe system discharges to prevent erosion or scouring
- Minimize the effect of the pipeline on the existing thermal regime
  - Design the pipeline and component to take into account the thermal regime, including placement and size of compressor stations and chillers.
  - Use engineering controls such as insulation and non-frost susceptible fill to control the thermal signature of the pipeline.
- Implement dewatering practices that avoid adverse effects to vegetation and to existing quality of surface waters, including erosion and scouring

- Locate fuel storage, equipment refueling, and equipment maintenance operations at least 100 feet from surface waters
- Avoid contaminated sites
- Use temporary bridges for transportation of construction equipment and materials

8.2.8 Wetlands and Vegetation

Wetlands

Wetlands evaluation for ASAP began in 2008 with a reconnaissance survey of the pipeline alignment. Pre-mapping of the route and a limited fieldwork program were completed in 2009. The 2009 effort included field survey of the route in the Minto area. The results of the 2008 and 2009 fieldwork and pre-mapping were submitted in The Wetland Technical Report In-State Gas Pipeline Project Prudhoe Bay to Wasilla, Alaska, April 2010 (POA 2009-651) submitted to the USACE in April 2010.

For purposes of evaluating wetlands along ASAP in 2010, a 2,000 foot (1,000 feet each side of centerline) planning corridor fieldwork was established for aerial photo interpretation, pre-mapping, and desktop analysis and through discussions and meetings with the USACE. Once pre-mapping of the corridor was completed, wetland determination points were identified where the wetland classification through pre-mapping appeared inconclusive, where there were problematic wetland/upland boundaries, or for those wetlands that lacked National Wetland Inventory (NWI) coverage. These determination points were uploaded to a GPS system for field data collection. A total of 121 field observation data points were visited between 2008 and 2009 using data collection protocol evaluated and accepted by the USACE. A total of 399 data points were visited in 2010. All wetland areas were mapped in 2009 and 2010 and analyzed to the Cowardin subclass level with added modifiers to the class or lower level in the hierarchy (e.g., PSS1B). Other site-specific data collection protocol utilized the *1987 U.S. Army Corps of Engineers Wetlands Delineation Manual*, the *2007 Regional Supplement of the Corps of Engineers Wetland Delineation Manual: Alaska Region*, and the Magee protocol for assessing wetland functional capacity (Magee, 1998). This wetland mapping approach allowed incorporation of all wetland types within the entire 2,000-foot-wide corridor to be classified, while concentrating field efforts verification of wetland types within the 300-foot-wide analysis corridor (150 feet each side of centerline), which allows for adjustments to the pipeline alignment to avoid wetlands, if determined practical and feasible.

The purpose of the 2010 field survey was to document vegetation, soil, and hydrological conditions; verify pre-mapped wetland and upland signatures; adjust pre-mapped wetland/upland boundaries and classifications based on field conditions; and collect wetland function data. A total of 399 sites were evaluated during the 2010 field season. The 2010 Wetland Preliminary Jurisdictional Determination Report includes results of field studies from 2010 and is expected to be submitted to USACE in early 2011. Based upon this report and the 2009 Wetlands Technical Report submitted in April 2010, USACE will make a Jurisdictional Determination.

The wetlands mapped along the route were divided into vegetation type and wetland class as represented in Table 8.2-1. Acreage represents mapped wetlands in the 300 foot corridor. The total acreage affected by the project is expected to differ from the totals due to the project planning and mitigation efforts. Planning efforts to avoid wetlands by moving the pipeline alignment or the use of HDD will reduce the affected acreage of wetlands.

TABLE 8.2-1 ALASKA STAND ALONE GAS PIPELINE WETLANDS RELATIVE ABUNDANCES

Wetland Type	Approximate Number of Features	Approximate Acreage(1) and Percent	
Freshwater Forested/Shrub Wetland	3,238	9,095	68
Freshwater Emergent Wetland	969	3,959	30
Riverine	255	188	1
Freshwater Pond	346	118	<1
Lake	19	12	<1
Total	**4,829**	**13,372**	**100**

Notes: (1) Linear distance x 300-foot wetlands survey corridor

Potential Effects

The construction and clearing activities associated with ASAP would have both direct and indirect effects on wetlands and vegetation. Effects related to pipeline construction will be categorized as either temporary or permanent. As the proposed pipeline will be buried, the majority of permanent effects are expected to be limited. An example of direct and permanent impacts to a wetland area are draining and filling for construction activities, roadways, and pipeline location placement. Temporary effects on wetlands and vegetation during construction include clearing, grubbing, and trenching activities associated with the laying of pipe.

Mitigation

The permitting process for placing fill in wetlands requires compliance with the mitigation steps outlined in NEPA to maintain wetland functions. These steps include:

- Avoid: A wetland should not be affected if there is a less environmentally damaging practicable alternative.
- Minimize: Unavoidable effects should be minimized to the extent possible.
- Compensate: Any remaining effects should be offset, if practicable and appropriate, through restoration, enhancement, creation, and/or preservation actions.

Mitigation options will be developed collaboratively with the USACE upon their review of the 2011 PJD. At that time, site-specific BMPs will be defined and applied as means of mitigation. Overall, mitigation measures will likely be geographically dependent, as some procedures will have a greater efficacy toward the northern end of the proposed pipeline corridor, whereas others might be better suited to the southern portions. Traditional construction methods can help avoid significant effects on wetland habitats and will likewise avoid long-term effects on wetland functions and values if mitigation measures are implemented. Traditional wetland mitigation measures may include the following:

- Schedule pipeline construction across wetlands during the winter to the maximum extent practicable
- Avoid and minimize ground-disturbing activity in wetland habitats
  - Limit grading except for trenching, to the maximum extent practicable to preserve root systems
  - Maintain slope stability
  - Use mats or other types of mitigation during non-winter construction to prevent rutting
  - When possible, locate permanent facilities including compressor stations, access roads, and workpads outside of wetlands

  - Reduce construction ROW width across wetlands as practical
- Maintain existing hydrologic systems
- Reestablish vegetation that is typical of the general area, where practicable
  - Segregate topsoil and use as top trench fill to the greatest extend practicable
  - Reseed and revegetate affected areas upon completion of construction activities
- Minimize the number of stream crossings
- Use existing bridges or HDD when crossing streams
- Contain fuel and lubricant spills during construction

Vegetation

The ASAP route traverses a variety of vegetation types from arctic tussock tundra in the north to taiga in the interior and south. Arctic tundra and alpine tundra areas are distinguished by cold climates, short growing seasons, and low vegetation dominated by grasses, sedges, mosses and lichens. Taiga, or boreal forest, stretches across most of Alaska and is distinguished by trees of moderate height, including conifer forests, marshes, and bogs. The southernmost area of the ASAP is typically covered by deciduous trees such as aspen, cottonwood, and birch.

Potential Effects

The most likely impacts to vegetation will be the direct impacts from brush clearing of the ROW and removal of the vegetative mat during grading. These effects are expected to be short-term and transitory, only occurring during construction activities. Upon completion of construction activities, remediation, rehabilitation, and restoration of all ground-disturbed areas associated with the pipeline construction will be implemented as discussed in Section 9.0.

Another potential effect of the project is the introduction of non-native invasive plants (NIPs) or non-native weeds. These are plant species that have been introduced to an area where they did not naturally evolve. Some NIPs can produce significant changes to vegetation, composition, structure, or ecosystem function. A total of 332 NIPs are currently being tracked in Alaska. It is typically more effective to prevent the introduction and spread of NIPs than to attempt to control infestations.

Mitigation

Mitigation measures that can be implemented to prevent the introduction and spread of NIPs include a NIP Prevention Plan. The NIP Prevention Plan will address procedures to reduce or eliminate the spread of NIPs at project locations such as airports, particularly at gravel airstrips, material sites, temporary use areas such as laydown yards and camps. Restoration of cleared areas will also be addressed in the NIP Prevention Plan. Leaving cleared areas un-restored may present an opportunity for NIPs to establish a foothold without competition from local species. More information about rehabilitation and restoration is provided in Section 9.0. The NIP Prevention Plan will provide details of the measures to be used to control invasive species through appropriate site preparation, monitoring, revegetation of disturbed areas with native species, and performance standards.

8.2.9 Fisheries Resources

The ASAP will cross an estimated 495 waterways and drainages of which 27 are major streams, 75 are anadromous fish streams, and an additional 7 have been nominated for inclusion in the Anadromous Waters Catalogue. Along the ASAP route, fish are an important subsistence and recreational resource. A listing of potentially sensitive areas and fish habitat along the proposed route is found in Attachment 7.

Potential Effects

There could be temporary and localized effects on fisheries resources from ASAP construction depending on the construction methods used. However, a long-term effect on fish populations is not expected from pipeline operations. Probable short-term effects that may occur are alteration or loss of fish habitat and temporary obstructions to fish passage during construction. Temporary loss of habitat may result from diverting rivers or stream channels, removing riparian vegetation, excavating stream-bed materials, or altering the water quality.

To ensure habitat impacts do not cause direct mortality to fish, fish population size, and fish habitat, ADF&G permits are required under Alaska Statutes (AS), Title 16, which protects freshwater habitat in streams and rivers that support anadromous fish. The ADF&G has developed effective standards and practices to protect fishery resources during sensitive periods. Each crossing will be evaluated for fishery resources, and the proposed crossing technique will be developed cooperatively with the ADF&G to avoid adverse effects to fish and fish habitat.

Mitigation

Mitigation measures that can be implemented to minimize effects on fish include:

- Follow mitigation measures for water quality identified in Section 8.2.7
- Minimize the number of fish stream crossings where practicable.
- Use open-cut isolation methods for stream crossings at locations where an open-cut is prevented by overwintering and spawning fish, or where stream flow conditions make open-cut impractical.
- A Blasting Control Plan as identified in Section 7.6.3 will be developed in accordance with ADF&G blasting standards to protect adult fish, juvenile fish and developing fish eggs when blasting activities occur in or near streams.
- Use existing bridges or HDD.
- Use pipeline designs and construction scheduling that minimize disruption of fish passage and spawning fish and effects to fish habitat.
- Develop supplemental site-specific fishery data to fill data gaps for the design of fish stream crossings and for lakes where water will be withdrawn during the winter for snow/ice road construction and maintenance during pipeline construction.
- Maintain to the maximum extent practicable existing stream hydrologic regimes at fish stream crossings.
- Maintain to the maximum extent practicable existing temperature regimes along corridor.
- Use construction methods and reclamation of disturbed areas that eliminates or reduces the potential for erosion and sedimentation reaching fish streams.
- Minimize cumulative effects to surface hydrology, stream bottom, and stream bank habitats when the pipeline crossing of a fish stream is downstream from an existing stream crossing by the highway, TAPS, or other buried utility system.
- Use temporary bridges for transportation of construction equipment and materials
- To the maximum extent practicable, locate material storage, refueling activity, fuel, and related liquid storage at least 100 feet from the bank of a fish stream.
- Implement hydrostatic testing in a manner that minimizes the potential that freeze depressants could be inadvertently discharged to fish bearing waters.
- Assure water withdrawals use appropriately-sized fish screens and other state and federal guidelines for fish protection.

8.2.10 Wildlife Resources

Wildlife resources are widely distributed along the proposed route. Construction and O&M activities will affect wildlife resources; however, the effects are likely to be short-term and localized. A listing of wildlife, habitat, and periods of sensitivity along the proposed route is found in Attachment 7.

Potential Effects

Potential effects on wildlife are likely to be associated with construction activities and will be temporary and localized. Individual animals are expected to be potentially affected and not the entire population. The potential short-term effects on wildlife during construction include:

- Temporary disturbance/displacement resulting in short-term changes in habitat use and short-term changes in behavior
- Temporary habitat loss or alteration
- Obstruction to movement
- Death/injury to animals due to collisions with vehicles

In general, long-term effects on wildlife from ASAP are not expected. However, increased access to remote areas with the addition of access roads could lead to increased human use of the area for hunting.

Mitigation

Mitigation measures that could be implemented to address wildlife resources include:

- Avoid locating pipeline facilities in sensitive wildlife habitats to the maximum extent practicable.
- Schedule construction activities to avoid effects during sensitive periods in the life cycle of wildlife to the extent practicable, including scheduling excavation activities during times of the year when major movements across the ROW occur (i.e., migrations).
- Minimize the duration of open-ditch construction activities to mitigate the risk of animal entrapment in an open ditch.
- Develop systems or mechanisms to facilitate escape of wildlife from the pipeline trench in the event wildlife becomes trapped (e.g., escape ramps)
- Develop a Blasting Control Plan as identified in Section 7.6.3 in accordance with ADF&G blasting standards to protect wildlife. A Blasting Control Plan is particularly necessary if blasting is required in sensitive areas or during sensitive life stages for wildlife.
- Ensure construction camp operations and pipeline facility construction activities comply with measures that avoid attracting wildlife.
- Adopt motor vehicle and aircraft procedures that minimize disturbances to wildlife.
- Identify and then avoid or minimize situations where wildlife may be killed in defense of life or property.
- Avoid or minimize construction and operational activities during sensitive periods in life cycles such as moose and caribou calving, bear denning, raptor nesting, and nesting migratory birds.
- Limit public accessing to ROW for recreation or hunting by blocking entry areas with large boulders, berms, or fencing.
- Rehabilitate pipeline construction access roads in a manner that allows public access and consistent safe operation of the pipeline system and that is in accordance with the plans of the landowner/land manager.

- The following plans will be developed prior to construction activities and followed during construction and operations to minimize human interactions with wildlife:
  - Wildlife Interaction and Habitat Protection Plan
  - Blasting Control Plan identified in Section 7.6.3 which follows ADF&G standards protective of wildlife in sensitive areas or during sensitive life stages
  - Bear Avoidance and Human Encounter/Interaction Plan
- To minimize human/carnivore interaction and discourage wildlife presence and feeding opportunities the following plans will be developed to assure the appropriate handling and disposal of wastes:
  - Comprehensive Waste Management Plan
  - Hazardous Materials Emergency Contingency Plan

8.2.11 Sensitive and Threatened and Endangered Species

A variety of federal regulations provide protection for designated species in Alaska. Regulations relevant to the proposed pipeline include the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), the Bald and Golden Eagle Protection Act, and the Migratory Bird Treaty Act (MBTA). In addition to these federal regulations, the State of Alaska has lists of endangered species (5 Alaska Administrative Code (AAC) 93.020) and species of special concern.

Species included in this discussion are either listed under the ESA, have previously been listed, or are considered a species of special concern by the State of Alaska or BLM.

Threatened and Endangered Species

The pipeline route is located within an area that provides habitat for some species that have been federally listed as threatened. There are no endangered species that occur near the route.

Polar bears (*Ursus maritimus*) and beluga whales (*Delphinapterus leucas*) are found near the planned project area. Polar bears have recently been listed as threatened under the ESA and may occur in the vicinity of proposed pipeline alignment. Cook Inlet beluga whales were listed by the National Marine Fisheries Service (NMFS) as endangered under the Endangered Species Act of 1973 on October 22, 2008 (Federal Register 73:205 (62919)). A proposed rule for designation of critical habitat was published in the Federal Register on December 2, 2009 (Federal Register 74:230 (63080). This project is not expected to affect polar bears and beluga whales, nor the subsistence harvest of these animals. Polar bears may be temporarily displaced by the operation of heavy equipment during winter pipeline construction activities at the northern portion of the pipeline route near Prudhoe Bay. The temporary displacement of polar bears would be expected to have no effect on the present subsistence harvest of polar bear by Alaska Natives. Construction and operation activities are not planned to occur in Cook Inlet. This project is not expected to affect Cook Inlet beluga whales or the subsistence harvest of beluga whales.

Steller's eiders (*Polysticta stelleri*) and spectacled eiders (*Somateria fischeri*) are threatened species that may occur in the vicinity of proposed pipeline alignment. Migratory birds are federally protected by the U.S. Fish and Wildlife Service (USFWS). Eagles are protected under the Bald Eagle Protection Act and the MBTA.

Arctic and American peregrine falcons were listed as threatened and endangered, but were delisted in 1994 and 1999 respectively. They are, however, still considered species of special concern by the State of Alaska. Peregrine falcons are uncommon migrant breeders in the Prudhoe Bay area. The Sagavanirktok and Colville Rivers serve as the main breeding areas for Arctic peregrine falcons. Nesting concentrations are greatest at Franklin and Sagwon Bluffs.

BLM Sensitive Species

The BLM within Alaska must designate and manage sensitive species in part to reduce the likelihood and need for new listings under the ESA as per BLM 6840 Manual direction. The BLM must include as sensitive species those designated as candidate and proposed under the ESA, as well as species that have been de-listed from the ESA within the past five years. At-risk species with no current ESA status are based upon the following eligibility criteria:

1) Species must be native species that occur on BLM lands or land which BLM has a significant management capability to affect the conservation status of, and
2) One of the two following conditions applies:
   (a) The species is known or predicted to be undergoing a downward population trend that could affect the viability of the species, or a distinct population of the species is at risk across a significant portion of its range; or
   (b) The species depends upon specialized or unique habitats and there is evidence that such areas are being threatened with alteration such that the continued viability of the species is at risk.

Species that do not meet the criteria to be placed on the BLM Sensitive Animals and Plants Lists, but whose status will be re-evaluated in the future are placed on the BLM Watch List. Watch species are not sensitive species and are not subject to sensitive species policy. However, additional research will be performed and information gathered, prior to re-evaluation during subsequent sensitive species list revisions. Table 8.2-2 provides numbers of species on the BLM Sensitive Species and Watch Lists.

TABLE 8.2-2 BUREAU OF LAND MANAGEMENT SENSITIVE AND WATCH LIST ANIMALS AND PLANTS

	BLM Sensitive Species List	BLM Watch List
Birds	15	6
Mammals	4	0
Fish	2	2
Insects	3	1
Plants	50	49

Potential Effects

The effects of the ASAP project are expected to be temporary and localized. For ESA species, they will be limited to marine vessel transit to a Southcentral Alaska port and to West Dock. For other species, effects will be due to construction activities along the alignment.

Mitigation

Mitigation measures that can be implemented to address Sensitive, Threatened, and Endangered Species are those identified in Sections 8.2.8, Wetlands and Vegetation; 8.2.9, Fisheries Resources; and 8.2.10, Wildlife Resources. In addition, mitigation measures identified in the Section 7 consultation as part of the NEPA process and included in permits as stipulations will be followed.

8.2.12 Cultural Resources

Cultural resources include archaeological and historic sites, and structures and features that are protected under the Antiquities Act of 1906, the National Historic Preservation Act of 1966 (NHPA) as amended, and the Archaeological Resources Act of 1979. The existing level of knowledge of cultural resources along the ASAP route varies, primarily because much of the route has not been surveyed extensively.

The existing knowledge is based on previous cultural resource studies that were designed for different projects and whose degree of applicability to ASAP varies. The most extensive and exhaustive of these surveys were undertaken prior to construction of TAPS and the Dalton Highway. The surveys conducted in advance of these projects provided substantial information about cultural resources within and near ASAP from the North Slope to Livengood. However, the existence of cultural resources is less well understood between Livengood through the Minto Flats to the Parks Highway, and for parts of the alignment where it departs from the immediate vicinity of the ROW occupied by the Parks Highway, ARRC railroad, and the Anchorage-Fairbanks Intertie.

Several other issues arise with the cultural resource studies completed for TAPS. The TAPS surveys were completed in the 1970s and 1980s, and the primary focus at that time was on prehistoric sites. Of the historic sites or structures that were documented along the route, many were not considered eligible for inclusion to the National Register of Historic Places (National Register) because they were not "historic" at the time (generally defined as 50 years or older). However, many of these places may now meet the criteria for inclusion on the National Register. In addition, survey methods, field documentation, and mapping methods used during TAPS have changed dramatically in the past 30–40 years. Archaeologists now use more advanced Global Positioning System (GPS) mapping which results in more accurate field locations. Many sites documented during TAPS may need to be site-checked for accuracy and to see if the sites are still intact or if they have been destroyed.

There is also potential for the project to impact Traditional Cultural Properties (TCP). A TCP is a place (often an ethnographic landscape) that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that are rooted in that community's history, or its importance in maintaining the continuing cultural identity of the community (Parker and King 1998). Similarities exist between TCPs and historic and archaeological sites. In fact, historic and archaeological sites can be all or part of a TCP. The key difference is TCPs exhibit a continuing role and importance to people today.

Identification of potential cultural resources (sites, structures, TCP) prior to ground disturbance is key to ensuring adverse impacts are avoided and/or mitigated. The project developer will be required to implement the following measures during the planning and construction of the pipeline:

- Identify cultural resources, in accordance with Section 106 the NHPA (36 CFR 800.4) and the Alaska Historic Preservation Act (AS 41.35).
- Determine whether or not the properties that may be affected by the undertaking are included in or determined to be eligible for inclusion in the National Register.
- Participate in consultation per Section 106 of the NHPA to determine what constitutes adverse effects to identified cultural resources.
- Assist the federal agency in the resolution of adverse effects.

Inventory, documentation, and preservation of cultural resources and mitigation of adverse effects to cultural resources will be based on a programmatic agreement between the concerned federal permitting entities, State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation. The agreement will clarify the procedures for considering cultural resources and will formalize the relationships between the various agencies. The affected federally-recognized Tribes, Alaska Native Corporations, and the public will participate in the implementation of the agreement, as required by Section 106.

Cultural Resources Work Completed to Date

In 2008, cultural resources baseline characteristics were examined in a desktop study and in 2009 known cultural resources within a 5-mile corridor centered on the proposed pipeline were inventoried with an overflight from Anchorage to Deadhorse and a vehicular survey on the return trip between Deadhorse and Anchorage. The purpose of these reconnaissance efforts was to acquire a preliminary assessment of the project area to facilitate future fieldwork planning. In 2010, 75 miles (approximately ten percent) of cultural resources fieldwork was completed. Areas surveyed in 2010 included segments between Happy Valley, on the North Slope, and Trapper Creek in Southcentral Alaska.

Potential Effects

An adverse effect to a cultural resource, as defined by 36 CFR 800.5(a)(1), is found when:

> "*an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.*"

The potential effects on cultural resources could include:

- Ground-disturbing construction activities such as trenching, grading, and excavation
- Development of workpads, pipeline laydown yards, camps, fuel storage sites, materials storage sites, disposal sites

Archaeological investigation, excavation(s) and documentation will have to be complete prior to pipeline construction and support activities in order to identify and evaluate potential effects on historic properties. Adverse effects must be resolved prior to construction. Adverse effects are resolved through mitigation agreed upon during Section 106 consultation.

Mitigation

Avoidance is generally the preferred mitigation measure for cultural resources eligible for the National Register. If negative effects are unavoidable, they should be mitigated in accordance with Section 106 and in coordination with the appropriate agencies, entities, and individuals. Mitigation measures can be specific to each cultural resource and will be determined and conducted in accordance with AS 41.35 and Section 106. More than one field season of archaeological survey may be required for determining the necessary level of mitigation.

Some areas within the pipeline ROW may be determined "high priority" areas for containing cultural resources. High priority areas are those areas that are known to contain high densities of cultural resources. These areas are defined through analysis of previous cultural resource studies, existing data on file at the Alaska Office of History and Archaeology's Alaska Heritage Resource Survey (AHRS) database, consultation with SHPO and other interested parties, and through current archaeological fieldwork completed for ASAP. In high priority areas, an archaeological monitor may be required during construction.

Alternatively, after the archaeological surveys have been conducted, the contractor may wish to avoid certain areas containing cultural resource sites rather than pay for lengthy and expensive excavations. Measures mitigating adverse effects may vary by specific cultural resource, but may include one or a combination of the following:

- Archaeological excavation, analysis, and documentation of all or part of the cultural resource site

- Perform Historic American Building Survey/Historic American Engineering Record (HABS/HAER)-level documentation for historic buildings and structures
- Perform archaeological monitoring of construction activities
- Provide interpretation for and involvement of the public. Some examples include brochures, signage, or partnering with local schools, museums, and/or heritage preservation groups, among others.
- Consultation with state and federal agency historic preservation officers
- Consultation with Alaska Native Tribes

The HABS/HAER documentation would be completed for historic structures prior to pipeline construction and support activities. Archaeological monitoring, as implied above, may be conducted during construction activities. Interpretation for the public can be initiated as soon as appropriate information is gathered. Interpretive material does not generally have to be completed prior to the activity that causes adverse effects. Public interpretive signage, for example, is most often installed after an activity is complete or near its completion.

While cultural studies will be performed prior to beginning construction activities, there is always the possibility that cultural resources will be discovered during the project. An Unanticipated Cultural Discoveries Plan will be developed to outline the exact procedures that will be followed in the event of an unanticipated cultural discovery.

8.2.13 Visual Resources

Visual resources are defined as those land, water, vegetation, animals, and structures that are visible on the land. The ASAP route passes through the vast, treeless tundra of the Arctic Coastal Plain, the mountains of the Brooks and Alaska Ranges, Tanana Flats, the Nenana River Valley, DNP&P, the Alaska Range, and the Susitna River Valley.

Potential Effects

Once constructed, most of the pipeline aboveground facilities, including compressor stations, valves, and other related structures, may be visible from adjacent public roads. The proposed pipeline ROW will be cleared within sight of some BLM and state recreation sites and will be visible from ridgelines along the eastern boundary of the Wilderness Area within Gates of the Arctic National Park and Preserve, DNP&P, and Denali State Park.

However, much of the pipeline will be located adjacent to an existing highway, pipeline, or powerline ROW, which will further minimize visual effects. In areas where the pipeline will be near major roadways used by tourists and other visitors, portions of the newly cleared ROW soil disturbance, construction with attendant equipment operations and activity, and any permanent facilities that will be required for operation will be seen. Many of these activities and much of the disturbed ROW will be transitory in nature. The entire project in an area usually takes several months to complete prior to restoration.

In addition, the project developer will be required to work with the BLM and state agencies in an effort to minimize and/or mitigate effects on areas of high scenic and visual values and expects to create only intermittent and localized effects on visual resources. All portions of the pipeline corridor that pass through BLM-administered land are managed in accordance with Class IV visual resource management (VRM) objectives, which provide for management activities that require major modification of the existing character of the landscape by allowing a high level of change. Consequently, major modifications to the existing landscape are allowed for activities related to energy transportation. The pipeline corridor will be managed according to the Class IV VRM objectives. Every effort will be made to minimize visual effects, particularly in areas of high scenic and visual value.

Mitigation

Mitigation measures that can be implemented to address effects on visual resources could include:

- Review the practicality of avoiding or minimizing significant adverse effects on visual resources created by the construction and operation of ASAP and incorporate proven mitigation measures into the design and location of the project where appropriate.
- Minimize the construction of new permanent access roads by using snow/ice roads during construction.
- Restore the construction zone in a manner that facilitates reestablishment of the adjacent natural vegetation.
- Use root balls, salvaged native plant materials, and topsoil removed from the construction footprint for redistribution on disturbed areas where feasible.
- Maintain a screening of existing natural vegetation when the pipeline is offset from a highway.
- Use existing disturbed areas to the maximum extent practicable for temporary construction activities such as construction camps, material stockpiling, pipe jointing, and pipe bending.
- Minimize locating pipeline facilities, new material sites, and construction material stockpiling in places with special visual resource values that would be visible to the general public.
- Blend the pipeline system into the natural setting to the extent practicable when crossing places with high visual resource values.
- Use revegetation species that are appropriate for the general area.
- Regrade construction disturbances to a condition that blends with the surrounding terrain and surface drainage patterns.
- Monitor reclaimed, disturbed construction areas and take remedial action where expected revegetation success is not achieved.

8.2.14 Social and Economic

Larger Alaska communities along the route will be better-prepared to absorb temporary construction impacts and will likely experience positive long-term effects. The smaller communities north of Fairbanks, however, may experience some temporary effects on rural lifestyle during construction, yet will potentially benefit in the long-term from lower energy costs. In addition, there are a number of the communities with for-profit village corporations that could benefit from the influx of construction opportunities in the region. The project may also result in improved opportunities to distribute CNG (and possibly propane) to rural Alaska communities via the Yukon and Tanana Rivers and to use CNG as a substitute for gasoline and diesel fuel in cars and trucks in communities along the Parks Highway. The project could provide employment opportunities for isolated communities that currently have high unemployment rates. In addition, first-class cities and first-class boroughs with taxing authority may have the opportunity to generate tax revenue.

In addition, many communities, while not located adjacent to the ROW, use the nearby region for subsistence activities. For example, residents of communities not actually adjacent to the pipeline ROW such as Anaktuvuk Pass, Nuiqsut, Alatna, Allakaket, Stevens Village, and Tanana obtain furbearing animals, caribou, fish, and moose from the region near the ROW. Summer construction activities are more likely to affect these activities.

Table 8.2-3 and Figure 8.2-1, list those communities that could potentially be affected by ASAP construction and O&M, because of their location near the project ROW or because the community uses the region near the project ROW.

TABLE 8.2-3 COMMUNITIES ADJACENT TO OR IN THE VICINITY OF THE PIPELINE ROW

Community	Population	City Classification	Borough	Regional/Village Corporation
Nuiqsut	424	Second-class city	NSB	ASRC/The Kuukpik Corporation
Anaktuvuk Pass	287	Second-class city	NSB	ASRC/Nunamiut Village Corporation
Alatna	22	Unincorporated	FNSB	Doyon, Limited
Allakaket	100	Second-class city	Unorganized borough	Doyon/K'oyitl'ots'ina Limited
Wiseman	16	Unincorporated	Unorganized borough	N/A
Coldfoot	13	Unincorporated	Unorganized borough	N/A
Evansville	13	Unincorporated	Unorganized borough	Doyon/Evansville Incorporated
Bettles	19	Second-class city	Unorganized borough	
Stevens Village	64	Unincorporated	FNSB	Doyon, Limited
Livengood	24	Unincorporated	Unorganized borough	N/A
Minto	191	Unincorporated	Unorganized borough	Doyon/Seth-De-Ya-Ah
Manley Hot Springs	81	Unincorporated	Unorganized borough	Doyon/Bean Ridge Corporation
Fairbanks	32,506	Home rule	FNSB	Doyon/None
Nenana	479	Home rule	Unorganized borough	Toghotthele Village Corporation
Tanana	251	First-class city	Unorganized borough	Tozitna, Ltd. Village Corporation
Anderson	275	Second-class city	DB	N/A
Healy	1,002	Unincorporated	DB	Doyon/Mendas Chaag Native Corporation
Cantwell	200	Unincorporated	DB	Doyon/ Ahtna, Inc
Talkeetna	894	Unincorporated	MSB	N/A
Willow	2,218	Unincorporated	MSB	CIRI/Montana Creek Native Association and Caswell Native Association
Houston	1,588	Second-class city	MSB	N/A
Big Lake	3,331	Unincorporated	MSB	N/A
Wasilla	7,245	First-class city	MSB	N/A
Anchorage	290,5788	Home Rule	Municipality of Anchorage	N/A

State of Alaska Community Database: 2009 Department of Commerce, Community and Economic Development (certified/not certified). http://www.commerce.state.ak.us/dca/commdb/CF_BLOCK.htm. Accessed 11/23/2010

Potential Effects

- Increased employment opportunities and workforce development
- Changes in community demographics
  - increase in local population numbers
  - change in population characteristics (more children or seniors=increase need for schools, health care)
- Increased demand for retail/service and housing

- Increase in seasonal residents
- Changes in employment and income levels
  - former non-cash economy communities experience influx of cash
  - unemployed now have opportunities previously out-of-town or non-existent
- Changes in the aesthetic quality of the community
  - temporary structures, pipeyards, construction yards
- Increased opportunities for local and regional business development to support construction
- Increase in opportunities to develop housing
- Pressure on regional public safety and emergency services
- Health care systems may not have capacity to handle influx of workers and families

Mitigation

Mitigation measures that can be implemented to address effects on socioeconomics include:

- Time construction activities to avoid subsistence activities where possible.
- Time construction activities to avoid high-use tourist and local recreation seasons (e.g., wildlife viewing, hunting, snowmachining, fishing, dog sledding)
- Time construction activities to prevent impacts to local business (i.e., avoid summer and fall construction for recreational and tourist areas)
- Develop and implement traffic control plans to prevent negative impacts to local businesses by blocking access during construction
- Identify and promote work opportunities for local residents
  - Prepare an Economic Opportunity Plan to describe how the project will operate to enhance locally based economic and employment opportunities for Alaska residents and businesses. Coordinate with the local village corporation, tribal government, and city government, and other groups to identify qualified individuals that are interested in working on the project.
  - Promote use of local businesses to support the project (lodging, food, services, sundries)
- Develop training programs for local residents so that they can be employed during construction and O&M
  - Coordinate with Alaska training centers and universities on workforce development and training opportunities, which may include, but are not limited to, future job fairs in the region.

8.2.15 Subsistence

Subsistence activities in Alaska are governed federally by the Alaska National Interest Lands Conservation Act (ANILCA) and by the state subsistence law. Federal and state law define subsistence as the "customary and traditional uses" of wild resources for food, clothing, fuel, transportation, construction, art, crafts, sharing, and customary trade. Since 1997 the State of Alaska has taken over a dual subsistence management role and coordinates with the Federal Subsistence Management program in order to effectively manage federal and state laws. Under ANILCA only rural residents qualify for subsistence but under the State of Alaska subsistence law all state residents qualify for subsistence.

Projects that require federal permits and are determined to potentially have an effect on the human environment are required to evaluate the effects of those projects on subsistence uses and needs under

Section 810 of ANILCA. ANILCA requires the preparation of an evaluation of effects of a project on subsistence use and needs, a finding of whether subsistence uses will be significantly affected, convening of a public hearing with prior notification in the area, and a Section 810 determination. An evaluation of subsistence uses will be completed per Section 810(a) of ANILCA (16 USC Section 3120) as part of the Environmental Impact Statement (EIS) to be prepared by the USACE, as the lead federal agency.

Projects that take place in Alaska within a designated coastal district fall under the jurisdiction of the Alaska Coastal Management Program (ACMP). For each coastal district that a project enters the Coastal Management Plan for that area must be abided by. State subsistence issues may be addressed within the Coastal Management Plans that the project enters. The ASAP will be located in the Northwest (North Slope Borough) and Southcentral (Matanuska-Susitna Borough) Coastal Districts. State subsistence issues could also be addressed within the EIS scoping process that USACE is coordinating.

Table 8.2-4 lists communities (by region) that are found along the proposed ROW route(s) in which subsistence or personal use harvesting activities are most likely to occur. Subsistence resources of concern for all three regions include waterfowl, anadromous and freshwater fish, furbearers, large mammals, and vegetation.

TABLE 8.2-4 SUBSISTENCE OR PERSONAL USE COMMUNITIES BY REGION

North Slope	Interior	Southcentral
Barrow	Alatna	Talkeetna
Prudhoe Bay [a]	Allakaket	Trapper Creek
Nuiqsut	Wiseman	Willow
Anaktuvuk Pass	Coldfoot	Houston [a]
	Evansville	Big Lake [a]
	Bettles	Wasilla [a]
	Steven's Village	Palmer [a]
	Livengood	Skwentna
	Minto	Susitna
	Manley Hot Springs	Knik
	Fairbanks North Star Borough [a, b]	Municipality of Anchorage [a, c]
	Nenana	
	Tanana	
	Anderson	
	Healy Lake	
	Healy	
	McKinley Park	
	Cantwell	

a = Communities determined to be non-rural and therefore do not fall under ANILCA. (Subsistence Management Regulations for the Harvest of Wildlife on Federal Public Lands in Alaska, Effective July 1, 2010-June 30, 2012)
b = Fairbanks North Star Borough includes Ester, Fox, North Pole, Eielson AFB, College, Harding Lake, Moose Creek, Pleasant Valley, Salcha, and Two Rivers
c= Municipality of Anchorage includes Eklutna

Potential Effects

Effects of ASAP on subsistence are expected to be limited to construction. Construction activities may cause short-term, localized effects on subsistence wildlife species and subsistence activities.

Mitigation

Mitigation measures that can be implemented to address effects on subsistence activities include:

- Identifying locations and times when subsistence activities occur, and avoiding work during these times and in these areas to the maximum extent practicable
- Scheduling work (e.g., blasting) to avoid conflict with subsistence activities when possible.
- Notifying workers that subsistence activities are ongoing in the area and directing them to avoid activities that may affect the activities (e.g., not removing trap line markers)
- A Wildlife Avoidance and Human Encounter/Interaction Plan will be developed and implemented for the construction and operation of ASAP to avoid impacts to subsistence species

8.2.16 BLM Projects

There are no known BLM projects in or near the proposed pipeline ROW.

8.2.17 Recreation Activities

The ASAP alignment will avoid, to the greatest extent practicable, recreation areas. It will avoid all national parks and refuge areas, including the Arctic National Wildlife Refuge, Gates of the Arctic National Park and Preserve, Yukon Flats National Wildlife Refuge, and Denali National Park and Preserve (DNP&P). The alignment will pass through Minto Flats State Game Refuge and Denali State Park, and may pass through the Willow Creek State Recreation Area and the Nancy Lake State Recreation Area.

In addition to these parks and designated recreation areas, areas along the entire route, both public and private, are used for recreation. As a general rule, tourism-related travel and destinations include DNP&P, with Anchorage and Fairbanks often being trip anchor locations.

Potential Effects

Pre-construction and construction activities (noise, traffic congestion/delays, competition for campgrounds) can cause short-term adverse effects on tourism and recreation. Some combination of barge traffic delivering pipe and other heavy construction materials to the Southcentral Alaska ports will temporarily increase traffic congestion in these communities. Distribution of construction supplies by the existing highway and railroad transportation systems may result in temporarily increased use of these systems. Construction activities adjacent to tourist and recreation facilities and areas near the Dalton and Parks Highways, as well as local road networks in the Fairbanks, Palmer, Wasilla, and Anchorage areas, will involve temporary delays of traffic.

Tourism peaks during the summer. The major seasons for recreation tend to focus on salmon fishing in the spring and early summer, with big game and waterfowl hunting in the fall. Adverse effects can be minimized by conducting pre-construction and construction activities during winter to the extent feasible. Scheduling summer pre-construction and construction activities to avoid the peak tourist and recreation seasons will greatly reduce any adverse effects.

No long-term effect on tourism or recreation is expected once construction is complete. No new public vehicular access is expected. Existing public access will be retained.

Mitigation

Mitigation measures that can be implemented to address effects on tourism and recreation use areas include:

- Retain existing public access routes and uses.
- Avoid areas with tourist-related facilities.
- Avoid areas with public recreation facilities.
- Avoid creating new public vehicular access to remote areas.
- Minimize impacts to the existing natural landscape to the extent practicable.
- Schedule pre-construction work to avoid peak periods of tourism and recreation.
- Conduct early and continuing consultation with the public, tourism, and recreation businesses.
- Provide new recreation-related opportunities when compatible with pipeline operation.
- Collocate with existing and planned transportation and utility system where practicable.

8.2.18 Wilderness

The proposed pipeline route does not cross federally-designated wilderness areas.

Potential Effects

The proposed pipeline route does not cross any designated wilderness areas, but it parallels the eastern boundary of the Gates of the Arctic National Park and Preserve. While wilderness users may have an expectation for a quiet and remote, undisturbed experience, there will be overflights from helicopters and fixed wing aircraft associated with environmental and engineering fieldwork, pipeline construction, and O&M activities. The above pipeline activities will require close coordination with the applicable local, state, and federal agencies to minimize unnecessary noise that could affect the wilderness experience.

Mitigation

Mitigation measures that can be implemented to address potential effects on wilderness include:

- Development and implementation of a communications plan for fieldwork, construction, and O&M activities.
- Coordinate location of communication towers used to support overflights with federal wilderness area land managers.

9.0 STABILIZATION AND REHABILITATION

A Stabilization, Rehabilitation, and Restoration Plan will be developed to address rehabilitation and restoration of all ground-disturbed areas associated with the pipeline construction, including the construction ROW, material sites, camp sites, temporary access roads, ice roads and pads and temporary use areas.

The Stabilization, Rehabilitation, and Restoration Plan will include specific requirements for restoration activities for each section of the pipeline prior to construction, including site preparation, monitoring, and performance standards. The Stabilization, Rehabilitation, and Restoration Plan will address the following topics:

- Soil replacement and stabilization
- Seeding
- Fertilizing
- Control of non-native invasive plants (NIPs)
- Limiting access to the ROW
- Reclaiming constructed roads

The Stabilization, Rehabilitation, and Restoration Plan identifies sensitive areas along the ROW or in temporary use areas that may require special attention such as erosion-prone areas. A range of engineering controls or maintenance measures will be identified to address the potential problem.

9.1 Soil Replacement and Stabilization

9.1.1 Ditch Backfilling

Once a large section of pipeline is ready for placement in the ditch, the soil or bedding material will be placed on the bottom of the ditch and the ditch will be prepared for the pipeline to be placed on top. The pipeline will be placed within the ditch and, the remaining portion of the ditch will be filled as described in Section 7.6.8.

During construction efforts, soil will be replaced as soon as practical after the pipeline section is laid down. This is particularly important during winter construction to reduce the introduction of snow or other precipitation into the ditch. In areas of concern (such as wetlands where the native vegetated mat was side-cast during ditch excavation) it will be placed as the top portion of trench backfill in the ditch, providing the vegetative mat can be salvaged during removal. The backfilled ditch vegetation will be monitored after construction to ensure that the vegetated mat grows in and erosion of the fill above the pipe does not occur.

9.1.2 Clean-Up

Following pipe installation, ditch backfilling, and hydrotesting (discussed in Section 10.2.1), crews will perform clean-up, including leveling of the pipeline ROW and shaping of a crown over the pipeline ditch, as required. Crews will dispose of any remaining scrap materials, timber, or other debris. Wood debris will be disposed of as identified in Section 7.4.2 and scrap materials and rubbish will be hauled to a designated, permitted landfill for disposal. Crews will be equipped with dozers, front-end loaders, and dump trucks to facilitate clearing and construction ROW clean-up.

In addition to restoration of the construction ROW, material sites, camp sites, ice roads and pads, temporary use areas and temporary access roads will be re-contoured and restored to an acceptable condition as required by applicable permits. Generally, revegetation of disturbed areas is planned for long-term stabilization.

Snow pad areas will require a summer cleanup check to verify that all construction materials have been removed from the construction ROW. Any remaining debris will be removed utilizing low-ground-pressure vehicles to minimize disturbance to surface vegetation.

9.1.3 Ditch Stabilization

Stabilization of the backfilled ditch may be a multi-year process in some areas, particularly areas with fine-grained, ice-rich soils. The pipeline ditch may intercept overland flow that may erode backfill material from the pipeline ditch and could potentially serve to channel for water into nearby waterways and wetlands. The interception of stream flow and wetland cross drainage could pose significant problems, particularly in areas of continuous and discontinuous permafrost in rolling or mountainous terrain. Rehabilitation, especially in ice-rich soils, may require extensive, repeated ditch maintenance and long-term thermal stabilization activities before the habitat can return to its former stability and productivity.

The Stabilization, Rehabilitation, and Restoration Plan will include techniques developed to address rehabilitation and restoration of all ground-disturbed areas associated with the pipeline construction, including the construction ROW, material sites, camp sites, temporary access roads, ice roads and pads and temporary use areas.

9.1.4 Erosion Control

The Stabilization, Rehabilitation, and Restoration Plan, the Erosion Control Plan, and final design plans will include BMPs and storm drainage design to control surface flow along the crowned ditch and the project. Along the construction ROW, in areas where ice roads and construction pads are not used, the construction pad will be left in place and erosion control BMPs will take into account the wider construction width not just the crowned ditch.

These plans will also address the fact that the crown will likely not remain after one or two years after the annual freeze thaw cycle results in some settlement. Temporary and permanent erosion and sediment control BMPs and drainage controls will be designed to work in concert to provide an acceptable erosion and sediment control for the project.

Erosion control measures for ditch excavations performed through stream beds and banks as identified in the Erosion Control Plan will be applied as soon as the backfill is placed into the ditch to complete pipe coverage. Specific materials to use for erosion control of the bed and banks will be determined on a case-by-case basis and identified in the construction plans for each crossing.

The project designers will develop appropriate methods to respond to local conditions based on existing terrain, geology, hydrology, slope, disturbed area, thermal regime, climate and other factors in the final design and relevant plans. Options available to direct flow from the crowned ditch line include:

- Installation of wattles at an angle and at predetermined spacing along the crowned ditch line based on slope angle to direct flow away from the ditch line
- Installation of temporary flexible piping to carry offsite and up-gradient water across the ditch line to vegetated down slope areas

- Periodic installation of flow breaks in the crowned section to transfer water from one side of the ditch line to the other for storm drainage
- Use of native fill berms to direct flow away from the crowned ditch at specified intervals based on slope
- Construction of drainage channels to direct flow from the construction area
- Installation of permanent culverts in some areas
- Development of earthen ditch blocks used to retain or direct water

9.2 Seeding Specifications

Seeding of the disturbed corridor will be conducted in consultation with the BLM and State of Alaska and adhere to ADNR's *Plant Materials Center Revegetation Manual for Alaska* (Wright, 2009). The methods and procedures outlined in the manual provide specific regional information for revegetation of disturbed areas with native plants to limit the potential for colonization by invasive species. The NIP Prevention Plan will also be consulted to limit the potential for colonization by invasive species.

Seed mixes will be developed for different geographic areas and fertilizers applied at an optimum rate per acre. Hand methods, hydro-seeding, and aerial seeding will be employed to rehabilitate surfaces as required and will be identified in the Stabilization, Rehabilitation, and Restoration Plan.

9.3 Fertilizer

Application of fertilizer will be conducted in consultation with the BLM and State of Alaska. Standard practices and planning will be followed to ensure that adequate volume, type, and quality of fertilizer are used where needed. Fertilizing ground-disturbed areas will be performed as construction progresses. Erosion control measures will be applied on top of the seed and fertilizer application. As project development proceeds, specific uses will be determined.

9.4 Control of Non-Native Invasive Plants

Procedures will be developed to control the introduction and spread of NIPs as part of pre-construction, construction, and rehabilitation and restoration activities. NIPs can be introduced and spread into an area from the use of airports (particularly at gravel airstrips), material sites, and temporary use areas such as laydown yards and camps.

Control of NIPs will also be addressed as part of restoration of cleared areas. Leaving cleared areas un-restored may present an opportunity for NIPs to establish a foothold without competition from local species.

9.5 Limiting Access to the Right-of-Way

Large boulders, berms, or fencing will be used to limit access to the project ROW.

9.6 Potential Reclaim of Constructed Roads

The need for reclamation activities of constructed roads will be mitigated largely by clearing the ROW and constructing the pipeline in winter when soils are frozen. However, a large number of temporary gravel access roads will be constructed for ASAP (Attachment 5). Land owners will be consulted about the reclamation of constructed roads during the planning phase.

10.0 OPERATION AND MAINTENANCE

Operation and maintenance of ASAP encompasses all activities after completion of construction activities, including startup, day-to-day activities necessary for the pipeline to function, and maintenance of equipment, systems, facilities, and pipe. Maintenance includes both preventative maintenance to make sure equipment and systems continue working efficiently, and corrective maintenance to fix or replace equipment and systems that are not working.

An O&M Plan will be prepared and followed in accordance with 49 CFR 192.605. The O&M Plan will provide written procedures for conducting operations and maintenance activities. Because ASAP is a transmission line, the O&M Plan will also include procedures for handling abnormal operations. The O&M Plan will be prepared before pipeline operations commence and will be updated at least once every calendar year.

The O&M Plan must include procedures to provide safety during maintenance and operations, including procedures for the following situations:

- Operating, maintaining, and repairing the pipeline in accordance with applicable requirements
- Controlling corrosion
- Maintaining construction records, maps, and operating history and making these documents available to the appropriate operating personnel
- Gathering data needed for reporting incidents in a timely and effective manner
- Starting up and shutting down any part of the pipeline in a manner designed to assure operation within the pipeline's MAOP limits plus the build-up allowed for operation of pressure-limiting and control devices
- Maintaining compressor stations, including provisions for isolating units or sections of pipe and for purging before returning to service
- Starting, operating, and shutting down gas compressor units
- Periodically reviewing the work done by operator personnel to determine the effectiveness, and adequacy of the procedures used in normal O&M and modifying the procedures when deficiencies are found
- Taking adequate precautions in excavated trenches to protect personnel from the hazards of unsafe accumulations of vapor or gas, and making emergency rescue equipment available when needed, including a breathing apparatus, and a rescue harness and line.
- Systematic and routine testing and inspection of pipe-type or bottle-type holders including:
  - Provision for detecting external corrosion before the strength of the container has been impaired
  - Periodic sampling and testing of gas in storage to determine the dew point of vapors contained in the stored gas which, if condensed, might cause internal corrosion or interfere with the safe operation of the storage plant
  - Periodic inspection and testing of pressure limiting equipment to determine that it is in safe operating condition and has adequate capacity
- Responding promptly to a report of a gas odor inside or near a building
- Implementing the applicable control-room management procedures

In addition, the O&M Plan must include safety procedures when operating design limits have been exceeded (i.e., during abnormal operations), including procedures for the following situations:

- Responding to, investigating, and correcting the cause of the following:
  - Unintended closure of valves or shutdowns
  - Increase or decrease in pressure or flow rate outside normal operating limits
  - Loss of communications
  - Operation of any safety device
  - Any other foreseeable malfunction of a component, deviation from normal operation, or personnel error, which may result in a hazard to persons or property
- Checking variations from normal operation after abnormal operation has ended to determine continued integrity and safe operation of the pipeline
- Notifying responsible operator personnel when notice of an abnormal operation is received.
- Periodically reviewing the response of operator personnel to determine the effectiveness of the procedures controlling abnormal operation and taking corrective action where deficiencies are found

O&M Facilities

Three O&M facilities are planned for the ASAP, one at the GCF in Prudhoe Bay, one in Fairbanks, and one at the Cook Inlet NGL Facility in Wasilla. Each location will include office facilities, a maintenance garage, and both warm and cold warehouse space. The Wasilla O&M facility will also house the pipeline control systems. Each O&M facility will be accessible via road and will have sufficient parking for staff, visitors, and maintenance vehicles.

10.1 New or Expanded Access for Operation and Maintenance

All major facilities will be accessible via the road. In addition, a number of roads will provide access to the ASAP operational ROW. Attachment 5 includes a list of existing and new permanent roads that will be used to access facilities or the ROW.

10.2 Inspection and Testing of Pipeline

10.2.1 Cleaning, Hydrostatic Testing, and Drying

After completion of the pipeline, it will be hydrostatically tested to ensure the pipeline has the strength necessary to meet design conditions and verify that the pipeline is leak-free. Water for hydrostatic testing will be withdrawn only from designated, permitted, surface-water sources with the capacity to supply the desired volumes without adverse affects on aquatic habitat and associated biota (particularly over-wintering fish).

Hydrostatic testing will most likely be done using untreated, heated water approximately 36°F to 38°F under most conditions. In winter, water will be freeze-protected, or compressed air will be used to test the pipe. Test water releases will be confined to designated, permitted upland locations and will be diverted to settling basins as necessary to comply with discharge permit limitations.

Plans for hydrostatic testing will be developed in accordance with all pertinent regulations and will follow BMPs. Specific information regarding hydrostatic testing will be developed by the construction contractor and operator of the pipeline. Analysis of each spread must be conducted to determine test sections. Once test sections are determined, a test manual will be prepared for use by the testing contractor to ensure the final tests meet the federal safety regulations.

10.2.2 Corrosion Control

In general, the entire pipeline will be externally coated with fusion bonded epoxy and internally coated with a two-part epoxy coating. The pipeline will be coated with an additional abrasion resistant coating for HDD crossings and where the pipeline will be placed in rocky ground or stream crossings where concrete coating is not used for buoyancy control.

A cathodic protection system has been preliminarily designed to protect the pipeline from corrosion. The cathodic protection is a partially redundant system where both sacrificial anodes in impressed current will be used. Between Prudhoe Bay and Healy, both systems will be used due to permafrost soils. Based upon the boundary of permafrost soils, beginning near Healy and continuing south, only the impressed current system will be employed.

Deep anode ground beds and gas-fired thermoelectric generators will be located at each compressor station site to protect station piping and the pipeline between stations. The GCF and NGL facilities will have separate cathodic protection systems.

10.2.3 Leak Detection and Emergency Response

A Supervisory Control and Data Acquisition (SCADA) system will be implemented to collect measurements and data along the pipeline, including flow rate through the pipeline, operational status, pressure, and temperature readings. This information may all be used to assess the status of the pipeline. The SCADA system will provide pipeline personnel with real-time information about equipment malfunctions, leaks, or any other unusual activity along the pipeline.

The pipeline operator will develop and implement an Emergency Response Plan in accordance with 49 CFR 192.615 to minimize the hazards resulting from a pipeline emergency, including a leak. The Emergency Response Plan will at a minimum include:

- Procedures for receiving, identifying, and classifying notices of events which require immediate response by the operator
- Procedures for notifying fire, police, and other public officials as necessary; establishing and maintaining adequate means of communication with appropriate officials; and coordinating responses in the event of an emergency
- Procedures for the prompt and effective response to a notice of emergency events, including gas detection inside or near a building, fire near or involving the pipeline or related facilities, explosions near or involving the pipeline or related facilities, or a natural disaster
- Availability of personnel, equipment, tools, and materials needed at the scene of an emergency
- Procedures for emergency shutdown and pressure reduction in any section of the pipeline system as necessary to minimize hazards to life or property
- Procedures for protecting life and property in the event of an emergency

10.3 Removal or Addition of Pipes and Pumps for Pipeline Maintenance

In general, removal or addition of equipment or pipe for maintenance is expected to occur at major facilities where the pipeline is aboveground. It is possible that removal or addition of equipment or pipe may take place at other locations (e.g., MLVs). All procedures for these activities will be detailed in the O&M Plan. Procedures will be developed and carried out in accordance with applicable regulation and will follow BMPs.

10.4 Right-of-Way Maintenance Schedules

In general, it is expected that limited maintenance will be required on the ROW. A schedule for maintenance will be developed in accordance with all pertinent regulations and will follow BMPs.

10.5 Safety

The ASAP will be designed, constructed, operated, and maintained in accordance the requirements of the Pipeline and Hazardous Materials Safety Administration (PHMSA) within the U.S. Department of Transportation. These requirements are included in 49 CFR Subtitle B and are intended to ensure adequate protection for the public from natural gas pipeline failures. The ASAP will meet or exceed these requirements. These requirements address:

- Pipeline safety programs and rulemaking procedures (49 CFR Part 190)
- Annual reports, incident reports, and safety-related condition reports for natural gas pipelines (49 CFR Part 191)
- Minimum federal safety standards for transportation of natural gas by pipeline (49 CFR Part 192)

An O&M Plan will be developed as discussed in Section 10.1 and a Safety Plan will be developed as discussed in Section 7.10. O&M will be performed in a manner that is protective of personal health, safety, and is protective of the environment.

Damage Prevention
A Damage Prevention Program as identified in 49 CFR 192.614 will be implemented to prevent damage from excavation activities, including excavation, blasting, boring, tunneling, backfilling, the removal of aboveground structures by either explosive or mechanical means, and other earthmoving operations. As part of the Damage Prevention Program, the pipeline operator would participate in the state one-call system for excavators to call for excavation activities (utility locates) as required by 49 CFR 192.614. Participation in the one-call system may not be necessary if access to the pipeline is physically controlled by the operator.

Public Awareness
The operator of ASAP will develop a public education program that follows the American Petroleum Institute's (API) Recommended Practice 1162. The education program will include provisions on the one-call notification system (utility locate), hazards associated with an unintended release and indications that a release has occurred, and reporting procedures and steps to be taken if a release occurs.

10.6 Industrial Wastes and Toxic Substances Near Right-of-Way

The pipeline operator will have a SPCP approved prior to operation of the pipeline. This plan will address operations and maintenance of vehicles, storage of fuels and other hazardous materials, containment requirements, liquid and solid storage and waste disposal, spill response and cleanup procedures, reporting requirements, and periodic inspection and documentation requirements. The plan will be developed in accordance with all pertinent regulations and will follow BMPs.

10.7 Inspection and Maintenance Schedule

A Continuing Pipeline Surveillance Plan for ASAP will be developed in accordance with 49 CFR 192.613. This plan will detail procedures for continuing surveillance of the pipeline and associated facilities so that appropriate action may be taken in the event of equipment failures, leakages, corrosion, substantial changes in cathodic protection, or other unusual operating and maintenance conditions. The Continuing Pipeline Surveillance Plan will adhere to all pertinent regulations and will follow BMPs.

10.7.1 Aircraft

Aerial patrols may be used to identify any areas of concern regarding ASAP. In particular, aerial patrols can identify threats to pipeline integrity from erosion or water undermining the pipeline (after storm events, ice damming, etc.), after seismic events, and identify construction activities or unauthorized digging in the vicinity of the pipeline. Procedures for aerial patrols will be described in the Continuing Pipeline Surveillance Plan.

10.7.2 Ground Inspection

Ground inspection will be performed when aerial patrols identify any areas of concern, in the event of excavation near the pipeline (during or immediately after the activity), and on a periodic basis. Procedures and frequency of ground patrols will be described in the Continuing Pipeline Surveillance Plan.

10.8 Personnel and Work Schedules

Information about O&M personnel requirements and work schedules are based upon early planning stage man-load estimates. Additional information regarding the number of personnel to be employed for O&M will be developed as the project progresses.

Preliminary calculations for O&M estimate that 10 workers will be required in Prudhoe Bay to run and manage the GCF and the Prudhoe Bay O&M Facility; 10 workers in Fairbanks for the Fairbanks O&M Facility; and 30 workers in Wasilla for the Cook Inlet NGL Extraction Facility and the Wasilla O&M Facility. Off-site housing will be provided for GCF workers, likely at a commercial camp located within Deadhorse. Personnel located in Fairbanks and Wasilla will be responsible for providing their own housing within local communities.

Personnel requirements have not yet been determined for compressor stations and the Straddle and Off-Take Facility; they may be manned on a full-time ongoing basis or periodically in the event of emergencies or for O&M activities.

10.9 Fire Control

Fire control systems will be in place at all major facilities. More detailed information will be developed as ASAP design progresses. Fire control systems will be developed in accordance with all pertinent regulations and will follow BMPs. In the event of a fire, the Emergency Response Plan will be followed as described in Section 10.2.3.

10.10 Contingency Planning

Contingency planning will be performed on an ongoing basis to identify specific situations when things could go wrong, and develop procedures to address these scenarios. Contingency planning will focus on the most likely events, but would also consider events that have a low likelihood of occurring, but would have major impacts (e.g., terrorist attack). The objective of contingency planning is to develop mechanisms and procedures so that ASAP personnel can respond in a timely manner to an unexpected event.

11.0 TERMINATION AND RESTORATION

Upon reaching the end of the ASAP's functional life, the pipeline will be shut down. Shut-down will include removal of all product and removal or in-situ remediation of ASAP-associated equipment and facilities. Landowners will be consulted about necessary revegetation in areas where structures are removed. Specific plans for termination and restoration activities will be developed in accordance with pertinent regulations and will follow BMPs applicable at the time of shut-down.

11.1 Removal of Structures

This information will be provided by the construction contractor and operator of the pipeline. Plans will be developed in accordance with all pertinent regulations and will follow BMPs.

11.2 Status of Pipe at Termination

This information will be provided by the construction contractor and operator of the pipeline. Plans will be developed in accordance with all pertinent regulations and will follow BMPs.

11.3 Obliteration of Roads

This information will be provided by the construction contractor and operator of the pipeline. Plans will be developed in accordance with all pertinent regulations and will follow BMPs.

11.4 Stabilization and Re-Vegetation of Disturbed Areas

This information will be provided by the construction contractor and operator of the pipeline. Plans will be developed in accordance with all pertinent regulations and will follow BMPs.

12.0 REFERENCES

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APPENDIX C

Mitigation Measures

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The USACE will consult with NMFS and USFWS to determine additional mitigation measures that may be required to ensure that the ASAP is not likely to jeopardize the continued existence of any ESA-listed species or result in the destruction or adverse modification of critical habitat. Mitigation will include application for an LOA and/or IHA for polar bears and walruses, and mitigation measures will be specified in such approvals.

Typical mitigation measures that will likely be required of ASAP vessel operators and construction crews by the USFWS and the NMFS.

Mitigation Measures	Species
Avoid concentrations of groups of whales by all vessels.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale, ringed seal, bearded seal, Steller sea lion, Pacific walrus, polar bear
Maintain the maximum practicable distance from concentrations of marine mammals.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale, ringed seal, bearded seal, Steller sea lion, Pacific walrus, polar bear
Not approach Pacific walruses or polar bears on ice or land closer than 805 m (.5 mi).	Pacific Walrus, polar bear
Reduce vessel speed to below 10 knots when within 300 yards (274 m) of whales and those vessels capable of steering around such groups should do so.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale
Vessels may not be operated in such a way as to separate members of a group of marine mammals from other members of the group.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale, ringed seal, bearded seal, Steller sea lion, Pacific walrus, polar bear
Avoid multiple changes in direction and speed when within 300 yards (274 m) of whales. In addition, operators should check the waters immediately adjacent to a vessel to ensure that no whales will be injured.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale
Reduce vessel speed when weather conditions require, such as when visibility drops, to avoid the likelihood of injury to marine mammals.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale, ringed seal, bearded seal, Steller sea lion, Pacific walrus, polar bear
Implement a 24-hour monitoring plan to record and observe polar bears in the area to minimize polar bear and human interactions, thereby reducing the potential for take.	polar bear

Mitigation Measures	Species
Reduce/eliminate polar bear attractants.	polar bear
Store food waste and other associated waste in containers until transferred for disposal at an approved disposal site.	Polar bear
Transfer sanitary waste from bathrooms, sewage sludge, and kitchen-associated garbage on a regular basis to ensure control of attractants.	Polar bear
Identify kitchen grease for treatment as spoilable waste.	Polar bear
Transport hazardous wastes off vessel for disposal at an approved facility.	Polar bear
Strictly prohibit employees from directly feeding animals, throwing food to animals, or improperly disposing of food wastes.	Polar bear
Ensure bear has escape route(s) prior to conducting harassment activity.	Polar bear
Choose the method that will have the least effect on the bear and increase the intensity of the method or use additional methods of harassment only if necessary.	Polar bear
Shout at the bear as a method of harassment before using a projectile.	Polar bear
Monitor bear movement after harassment	Polar bear
Designate a qualified individual or individuals to observe, record, and report on the effects of their activities on polar bears and Pacific walruses.	Pacific Walrus, polar bear
Have an approved polar bear and/or walrus interaction plan on file with the USFWS and onsite.	Pacific Walrus, polar bear
Train operation and construction crews regarding polar bear awareness.	Polar bear
Provide USFWS and NMFS with a Plan of Cooperation that ensures that activities will not interfere with subsistence hunting and that adverse effects on the availability of marine mammals are minimized.	Bowhead whale, ringed seal, bearded seal, polar bear, Pacific walrus
Contact affected subsistence communities to discuss potential conflicts caused by location, timing, and methods of proposed operations.	Bowhead whale, ringed seal, bearded seal, polar bear, Pacific walrus
Make efforts to locate occupied polar bear dens within and near proposed areas of operation, utilizing appropriate tools, such as, forward looking infrared (FLIR) imagery and/or polar bear scent-trained dogs and report polar bear dens to the USFWS prior to the initiation of activities.	Polar bear
Observe a 1-mile operational exclusion zone around all known polar bear dens during the denning season (November-April) or until the female and cubs leave the areas.	Polar bear

Mitigation Measures	Species
Cease work in the immediate area of previously unknown occupied polar bear dens and contact the USFWS for guidance.	Polar bear
Restrict the timing of activity to limit disturbance around polar bear dens.	Polar bear
Consult with potentially affected communities and appropriate subsistence user organizations to discuss potential conflicts with subsistence marine mammal hunting caused by the location, timing, and methods of proposed operations and support activities.	Bowhead whale, ringed seal, bearded seal, polar bear, Pacific walrus
Develop and implement a site-specific, USFWS- and NMFS-approved, marine mammal monitoring and mitigation plan to monitor and evaluate the effects of authorized activities on marine mammals and the subsistence use of these resources.	Pacific Walrus, polar bear
Maintain trained Marine Mammal Observers aboard vessels to alert crew of the presence of marine mammals and initiate adaptive mitigation responses and to carry out specified monitoring activities identified in the marine mammal monitoring and mitigation plan necessary to evaluate the impact of authorized activities on marine mammals and the subsistence use of these resources.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale, ringed seal, bearded seal, Steller sea lion, Pacific walrus, polar bear
Cooperate with the USFWS, NMFS, and other designated Federal, State, and local agencies to monitor the impacts of oil and gas activities in the Beaufort Sea on marine mammals.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale, ringed seal, bearded seal, Steller sea lion, Pacific walrus, polar bear
Report the results of specified monitoring activities to the USFWS and NMFS.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale, ringed seal, bearded seal, Steller sea lion, Pacific walrus, polar bear
Report all observations of polar bears during any Industry operation.	Polar bear
Report any incidental lethal take or injury of a marine mammal immediately to USFWS or NMFS, depending upon the species injured or killed.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale, ringed seal, bearded seal, Steller sea lion, Pacific walrus, polar bear

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ALASKA GASLINE DEVELOPMENT CORP.
GAS FOR ALASKANS

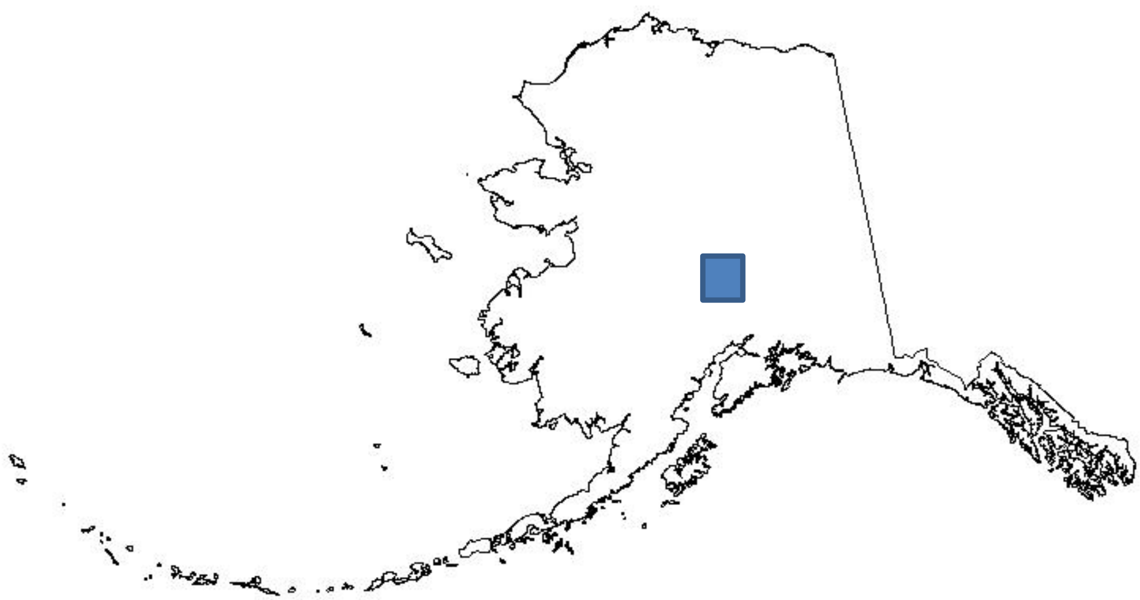
Appendix J

ASAP Wilderness Characteristics Inventory

U.S. Department of the Interior
Bureau of Land Management

Glennallen Field Office
Milepost 186.5 Glenn Highway
Glennallen, Alaska 99586
http://www.blm.gov/ak/st/en/fo/gdo.html

Wilderness Chacteristic Inventory
Case File Number: FF-95641
AK-A020-2011-ASAP-Wilderness Characteristics Inventory



Prepared By:
Glennallen Field Office
December 14, 2011

Documentation of BLM Wilderness Characteristics Inventory Findings from Previous Inventory on Record

1. **Is there existing BLM wilderness characteristics inventory information on all or part of this area?** There is no wilderness inventory characteristics inventory available for any of the three units identified in this evaluation.

No X **Yes** ______
(go to Form 2) (If yes, and if more than one area is within the area, list the unique identifiers for those areas.)

a) Inventory Source: ______
b) Inventory Area Unique Identifier(s): ______
c) Map Name(s)/Number(s): ______
d) BLM District(s)/Field Office(s): ______

2. **BLM Inventory Findings on Record:**

Existing inventory information regarding wilderness characteristics (if more than one BLM inventory area is associated with the area, list each area and answer each question individually for each inventory area): N/A

Inventory Source:

Area Unique Identifier	*Sufficient Size? Yes/No (acres)*	*Naturalness? Yes/No*	*Outstanding Solitude? Yes/No*	*Outstanding Primitive & Unconfined Recreation? Yes/No*	*Supplemental Values? Yes/No*

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Unique Identifier: AKA020-ASAP-Unit 1-Wilderness Inventory

Acreage: 3995 acres (T. 18 S., R. 8 W., Fairbanks Meridian)

Is the area of sufficient size? (If the area meets one of the exceptions to the size criterion, check Yes and describe the exception in the space provided below), Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes ________ No X ________

This unit is located south of Cantwell on the George Parks Highway at the west end of the Denali Highway, 211 miles north of Anchorage and 28 miles south of Denali National Park and Preserve. Lands within this unit are currently under the administration of the Bureau of Land Management. Units 1 boundary consists of the Alaska Rail Road to the south and Denali National Park and Preserve to the north. This unit does not meet the size requirement therefore no further review is required.

Does the area appear to be natural? Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes ________ No ________ N/A X ________

Vegetation consists mainly of dwarf birch, willows, grasses and sedges. Vegetation and soils are predominantly natural but localized areas of disturbance exist. Topography consists of rolling tundra, interspersed with many small lakes and boggy areas.

This area has substantial noticeable human impacts that would be apparent to the average visitor. The area is accessible to OHVs but, generally, is not accessible to most street four-wheel drive vehicles. Primary human uses/activities include hunting, hiking, and wildlife viewing, snowmachining and off-highway vehicle use along established multiple use trails in the area. Sights and sounds of the road system and other existing man-made features are dominant.

The George Parks Highway and the Alaska Railroad Right of Way are within sight and sound. All of these man-made developments/disturbances are substantially noticeable within close proximity and are less noticeable from further distances. The total man-made disturbances within the unit cumulatively detract from the natural quality of the area.

Does the area have outstanding opportunities for solitude?

Yes ____________ No ____________ N/A X ____________

The Parks Highway and Alaska Railroad ROW are dominant man-made features within this unit. The area does not offer vegetative and topographic screening that would provide the seclusion needed to reduce the presence of sights, sounds and evidence of other people or human-made features in the area.

Does the area have outstanding opportunities for primitive and unconfined recreation? Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

Yes ____________ No ____________ N/A X ____________

Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

This unit offers potential for some types of primitive recreation activities such as hiking, backpacking, hunting, and dispersed camping. However, these opportunities are similar to those available throughout much of the surrounding BLM-administered lands. Additionally the activities within this unit would generally require the use of motorized equipment. The motorized activities include snowmachining opportunities and off highway vehicle use.

Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

Yes ____________ No ____________ N/A X ____________

Summary of Analysis*

Area Unique Identifier: AKA020-ASAP-Unit 1

Results of analysis: This area has substantial noticeable human impacts that would be apparent to the average visitor. The area is accessible to OHVs but, generally, is not accessible to most street four-wheel drive vehicles. Sights and sounds of the Alaska Railroad and road system are dominate man made feature within this unit. The total man-made disturbances within the unit cumulatively detract from the natural quality, solitude and primitive recreation opportunities of the area.

1. Does the area meet any of the size requirements?	Yes		No	X		
2. Does the area appear to be natural?	Yes		No		N/A	X
3. Does the area offer outstanding opportunities for solitude or a primitive and unconfined type of recreation?	Yes		No	X	N/A	X
4. Does the area have supplemental values?	Yes		No		N/A	X

Check one:

____ The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.

X The area does not have wilderness characteristics.

Prepared by:

Name: Denton Hamby
Title: Outdoor Recreation Planner
Date: 11/8/2011

Reviewed by: (District or Field Manager):

Name: Beth Maclean
Title: Glennallen Field Manager
Date: 11/8/2011

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Unique Identifier: AKA020-ASAP-Unit 2-Wilderness Characteristics Inventory

Acreage: 1210 acres (T. 18 S., R. 8 W., Fairbanks Meridian)

1. **Is the area of sufficient size?** (If the area meets one of the exceptions to the size criterion, check Yes and describe the exception in the space provided below), Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes ____ No __X__

Description (describe the boundaries of the area--wilderness inventory roads, property lines, etc.):

This unit does not meet the size requirement therefore no further review is required.

Unit 2 is located south of Cantwell on the George Parks Highway at the west end of the Denali Highway, 211 miles north of Anchorage and 28 miles south of Denali National Park and Preserve. Lands within this unit are currently under the administration of the Bureau of Land Management. There is a mix of duel selected lands by the State of Alaska and Ahtna Native Corporation. Units 2 boundaries consist of the Alaska Rail Road to the north and the Parks Highway to the South.

2 **.Does the area appear to be natural?** Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes ____ No ____ N/A __X__

Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

3**. Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for solitude?**

Yes ____ No ____ N/A __X__

Description (describe the area's outstanding opportunities for solitude):

The Parks Highway, Alaska Energy Authority Transmission Line and Alaska Railroad ROW are dominant man-made features within this unit. The area does not offer vegetative and topographic screening that would provide the seclusion needed to reduce the presence of sights, sounds and evidence of other people or human-made features in the area.

Standing on its own merits, these opportunities are similar to those available throughout much of the surrounding lands. In addition, the existing primitive motorized routes extending into the interior of the unit increase the likelihood of encountering others within portions the unit. The AEA power line, within this unit, is visible from a majority of the unit and detracts from the solitude experience.

4**. Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation?** Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

Yes __________ No __________ N/A X __________

Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

This unit offers potential for some types of primitive recreation activities such as hiking, backpacking, hunting, and dispersed camping. However, these opportunities are similar to those available throughout much of the surrounding BLM-administered lands. Additionally the activities within this unit would generally require the use of motorized equipment. The motorized activities include snowmachining opportunities and off highway vehicle use.

5. **Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?**

Yes __________ No __________ N/A X __________

Description:

Summary of Analysis*

Area Unique Identifier: AKA020-ASAP-Unit 2

Results of analysis: Unit 2 does not meet the size criteria for consideration of Wilderness Characteristics. Additionally Unit 2 has substantial noticeable human impacts that would be apparent to the average visitor. The George Parks Highway and the Alaska Railroad Right of Way are within sight and sound of this unit. All of these man-made developments/disturbances are substantially noticeable and within close proximity (¼ mile). The total man-made disturbances within the unit cumulatively detract from the natural quality, solitude and primitive recreation opportunities of the area.

1. Does the area meet any of the size requirements?	Yes		No	X		
2. Does the area appear to be natural?	Yes		No		N/A	X
3. Does the area offer outstanding opportunities for solitude or a primitive and unconfined type of recreation?	Yes		No		N/A	X
4. Does the area have supplemental values?	Yes		No		N/A	X

Check one:

____ The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.

X The area does not have wilderness characteristics.

Prepared by :

Denton Hamby
Title: Outdoor Recreation Planner
Date: 11/8/2011

Reviewed by: (District or Field Manager):

Name: Beth Maclean
Title: Glennallen Field Manager
Date: 11/8/2011

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Unique Identifier: AKA020-ASAP-Unit 3-Wilderness Characteristics Inventory
Acreage: 6886 acres (Unit 3) T. 18 S., R. 8 W., Fairbanks Meridian

Is the area of sufficient size?

Yes x No ______
Description (describe the boundaries of the area--wilderness inventory roads, property lines, etc.):

This unit is located south of Cantwell on the George Parks Highway at the west end of the Denali Highway, 211 miles north of Anchorage and 28 miles south of Denali National Park and Preserve. Lands within this unit are currently under the administration of the Bureau of Land Management. There is a mix of duel selected lands by the State of Alaska and Ahtna Native Corporation. The George Parks Highway and Alaska Rail railroad rights of way (ROW)makes up the northern boundary while the Alaska Electric Authority (AEA)transmission line are the southern boundary.

Does the area appear to be natural? Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes ______ No X N/A ______
Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

The Alaska Energy Authority Transmission Line (AEA), the George Parks Highway and the Alaska Railroad Right of Way are within sight and sound within Unit 3. These man-made developments/disturbances are substantially noticeable within close proximity and are less noticeable from further distances. The total man-made disturbances within the unit cumulatively detract from the natural quality of the area.

This area has substantial noticeable human impacts that would be apparent to the average visitor. The area is accessible to OHVs but, generally, is not accessible to most street four-wheel drive vehicles. Primary human uses/activities include hunting, hiking, and wildlife viewing, snowmachining and off-highway vehicle use along an established multiple use trails in the area. Sights and sounds of the road system, the Alaska Railroad and the AEA transmission line are dominant man-made features within this unit.

Vegetation consists mainly of dwarf birch, willows, grasses and sedges. Vegetation and soils are predominantly natural but localized areas of disturbance exist. Topography consists of rolling tundra, interspersed with many small lakes and boggy areas.

1. **Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for**

solitude?

Yes ____________ No ____________ N/A X____________

Description: The Parks Highway, Alaska Energy Authority Transmission Line and Alaska Railroad ROW are dominant man-made features within this unit. The area does not offer vegetative and topographic screening that would provide the seclusion needed to reduce the presence of sights, sounds and evidence of other people or human-made features in the area. The AEA power line, George Parks Highway and the Alaska Railroad Right of Ways within this unit, are visible from a majority of the unit and detracts from the solitude experience.

Standing on its own merits, these opportunities are similar to those available throughout much of the surrounding lands. In addition, the existing motorized routes extending into the interior of the unit increase the likelihood of encountering others within portions the unit.

2. **Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation?** Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

Yes ____________ No X____________ N/A ____________

Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

This unit offers potential for some types of primitive recreation activities such as hiking, backpacking, hunting, and dispersed camping. However, these opportunities are similar to those available throughout much of the surrounding BLM-administered lands. Additionally the activities within this zone would generally require the use of motorized equipment. Depending on user tolerances, a truly primitive recreation experiences may be impeded upon by the existence of the George Parks Highway, Transmission lines and Pass Creek OHV Trail.

Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

Yes ____________ No ____________ N/A X____________

Summary of Analysis*

Area Unique Identifier: AKA020-ASAP-Unit 3

SUMMARY: The Alaska Energy Authority Transmission Line (AEA), the George Parks Highway and the Alaska Railroad Right of Way are pervasive and Omni -present within Unit 3. These man-made developments/disturbances are substantially noticeable. The total man-made disturbances within the unit cumulatively detract from the natural quality, opportunities for solitude and primitive recreation of the area.

1. Does the area meet any of the size requirements?	Yes	X	No			
2. Does the area appear to be natural?	Yes		No	X	N/A	
3. Does the area offer outstanding opportunities for solitude or a primitive and unconfined type of recreation?	Yes		No		N/A	X
4. Does the area have supplemental values?	Yes		No		N/A	X

Check one:

_____ The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.

X The area does not have wilderness characteristics.

Prepared by:

Name: Denton Hamby

Title: Outdoor Recreation Planner

Date: 11/8/2011

Reviewed by:

Name: Beth Maclean

Title: Glennallen Field Manager

Date: 11/8/2011

Wilderness Characteristics Inventory
Appendix C – Route Analysis[1]

Wilderness Characteristics Inventory Area Unique Identifier: AK020-ASAP-Wilderness Characteristic Inventory (Unit 3)

Route or Route Segment[3] Name and/or Identifier: (Include Transportation Plan Identifier, if known, and include route number supplied by citizen information, when available.)

I. LOCATION: Alaska Electric Authority (Right-Of-Way)

- Pass Creek Trail

Describe: The Pass Creek trail system begins immediately to the south of MP 206 on the east side of the Parks Highway. The southwestern (right) spur is in excellent shape until its end below a large hillside on the tundra at 3.75 miles. The NE spur (left) follows the ROW, crossing Pass Creek, then turns south into a small forest. At .61 miles on this spur a small creek with steep entry and exit points is crossed. At 1.19 miles this spur becomes badly rutted, with deep tree-rooted muck holes. These conditions persist until mile 1.50. The remainder of the trail is very bumpy and in some sections rutted and braided as it ascends a ridge. Near the ridge crest a small outfitter camp is located by a small lake (2 cabins/tents). 3 Spurs leave the camp accessing different camping/hunting sites.

II. ROUTE CONTEXT

A. Current Purpose[4] (if any) of Route: (Examples: Rangeland/Livestock Improvements (stock tank, developed spring, reservoir, fence, corral), Inholdings (ranch, farmhouse), Mine Site, Concentrated Use Site (camp site), Recreation, Utilities (transmission line, telephone, pipeline), Administrative (project maintenance, communication site, vegetation treatment)).

Describe: Recreational and hunting OHV, snowmachine, and hiking use.

B. Right-of-Way (ROW):

1. Is there a ROW associated with this route? Yes _x_ No ____ Unknown ____

2. If yes, what is the stated purpose of the ROW?

This ROW accesses the AEA power transmission line.

3. Is the ROW still being used for this purpose? Yes x No Unknown

Explain: The ROW provides access to the transmission line for annual and regular maintenance of the line.

III. WILDERNESS INVENTORY ROAD CRITERIA

A. Evidence of construction or improvement using mechanical means:

Yes _X___ (if either A.1 or A.2 is checked "yes" below)
No _____ (if both A.1 and A.2 are checked "no" below)

1. Construction: (Is there evidence that the route or route segment was originally constructed using

Yes _x_ No ____ Unknown ____

mechanical means?)

Examples: The ¼ to ½ mile of this route appear to have been initially created using mechanized equipment.

Paved ___ Bladed _x_ Graveled _x_ Roadside Berms ___ Cut/Fill ___ Other ____________

Describe: The first section of this trail show signs of gravel work and bladed grade.

2. Improvements: (Is there evidence of improvements using mechanical means to facilitate access?)

   Yes _x_ No ___

   If yes, By handtool ___ By machine _x_

   Examples:

   Culverts ___ Hardened Stream Crossings ___ Bridges ___ Drainage ___ Barriers ___

   Other ____________

   Describe:

B. **Maintenance:** (Is there evidence of maintenance that would ensure relatively regular and continuous use?):

Yes _x_ (if either B.1 or B.2 is checked "yes" below)

No ___ (if both B.1 and B.2 are checked "no" below)

1. Is there Evidence or Documentation of Maintenance using hand tools or machinery?

   Yes _x_ No ___

   If yes, By handtool ___ By machine _x_

   Explain:

2. If the route or route segment is in good[5] condition, but there is no evidence of maintenance, would mechanical maintenance with hand tools or machines be approved by BLM to meet the purpose(s) of the route in the event this route became impassable?

   Yes _X_ No ___

   Explain: Maintenance by mechanical means would be approved within the existing ROW to help maintain the transmission line.

C. **Relatively regular and continuous use:** (Does the route or route segment ensure relatively regular and continuous use?)

Yes X No ____

IV. CONCLUSION

Does the route or route segment[7] meet the definition of a wilderness inventory road (i.e., are items III.A and III.B and III.C all checked yes)?

Yes ____ = Wilderness Inventory Road
No x = Not a road for wilderness inventory purposes

Explanation[8]: This route shows evidence of being constructed by the use of mechanical means. The first section of trail that departs from the Parks highway has had additional gravel brought to the location and worked with a dozer to improve access route.

Evaluator(s): Denton Hamby

Date: 11/9/2011

[1.]This form documents information that constitutes and inventory finding on wilderness characteristics. It does not represent a formal land use allocation or a final agency decision subject to administrative remedies under either 43 CFR parts 4 or 1610.5-3.

[2].Road: An access route which has been improved and maintained by mechanical means to insure relatively regular and continuous use. A way maintained solely by the passage of vehicles does not constitute a road.

a. Improved and maintained – Actions taken physically by people to keep the road open to vehicle traffic. "Improved" does not necessarily mean formal construction. "Maintained" does not necessarily mean annual maintenance.

b. Mechanical means – Use of hand or power machinery or tools.

c. Relatively regular and continuous use – Vehicular use that has occurred and will continue to occur on a relatively regular basis. Examples are: access roads for equipment to maintain a stock water tank or other established water sources, access roads to maintained recreation sites or facilities, or access roads to mining claims.

[3]If a portion of a route is found to meet the wilderness inventory road criteria (see Part III) and the remainder does not meet these criteria (e.g., a cherrystem road with a primitive route continuing beyond a certain point), identify each segment and explain the rationale for the separate findings under pertinent criteria. [1] The purpose of a route is not a deciding factor in determining whether a route is a road for wilderness characteristics inventory purposes. The purpose of a route does provide context for factors on which such a determination may be based, particularly the question of whether maintenance of the route ensures relatively regular and continuous use.

[4]The purpose also helps to determine whether maintenance that may so far have been unnecessary to ensure such use would be approved by BLM when the need arises.

[5]Good condition would be a condition that ensures regular and continuous use relative to the purposes of the route. Consider whether the route can be clearly followed in the field over its entire course and whether all or any portion of the route contains any impediments to travel

[6] Include estimate of travel rates for the stated purposes, e.g., trips/day or week or month or season or year or even multiple years in some facility maintenance cases.

[7].If part of the route meets the wilderness inventory road definition and the remainder does not, describe the segment meeting the definition and any remaining portion not meeting the definition and why.

[8]Describe and explain rationale for any discrepancies with citizen proposals.

Appendix D - Photo Log Form

Photographer(s): Dann Gunn, Recreation Technician
Inventory Area Name & No.: Unit 1

Date	Frame #	Camera Direction	Description	GPS/UTM Location	Township	Range	Section
8/2006	2844		Pass Creek Trail				
8/2006	2845		Pass Creek Trail				


Current Conditions: Presence or Absence of Wilderness Characteristics

Area Unique Identifier: AKA020-ASAP-Unit 4-Wilderness Characteristics Inventory
Acreage: 6112 acres (Unit 4) T. 18 S., R. 8 W., Fairbanks Meridian

Is the area of sufficient size? (If the area meets one of the exceptions to the size criterion, check Yes and describe the exception in the space provided below), Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes x No ____

Description:

This unit is located south of Cantwell on the George Parks Highway. Lands within this unit are currently under the administration of the Bureau of Land Management. There is a mix of duel selected lands by the State of Alaska and Ahtna Native Corporation. The Alaska Electric Authority (AEA) transmission line is the northern boundary.

Does the area appear to be natural? Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes ____________ No ___X_______ N/A _____________

Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

The Alaska Energy Authority Transmission Line (AEA), the George Parks Highway and the Alaska Railroad Right of Way are within sight and sound within Unit 4. These man-made developments/disturbances are substantially noticeable within close proximity and are less noticeable from further distances. The total man-made disturbances within the unit cumulatively detract from the natural quality of the area.

This area has substantial noticeable human impacts that would be apparent to the average visitor. The area is accessible to OHVs but, generally, is not accessible to most street four-wheel drive vehicles. Primary human uses/activities include hunting, hiking, and wildlife viewing, snowmachining and off-highway vehicle use along an established multiple use trails in the area. Sights and sounds of the road system, the Alaska Railroad and the AEA transmission line are dominant man-made features within this unit.

Vegetation consists mainly of dwarf birch, willows, grasses and sedges. Vegetation and soils are predominantly natural but localized areas of disturbance exist. Topography consists of rolling tundra, interspersed with many small lakes and boggy areas.

Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for solitude?

Yes ____________ No ___X_______ N/A _____________

Description (describe the area's outstanding opportunities for solitude):

The Parks Highway, Alaska Energy Authority Transmission Line and Alaska Railroad ROW are dominant man-made features within this unit. The area does not offer vegetative and topographic screening that would provide the seclusion needed to reduce the presence of sights, sounds and evidence of other people or human-made features in the area. The AEA power line, George Parks Highway and the Alaska Railroad Right of Ways within this unit, are visible from a majority of the unit and detracts from the solitude experience.

Standing on its own merits, these opportunities are similar to those available throughout much of the surrounding lands. In addition, the existing motorized routes extending into the interior of the unit increase the likelihood of encountering others within portions the unit.

Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation? Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

Yes __________ No __X_______ N/A ___________
Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

This unit offers potential for some types of primitive recreation activities such as hiking, backpacking, hunting, and dispersed camping. However, these opportunities are similar to those available throughout much of the surrounding BLM-administered lands. Additionally the activities within this zone would generally require the use of motorized equipment. Depending on user tolerances, a truly primitive recreation experiences may be impeded upon by the existence of the George Parks Highway, Transmission lines and Pass Creek OHV Trail.

Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

Yes __________ No __________ N/A __X_________

Summary of Analysis*

Area Unique Identifier: AKA020-ASAP-Unit 4

SUMMARY: The Alaska Energy Authority Transmission Line (AEA), the George Parks Highway and the Alaska Railroad Right of Way are pervasive and Omni -present within Unit 4. These man-made developments/disturbances are substantially noticeable. The total man-made disturbances within the unit cumulatively detract from the natural quality, opportunities for solitude and primitive recreation of the area.

1. Does the area meet any of the size requirements?	Yes	X	No			
2. Does the area appear to be natural?	Yes		No	X	N/A	
3. Does the area offer outstanding opportunities for solitude or a primitive and unconfined type of recreation?	Yes		No		N/A	X
4. Does the area have supplemental values?	Yes		No		N/A	X

Check one:

	The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.
X	The area does not have wilderness characteristics.

Prepared by:

Name: Denton Hamby
Title: Outdoor Recreation Planner
Date: 11/8/2011

Reviewed by:

Name: Beth Maclean
Title: Glennallen Field Manager
Date: 11/8/2011

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Unique Identifier: AKA020-ASAP-Units-5-9 Cantwell South-Wilderness Inventory

Acreage: Sections 24-25 (1280 acres), and 34-35 (1110.25 acres), T. 19 S., R. 9 W., Fairbanks Meridian. Totals 2390.25 acres.

Is the area of sufficient size? (If the area meets one of the exceptions to the size criterion, check Yes and describe the exception in the space provided below), Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes ____________ No X ___________

Units 5-8 do not meet the size requirement therefore no further wilderness review is required.

This unit is located south of Cantwell on the George Parks Highway. Lands within this unit are currently under the administration of the Bureau of Land Management.

Does the area appear to be natural? Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes ____________ No ___________ N/A X _____________

Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

Vegetation consists mainly of dwarf birch, willows, grasses and sedges. Vegetation and soils are predominantly natural but localized areas of disturbance exist. Topography consists of rolling tundra, interspersed with many small lakes and boggy areas.

This area has substantial noticeable human impacts that would be apparent to the average visitor. Primary human uses/activities include hunting, hiking, and wildlife viewing, snowmachining and off-highway vehicle use along established multiple use trails in the area. Sights and sounds of the road system and other existing man-made features are dominant.

The George Parks Highway and the Alaska Railroad Right of Way are within sight and sound. All of these man-made developments/disturbances are substantially noticeable within close proximity and are less noticeable from further distances. The total man-made disturbances within the unit cumulatively detract from the natural quality of the area.

Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) **have outstanding opportunities for solitude?**

Yes ___________ No ___________ N/A X ___________

Description (describe the area's outstanding opportunities for solitude):

The Parks Highway and Alaska Railroad ROW are dominant man-made features within this unit. The area does not offer vegetative and topographic screening that would provide the seclusion needed to reduce the presence of sights, sounds and evidence of other people or human-made features in the area.

Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation? Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

Yes ___________ No ___________ N/A X ___________

Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

Yes ___________ No ___________ N/A X ___________

Summary of Analysis*

Area Unique Identifier: AKA020-ASAP-Unit(s) 5-8 Cantwell South

Results of analysis: This area has substantial noticeable human impacts that would be apparent to the average visitor. Sights and sounds of the Alaska Railroad and road system are dominate man made feature within this unit. The total man-made disturbances within the unit cumulatively detract from the natural quality, solitude and primitive recreation opportunities of the area.

1. Does the area meet any of the size requirements?	Yes		No	X		
2. Does the area appear to be natural?	Yes		No		N/A	X
3. Does the area offer outstanding opportunities for solitude or a primitive and unconfined type of recreation?	Yes		No	X	N/A	X
4. Does the area have supplemental values?	Yes		No		N/A	X

Check one:

____ The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.

X The area does not have wilderness characteristics.

Prepared by:

Name: Denton Hamby
Title: Outdoor Recreation Planner
Date: 11/8/2011

Reviewed by:

Name: Beth Maclean
Title: Glennallen Field Manager
Date: 11/8/2011

U.S. Department of the Interior
Bureau of Land Management

Central Yukon Field Office
1150 University Avenue
Fairbanks, AK 99709
http://www.blm.gov/ak/st/en/fo/fdo/central_yukon_field.html

Wilderness Characteristics Inventory

Case File Number: FF-95641

Alaska Stand-Alone Pipeline Wilderness Characteristics Inventory

Prepared By:

Central Yukon Field Office

December 5, 2011

Wilderness Characteristics Assessment - ASAP

This action is being analyzed under the Secretary of Interior's Order 3310 of December 22, 2010, as a project level decision.

The basis for this evaluation is the 1980 Nonwilderness Assessment conducted by BLM along portions of the trans-Alaska oil pipeline system (TAPS) corridor (U.S. Department of Interior, BLM, 1980). This was a special project approved by the Director, BLM. The assessment identified lands under BLM administration that lacked wilderness characteristics as defined in the Wilderness Act of 1964 and was conducted in a manner that met the requirements of Section 603 of the Federal Land Policy and Management Act of 1976 (FLPMA).

The nonwilderness assessment area was divided into nine segments. Four of these segments include BLM managed land located near the TAPS corridor north of Dalton Highway milepost 56 (Yukon River).

The ASAP proposed alignment bisects the four BLM managed segments. Location and a brief summary of the study findings for each of the segments are discussed below. If alternatives to the proposed alignment fall outside these segments, or fall outside the lands determined to be nonwilderness, additional analysis will be required for those alternatives.

Yukon Segment

The Yukon Segment covers the area from T14N R12W/13W Fairbanks Meridian (Milepost 76 (approximate) Dalton Highway) into T3N R2W/3W Fairbanks Meridian (Milepost 16 (approximate) Elliott Highway). BLM management authority in this segment occurs between approximately Milepost 76-56 (Yukon River) of the Dalton Highway and extends to the east/west limits of BLM managed land.

Portions of this segment meet the 5,000 acre minimum size. Lands identified within the nonwilderness boundary line were deemed as not meeting naturalness standards due to roads, camps, airfields, pipelines and material sites. The presence of the Yukon River bridge affects the naturalness of the area. These disturbances bisect the entire length of the segment. The proposed action is located within the nonwilderness portion of this segment.

Prospect Segment

The Prospect Segment covers the area from T28N (two miles south of the T29N/T28N boundary) R11W/12W/13W Fairbanks Meridian (Milepost 175.5 (approximate) Dalton Highway) through T15N R12W/13W Fairbanks Meridian (Milepost 76 (approximate) Dalton Highway). BLM management authority in this segment occurs between approximately Milepost 175.5-76 of the Dalton Highway and extends to the east/west limits of BLM managed land.

Portions of this segment meet the 5,000 acre minimum size. Lands identified within the nonwilderness boundary line were deemed as not meeting naturalness standards due to roads, camps, airfields, pipelines and material sites. Cabins and mining activities are also noted as affecting the naturalness of the area. These disturbances bisect the entire length of the segment. The proposed action is located within the nonwilderness portion of this segment.

Atigun Segment

The Atigun Segment covers the area from T12S R11E/12E Umiat Meridian (Milepost 269 (approximate) Dalton Highway) to T28N (two miles south of the T29N/T28N boundary) R11W/12W/13W Fairbanks Meridian (Milepost 175.5 (approximate) Dalton Highway). BLM management authority in this segment occurs between approximately Milepost 175.5-269 of the Dalton Highway and extends to the east/west limits of BLM managed land.

Portions of this segment meet the 5,000 acre minimum size. Lands identified within the nonwilderness boundary line were deemed as not meeting naturalness standards due to roads, camps, airfields, pipelines and material sites. These disturbances bisect the entire length of the segment. The proposed action is located within the nonwilderness portion of this segment.

Sagavanirktok Segment

The Sagavanirktok Segment covers the area from T11S R11E/12E Umiat Meridian (Milepost 269 (approximate) Dalton Highway) through T1N R13/R14E/15E/16E Umiat Meridian (Milepost 360 (approximate) Dalton Highway). BLM management authority in this segment occurs between approximately Milepost 269-300 of the Dalton Highway and extends to the east/west limits of BLM managed land.

Portions of this segment meet the 5,000 acre minimum size. More than half of the segment was deemed as not meeting naturalness standards due to roads, camps, airfields, pipelines and material sites. These disturbances bisect the entire length of the segment. The proposed action is located within the nonwilderness portion of this segment.

Finding:

The BLM managed land encompassed by the proposed action does not contain wilderness characteristics. The 1980 Nonwilderness Assessment showed the area lacked naturalness. Recent in the field observations have confirmed that the 1980 assessment is still valid. In addition, the lands that were determined to be nonwilderness are reserved as a Utility and Transportation Corridor under PLO 5150, so would not be suitable for management as wild lands.

Reference:

U.S. Department of Interior, BLM, 1980. Nonwilderness Assessment: The Alaska Natural Gas Transportation System. Final Decision. Anchorage, Alaska.

FORM 1
Documentation of BLM Wilderness Characteristics Inventory Findings on Record
1. Is there existing BLM wilderness characteristics inventory information on all or part of this area?
No (Go to Form 2)**Yes YES____** (If yes, and if more than one area is within the area, list the unique identifiers for those areas.):
a) Inventory Source: _
U.S. Department of Interior, BLM, 1980. Nonwilderness Assessment: The Alaska Natural Gas Transportation System. Final Decision. Anchorage, Alaska.

b) Inventory Area Unique Identifier(s):
Sagavanirktok Segment
Atigun Segment
Prospect Segment
Yukon Segment

c) Map Name(s)/Number(s): See Area Unique Identifiers, above.

d) BLM District(s)/Field Office(s): Central Yukon Field Office, Fairbanks District.

2. BLM Inventory Findings on Record:
Existing inventory information regarding wilderness characteristics (if more than one BLM inventory area is associated with the area, list each area and answer each question individually for each inventory area):
Inventory Source: U.S. Department of Interior, BLM, 1980. Nonwilderness Assessment: The Alaska Natural Gas Transportation System. Final Decision. Anchorage, Alaska.

Area Unique Identifier	Sufficient Size? Yes/No (acres)	Naturalness? Yes/No	Outstanding Solitude? Yes/No	Outstanding Primitive & Unconfined Recreation? Yes/No	Supplemental Values? Yes/No
Sagavanirktok Segment	Yes	No	No	No	No
Atigun Segment	Yes	No	No	No	No
Prospect Segment	Yes	No	No	No	No
Yukon Segment	Yes	No	No	No	No

FORM 1 – **ASAP Line, Livengood to Denali National Park**

Documentation of BLM Wilderness Characteristics Inventory Findings from Previous Inventory on Record

1. Is there existing BLM wilderness characteristics inventory information on all or part of this area?

No____X_____ (Go to Form 2) **Yes ________** (If yes, and if more than one area is within the area, list the unique identifiers for those areas.):

a) Inventory Source: ____________________

b) Inventory Area Unique Identifier(s):__ ___________

c) Map Name(s)/Number(s):____________________

d) BLM District(s)/Field Office(s):___ _________________

2. BLM Inventory Findings on Record:

Existing inventory information regarding wilderness characteristics (if more than one BLM inventory area is associated with the area, list each area and answer each question individually for each inventory area):
Inventory Source: __________________

Area Unique Identifier	Naturalness? Yes/No	Outstanding Solitude? Yes/No	Outstanding Primitive & Unconfined Recreation? Yes/No	Supplemental Values? Yes/No

Form 2

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Name: *Livengood Scattered Parcels*

Total BLM Inventory Acreage: approximately 408 acres

Area Unique Identifiers

- CYFO-ASAP-001, 160 acres
- CYFO-ASAP-002, 20 acres
- CYFO-ASAP-003, 15 acres
- CYFO-ASAP-004, 110 acres
- CYFO-ASAP-005, 10 acres
- CYFO-ASAP-006, 92 acres
- CYFO-ASAP-007, < 1 acre

Is the area of sufficient size? (If the area meets one of the exceptions to the size criterion, check Yes and describe the exception in the space provided below), Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes ________ No ___**X**___
Description (describe the boundaries of the area--wilderness inventory roads, property lines, etc.):

This inventory unit consists of scattered parcels, none of which are individually greater than 5,000 acres. Primarily bordered by State of Alaska and Native lands, none of these parcels are contiguous to lands which have been formally determined to have wilderness or potential wilderness values. Many of these parcels are State-selected and some are likely to be conveyed. Because none of the inventory units listed in this section meet the 5,000 acre size requirement, no further evaluation is needed.

Does the area appear to be natural? Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes ________ No ________ N/A ___**X**___
Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

1. **Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for solitude?**

Yes ________ No ________ N/A ___**X**___
Description (describe the area's outstanding opportunities for solitude):

2. **Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation?** Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

   Yes __________ No __________ N/A **X**__________

   Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

   Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

   Yes __________ No __________ N/A X__________

   Description:

Form 2

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Name: *Denali North Scattered Parcels*

Total BLM Inventory Acreage: 3,595 acres

Area Unique Identifiers

- CYFO-ASAP-016, 2,120 acres
- CYFO-ASAP-017, 133 acres
- CYFO-ASAP-018, 62 acres
- CYFO-ASAP-019, 1,280 acres

Is the area of sufficient size? (If the area meets one of the exceptions to the size criterion, check Yes and describe the exception in the space provided below), Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes ______ No **X**

Description (describe the boundaries of the area--wilderness inventory roads, property lines, etc.):

This inventory unit consists of scattered parcels, none of which are individually greater than 5,000 acres. Units ASAP-016, 017 and 018 are adjacent or close to the George Parks Highway and other man-made structures such as power transmission lines. Unit ASAP-019 is one mile south of the Suntrana-Nenana River road and has a power transmission line crossing it.

These parcels are bordered by State of Alaska-patented lands. None of these parcels are contiguous to lands which have been formally determined to have wilderness or potential wilderness values. Because none of the inventory units listed in this section individually meet the 5,000 acre size requirement, no further evaluation is needed.

Does the area appear to be natural? Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes ______ No ______ N/A **X**

Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

3. **Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for solitude?**

Yes ______ No ______ N/A **X**

Description (describe the area's outstanding opportunities for solitude):

4. **Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation?** Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

   Yes ____________ No ____________ N/A **X**____________

   Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

   Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

   Yes ____________ No ____________ N/A X____________

   Description:

   Check one:

   ________ The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.

   X________ The area does not have wilderness characteristics.

   Prepared by:

   Name: Lisa Shon Jodwalis
   Title: Park Ranger - Interpretation
   Date: 12/05/11

   Reviewed by:

   Name: Nichelle Jacobson
   Title: Central Yukon Field Manager
   Date:

Form 2

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Name: *Anderson North*

Total BLM Inventory Acreage: 7,680 acres

Area Unique Identifiers

- CYFO-ASAP-14

Is the area of sufficient size? (If the area meets one of the exceptions to the size criterion, check Yes and describe the exception in the space provided below), Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes __X________ No ___________
Description (describe the boundaries of the area--wilderness inventory roads, property lines, etc.):

The east side is bordered by state and patented lands and touches the Golden Valley Electric Association transmission line and touches the George Parks Highway north of the town of Anderson. On the west, the Alaska Railroad and lands conveyed to the railroad form the boundary of this unit. To the south the boundary is formed by state-patented lands and to the north by state-conveyed lands.

Does the area appear to be natural? Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes ___________ No __X________ N/A _____________
Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

The George Parks Highway, the major road between Anchorage and Fairbanks and the Alaska Railroad are within sight and sound for a considerable distance due to the flat topography. The Golden Valley Electric Association (GVEA) transmission line cuts through the SE and NE corners of the unit and scattered private parcels occur to the east.

Vegetation consists mainly of boreal forest mixed with many wetlands and discontinuous permafrost. It is predominantly natural but there are substantial noticeable human impacts that are readily apparent to visitors. The transmission line supports are tall, massive and dominate the landscape. The area beneath them is kept clear of vegetation by heavy equipment. Since the region is mostly flat, the noise from both the railroad and highway can be loud and audible at quite a distance. Even at its widest point, a person would be at most one mile from the railroad and one mile from the highway.

Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for solitude?

Yes ___________ No ___X_______ N/A ____________

Description (describe the area's outstanding opportunities for solitude):

There are numerous casual ATV trails that are used by local residents. In winter there is probably some snowmachine use by local residents. Solitude is possible but certainly not an "outstanding" feature of this unit.

Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation? Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

Yes ___________ No ___X_______ N/A ____________

Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

This unit offers a limited opportunity for primitive recreation activities such as riding off-road vehicles and/or hunting. Hiking is virtually impossible. Some snowmachine and dog-mushing use by area residents might occur in winter. The generally flat and unremarkable terrain, with its mixed areas of dense vegetation and extensive wetlands, precludes an "outstanding " designation for primitive and unconfined recreation.

Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

Yes ___________ No ___________ N/A X ____________

Description:

Summary of Analysis*

Area Unique Identifier: CYFO-ASAP-14

SUMMARY: The Golden Valley Electric Association (GVEA) transmission line, the George Parks Highway and the Alaska Railroad Right of Way have visual and audible effects on the unit. These man-made developments/disturbances are substantially noticeable. The total man-made disturbances within the unit cumulatively detract from the natural quality, opportunities for solitude and primitive recreation of the area.

1. Does the area meet any of the size requirements?	Yes	X				
2. Does the area appear to be natural?	Yes		No	X	N/A	
3. Does the area offer outstanding opportunities for solitude or a primitive and unconfined type of recreation?	Yes		No	X	N/A	
4. Does the area have supplemental values?	Yes		No		N/A	X

Check one:

_____ The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.

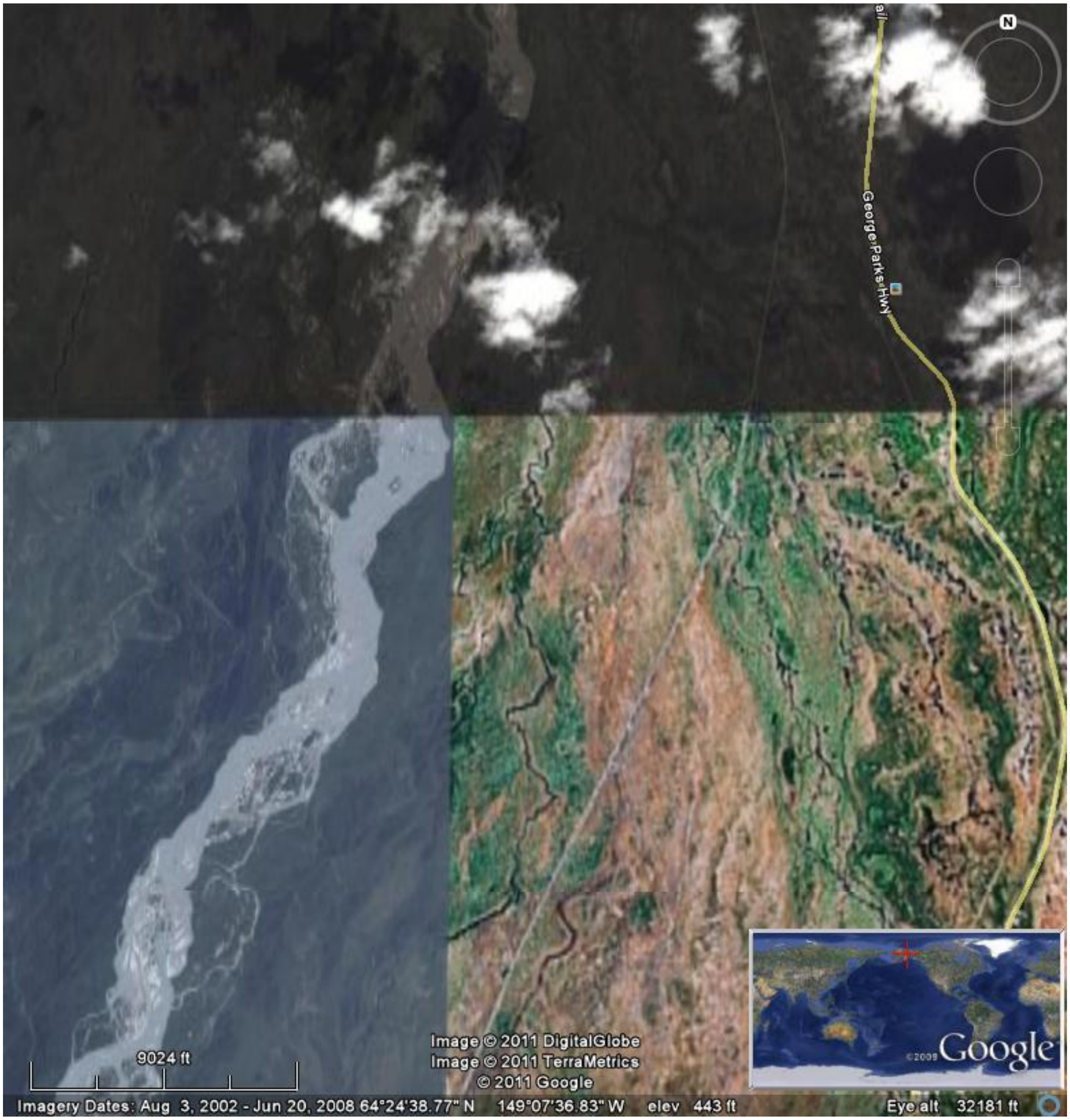
X The area does not have wilderness characteristics.

Prepared by:

Name: Lisa Shon Jodwalis
Title: Park Ranger - Interpretation
Date: 12/05/11

Reviewed by:

Name: Nichelle Jacobson
Title: Central Yukon Field Manager
Date:


George Parks Hwy
9024 ft
Image © 2011 DigitalGlobe
Image © 2011 TerraMetrics
© 2011 Google
Imagery Dates: Aug 3, 2002 - Jun 20, 2008 64°24'38.77" N 149°07'36.83" W elev 443 ft
Eye alt 32181 ft
Google

Form 2

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Name: *Anderson South*

Total BLM Inventory Acreage: 6,080 acres

Area Unique Identifiers

- CYFO-ASAP-15

Is the area of sufficient size? (If the area meets one of the exceptions to the size criterion, check Yes and describe the exception in the space provided below), Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes _X________ No ___________
Description (describe the boundaries of the area--wilderness inventory roads, property lines, etc.):

The east boundary is Alaska Railroad patented land and the road to the town of Anderson. Much of this unit is in the Clear Air Force Base withdrawal. Land on the west, north and south is state-patented land.

Does the area appear to be natural? Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes ___________ No _X________ N/A ____________
Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

This area contains an Air Force base with its roads and facilities, which have substantial noticeable human impacts that are readily apparent to visitors. Since the region is mostly flat, the man-made noise from these roads and facilities can be loud and audible at quite a distance.

Vegetation consists mainly of boreal forest mixed with wetlands and discontinuous permafrost.

Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for solitude?

Yes ___________ No _X________ N/A ____________
Description (describe the area's outstanding opportunities for solitude):

Because of the proximity of the air force base and the town of Anderson, solitude is unlikely, and certainly not an "outstanding" feature of this unit.

Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation? Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

Yes ____________ No ___X_______ N/A ______________

Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

This unit offers a limited opportunity for primitive recreation activities such as hunting. There are informal ATV trails in the area used by local residents. Some snowmachine and dog-mushing use by area residents might occur in winter. The generally flat and unremarkable terrain, with its mixed areas of dense vegetation and extensive wetlands, precludes an "outstanding " designation for primitive and unconfined recreation.

Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

Yes ____________ No ___________ N/A X ______________

Description:

Check one:

________ The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.

X_______ The area does not have wilderness characteristics.

Prepared by:

Name: Lisa Shon Jodwalis

Title: Park Ranger - Interpretation

Date: 12/05/11

Reviewed by:

Name: Nichelle Jacobson

Title: Central Yukon Field Manager

Date:

Summary of Analysis*

Area Unique Identifier: CYFO-ASAP-14

SUMMARY: Most of this unit is a military withdrawal for Clear Air Force Base. The Alaska Railroad Right of Way and the road to the town of Anderson are in close proximity. These man-made developments/disturbances are substantially noticeable. The total man-made disturbances within the unit cumulatively detract from the natural quality, opportunities for solitude and primitive recreation of the area.

1. Does the area meet any of the size requirements?	Yes	X				
2. Does the area appear to be natural?	Yes		No	X	N/A	
3. Does the area offer outstanding opportunities for solitude or a primitive and unconfined type of recreation?	Yes		No	X	N/A	
4. Does the area have supplemental values?	Yes		No		N/A	X

Check one:

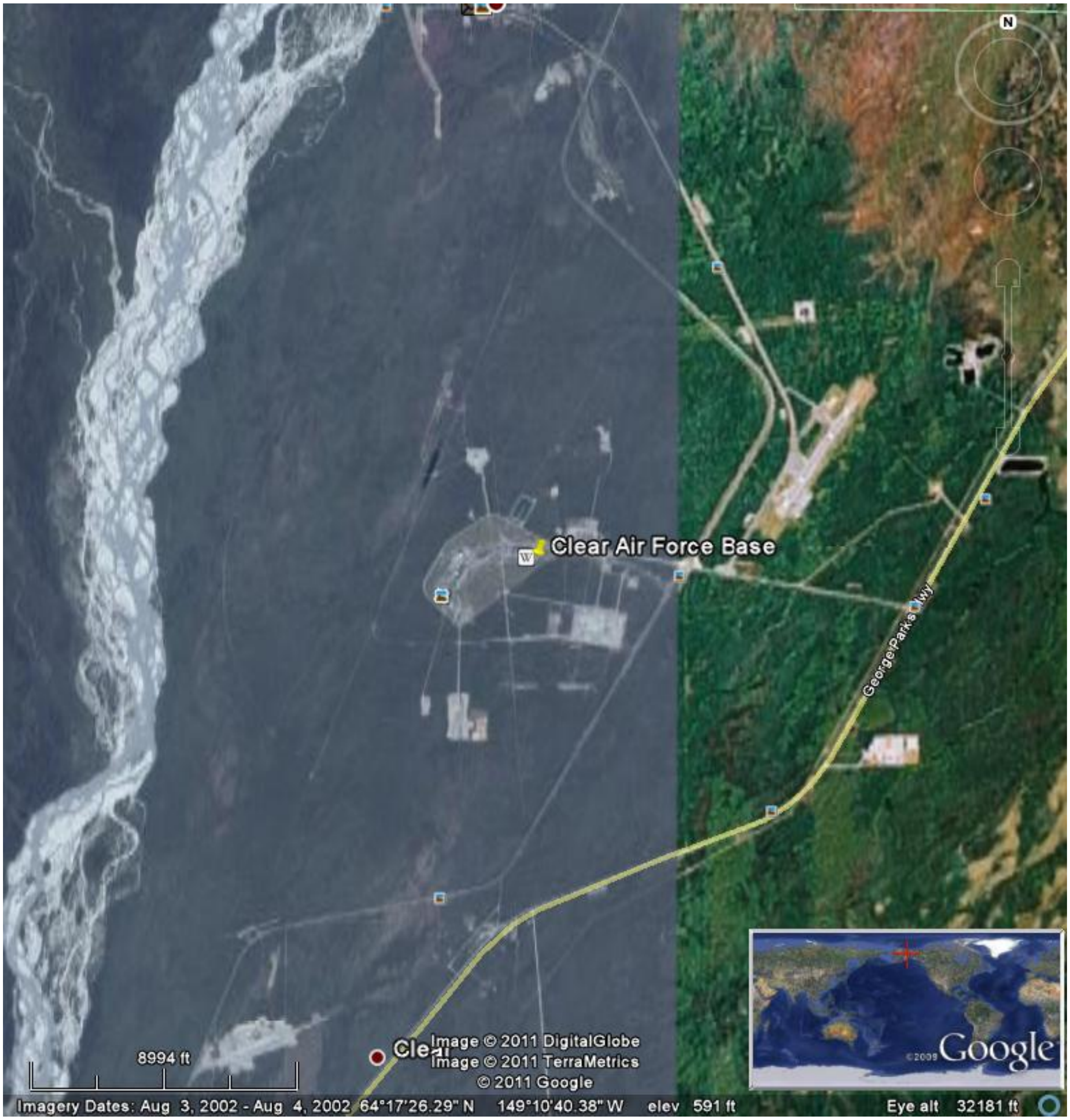
	The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.
X	The area does not have wilderness characteristics.

Prepared by:

Name: Lisa Shon Jodwalis
Title: Park Ranger - Interpretation
Date: 11/18/2011

Reviewed by:

Name: Nichelle Jacobson
Title: Central Yukon Field Manager
Date:



N
Clear Air Force Base
George Parks Hwy
Clear
Image © 2011 DigitalGlobe
Image © 2011 TerraMetrics
© 2011 Google
8994 ft
Imagery Dates: Aug 3, 2002 - Aug 4, 2002 64°17'26.29" N 149°10'40.38" W elev 591 ft Eye alt 32181 ft
Google

Form 2

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Name: *Nenana Scattered Parcels*

Total BLM Inventory Acreage: 3,575 acres

Area Unique Identifiers

- CYFO-ASAP-008, 10 acres
- CYFO-ASAP-009, <5 acres total estimated for 7 Railroad Reserve parcels within the City of Nenana
- CYFO-ASAP-010, 40 acres
- CYFO-ASAP-011, 1280 acres
- CYFO-ASAP-012, 1920 acres
- CYFO-ASAP-013, 320 acres

Is the area of sufficient size? (If the area meets one of the exceptions to the size criterion, check Yes and describe the exception in the space provided below), Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes ____________ No **X**__________

Description (describe the boundaries of the area--wilderness inventory roads, property lines, etc.):

This inventory unit consists of scattered parcels, none of which are individually greater than 5,000 acres. Several are located in the City of Nenana and consist of small lots. Except for the latter, these units are bordered by state-selected lands. None of these parcels is contiguous to lands which have been formally determined to have wilderness or potential wilderness values. Because none of the inventory units listed in this section meet the 5,000 acre size requirement, no further evaluation is needed.

Does the area appear to be natural? Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes ____________ No ____________ N/A **X**____________

Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

5. **Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for solitude?**

Yes ____________ No ___________ N/A **X** ___________

Description (describe the area's outstanding opportunities for solitude):

6. **Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation?** Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

Yes ____________ No ___________ N/A **X** ___________

Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

Yes ____________ No ___________ N/A X ___________

Description:

Check one:

________ The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.

X ________ The area does not have wilderness characteristics.

Prepared by:

Name: Lisa Shon Jodwalis

Title: Park Ranger - Interpretation

Date: 12/05/11

Reviewed by:

Name: Nichelle Jacobson

Title: Central Yukon Field Manager

Date:

Appendix K

Visual Impact Analysis Report for Denali National Park

A Visual Impact Analysis Report

of the

Alaska Stand Alone Gas Pipeline Project

in the Area of the

Denali National Park and Preserve

September 30, 2011

Design Alaska

A Visual Impact Analysis Report

of the

Alaska Stand Alone Gas Pipeline Project

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Denali National Park and Preserve

September 30, 2011

Prepared for:

Alaska Gas Development Corporation

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Table of Contents

List of Acronyms

AGDC ..... Alaska Gasline Development Corporation
ARRC ..... Alaska Railroad Corporation
ASAP ..... Alaska Stand Alone Gas Pipeline
BLM ..... Bureau of Land Management
DNPP ..... Denali National Park and Preserve
EIS ..... Environment Impact Statement
KOP ..... Key Observation Point
MP ..... Milepost
NPS ..... National Park Service
RMP ..... Resource Management Plan
ROW ..... Right-of-way
USACE ..... US Army Corps of Engineers
VRM ..... Visual Resource Management
WAC ..... Wilderness Access Center

1.0 Executive Summary

The visual impact analysis evaluates the potential visual impact to resources surrounding the Denali National Park and Preserve (DNPP) as a result of the Alaska Stand Alone Gas Pipeline (ASAP) project proposed by Alaska Gasline Development Corporation (AGDC). The project will construct a 24-inch diameter natural gas pipeline stretching from the North Slope to the Cook Inlet Area of Southcentral Alaska. The routing of ASAP from Prudhoe Bay generally parallels established transportation and existing infrastructure corridors from the North Slope. At the entrance to DNPP, the pipeline follows the Parks Highway. The National Park Service (NPS) has expressed concern for the impact the pipeline project may have on the views from inside DNPP.

Observation points are locations within DNPP from which the pipeline route would likely be seen. In a joint meeting between the NPS, DNPP, AGDC, and Design Alaska, the observation points were chosen to evaluate concerns regarding the visual impacts of the proposed gasline route on the surrounding landscape. After the initial observation points were evaluated, six Key Observation Points (KOPs) were accepted by the stakeholders and subjected to in-depth analysis using the BLM contrast rating system. The basis of the visual impact assessment is to analyze the degree to which the project affects existing landscape features using the following KOPs:

- KOP 1 – Government Hill is located on the Park Road. It provides an informal scenic view of the Riley Creek Bridge and the surrounding natural landscape.
- KOP 2 – Alaska Railroad Depot is a main destination for many visitors to the DNPP. It is the information hub of the park and in the center of the project KOPs.
- KOP 3 – Wilderness Access Center is where visitors go to obtain backcountry information. Of all the KOPs in the analysis, it is situated closest to the proposed pipeline route.
- KOP 4 – Parks Highway South of Entrance represents the most direct view of the project route from the highway heading northbound. It is the only KOP on the Parks Highway.
- KOP 5 – Mt. Healy Overlook Trail leads from the DNPP Visitor Center to Mt. Healy Overlook at 3500 feet elevation. It is the location where the project has the highest degree of visibility.
- KOP 6 – Alaska Railroad Corridor shows the unique, moving view from the Alaska Railroad.

Utilizing visual simulations and the contrast rating worksheets in the analysis, the two KOPs with the most potential impacts are KOP 1 and KOP 4. Considering the views from all KOPs, the visual impacts of the ASAP project appear to be primarily between MP 538.5 and MP 540.2 of the pipeline route. The potential impacts could be mitigated by using such methods as directional boring on that section of the pipeline or rerouting the ASAP to avoid the area entirely. These mitigation options could greatly reduce or eliminate the potential visual impacts caused by the construction and operations of the ASAP.

This report does not imply that mitigation alternatives are required. Mitigation solutions are presented to fulfill the contrast rating system requirement to identify mitigation possibilities whenever they exist. The contrast rating system is to be used as a guide, applied with common sense, to identify and minimize potential visual impacts.

2.0 Introduction

This report is a visual impact analysis for the Alaska Stand Alone Gas Pipeline (ASAP) project in the area of Denali National Park and Preserve (DNPP) from milepost (MP) 438 to MP 552 of the pipeline along the George Parks Highway. The purpose of the visual impact analysis is to measure the project's potential disturbance to the visual landscape.

2.1 Background

The need for a visual impact analysis is based on the National Park Service (NPS) request to more thoroughly analyze the potential visual impacts of the ASAP project. The NPS has stated their concern over visual impacts of the project in the area of DNPP in the form of written comments during their review of the Preliminary Draft EIS. During a meeting held with the NPS, the US Army Corps of Engineers (USACE), and the Alaska Gasline Development Corporation (AGDC) team on July 6, 2011, it was agreed that AGDC would conduct a visual analysis in the area of the Park. Design Alaska has prepared this analysis at the request of AGDC.

3.0 Project Summary

The proposed project consists of the construction of ASAP from the North Slope to the Cook Inlet Area in Southcentral Alaska. The purpose of the project is to provide a long-term, stable supply of up to 500 million standard cubic feet per day of natural gas and natural gas liquids from North Slope gas fields to markets in the Fairbanks and Cook Inlet areas by 2019.

The proposed ASAP is a 24-inch diameter natural gas pipeline which will be buried except in the following areas: MP 0 to MP 6, elevated bridge stream crossings, compressor stations, possible fault crossings, pigging facilities, and offtake valve locations. The pipeline system will be designed to transport a highly-conditioned natural gas highly-enriched in non-methane hydrocarbons.

The routing of ASAP is from Prudhoe Bay following the Trans-Alaska Pipeline System and Dalton Highway corridors, generally paralleling the highway corridor from the North Slope to near Livengood, northwest of Fairbanks. At Livengood, the pipeline route heads south, joining the Parks Highway corridor west of Fairbanks near Nenana. From there it continues south and terminates at MP 737 near Wasilla. It will connect at MP 39 of the Beluga Pipeline (ENSTAR's distribution system). A lateral pipeline to Fairbanks (Fairbanks Lateral) will take off from the main pipeline just a few miles north of Nenana at Dunbar. The Fairbanks Lateral will travel northeast to Fairbanks, a distance of approximately 35 miles.

DNPP is visited by more than 400,000 visitors annually, most of whom visit between late May and early September. The main attraction to the park is the 20,320 foot tall Mt. McKinley (Denali). However, there are many activities throughout the 6-million-acre park that attract international visitors looking to experience DNPP.

The project area is adjacent to the park entrance and visible from multiple vantage points within DNPP. The project route is situated so that it bypasses the park while continuing in a north-south direction. Although the project maintains a physical separation from the park limits, there have been concerns expressed regarding the visual impacts created by the ASAP project.

The ASAP mainline route comes within a quarter of a mile of DNPP along the Parks Highway. The NPS and USACE are interested in graphical depictions and visual analysis for the affected area of DNPP. This visual impact analysis report will support the visual impacts analysis in the ASAP Environmental Impact Statement and will be used to inform decision-makers and the public about the visual effects of construction and operation of ASAP through land surrounding DNPP.

4.0 Analysis Methodology

Visual resources are coordinated using a document that ensures future decisions and actions are consistent with environmental management objectives, called a Resource Management Plan (RMP). Normally, Visual Resource Management (VRM) objectives are identified using the RMP. However, no current RMP exists for DNPP. Without an RMP in place, this analysis will use interim VRM classes derived from guidelines in the Bureau of Land Management (BLM) Handbook H-8410-1 in addition to input from Paul Schrooten, Landscape Architect, with the NPS.

Lands are classified into one of four visual resource inventory classes (I, II, III, and IV). Class I lands are the most valued, while Class IV are the least valued. The VRM classification is the result of analyzing three factors: scenic quality evaluation, sensitivity level analysis, and delineation of distance zones. VRM classification serves two purposes: first, it is an inventory tool that portrays the relative value of visual resources; and second, it provides a management tool that portrays the visual management objectives. The VRM classification defines the objectives of preserving the existing character of the land and outlines the level of change that the landscape can support.

The visual resource inventory process provides land managers with a means for determining visual values. The assessment involves four key components. The first is to establish observation points. Observation points are locations in the project area from which proposed actions are potentially visible. The second element is to select a few Key Observation Points (KOPs) from the identified observation points within the project area that might be affected. The criteria for selecting KOPs are detailed in Section 4.2. The third part of the assessment is to prepare visual simulations for each KOP in order to illustrate which activities or aspects of a project could create impacts to visual resources and to evaluate defined impacts at KOPs. The final step is to conduct a visual assessment for each KOP, which compares the contrast rating between existing conditions and the proposed project features.

4.1 Establish Observation Points

Observation points were established through discussion, research, and evaluations accomplished by senior, experienced personnel familiar with the DNPP, including representatives from DNPP, NPS, AGDC, and Design Alaska. Observation points were chosen with the intent to address concerns of the NPS regarding the visual impacts of the proposed gasline route. Criteria for selecting observation points involved considering the perspectives of three levels of users. The first group of users would view the project area from locations of historical and visual significance inside DNPP, such as the DNPP Visitor Center. The second group involved users inside motor vehicles or pedestrians along the Parks Highway who might see the project. The third group consists of passengers traveling by rail on the Alaska Railroad. The observation points were confirmed at an on-site meeting with stakeholder representatives on July 26, 2011. The locations of these observation points are shown in Figure 1 (following page).

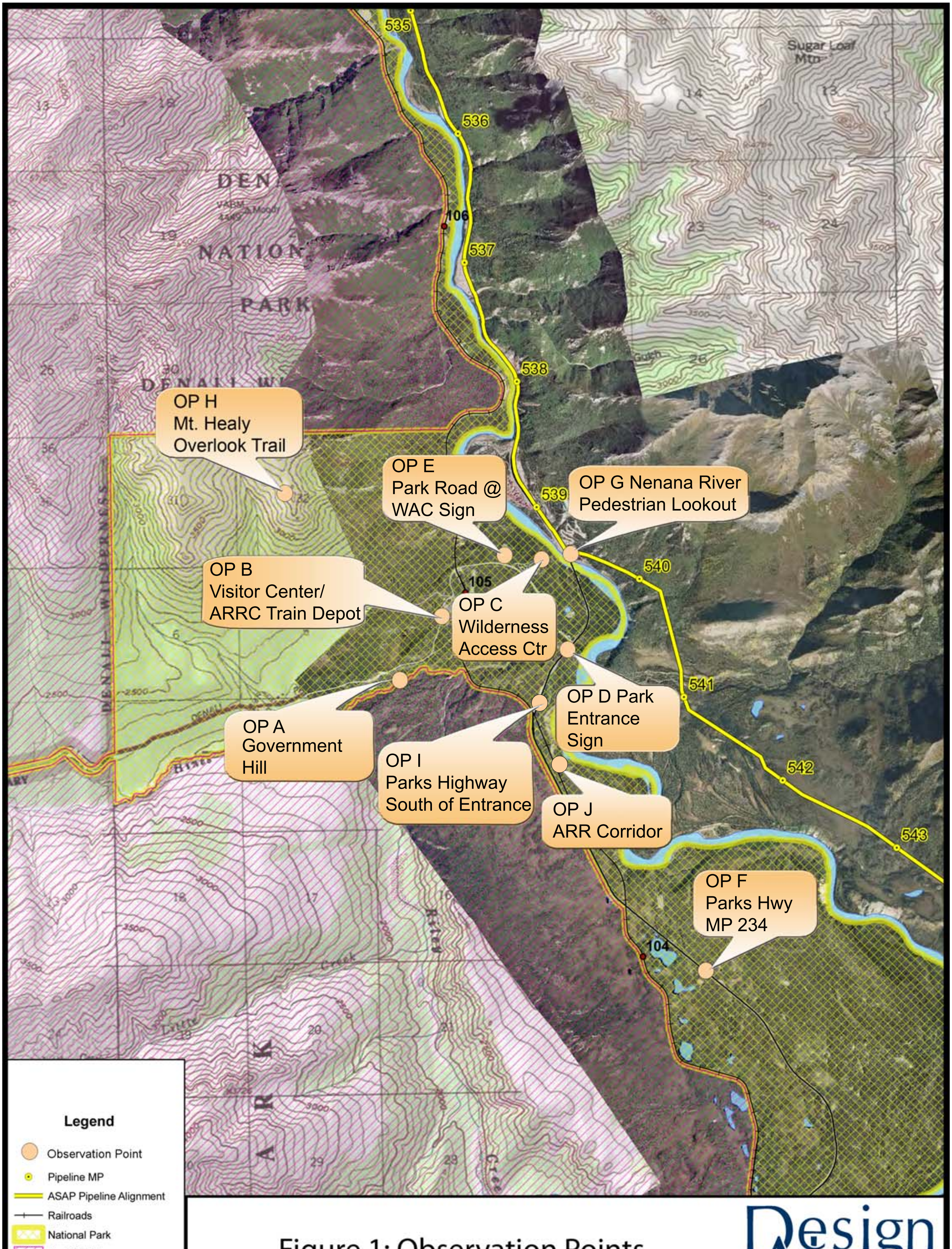

Figure 1: Observation Points

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The project team and NPS visited these observation points to gather more information. Photos were taken and data collected for each location. Some of the observation points were eliminated from future consideration due to various reasons, such as no line-of-sight to pipeline alignment, lack of importance of maintaining view due to surrounding commercial development, or a combination of factors. The DNPP Visitor Center (OP B on Figure 1), one of the most frequented stops and the information hub of the park, was one observation point eliminated due to lack of visibility of the pipeline alignment. The ARRC Depot (also denoted as OP B on Figure 1) was retained and is discussed in Section 5.2. Other observation points considered for this analysis, which were eliminated, include the DNPP Entrance Sign (OP D), the Park Road at Wilderness Access Center (WAC) Sign (OP E), and the Nenana River Pedestrian Lookout (OP G). Following the reduction of these four observation points, additional observation points were suggested by NPS for evaluation, specifically the Mt. Healy Overlook Trail (OP H), the Parks Highway South of Entrance (OP I), and Alaska Railroad Corridor (OP J).

4.2 Identify Key Observation Points (KOPs)

Following discussions with the NPS and project team site visits, the observation points were evaluated. In selecting KOPs for linear projects (such as ASAP), the BLM *Manual 8431 – Visual Resource Contrast Rating* suggests choosing viewpoints that represent:

- The most critical viewpoints, such as views from communities or road crossings;
- Typical views encountered in representative landscapes, if not covered by critical viewpoints; and
- Any special project or landscape feature, such as skyline, river and roadway crossings.

The contrast rating is done from the most critical viewpoints, usually along commonly traveled routes or at other likely observation points. Factors that should be considered in selecting KOPs are: 1) angle of observation, 2) number of viewers, 3) length of time the project is in view, 4) relative project size, 5) season of use, and 6) light conditions.

Utilizing input from the NPS and data from site visits, four of the original observation points were selected as KOPs. The two additional KOPs mentioned in Section 4.1 were agreed upon and added to the analysis. All KOP locations and associated VRM classifications were accepted by all interested parties for the mainline route. These include:

- KOP 1 – Government Hill
- KOP 2 – ARRC Depot
- KOP 3 – Wilderness Access Center (WAC)
- KOP 4 – Parks Highway South of Entrance
- KOP 5 – Mt. Healy Overlook Trail
- KOP 6 – Alaska Railroad Corridor

Thorough visual assessments on the KOPs were conducted. The analysis of each KOP is discussed in Section 5.0 of this report. KOPs identified for this project are shown in Figure 2.

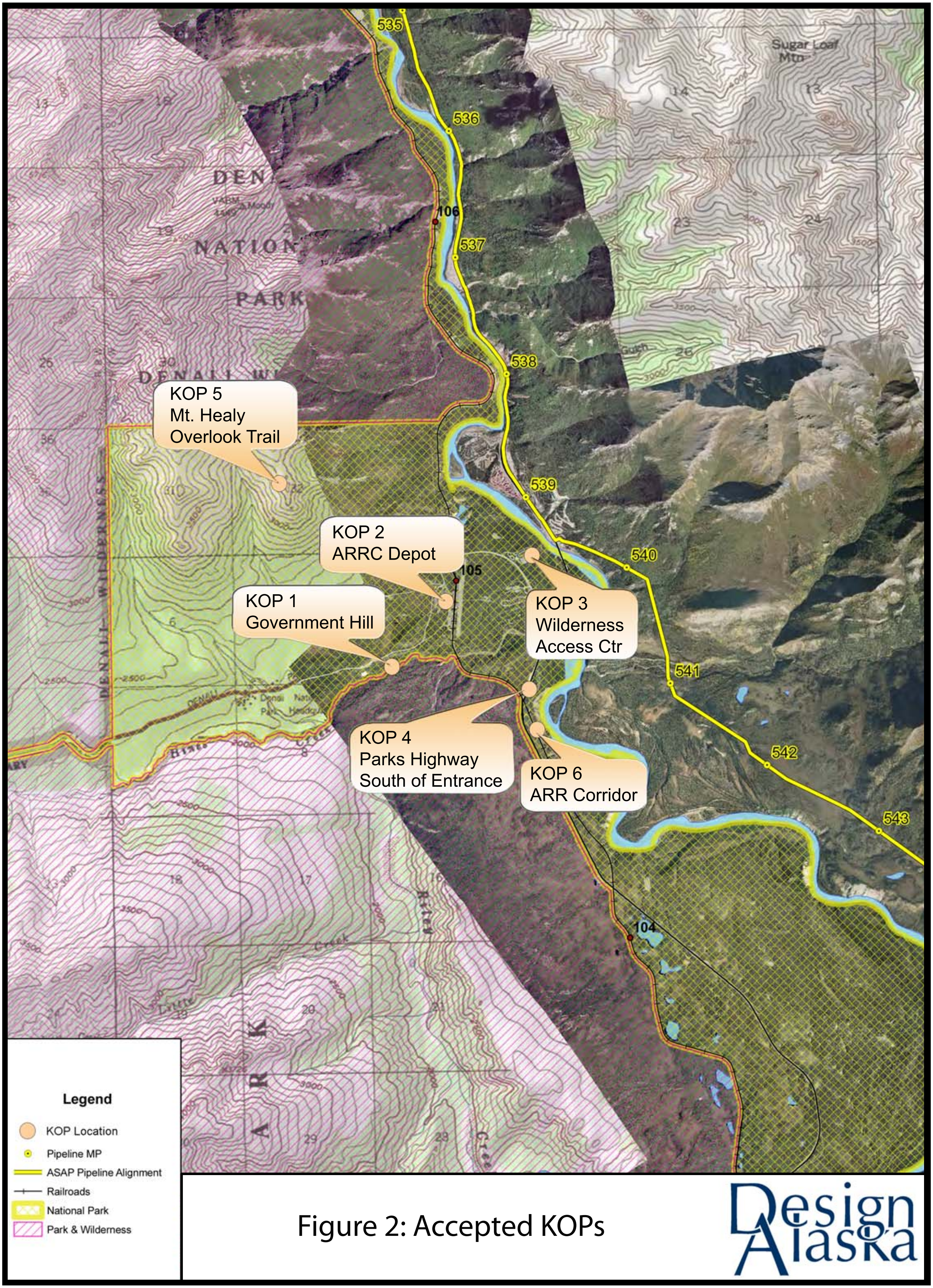

Figure 2: Accepted KOPs

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4.3 Prepare Visual Simulations

Visual simulations are instrumental in determining potential impacts of the proposed project. The visual simulations were prepared to a high level of detail, consistent with the high visual value of DNPP and the surrounding area.

In order to create the visual simulations, a sequence of photos at each KOP was combined using Adobe Photoshop to form a panorama. Then, using Google Earth, a representation of the pipeline alignment was digitized, following the topographical features depicted in the satellite imagery. Each KOP was located in Google Earth and the initial three-dimensional model was manipulated to match the orientation of the photo. This manipulation simplified the visualization of the pipeline's course. In some cases, features in the imagery were measured to achieve a relative scale for the pipeline route. For instance, the width of the Parks Highway is about 100', so in some photos the visual appearance of the highway at different distances would be similar to the proposed pipeline. Paths of approximately 100' were added perpendicular to the pipeline alignment at regular intervals, giving a better grasp of the pipeline limits. Figure 3 shows the manipulated Google Earth digital model for KOP 3.

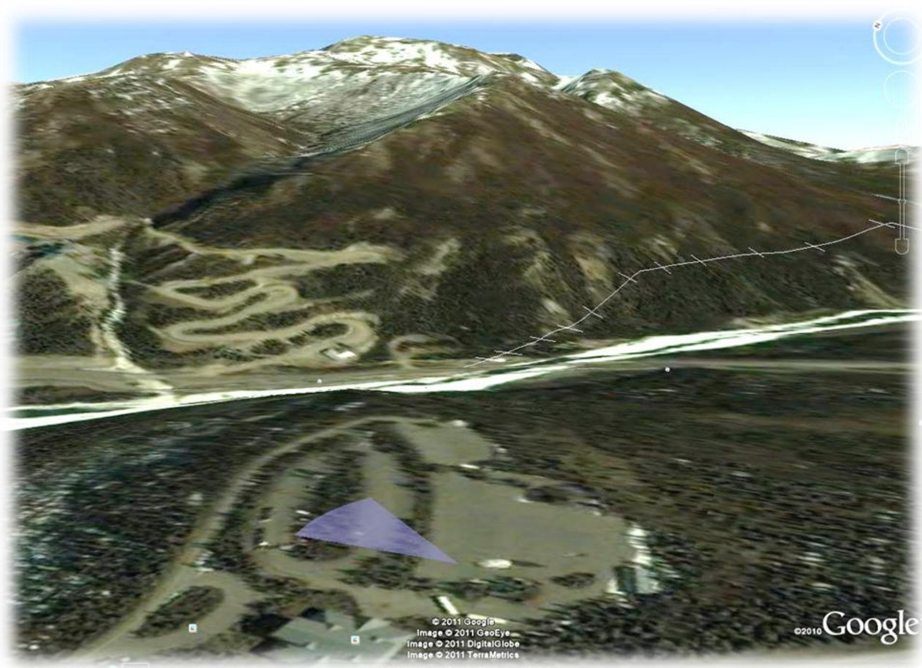

Figure 3: Google Earth Three Dimensional Model

In Adobe Photoshop, features were matched up with the Google Earth satellite imagery. The alignment of the pipeline was sketched in and refined. The pipeline route was digitally painted on top of the existing photo, taking into account vegetative cover as well as the viewing angle. Photos from the different KOPs were referenced against each other to locate distinctive features (rock outcroppings, bare areas) and keep the representation of the pipeline path consistent. After the construction phase of the pipeline route was depicted, a second digital painting with a 50' right-of-way (ROW) and vegetation matched from the surrounding area was completed to represent the operations phase.

Finally, three images were created from the master file showing the existing, construction, and operations phases. The completed visual simulations are shown during the discussion of each KOP. These simulations are extremely important to evaluate the potential impacts of the ASAP project at the KOP locations.

4.4 Evaluate Potential Impacts at KOPs

The following subsections summarize the steps for evaluating impacts at KOPs as explained in the BLM VRM manual 8431.

4.4.1 Select Timeframe

Projects are typically rated on either a short- or long-term basis. Short-term projects are defined as five years or less. The long-term timeframe considers the impacts over the life of the project. The ASAP project could be evaluated for both, but this analysis will consider only the long-term effects due to the lack of significant differences in the scope of construction and operations phases.

4.4.2 Assess Contrast

KOPs provide several reference points for rating the impact of construction activities on visual resources. The project team has visited each of these KOPs and completed a Visual Contrast Rating Worksheet (BLM VRM Form 8400-4) in the field. Appendix A includes copies of the completed worksheets.

The characteristics for each KOP were analyzed using the visual resource inventory process, in order to measure visual impacts. Visual impacts are interruptions in the form, line, color, or texture of the natural landscape. Impacts to the visual scenery as a result of the proposed project may include the following:

- Clearing of native vegetation along proposed gasline alignment
- Roads and trails caused by construction equipment
- General construction including open excavation
- Final condition – involving proposed route of cleared land, sparse vegetation, and operations roads

Utilizing the matrix in Section D of BLM VRM Form 8400-4, the degree to which visual impacts affect the project area at each KOP was recorded as one of four magnitudes: None, Weak, Moderate, or Strong. The general criteria for the degree of contrast ratings are shown in Table 1.

Table 1: Degree of Contrast Criteria

Degree of Contrast	Criteria
None	The element contrast is not visible or perceived.
Weak	The element contrast can be seen but does not attract attention.
Moderate	The element contrast begins to attract attention and begins to dominate the characteristic landscape.
Strong	The element contrast demands attention, will not be overlooked, and is dominant in the landscape.

Characteristics to keep in mind when classifying the degree of contrast are similar to those used previously when the KOPs were selected (see Section 4.2). In addition to the six factors listed in that section, evaluators should also consider recovery time, spatial relationships, atmospheric conditions, and motion, when evaluating the degree of contrast. The existing VRM classifications were concurred by NPS.

4.4.3 Determine Whether VRM Objectives are Met

The basic philosophy of the contrast rating system is that the effects of a project depend on the degree of contrast between the existing landscape and the final landscape as a result of work done on the project. The contrast is measured by comparing the features of the existing landscape with the proposed project features. The design elements of form, line, color, and texture are used to make the comparison and to describe the visual contrast created by the project.

An understanding of the contrast rating system is important in order to determine whether VRM objectives are met. For comparative purposes, the four levels of contrast (None, Weak, Moderate, and Strong) roughly compare with the BLM visual resource inventory classes (I, II, III, and IV) respectively. Additionally, a combination of ratings may indicate a stronger overall contrast than what the individual ratings show, such as multiple “moderate” ratings or a combination of ratings. In the discussion for each KOP in Sections 5.1 to 5.6, the classes will be identified for each KOP and it will be stated whether the VRM objectives are met.

4.4.4 Develop Potential Mitigating Measures

Since the VRM goal is to minimize visual impacts, mitigating measures will be discussed for all potential adverse contrasts due to the ASAP project. This includes KOPs where the VRM objectives are met, but where impacts can be reduced. Mitigation solutions presented in this report follow the discussion for each KOP.

5.0 KOPs

Each of the identified KOPs is evaluated in the following sections. The discussion for each KOP follows a general outline. First, there is an introduction of the KOP, including VRM classification and a figure establishing the existing view. Next, follows a discussion of the potential impacts on the visual landscape as identified from the BLM VRM Form 8400-4. Third, it is stated whether the VRM objectives are met and any possible mitigation that could be implemented. And last, graphic simulations of the project are presented to depict the appearance of the existing landscape during the construction and operations phases. At locations where directional boring is identified as a possible mitigation solution, graphic simulations have been prepared to show the effect this solution could have on the visual landscape. The completed Form 8400-4 for each KOP is included in Appendix A.

5.1 KOP 1 – Government Hill

Although there is no formal pull-off, the observation point provides a view of the Riley Creek Railroad Bridge and the surrounding natural landscape. Other than the rail bridge and a brief glimpse of vehicles on the Parks Highway, there are no man-made features visible. The VRM classification of this view is Class II. Figure 4 shows the existing view from KOP 1.

Figure 4: KOP 1 EXISTING

Figure 5 shows the view from KOP 1 with the simulated 100-foot project route during construction. The 50-foot operations route is shown in Figure 6.

While there are no official VRM objectives for this area, the strong lines and contrast between vegetation and soil color created by clearing the utility alignment could draw viewers' attention and potentially detract from the natural elements. Since there is no formal pullout and due to the limited time that the project is in view, moderate visual impact would be experienced with the proposed pipeline route. A strong rating would be appropriate, based on the contrast rating for this KOP, if a major public space was located at this KOP. The prominent features of this view (the bridge and Riley Creek) remain the focal point. However, the line of the project route on the left side of the view does attract attention. As the pipeline passes the middle of the view and to the right, it disappears from view mostly due to the weak color contrast and the decreased viewing angle.

Mitigation measures for this KOP could include rerouting the pipeline to less visible areas or minimizing the surface disturbance using underground boring. Either of these measures could alleviate the introduction of defined lines seen in the landscape from this KOP (Figures 7 and 8). A reroute of the proposed pipeline from MP 538.5 to MP 540.2 could push the gasline from the south and west side of the slope at Glitter Gulch to the backside (north and east side) of the hill.

Figure 5: KOP 1 CONSTRUCTION PHASE

Figure 6: KOP 1 OPERATIONS PHASE

Figure 7: KOP 1 MITIGATED CONSTRUCTION PHASE

Figure 8: KOP 1 MITIGATED OPERATIONS PHASE

5.2 KOP 2 – Alaska Railroad Depot

As mentioned previously, the DNPP Visitor Center is a major public gathering space. Limited views are provided from the Visitor Center due to surrounding mature vegetation in most directions, including toward the pipeline route. A short distance from the DNPP Visitor Center is the Alaska Railroad (ARRC) Depot, which has an extensive view shed of the project route (shown in Figure 9). The VRM classification for this KOP is Class III.

Figure 9: KOP 2 EXISTING

While there is a more extensive panorama from the ARRC Depot area, the simulations in Figures 10 and 11 show that most of the proposed pipeline route will not be visible. The part that is visible is low on the mountain and partially hidden from view by existing vegetation.

There are no official VRM objectives for this area. With many man-made structures in the foreground, the visual contrast at this location is weak. The impact does not dominate the view of the casual observer.

Any mitigation considered for other KOPs would likely lessen the amount of the project route that remains partially visible at this location. Mitigation measures for this KOP could include rerouting the pipeline to less visible areas or minimizing the surface disturbance using underground directional boring. A reroute of the proposed pipeline from MP 538.5 to MP 540.2 pushing the pipeline to the backside of the hill would mitigate the impacts to the view. Similarly, an underground bore for the gasline from MP 539.5 to MP 540.2 would eliminate most, if not all, of the potential impacts at this KOP. The visual simulations for the effect of mitigation alternatives are illustrated in Figure 12 and Figure 13.

Figure 10: KOP 2 CONSTRUCTION PHASE

Figure 11: KOP 2 OPERATIONS PHASE

Figure 12: KOP 2 MITIGATED CONSTRUCTION PHASE

Figure 13: MITIGATED OPERATIONS PHASE

5.3 KOP 3 – Wilderness Access Center

The WAC is a major public gathering space. Limited views are provided from the southern parking lot looking to the northeast (see Figure 14). The VRM classification for this location is Class III.

Figure 14: KOP 3 EXISTING

Pipeline views that might be observed from this area would be just above the tree line and would be a perpendicular view to the alignment (shown in Figures 15 and 16).

There are no official VRM objectives for this area. The contrast rating is weak as the impact closely follows the break between contrasting textures and lines in the tree line and the mountain. As seen in the two preceding figures, a small portion of the gasline route would be visible just above the tree line, looking to the northeast. The impact does not dominate the view of the casual observer as it is mostly interrupted by RV's and other vehicles using the parking lot.

Any mitigation considered for other KOPs would likely lessen the amount of the project route that remains partially visible at this location. Mitigation measures for this KOP could include rerouting the pipeline to less visible areas or minimizing the surface disturbance using underground directional boring. A reroute of the proposed pipeline from MP 538.5 to MP 540.2 pushing the pipeline to the backside of the hill would mitigate the impacts to the view. Likewise, underground drilling for the gasline from MP 539.5 to MP 540.2 would eliminate all of the potential impacts at this KOP. The view after mitigation at this KOP would remain unchanged from the existing shown previously in Figure 14.

Figure 15: KOP 3 CONSTRUCTION PHASE

Figure 16: KOP 3 OPERATIONS PHASE

5.4 KOP 4 – Parks Highway South of Entrance

The location on the Parks Highway (see Figure 17) was chosen as a representative location for users who experience views near DNPP from the highway. Speeds on this section of the highway are 55 miles per hour (mph) and reduce to 45 mph closer to the DNPP entrance. There is limited pedestrian activity. The VRM classification for this location is Class II.

Figure 17: KOP 4 EXISTING

Figure 18 shows the introduction of the pipeline route on the mountainside. The alignment is a defining feature on the mountain in the construction phase. In the operations phase (Figure 19) the re-vegetation softens the extents of the route but the cut line is still visible.

The contrast rating for this location is between moderate and strong. The prominent, undulating line created with the clearing of the pipeline route demands attention and will likely not be overlooked by the casual observer in the construction phase. During the operations phase, the impact is moderate as the cleared land begins to be re-vegetated. Although the route remains noticeable, it does not dominate the view as the focal point.

Possible mitigation for this location could include minimizing the effect on existing vegetation, such as feathering or thinning edges of the cut. Additionally, rerouting to a less visible area may make the cut less prominent in the overall view. Rerouting to blend with topographic forms in shape or placement might also be possible.

The resulting view from mitigation alternatives in the area between MP 539.5 to MP 540.2 is shown on the mitigation visual simulations. Both construction and operations phases are shown in Figure 20 and Figure 21.

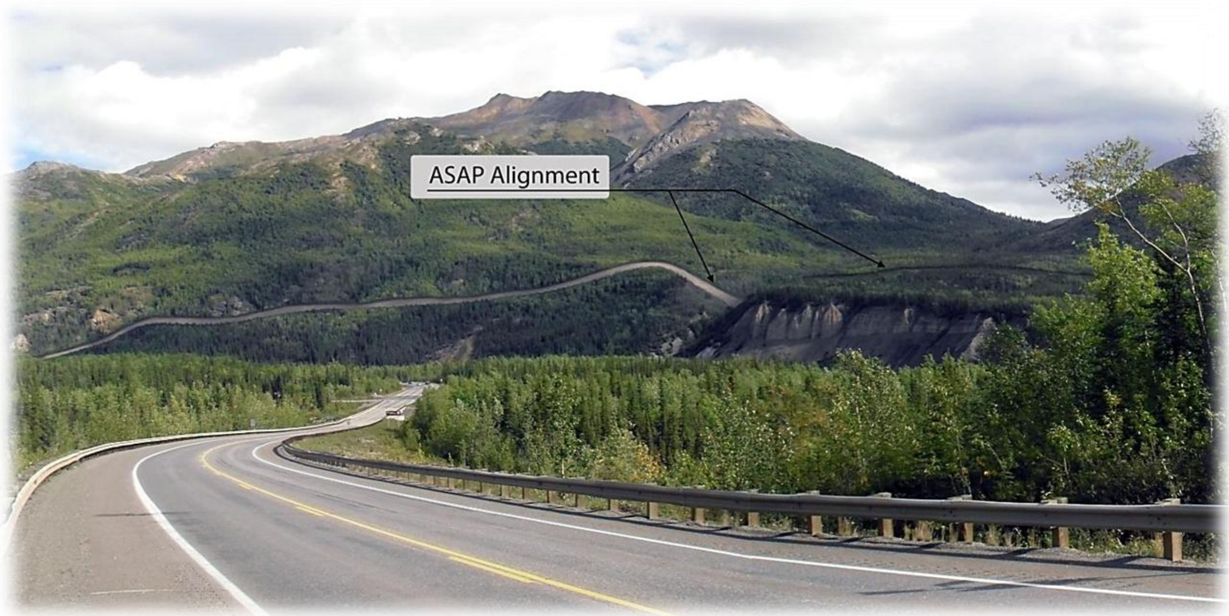

Figure 18: KOP 4 CONSTRUCTION PHASE

Figure 19: KOP 4 OPERATIONS PHASE

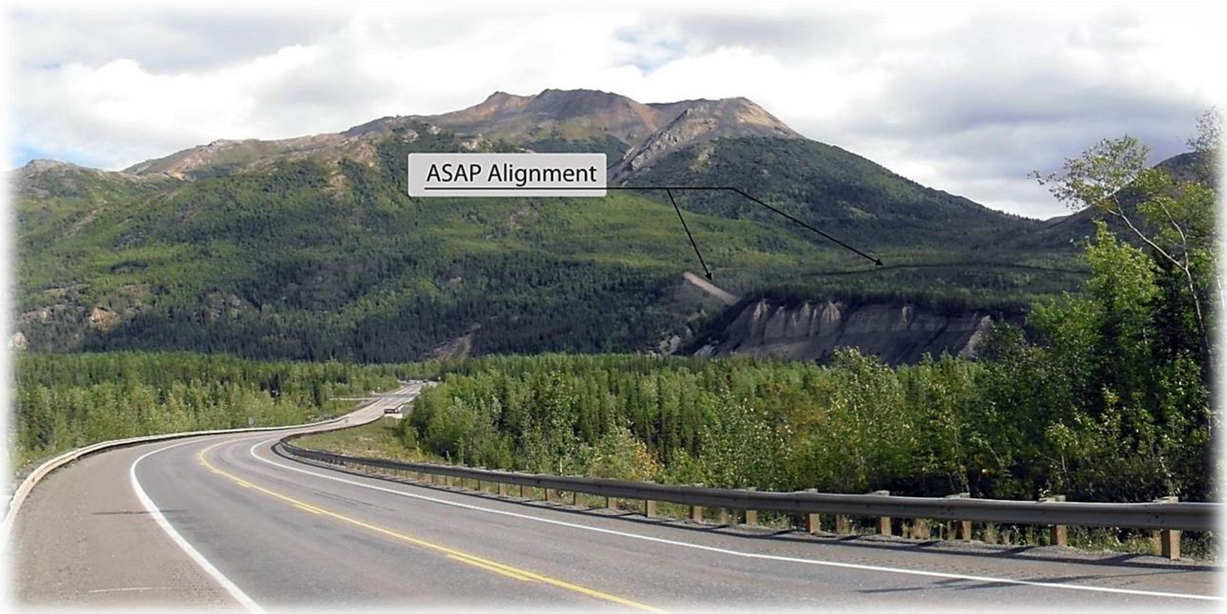

Figure 20: KOP 4 MITIGATED CONSTRUCTION PHASE

Figure 21: KOP 4 MITIGATED OPERATIONS PHASE

5.5 KOP 5 – Mt. Healy Overlook Trail

The Mt. Healy Overlook Trail is a 4.4 mile (round trip) hike that begins near the DNPP Visitor Center parking lot. This KOP was suggested by NPS as a representative location for the recreational trail users who visit the park. The existing view from the summit of the trail is shown in Figure 22. The VRM classification for this location is Class III.

Figure 22: KOP 5 EXISTING

While there are no formal VRM objectives, the contrast rating for this KOP is considered weak. The KOP view is of the pipeline route from a substantial distance. While the proposed route creates a long, narrow, winding ribbon through the landscape, it is camouflaged by the clutter of development in Glitter Gulch. In addition the number of defined lines seen from this KOP (between the Parks Highway, Nenana River, and driveways and other roadways) flow in the same direction as the pipeline alignment. The proposed project does not attract the attention of a casual observer.

Mitigation proposed at other locations will likely reduce the visual impact at this KOP. A directional bore for the gasline between stations 539.5 and 540.2 would eliminate a majority of the visual disturbance created by clearing the route. If the pipeline is rerouted, it should create curved lines in the landscape to be indistinguishable from other lines seen from this KOP.

Figure 23: KOP 5 CONSTRUCTION PHASE

Figure 24: KOP 5 OPERATIONS PHASE

Figure 25: KOP 5 MITIGATION CONSTRUCTION PHASE

Figure 26: KOP 5 MITIGATION OPERATIONS PHASE

5.6 KOP 6 – Alaska Railroad Corridor

The ARRC Corridor in the area of DNPP was recorded as a continuous series of 360° photographs by Immersive Video Solutions, LLC. The footage affords a way of viewing and characterizing the entire ARRC corridor through the DNPP area. The railroad corridor is generally bordered by dense vegetation at the edge of the cleared ARRC ROW. A few locations within the corridor have expansive views of the area surrounding DNPP and of the proposed pipeline route. These infrequent sweeping views of the pipeline alignment are visible for short spans of time. The existing view for KOP 6 is shown in Figure 27. The VRM classification for this location is Class II.

Figure 27: KOP 6 EXISTING

There is no formal railroad stop scheduled at this KOP location. The view of the proposed route is seen for less than 10 seconds by traveling railroad passengers before it is hidden by dense vegetation. Due to the width of the view, the visual simulations are separated into left and right segments. The view from KOP 6 of the proposed pipeline route during the construction phase is simulated in Figures 28 and 29. The operations phase visual simulation is shown in Figures 30 and 31. Similar to the other KOPs in this analysis, no VRM objectives have been formally established.

Potential impacts to KOP 6 are categorized by line and texture interruptions in the existing landscape. The visual contrast is moderate to weak at this location. The pipeline alignment is located at a considerable distance from the railroad corridor. Due to this distance, the potential impacts blend into the existing vegetation to a greater degree than if the pipeline were closer. Additionally, the viewing angle and site topography minimize the appearance of the contrasting features introduced by the proposed project. For three-fourths of the visible width of the view, the pipeline route is indistinguishable from other lines at the base of the surrounding mountains. On the northernmost (photo left) one-fourth of the view, the potential impacts are most pronounced during the construction phase of the proposed project. These potential impacts are a result of the surface clearing required for pipeline construction. During the operations phase, the visual contrast is weak for the entire route as re-vegetation dulls the defined line of the pipeline alignment.

Possible mitigation solutions for this location include those mentioned previously for other KOPs, specifically rerouting and underground drilling. Either of these solutions would reduce the potential impacts between MP 538.5 and MP 540.2. As the right portion is outside the specified milepost limits, the resulting views showing potential impacts after mitigation during construction and during operations for the northernmost (photo left) half only are shown in Figures 32 and 33, respectively.

Figure 28: CONSTRUCTION PHASE (LEFT)

Figure 29: CONSTRUCTION PHASE (RIGHT)

Figure 30: OPERATIONS PHASE (LEFT)

Figure 31: OPERATIONS PHASE (RIGHT)

Figure 32: MITIGATION CONSTRUCTION PHASE (LEFT)

Figure 33: MITIGATION OPERATIONS PHASE (LEFT)

6.0 Summary

The views from KOP 1 – Government Hill and KOP 4 – Parks Highway South of Entrance have the largest potential for visual impacts. These areas are both Class II in the VRM classification system and are experienced primarily by motorists. The contrast ratings are determined to be between moderate and strong in severity. KOP 2 – ARRC Depot and KOP 3 – Wilderness Access Center have only brief segments of the pipeline route visible. Both of these areas are classified as Class III and will be viewed by pedestrians. The contrast ratings are determined to be weak at both of these KOPs. KOP 5 – Mt. Healy Overlook Trail has the longest view of the disruption caused by the pipeline clearing and construction. However, the view shed itself is minimally affected due to the distance from the pipeline alignment and the number of both natural and man-made elements that compose the view. Due to the lack of contrast between the existing panorama and the resulting view with the proposed project, the contrast rating is weak. Table 2 shows the VRM classifications accepted by NPS for each KOP. Table 2 also shows the contrast rating for each KOP as discussed in this report.

Table 2: KOP Summary

KOP No.	Site Name	VRM Classification	Contrast Rating
1	Government Hill	Class II	Moderate
2	Alaska Railroad Depot	Class III	Weak
3	Wilderness Access Center	Class III	Weak
4	Parks Highway South of Entrance	Class II	Moderate/Strong
5	Mt. Healy Overlook Trail	Class III	Weak
6	Alaska Railroad Corridor	Class II	Moderate/Weak

The visual impacts of the ASAP project appear to be limited to the portion of the pipeline route from MP 538.5 to MP 540.2. The contrast rating due to these impacts is determined to be moderate or strong at 2 out of the 6 KOPs. The discussion of mitigating factors in this analysis and resulting visual simulations for mitigation alternatives suggest that underground boring or rerouting of the pipeline alignment could greatly reduce the potential impacts at this location.

This report does not imply that mitigation alternatives are required. The purpose of this analysis is to present the information for consideration by the interested parties. The contrast rating system is to be used as a guide, tempered by common sense, to identify and minimize the potential impacts of proposed projects.

Appendix A

Completed Form 8400-4 for Each KOP

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 08/04/2011
District N/A
Resource Area DNPP
Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name ASAP Pipeline	4. Location	5. Location Sketch
2. Key Observation Point #1 Government Hill	Township ______ Range ______ Section ______	
3. VRM Class		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Steep & Diagonal Background. Flat to Rolling Foreground	Smooth in Background Medium to Rough in Foreground	Smooth, Linear Rail Bridge
LINE	Bold Angular Lines at Horizon, Sloping/Broken Lines in middle ground	-Soft, irregular in Background -Irregular, vertical in Foreground	Strong Vertical and Horizontal Lines @ Bridge
COLOR	Gray, Tan, Brownish Red, Blue/Gray Water	Light to Dark Greens	Gray Road, Black/Brown Rail Bridge
TEXTURE	Smooth and Mottled	-Smooth/Med in Background -Medium/Coarse in Foreground	Smooth/Fine Rail Bridge

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat	Narrow, Curving and Straight Form created by clearing	N/A
LINE	Curved, Undulating	Strong to Moderate Lines created by edge effect of corridor clearing	N/A
COLOR	Gray, Tan, Brownish-Red	Light Green	N/A
TEXTURE	Fine to Smooth Clearing Corridor	Fine to Medium	N/A

SECTION D. CONTRAST RATING ☐ SHORT TERM ☑ LONG TERM

1.

DEGREE OF CONTRAST	LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
ELEMENTS: Form		✓				✓						✓
Line	✓				✓							✓
Color			✓				✓					✓
Texture		✓				✓						✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☑ Yes ☐ No (Explain on reverse side)

Evaluator's Names
John Rowe, ASLA
Alan Skinner, PE

Date
08/04/2011

Comments from item 2.

While there are no official VRM objective for this area, these strong lines and contrast in vegetation/soil color created by the clearing of the utility corridor will draw viewers attention and detract from the other natural and man made (rail bridge) aesthetics.

Additional Mitigating Measures (See item 3)

1. A directional bore for the gas line from approx. station 539.2 to 540.2 would elevate a majority of the heavy scaring to landscape from this KOP.

2. A reroute of the proposed pipeline from approx. station 538.5 to 540.2. This reroute would push the gasline from the South and West side of the slope at Glitter Gulch to the backside (North and East side) of the hill.

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Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 08/04/2011

District N/A

Resource Area DNPP

Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name
ASAP Pipeline

2. Key Observation Point
#2 Visitor Center/AK Railroad

3. VRM Class

4. Location
Township ________
Range ________
Section ________

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Steep/Diagonal Background Flat/Linear Foreground	Smooth in Background Medium to Coarse in Foreground	Rectangular Hotel in Background, Complex structures/Bold, Angular/Flat in Foreground
LINE	Bold Jagged Lines at Horizon, Angular Broken Lines in Middleground, Flat in Foreground	Soft, Flowing in Background Complex, Irregular in Foreground	Regular, Geometric Hotel Building in Background, Complex/Geometric, Hard in Foreground
COLOR	Gray, Tan and Brownish-Red Land/No Water Viewed	Light to Dark Green	Hotel with Green Roof and white exterior in Background/Browns and grays dominate structures Foreground
TEX-TURE	Smooth and Mottled	Smooth in Background Medium to Coarse in Foreground	Hard, Smooth Textures in Both Background & Foreground

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat	Narrow, Curving, and Straight form created by clearing activities	N/A
LINE	Straight and Curved, Undulating Line	Moderate Lines created by Edge Effect of Clearing Activities	N/A
COLOR	Gray, Tan & Brownish Red Land	Light Green	N/A
TEX-TURE	Fine to Smooth Created by Clearing	Fine to Medium	N/A

SECTION D. CONTRAST RATING ☐ SHORT TERM ☑ LONG TERM

1. DEGREE OF CONTRAST

	FEATURES											
	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
ELEMENTS	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form			✓				✓					✓
Line			✓			✓						✓
Color				✓				✓				✓
Texture			✓				✓					✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☑ No (Explain on reverse side)

Evaluator's Names
John Rowe, ASLA
Alan Skinner, PE

Date
08/04/2011

Comments from item 2.

While there is a segment of the proposed gasline corridor that will be visible from the parking/access drive area, the business of the surrounding foreground and background activities dulls the visual impact from this vantage point.

Additional Mitigating Measures (See item 3)

(Same as KOP #1)

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Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 08/04/2011

District N/A

Resource Area DNPP

Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name
ASAP Pipeline

2. Key Observation Point
#3 - Wilderness Access Center

3. VRM Class

4. Location
Township ______
Range ______
Section ______

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Jagged to Rolling	Smooth to Medium in Background Coarse in Foreground	Flat parking lot in Foreground
LINE	Bold Angular and Curved Lines at Horizon. Strong Horizontal In Foreground	Soft, Irregular in Background Irregular, vertical in Foreground	Strong, Horizontal and Flat
COLOR	Gray, Tan, Brownish Red	Light to Dark Green	Open gray parking lot with blue and white traffic striping
TEXTURE	Smooth to Medium Mottled in Background Flat in Foreground	Smooth to Medium in Background Medium to Coarse in Foreground	Flat, Smooth in Foreground

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat	Short, Narrow, straight and curving form created by clearing of corridor	N/A
LINE	Straight and curved, undulating line	Light to Moderate line created by clearing activities	N/A
COLOR	Gray, Brownish Red Land	Light Green	N/A
TEXTURE	Fine to Smooth, Created by Clearing	Fine to Medium	N/A

SECTION D. CONTRAST RATING ☐ SHORT TERM ☑ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form			✓				✓					✓
Line			✓				✓					✓
Color				✓				✓				✓
Texture			✓				✓					✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☑ No (Explain on reverse side)

Evaluator's Names	Date
John Rowe, ASLA	08/04/2011
Alan Skinner, PE	

Comments from item 2.

A small segment of the proposed gasline corridor would be visible amongst the treeline, looking to the Northeast. The view will often be interrupted by RV's and other vehicles using the parking lot.

Additional Mitigating Measures (See item 3)

(Same as KOP#1)

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Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 08/18/2011

District N/A

Resource Area DNPP

Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name
ASAP Pipeline

2. Key Observation Point
#4 - Parks Highway

3. VRM Class

4. Location
Township ________
Range ________
Section ________

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Steep with Diagonal Form in Background Flat/Light Rolling in Foreground	Smooth/Flowing in Background Medium to Rough in Foreground	Smooth, Curving Road and guard rail signs and embankment
LINE	Bold angular lines at horizon, sloped broken lines in Background Flat, flowing in Foreground	Soft, Irregular in Background Irregular in Foreground	Strong curving lines from road from Foreground to Middle ground, Complex vertical Foreground
COLOR	Gray, Ran and Brownish-Red	Light to Dark Greens	Gray road and guardrail, white and yellow stripping on the roadway.
TEX-TURE	Smooth, Discontinuous and Mottled	Smooth/Medium in Background Medium/Coarse in Foreground	Smooth road surface and guard rail, Slightly coarse in Foreground due to Posts

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat	Narrow Curving Band due to Corridor Clearing	N/A
LINE	Curved and Undulating	Strong curved lines created by edge effect of clearing	N/A
COLOR	Gray, Tan and Brownish Red	Light Green	N/A
TEX-TURE	Fine/Smooth	Fine to Medium	N/A

SECTION D. CONTRAST RATING ☐ SHORT TERM ☑ LONG TERM

1.

DEGREE OF CONTRAST	FEATURES											
	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS: Form		✓				✓						✓
Line	✓				✓							✓
Color			✓				✓					✓
Texture		✓				✓						✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended
☑ Yes ☐ No (Explain on reverse side)

Evaluator's Names
John Rowe, ASLA
Alan Skinner, PE

Date
08/18/2011

Comments from item 2.

The strong, undulating line that is created with the clearing of the pipeline corridor will command attention of the motorist as they are traveling north towards the main park entrance.

Additional Mitigating Measures (See item 3)

(Same as KOP#1)

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 08/18/2011
District N/A
Resource Area DNPP
Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name
ASAP Pipeline

2. Key Observation Point
#5 Mt. Healy Trail Outlook

3. VRM Class
Visual Impact

4. Location
Township ________
Range ________
Section ________

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Steep/Rugged angles with low rolling valley	Smooth/Fine in Background Medium to Fine in Middleground Coarse Complex in Foreground	Multiple, Complex Buildings, Roads and Structures in Mid and Back Ground
LINE	Bold Angular Lines at Horizon. Complex and Irregular series of curves in Middleground	Soft, Broken lines in Background Irregular/Complex lines in Foreground	Complex, Geometric Lines create buildings, roads and other structures
COLOR	Gray, Tan & Brownish-Red/Grayish-Blue Water	Light to Dark Greens, and Red	Red, Blue, White, Grays in Buildings and Structures.
TEX-TURE	Smooth, Mottled Land with Medium to Coarse in Foreground	Smooth to Medium in Background Medium to Coarse in Foreground	Medium to Coarse texture created by scattered development

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat/Curved	Narrow, Curving Form created by Clearing	N/A
LINE	Curved, Undulating	Moderate, Lightly curved line created by corridor clearing	N/A
COLOR	Gray, Tan, Brownish-Red	Light Green	N/A
TEX-TURE	Fine/Smooth Corridor created by Clearing	Fine to Medium Texture in Background	

SECTION D. CONTRAST RATING ☐ SHORT TERM ☑ LONG TERM

1. DEGREE OF CONTRAST

	FEATURES											
	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
ELEMENTS	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form		✓					✓					✓
Line			✓				✓					✓
Color			✓				✓					✓
Texture			✓				✓					✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended
☐ Yes ☑ No (Explain on reverse side)

Evaluator's Names	Date
John Rowe, ASLA	08/18/2011
Alan Skinner, PE	

Comments from item 2.

While the proposed corridor clearing does create a long, narrow, winding ribbon through the landscape, it does get lost in the clutter of the development in Glitter Gulch, as well as the rivers and roads that wind through the valley in the same direction as the pipeline corridor.

Additional Mitigating Measures (See item 3)

1. A directional bore for the gasline between stations 539.5 and 540.2 would eliminate a majority of the visual scaring created by clearing the corridor.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 09/13/2011

District N/A

Resource Area DNPP

Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name
ASAP Pipeline

2. Key Observation Point
#6 AK RR South of Parks Highway

3. VRM Class

4. Location
Township ________
Range ________
Section ________

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Steep/Diagonal Background Flat to Rolling Foreground	Smooth in Background Medium to Coarse in Foreground	N/A
LINE	Bold Angular Lines at Horizon Broken Lines in Mid ground Curving River	Soft, Irregular in Background Irregular, Vertical in Foreground	N/A
COLOR	Gray, Tan, Brownish Red, Blue/Gray Water	Dark to Light Green, Yellow	N/A
TEX-TURE	Smooth to Mottled	Smooth in Background Medium to Coarse in Foreground	N/A

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat	Narrow, Curving and Straight Form Created by Clearing Activities	N/A
LINE	Curved and Straight Line Segments	Strong to Moderate Lines Created by Edge Effect from Clearing	N/A
COLOR	Gray, Tan, Brownish Red with Earth Disruption	Strong to Moderate Lines Created by Edge Effect from Clearing	N/A
TEX-TURE	Fine to Smooth, Clearing of Corridor	Fine to Medium	N/A

SECTION D. CONTRAST RATING ☐ SHORT TERM ☑ LONG TERM

1\.

DEGREE OF CONTRAST	FEATURES											
	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
ELEMENTS	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form			✓				✓					✓
Line		✓				✓						✓
Color			✓			✓						✓
Texture			✓				✓					✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No
(Explain on reverse side)

3. Additional mitigating measures recommended
☐ Yes ☑ No (Explain on reverse side)

Evaluator's Names	Date
John Rowe, ASLA	09/13/2011

Comments from item 2.

While a small segment of the pipeline corridor (Between ASAP MP 589.5 and 540.2) will cause a short term visual impact, the long term maintenance activities are anticipated to have much less impact. The distance from the KOP to the pipeline and the relatively low viewing angle are major factors in the anticipated, low visual impact over the long term.

Additional Mitigating Measures (See item 3)

While no mitigating actions are recommended, the mitigation actions discussed in other KOP's (to the segment between ASAP MP 539.5 and 540.2) would greatly reduce the short term visual impacts on this KOP.

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A Visual Impact Analysis Report

of the

Alaska Stand Alone Gas Pipeline Project

in the Area of the

Denali National Park and Preserve

December 6, 2011

Design Alaska

A Visual Impact Analysis Report

of the

Alaska Stand Alone Gas Pipeline Project

in the Area of the

Denali National Park and Preserve

December 6, 2011

Prepared for:

Alaska Gas Development Corporation

P.O. Box 101020, Anchorage, Alaska 99510

Prepared by:

John R. Rowe II, ASLA, Landscape Architect

State of Alaska License # 10152

Design Alaska, Inc.

601 College Road, Fairbanks, Alaska 99701

Table of Contents

List of Acronyms

AGDC ..... Alaska Gasline Development Corporation
ARRC ..... Alaska Railroad Corporation
ASAP ..... Alaska Stand Alone Gas Pipeline
BLM ..... Bureau of Land Management
DNPP ..... Denali National Park and Preserve
EIS ..... Environment Impact Statement
KOP ..... Key Observation Point
MP ..... Milepost
NPS ..... National Park Service
RMP ..... Resource Management Plan
ROW ..... Right-of-way
USACE ..... US Army Corps of Engineers
VRM ..... Visual Resource Management
WAC ..... Wilderness Access Center

1.0 Executive Summary

The visual impact analysis evaluates the potential visual impact to resources surrounding the Denali National Park and Preserve (DNPP) as a result of the Alaska Stand Alone Gas Pipeline (ASAP) project proposed by Alaska Gasline Development Corporation (AGDC). The project will construct a 24-inch diameter natural gas pipeline stretching from the North Slope to the Cook Inlet Area of Southcentral Alaska. The routing of ASAP from Prudhoe Bay generally parallels established transportation and existing infrastructure corridors from the North Slope. At the entrance to DNPP, the pipeline follows the Parks Highway.

Observation points are locations within DNPP from which the pipeline route would likely be seen. In a joint meeting between the National Park Service (NPS), DNPP, AGDC, and Design Alaska, the observation points were chosen to evaluate concerns regarding the visual impacts of the proposed gasline route on the surrounding landscape. After the initial observation points were evaluated, six Key Observation Points (KOPs) were accepted by the stakeholders and subjected to in-depth analysis using the BLM contrast rating system. The basis of the visual impact assessment is to analyze the degree to which the project affects existing landscape features using the following KOPs:

- KOP 1 – Government Hill is located on the Park Road. It provides an informal scenic view of the Riley Creek Bridge and the surrounding natural landscape.
- KOP 2 – Alaska Railroad Depot is a main destination for many visitors to the DNPP. It is the information hub of the park and in the center of the project KOPs.
- KOP 3 – Wilderness Access Center is where visitors go to obtain backcountry information. Of all the KOPs in the analysis, it is situated closest to the proposed pipeline route.
- KOP 4 – Parks Highway South of Entrance represents the most direct view of the project route from the highway heading northbound. It is the only KOP on the Parks Highway considered for the proposed alignment.
- KOP 5 – Mt. Healy Overlook Trail leads from the DNPP Visitor Center to Mt. Healy Overlook at 3500 feet elevation. It is the location where the project has the highest degree of visibility.
- KOP 6 – Alaska Railroad Corridor shows the unique, moving view from the Alaska Railroad.

In addition, this visual analysis addresses a route variation ("DNPP route variation") that, unlike the proposed pipeline route, traverses through portions of DNPP adjacent to the Parks Highway. This route variation is one of the alternatives considered in the ASAP project environmental impact statement (EIS). The following two KOPs were investigated for this NEPA alternative alignment:

- KOP 7 – Parks Highway MP 234 is a typical view of the driving surface and surrounding landscape from the highway.
- KOP 8 – Mt. Healy Overlook Trail is the same view as from KOP 5. The change in alignment of the pipeline does not result in a significant change in the potential impacts.

Utilizing visual simulations and the contrast rating worksheets in the analysis, as summarized in Table 2, the two KOPs with the most potential impacts are KOP 1 (moderate) and KOP 4 (moderate/strong). Considering the views from all KOPs, the visual impacts of the ASAP project appear to be primarily between MP 538.5 and MP 540.2 of the pipeline route. The potential impacts might be mitigated by using such methods as directional boring on that section of the pipeline or rerouting the ASAP to avoid the area entirely if otherwise practicable.

The majority of the report details the analysis of the proposed alignment. The discussion of DNPP route variation is presented where appropriate to compare this NEPA alternative in regard to the potential visual impacts.

This report does not imply that mitigation alternatives are required and does not analyze either the practicability of such mitigation or the probable adverse impacts of such mitigation on other environmental values. Mitigation solutions are presented to fulfill the contrast rating system requirement to identify mitigation possibilities whenever they exist. The contrast rating system is to be used as a guide, applied with common sense, to identify and minimize potential visual impacts.

2.0 Introduction

This report is a visual impact analysis for the ASAP project in the area of DNPP from MP 438 to MP 552 of the pipeline along the George Parks Highway. The purpose of the visual impact analysis is to measure the project's potential disturbance to the visual landscape. This report addresses both the proposed ASAP project route and the DNPP route variation presented as a NEPA alternative in the ASAP EIS.

2.1 Background

The need for a visual impact analysis is based on the NPS request to more thoroughly analyze the potential visual impacts of the ASAP project. The NPS has stated their concern over visual impacts of the project in the area of DNPP in the form of written comments during their review of the Preliminary Draft EIS. During a meeting held with the NPS, the US Army Corps of Engineers (USACE), and the AGDC team on July 6, 2011, it was agreed that AGDC would conduct a visual analysis in the area of the Park. Design Alaska has prepared this analysis at the request of AGDC. At the request of USACE, AGDC and Design Alaska subsequently amended this report to also address the DNPP route variation.

3.0 Project Summary

The proposed project consists of the construction of ASAP from the North Slope to the Cook Inlet Area in Southcentral Alaska. The purpose of the project is to provide a long-term, stable supply of up to 500 million standard cubic feet per day of natural gas and natural gas liquids from North Slope gas fields to markets in the Fairbanks and Cook Inlet areas by 2019.

The proposed ASAP is a 24-inch diameter natural gas pipeline which will be buried except in the following areas: MP 0 to MP 6, elevated bridge stream crossings, compressor stations, possible fault crossings, pigging facilities, and offtake valve locations. The pipeline system will be designed to transport a highly-conditioned natural gas highly-enriched in non-methane hydrocarbons.

The routing of ASAP is from Prudhoe Bay following the Trans-Alaska Pipeline System and Dalton Highway corridors, generally paralleling the highway corridor from the North Slope to near Livengood, northwest of Fairbanks. At Livengood, the pipeline route heads south, joining the Parks Highway corridor west of Fairbanks near Nenana. From there it continues south and terminates at MP 737 near Wasilla. It will connect at MP 39 of the Beluga Pipeline (ENSTAR's distribution system). A lateral pipeline to Fairbanks (Fairbanks Lateral) will take off from the main pipeline just a few miles north of Nenana at Dunbar. The Fairbanks Lateral will travel northeast to Fairbanks, a distance of approximately 35 miles.

DNPP is visited by more than 400,000 visitors annually, most of whom visit between late May and early September. The main attraction to the park is the 20,320 foot tall Mt. McKinley (Denali). However, there are many activities throughout the 6-million-acre park that attract international visitors looking to experience DNPP.

The project area is adjacent to the park entrance and visible from various vantage points within DNPP. AGDC's proposed ASAP project route is situated so that it bypasses the park while continuing in a north-south direction.

AGDC's proposed ASAP mainline route comes within a quarter of a mile of DNPP along the Parks Highway, but does not enter the park boundaries. The NPS and USACE are interested in graphical depictions and visual analysis for the potentially-affected area of DNPP. This visual impact analysis report will support the visual impacts analysis in the ASAP EIS and will be used to inform decision-makers and the public about the visual effects of construction and operation of ASAP through land surrounding DNPP.

One of the NEPA alternatives identified during the planning stages of the ASAP project locates the proposed pipeline directly adjacent to the Parks Highway and within DNPP for 15 miles. This DNPP route alternative is included in the analysis to provide a comparison of one alternative route to the proposed alignment. All alignment alternatives considered for the proposed pipeline are discussed in the EIS.

4.0 Analysis Methodology

Visual resources are coordinated using a document that ensures future decisions and actions are consistent with environmental management objectives, called a Resource Management Plan (RMP). Normally, Visual Resource Management (VRM) objectives are identified using the RMP. However, no current RMP exists for DNPP. Without an RMP in place, this analysis will use interim VRM classes derived from guidelines in the Bureau of Land Management (BLM) Handbook H-8410-1 in addition to input from Paul Schrooten, Landscape Architect, with the NPS.

Lands are classified into one of four visual resource inventory classes (I, II, III, and IV). Class I lands are the most valued, while Class IV are the least valued. The VRM classification is the result of analyzing three factors: scenic quality evaluation, sensitivity level analysis, and delineation of distance zones. VRM classification serves two purposes: first, it is an inventory tool that portrays the relative value of visual resources; and second, it provides a management tool that portrays the visual management objectives.

The VRM classification defines the objectives of preserving the existing character of the land and outlines the level of change that the landscape can support.

The visual resource inventory process provides land managers with a means for determining visual values. The assessment involves four key components. The first is to establish observation points. Observation points are locations in the project area from which proposed actions are potentially visible. The second element is to select a few Key Observation Points (KOPs) from the identified observation points within the project area that might be affected. The criteria for selecting KOPs are detailed in Section 4.2. The third part of the assessment is to prepare visual simulations for each KOP in order to illustrate which activities or aspects of a project could create impacts to visual resources and to evaluate defined impacts at KOPs. The final step is to conduct a visual assessment for each KOP, which compares the contrast rating between existing conditions and the proposed project features.

4.1 Establish Observation Points

Observation points were established through discussion, research, and evaluations accomplished by senior, experienced personnel familiar with the DNPP, including representatives from DNPP, NPS, AGDC, and Design Alaska. Observation points were chosen with the intent to address concerns of the NPS regarding the visual impacts of the proposed gasline route. Criteria for selecting observation points involved considering the perspectives of three levels of users. The first group of users would view the project area from locations of historical and visual significance inside DNPP, such as the DNPP Visitor Center. The second group involved users inside motor vehicles or pedestrians along the Parks Highway who might see the project. The third group consists of passengers traveling by rail on the Alaska Railroad. The observation points were confirmed at an on-site meeting with stakeholder representatives on July 26, 2011. The locations of these observation points are shown in Figure 1 (following page).

The project team and NPS visited these observation points to gather more information. Photos were taken and data collected for each location. Some of the observation points were eliminated from future consideration due to various reasons, such as no line-of-sight to pipeline alignment, lack of importance of maintaining view due to surrounding commercial development, or a combination of factors. The DNPP Visitor Center (OP B on Figure 1), one of the most frequented stops and the information hub of the park, was one observation point eliminated due to lack of visibility of the pipeline alignment. The ARRC Depot (also denoted as OP B on Figure 1) was retained and is discussed in Section 5.2. Other observation points considered for this analysis, which were eliminated, include the DNPP Entrance Sign (OP D), the Park Road at Wilderness Access Center (WAC) Sign (OP E), and the Nenana River Pedestrian Lookout (OP G). Following the reduction of these four observation points, additional observation points were suggested by NPS for evaluation, specifically the Mt. Healy Overlook Trail (OP H), the Parks Highway South of Entrance (OP I), and Alaska Railroad Corridor (OP J).

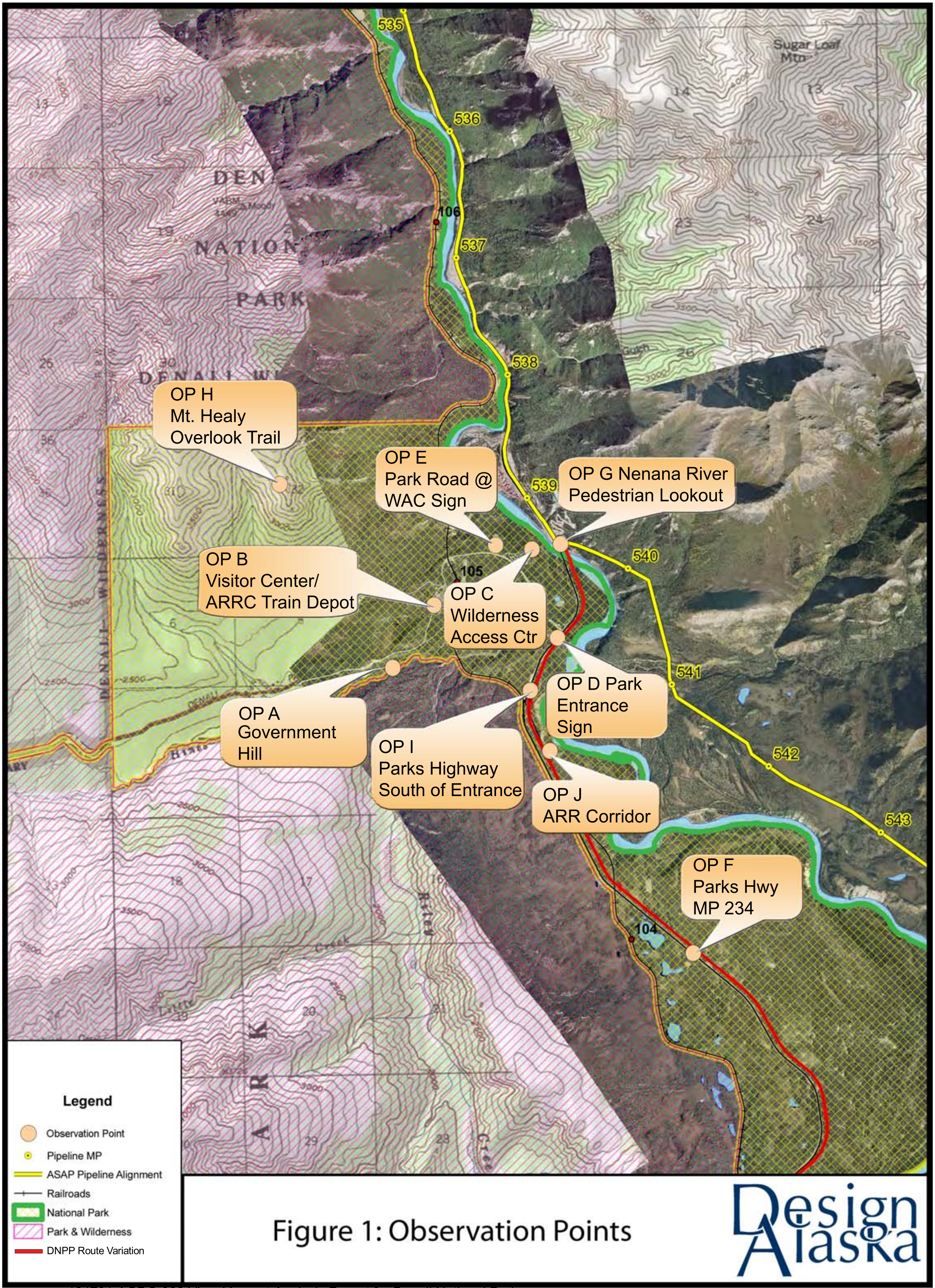

Figure 1: Observation Points

4.2 Identify Key Observation Points (KOPs)

Following discussions with the NPS and project team site visits, the observation points were evaluated. In selecting KOPs for linear projects (such as ASAP), the BLM *Manual 8431 – Visual Resource Contrast Rating* suggests choosing viewpoints that represent:

- The most critical viewpoints, such as views from communities or road crossings;
- Typical views encountered in representative landscapes, if not covered by critical viewpoints; and
- Any special project or landscape feature, such as skyline, river and roadway crossings.

The contrast rating is done from the most critical viewpoints, usually along commonly traveled routes or at other likely observation points. Factors that should be considered in selecting KOPs are: 1) angle of observation, 2) number of viewers, 3) length of time the project is in view, 4) relative project size, 5) season of use, and 6) light conditions.

Utilizing input from the NPS and data from site visits, four of the original observation points were selected as KOPs. The two additional KOPs mentioned in Section 4.1 were agreed upon and added to the analysis. All KOP locations and associated VRM classifications were accepted by all interested parties for the mainline route. These include:

- KOP 1 – Government Hill
- KOP 2 – ARRC Depot
- KOP 3 – Wilderness Access Center (WAC)
- KOP 4 – Parks Highway South of Entrance
- KOP 5 – Mt. Healy Overlook Trail
- KOP 6 – Alaska Railroad Corridor

The two KOPs for the DNPP route variation have been agreed upon by all interested parties and are discussed in a similar manner to the previous six KOPs. They represent both typical and critical views where the potential impacts might be noticed. The KOPs for DNPP route variation are:

- KOP 7 – Parks Highway MP 234 – DNPP Route Variation
- KOP 8 – Mt. Healy Overlook Trail– DNPP Route Variation

Thorough visual assessments on the KOPs were conducted. The analysis of each KOP is discussed in Section 5.0 of this report. KOPs identified for this project are shown in Figure 2 (following page).

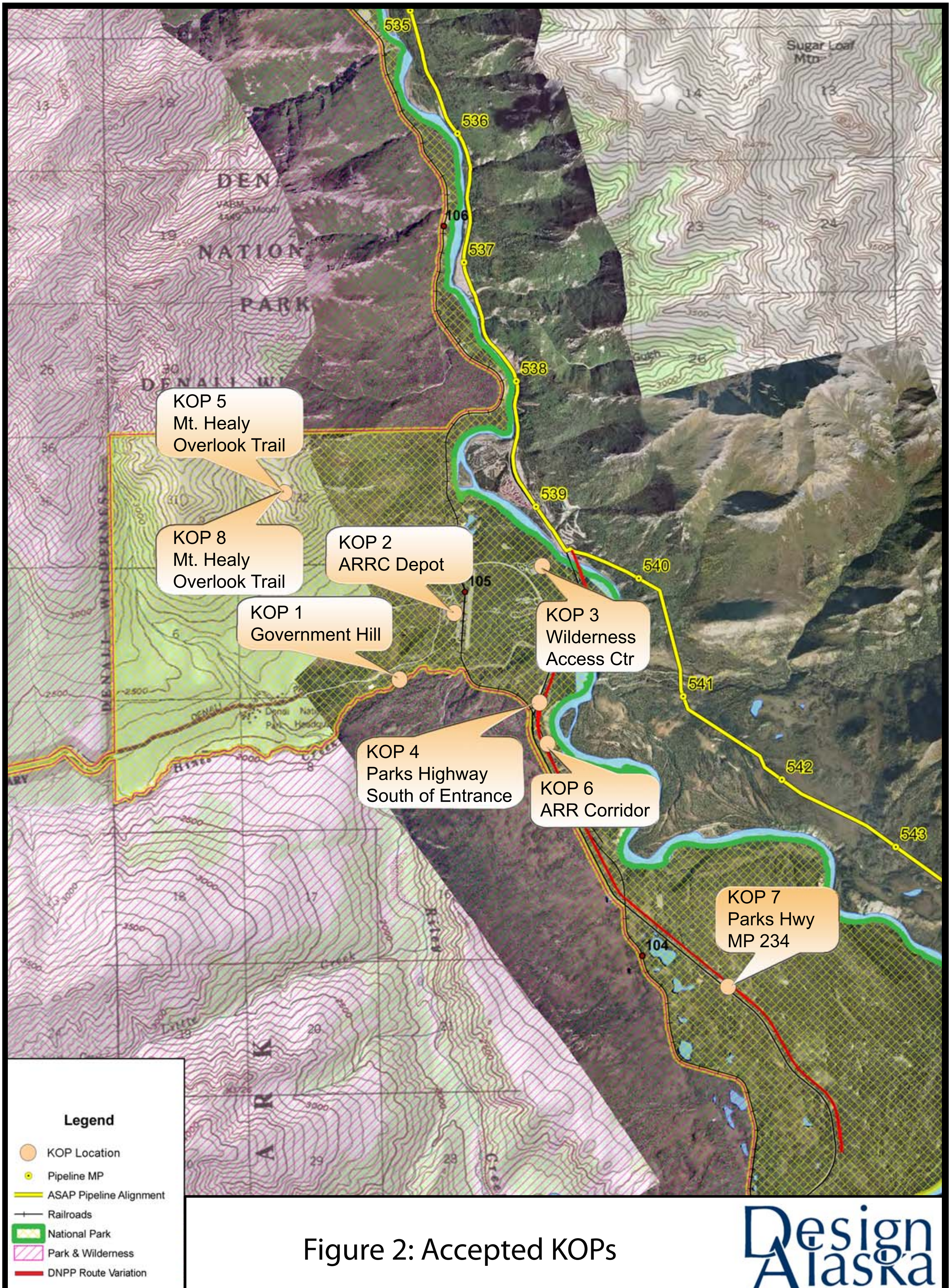

Figure 2: Accepted KOPs

Design Alaska

4.3 Prepare Visual Simulations

Visual simulations are instrumental in determining potential impacts of the proposed project. The visual simulations were prepared to a high level of detail, consistent with the high visual value of DNPP and the surrounding area.

In order to create the visual simulations, a sequence of photos at each KOP was combined using Adobe Photoshop to form a panorama. Then, using Google Earth, a representation of the pipeline alignment was digitized, following the topographical features depicted in the satellite imagery. Each KOP was located in Google Earth and the initial three-dimensional model was manipulated to match the orientation of the photo. This manipulation simplified the visualization of the pipeline's course. In some cases, features in the imagery were measured to achieve a relative scale for the pipeline route. For instance, the width of the Parks Highway is about 100'; so, in some photos, the visual appearance of the highway at different distances would be similar to the proposed pipeline. Paths of approximately 100' were added perpendicular to the pipeline alignment at regular intervals, giving a better grasp of the pipeline limits. Figure 3 shows the manipulated Google Earth digital model for KOP 3.

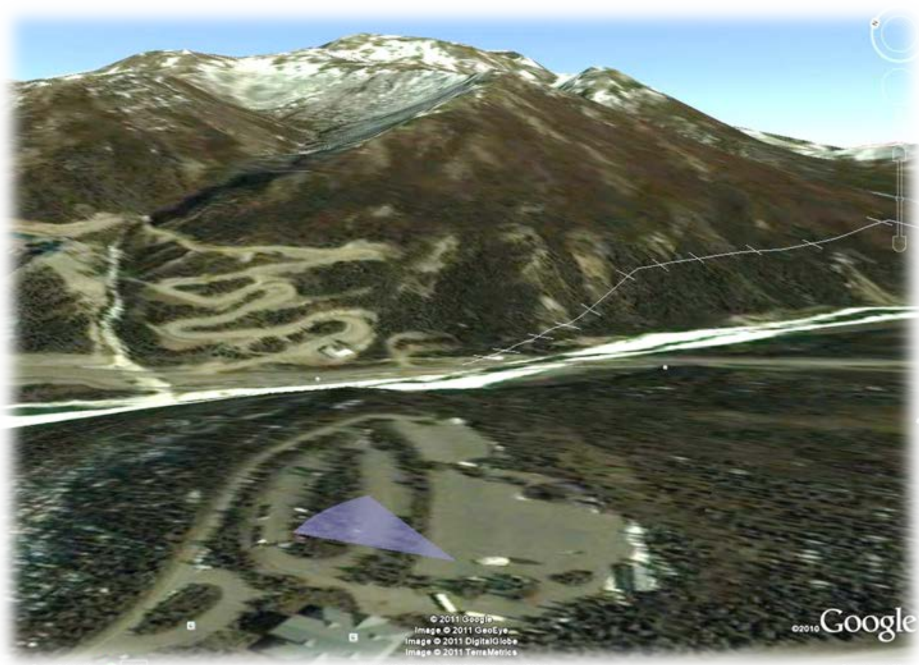

Figure 3: Google Earth Three Dimensional Model

In Adobe Photoshop, features were matched up with the Google Earth satellite imagery. The alignment of the pipeline was sketched in and refined. The pipeline route was digitally painted on top of the existing photo, taking into account vegetative cover as well as the viewing angle. Photos from the different KOPs were referenced against each other to locate distinctive features (rock outcroppings, bare areas) and keep the representation of the pipeline path consistent. After the construction phase of the pipeline route was depicted, a second digital painting with a 50' right-of-way (ROW) and vegetation matched from the surrounding area was completed to represent the operations phase.

Finally, three images were created from the master file showing the existing, construction, and operations phases. The completed visual simulations are shown during the discussion of each KOP. These simulations are extremely important to evaluate the potential impacts of the ASAP project at the KOP locations.

4.4 Evaluate Potential Impacts at KOPs

The following subsections summarize the steps for evaluating impacts at KOPs as explained in the BLM VRM manual 8431.

4.4.1 Select Timeframe

Projects are typically rated on either a short- or long-term basis. Short-term projects are defined as five years or less. The long-term timeframe considers the impacts over the life of the project. The ASAP project could be evaluated for both, but this analysis will consider only the long-term effects due to the lack of significant differences in the scope of construction and operations phases.

4.4.2 Assess Contrast

KOPs provide several reference points for rating the impact of construction activities on visual resources. The project team has visited each of these KOPs and completed a Visual Contrast Rating Worksheet (BLM VRM Form 8400-4) in the field. Appendix A includes copies of the completed worksheets.

The characteristics for each KOP were analyzed using the visual resource inventory process, in order to measure visual impacts. Visual impacts are interruptions in the form, line, color, or texture of the natural landscape. Impacts to the visual scenery as a result of the proposed project may include the following:

- Clearing of native vegetation along proposed gasline alignment.
- Roads and trails caused by construction equipment.
- General construction including open excavation.
- Final condition – involving proposed route of cleared land, sparse vegetation, and operations roads.

Utilizing the matrix in Section D of BLM VRM Form 8400-4, the degree to which visual impacts affect the project area at each KOP was recorded as one of four magnitudes: None, Weak, Moderate, or Strong. The general criteria for the degree of contrast ratings are shown in Table 1.

Table 1: Degree of Contrast Criteria

Degree of Contrast	Criteria
None	The element contrast is not visible or perceived.
Weak	The element contrast can be seen but does not attract attention.
Moderate	The element contrast begins to attract attention and begins to dominate the characteristic landscape.
Strong	The element contrast demands attention, will not be overlooked, and is dominant in the landscape.

Characteristics to keep in mind when classifying the degree of contrast are similar to those used previously when the KOPs were selected (see Section 4.2). In addition to the six factors listed in that section, evaluators should also consider recovery time, spatial relationships, atmospheric conditions, and motion, when evaluating the degree of contrast. The existing VRM classifications were concurred by NPS.

4.4.3 Determine Whether VRM Objectives are Met

The basic philosophy of the contrast rating system is that the effects of a project depend on the degree of contrast between the existing landscape and the final landscape as a result of work done on the project. The contrast is measured by comparing the features of the existing landscape with the proposed project features. The design elements of form, line, color, and texture are used to make the comparison and to describe the visual contrast created by the project.

An understanding of the contrast rating system is important in order to determine whether VRM objectives are met. For comparative purposes, the four levels of contrast (None, Weak, Moderate, and Strong) roughly compare with the BLM visual resource inventory classes (I, II, III, and IV, respectively). Additionally, a combination of ratings may indicate a stronger overall contrast than what the individual ratings show, such as multiple “moderate” ratings or a combination of ratings. In the discussion for each KOP in Sections 5.1 to 5.6, the classes will be identified for each KOP and it will be stated whether the VRM objectives are met.

4.4.4 Develop Potential Mitigating Measures

Since the VRM goal is to minimize visual impacts, mitigating measures will be discussed for all potential adverse contrasts due to the ASAP project. This includes KOPs where the VRM objectives are met, but where impacts can be reduced. Mitigation solutions presented in this report follow the discussion for each KOP.

5.0 KOPs

Each of the identified KOPs is evaluated in the following sections. The discussion for each KOP follows a general outline. First, there is an introduction of the KOP, including VRM classification and a figure establishing the existing view. Next follows a discussion of the potential impacts on the visual landscape as identified from the BLM VRM Form 8400-4. Third, it is stated whether the VRM objectives are met and any possible mitigation that could be implemented. And last, graphic simulations of the project are presented to depict the appearance of the existing landscape during the construction and operations phases. At locations where directional boring is identified as a possible mitigation solution, graphic simulations have been prepared to show the effect this solution could have on the visual landscape. The completed Form 8400-4 for each KOP is included in Appendix A.

5.1 KOP 1 – Government Hill

Although there is no formal pull-off, the observation point provides a view of the Riley Creek Railroad Bridge and the surrounding natural landscape. Other than the rail bridge and a brief glimpse of vehicles on the Parks Highway, there are no man-made features visible. The VRM classification of this view is Class II. Figure 4 shows the existing view from KOP 1.

Figure 4: KOP 1 EXISTING

Figure 5 shows the view from KOP 1 with the simulated 100-foot project route during construction. The 50-foot operations route is shown in Figure 6.

While there are no official VRM objectives for this area, the strong lines and contrast between vegetation and soil color created by clearing the utility alignment could draw viewers' attention and potentially detract from the natural elements. Since there is no formal pullout and due to the limited time that the project is in view, moderate visual impact would be experienced with the proposed pipeline route. The prominent features of this view (the bridge and Riley Creek) remain the focal point. However, the line of the project route on the left side of the view does attract attention. As the pipeline passes the middle of the view and to the right, it disappears from view mostly due to the weak color contrast and the decreased viewing angle.

Mitigation measures for this KOP could include rerouting the pipeline to less visible areas or minimizing the surface disturbance using underground boring. Either of these measures could alleviate the introduction of defined lines seen in the landscape from this KOP (Figures 7 and 8). A reroute of the proposed pipeline from MP 538.5 to MP 540.2 could push the gasline from the south and west side of the slope at Glitter Gulch to the backside (north and east side) of the hill.

Figure 5: KOP 1 CONSTRUCTION PHASE

Figure 6: KOP 1 OPERATIONS PHASE

Figure 7: KOP 1 MITIGATED CONSTRUCTION PHASE

Figure 8: KOP 1 MITIGATED OPERATIONS PHASE

5.2 KOP 2 – Alaska Railroad Depot

As mentioned previously, the DNPP Visitor Center is a major public gathering space. Limited views are provided from the Visitor Center due to surrounding mature vegetation in most directions, including toward the pipeline route. A short distance from the DNPP Visitor Center is the Alaska Railroad (ARRC) Depot, which has an extensive view shed of the project route (shown in Figure 9). The VRM classification for this KOP is Class III.

Figure 9: KOP 2 EXISTING

While there is a more extensive panorama from the ARRC Depot area, the simulations in Figures 10 and 11 show that most of the proposed pipeline route will not be visible. The part that is visible is low on the mountain and partially hidden from view by existing vegetation.

There are no official VRM objectives for this area. With many man-made structures in the foreground, the visual contrast at this location is weak. The impact does not dominate the view of the casual observer.

Any mitigation considered for other KOPs would likely lessen the amount of the project route that remains partially visible at this location. Mitigation measures for this KOP could include rerouting the pipeline to less visible areas or minimizing the surface disturbance using underground directional boring. A reroute of the proposed pipeline from MP 538.5 to MP 540.2 pushing the pipeline to the backside of the hill would mitigate the impacts to the view. Similarly, an underground bore for the gasline from MP 539.5 to MP 540.2 would eliminate most, if not all, of the potential impacts at this KOP. The visual simulations for the effect of mitigation alternatives are illustrated in Figure 12 and Figure 13.

Figure 10: KOP 2 CONSTRUCTION PHASE

Figure 11: KOP 2 OPERATIONS PHASE

Figure 12: KOP 2 MITIGATED CONSTRUCTION PHASE

Figure 13: MITIGATED OPERATIONS PHASE

5.3 KOP 3 – Wilderness Access Center

The WAC is a major public gathering space. Limited views are provided from the southern parking lot looking to the northeast (see Figure 14). The VRM classification for this location is Class III.

Figure 14: KOP 3 EXISTING

Pipeline views that might be observed from this area would be just above the tree line and would be a perpendicular view to the alignment (shown in Figures 15 and 16).

There are no official VRM objectives for this area. The contrast rating is weak as the impact closely follows the break between contrasting textures and lines in the tree line and the mountain. As seen in the two preceding figures, a small portion of the gasline route would be visible just above the tree line, looking to the northeast. The impact does not dominate the view of the casual observer as it is mostly interrupted by RV's and other vehicles using the parking lot.

Any mitigation considered for other KOPs would likely lessen the amount of the project route that remains partially visible at this location. Mitigation measures for this KOP could include rerouting the pipeline to less visible areas or minimizing the surface disturbance using underground directional boring. A reroute of the proposed pipeline from MP 538.5 to MP 540.2 pushing the pipeline to the backside of the hill would mitigate the impacts to the view. Likewise, underground drilling for the gasline from MP 539.5 to MP 540.2 would eliminate all of the potential impacts at this KOP. The view after mitigation at this KOP would remain unchanged from the existing shown previously in Figure 14.

Figure 15: KOP 3 CONSTRUCTION PHASE

Figure 16: KOP 3 OPERATIONS PHASE

5.4 KOP 4 – Parks Highway South of Entrance

The location on the Parks Highway (see Figure 17) was chosen as a representative location for users who experience views near DNPP from the highway. Speeds on this section of the highway are 55 miles per hour (mph) and reduce to 45 mph closer to the DNPP entrance. There is limited pedestrian activity. The VRM classification for this location is Class II.

Figure 17: KOP 4 EXISTING

Figure 18 shows the introduction of the pipeline route on the mountainside. The alignment is a defining feature on the mountain in the construction phase. In the operations phase (Figure 19) the revegetation softens the extents of the route but the cut line is still visible.

The contrast rating for this location is between moderate and strong. The prominent, undulating line created with the clearing of the pipeline route demands attention and will likely not be overlooked by the casual observer in the construction phase. During the operations phase, the impact is moderate as the cleared land begins to be revegetated. Although the route remains noticeable, it does not dominate the view as the focal point.

Possible mitigation for this location could include minimizing the effect on existing vegetation, such as feathering or thinning edges of the cut. Additionally, rerouting to a less visible area may make the cut less prominent in the overall view. Rerouting to blend with topographic forms in shape or placement might also be possible.

The resulting view from mitigation alternatives in the area between MP 539.5 to MP 540.2 is shown on the mitigation visual simulations. Both construction and operations phases are shown in Figure 20 and Figure 21.

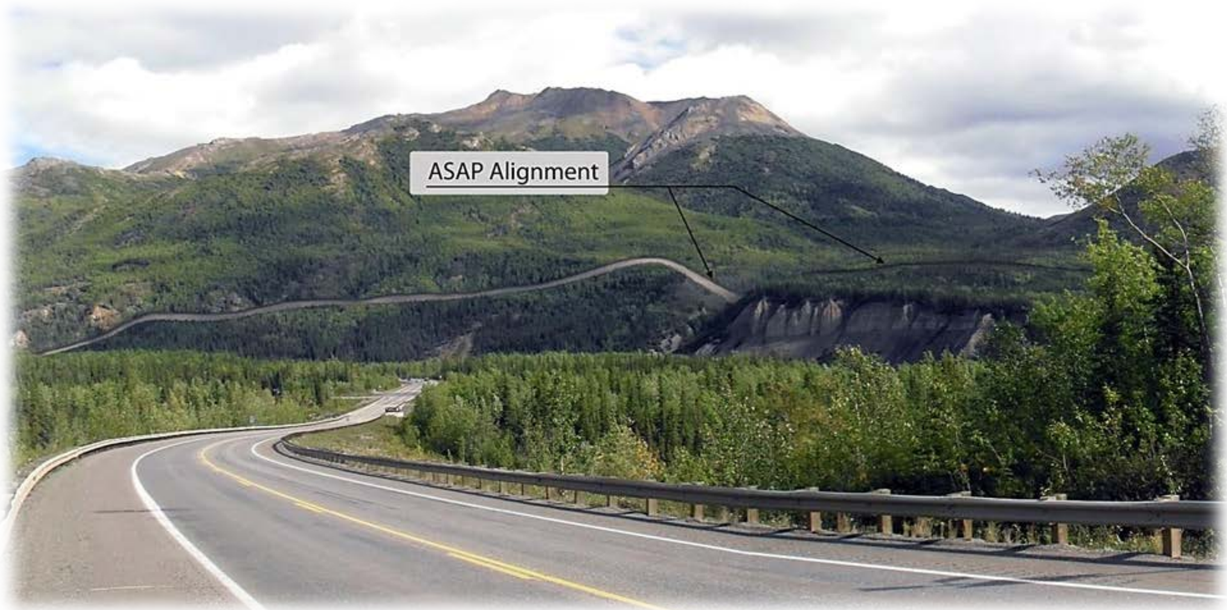

Figure 18: KOP 4 CONSTRUCTION PHASE

Figure 19: KOP 4 OPERATIONS PHASE

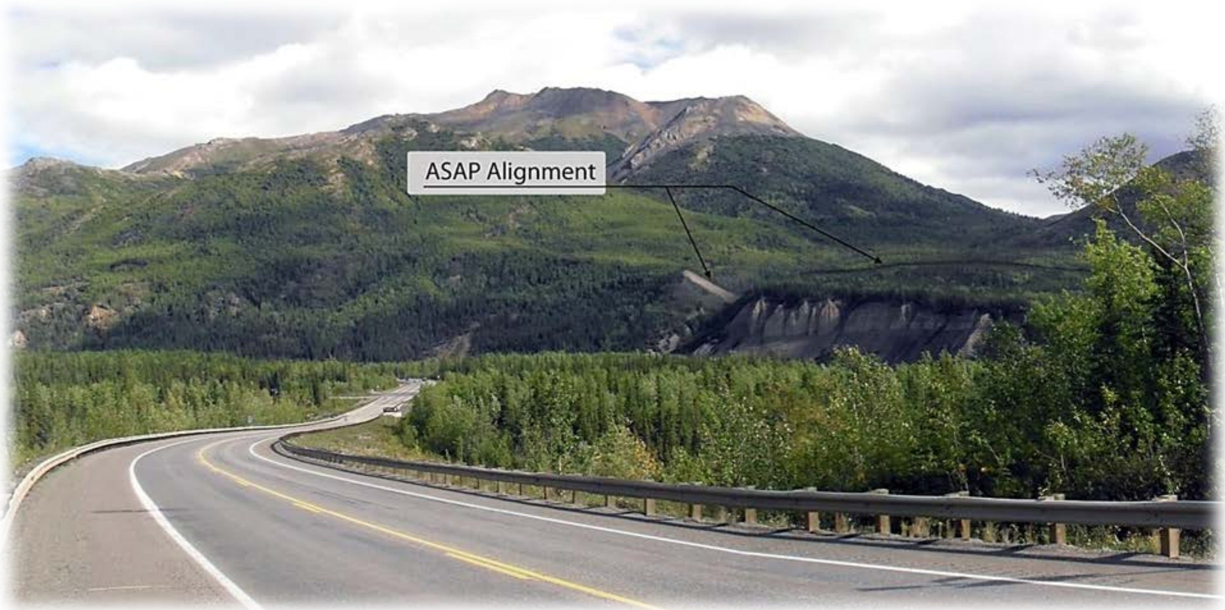

Figure 20: KOP 4 MITIGATED CONSTRUCTION PHASE

Figure 21: KOP 4 MITIGATED OPERATIONS PHASE

5.5 KOP 5 – Mt. Healy Overlook Trail

The Mt. Healy Overlook Trail is a 4.4 mile (round trip) hike that begins near the DNPP Visitor Center parking lot. This KOP was suggested by NPS as a representative location for the recreational trail users who visit the park. The existing view from the summit of the trail is shown in Figure 22. The VRM classification for this location is Class III.

Figure 22: KOP 5 EXISTING

While there are no formal VRM objectives, the contrast rating for this KOP is considered weak. The KOP view is of the pipeline route from a substantial distance. While the proposed route creates a long, narrow, winding ribbon through the landscape, it is camouflaged by the clutter of development in Glitter Gulch. In addition the number of defined lines seen from this KOP (between the Parks Highway, Nenana River, and driveways and other roadways) flow in the same direction as the pipeline alignment. The proposed project does not attract the attention of a casual observer.

Mitigation proposed at other locations will likely reduce the visual impact at this KOP. A directional bore for the gasline between stations 539.5 and 540.2 would eliminate a majority of the visual disturbance created by clearing the route. If the pipeline is rerouted, it should create curved lines in the landscape to be indistinguishable from other lines seen from this KOP.

Figure 23: KOP 5 CONSTRUCTION PHASE

Figure 24: KOP 5 OPERATIONS PHASE

Figure 25: KOP 5 MITIGATION CONSTRUCTION PHASE

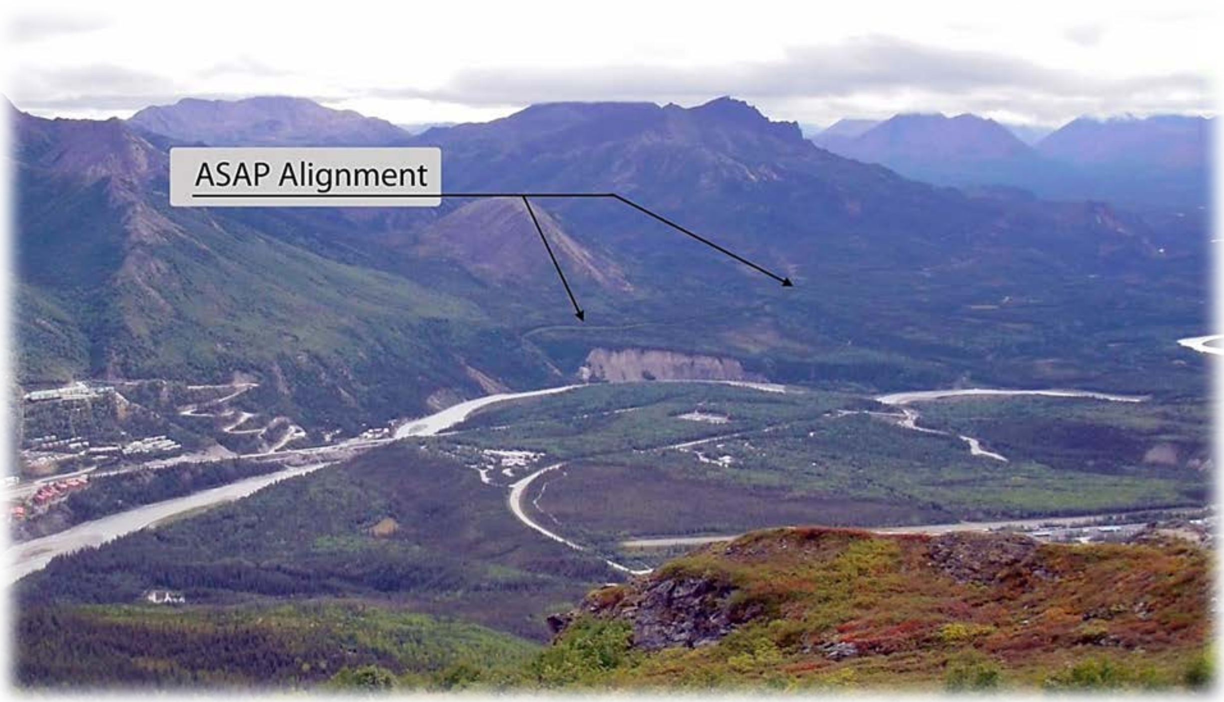

Figure 26: KOP 5 MITIGATION OPERATIONS PHASE

5.6 KOP 6 – Alaska Railroad Corridor

The ARRC Corridor in the area of DNPP was recorded as a continuous series of 360° photographs by Immersive Video Solutions, LLC. The footage affords a way of viewing and characterizing the entire ARRC corridor through the DNPP area. The railroad corridor is generally bordered by dense vegetation at the edge of the cleared ARRC ROW. A few locations within the corridor have expansive views of the area surrounding DNPP and of the proposed pipeline route. These infrequent sweeping views of the pipeline alignment are visible for short spans of time. The existing view for KOP 6 is shown in Figure 27. The VRM classification for this location is Class II.

Figure 27: KOP 6 EXISTING

There is no formal railroad stop scheduled at this KOP location. The view of the proposed route is seen for less than 10 seconds by traveling railroad passengers before it is hidden by dense vegetation. Due to the width of the view, the visual simulations are separated into left and right segments. The view from KOP 6 of the proposed pipeline route during the construction phase is simulated in Figures 28 and 29. The operations phase visual simulation is shown in Figures 30 and 31. Similar to the other KOPs in this analysis, no VRM objectives have been formally established.

Potential impacts to KOP 6 are categorized by line and texture interruptions in the existing landscape. The visual contrast is moderate to weak at this location. The pipeline alignment is located at a considerable distance from the railroad corridor. Due to this distance, the potential impacts blend into the existing vegetation to a greater degree than if the pipeline were closer. Additionally, the viewing angle and site topography minimize the appearance of the contrasting features introduced by the proposed project. For three-fourths of the visible width of the view, the pipeline route is indistinguishable from other lines at the base of the surrounding mountains. On the northernmost (photo left) one-fourth of the view, the potential impacts are most pronounced during the construction phase of the proposed project. These potential impacts are a result of the surface clearing required for pipeline construction. During the operations phase, the visual contrast is weak for the entire route as revegetation dulls the defined line of the pipeline alignment.

Possible mitigation solutions for this location include those mentioned previously for other KOPs, specifically rerouting and underground drilling. Either of these solutions would reduce the potential impacts between MP 538.5 and MP 540.2. As the right portion is outside the specified milepost limits, the resulting views showing potential impacts after mitigation during construction and during operations for the northernmost (photo left) half only are shown in Figures 32 and 33, respectively.

Figure 28: CONSTRUCTION PHASE (LEFT)

Figure 29: CONSTRUCTION PHASE (RIGHT)

Figure 30: OPERATIONS PHASE (LEFT)

Figure 31: OPERATIONS PHASE (RIGHT)

Figure 32: MITIGATION CONSTRUCTION PHASE (LEFT)

Figure 33: MITIGATION OPERATIONS PHASE (LEFT)

5.7 KOP 7 – Parks Highway MP 234 – DNPP Route Variation

The Parks Highway MP 234 is a representative view from the main vehicle transportation route surrounding DNPP. The DNPP route variation alignment places the pipeline route offset to the east of the Parks Highway from MP 223 to MP 238. The existing view from this location along the highway is shown in Figure 34. The VRM classification for this location is Class II.

Figure 34: KOP 7 EXISTING

While there are no formal VRM objectives, the contrast rating for this KOP is moderate to weak. The pipeline route generally follows the roadway and introduces a defined width of clearing for approximately 15 miles. There are a number of established lodging facilities to the north upon entering the Carlo Creek area and continuing to DNPP. Scenic views can be seen from either side of the road.

Observers from this view are typically traveling 55 mph. In most areas, the mature vegetation bordering the roadway will obscure a direct view of the cleared area of the pipeline alignment to the east. The potential impact of the alignment will decrease during the operations phase as revegetation begins to decrease the contrast between the color of the disturbed ground and the color of the grassy areas. The resulting views showing potential impacts after mitigation during construction and operations phases are shown in Figures 35 and 36, respectively.

Figure 35: KOP 7 CONSTRUCTION PHASE

Figure 36: KOP 7 OPERATIONS PHASE

5.8 KOP 8 – Mt. Healy Overlook Trail – DNPP Route Variation

The Mt. Healy Overlook Trail is detailed in Section 5.5 of this report with the existing view from the summit of the trail shown in Figure 22. The VRM classification for this location is Class III.

While there are no formal VRM objectives, the contrast rating for this KOP remains unchanged from KOP 4 and is still considered weak. The pipeline route is seen from a substantial distance and meanders in connection with the Parks Highway, Nenana River, and other roadways that flow in the same direction as the pipeline alignment. The proposed project does not attract the attention of a casual observer. The resulting views during the construction and operations phases for this KOP are shown in Figure 37 and Figure 38.

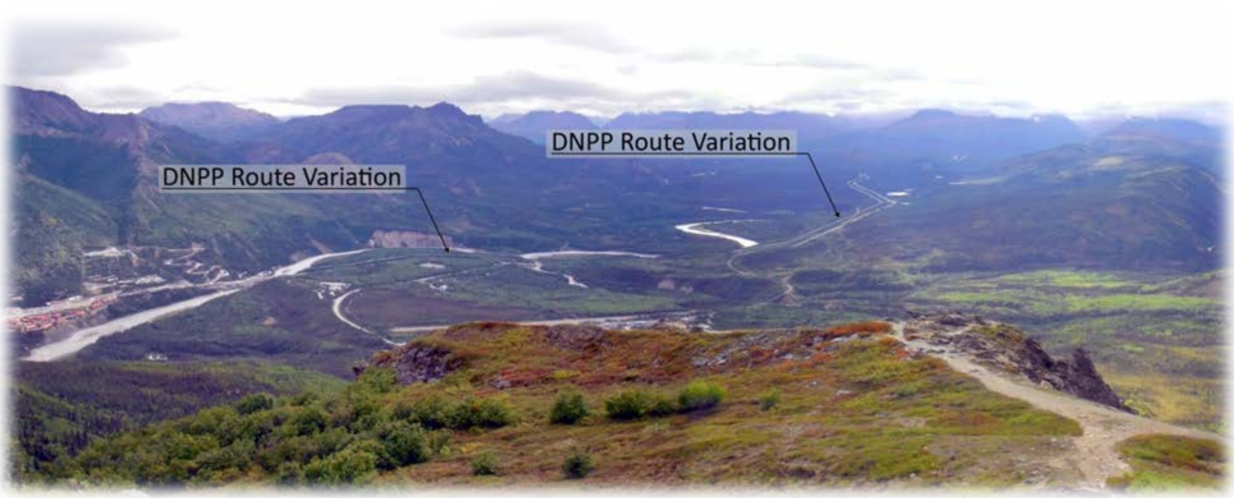

Figure 37: KOP 8 CONSTRUCTION PHASE

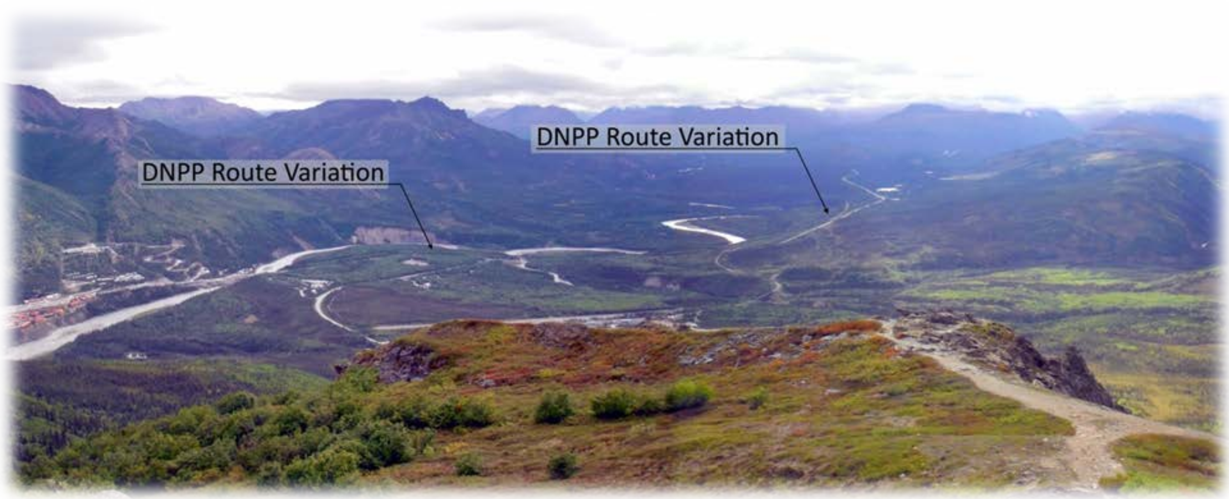

Figure 38: KOP 8 OPERATIONS PHASE

6.0 Summary

The visual impacts of the ASAP project appear to be limited to a less than 2 mile portion of the proposed pipeline route from MP 538.5 to MP 540.2. Table 2 shows the VRM classifications accepted by NPS for each KOP as well as the contrast rating for each KOP as discussed in this report.

Table 2: KOP Summary

KOP No.	Site Name	VRM Classification	Contrast Rating
1	Government Hill	Class II	Moderate
2	Alaska Railroad Depot	Class III	Weak
3	Wilderness Access Center	Class III	Weak
4	Parks Highway South of Entrance	Class II	Moderate/Strong
5	Mt. Healy Overlook Trail	Class III	Weak
6	Alaska Railroad Corridor	Class II	Moderate/Weak
7*	Parks Highway MP 234	Class III	Moderate/Weak
8*	Mt. Healy Overlook Trail	Class III	Weak

*denotes KOP for DNPP route variation

The views from KOP 1 – Government Hill and KOP 4 – Parks Highway South of Entrance have the largest potential for visual impacts. These areas are both Class II in the VRM classification system and are experienced primarily by motorists. The contrast ratings are determined to be between moderate and moderate/strong in severity. KOP 2 – ARRC Depot and KOP 3 – Wilderness Access Center have only brief segments of the pipeline route visible. Both of these areas are classified as Class III and will be viewed by pedestrians. The contrast ratings are determined to be weak at both of these KOPs. KOP 5 – Mt. Healy Overlook Trail has the longest view of the disruption caused by the pipeline clearing and construction. However, the view shed itself is minimally affected due to the distance from the pipeline alignment and the number of both natural and man-made elements that compose the view. Due to the lack of contrast between the existing panorama and the resulting view with the proposed project, the contrast rating is weak.

The visual impacts from the DNPP route variation extend from MP 223 to MP 228 within DNPP. From the perspective of KOPs 7 and 8, the visual impacts from this route variation would be moderate/weak and weak.

Appendix A

Completed Form 8400-4 for Each KOP

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 08/04/2011

District N/A

Resource Area DNPP

Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name
ASAP Pipeline

2. Key Observation Point
#1 Government Hill

3. VRM Class

4. Location
Township ______
Range ______
Section ______

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Steep & Diagonal Background. Flat to Rolling Foreground	Smooth in Background Medium to Rough in Foreground	Smooth, Linear Rail Bridge
LINE	Bold Angular Lines at Horizon, Sloping/Broken Lines in middle ground	-Soft, irregular in Background -Irregular, vertical in Foreground	Strong Vertical and Horizontal Lines @ Bridge
COLOR	Gray, Tan, Brownish Red, Blue/Gray Water	Light to Dark Greens	Gray Road, Black/Brown Rail Bridge
TEX-TURE	Smooth and Mottled	-Smooth/Med in Background -Medium/Coarse in Foreground	Smooth/Fine Rail Bridge

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat	Narrow, Curving and Straight Form created by clearing	N/A
LINE	Curved, Undulating	Strong to Moderate Lines created by edge effect of corridor clearing	N/A
COLOR	Gray, Tan, Brownish-Red	Light Green	N/A
TEX-TURE	Fine to Smooth Clearing Corridor	Fine to Medium	N/A

SECTION D. CONTRAST RATING ☐ SHORT TERM ☑ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form		✓				✓						✓
Line	✓				✓							✓
Color			✓				✓					✓
Texture		✓				✓						✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☑ Yes ☐ No (Explain on reverse side)

Evaluator's Names
John Rowe, ASLA
Alan Skinner, PE

Date
08/04/2011

Comments from item 2.

While there are no official VRM objective for this area, these strong lines and contrast in vegetation/soil color created by the clearing of the utility corridor will draw viewers attention and detract from the other natural and man made (rail bridge) aesthetics.

Additional Mitigating Measures (See item 3)

1. A directional bore for the gas line from approx. station 539.2 to 540.2 would elevate a majority of the heavy scaring to landscape from this KOP.

2. A reroute of the proposed pipeline from approx. station 538.5 to 540.2. This reroute would push the gasline from the South and West side of the slope at Glitter Gulch to the backside (North and East side) of the hill.

U.S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 08/04/2011

District N/A

Resource Area DNPP

Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name
ASAP Pipeline

2. Key Observation Point
#2 Visitor Center/AK Railroad

3. VRM Class

4. Location
Township ________
Range ________
Section ________

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Steep/Diagonal Background Flat/Linear Foreground	Smooth in Background Medium to Coarse in Foreground	Rectangular Hotel in Background, Complex structures/Bold, Angular/Flat in Foreground
LINE	Bold Jagged Lines at Horizon, Angular Broken Lines in Middleground, Flat in Foreground	Soft, Flowing in Background Complex, Irregular in Foreground	Regular, Geometric Hotel Building in Background, Complex/Geometric, Hard in Foreground
COLOR	Gray, Tan and Brownish-Red Land/No Water Viewed	Light to Dark Green	Hotel with Green Roof and white exterior in Background/Browns and grays dominate structures Foreground
TEX-TURE	Smooth and Mottled	Smooth in Background Medium to Coarse in Foreground	Hard, Smooth Textures in Both Background & Foreground

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat	Narrow, Curving, and Straight form created by clearing activities	N/A
LINE	Straight and Curved, Undulating Line	Moderate Lines created by Edge Effect of Clearing Activities	N/A
COLOR	Gray, Tan & Brownish Red Land	Light Green	N/A
TEX-TURE	Fine to Smooth Created by Clearing	Fine to Medium	N/A

SECTION D. CONTRAST RATING ☐ SHORT TERM ☑ LONG TERM

1.

DEGREE OF CONTRAST	FEATURES											
	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
ELEMENTS	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form			✓				✓					✓
Line			✓			✓						✓
Color				✓				✓				✓
Texture			✓				✓					✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No
(Explain on reverse side)

3. Additional mitigating measures recommended
☐ Yes ☑ No (Explain on reverse side)

Evaluator's Names	Date
John Rowe, ASLA	08/04/2011
Alan Skinner, PE	

Comments from item 2.

While there is a segment of the proposed gasline corridor that will be visible from the parking/access drive area, the business of the surrounding foreground and background activities dulls the visual impact from this vantage point.

Additional Mitigating Measures (See item 3)

(Same as KOP #1)

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(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 08/04/2011

District N/A

Resource Area DNPP

Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name
ASAP Pipeline

2. Key Observation Point
#3 - Wilderness Access Center

3. VRM Class

4. Location
Township ________
Range ________
Section ________

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Jagged to Rolling	Smooth to Medium in Background Coarse in Foreground	Flat parking lot in Foreground
LINE	Bold Angular and Curved Lines at Horizon. Strong Horizontal In Foreground	Soft, Irregular in Background Irregular, vertical in Foreground	Strong, Horizontal and Flat
COLOR	Gray, Tan, Brownish Red	Light to Dark Green	Open gray parking lot with blue and white traffic striping
TEXTURE	Smooth to Medium Mottled in Background Flat in Foreground	Smooth to Medium in Background Medium to Coarse in Foreground	Flat, Smooth in Foreground

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat	Short, Narrow, straight and curving form created by clearing of corridor	N/A
LINE	Straight and curved, undulating line	Light to Moderate line created by clearing activities	N/A
COLOR	Gray, Brownish Red Land	Light Green	N/A
TEXTURE	Fine to Smooth, Created by Clearing	Fine to Medium	N/A

SECTION D. CONTRAST RATING ☐ SHORT TERM ☑ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form			✓				✓					✓
Line			✓				✓					✓
Color				✓				✓				✓
Texture			✓				✓					✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No
(Explain on reverse side)

3. Additional mitigating measures recommended
☐ Yes ☑ No (Explain on reverse side)

Evaluator's Names	Date
John Rowe, ASLA	08/04/2011
Alan Skinner, PE	

Comments from item 2.

A small segment of the proposed gasline corridor would be visible amongst the treeline, looking to the Northeast. The view will often be interrupted by RV's and other vehicles using the parking lot.

Additional Mitigating Measures (See item 3)

(Same as KOP#1)

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 08/18/2011

District N/A

Resource Area DNPP

Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name ASAP Pipeline	4. Location	5. Location Sketch
2. Key Observation Point #4 - Parks Highway	Township ______ Range ______ Section ______	
3. VRM Class		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Steep with Diagonal Form in Background Flat/Light Rolling in Foreground	Smooth/Flowing in Background Medium to Rough in Foreground	Smooth, Curving Road and guard rail signs and embankment
LINE	Bold angular lines at horizon, sloped broken lines in Background Flat, flowing in Foreground	Soft, Irregular in Background Irregular in Foreground	Strong curving lines from road from Foreground to Middle ground, Complex vertical Foreground
COLOR	Gray, Ran and Brownish-Red	Light to Dark Greens	Gray road and guardrail, white and yellow stripping on the roadway.
TEX-TURE	Smooth, Discontinuous and Mottled	Smooth/Medium in Background Medium/Coarse in Foreground	Smooth road surface and guard rail, Slightly coarse in Foreground due to Posts

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat	Narrow Curving Band due to Corridor Clearing	N/A
LINE	Curved and Undulating	Strong curved lines created by edge effect of clearing	N/A
COLOR	Gray, Tan and Brownish Red	Light Green	N/A
TEX-TURE	Fine/Smooth	Fine to Medium	N/A

SECTION D. CONTRAST RATING ☐ SHORT TERM ☑ LONG TERM

1.

DEGREE OF CONTRAST	FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
ELEMENTS	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form		✓				✓						✓
Line	✓				✓							✓
Color			✓				✓					✓
Texture		✓				✓						✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended
☑ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
John Rowe, ASLA	08/18/2011
Alan Skinner, PE	

SECTION D. (Continued)

Comments from item 2.

The strong, undulating line that is created with the clearing of the pipeline corridor will command attention of the motorist as they are traveling north towards the main park entrance.

Additional Mitigating Measures (See item 3)

(Same as KOP#1)

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DEPARTMENT OF THE INTERIOR
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VISUAL CONTRAST RATING WORKSHEET

Date 08/18/2011

District N/A

Resource Area DNPP

Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name
ASAP Pipeline

2. Key Observation Point
#5 Mt. Healy Trail Outlook

3. VRM Class
Visual Impact

4. Location
Township ________
Range ________
Section ________

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Steep/Rugged angles with low rolling valley	Smooth/Fine in Background Medium to Fine in Middleground Coarse Complex in Foreground	Multiple, Complex Buildings, Roads and Structures in Mid and Back Ground
LINE	Bold Angular Lines at Horizon. Complex and Irregular series of curves in Middleground	Soft, Broken lines in Background Irregular/Complex lines in Foreground	Complex, Geometric Lines create buildings, roads and other structures
COLOR	Gray, Tan & Brownish-Red/Grayish-Blue Water	Light to Dark Greens, and Red	Red, Blue, White, Grays in Buildings and Structures.
TEX-TURE	Smooth, Mottled Land with Medium to Coarse in Foreground	Smooth to Medium in Background Medium to Coarse in Foreground	Medium to Coarse texture created by scattered development

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat/Curved	Narrow, Curving Form created by Clearing	N/A
LINE	Curved, Undulating	Moderate, Lightly curved line created by corridor clearing	N/A
COLOR	Gray, Tan, Brownish-Red	Light Green	N/A
TEX-TURE	Fine/Smooth Corridor created by Clearing	Fine to Medium Texture in Background	

SECTION D. CONTRAST RATING ☐ SHORT TERM ☑ LONG TERM

1. DEGREE OF CONTRAST

	FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
ELEMENTS	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form		✓					✓					✓
Line			✓				✓					✓
Color			✓				✓					✓
Texture			✓				✓					✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended
☐ Yes ☑ No (Explain on reverse side)

Evaluator's Names
John Rowe, ASLA
Alan Skinner, PE

Date
08/18/2011

Comments from item 2.

While the proposed corridor clearing does create a long, narrow, winding ribbon through the landscape, it does get lost in the clutter of the development in Glitter Gulch, as well as the rivers and roads that wind through the valley in the same direction as the pipeline corridor.

Additional Mitigating Measures (See item 3)

1. A directional bore for the gasline between stations 539.5 and 540.2 would eliminate a majority of the visual scaring created by clearing the corridor.

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VISUAL CONTRAST RATING WORKSHEET

Date 09/13/2011

District N/A

Resource Area DNPP

Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name
ASAP Pipeline

2. Key Observation Point
#6 AK RR South of Parks Highway

3. VRM Class

4. Location
Township ________
Range ________
Section ________

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Steep/Diagonal Background Flat to Rolling Foreground	Smooth in Background Medium to Coarse in Foreground	N/A
LINE	Bold Angular Lines at Horizon Broken Lines in Mid ground Curving River	Soft, Irregular in Background Irregular, Vertical in Foreground	N/A
COLOR	Gray, Tan, Brownish Red, Blue/Gray Water	Dark to Light Green, Yellow	N/A
TEX-TURE	Smooth to Mottled	Smooth in Background Medium to Coarse in Foreground	N/A

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat	Narrow, Curving and Straight Form Created by Clearing Activities	N/A
LINE	Curved and Straight Line Segments	Strong to Moderate Lines Created by Edge Effect from Clearing	N/A
COLOR	Gray, Tan, Brownish Red with Earth Disruption	Strong to Moderate Lines Created by Edge Effect from Clearing	N/A
TEX-TURE	Fine to Smooth, Clearing of Corridor	Fine to Medium	N/A

SECTION D. CONTRAST RATING ☐ SHORT TERM ☑ LONG TERM

1.

DEGREE OF CONTRAST	FEATURES											
	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS Form			✓				✓					✓
Line		✓				✓						✓
Color			✓			✓						✓
Texture			✓				✓					✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended
☐ Yes ☑ No (Explain on reverse side)

Evaluator's Names	Date
John Rowe, ASLA	09/13/2011

Comments from item 2.

While a small segment of the pipeline corridor (Between ASAP MP 589.5 and 540.2) will cause a short term visual impact, the long term maintenance activities are anticipated to have much less impact. The distance from the KOP to the pipeline and the relatively low viewing angle are major factors in the anticipated, low visual impact over the long term.

Additional Mitigating Measures (See item 3)

While no mitigating actions are recommended, the mitigation actions discussed in other KOP's (to the segment between ASAP MP 539.5 and 540.2) would greatly reduce the short term visual impacts on this KOP.

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VISUAL CONTRAST RATING WORKSHEET

Date 11/15/2011

District N/A

Resource Area DNPP

Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name
ASAP Pipeline

2. Key Observation Point
#7 Parks Highway - MP 234

3. VRM Class

4. Location
Township ________
Range ________
Section ________

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Steep Mountains in Background Flat to Rolling in Foreground	Smooth/Mottled in Background Coarse in Forground	Flat Road Surface
LINE	Strong Diagonal in Background Horizontal and Undulating in Foreground	Soft/Irregular in Background Irregular, Vertical in Foreground	Straight Lines
COLOR	Gray, Tan, Brownish-Red in Background, Green in Foreground	Medium Green in Background, Light to Medium Green in Foreground	Gray with White and Yellow Stripes, Green Mile Sign
TEX-TURE	Smooth/Mottled in Background Mottled in Foreground	Smooth in Background Medium to Coarse in Foreground	Smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat	Straight, Narrow Form created by Vegetation Clearing	N/A
LINE	Curved and Straight Line Sections	Moderate to Strong Lines created by Edge Effect from Clearing	N/A
COLOR	Gray, Brown with Earth Disruption	Light to Dark Green	N/A
TEX-TURE	Fine to Smooth with Clearing of Corridor	Fine to Medium	N/A

SECTION D. CONTRAST RATING ☐ SHORT TERM ☐ LONG TERM

1.

DEGREE OF CONTRAST	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
ELEMENTS	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form		✓				✓						✓
Line		✓				✓						✓
Color			✓				✓					✓
Texture			✓			✓						✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended
☐ Yes ☑ No (Explain on reverse side)

Evaluator's Names: John Rowe, ASLA

Date: 11/15/11

Comments from item 2.

While the Construction Phase of the project will create considerable visual pollution, the long term (maintenance) phase will have considerably less impact with the corridor width being reduced, compared to the construction, and the earth being revegetated.

Additional Mitigating Measures (See item 3)

None

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Appendix L

ANILCA Section 810 Analysis of Subsistence Impacts

Alaska Stand Alone Gas Pipeline
ANILCA Section 810 Analysis of Subsistence Impacts

In 2010, the Alaska Legislature passed House Bill (HB) 269 that, in part, provided for establishing an intrastate natural gas pipeline system. With a shortfall of natural gas supply from the Cook Inlet area to meet current and future anticipated demands from Alaskans, the Alaska Stand Alone Gas Pipeline (ASAP) aims to provide a long-term, stable supply of natural gas and NGLs from North Slope gas fields to markets in the Fairbanks and Cook Inlet areas by 2016. To this end, the Alaska Gasline Development Corporation (AGDC) proposes to develop a 24-inch diameter, 737-mile long, high pressure natural gas pipeline from the North Slope to Cook Inlet.

Chapter five (Affected Environment and Environmental Consequences) of the ASAP Preliminary Draft Environmental Impact Statement (PDEIS) provides a detailed description of the affected environment of the planning area and the potential adverse effects of the various alternatives to subsistence. This analysis uses the detailed information presented in the PDEIS to evaluate the potential impacts to subsistence pursuant to Section 810 of the Alaska National Interest Land Conservation Act (ANILCA, P.L. 96-487).

A. Subsistence Evaluation Factors

Section 810(a) of ANILCA requires that an evaluation of subsistence uses and needs be completed for any federal determination to "withdraw, reserve, lease, or otherwise permit the use, occupancy or disposition of public lands." Therefore, an evaluation of potential impacts to subsistence under ANILCA Sec. 810(a) must be completed for the ASAP. ANILCA requires that this evaluation include findings on three specific issues:

- The effect of use, occupancy, or disposition on subsistence uses and needs;
- The availability of other lands for the purpose sought to be achieved; and
- Other alternatives that would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes (16 USC Sec. 3120).

A finding that the proposed action may significantly restrict subsistence uses imposes additional requirements, including provisions for notices to the State of Alaska and appropriate regional and local subsistence committees, a hearing in the vicinity of the area involved, and the making of the following determinations, as required by Section 810(a)(3):

- Such a significant restriction of subsistence uses is necessary, and consistent with sound management principles for the utilization of public lands;
- The proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of use, occupancy, or other disposition; and
- Reasonable steps will be taken to minimize adverse effects upon subsistence uses and resources resulting from such actions.

To determine if a significant restriction of subsistence uses and needs may result from any one of the alternatives discussed in the PDEIS, including its cumulative effects, the following three factors in particular are considered:

- The reduction in the availability of subsistence resources caused by a decline in the population or amount of harvestable resources. Forces that might cause a reduction include adverse impacts on habitat, direct impacts on the resource, increased harvest and increased competition from non-rural harvesters.;
- Reductions in the availability of resources used for subsistence purposes caused by alteration of their normal locations, migration, and distribution patterns; and
- Limitations on access to subsistence resources, including but not limited to increased competition for the resources.

A significant restriction to subsistence may occur in at least two instances: 1) when an action substantially reduces populations or their availability to subsistence users, and 2) when an action substantially limits access by subsistence users to resources. The information contained in Chapter 5 of the ASAP PDEIS is the primary data used in this analysis.

B. ANILCA Sec. 810(a) Evaluations and Findings for All Alternatives and the Cumulative Case

The following evaluations are based on information relating to the environmental and subsistence consequences of the proposed Alaska Stand Alone Gas Pipeline. The evaluation and findings focus on the potential impacts to the subsistence resources themselves, as well as access to resources, and economic and cultural issues that relate to subsistence use.

1. Evaluation and Finding for Alternative A: No Action Alternative

a) Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

Under the No Action Alternative, the area would remain available to lawful and permitted activities pursuant to State and Federal regulations. All special areas and site-specific prohibitions would remain in effect.

The analysis of the No Action Alternative on subsistence considers the effects of not undertaking the proposed action. The analysis concludes that the activities would have no significant effects on subsistence species and on access to subsistence resources.

b) Evaluation of the Availability of Other Lands for the Purpose Sought to be Achieved

Other lands are available for the purpose sought to be achieved. Under the No Action Alternative, none will be affected. Therefore, there are no significant effects on subsistence species and on access to subsistence resources.

c) Evaluation of Other Alternatives that Would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

No other alternatives are considered. Therefore, there are negligible effects on subsistence species and on access to subsistence resources.

d) Findings

Under the No Action Alternative, management of BLM lands will continue under currently existing management plans. The No Action Alternative would not significantly restrict subsistence uses and needs. The impacts to subsistence resources and access discussed above would be minimal, or would be adequately mitigated by specific instructions under which the lessee/permittee must operate.

2. Evaluation and Findings for Alternative B: the Proposed Action

Under the Proposed Action, the AGDC proposes to construct, operate, and maintain approximately 737 miles of new 24 in diameter intrastate natural gas transmission pipeline, approximately 34 miles of new 12 inch diameter pipeline lateral, on or two stand alone compressor stations, a GCF, a straddle and off-take facility, the Cook Inlet Natural Gas Liquid Extraction Plant (NGLEP) Facility, three meter stations, 31 mainline valves, five pig launcher and/or receiver facilities, and other permanent facilities. The analysis of the proposed activity considers the effects of construction as well as operational and maintenance activities on subsistence uses and needs.

a) Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

As mentioned in Section 5.5, the proposed action will impact wildlife resources via 1) habitat loss, alteration, and fragmentation, and 2) altered hunting mortality patterns due to altered human access, among other things. During the construction phase, general disturbance of wildlife and their habitat could result in the unavailability of subsistence resources. Big game animals such as moose and caribou will likely temporarily avoid areas where human disturbance is occurring. Large machinery creates noise, vehicular traffic creates barriers, and the influx of construction workers increase human presence. With general disturbance, subsistence resources may be unavailable at the time and place that subsistence users are accustomed to finding them. During construction, the effect of resource displacement on subsistence uses due to disturbance is likely greatest in the undeveloped Minto Flats area and for subsistence users in communities that lie directly along the proposed route (e.g. Minto, Nenana, Healy, Wiseman, Coldfoot, Anderson, McKinley Park, Cantwell, Trapper Creek, and Willow). For migratory resources such as caribou, a greater number of communities may be affected by the construction of the pipeline. Of the villages potentially affected by the construction of the proposed pipeline, Anaktuvuk Pass has the greatest reported reliance on caribou. Due to annual variation in caribou migration, in some years, caribou may not migrate through Anaktuvuk Pass. However, caribou in particular are sensitive to disturbance (Vistnes and Nellemann

2008). During construction, vehicular and human traffic is likely to increase. Traffic can be a physical barrier to caribou in transit (Wolfe *et. al.* 2000). This may cause animals to be displaced or diverted. Disturbance that could alter the migration of caribou such that they are inaccessible by residents of Anaktuvuk Pass may affect their food security. Therefore, Anaktuvuk Pass will likely feel the greatest impact from displacement of migratory resources due to construction of the proposed pipeline. However, because most of the pipeline will be co-located with the Trans-Alaska Pipeline System (TAPS) right-of-way (ROW), displacement of caribou due to the construction of the ASAP is likely short-term.

The effects of the proposed action on resource populations are variable. In recent years, caribou herds on the North Slope are relatively stable or have increased in population (Caikoski 2009, Lenart 2009, Parret 2009) while moose populations have fluctuated (Carroll 2008). However, larger ecosystem processes such as climate, predation, and fire drive population dynamics rather than the pipeline construction. The construction of up to 60 new access roads to the pipeline will increase access to subsistence resources not readily accessible at the current time. Access roads may increase access to resources by hunters. One of the concerns about the proposed action is competition from non-locals for fish and game that might otherwise be harvested for local subsistence. One of the causes of this competition is increased access to remote areas primarily as a consequence of opening the Dalton Highway to the public in 1994. The TAPS service roads were also cited as providing increased access to remote areas although the decision to open the Dalton Highway was not related to the TAPS. Because the ASAP will be co-located with the TAPS on the North Slope, the amount of access that access roads provide to subsistence resources is limited because of their short length and the size and configuration of subsistence use areas. Moreover, vehicular use of access roads will be restricted for security purposes. Competition from workers and employees of the ASAP could be minimized by stipulations that prohibit employees from camping, hunting, fishing, and trapping in the ROW. And restrictions on motorized vehicle use and firearms use within the five-mile Dalton Highway corridor further limits competition from non-locals. Disturbance of subsistence activities due to competition from non-local hunters is likely limited to the ROW with restrictions imposed on non-locals as discussed above. Therefore, the proposed action would have no significant effect on subsistence uses and needs.

Waterbody crossings will be achieved via different techniques as to minimize impacts on subsistence fisheries. Section 2.2.3.2 describes the different methods of waterbody crossings.

The proposed action would not significantly impact other harvestable resources such as berries, willows, and spruce roots. Most of the construction is within the Dalton and Parks highway ROW. Therefore, the amount of vegetation clearing necessary for the construction of the pipeline is minimized. Mitigating actions such as revegetation of disturbed areas could help lessen the impact on these resources.

The analysis concludes that the activities would have no significant effects on subsistence uses and needs, and on access to subsistence resources.

b) Evaluation of the Availability of Other Lands for the Purpose Sought to be Achieved

Other lands are available for the purpose sought to be achieved. According to the applicant, the proposed pipeline route will minimize total pipeline length; reduce the amount of challenging terrain and geologic special design areas; avoid and/or minimize impacts to ROWs; and avoid parks, preserves, refuges, and wilderness areas, thereby reducing construction impacts. To the extent feasible, existing state infrastructure and ROWs, including state/borough highways and road systems and the ARRC railroad, will be used for pipeline installation to minimize project impact.

c) Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

There are no other alternatives to this activity. The proposed action has negligible effect on federal subsistence resources and its users.

d) Findings

Under Alternative B (Proposed Action), access to subsistence resources will not be significantly hampered by the proposed activity. The proposed activity would not significantly restrict subsistence uses and needs in or near the proposed activity area. The impacts to subsistence resources and access discussed above would be minimal. There is no reasonably foreseeable significant decrease in the abundance of harvestable resources, and in the distribution of harvestable resources due to the proposed action.

3. Evaluation and Finding for the Cumulative Case

The goal of the cumulative analysis is to evaluate the incremental impact of the proposed action in conjunction with all past, present, and reasonably foreseeable future actions in or near the proposed ASAP system. The cumulative analysis considers in greatest detail activities that are more certain to happen, and activities that are identified as being of great concern during consultation. Chapter 5.19 discusses cumulative effects in greater detail. Actions included in the cumulative analysis include, but are not limited to, the following:

- Previous land use pattern in the proposed activity area
- Current land use activities in the proposed activity area
- Foreseeable future developments and land use activities in the proposed activity area

a) Evaluation of the Effects of Use, Occupancy, or Disposition on Subsistence Uses and Needs

The potential list of cumulative activities, depending on timing, magnitude, duration, intensity, and type of activity would impact local subsistence species of fish and wildlife relative to abundance, distribution, seasonal habitat use, movement patterns, and habitat integrity (relative to fragmentation, degradation, and conversion). The activities and impacts of reasonably foreseeable actions would be dealt with on a case-by-case basis as at this time it cannot be predicted how such activities will present themselves or if they will actually occur.

One of the most frequently cited concerns about the potential construction and operation of the ASAP system is the adverse impact on the distribution of subsistence resources. The implication of such changes would be reduced accessibility. Even though the population size of important subsistence resources might be equal to or larger than those in the past, displacement of resources may render the resources inaccessible to subsistence users. Analyzed individually, the ASAP system may not have a significant impact on the distribution of subsistence resources. However, combined with likely future constructions such as the Foothills West Transportation Access, Ambler Mining District Access, and roads being considered in the Western Alaska Access Planning Study, there is likely a cumulative increase in habitat loss, alteration, and fragmentation, as well as an altered hunting mortality pattern due to altered human access. The effects of future constructions along the Denali and the Parks highways will not likely affect population sizes of subsistence resources. Some of the actions that are considered as contributing cumulative impacts are already in place and have not led to population declines in key species. Some subsistence resource populations have actually increased with the existence of the TAPS. Competition for resources due to increased access to remote areas may increase with the opening of roads such as the ones mentioned above. And specific villages that lie in proximity to these proposed future roads will likely be the most affected by future competition for resources. Therefore, the cumulative case may have a significant effect on subsistence uses and needs.

e) Evaluation of the Availability of Other Lands for the Purpose Sought to be Achieved

According to the applicant, the proposed pipeline route will minimize total pipeline length; reduce the amount of challenging terrain and geologic special design areas; avoid and/or minimize impacts to ROWs; and avoid parks, preserves, refuges, and wilderness areas, thereby reducing construction impacts. To the extent feasible, existing state infrastructure and ROWs, including state/borough highways and road systems and the ARRC railroad, will be used for pipeline installation to minimize project impact. The future construction of roads such as the Foothills West Transportation Access, the Ambler Mining District Access, and roads being considered in the Western Alaska Access Planning Study will likely depend on many aspects of feasibility studies to undertake these projects. The specific routes may not be exactly determined as of now, but other lands may be available for the purposes sought to be achieved.

f) Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

There are no other alternatives to this activity. The only alternative that would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes is to not allow or permit any activities that conflict with subsistence uses on BLM lands. However, such an alternative is not viable because multiple land managers have different mandates and the BLM manages public lands for multiple uses.

g) Findings

Cumulative impacts associated with the proposed action may significantly affect subsistence uses and needs. As discussed in the preceding section, an increase in potential disruption of subsistence resource movements and an increase in competition for subsistence resource may hamper subsistence activities on the North Slope.

C. Subsistence Determinations Under the ANILCA Sec. 810(a)(3)(A), (B), and (C)

ANILCA Sec. 810(a) provides that no “withdrawal, reservation, lease, permit, or other use, occupancy or disposition of the public lands which would significantly restrict subsistence uses shall be affected” until the federal agency gives the required notice and holds a hearing in accordance with ANILCA Sec. 810(a)(1) and (2), and makes the three determinations required by the ANILCA Sec. 810 (a)(3)(A), (B), and (C). The three determinations that must be made are: 1) that such a significant restriction of subsistence use is necessary, consistent with sound management principles for the utilization of the public lands; 2) that the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other such disposition; and 3) that reasonable steps will be taken to minimize adverse impacts to subsistence uses and resources resulting from such action [16 U.S.C. Sec. 3120(a)(3)(A), (B), and (C)].

The BLM has found in this ANILCA 810 Evaluation that the cumulative case in this EIS may significantly restrict subsistence uses. Therefore, the BLM will undertake the notice and hearing procedures required by the ANILCA Sec. 810 (a)(1) and (2) in conjunction with release of the Draft EIS in order to solicit public comment from the potentially affected communities and subsistence users.

Should the proposed action have a positive finding, the determination that the requirements of ANILCA §810 (a)(3)(A), (B), and (C)have been met will be analyzed in the Final ANILCA §810 Evaluation, and will be presented in the FEIS, and will include testimony and input from the communities in which subsistence hearings will be held.

D. References

Caikoski, J. R. 2009. Units 25A, 25B, 25D, and 26C caribou. Pages 240-258 *in* P. Harper, editor. Caribou management report of survey and inventory activities 1 July 2006-30 June 2008. Alaska Department of Fish and Game. Project 3.0. Juneau, Alaska, USA.

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Wolfe, S. A., B. Griffith, and C. A. G. Wolfe. 2000. Response of reindeer and caribou to human activities. Polar Research. 19(1):63-73.

15 Dec 2011

Merben R. Cebrian
Wildlife Biologist
BLM Central Yukon Field Office

Date

Appendix M

Right-of-Way Lease

ADL 418997

RIGHT-OF-WAY LEASE
FOR
THE ALASKA STAND ALONE GAS PIPELINE/*ASAP*

BY AND
BETWEEN
THE STATE OF ALASKA
AND
THE ALASKA GASLINE DEVELOPMENT CORPORATION

ADL 418997
ALASKA STAND ALONE GAS PIPELINE/ASAP
RIGHT-OF-WAY LEASE

Table of Contents

ADL 418997
ALASKA STAND ALONE GAS PIPELINE/ASAP
RIGHT-OF-WAY LEASE

This Right-of-Way Lease (hereinafter "Lease") is entered into this 25th day of July, 2011 (hereinafter "Effective Date"), by the State of Alaska (hereinafter "State"), acting through the Commissioner of the Department of Natural Resources (hereinafter "Commissioner"), and by the Alaska Gasline Development Corporation (hereinafter "AGDC" or "Lessee").

WHEREAS the AGDC was created pursuant to Alaska Statutes 38.34.030(a) and 18.56.086;

WHEREAS AGDC is required by AS 38.34.040(e)(3) to apply for and obtain rights-of-way and other permits for the project route;

WHEREAS AS 38.34.050(c) provides the Commissioner shall grant AGDC a right-of-way lease under AS 38.35 for the gas pipeline transportation corridor if AGDC submits a complete right-of-way lease application under AS 38.35.050, the lease application is made the subject of notice and other reasonable and appropriate publication requirements under AS 38.35.070, and (3) AGDC agrees to be bound by certain right-of-way lease covenants set out in AS 38.35.120; and

WHEREAS AGDC submitted a complete right-of-way lease application, and the lease application was noticed for public comment on March 21, 2011.

Now, in consideration of Lessee's covenants and agreements described hereinafter, and subject to the provisions of this Lease, the State and Lessee agree as follows:

1. <u>Lease of Right-of-Way</u>

(a) Pursuant to the provisions of AS 38.35, the Alaska Right-of-Way Leasing Act, as amended, and for and in consideration of the covenants and conditions contained herein and the Stipulations incorporated by reference and attached as Exhibit A, the State hereby grants to the Lessee, for a limited duration described in Section 2, a non-exclusive right-of-way Lease only for the purposes described in Subsection (c) of this section, across, through, and upon those State Lands and those lands now owned or hereafter acquired, each as shown and described in the incorporated alignment and site locations attached hereto as Exhibit B. If needed upon completion of a title report on the lands listed in Exhibit B, Exhibit B shall be amended.

(b) This Lease conveys a right-of-way interest only in lands in which the State holds or obtains a property interest, including lands selected by the State pursuant to Section 906 of the Alaska National Interest Lands Conservation Act. This Lease does not convey land or interest in lands owned or administered by the University of Alaska, the Alaska Mental Health Trust Authority, or the Alaska Railroad Corporation. Although this Lease applies to State Lands in which the Alaska Department of Transportation and Public Facilities has an interest or which the Alaska Department of Transportation and Public Facilities administers, the Lessee must also secure the written permission of the Alaska Department of Transportation and Public Facilities to enter upon and use such lands through an Highway Use Agreement to be entered into pursuant to Exhibit A Stipulation 4.

(c) This Lease is granted for the purpose of the Construction, Operation, Maintenance, and Termination of a Natural Gas transportation Pipeline, consisting of one 24-inch diameter Pipeline, one 12-inch diameter Pipeline and Related Facilities in compliance with the terms of this Lease and all applicable State laws and regulations.

(d) Except as otherwise provided herein, the Lessee shall not allow or suffer any other Person or entity to use the Leasehold for carrying on activities which are not part of the Lessee's authorized operations pursuant to this Lease. Nothing in this subsection is intended to excuse or preclude the Lessee from complying with its obligations under this Lease, or employing agents, employees, or Contractors to effect the Construction, Operation, Maintenance, or Termination of the Pipeline. This Lease is subject to any valid existing rights including rights of third parties and of State entities with authority over the Leasehold.

2. <u>Duration</u>

(a) This Lease shall expire on the 25th day of July, 2041, at 12 noon (Alaska Time), unless prior thereto it is released, abandoned, or otherwise terminated pursuant to the provisions of this Lease or any applicable law or regulation.

(b) The Lessee shall give written notice to the Commissioner of its intent to seek renewal of this Lease no later than one-hundred eighty (180) days before expiration. The Commissioner shall, upon request of the Lessee, renew the Lease for additional terms of up to thirty (30) years each, hut not less than ten (10) years each, so long as the Pipeline is in commercial operation and Lessee is in compliance with:

(1) all terms of the Lease;

(2) all State laws, including but not limited to State law pertaining to regulation and taxation of the Pipeline; and

(3) any agreement(s) between the State and the Lessee pertaining to regulation and taxation of the Pipeline.

(c) The Lessee shall provide three hundred sixty-five (365) days notice to the Commissioner prior to any relinquishment, renewal, abandonment or other Termination of this Lease.

(d) Upon the expiration of the Lease term (including any renewal thereof), or upon its earlier forfeiture, relinquishment, abandonment, or other Termination, the provisions of this Lease, to the extent applicable, shall continue in effect and shall be binding on the Lessee, its successors, and assigns, until they have fully performed their respective obligations and liabilities resulting from that Lessee's tenure as the leaseholder or on account of the expiration, or prior Termination, of the Lease. At any time following the expiration, forfeiture, relinquishment, abandonment, or other Termination of this Lease, upon a determination in writing that the State's best interest shall be served, the Commissioner may release the Lessee from all or a portion of such continuing obligations and liabilities, with the exception of those contained in Section 8(m) and Section 9 herein.

3. <u>Rental</u>

(a) Construction Leasehold:

(1) The Lessee shall pay to the State annual rental payments in the amount of $188,600.00 during the period of Pipeline Construction. However, this rental amount shall be adjusted on the basis of a formal appraisal conducted on or before one (1) year after the Effective Date of this Lease.

(2) The first payment is due on or before the Effective Date of this Lease and all subsequent payments are due on or before each Lease Anniversary Date.

(3) The annual rental payments made during Construction under this subsection shall be adjusted by an amount which reflects any overpayment for the period from the date of the Commissioner's approval of all the requirements under Section 23(e) of this Lease to the next Lease Anniversary Date following the re-appraisal of the Operation and Maintenance Leasehold. The amount of difference shall be calculated on a pro rata acreage basis.

(b) Operation and Maintenance Leasehold:

(1) Upon receipt of the Commissioner's approval of all of the requirements under Section 23(e) of this Lease, and for the remainder of the term of this Lease and any subsequent renewals, Lessee shall pay to the State annual rental payments in the amount of the annual fair market rental of the Leasehold based on the appraised fair market rental value of the Leasehold.

(c) The initial formal appraisal, and all subsequent reappraisals, shall be carried out by an independent appraiser selected by the Lessee from a list of appraisers provided by the Department of Natural Resources. All costs of the initial formal appraisal, and of all subsequent reappraisals, shall be borne by the Lessee.

(d) The annual rental payment is subject to adjustment by the State five years from the first payment date as set out in (a) of this section and every fifth Lease Anniversary Date thereafter. The new rental payment shall be based on the appraised fair market rental value of the Leasehold. Except as set forth in Subsection (a)(3), the new annual rental payment takes effect on the applicable Lease Anniversary Date, regardless of whether the adjustment determination occurs before or after the applicable Lease Anniversary Date.

(e) The Lessee's rental obligations described in this section shall expire upon the expiration, forfeiture, relinquishment, abandonment, or other Termination of this Lease, subject only to the completion of all of Lessee's obligations described in Section 25 of this Lease.

(f) Except as provided in AS 38.34.040(f) and (g), any interest in land acquired under the provisions of AS 38.35.130 for the Pipeline shall become part of the Leasehold, and the costs for the acquisition thereof shall be borne by the Lessee. Rental shall not be charged for any land acquired under AS 38.35.130 and conveyed without cost to the State.

4. <u>Payment</u>

(a) The initial rental payment is due and shall be tendered on or before the Effective Date of the Lease. Subsequent rental payments shall be due annually on or before each Lease Anniversary Date.

(b) All payments to the State under this Lease must be made payable to the State in the manner directed by the State, and unless otherwise specified, shall be tendered to the State at:

Alaska Department of Natural Resources
Attention: Revenue Unit
550 West 7th Avenue, Suite 1410
Anchorage, Alaska 99501-3561

or to any other depository designated by the State. If the State changes the designated depository, it shall give at least sixty (60) days written notice to the Lessee in the manner provided in Section 26 herein.

(c) The Lessee shall pay the fee set forth in 11 AAC 05.010 for any late payment or returned check issued by the Lessee. Interest at the rate set by AS 45.45.010(a) shall be assessed on all past due amounts until payment is tendered to the State.

5. Denial of Warranty

(a) The State makes no representations or warranties, express or implied, as to title to, access to, or quiet enjoyment of the Leasehold. The State is not liable to the Lessee for any deficiency of title to or difficulty in securing access to the Leasehold. The Lessee or any successor in interest to the Lessee is not entitled to any refund of prior rentals paid under this Lease due to deficiency of title.

(b) The State makes no warranty, express or implied, and assumes no liability whatsoever, regarding the social, economic, or environmental aspects of the Leasehold granted herein, including, without limitation, the soil conditions, water drainage, access, natural or artificial hazards that may exist, or the profitability or fitness of the Leasehold granted herein for any use. The Lessee represents that the Lessee has inspected the Leasehold granted herein and determined that the Leasehold is suitable for the use intended, or has voluntarily declined to do so, and accepts the State Lands included in the Leasehold granted herein "as is" and "where is," subject to Section 13 of this Lease.

6. Reservation of Certain Rights to the State

(a) The State reserves and shall have a continuing and reasonable right of access to any part of the Leasehold (including the subsurface of, and the air space above, such Leasehold) and a continuing and reasonable right of physical entry to any part of the Pipeline, including federal and private lands, for inspection or monitoring purposes and for any other purpose or reason that is consistent with any right or obligation of the State.

(b) The right of access and entry reserved in Subsection (a) of this section shall extend to and be enjoyed by any Contractor of the State designated by the Commissioner in writing. Such written designation shall be provided to the Lessee. The Commissioner and the Lessee may mutually develop additional procedures to implement this subsection.

(c) There is reserved to the State the right to grant additional permits, Leases or easements for rights-of-way or other uses to third parties that include lands subject to the Leasehold; provided that such grant shall not unreasonably interfere with the Lessee's rights under this Lease.

(d) This Lease is subject to the reservations set forth in AS 38.05.125 as such statutes exist on the Effective Date of this Lease.

7. Access to Navigable and Public Waters

The State reserves a public access easement to and along all public or navigable water bodies or waterways that border on or are included in the State Lands included in the Leasehold. The State shall make the determinations and provisions required in AS 38.05.127(a) before the first formal appraisal. No public access easement may be obstructed or otherwise rendered incapable of reasonable use for the purposes for which it was reserved. The Lessee shall not petition to vacate, abandon, or extinguish any public access easement without the prior written approval of the Commissioner.

8. Covenants of Lessee

Unless specifically exempted by law, the Lessee expressly covenants, in consideration of the rights acquired by it pursuant to this Lease, that:

(a) Lessee will assume the status of and will perform all of its functions undertaken under this Lease as a common carrier and will accept, convey, and transport without discrimination Natural Gas delivered to it for transportation from fields in the vicinity of the Pipeline throughout its route on State Land obtained under this Lease and on other land; Lessee will accept, convey, and transport Natural Gas without unjust or unreasonable discrimination in favor of one producer or person, including itself, as against another but will take the Natural Gas delivered or offered, without unreasonable discrimination, that the Regulatory Commission of Alaska or its successor with jurisdiction over common carrier pipelines shall, after a full hearing with due notice to the interested Parties and a proper finding of facts, determine to be reasonable in the performance of its duties as a common carrier;

(b) Lessee will interchange Natural Gas with each like common carrier and provide connections and facilities for the interchange of Natural Gas at every locality reached by both pipelines when the necessity exists, subject to rates and regulations made by the appropriate State or federal regulatory agency;

(c) Lessee shall maintain and preserve books, accounts, and records and shall make those reports that the Commissioner may prescribe by regulation or law as necessary and appropriate for the purposes of administering AS 38.35;

(d) Lessee shall accord at all reasonable times to the State and its authorized agents and auditors the right of access to its property and records, of inspection of its property, and of examination and copying of records at Lessee's offices or other location chosen by Lessee;

(e) Lessee will provide connections, as determined by the Regulatory Commission of Alaska or its successor with jurisdiction over common carrier pipelines, under AS 42.06.340, to facilities on the Pipeline subject to this Lease, both on State Lands and other land in the State, for the purpose of delivering Natural Gas to persons (including the State and its political subdivisions) contracting for the purchase at wholesale of Natural Gas transported by the Pipeline when required by the public interest;

(f) Lessee shall, notwithstanding any other provision, provide connections and interchange facilities at State expense at such places the State considers necessary, if the State determines to take a portion of its royalty or taxes in Natural Gas;

(g) Lessee shall construct and operate the Pipeline in accordance with applicable State laws and lawful regulations and orders of the Regulatory Commission of Alaska or its successor with jurisdiction over common carrier pipelines;

(h) Lessee shall, at its own expense, during the term of this Lease

(1) maintain the Leasehold and Pipeline in good repair;

(2) promptly repair or remedy any damage to the Leasehold;

(3) promptly compensate for any damage to or destruction of property for which the Lessee is liable resulting from damage to or destruction of the Leasehold or Pipeline;

(i) As more fully set out in Section 22 of this Lease, Lessee shall not transfer, assign, or dispose of in any manner, directly or indirectly, or by transfer of control of the Lessee, its interest in this Lease, or any rights under this Lease or any Pipeline subject to this Lease to any person other than another owner of the Pipeline (including subsidiaries, parents and affiliates of the owners), except to the extent that the Commissioner, after consideration of the protection of the public interest (including whether the proposed transferee is fit, willing and able to perform the transportation or other acts proposed in a manner that shall reasonably protect the lives, property and general welfare of the people of Alaska), authorizes; the Commissioner shall not unreasonably withhold consent to the transfer, assignment, or disposal;

(j) Lessee shall file with the Commissioner a written appointment of a named permanent resident of the State of Alaska to be its registered agent in Alaska and to receive service of notices, regulations, decisions and orders of the Commissioner; if Lessee fails to appoint an agent for service, service may be made by posting a copy in the office of the Commissioner and filing a copy of it in the Office of the Lieutenant Governor and by mailing a copy to the Lessee's last known address;

(k) the applicable law of the State of Alaska shall be used in resolving questions of interpretation of this Lease;

(l) the granting of this Lease is subject to the express condition that the exercise of the rights and privileges granted under this Lease shall not unduly interfere with the management, administration, or disposal by the State of the State Land affected by this Lease, and that Lessee agrees and consents to the occupancy and use by the State, its grantees, permittees, or other Lessees of any part of the Leasehold not actually occupied or required by the Pipeline for the full and safe utilization of the Pipeline, for necessary operations incident to land management, administration, or disposal;

(m) as more fully set out in Section 9 of this Lease, Lessee shall be liable to the State for damages or injury incurred by the State caused by the Construction, Operation or Maintenance of the Pipeline and Lessee shall indemnify the State for the liabilities or damages;

(n) Lessee shall procure and furnish liability and property damage insurance from a company licensed to do business in the State or furnish other security or undertaking upon the terms and conditions the Commissioner considers necessary if the Commissioner finds that the net assets of the Lessee are insufficient to protect the public from damage for which the Lessee may be liable arising out of the Construction or Operation of the Pipeline.

9. Indemnity

(a) If and when the Lessee is no longer a State entity, then the Lessee shall assume all responsibility, risk, and liability for its Pipeline activities and its use of or contact with the Leasehold. If and when the Lessee is no longer a State entity, the Lessee shall defend, indemnify, and hold harmless the State, its agents and employees, from and against any and all demands, causes of action (whether in the nature of an action for damages, indemnity, contribution, government cost recovery or otherwise), fines, judgments, suits, claims, actions, proceedings, losses, costs (including reasonable attorneys' fees and costs), expenses, charges, forfeitures, liens, liabilities, settlements, penalties, and damages of any kind or nature whatsoever, including, but not limited to those alleging personal injury, wrongful death, nuisance, property damage, environmental contamination (including any disposal, release, spill or discharge or any threatened disposal, release, spill, or discharge of or contamination by Hazardous Materials, but subject to the limitations on Lessee's liabilities expressly provided under Section 13 of this Lease), and environmental noncompliance (including the Lessee's failure to provide all information, make all submissions, and take all steps required by the authority under the environmental laws or any other law concerning any spill, discharge, or contamination), arising out of, in connection with, directly or indirectly from, or otherwise incident to, Lessee's Construction, Operation or Maintenance of the Pipeline or use of or contact with the Leasehold, except to the extent the proximate cause of the injury or damage is due to the action or omission of the State, including any negligence, gross negligence, or reckless or willful misconduct of the State or anyone acting on the State's behalf.

(b) The State shall tender, and the Lessee shall accept the tender by the State of any such cause of action, lawsuit, or other proceeding brought against the State which is covered by Subsection (a) of this section. Subject to the last sentence in this subsection, any reasonable attorneys' fees or costs incurred by the State prior to such tender of defense shall be the complete and sole responsibility of Lessee, so long as the tender is covered by Subsection (a) of this section. If the State tenders such cause of action, lawsuit, or other proceeding later than twenty (20) days after service on the State, and the Lessee informs the State that the delay in tendering shall require Lessee to incur additional costs in order to respond in a competent and timely manner, and the State is unable to obtain an extension of time sufficient to provide Lessee with at least one-half of the number of days which the State originally had to respond, then the State shall reimburse Lessee for documented, reasonable costs incurred by the Lessee that are directly related to the delay in tendering and the State shall bear its attorneys' fees and costs prior to the tender.

(c) The obligations of the Lessee to indemnify the State under the terms of this Lease shall survive the transfer, assignment, or other disposition of the Lessee's interest in this Lease as well as the expiration, forfeiture, relinquishment, abandonment or other Termination of this Lease to the extent the obligation(s) arose during that Lessee's tenure as the leaseholder.

10. Lessee's Contractors, Agents and Employees

(a) Lessee shall require that all of its Contractors conducting Pipeline Activities on the Leasehold:

(1) indemnify the State and extend all its Contractors' indemnities to include the State as an additional named indemnitee;

(2) name the State of Alaska as additional insured on all liability insurance policies maintained under their contracts with Lessee; and

(3) obtain an appropriate waiver of subrogation in favor of the State with respect to all other insurance policies.

(b) Unless clearly inapplicable, the requirements and prohibitions imposed upon the Lessee by this Lease are also imposed upon the company's agents, employees, Contractors, and employees of each of them. The Lessee shall ensure compliance with this Lease by its agents, employees and Contractors, and the employees of each of them.

11. Guaranty and State as Additional Insured

(a) The Commissioner shall not issue a Notice To Proceed for the Lessee to initiate any Construction under this Lease prior to the Commissioner's receipt from the Lessee of an unconditional guaranty, meeting all requirements of this section, guaranteeing the performance of all of Lessee's duties and obligations under and by virtue of this Lease; except that the State shall not require a guaranty from a State entity.

(b) The guarantor's unconditional guaranty shall be in a form approved by the Commissioner, and shall be attached to this Lease as Exhibit C. If the Commissioner determines at any time that the guaranty is insufficient to satisfactorily guarantee the performance of all the Lessee's duties, obligations, and potential liabilities under and by virtue of this Lease, the Commissioner may require the substitution and delivery of a supplementary guaranty or other security from Lessee or from a substitute guarantor or insurer, with any provisions the Commissioner reasonably finds necessary. Lessee shall submit, on an annual basis, guarantor's annual financial statement and balance sheet, or such financial documentation of any required substitute guarantor, that the Commissioner requests.

(c) The Lessee shall procure and furnish liability and property damage insurance from a company licensed to do business in the State or furnish other security or undertaking upon the terms and conditions the Commissioner considers necessary if the Commissioner finds that the net assets of the Lessee are insufficient to protect the public from damage for which the Lessee may be liable arising out of the Construction or Operation of the Pipeline. If the Lessee, at its option or as required by the Commissioner under this section, obtains commercially available insurance coverage for the Leasehold and the Lessee's activities in, on or related to the Leasehold, the Lessee shall cause the State to be named as an additional insured on all such insurance policies obtained and maintained by the Lessee, except that such insurance coverage shall not cover or apply where the proximate cause of the injury or damage is the gross negligence or reckless or willful misconduct of the State or anyone acting on behalf of the State. Any commercially available insurance purchased by Lessee under this section shall not be construed to limit in any way the Lessee's liabilities or responsibilities under this Lease.

12. Conduct of Operations

(a) The Lessee shall perform all Pipeline Activities under this Lease in a lawful, prudent, and skillful manner in compliance with the terms and conditions of this Lease, its incorporated exhibits and all required permits.

(b) Except as set forth in Section 13, the Lessee shall prevent or, if the procedure, activity, event or condition already exists or has occurred, shall abate, as completely as practicable, any physical or mechanical procedure, activity, event or condition:

(1) that is susceptible to prevention or abatement;

(2) that arises out of, or could adversely affect, Pipeline Activities; and

(3) that causes or threatens to cause

a) a hazard to the safety of workers or to the public health or safety (including but not limited to personal injury or loss of life with respect to any person or persons); or

b) immediate, serious, or irreparable harm or damage to the environment (including but not limited to soil, sediments, water and air quality, areas of vegetation, fish or other wildlife populations or their habitats, or any other natural resource).

(c) The Lessee shall provide reasonable protection to public or private improvements on State Land, which may be adversely affected by Pipeline Activities. If the Commissioner determines that the Lessee has caused damage to such public or private improvements, and if the owner of such improvements so requires, then the Lessee shall promptly repair or reimburse the owner for reasonable costs in repairing such improvements to a condition which is reasonably satisfactory to the owner, but which does not exceed the improvements' condition prior to damage. This section does not limit in any way the legal or equitable remedies that may be available to a public or private owner of improvements on State Land.

13. Use of Previously Disturbed Lands

(a) The Commissioner and the Lessee agree that, where possible, the use of previously disturbed lands is desired to reduce impacts to the environment. Both parties recognize that certain sites authorized for use under the Lease may contain releases or threatened releases of Hazardous Substances that are the result of activities prior to the use of such sites by the Lessee. For the purposes of this section, the term "Site" shall mean a specific area of the Leasehold selected for a particular operation or use by the Lessee in accordance with the terms of this Lease, and the term "Existing Contamination" shall mean Hazardous Substances present at the Site prior to Lessee's initial Field Activity on the Site.

(b) The Lessee, the Department of Natural Resources, and the Department of Environmental Conservation will enter into good faith negotiations to reach an agreement that will limit Lessee's liability for Existing Contamination. That agreement may contain additional conditions governing Lessee's activity on Sites where Existing Contamination may be present and/or provide for alternate Site selection in the event that Existing Contamination makes use of a Site undesirable to the Lessee. If, before the start of Field Activity at a Site, there is Existing

Contamination or there is a reasonable possibility that there is Existing Contamination at a Site, the Lessee, in its sole discretion, may choose to work with the Commissioner to amend the Lease to:

(1) remove the Site from the Leasehold, without any further obligation or liability to remove, remediate, minimize or control Existing Contamination, and

(2) identify and add any necessary alternative State Lands to the Leasehold in replacement of the removed Site.

14. Permits

Before any particular activity requiring any federal, State, or municipal permits or authorizations occurs under this Lease, all required federal, State, and municipal permits and other authorizations for that particular activity must be issued to the Lessee. The Lessee shall maintain any such required permits in good standing for so long as such permits are required for activities carried on pursuant to rights granted under this Lease during the term of this Lease.

15. Orders by the Commissioner

(a) The Commissioner may issue any order necessary to enforce or implement any provision of this Lease.

(b) Before delivery of any such order, the Commissioner shall confer with Lessee, if practicable to do so, regarding the required action or actions included in the order. Any such order shall state in detail what is demanded of Lessee and the reasons and basis for such demand.

(c) All decisions, determinations, authorizations, approvals, consents, demands or directions that shall be made or given by the Commissioner to Lessee in connection with the enforcement or administration of this Lease, or in connection with any other agreement, permit or authorization relating in whole or in part to all or any part of the Pipeline shall, except as otherwise provided in Subsection (d) of this section, be in the form of a written order or notice.

(d) All orders, approvals, or notices of the Commissioner shall be in writing; provided, however, that if, in the judgment of the Commissioner, there is an emergency that necessitates the immediate issuance to the Lessee of an order, approval, or notice, such order, approval, or notice may be given orally with subsequent confirmation in writing as soon as possible thereafter, but not later than forty-eight (48) hours.

16. Information

The Commissioner may order the Lessee at any time to furnish any and all information related to Pipeline Activities to the extent necessary to enforce a provision of this Lease or a provision of AS 38.35. If the Lessee desires that records submitted to the State be kept confidential, the Lessee shall submit a request for confidentiality in writing to the Commissioner along with the statutory basis for its claim of confidentiality. The Commissioner shall retain records as confidential to the extent consistent with the Commissioner's authority to do so under applicable State statutes.

17. <u>Right of the State to Perform</u>

(a) The Lessee shall carry out, at the Lessee's expense, all lawful orders and requirements of the State relative to the Lessee's occupation and use of the Leasehold within a reasonable time period under the circumstances. If, after thirty (30) days following the making of a demand by the Commissioner in the manner that is provided in this Lease, the Lessee, or its respective agents, employees, or Contractors, shall fail or refuse to perform any action required by this Lease or by the Commissioner under this Lease, the State shall have the right, but not the obligation, to enter the Leasehold and at the Lessee's expense, consistent with all applicable State and federal laws and regulations, perform any or all of the following:

(1) repair damage;

(2) prevent imminent harm to workers;

(3) protect public health or safety; and

(4) prevent immediate, serious or irreparable harm or damage to the environment.

(b) The Commissioner shall submit to the Lessee a statement of the expenses reasonably incurred by the State of any required action taken pursuant to this section. The Lessee shall pay the amount shown within thirty (30) days of receipt of the statement.

18. <u>Temporary Suspension</u>

(a) The Commissioner may, consistent with applicable State and federal law, order the temporary suspension of any or all Pipeline Activities, if:

(1) an immediate temporary suspension of the activity or the activities is necessary to protect:

a) public health or safety (including but not limited to personal injury or loss of life with respect to any Person or Persons); or

b) the environment from immediate, serious or irreparable harm or damage (including, but not limited to harm or damage to soil, sediments, water and air quality, areas of vegetation, fish or other wildlife population or their habitats, or any other natural resource); or

(2) the Lessee, its agents, employees, or Contractors are failing or refusing, or have failed or refused to comply with or observe:

a) any provision of this Lease intended to protect public health, safety or the environment; or

b) any order of the Commissioner implementing any provision of this Lease or any Notice to Proceed, plan or agreement approved, issued or granted by the Commissioner in connection with all or any part of the Pipeline.

(b) A temporary suspension order shall specify:

(1) the specific activity or activities which must be stopped and the site of such activities;

(2) the reason for the issuance of the order, including a description of the immediate, serious or irreparable harm sought to be avoided that requires suspension of the specific activity or activities;

(3) any Notice to Proceed or other Written Authorizations affected by the order;

(4) the name of the Person issuing the order;

(5) the name of the Lessee's representative to whom the order is issued; and

(6) the time and date of the order.

(c) When a temporary suspension order is issued by any delegate of the Commissioner a copy of the written delegation of authority from the Commissioner must accompany the order. A copy of the temporary suspension order must be provided to the Lessee in a manner specified by Section 26 herein.

(d) A temporary suspension order is effective as of the date and time given, unless it specifies otherwise. A written temporary suspension order shall remain in full force and effect until modified or revoked in writing by the Commissioner.

(e) If the Commissioner finds that an emergency exists, a temporary suspension order may be given orally to the Lessee or a field representative of Lessee. If an oral temporary suspension order is given, a written order consistent with the requirements of Subsection (b) shall be issued as soon as possible, but no later than seventy-two (72) hours, after the oral order is given. An oral temporary suspension order that is not confirmed with a written order within the specified time is vacated.

(f) To the extent practicable, the Commissioner shall give the Lessee prior notice of any temporary suspension order. If circumstances permit, the Commissioner shall discuss with the Lessee before issuing the order measures that would:

(1) immediately abate or avoid the harm or threatened harm that is the reason for the issuance of the order; or

(2) effect compliance with the provision or order, whichever is applicable.

(g) After a temporary suspension order has been given by the Commissioner, the Lessee shall promptly comply with all of the provisions of the order and shall not resume any activity suspended or curtailed thereby except as provided in this Lease, a subsequent order of the Commissioner, or a court order.

(h) When the Commissioner is satisfied that:

(1) the harm or threatened harm has been abated or remedied,

(2) the Lessee has effected, or is ready, willing and able to effect, compliance with the provisions of the temporary suspension order, or

(3) the Lessee has implemented, or is ready, willing and able to implement, mitigating, corrective, or alternative measures approved by the Commissioner, the Commissioner shall promptly authorize in writing the resumption of the suspended activity or activities. The Commissioner shall render a decision within three (3) days of the date that the request from the Lessee to resume suspended activities is received by the Commissioner. The decision shall state whether the request is granted or denied, and the basis for the decision.

(i) Without limiting any other rights available under 11 AAC 02 or any other law, the Lessee may bring to the Commissioner appeals from temporary suspension orders of the Commissioner's delegates, requests for reconsideration of temporary suspension orders of the Commissioner, and requests for reconsideration of denials of requests to resume suspended activities under the provisions of this section. The Lessee may:

(1) appeal directly to the Commissioner for review of any temporary suspension order issued by a Commissioner's delegate under this section; or

(2) request reconsideration from the Commissioner of

a) any temporary suspension order issued by the Commissioner; or

b) any denial by the Commissioner of a request for resumption of activities suspended under such temporary suspension order.

(j) The Lessee shall file with the Commissioner a notice of appeal or a request for reconsideration brought pursuant to this subsection within ten (10) days after the effective date of the order or denial being appealed or being asked to be reconsidered. The notice must set forth with particularity the order or denial being appealed or being asked to be reconsidered and must contain a statement of facts and points of law the Lessee wishes to present to justify modification or reversal of the order or denial. All statements of fact must be under oath.

(k) The Commissioner shall decide an appeal or a request for reconsideration within ten (10) days from the date the Commissioner received the notice of appeal or request for reconsideration from the Lessee. If the Commissioner does not render a decision within that time, the appeal or request for reconsideration shall be considered to have been denied by the Commissioner, and that denial shall constitute a final decision appealable in accordance with the rules of the court, and to the extent permitted by applicable law.

19. Commissioner's Decisions

(a) Except as set forth in Subsection (b) of this section, any decision of the Commissioner as to any matter arising out of this Lease shall constitute the final agency decision appealable in accordance with the rules of the court. The Commissioner shall act in writing upon each required submission for approval of an action by the Lessee. The absence of any comment by the Commissioner on any plan, design, specification, or other document that may be filed by the Lessee with the Commissioner shall not represent in any way whatsoever any assent to, approval of, or concurrence in such plan, design, specification, or other document, or any action proposed therein. Any written approval, instruction or order remains in effect unless and until written notice of the withdrawal or modification of the approval, instruction or order is provided to Lessee. Any written approval or instruction by the Commissioner may be relied upon by the Lessee unless and until rescinded in writing. Any disapproval by the Commissioner, including any requests for additional information, shall state what additional action is necessary to gain approval.

(b) Decisions of a Commissioner's delegate shall not constitute final agency decisions and are subject to the procedures for appeal and reconsideration as set forth in 11 AAC 02, except as otherwise provided in Section 18(i).

20. Reimbursement of State Expenses

(a) Lessee shall reimburse the State for all reasonable costs incurred by the State in the oversight of Pipeline Activities in compliance with AS 38.35.140. The Commissioner shall administer this Lease to reasonably assure that unnecessary employment of personnel and needless expenditure of funds by the State are avoided. The Commissioner shall provide Lessee with an annual estimate of the projected costs and scope of the work.

(b) Reimbursement provided for in this section must be made for each quarter ending on the last day of March, June, September, and December. On or before the ninetieth (90th) day after the close of each quarter, the Commissioner shall submit to the Lessee a written statement describing any reimbursable costs incurred by the State during that quarter. This statement may be supplemented within ninety (90) days after the end of a fiscal year for costs incurred in the State's fiscal year but which, because of reasonable mistake, inadvertence, or unavailability, were not previously submitted. The State shall submit invoices to Lessee in accordance with Section 26.

(c) The Lessee shall pay to the State the total amount shown on each statement submitted under Subsection (b), within thirty (30) days of receipt. If the Lessee disputes any item of a statement for reimbursement, the Lessee shall, on or before the date on which the statement is due and payable, deliver to the Commissioner written notice of each item that is disputed, accompanied by a detailed explanation of its objection. The Commissioner shall provide a written decision regarding the Lessee's objections within thirty (30) days of receipt of the Lessee's objections, and any items determined by the Commissioner to have been in error, improper, unnecessary, or needless shall be reimbursed within thirty (30) days after the date of the Commissioner's written decision.

(d) The Lessee may conduct, at its own expense, and by auditors or accountants designated by the Lessee, reasonable audits of the books, records and documents of the State relating to a statement submitted under Subsection (b) of this section, at the places where such books, records and documents are usually maintained and at reasonable times. Written notice of intent to conduct an audit must be given to the Commissioner:

(1) at least fifteen (15) days prior to the audit and

(2) not later than the ninetieth (90th) day after the date that the State submits the statement, or supplemental statement, as applicable, under Subsection (b) of this section.

(e) An audit under this subsection must be completed within one hundred eighty (180) days after receipt by the Commissioner of the notice of intent to conduct an audit; provided, however, that if the Commissioner fails to provide the Lessee with reasonably timely access to the relevant books, records and documents necessary to complete the audit, such period shall be extended by an appropriate number of days to be mutually agreed to in writing by the Commissioner and the Lessee. The Lessee may present the results of an audit to the Commissioner in a written notice requesting a timely review by the Commissioner of errors, omissions, or discrepancies noted in the audit, including unnecessary employment of personnel or needless expenditures of funds. The Commissioner shall meet with the Lessee within thirty (30) days of receipt of the notice of results of the audit to discuss and attempt to resolve all items listed in the notice of results. The Commissioner shall promptly provide a written decision to the Lessee setting forth the results of the meeting between the Lessee and the Commissioner. Any items previously reimbursed to the State but found during the audit and concurred in by the Commissioner in the written decision setting forth the results of the meeting to have been in error, improper, unnecessary, or needless shall be reimbursed within thirty (30) days after the date of the Commissioner's written decision.

(f) Nothing herein requires the State to maintain books, records or documents other than those usually maintained by it, provided such books, records and documents reasonably segregate and identify the costs for which reimbursement is required by this section. Such books, records and documents must be preserved for a period of at least two (2) years after the Commissioner submits a statement for reimbursement based on such books, records and documents. The Lessee and auditors or accountants designated by the Lessee shall be given reasonable access to, and the right to copy, at the Lessee's expense, all such books, records and documents.

21. Liability of the State

The Lessee agrees that neither the State nor any of its officials, employees, agents or Contractors shall be liable for money damages for any loss caused to the Lessee, its agents or Contractors, by reason of decisions made in respect to the application and administration of this Lease; provided, however, this section does not excuse the State, its officials, employees, agents or Contractors from liability for damages or injuries resulting from acts (or omissions) of the State officials, employees, agents or Contractors that are negligent, grossly negligent, reckless or willful.

22. Transfer, Assignment, or Other Disposition

(a) The State may convey all or a portion of its ownership of the Leasehold at any time to any entity allowed by law. Any conveyance, transfer or other disposition, subsequent to the execution of this Lease, of any right, title, or interest in any of the Leasehold shall be subject to this Lease and the Lessee's rights hereunder, including the Lessee's right to renew the Lease under Section 2(b) herein.

(b) Except as set forth in Section 8(i) herein, the Lessee may assign, sublease, or transfer this Lease, or any interest in or rights under this Lease only upon a written finding by the Commissioner that the transferee meets the requirements of AS 38.35.100.

(c) In making the determination whether the proposed transferee is fit, willing, and able under this paragraph, the Commissioner shall not consider the existence of the guaranty by the guarantor, unless specifically requested by the Lessee in the Lessee's request for transfer or assignment. If the Commissioner determines that a guaranty or other security is required to guarantee the performance of all of the duties, obligations, and potential liabilities under and by virtue of this Lease by the proposed assignee, transferee, or other receiving party, the proposed assignee, transferee, or other receiving party shall secure a guaranty or other security satisfactory to the Commissioner, in substantially such form as the Commissioner required from the Lessee under Section 11 of this Lease, as a condition to the Commissioner's approval of the transfer, assignment, or other disposal.

23. <u>Release of Interest</u>

(a) In connection with the relinquishment, abandonment or other Termination before the expiration of this Lease, of any right or interest in the Leasehold, or in the use of all or any part of the Leasehold, the Lessee shall promptly execute and deliver to the State, through the Commissioner, a valid instrument of release in recordable form, which must be executed and acknowledged with the same formalities as a deed. The instrument of release must contain, among other things, appropriate recitals, a description of the pertinent rights and interests, and for the benefit of the State and its grantees or assigns, express representations and warranties by the Lessee that it is the sole owner and holder of the Lease rights or interests described therein and that such Lease rights or interests are free and clear of all liens, equities or claims of any kind, except for such liens, equities or claims that arose before the Effective Date of this Lease. The form and substantive content of each instrument of release must be approved by the Commissioner, but except as otherwise provided for in this subsection; in no event shall any such instrument operate to increase the then-existing liabilities and obligations of the Lessee furnishing the release.

(b) A release under this section must be accompanied by such resolutions and certifications as the Commissioner may reasonably require, including the power or the authority of the Lessee, or of any officer or agent acting on its behalf, to execute, acknowledge or deliver the release.

(c) Notwithstanding any language or provision in the release that operates or could operate to the contrary, neither the tender, nor approval and acceptance, of any such release shall operate as an estoppel or waiver of any claim or judgment against the Lessee or as a relief or discharge, in whole or in part, of the Lessee from any of its then existing liabilities or obligations which accrued during that Lessee's tenure as the leaseholder.

(d) Lessee may relinquish to the State at any time any or all of the Leasehold that the Lessee determines are no longer necessary for the Lessee's Pipeline Activities by filing a release as provided for above. The release shall be effective as of the date the release is approved by the Commissioner, subject to the continued obligations of the Lessee to fulfill all obligations and resolve all liabilities that arose under this Lease during that Lessee's tenure as the leaseholder.

(e) No later than one year following the date that Natural Gas is first transported through the Pipeline, the Lessee shall execute and deliver to the State a release of interest for all of the Lessee's interest in the Leasehold other than the Operation and Maintenance Leasehold, which is fully described in Exhibit B.

(f) Within one-hundred eighty (180) days of delivery of the release required by Subsection (e) of this section, Lessee shall:

(1) complete the installation of monumentation of the Pipeline to standards required by the Department of Natural Resources for the purposes of locating and describing rights-of-way on State Lands; and

(2) provide a final survey, approved by the Commissioner, showing the final "as built" location of the completed Pipeline, including the final locations and elevations of all buried and above-ground improvements, the centerline of the Operation and Maintenance Leasehold, the boundaries of the Operation and Maintenance Leasehold, and its relationship to existing pipelines and other structures pursuant to survey instructions issued by the Department of Natural Resources.

(g) The State shall have ninety (90) calendar days after delivery of the final survey required by Subsection (f)(2) of this section to record the survey and reduce the rental amount as set forth in Section 3 for that year and all subsequent years by the same proportion as the released acreage bears to the original Lease acreage.

24. Default, Remedies and Forfeiture

(a) Failure of the Lessee to substantially comply with the terms of this Lease shall be grounds for forfeiture of the right-of-way interest of the Lessee in an action brought by the Commissioner in the Anchorage Superior Court. Before the commencement of any action for forfeiture of an interest in the right-of-way under this section, the Commissioner shall give the Lessee notice in writing of the alleged default and shall not commence the proceeding unless the Lessee has failed to initiate good faith efforts to cure the default within sixty (60) days of the notice of the alleged default or fails to diligently continue the same until cured.

(b) No items on the Leasehold, including but not limited to, improvements, structures, machinery, equipment, tools, or materials, may be removed from it by the Lessee while the Lessee is in default except with the Commissioner's prior approval.

(c) After forfeiture, any new right-of-way lease for the Leasehold shall have no effect on the Lessee's rights or on any obligations under this Lease which accrued prior to or as a result of the forfeiture.

25. Lessee's Obligations Upon Termination Not Resulting From Forfeiture

(a) This section shall apply to all terminations of this Lease, whether from expiration, relinquishment, abandonment or otherwise, with the exception of a forfeiture under Section 24.

(b) The deadlines provided for in this section apply only when the Lessee has provided the three hundred and sixty five (365) day notice required by Section 2(c) of this Lease. If the Lessee fails to provide the notice required by Section 2(c), the Commissioner may reasonably alter the deadlines in this section.

(c) Prior to the expiration, relinquishment, abandonment or Termination of this Lease, the Commissioner shall determine in writing whether a public interest exists which requires that all or a portion of the Pipeline be left in place following the expiration, relinquishment, abandonment or Termination of this Lease. The Commissioner's written determination shall:

(1) describe which components of the Pipeline, if any, must remain on the Leasehold following the expiration, relinquishment, abandonment or Termination of this Lease, and,

(2) resolve issues pertaining to title to such components of the Pipeline.

(d) No later than sixty (60) days after receipt of the Commissioner's determination under Subsection (c), the Lessee shall submit the following to the Commissioner for the Commissioner's approval:

(1) A plan for the removal of all items found on the Leasehold, including but not limited to, improvements, structures, machinery, equipment, tools and materials, but excluding those components of the Pipeline described in the Commissioner's determination under Subsection (c); and

(2) A plan to Restore and Revegetate the Leasehold.

(e) The Commissioner shall set a reasonable time, which may be extended, during which the Lessee shall implement the plans in Subsection (d). The Lessee shall be responsible for all costs of implementation of the plans required by this section.

(f) Following completion of the time period for plan implementation under Subsection (e) and any extensions, the Commissioner shall order the disposition of all improvements, structures, machinery, equipment, tools, and materials, if any, that the Lessee failed to remove. The Commissioner's options with respect to any disposition under this subsection include, but are not limited to: sale, transfer, lease, auction, destruction, repair and abandonment in place, retention in State ownership for a public or State use, and removal. The Commissioner may order the Lessee to perform disposition work required under this subsection. The Lessee is responsible for all disposition costs incurred by the State under this subsection.

(g) If the Lessee fails to submit or fully implement the plans required by this section, the State's options include any of the following:

(1) The Commissioner may order the Lessee to submit and fully implement the plans required by this subsection.

(2) The Commissioner may develop the plans required under this section and order the Lessee to fully implement them. The Lessee shall be responsible for all costs incurred by the State in developing such plans.

(3) The State may complete the required work under such plans. The Lessee shall be responsible for all costs incurred by the State for such work.

(h) In the event the Commissioner makes a determination under Subsection (b) that all or a portion of the Pipeline shall remain on the Leasehold following the expiration, relinquishment, abandonment or Termination of this Lease, then Lessee shall be released from all future obligation or liability for the portion of the Pipeline the Commissioner determined shall remain on the Leasehold, including but not limited to, abandonment or removal liability, and from any obligation to Restore and Revegetate the Leasehold after completion of the plan approved under Subsection (c) herein. Upon release, the State or its assignee shall immediately assume all responsibility and obligation for the Pipeline or any part thereof remaining on the State Lands formerly subject to this Lease. Such release shall not discharge Lessee from performance of obligations and other liabilities which arose during that Lessee's tenure as the leaseholder and which accrued prior to the expiration, relinquishment, abandonment or Termination of this Lease.

26. <u>Correspondence</u>

(a) Any notice or demand by the Lessee to the State shall be made in writing and must be given by hand delivery, by email or facsimile during normal business hours, or by registered or certified mail, postage paid, return receipt requested, addressed as follows (or to any new address that the Commissioner designates in writing):

State Pipeline Coordinator's Office
411 W. 4th Avenue, Suite 2
Anchorage, Alaska 99501-2343
Facsimile Number: (907) 272-0690
mike.thompson@alaska.gov

(b) Delivery to the State occurs:

(1) if by hand delivery, email or facsimile, when received by the addressee, and

(2) if by registered or certified mail, when the notice or demand is signed for by the State or State's agent.

(c) Any order, notice or demand by the Commissioner to the Lessee shall be made in writing and must be given by hand delivery, by email or by facsimile during normal business hours with the original to follow in the mail, or by registered or certified mail, postage paid, return receipt requested, addressed as follows (or to any new address that the Lessee designates in writing):

Alaska Gasline Development Corporation
P.O. Box 101020
Anchorage, AK 99510
Facsimile Number: (907) 277-4484
dfauske@ahfc.us

(d) Delivery to the Lessee occurs:

(1) if by hand delivery, email or facsimile, when received by the addressee, and

(2) if by registered or certified mail, when the notice or demand is signed for by the Lessee or Lessee's agent.

(e) Other correspondence may be made by email, mail, hand delivery or facsimile during normal business hours.

(f) The Commissioner or Lessee, by written notice to the other, may change the office address to which written notices, orders, or other written communications may be addressed and delivered thereafter, subject, however, to the provisions of this Lease.

27. Authorized Representatives

The State Pipeline Coordinator and the person executing this Lease on behalf of the Lessee shall be the authorized representatives for their respective principals for the purposes of administering this Lease. This authorized representative is in addition to the registered agent required to be appointed pursuant to Section 8(j) herein. The Commissioner or the Lessee may change the designation of its authorized representative or the address to which notices to that representative are to be sent by a notice given in accordance with Section 26.

28. Waiver not Continuing

The waiver by the State of any breach of any provision of this Lease, whether express or implied, shall not be construed to be a continuing waiver or a waiver of, or consent to, any subsequent or prior breach by the Lessee. The waiver by the Lessee of any breach of any provision of this Lease, whether express or implied, shall not be construed to be a continuing waiver or a waiver of, or consent to, any subsequent or prior breach by the State.

29. No Third Party Beneficiaries

The parties to this Lease do not intend to create any rights under this Lease that may be enforced by third parties for their own benefit or for the benefit of others.

30. Local Hire

The Lessee shall, in the Construction and Operation of the Pipeline, comply with, and require its Contractors to comply with, applicable and valid laws and regulations regarding the hiring of residents of the State then in effect or that take effect subsequently.

31. Nondiscrimination

The Lessee and its Contractors may not discriminate against any employee or applicant for employment because of race, religion, marital status, change in martial status, pregnancy, parenthood, physical handicap, color, sex, age, or national origin as set out in AS 18.80.220. The Lessee and its Contractors, on beginning any Pipeline Activities, must post in a conspicuous place notices setting out this nondiscrimination provision.

32. Rights and Remedies Cumulative

No right or remedy conferred by this Lease upon or reserved to the State or the Lessee is intended to be exclusive of any other right or remedy provided for by this Lease or by law, and each and every right and remedy set forth herein shall be cumulative.

33. Authority to Enter into Lease

The Lessee represents and warrants to the State that:

(a) it is authorized and empowered under the applicable laws of the State and its jurisdiction of formation to enter into and perform this Lease in accordance with the Lease and its provisions;

(b) the Lessee has approved and authorized the execution, delivery and performance of this Lease insofar as it pertains to the obligations of the Lessee;

(c) all action that may be necessary to the approval, execution, and delivery of this Lease by the Lessee, has been taken; and

(d) all of the required and necessary approvals, authorizations, and actions are in effect at the time of the execution and delivery of the Lease.

34. Delegation of Authority

The Commissioner may make delegations of authority and changes to delegations of authority to administer all or a portion of the provisions of this Lease, consistent with AS 38.35.210, at any time. The Commissioner shall notify Lessee in writing of any such delegation of authority or change in delegation of authority that affects this Lease.

35. Interpretation of Lease

(a) The parties acknowledge that this Lease is an "arm's length" agreement, and that each party has had an adequate opportunity to consult with counsel, and has consulted with counsel with respect to this Lease. The parties agree that ambiguities in this Lease shall not be construed either for or against any party.

(b) The language of the terms and conditions of any other pipeline lease may not be used to assist in resolving any disputes arising from the interpretation of this Lease.

36. Compliance with Law and Regulation

Lessee shall conduct all Pipeline Activities in compliance with all applicable federal, State and local laws and regulations.

37. Venue

The venue for any appeal or civil action relating to this Lease shall be in the Third Judicial District, State of Alaska.

38. Recording

Upon execution, acknowledgment, and delivery of this Lease, the Lessee shall at its sole expense cause this Lease to be recorded in all applicable Recording Districts.

39. Severability

A judicial finding that any term or condition of this Lease is unlawful or invalid may not operate to invalidate this Lease or any other term or condition of the Lease.

40. Amendments in Writing

No amendment to this Lease is effective until agreed to in writing by the parties.

41. Exhibits

The following exhibits are attached to this Lease and are, by this reference, incorporated into this Lease as if they were set out in their entirety:

(a) Stipulations for this Lease attached hereto as Exhibit A included pursuant to AS 38.35.120(c) and (d);

(b) a description of the land included in the Construction Leasehold and the Operation and Maintenance Leasehold attached as Exhibit B;

(c) parental guaranty attached as Exhibit C (only for non-State entities); and

(d) definitions attached as Exhibit D.

42. Merger Clause

This Lease, including all exhibits hereto, contains the entire agreement between the parties, and is binding upon the parties.

43. Section Headings

The section headings in this Lease are for convenience only and have no other significance.

IN WITNESS WHEREOF, the parties have executed this lease as of the date first above written.

STATE OF ALASKA

By: [signature]
Daniel S. Sullivan
Commissioner
Department of Natural Resources

ALASKA GASLINE DEVELOPMENT CORPORATION

By: [signature]
Daniel R. Fauske
President

EXHIBITS:

Exhibit A:	Stipulations
Exhibit B:	Right-of-Way Description
Exhibit C:	Guaranty
Exhibit D:	Definitions

STATE OF ALASKA)
) ss.
THIRD JUDICIAL DISTRICT)

THIS IS TO CERTIFY that on this 29th day of June, 2011, before me personally appeared Daniel R. Fauske, the President of the Alaska Gasline Development Corporation, who executed the foregoing on behalf of said corporation and acknowledged voluntarily signing same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year above written.

April M. Andrews

Notary Public in and for the State of Alaska
My Commission Expires: With Office

STATE OF ALASKA
NOTARY PUBLIC
April M. Andrews
My Commission Expires With Office

MARY KAY RYCKMAN
COMM. #113030
Notary Public - State of Alaska
My Comm. Expires "with office"

STATE OF ALASKA)
) ss.
THIRD JUDICIAL DISTRICT)

THIS IS TO CERTIFY that on this ~~1st~~ 25th MKR day of July, 2011, before me personally appeared Daniel S. Sullivan, the Commissioner of the Department of Natural Resources of the State of Alaska, who executed the foregoing on behalf of the Department of Natural Resources of the State of Alaska and acknowledged voluntarily signing the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year above written.

Mary Kay Ryckman
Notary Public in and for the State of Alaska
My Commission Expires: with office

ADL 418997
ALASKA STAND ALONE GAS PIPELINE/ASAP
RIGHT-OF-WAY LEASE

EXHIBIT A
STIPULATIONS

Table of Contents

ADL 418997
ALASKA STAND ALONE GAS PIPELINE/ASAP
RIGHT-OF-WAY LEASE

EXHIBIT A
STIPULATIONS

1. GENERAL

1.1 Responsibilities

1.1.1 Except where the approval of the Pipeline Coordinator is required before the Lessee may commence a particular operation, neither the State nor any of its agents or employees is in any way obligated to examine or review any plan, design, specification, or other document which may be filed with the Pipeline Coordinator by the Lessee pursuant to these Stipulations.

1.1.2 The absence of any comment by the Pipeline Coordinator or any other agent or employee or Contractor of the State with respect to any plan, design, specification, or other document which may be filed by the Lessee with the Pipeline Coordinator shall not be deemed to represent in any way whatever, assent to, approval of, or concurrence in such plan, design, specification, or other document or of any action proposed therein.

1.1.3 With regard to the Construction, Operation, Maintenance, and Termination of the Pipeline:

(1) The Lessee shall ensure full compliance with the provisions of this Lease, including these Stipulations, by its agents, employees, Contractors, and the employees of each of them;

(2) Unless clearly inapplicable, the requirements and prohibitions imposed upon the Lessee by these Stipulations are also imposed upon the Lessee's agents, employees, Contractors, and the employees of each of them;

(3) Failure or refusal of the Lessee's agents, employees, Contractors, or the employees of each of them to comply with the Stipulations shall be deemed to be the failure or refusal of the Lessee; and

(4) The Lessee shall require its agents and Contractors to include the Stipulations in all contracts and subcontracts which are entered into by any of them for work on the Leasehold, together with a provision that the other contracting party, together with its agents, employees, Contractors, and the employees of each of them, shall likewise be bound to comply with the Stipulations.

1.2 Authority of Representatives of the Pipeline Coordinator and Lessee

1.2.1 No order or notice given to the Lessee on behalf of the Pipeline Coordinator or any other Person shall be effective as to the Lessee unless prior written notice of the delegation of authority to issue such order or notice has been given to the Lessee in the manner provided in Section 26 of the Lease.

1.2.2 The Lessee shall comply with each and every lawful order directed to the Lessee by the Pipeline Coordinator or by any duly authorized representative of the Pipeline Coordinator.

1.2.3 The Lessee shall maintain a sufficient number of its duly authorized Field Representatives to allow for the prompt delivery to the Lessee of all notices, orders, and other communications, written or oral, of the Pipeline Coordinator. The Lessee shall notify the Pipeline Coordinator and each of his/her duly authorized representatives of the Lessee's Field Representatives, who shall be appropriately identified in such a manner as the Pipeline Coordinator shall prescribe. The Lessee shall consult with the Pipeline Coordinator regarding the number and location of such representatives.

1.3 Notices to Proceed for Initial Construction of the Pipeline

1.3.1 Permission to Construct

1.3.1.1 The Lessee shall not initiate any Construction on State Land without prior written permission of the Pipeline Coordinator. Such permission shall be given solely by means of a written Notice to Proceed issued by the Pipeline Coordinator. Each Notice to Proceed shall authorize Construction only as therein expressly stated and only for the particular Construction Segment therein described.

1.3.2 Schedule for Notice to Proceed Applications

1.3.2.1 Prior to submission of any Preliminary Design or application for any Notice to Proceed for any Construction Segment on State Land, the Lessee and the Pipeline Coordinator shall agree to a schedule for the time, scope, and quantity of such submissions and applications. The purpose of such schedule is to assure that the Lessee's submissions and applications shall be reasonable in scope, and filed in a reasonable time frame. Submittals and applications shall be filed in accordance with said schedule, and the Pipeline Coordinator may refuse to consider any that are not so filed. The schedule may be reviewed and revised from time to time as may be agreed upon by the Lessee and the Pipeline Coordinator.

1.4 Submissions Required Before First Notice to Proceed Application

1.4.1 Prior to submission of any application for any Notice to Proceed for any Construction Segment on State Land, the Lessee shall submit to the Pipeline Coordinator the documents identified in Stipulations 1.4.2 through 1.4.5 below. These documents shall form the basis for the individual Notice to Proceed applications submitted for specific Construction Segments on State Land.

1.4.2 Design Documents

1.4.2.1 The Lessee shall develop a Design Basis and Criteria document as defined in Stipulation 3.2.1 for acceptance by the Pipeline Coordinator.

1.4.2.2 A Corrosion Plan for corrosion-resistant design and methods for early detection of corrosion, as required by Stipulation 3.6.2, shall be provided to the Pipeline Coordinator.

1.4.2.3 The Lessee shall submit to the Pipeline Coordinator an Engineering Analysis and Report on the Seismic Design of the Pipeline, as required by Stipulation 3.8.2.

1.4.2.4 The Lessee shall identify seismic faults and assess the results of fault movement and ground deformation as required in Stipulation 3.9.2, to the reasonable satisfaction of the Pipeline Coordinator.

1.4.2.5 The Lessee shall submit a Seismic Analysis of Pipeline Communication Systems, as required by Stipulation 3.5.5.

1.4.3 Plans for Construction, Operation, Maintenance, and Termination

1.4.3.1 The Lessee shall submit for approval the following plans, each of which shall cover Construction, Operation, Maintenance, and Termination activities:

(a) Proximity to the Trans Alaska Pipeline System (TAPS) and Other Existing Infrastructure (Stipulation 3.4)

(b) Blasting and Use of Explosives;

(c) Camps;

(d) Timber Clearing, Salvage and Utilization;

(e) Work Pads (Stipulation 3.15);

(f) Erosion and Sedimentation Control;

(g) Fire Control;

(h) Stream, River, and Floodplain Crossings (Stipulation 3.13);

(i) Disposal of Sanitation and Hazardous Waste;

(j) Pipeline Trench Backfill Methods

(k) Disposal of Overburden, and Excess and Excavated Material;

(l) Cultural Resource Preservation;

(m) Groundwater Control;

(n) Restoration and Revegetation of Disturbed Areas;

(o) Fish and Wildlife Protection;

(p) Access to the Pipeline and Methods for Access Road Construction (Stipulation 3.14);

(q) Control, Cleanup, and Disposal of Hazardous Substances;

(r) Use of Pesticides, Herbicides, Preservatives, and Other Chemicals;

(s) River Training Structures;

(t) Construction in Wetlands;

(u) Handling of Solid and Liquid Waste; and

(v) Managing Human/Carnivore Interaction.

1.4.3.2 These plans shall provide sufficient detail and scope to allow the Pipeline Coordinator to determine if they are consistent with the requirements of this Lease. All applicable State and federal requirements shall be incorporated into the plans and programs of this Lease.

1.4.3.3 Any amendments to these plans must be approved by the Pipeline Coordinator before the amendment is implemented.

1.4.4 Quality Assurance Program

1.4.4.1 The Lessee shall submit a Quality Assurance Program for review and approval by the Pipeline Coordinator. The Lessee must have an approved Quality Assurance Program in effect during all phases of Construction, Operation, Maintenance, and Termination activities related to the Pipeline. The Quality Assurance Program shall document the Lessee's compliance with the Lease.

1.4.4.2 The Quality Assurance Program shall be comprehensive and designed to assure safety, Pipeline integrity, and compliance with all Stipulations.

1.4.4.3 Any amendments to the Quality Assurance Program must be approved by the Pipeline Coordinator before the amendment is implemented.

1.4.4.4 The Lessee, including its agents, employees, Contractors, and the employees of each of them, shall comply with the approved Quality Assurance Program.

1.4.5 Project Management Schedule

1.4.5.1 The Lessee shall submit a Project Management Schedule for the entire project to the Pipeline Coordinator. This schedule shall be time-scaled and shall include all activities and contingencies which may reasonably be anticipated in connection with the project. The Project Management Schedule shall include:

(a) Data collection activities;

(b) Submittal and approval activities; and

(c) Pre-Construction, Construction, and post-Construction activities.

1.4.5.2 The Project Management Schedule shall be updated at thirty (30) day intervals, as significant changes occur, or as otherwise approved by the Pipeline Coordinator.

1.5 Submissions Required Before Notice to Proceed Application for a Construction Segment

1.5.1 Prior to submission of an application for a Notice to Proceed for a Construction Segment on State Land, the Lessee shall submit to the Pipeline Coordinator the documents identified in Stipulations 1.5.1 and 1.5.2 below.

1.5.1 Preliminary Design Submissions

1.5.1.1 Prior to applying for a Notice to Proceed for a Construction Segment on State Land, the Lessee shall submit the Preliminary Design for that Segment to the Pipeline

Coordinator for acceptance. The Pipeline Coordinator shall expeditiously review each submission and shall do so within thirty (30) days from the date of his/her receipt of the submission. The Pipeline Coordinator may request additional information if he/she reasonably determines it is necessary.

1.5.1.2 In appropriate cases, the Pipeline Coordinator may waive the requirement that a Preliminary Design be submitted.

1.5.2 Survey

1.5.2.1 Before applying for a Notice to Proceed for a Construction Segment, the Lessee shall, in a manner acceptable to the Pipeline Coordinator, by survey, locate and clearly mark on the ground the proposed centerline of the pipe and the location of all Related Facilities proposed to be constructed.

1.6 Application for Notice to Proceed

1.6.1 The Lessee may apply for a Notice to Proceed on State Land for only those Construction Segments for which the Preliminary Design has been accepted in writing by the Pipeline Coordinator or for which a waiver pursuant to Stipulation 1.5.1.2 has been issued in writing by the Pipeline Coordinator.

1.6.2 Each application for a Notice to Proceed shall be supported by:

(a) A Final Design;

(b) Approved plans as required by Stipulation 1.4.3;

(c) All reports and results of environmental studies conducted or considered by the Lessee;

(d) All data reasonably necessary to demonstrate compliance with the terms and conditions of these Stipulations with respect to that particular Construction Segment.

(e) A Project Management Schedule for the Construction Segment, including: the Lessee's work schedules; consents, permits, or authorizations required by State and federal agencies and their interrelationships; design and review periods; data collection activities; and Construction sequencing.

(f) A map or maps, prepared in a manner acceptable to the Pipeline Coordinator, depicting the proposed location of the Construction Segment, including: (1) the boundaries of all contiguous temporary use areas and (2) all improvements, buried or above-ground, that are to be constructed. The Pipeline Coordinator shall not issue a Notice to Proceed for Construction until he/she bas approved all appropriate locations on the ground and the Lessee has set temporary boundary markers to the satisfaction of the Pipeline Coordinator; and

(g) Such other data relevant to the application as may be requested by the Pipeline Coordinator either before submission of the application for a Notice to Proceed or at any time during the review period.

1.6.3 Within ninety (90) days of submittal of an application for a Notice to Proceed, the Pipeline Coordinator shall review such application and all data submitted in connection therewith. Said ninety (90) day period shall begin from the later of the following dates:

(a) Date of receipt by the Pipeline Coordinator of an application for a Notice to Proceed.

(b) Date of receipt by the Pipeline Coordinator of the last submittal of additional data pursuant to this Stipulation.

1.6.4 During review of an application for a Notice to Proceed, discrete portions of the route of the Pipeline may be modified by the Pipeline Coordinator and relocated to another position within the general route if in his/her reasonable judgment the modification is necessary to achieve any of the objectives listed below. Any such modification shall be made without liability or expense to the State.

(a) Protect or maintain stability of geologic materials;

(b) Protect or maintain integrity of the Pipeline;

(c) Prevent serious and irreparable harm to the environment (including but not limited to water and air quality, fish or wildlife populations, or their habitats);

(d) Remove hazards to public health and safety; or

(e) Protect existing infrastructure including TAPS.

1.6.5 If, during Construction, adverse physieal conditions are encountered that were not known to exist, or that were known to exist but their significance was not fully appreciated when the Pipeline Coordinator issued a Notice to Proceed for the portion of the Construction Segment in which the physical conditions are encountered, the Pipeline Coordinator may authorize deviations from the initially approved location of the Pipeline to another location within the general route of the Pipeline at the point or points where the physical conditions are encountered, including adequate room for structurally sound transition. Any such modification shall be made without liability or expense to the State in order to achieve any of the objectives listed in Stipulation 1.6.4. A deviation shall not be constructed without the prior approval of the Pipeline Coordinator and, if so approved, shall conform in all respects to the provisions of the approval.

1.7 Written Authorizations

1.7.1 After Initial Construction of the Pipeline, the Pipeline Coordinator may require a Written Authorization for a major activity or significant modification to the Pipeline. Required information shall be project-specific and provided to the Lessee in writing.

1.7.2 Once all project information is received from the Lessee, the Pipeline Coordinator shall have thirty (30) days for review of each complete request, unless the Pipeline Coordinator states, in written notice, that more time is needed.

1.7.3 Any Written Authorization may contain site-specific terms and conditions as deemed reasonably necessary by the Pipeline Coordinator.

1.8 Surveillance and Monitoring

1.8.1 A Surveillance and Monitoring Program for the Pipeline shall be approved by the Pipeline Coordinator prior to start-up of the Pipeline. The program shall be designed to at a minimum:

(a) Provide for and protect public health and safety;

(b) Prevent and mitigate damage to natural resources;

(c) Prevent and mitigate erosion;

(d) Maintain Pipeline integrity and monitor any Pipeline movement that may affect integrity (Stipulation 3.11); and

(e) Protect public and private property.

1.9 Incident Reporting

1.9.1 The Lessee shall give immediate notice in accordance with applicable law of any spill, leakage, or discharge of Natural Gas or other Hazardous Materials in connection with Pipeline Activities to the Pipeline Coordinator.

1.9.2 The Pipeline Coordinator may require notice of events or incidents in addition to those identified in Stipulation 1.9.1. The Pipeline Coordinator shall give the Lessee written notice of such reporting requirements.

1.9.3 The Lessee shall promptly notify the Alyeska Pipeline Service Company of incidents that may threaten TAPS.

1.10 Annual Report

1.10.1 The Lessee shall provide a comprehensive annual report by March 1 of each year this Lease is in effect beginning after the first Lease Anniversary Date unless notified otherwise by the Pipeline Coordinator. The Pipeline Coordinator shall provide a written description of the annual reporting requirements.

1.11 Completion of Use

1.11.1 Upon completion of use of all, or a very substantial part, of the Leasehold, the Lessee shall promptly remove all improvements and equipment, except as otherwise approved by the Pipeline Coordinator, and shall Restore the Leasehold to a condition that is approved in writing by the Pipeline Coordinator or, at the option of the Lessee, pay the cost of such removal and Restoration. Where approved by the Pipeline Coordinator, buried pipe may be left in place provided all residue is removed from the pipe and the ends are suitably capped.

1.11.2 All areas that do not constitute all, or a very substantial part of the Leasehold, or other portion of the Pipeline, utilized pursuant to authorizations issued in connection with the Pipeline, shall be "put-to-bed" by the Lessee upon completion of use unless otherwise directed by the Pipeline Coordinator. "Put-to-bed" is used herein to mean that Access Roads, material sites, and other areas shall be left in such stabilized condition that erosion shall be minimized through the use of adequately designed and constructed waterbars, Revegetation, and chemical surface control; that culverts and bridges shall be removed by the Lessee in a manner satisfactory to the Pipeline Coordinator; and that Access Roads, sites and areas shall be closed to use. The Lessee's Restoration and Revegetation plans shall be approved by the Pipeline Coordinator prior to Termination of use of any Access Road, or any part thereof.

1.12 Changes in Condition

1.12.1 Unforeseen conditions arising during Construction, Operation, Maintenance, or Termination of the Pipeline may make it necessary to revise or amend these Stipulations to control or prevent damage to the environment or hazards to public health and safety. In that event, the Lessee and the Pipeline Coordinator shall agree as to what revisions or amendments shall be made.

1.13 Lessee Support of State Oversight

1.13.1 During the Design, Construction, Operation, Maintenance, and Termination of the Pipeline, the Lessee shall furnish, without cost, representatives of the State, including Contractors involved in field surveillance of the Leasehold and/or the Pipeline, adequate meals, living quarters, office space, transportation, and use of the Lessee's communication systems. Whenever possible, the Pipeline Coordinator shall give the Lessee advance written notice of the need for such services and facilities, including the number and names of Persons to be accommodated.

1.14 Access

1.14.1 Maintenance Access

1.14.1.1 The Lessee shall provide and maintain Access Roads and airstrips, the number and location of which shall be approved by the Pipeline Coordinator, to ensure that the Lessee's Maintenance crews and State representatives shall have continued access.

1.14.2 Public Access

1.14.2.1 The Lessee shall regulate or temporarily prohibit public access and vehicular traffic on Roads on State Land, which are not managed or owned by the Alaska Department of Transportation and Public Facilities (DOT&PF), as required for activities in the immediate vicinity of the Pipeline and Related Facilities. The Lessee shall provide appropriate warnings, flagging, barricades, and other safety measures when the Lessee is regulating public access.

1.14.2.2 Pipeline Activities shall not interfere with the public's free and unrestricted access to and upon the Leasehold, except that, with the Pipeline Coordinator's approval, the Lessee shall regulate or prohibit access, including vehicular traffic, to and upon the Leasehold to the extent necessary to facilitate Pipeline Activities, maintain Pipeline integrity, or to protect the public and wildlife from hazards associated with Pipeline Activities.

1.14.2.3 The creation of any permanent obstruction to the passage of small craft in streams is prohibited, unless otherwise approved by the Pipeline Coordinator.

1.14.2.4 The Lessee shall make provisions for suitable permanent crossings for the public where the Leasehold or Access Roads cross existing Roads, foot trails, winter trails, easements or other rights-of-way, unless otherwise authorized by the Pipeline Coordinator.

1.14.2.5 After completion of Construction of the Pipeline, and with the concurrence of the Lessee, the Pipeline Coordinator may designate areas of the Leasehold to which the public shall have free and unrestricted access.

1.15 Public Improvements

1.15.1 The Lessee shall protect existing telephone and other transmission lines, Roads, trails, fences, ditches, and like improvements during Construction, Operation, Maintenance, and Termination of the Pipeline.

1.15.2 Any damages caused by the Lessee to public utilities and/or improvements shall be promptly repaired by the Lessee to a condition which is reasonably satisfactory to the Pipeline Coordinator.

1.16 Fire Prevention and Suppression

1.16.1 The Lessee shall promptly notify the Pipeline Coordinator of any fires on, or which may threaten any portion of, the Pipeline and shall take all measures necessary or appropriate for the prevention and suppression of fires in accordance with applicable law. The Lessee shall comply with the instructions and directions of the Pipeline Coordinator concerning the use, prevention, and suppression of fires on State Land.

1.16.2 Use of open fires in connection with Pipeline Activities is prohibited on State Land unless approved by the Pipeline Coordinator and performed in accordance with State law.

1.17 Health and Safety

1.17.1 The Lessee shall take all measures necessary to protect the health and safety of all Persons affected by its activities performed in connection with the Construction, Operation, Maintenance, or Termination of the Pipeline, and shall immediately abate any health or safety hazards. The Lessee shall immediately notify the Pipeline Coordinator of all serious accidents which occur in connection with such activities.

1.18 Protection of Survey Monuments

1.18.1 The Lessee shall mark and protect all survey monuments encountered during Pipeline Activities. These monuments are not to be disturbed; however, if a disturbance of a monument, or any of its accessories, becomes necessary, the Lessee shall contact the survey section of the Division of Mining Land and Water for current information on the policies regulating the implementation of "Records of Monuments" (AS 38.65.040).

1.18.2 A written report to the Pipeline Coordinator shall be made by the Lessee in the event that any monuments or accessories are inadvertently damaged.

1.19 Use of Existing Facilities

1.19.1 Subject to existing rights vested in other parties, the Lessee shall use existing facilities, to the maximum extent feasible, in all Pipeline Activities associated with the Pipeline. Nothing in this Stipulation shall require the Lessee to use an existing facility if the use of the facility could potentially create a risk to health, safety, or the environment.

1.20 Protection of Cultural Resources

1.20.1 The Lessee shall enter into a programmatic agreement with the State of Alaska Office of History and Archaeology (OHA) related to implementation of Section 106 of the Historic Preservation Act (16 U.S.C. 470 et seq.).

1.20.2 The Lessee shall take affirmative responsibility to require its agents, employees, Contractors, and the employees of each of them to protect cultural resources while conducting Pipeline Activities.

1.20.3 Should any sites or suspected sites be discovered during the course of Pipeline Activities, the activities that may disturb or damage the site shall cease. The OHA and the appropriate Coastal District shall be notified immediately.

1.21 Hunting, Fishing, Trapping, and Camping

1.21.1 With respect to Lessee's agents, employees, Contractors, and the employees of each of them, the Lessee shall prohibit hunting, fishing, trapping, shooting, and camping within the Leasehold.

1.21.2 The Lessee's agents, employees, Contractors, and the employees of each of them shall not use project equipment, including transportation to and from the job site, for the purpose of hunting, fishing, shooting, and trapping.

1.22 Off Right-of-Way Traffic

1.22.1 The Lessee shall not operate mobile ground equipment off the Leasehold, Access Roads, State highways, or authorized areas, unless approved by the Pipeline Coordinator or when necessary to prevent harm to any Person.

1.23 Material Sites

1.23.1 Purchase of Materials

1.23.1.1 If the Lessee requires materials from State Land, the Lessee shall make application to purchase such materials in accordance with appropriate State laws and regulations. No materials shall be removed from State Land by the Lessee without the approval of the Pipeline Coordinator.

1.23.1.2 Insofar as possible, use of existing material sites shall be authorized in preference to new sites.

1.23.1.3 Gravel and other construction materials shall not be taken from streambeds, riverbeds, lakeshores, or outlets of lakes, unless the taking is approved by the Pipeline Coordinator.

1.23.2 Layout of Material Sites

1.23.2.1 Material site boundaries shall be shaped in such a manner as to blend with surrounding natural land patterns. Regardless of the layout of material sites, primary emphasis shall be placed on prevention of soil erosion and damage to vegetation.

2. ENVIRONMENTAL

2.1 Environmental Briefings

2.1.1 The Lessee shall develop and provide environmental briefings for supervisory and field personnel and Field Representatives. The briefings shall communicate, at a minimum, Lease and environmental permit requirements.

2.2 Pollution Control

2.2.1 The Lessee shall conduct all activities associated with the Pipeline in a manner that shall avoid or minimize degradation of air, land, and water quality. In the Construction, Operation, Maintenance, and Termination of the Pipeline, the Lessee shall perform its activities in accordance with applicable air and water quality standards, related facility siting standards, and related plans required by Stipulation 1.4.3.

2.2.2 Mobile ground equipment shall not be operated in or on lakes, streams, or rivers on State Land unless such operation is approved by the Pipeline Coordinator.

2.2.3 The Lessee shall use only non-persistent and immobile types of pesticides, herbicides, preservatives, and other chemicals. Each chemical to be used and its application constraint shall be approved by the Pipeline Coordinator prior to use.

2.2.4 All waste generated in Construction, Operation, Maintenance, and Termination of the Pipeline shall be removed or otherwise disposed of according to all local, State, and federal laws, and in a manner reasonably acceptable to the Pipeline Coordinator.

2.2.5 The Lessee shall utilize and operate all facilities and devices used in connection with the Pipeline so as to avoid or minimize air pollution and ice fog. Facilities and devices which cannot be prevented from producing ice fog shall be located so as not to interfere with airfields, communities, or Roads.

2.3 Disturbance of Natural Waters

2.3.1 All activities of the Lessee in connection with the Pipoline that may create new lakes, drain existing lakes, significantly divert natural drainage and surface runoff, permanently alter stream or groundwater hydrology, or disturb significant areas of streambeds are prohibited unless such activities and necessary mitigation measures are approved by the Pipeline Coordinator.

2.3.2 The temperature of natural surface water or groundwater shall not be significantly changed by the Pipeline or by any Construction, Maintenance, Operation, or Termination related activities so as to adversely affect the natural surface water or groundwater, unless approved by the Pipeline Coordinator.

2.4 Erosion and Sedimentation

2.4.1 Erosion control measures shall be maintained to limit induced and accelerated erosion, limit sediment production and transport, and lessen the possibility of forming new drainage channels during Construction, Operation, Maintenance, and Termination of the Pipeline.

2.5 Excavated Material

2.5.1 Excess excavated material shall be disposed of in accordance with approved Construction plans during Construction and as approved by the Pipeline Coordinator during Operation, Maintenance, and Termination of the Pipeline.

2.5.2 Excavated materials shall not be stockpiled in rivers, streams, floodplains, or Wetlands unless approved by the Pipeline Coordinator.

2.6 Restoration and Revegetation

2.6.1 Revegetation of disturbed areas on State Land shall be conducted as soon as practicable and, if necessary, shall be repeated until Revegetation is successful, unless otherwise approved by the Pipeline Coordinator. All other Restoration shall be completed as soon as possible.

2.6.2 Surface materials taken from disturbed areas shall be stockpiled and utilized during Restoration unless otherwise approved by the Pipeline Coordinator. Stabilization practices, as determined by the needs for specific sites, shall include but shall not be limited to the placement of mat binders, soil binders, rock, or gravel blankets or structures.

2.6.3 All disturbed areas of State Land shall be left in such stabilized condition that erosion in excess of natural rates shall be minimized until the practicable Restoration and Revegetation of the Leasehold can be accomplished in a manner that is reasonably satisfactory to the Pipeline Coordinator.

2.6.4 Areas on State Land disturbed by the Lessee shall be Restored by the Lessee to the reasonable satisfaction of the Pipeline Coordinator as stated in writing.

2.6.5 Vegetation, overburden, and other materials removed during clearing operations shall be disposed of by the Lessee in a manner approved by the Pipeline Coordinator.

2.6.6 Upon completion of Restoration on State Land, the Lessee shall remove all equipment and supplies from the site.

2.7 Timber Clearing, Salvage and Utilization

2.7.1 Prior to initiating clearing operations on State Land, the Lessee shall provide the Pipeline Coordinator with an estimate of the amount of merchantable timber, if any, which shall be cut, removed, or destroyed in the Construction and Maintenance of the Pipeline, and shall pay the State in advance of such Construction or Maintenance activity, such sum of money as the Pipeline Coordinator determines to be the full stumpage value of the timber to be cut, removed, or destroyed.

2.7.2 The Lessee shall, as part of the Timber Clearing, Salvage and Utilization Plan required in Stipulation 1.4.3.1(d), provide an opportunity for residents and local communities to utilize the salvage timber.

2.7.3 All debris resulting from clearing operations and Construction that may block stream flow, delay fish passage, contribute to flood damage, or result in streambed scour or erosion shall be removed.

2.7.4 Logs shall not be skidded or yarded across any watercourse without the approval of the Pipeline Coordinator.

2.7.5 No log storage shall be located within three hundred (300) feet of any watercourse on State Land except with the approval of the Pipeline Coordinator.

2.8 Fish and Wildlife Protection

2.8.1 Fish Passage

2.8.1.1 All Pipeline Activities shall be conducted so as to assure free passage and movement of fish in streams designated by the Pipeline Coordinator in consultation with the Alaska Department of Fish and Game (ADF&G). Temporary blockages of fish necessitated by in-stream activities shall be approved by the ADF&G.

2.8.1.2 Pump intakes shall be screened to prevent harm to fish. Screening specifications shall be approved by the Pipeline Coordinator.

2.8.1.3 When abandoned, water diversion structures shall be removed or plugged and stabilized unless otherwise approved by the Pipeline Coordinator.

2.8.1.4 If material sites are approved adjacent to or in certain lakes, rivers, or streams, the Pipeline Coordinator may require the Lessee to construct levees, berms, or other suitable means to protect fish and fish passage and to prevent siltation of streams or lakes.

2.8.2 Fish Spawning Beds, Rearing Areas, and Overwintering Areas

2.8.2.1 The Lessee shall protect Fish Spawning Beds, Fish Rearing Areas, and Overwintering Areas from sediment where soil material is expected to be suspended in water as a result of Pipeline Activities. Settling basins or other sediment control structures shall be constructed and maintained to intercept sediment before it reaches rivers, streams, or lakes.

2.8.2.2 The Lessee shall comply with site-specific terms and conditions imposed by the Pipeline Coordinator to protect Fish Spawning Beds, Fish Rearing Areas, and Overwintering Areas from the effects of Pipeline Activities. Damage caused by the Lessee's Pipeline Activities shall be repaired to the reasonable satisfaction of the Pipeline Coordinator.

2.8.2.3 The Lessee shall avoid disturbance to Fish Spawning Beds, Fish Rearing Areas, and Overwintering Areas designated by the Pipeline Coordinator. However, where disturbances cannot be avoided, proposed modifications and appropriate mitigation measures shall be designed by the Lessee and approved by the Pipeline Coordinator.

2.8.3 Wildlife

2.8.3.1 The Pipeline shall be maintained to avoid significant alteration of big-game movement patterns. The Pipeline Coordinator may require additional measures to mitigate impacts to big-game movement.

2.8.3.2 The Lessee shall coordinate with the U.S. Fish & Wildlife Service regarding any activity that has the potential to disturb polar bears. Pipeline Activities shall avoid polar bear dens unless alternative mitigative measures to minimize disturbances are approved by the Pipeline Coordinator and the U.S. Fish and Wildlife Service.

2.8.3.3 Prior to starting Pipeline Activities, the Lessee shall obtain the locations of known brown-bear dens from the ADF&G for the purpose of avoiding both human/bear interactions and disturbance of bear dens.

2.8.4 Zones of Restricted Activity

2.8.4.1 During periods of wildlife breeding, nesting, lambing, or calving activity, and during major migrations of wildlife, the Lessee's activities on State Land may be restricted by the Pipeline Coordinator with written notice. From time to time, the Pipeline Coordinator shall furnish the Lessee a list of areas where such actions may be required, together with anticipated dates of restriction. In addition, no blasting shall be done under water or within one-quarter (1/4) mile of streams or lakes with identified sensitive wildlife habitat without the approval of the Pipeline Coordinator.

2.8.4.2 During periods of fish spawning, rearing, and migration, the Lessee's activities on State Land may be restricted by the Pipeline Coordinator with written notice. From time to time, the Pipeline Coordinator shall furnish the Lessee a list of areas where such actions may be required, together with anticipated dates of restriction. In addition, no blasting shall be done under water or within one-quarter (1/4) mile of streams or lakes with identified sensitive fisheries habitat without the approval of the Pipeline Coordinator.

2.9 Use of Explosives

2.9.1 The Lessee shall submit a plan for use of explosives on State Land, including but not limited to blasting techniques, to the Pipeline Coordinator in accordance with Stipulation 1.4.3.

2.9.2 Any blasting not previously approved in the blasting plan shall be approved by the Pipeline Coordinator.

2.10 Vegetative Screens and Buffers

2.10.1 Where the Leasehold crosses Roads, a screen of native vegetation shall be established over the disturbed areas unless otherwise approved by the Pipeline Coordinator.

2.10.2 The Pipeline shall be located so as to provide a buffer of undisturbed land at least five hundred (500) feet wide between the Pipeline and streams, unless otherwise approved by the Pipeline Coordinator.

2.10.3 Undisturbed vegetative screens at least five hundred (500) feet wide shall be maintained between material sites and highways unless otherwise approved by the Pipeline Coordinator.

2.11 Contingency Plans

2.11.1 It is the policy of the Department of Natural Resources that there should be no discharge of petroleum products or other pollutants into or upon lands or waters of the State. The Lessee must therefore recognize its prime responsibility for the protection of the public and environment from the effects of spillage.

2.11.2 Prior to Pipeline startup, the Lessee shall demonstrate its capability and readiness to execute the Hazardous Substances control, cleanup, and disposal plan referenced in Stipulation 1.4.3 and approved by the Pipeline Coordinator. The Lessee shall update, as appropriate, the plans and methods of implementation, and submit the updates to the Pipeline Coordinator for approval.

2.11.3 If during any phase of the Construction, Operation, Maintenance, or Termination of the Pipeline, any oil or other pollutant should be discharged from the Pipeline or from any storage or refueling facility or equipment, the control and total removal, disposal, and cleaning up of such oil or other pollutant, wherever found, shall be the responsibility of the Lessee. Upon failure of the Lessee to control, dispose of, or clean up such discharge, the Pipeline Coordinator may take measures to control and clean up the discharge at the full expense of the Lessee. Such action by the Pipeline Coordinator shall not relieve the Lessee of any responsibility as provided herein.

3. TECHNICAL

3.1 General

3.1.1 All Design, Construction, Operation, Maintenance, and Termination methods employed with respect to the Pipeline shall be in accordance with sound engineering practice and shall meet or exceed the U.S. Department of Transportation Regulations in 49 CFR, Parts 191, 192 and 199.

3.1.2 Requirements in addition to those set forth in the above minimum standards may be imposed by the Pipeline Coordinator as reasonably necessary to reflect the impact of arctic environments or other specialized situations. The Pipeline Coordinator shall make every effort to identify such additional requirements during the Design phase.

3.1.3 The Lessee shall perform Maintenance in such a manner as to minimize damage to the Leasehold; to minimize environmental deterioration, such as to water or air quality; and to protect public safety. The Lessee shall submit a Maintenance Plan to the Pipeline Coordinator for acceptance prior to start-up and shall submit to the Pipeline Coordinator for acceptance any subsequent major changes to the plan.

3.2 Design Basis and Criteria

3.2.1 The Lessee shall develop a Design Basis and Criteria document for acceptance by the Pipeline Coordinator. The document shall follow the Pipeline Coordinator's standard format modified to encompass the characteristics of the project. In particular, proximity to TAPS shall be given emphasis. After acceptance, any modifications to the contents of the Design Basis and Criteria shall also be accepted by the Pipeline Coordinator.

3.3 Technical Record Keeping

3.3.1 All drawings and primary technical documents shall be kept up-to-date. Changes to the Pipeline shall be documented by final drawings sealed by an engineer registered in the State of Alaska within 180 days of completion, unless otherwise authorized by the Pipeline Coordinator.

3.4 Proximity to TAPS and Other Existing Infrastructure

3.4.1 The Pipeline route and proximity to all existing or planned installations shall be approved by the Pipeline Coordinator. Any subsequent changes in route shall be approved by the Pipeline Coordinator.

3.4.2 All route and proximity analyses, maps, selection, and reports shall consider the potential impact radius.

3.4.3 The Lessee shall not interfere with operations or other activities of TAPS except as may be approved by the Pipeline Coordinator.

3.4.4 The Lessee and the Pipeline Coordinator agree to meet on a regular basis with Alyeska Pipeline Service Company to review all issues associated with proximity, including the opportunity to review and comment on the "proximity to Trans Alaska Pipeline System (TAPS) and Other Existing Infrastructure" (Stipulation 1.4.3.1(a)).

3.5 Electronics and Communications

3.5.1 The Lessee shall screen, filter, or otherwise suppress any electronically operated devices installed as part of the Pipeline which are capable of producing electromagnetic interference radiations so that such devices shall not adversely affect the functioning of the Pipeline communication systems.

3.5.2 Any structures built as part of the communication systems shall not interfere with radiation patterns of existing line-of-site communication systems, navigational aids, or related systems including all systems used in connection with the operation of TAPS.

3.5.3 The Lessee shall provide a reliable voice and data communication system and backup that shall provide information to a control center and be fully usable for an incident command system. This communication system shall provide automated and timely regulatory reporting, timely operational data retrieval, automated trending capabilities, alarming functionality, security, and automated operator notification. Part of the communication system shall be a fully functioning and reliable Supervisory Control and Data Acquisition (SCADA) system.

3.5.4 The Lessee shall maintain two independent communication systems capable of full transmission of voice and data for emergencies. Both the primary and backup systems shall be continuously available for use for incident command.

3.5.5 The Lessee shall ensure that both independent communication systems can be fully functional after a seismic event as defined elsewhere in the Stipulations. This includes all transmission equipment, supporting facilities, power, and other devices needed to make a fully functional communication system. A seismic analysis sealed by an engineer registered in the State of Alaska shall be provided to the Pipeline Coordinator verifying this has been accomplished.

3.6 Corrosion

3.6.1 The Lessee shall provide a plan for corrosion-resistant design and methods for early detection of corrosion in accordance with 49 CFR, Part 192.

3.6.2 The Corrosion Plan shall include consideration of:

(a) Pipeline material to be used and information on its particular suitability for the environment involved;

(b) Details on the external pipe protection to be provided (coating, wrapping, or other means of protection), including information on variations in environmental factors along the Pipeline route;

(c) Plans for cathodic protection if necessary or when appropriate, including details of impressed-current sources and controls to ensure continuous maintenance of adequate protection over the entire surface of the pipe;

(d) Details of plans for monitoring cathodic-protection current, including spacing of current monitors;

(e) Provision for periodic intensive surveys of trouble spots, regular preventive maintenance surveys, and special provisions for abnormal potential patterns, especially those resulting from other pipelines or cables; and

(f) Information on any precautions that may be required to prevent external or internal corrosion of the Pipeline.

3.7 Lightning Protection

3.7.1 Lightning protection and surge suppression shall conform to the requirements of NFPA 780, 2011 Edition, "Standard for the Installation of Lightning Protection Systems."

3.7.2 The Lessee shall provide an engineering summary verifying that all lightning protection is in place and fully functional. The report shall be updated to accommodate subsequent changes to facilities and installation requiring additional protection required under NFPA 780. All reports shall be sealed by an engineer registered in the State of Alaska.

3.7.3 The Lessee shall inspect lightning protection annually and repair damage no later than June 1 unless otherwise authorized by the Pipeline Coordinator.

3.8 Seismic

3.8.1 The Pipeline shall be designed to prevent gas leakage or damage to the Pipeline from the Design Contingency Earthquake (DCE). The DCE is defined as an earthquake with a five (5) percent probability of exceedance in fifty (50) years. Seismic ground-motion parameters shall be based on the U.S. Geological Survey (USGS) national seismic hazard maps for Alaska as appropriate to the particular pipeline or facility application, except for areas of special seismic hazards such as active faults, unstable slopes, or liquefaction zones. An engineer registered in the State of Alaska shall assess the design for each of these special seismic hazards.

3.8.2 An Engineering Analysis and Report on the Design of the Pipeline, sealed by an engineer registered in the State of Alaska, shall be submitted to the Pipeline Coordinator for review and acceptance. The report shall assess and confirm that the Pipeline can withstand the DCE and shall indicate any areas of high hazards, fault zones, and mitigating measure that the Lessee has undertaken. The report shall be reviewed by a qualified geologist to determine that all identified hazards have been considered and proper geologic parameters (e.g., fault zone location, width, and DCE offset) have been used.

3.8.3 Seismic design provisions shall include an earthquake monitoring system (EMS). The EMS shall be integrated into the University of Alaska statewide seismic monitoring system and shall include the following elements:

(a) A network of ground-motion detectors to continuously detect and instantaneously report events near the Pipeline approaching the level of the DCE;

(b) An automatic programmed shutdown of the Pipeline when an event near the Pipeline approaches the level of the DCE; and

(c) An automatic generation of a post-event inspection checklist targeting the facilities most affected by the location of the event.

3.9 Fault Displacements

3.9.1 Prior to applying for a Notice to Proceed for any Construction Segment on State Land, the Lessee shall demonstrate to the Pipeline Coordinator that all recognizable or reasonably inferred active faults or fault zones along the alignment within that Construction Segment have been identified, delineated, and characterized.

3.9.2 The Lessee shall demonstrate to the Pipeline Coordinator that the risk of leakage resulting from fault movement and ground deformation has been adequately assessed and provided for in the Design of the Pipeline for any Construction Segment. Evaluation of the risk shall be based on geologic, geomorphic, geodetic, seismic, and other appropriate scientific evidence of fault behavior active during the Holocene era and shall be compatible with the DCE and with observed relationships between earthquake magnitude and extent and the amount of deformation and fault slip within the fault zone. Individual fault-rupture parameters used for Pipeline fault-crossing design shall be verified by site-specific geologic field investigation.

3.9.3 In a fault zone that is reasonably interpreted as active, the Pipeline shall meet the following minimum design criteria:

(a) The Pipeline shall resist failure resulting in leakage from displacement in the foundation material resulting from the DCE on that fault zone;

(b) No storage tank or compressor station shall be located within an active fault zone on State Land; and

(c) The manner of pipe installation across the fault zone, location of valves on each side of the fault, and monitoring system shall be included in the design.

3.9.4 Where the Pipeline crosses a fault or lies within a fault zone on State Land that is reasonably interpreted as active, the Lessee shall monitor crustal deformation in the vicinity (e.g., fault creep, seismicity) and report findings to the Pipeline Coordinator at a frequency to be agreed upon by the Pipeline Coordinator and the Lessee.

3.10 Land, Soil, Snow, and Ice Movement

3.10.1 Areas subject to mud flows, landslides, avalanches, rock falls, and other types of mass movements shall be avoided where practicable in locating the Pipeline on State Land. Where such avoidance is not practicable, the Pipeline Design, based upon detailed field investigations and analysis, shall provide measures to prevent the occurrence of, or protect the Pipeline against, the effects of such mass movements. Special emphasis shall be used to find areas of unusual cold-region methods of soil failure, such as transitional permafrost, solifluction, and areas of seasonal groundwater flow.

3.10.2 The Pipeline shall be designed to protect existing facilities, including TAPS, from the effects of mass movement caused by the Lessee's activities, and shall not adversely affect slope stability protection measures of existing structures.

3.11 Land and Surface Disturbance

3.11.1 All Construction, Operation, Maintenance, and Termination activities in connection with the Pipeline shall be conducted to minimize surface modifications. These activities shall be planned and executed in such a way that the resulting alteration of permafrost shall not jeopardize Pipeline integrity or the surrounding environment.

3.11.2 A monitoring program shall be developed by the Lessee to (a) identify any Pipeline movement that may affect Pipeline integrity, resulting from frost heave or settlement forces, and (b) identify surface heave or subsidence above the Pipeline. This program, including baseline data, shall be finalized and operational prior to transmission of Natural Gas through the Pipeline.

3.11.3 Construction of Access Roads, ice ramps, ice work pads, protective work mats, or any other method to protect the ground surface shall be approved by the Pipeline Coordinator. Approvals shall be obtained during all phases of the Lease, including Construction, Operation, Maintenance, and Termination of the Pipeline.

3.11.4 The Pipeline Coordinator shall approve Pipeline trench backfill methods prior to the start of detailed Construction planning.

3.12 Pipe/Soil Interaction

3.12.1 The Lessee shall produce a summary report discussing the effects of modifications to the in-situ thermal condition of the soils supporting the Pipeline caused by Construction, Operations, and/or Maintenance. The report shall also include the steps taken to mitigate those effects so as to maintain Pipeline operational integrity and minimize the effects of ground surface expression. The Pipeline shall be designed to maintain Pipeline integrity under potential ground movements resulting from these modifications as required by ASME B31.8S. The report shall be sealed by an engineer registered in the State of Alaska.

3.12.2 The Lessee shall monitor the thermal regime and submit annual reports on the thermal stability of the Pipeline. The reports shall also include records of the gas temperatures maintained in the Pipeline. The reporting frequency of these reports shall continue until the Pipeline Coordinator has determined that the installation has stabilized.

3.13 Rivers, Streams, and Floodplains

3.13.1 The Pipeline shall be designed to withstand or accommodate the effects (including runoff, stream and floodplain erosion, meander cutoffs, lateral migration, ice jams, and icings) of those meteorological and hydrologic (including surface and subsurface) conditions considered characteristic for each hydrologic region.

3.13.2 For stream crossings and portions of the Pipeline within a floodplain, the following design standards shall apply:

(a) The design flood shall be based on the 100-year flood event as defined by the USGS Regional regression equations or flood frequency analysis of gage data if close and representative to the stream under consideration;

(b) The depth of channel scour shall be established by appropriate field investigations and theoretical calculations using those combinations of water velocity and depth that yield the maximum value. At the point of maximum scour, the cover over the top of the pipe shall be at least twenty (20) percent of the computed scour, but not less than four (4) feet;

(c) For overhead crossings, analysis shall be made to ensure that support structures are adequately protected from the effects of scour, channel migration, undercutting, ice forces, degradation of permafrost, and other external and internal loads;

(d) To avoid channelization along the pipe, appropriate design and construction procedures shall be included in the plans required and shall be used wherever there is potential for such channelization;

(e) Methods of constructing stream crossings, including horizontal directional drilling or excavation and backfill of pipe trench near and through stream banks and existing river-training structures shall be approved by the Pipeline Coordinator prior to initiation of Construction; and

(f) Low water crossings (fords across streams or rivers where any mobile ground equipment is moved on the streambed) shall be designed, constructed, maintained, and Restored to standards approved by the Pipeline Coordinator.

3.13.3 The Pipeline shall be designed to minimize the number of stream and Wetland crossings and to include, but not be limited to, consideration of effects to other nearby structures, from aufeis development, erosion and sedimentation, restriction of natural meander, or alteration of the physical or chemical nature of the water body caused by Pipeline Activities.

3.13.4 Temporary access over stream banks prior to and following Construction shall be made through the use of fill ramps rather than by cutting through stream banks, unless otherwise approved by the Pipeline Coordinator. The Lessee shall remove such ramps upon termination of the activity. Ramp materials shall be disposed of in a manner approved by the Pipeline Coordinator.

3.13.5 Culverts, bridges, and other hydrological structures necessary for Maintenance of the Pipeline shall be designed at a minimum to accommodate a fifty (50) year flood in accordance with criteria established by the American Association of State Highway and

Transportation Officials and the Federal Highway Administration, and in accordance with the DOT&PF Alaska Highway Drainage Manual.

3.13.6 ADF&G standards shall be adhered to for installation of culverts in fish streams designated by the Pipeline Coordinator. Such culverts shall be necessary for Construction or Operation of the Pipeline.

3.14 Access Roads

3.14.1 The Lessee shall submit a layout of each proposed Access Road for approval by the Pipeline Coordinator.

3.14.2 Access Roads shall be constructed to standards suitable for safe operations of equipment at the travel speeds proposed by the Lessee.

3.14.3 Design, materials, and construction practices employed for Access Roads shall be in accordance with safe and proven engineering practice. Access Roads intended for permanent use shall be constructed in accordance with federal and State road standards and the principles of construction for roads in the arctic environment.

3.14.4 The maximum allowable grade is twelve (12) percent unless otherwise approved by the Pipeline Coordinator.

3.15 Work Pads

3.15.1 Gravel work pads shall be designed and constructed to protect the ground surface and prevent any thermal degradation of permafrost.

3.15.2 A Maintenance Plan for work pads shall be developed for acceptance by the Pipeline Coordinator.

4. HIGHWAY USE AGREEMENT

4.1 Prior to commencement of Construction, the Lessee shall enter into a comprehensive agreement with DOT&PF for the use of highways and other facilities under the jurisdiction of the DOT&PF.

ADL 418997
ALASKA STAND ALONE GAS PIPELINE/ASAP
RIGHT-OF-WAY LEASE

EXHIBIT B
LINE LIST

Umiat Meridian

Township 11 North, Range 14 East
Section(s): 11, 14, 15, 22, 27, 28, 33

Township 10 North, Range 14 East
Section(s): 4, 8, 9, 17, 20, 29, 32

Township 9 North, Range 14 East
Section(s): 4, 5, 9, 15, 16, 22, 27, 34

Township 8 North, Range 14 East
Section(s): 2, 10, 11, 15, 21, 22, 28, 32, 33

Township 7 North, Range 14 East
Section(s): 5, 7, 8, 18, 19, 30

Township 7 North, Range 13 East
Section(s): 25, 36

Township 6 North, Range 13 East
Section(s): 1, 2, 11, 12, 13, 24, 25, 36

Township 5 North, Range 13 East
Section(s): 1

Township 5 North, Range 14 East
Section(s): 6, 7, 17, 18, 20, 29, 32

Township 4 North, Range 14 East
Section(s): 4: SE1/4 & N1/2, SW1/4,
9, 16, 21, 28, 33

Township 3 North, Range 14 East
Section(s): 3, 4, 10, 14, 15, 22, 23, 26, 35

Township 2 North, Range 14 East
Section(s): 1, 2, 11, 12, 13, 24, 25, 36

Township 2 North, Range 15 East
Section(s): 31

Township 1 North, Range 14 East
Section(s): 1, 6, 11, 12, 14, 15, 22, 23, 27, 28, 33

Township 1 North, Range 15 East
Section(s): 6

Township 2 North, Range 14 East
Section(s): 1, 2, 11, 12, 13, 24, 25, 36

Township 1 South, Range 14 East
Section(s): 3, 4, 9, 16, 21, 22, 27, 34

Township 2 South, Range 14 East
Section(s): 3, 4, 9, 16, 21, 28, 32, 33

Township 3 South, Range 14 East
Section(s): 5, 7, 8, 18, 19, 30, 31

Township 4 South, Range 14 East
Section(s): 6, 7, 17, 18, 19, 20, 29, 30, 31

Township 5 South, Range 14 East
Section(s): 4, 5, 8, 16, 17, 21, 28, 29, 32

Township 6 South, Range 14 East
Section(s): 5, 6, 7, 18, 19, 29, 30, 31, 32

Township 7 South, Range 14 East
Section(s): 5, 8, 9, 16, 20, 21, 29, 32

Township 8 South, Range 14 East
Section(s): 5, 7, 8, 18

Township 8 South, Range 13 East
Section(s): 13, 23, 24, 26, 27, 33, 34

Fairbanks Meridian

Township 29 North, Range 12 West
Section(s): 23, 26, 35 (Portion East of the Middle Fork Koyukuk River)

Township 28 North, Range 12 West
Section(s): 3, 10, 15, 16, 20, 21

Township 12 North, Range 11 West
Section(s): 12 (Yukon River and Lot 2)
13

Township 12 North, Range 10 West
Section(s): 18, 19, 20, 27, 28, 29, 34, 35, 36

Township 11 North, Range 10 West
Section(s): 1

Township 11 North, Range 9 West
Section(s): 6, 7, 8, 9, 15, 16, 17, 22, 23, 25, 26, 36

Township 11 North, Range 8 West
Section(s): 31, 32

Township 10 North, Range 8 West
Section(s): 13, 14

Township 10 North, Range 7 West
Section(s): 18, 19, 20, 29, 30, 32, 33

Township 9 North, Range 7 West
Section(s): 3, 4, 10, 11, 13, 14, 24

Township 9 North, Range 6 West
Section(s): 19, 30, 31, 32

Township 8 North, Range 6 West
Section(s): 5, 8, 9, 15, 16, 22, 23, 25, 26, 36

Township 8 North, Range 5 West
Section(s): 30, 31

Township 7 North, Range 5 West
Section(s): 5, 6, 8, 17, 20, 29, 31, 32

Township 6 North, Range 5 West
Section(s): 5, 6, 7, 18, 19, 30, 31

Township 5 North, Range 5 West
Section(s): 6 (W1/2), 7 (W1/2)

Township 5 North, Range 6 West
Section(s): 12, 13, 24, 25, 36

Township 4 North, Range 6 West
Section(s): 1, 2, 11, 14, 22, 23, 27, 34

Township 3 North, Range 6 West
Section(s): 2, 3, 11, 14, 23, 24, 25, 26, 36

Township 2 North, Range 6 West
Section(s): 1, 12, 13,
24 (Tract B, Chatanika River),
25 (USS 4459 and Chatanika River),
36

Township 1 North, Range 6 West
Section(s): 1, 2,
11 (USS 4474),
14 (USS 4474 and USS 4466A),
23, 26 (USS 4445B, USS 4473C, USS 3721),
34 (USS 9979),
35 (USS 9979)

Township 1 South, Range 6 West
Section(s): 3, 4,
9 (USS 4448-C),
16, 20, 21, 29, 31, 32

Township 2 South, Range 6 West
Section(s): 5,
7, 8 (Lots 1 & 3, USS 2123),
18

Township 2 South, Range 7 West
Section(s): 24 (USS 9064),
25 (82-6),
35 (Plat No. 85-5),
36 (Plat No. 85-5)

Township 3 South, Range 7 West
Section(s): 2 (Plat No. 82-10),
3 (Plat No. 82-10; Tract D),
9 (ROW),
10 (ROW and Plat No. 85-6),
16 (ROW, 181, Plat No. 83-4; Excluding ASLS 82-181, Berg),
17 (ROW, Excluding ASLS 82-181, Berg; Plat No. 83-4, Nenana),
19 (Parks Hwy ROW), 20 (NW4NE4SW4 and SE4SE4NW4),
30 (Parks Hwy ROW)

Township 3 South, Range 8 West
Section(s): 25 (Parks Hwy ROW),
36 (W2)

Township 4 South, Range 8 West
Section(s): 2 (Parks Hwy ROW),
11 (ROW, Tr B2A, Tr B2B),
14 (Tanana River),
35 (Lot 1)

Township 5 South, Range 8 West
Section(s): 3 (SE1/4; Lots 8, 9, & 14; TA 19830035),
10 (E1/2; TA 19830035),

Township 6 South, Range 8 West
Section(s): 28 (N1/2)

Township 7 South, Range 8 West
Section(s): 4,
8 (Lots 2 and 3)

Township 7 South, Range 9 West
Section(s): 36

Township 8 South, Range 9 West
Section(s): 11, 13,
14 (ROW, Portion west of the Nenana, Nenana River),
15 (Parks Hwy ROW),
22 (ROW, NW1/4SE1/4),
27, 34, 35

Township 9 South, Range 9 West
Section(s): 3 (ROW),
10 (ROW, Plat 80-9),
11,
14 (ROW, Creek Alaska Subdivision),
23 (ROW, Portion west of the Nenana River, Creek Alaska Subdivision),
24 (Portion west of the Nenana River),
25 (ROW, Portion West of the Parks Hwy ROW),
36 (ROW, Creek Alaska Subdivision, Plat)

Township 10 South, Range 8 West
Section(s): 6 (Portion West of the Nenana River),
7 (ROW, Excluding ASLS 87-361, ASLS 85-237, ASLS 92-70 and ASLS 88-111),
17 (Excluding ASLS 94-20, ROW),
18 (Excluding ASLS 86-108 and ASLS 86-160, ROW),
20,
21 (ROW, W1/2W1/4),
28 (ROW, NW1/4NW1/4 that portion lying west of the Parks Hwy ROW),
28 (Material Site that portion lying west of the Parks Hwy ROW),
33 (Parks Hwy ROW)

Township 11 South, Range 8 West
Section(s): 4 (That portion westerly of the Alaska Railroad ROW, excluding USS 5866; Park Hwy ROW),
9 (E1/2 excluding USS 5866; Parks Hwy ROW),
16 (E1/2 excluding ASLS 85-121; Parks Hwy ROW),
21 (Parks Hwy ROW; E1/2 excluding ASLS 85-120, ASLS 86-56, ASLS 88-164, ASLS 87-367, and ASLS 89-130),
22 (Parks Hwy ROW; excluding the Alaska Railroad ROW, USS 9054),
27 (Excluding ASLS 91-97, ASLS 87-327, AND ASLS 90-135; Parks Hwy ROW),
28 (Parks Hwy ROW),
34 (E1/2 excluding ASLS 83-168; Parks Hwy ROW),
35 (Parks Hwy ROW)

Township 12 South, Range 8 West
Section(s): 1 (SW1/4),
2 (Tracts A, B, & D, ROW),
11 (Tract B),
12 (Excluding First Addition Healy Small Tracts, Plat 68-245),
13 (NE1/4, Parks Hwy ROW, Portion west of Parks Hwy ROW excluding PLAT 68-245)

Township 13 South, Range 7 West
Section(s): 5, 6, 8, 9 (Portions within Parks Hwy ROW),
16 (Parks Hwy ROW),
21, 27,
33 (Parks Hwy ROW),
34 (Parks Hwy ROW; Nenana River)

Township 14 South, Range 7 West
Section(s): 2 (Tract A),
3 (Nenana River lying w/in Section)

Township 14 South, Range 6 West
Section(s): 17, 18,
19 (Excluding USS 2177),
20, 29, 32

Township 15 South, Range 6 West
Section(s): 20 (Tract B)

Township 16 South, Range 7 West
Section(s): 12 (Nenana River)

Township 17 South, Range 7 West
Section(s): 12 (Nenana River),
33 (Parks Hwy ROW)

Township 18 South, Range 7 West
Section(s): 4 (Denali Hwy ROW; Parks Hwy ROW)

Township 18 South, Range 8 West
Section(s): 21 (ROW within Lot 1, USS 6113),
30 (E1/2SW1/4, SE1/4, S1/2SE1/4NW1/4, E1/2NE1/4, SW1/4NE1/4, S1/2NW1/4NE1/4),
20 (E1/2SW1/4, SW1/4SW1/4, SE1/4),
29 (Portion lying northwest of the northwesterly boundary of the Alaska Railroad ROW)

Township 18 South, Range 9 West
Section(s): 36 (LOT 1, SW1/4SE1/4, NW1/4SE1/4, NE1/4SE1/4, S1/2NE1/4, S1/2NW1/4, SW1/4),

Township 20 South, Range 9 West
Section(s): 5 (TRACT A, USRS),
8

Township 20 South, Range 10 West
Section(s): 24, 25,
26 (PARCEL 15-4, Tract B, Parcel 15-3; Parks Hwy ROW),
34 (Tract E; Parcel 15-1; Parks Hwy ROW),
35

Township 21 South, Range 10 West
Section(s): 3, 4, 8, 9, 16, 17, 19, 20, 3

Township 21 South, Range 11 West
Section(s): 36

Township 22 South, Range 11 West
Section(s): 1, 2, 11, 12, 14, 22, 23, 27, 34

Seward Meridian

Township 33 North, Range 2 West
Section(s): 16, 20, 21, 29, 30, 31

Township 32 North, Range 3 West
Section(s): 1, 2, 6, 9, 10, 11, 16, 17, 20, 29, 30, 31

Township 32 North, Range 4 West
Section(s): 36

Township 31 North, Range 4 West
Section(s): 1, 2, 3, 9, 10, 16, 17, 19, 20, 30

Township 31 North, Range 5 West
Section(s): 24, 25, 26, 34, 35

Township 30 North, Range 5 West
Section(s): 3, 8,
9 (Lot 1A),
16, 17, 20, 21, 28, 33

Township 29 North, Range 5 West
Section(s): 4, 9, 17, 20, 28,
29 (Lot A2)
32 (Lot A1)

Township 28 North, Range 5 West
Section(s): 5 (ROW),
8 (ROW),
17 (ROW),
19 (ROW),
30 (ROW),
31 (ROW)

Township 27 North, Range 5 West
Section(s): 6 (ROW),
7 (ROW),
18 (ROW),
19 (ROW),
30 (ROW),
31 (ROW)

Township 26 North, Range 5 West
Section(s): 7, 8, 20, 29, 32

Township 25 North, Range 5 West
Section(s): 5 (ASCS 89-8, S05 Tract C),
8 (ASCS 89-8, S08 Tract F; Tract J; ROW; S08 Tract B),
17 (ASCS 89-8, S17 Tract; Tract B),
20 (ASCS 89-8, S20 TRACT B),
33

Township 24 North, Range 5 West
Section(s): 4, 5, 9, 15

Township 24 North, Range 4 West
Section(s): 32 (Lot A7)

Township 23 North, Range 4 West
Section(s): 5 (ROW),
8 (Lot B5 & B8),
29 (ROW),
32 (ROW)

Township 22 North, Range 4 West
Section(s): 7, 8, 17, 20

Township 21 North, Range 4 West
Section(s): 5 (ROW),
18 (Lot A6, ROW),
19 (Lot A2, ROW),
30 (ROW),
31 (Lot C6; Lot 2, ASLS 97-072)

Township 20 North, Range 4 West
Section(s): 6 (ROW),
7 (ROW; Lot B3; Kashwitna Lake),
18 (ROW),
31 (Lot C2)

Township 19 North, Range 4 West
Section(s): 6 (Lots D13, D14; ROW),
7 (Willow Airport, Parcel E)

Township 19 North, Range 5 West
Section(s): 1 (Lot A1),
2 (Lot A1)
10, 15,
17 (ROW),
22, 27, 34

Township 18 North, Range 5 West
Section(s): 3 (Lot A1),
9 (Lot A1),
10 (Lot B1),
16 (Lot A1),
17 (Lot A1),
20 (Lot A1),
29 (Lot A1),
31,
32 (Lot A1)

Township 17 North, Range 5 West
Section(s): 6, 7, 17, 18, 20, 29, 32

Township 16 North, Range 5 West
Section(s): 10 (Lots D2, D1 and C1),
11, 14

FAIRBANKS LATERAL

Fairbanks Meridian

Township 2 South, Range 6 West
Section(s): 1, 2, 3, 4, 9

Township 2 South, Range 5 West
Section(s): 4, 5, 6

Township 1 South, Range 5 West
Section(s): 25, 34, 35, 36

Township 1 South, Range 4 West
Section(s): 1, 2, 8, 9, 10, 11, 12, 15, 16,
19 (ROW),
20, 21, 22, 23, 30, 31

Township 1 North, Range 4 West
Section(s): 36

Township 1 North, Range 3 West
Section(s): 21, 29, 30, 31

Township 1 North, Range 2 West
Section(s): 15 (ROW),
16,
21 (ROW),
22 (ROW),
27 (ROW),
35

Township 1 South, Range 2 West
Section(s): 1 (ROW)

ADL 418997
ALASKA STAND ALONE GAS PIPELINE/ASAP
RIGHT-OF-WAY LEASE

EXHIBIT C
LESSEE GUARANTY

(EXCEPTION: A GUARANTY WILL NOT BE REQUIRED FROM A STATE ENTITY)

ADL 418997
ALASKA STAND ALONE GAS PIPELINE/ASAP
RIGHT-OF-WAY LEASE

EXHIBIT D
DEFINITIONS

Terms having specific meaning in this Lease and incorporated documents are indicated by capitalization. In the absence of a definition in this Exhibit D, terms shall be defined in accordance with definitions found in any applicable State statute or regulation, and otherwise in accordance with common usage.

Access Roads mean the roads or ice roads on State Lands constructed or used by Lessee within, or for ingress to and egress from, the Pipeline. It does not include the State highways or private roads or those highways and/or roads managed by a municipality, a borough, a city, other local jurisdictions or the Alaska DOT&PF.

As Built means an engineering diagram that depicts the centerline location of the Pipeline and the improvements as constructed.

Commissioner means the Commissioner of the Alaska Department of Natural Resources and includes the Commissioner's delegates, when a delegation of power to administer all or a portion of the provisions of this Lease is made pursuant to AS 38.35.210.

Construction means all Field Activities by the Lessee or its Contractors located on the Leasehold which involve more than *de minimis* physical disturbance of the existing natural land features or conditions of the Leasehold. Construction is not limited to mean only the actual construction of the Pipeline, but also includes other disturbances such as materials movements and stockpiling, development of borrow pit areas, and the establishment of work-camps and communications facilities. Construction excludes, however, the following kinds of Field Activities: engineering surveys, soil tests, biological and other studies, and any Field Activities in connection with the Termination of the Pipeline.

Construction Segment means a portion of the Pipeline that constitutes a complete physical entity or stage, in and of itself, which can be constructed independently of any other portion or stage of the Pipeline, in a designated area or between two given geographical points reasonably proximate to one another. It is not to be construed as referring to the entirety of the Pipeline.

Contractor means any contractor or subcontractor at any tier, and the employees, representatives, and agents of such a contractor.

Design Basis and Criteria mean a document specifying how the design and engineering provides for and meets the performance and operational requirements of the project and meets regulatory requirements, maintains safety, protects the environment and protects public interests. The Design Basis and Criteria covers the Pipeline and Related Facilities.

Field Activity means any Lease-related activity conducted on or in direct support of activities on the Leasehold by the Lessee.

Field Representative means an employee, Contractor, agent, or representative of the Lessee, appointed in writing by the Lessee, with notice to the State, to receive notices and orders from the

Commissioner's authorized representative at any location not part of the Lessee's urban administrative offices during Construction.

Final Design means the stage of the engineering of a Construction Segment when design is essentially complete and includes detailed facility and equipment specifications, process flow diagrams, detailed route maps, Construction drawings, detailed Construction methods, and timing, manpower and equipment requirements.

Fish Rearing Areas mean those areas inhabited by fish during any life stage.

Fish Spawning Beds mean those areas where anadromous and resident fish deposit their eggs.

Hazardous Substance or Hazardous Material means any solid, liquid, or gas that is defined as hazardous under local, State or federal laws or regulations. In particular, any substance defined as hazardous under Alaska Department of Labor, Alaska Department of Environmental Conservation, EPA, OSHA, U.S. DOT/PHMSA and FDA laws and regulations shall be considered hazardous under this Lease.

Initial Construction means all Construction performed by the Lessee or its Contractors that is conducted prior to the first start-up and Operation of the Pipeline.

Lease Anniversary Date means the same day and month as the date this Lease is effective, in each subsequent year that this Lease is in effect.

Leasehold means the State Lands subject to this Lease as those lands are identified in Exhibit B of this Lease and any amendments, modifications and subsequent renewals.

Lessee means the Alaska Gasline Development Corporation, or its successors and/or assigns holding an undivided ownership interest in the right-of-way in accordance with the provisions of this Lease.

Maintenance means activities associated with ensuring that the Pipeline and Related Facilities meet all legal, government and regulatory requirements. This may involve repairs, fixes, and replacement of parts.

Natural Gas has the same meaning as given in AS 38.35.230(5), i.e. all hydrocarbons produced at the wellhead not defined as oil.

Notice to Proceed means a permission to initiate Initial Construction that is issued in accordance with the Stipulations set forth in Exhibit A of this Lease.

Operation(s) means all activities connected with the transportation of Natural Gas through the Pipeline including Maintenance of the Pipeline.

Overwintering Areas mean those areas inhabited by fish between freeze-up and break-up.

Person(s) has the same meaning as given in AS 01.10.060(a)(8).

Pipeline means all the facilities of a total system of pipe, whether owned or operated under a contract, agreement, or lease, used by Lessee for transportation of Natural Gas for delivery, for storage, or for further transportation, and including all pipe, pump or compressor stations, station equipment, tanks, valves, Access Roads, bridges, airfields, terminals and terminal facilities, including docks and tanker loading facilities, operations control centers for both the upstream part of the pipeline and the terminal, tanker ballast treatment facilities, and fire protection systems, communication systems, and all other facilities used or necessary for an integral line of pipe, taken as a whole, to effectuate transportation, including an extension or enlargement of the line.

Pipeline Activities mean activities involving and related to Construction, Operation, Maintenance, and Termination of the Pipeline or any part of the Pipeline.

Preliminary Design means the stage of the engineering for a Construction Segment when the design has been refined enough to include basic facility and equipment specifications, route maps, and Construction methods.

Quality Assurance Program means the programmatic application of planned, systematic quality activities to ensure that the project will employ all processes needed to satisfy the commitments and requirements to ensure the integrity of the Pipeline, and required standards for health, safety, and environment.

Related Facilities mean those structures, devices, improvements, and sites located in, on, or over State Lands subject to this Lease and other lands in the State, other than the pipe itself, the substantially continuous use of which is necessary for the Operation and Maintenance of the Pipeline. Related Facilities include, but are not limited to: pump or compressor stations, station equipment, tanks, valves, Access Roads, bridges, airfields, terminals and terminal facilities, including docks and tanker loading facilities, control center(s) for all operations, tanker ballast treatment facilities, fire protection systems, and communication systems. Related Facilities generally do not include equipment not owned by the Lessee or facilities or Pipelines upstream of the gas treatment facilities or upstream of the first compressor station, except where such equipment constitutes the portion of the operations control center necessary to operate the Pipeline.

Restoration means the return of a disturbed site on the Leasehold upon completion of use by the Lessee to a physical and biological condition consistent with applicable State and federal law, regulations and policies at the time and to the extent acceptable to the Commissioner but in any event no better than its condition prior to the issuance of this Lease nor to original contours. Restoration includes, where appropriate, erosion and sedimentation control, stabilization, habitat reconstruction, Revegetation, and visual amelioration.

Restore means leaving a disturbed site in a condition consistent with applicable State and federal law, regulations and policies at the time acceptable to the Commissioner but in any event no better than its condition prior to the issuance of this Lease nor to original contours.

Revegetation means the establishment of native plant cover, unless non-native plant cover is required as a temporary means to reduce erosion, on disturbed lands in a manner consistent with applicable State and federal law and regulations. Methods or techniques to accomplish this include, but are not limited to, surface protection and preparation, fertilizing, seeding, planting, mulching and watering, and utilizing local growing conditions to dictate the timing for establishment of vegetative cover.

Revegetate means establishing native plant cover, unless non-native plant cover is required as a temporary means to reduce erosion, and reestablish conditions suitable for native plants. The priority of native plant cover for reestablishment shall be plant cover from 1) the immediate area; 2) the regional area; and 3) the State of Alaska.

Roads mean the State highways or private roads or those highways and/or roads managed by a municipality, a borough, a city, other local jurisdictions or the Alaska DOT&PF.

State Land(s) has the same meaning as given in AS 38.35.230(9).

State Pipeline Coordinator means that officer operating under written delegation of authority from the Commissioner with the authority and responsibility of administering a portion or all of the provisions of this Lease.

Termination means all activities connected with the expiration or completion of use of the right-of-way.

Trans-Alaska Pipeline System (TAPS) means that pipeline, or related facilities, referred to in and authorized by the Trans-Alaska Pipeline Authorization Act, Title II, P.L. 93 153, 87 Stat. 584.

Wetlands mean those areas defined as wetlands in State and federal law.

Written Authorization(s) means any authorization issued in writing by the Commissioner other than a Notice to Proceed.

Appendix N

Pipeline Design Approach

Alaska Stand Alone Gas Pipeline / ASAP

Design Methodology to Address Frost Heave Potential

Prepared for:

ALASKA GASLINE DEVELOPMENT CORP.
GAS FOR ALASKANS

Michael Baker Jr., Inc.
6/9/2011

121283-MBJ-RPT-024

Rev. 0

REVISION HISTORY

Rev	Date	Comments	Approval
0	6/9/2011	Initial Release	

EXECUTIVE SUMMARY

The purpose of this report is to introduce the design methodology for addressing potential threats related to frost heave in areas where the ASAP is routed through frost susceptible soils. Specifically, this report introduces the ASAP approach to the structural mechanics issues of the pipeline, particularly the methodology employed to ensure pipeline mechanical structural integrity when subjected to potential displacements associated with earth movement.

The report also addresses questions raised by the Pipeline and Hazardous Materials Safety Administration (PHMSA) to the Alaska Gasline Development Corporation (AGDC) regarding the approach to structural mechanics of the Alaska Stand Alone Gas Pipeline/ASAP (ASAP) relating to potential ditch displacements, such as frost heave, which could affect the longitudinal stress/strain response of the pipeline.

The ASAP project methodology to ensure pipeline integrity from time-dependent threats such as frost heave depends on the evaluation of a limiting curvature of the pipe. The limiting curvature of the pipe is used for design screening of the route terrain units and developing operational monitoring using pipeline in-line inspection (ILI) tools that detect pipeline movement (e.g., high resolution geometry pigs). The limiting curvature criterion is derived from consideration of limiting tensile and compressive strains capacities of the pipe material. This criterion is used to screen pipe route segments which do not exceed the criteria limits, after evaluation of the interaction of the pipe material, its operating characteristics, and the segment route subsurface behavior. Those segments that are determined to potentially exceed the curvature criteria limits are subject to mitigative actions to reduce the pipe response to within acceptable bounds.

Section 1 through Section 4 introduce the ASAP design terminology as it applies to this effort. In particular, these chapters relate the development of the methodology that employs curvature limits to ensure pipeline integrity, especially for those displacement-controlled loadings that induce transverse bending. The introductory material includes background on the determination of the loading, its associated soil and pipe resisting functions, and how these are integrated in a combined pipe-soil interaction analysis. The analytical process measures the effect of the loading and soil resisting functions on pipe response against quantitative structural integrity criteria for the range of route soils to be encountered and a range of operational conditions. This evaluation process for the range of alignment conditions forms the demand evaluation.

Section 5 focuses on the line pipe material and fabrication, and the corresponding development of appropriate design limits using these materials. These limits are used as the capacity evaluation and are used to judge the acceptance or rejection of the demand developed in the previous chapters. Section 5 then addresses the questions:

- How are the curvature limits to be developed?
- What tests will be conducted to verify the limits?
- What material requirements will be imposed?

Section 6 outlines the application of the design methodology to the alignment. This includes an introduction to the alignment conditions where the loading under consideration in this report, frost heave, would *not* occur. The application methodology is presented as a progressive exclusion sieve, narrowing down the alignment conditions, and associated alignment geographical segments, where the concern needs more detailed evaluation and potential mitigation. This chapter addresses the questions:

- Where would curvature criteria be used?
- Where would curvature criteria not be used?

Section 7 addresses construction requirements relating to frost heave answering the question:

- What modifications to standard construction techniques will be needed?

Section 8 addresses potential operational mitigation methods if operational monitoring concludes that the established curvature/strain limits may be exceeded and pipeline integrity is at risk. This chapter addresses the questions:

- What monitoring will be required during operations to ensure the limits are not exceeded?
- What mitigation measures will be employed should the limits be approached or exceeded?

As discussed with PHMSA, AGDC has not yet developed the final quantitative criteria, nor has AGDC compiled the ASAP alignment subsurface evaluation, which would allow completion of this design determination and application of the frost heave methodology to final design. Nevertheless, AGDC is confident that the process presented herein addresses the design methodology requirements needed at this front end of preliminary design, and forms a framework for successful evaluation of the route in final design.

CONTENTS

TABLES

FIGURES

ACRONYMS AND ABBREVIATIONS

ADOT&PF	Alaska Department of Transportation and Public Facilities
AGDC	Alaska Gasline Development Corporation
API	American Petroleum Institute
APSC	Alyeska Pipeline Service Company
ARRC	Alaska Railroad Corporation
ASAP	Alaska Stand Alone Gas Pipeline
ASME	American Society of Mechanical Engineers
ASTM	American Standard Testing Materials
AUT	Automated ultrasonic testing
BLM	Bureau of Land Management
cf	Cubic feet
CFR	Code of Federal Regulations
CO2	Carbon dioxide
CTOD	Crack tip opening displacement
D/t	Diameter to wall thickness ratio
DGGS	State of Alaska Division of Geological and Geophysical Surveys
FEL	Front end loading
GIS	Geographic Information System
HDD	Horizontal directional drill(ing)
HT	Hoop tension
ILI	In-Line Inspection
INS	Inertial Navigation System
ksi	Kips per square inch
LT	Longitudinal tension
MAOP	Maximum allowable operating pressure
MMscfd	Million standard cubic feet per day
PHMSA	Pipeline and Hazardous Materials Safety Administration
psi	Pounds per square inch
psig	Pounds per square inch gage
ROW	Right-of-way
SMYS	Specified minimum yield strength
TAPS	Trans-Alaska Pipeline System
U.S.	United States of America
UAF	University of Alaska Fairbanks
USGS	U.S. Geological Survey

SECTION 1. INTRODUCTION

The purpose of this report is to introduce the design methodology for addressing potential threats related to frost heave in areas where the ASAP is routed through frost susceptible soils. Specifically, this report introduces the ASAP approach to the structural mechanics issues of the pipeline, in particular the methodology employed to ensure pipeline mechanical structural integrity when subjected to potential displacements associated with earth movement.

Presentation of the design methodology will help address questions raised by the Pipeline and Hazardous Materials Safety Administration (PHMSA) in correspondence to the Alaska Stand Alone Gas Pipeline/ASAP project (ASAP or the Project) and in meetings between PHMSA and the ASAP technical team. Correspondence with PHMSA is reproduced in Appendix A of this report. The specific item of interest is the section entitled *"External loads that exceed design allowable – strain based design"* contained in the letter to Dan Fauske from Jeffrey Wiese, received by the Alaska Gasline Development Corporation (AGDC) on May 4, 2011. In the beginning of this section, five code segments of the federal regulations are cited: 49 CFR 192, paragraphs 192.103, 192. 105, 192.111, 192.317, and 192.620. Further discussion of these regulations is presented in Section 2.

Potential threats to the pipeline integrity are generally identified and assessed using ASME B31.8S, Managing System Integrity of Gas Pipelines, which has an overview of a generalized procedure to the approach to earth movement threats contained in Section A-9, "*Weather Related and Outside Force Threat (Earth Movement, Heavy Rains or Floods, Cold Weather, Lightning)*." The potential pipeline displacement loading from earth movement used to illustrate the approach in this report is frost heave. Note that frost heave is a time-dependent threat, which is different from other familiar earth movement threats, such as seismicity, which are time-independent.

1.1 PROJECT OVERVIEW

The purpose of the Alaska Stand Alone Gas Pipeline/ASAP is to provide the in-state infrastructure for the reliable delivery of natural gas, primarily from the existing gas production facilities on the North Slope of Alaska, to markets in South Central Alaska, Fairbanks, and other communities, as practical. The pipeline routing is generally along the state's existing highway corridors from the North Slope to tidewater in Southcentral Alaska. A route map is presented in Figure 1.1.

The design basis for ASAP consists of a 24-inch-diameter chilled natural gas pipeline, approximately 737 miles in length, with a flow rate of up to 500 million standard cubic feet per day (MMscfd). The mainline pipeline system will be designed to transport natural gas consisting of either a highly-conditioned natural gas enriched in non-methane hydrocarbons or of conditioned natural gas containing mostly methane. At the 500 MMscfd throughput a single compressor station is required to be located approximately 286 miles south of Prudhoe Bay. A 12-inch lateral pipeline, approximately 35 miles in length, will tie-in to the mainline at approximately ASAP milepost 458 to supply up to 60 MMscfd of utility grade gas to Fairbanks.

The majority of the pipeline will be installed belowground utilizing conventional trenching techniques. The mainline pipeline will be API 5L X70 pipe with a minimum wall thickness of 0.595 inches, for the maximum allowable operating pressure (MAOP) of 2500 psig, which corresponds to a design factor of 0.72. There is no intention of utilizing the alternative MAOP provisions of the 49 CFR 192 regulations which allow an increase of the design factor to 0.80. Since much of the pipe lies within the state roadway right-of-way (ROW), the design factor for over half the length of the mainline is 0.60 resulting in a wall thickness increase to 0.714 inches. The decrease in the design factor is required so as to conform to the 49 CFR 192.111(b)(2) when the pipeline is in a parallel encroachment. The Fairbanks Lateral will be API 5L X65 pipe with a minimum wall thickness of 0.250 inches (increased from 0.190 inches for constructability) for the MAOP of 1480 psig.

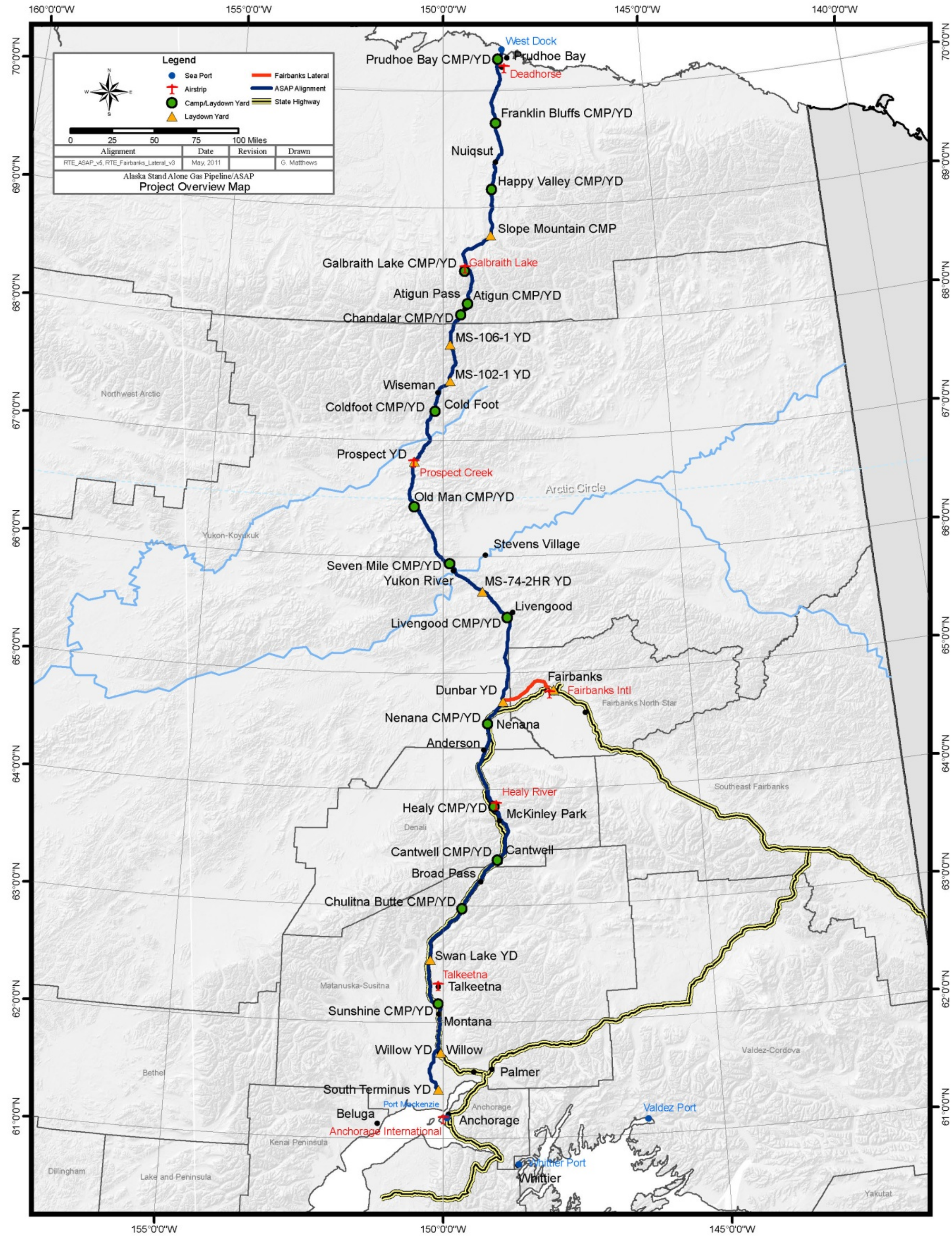

Figure 1.1 Route Map

1.2 PROJECT PHASING AND ASSOCIATED DELIVERABLES

1.2.1 PROJECT PHASING

Research shows that the disciplined application of a stage-gated process is strongly correlated with producing superior project outcomes. The gated approach involves breaking a capital project into discretely defined phases, where a clear set of deliverables or outcomes is outlined for each phase, which must be completed before the project is approved to move into the next phase. AGDC will be employing a stage-gated approach to project execution and delivery.

The first major phase of the gated project delivery process is FEL (front-end loading). Three stages usually comprise the FEL process (Conceptual Engineering, Preliminary Design, and Detailed Design) prior to project sanction (start of Execution). ASAP is currently in Conceptual Engineering, or early definition stages of project development.

The results of the initial phases provide critical input for making the final authorization decision to move forward with the project. The primary objective of FEL is to achieve an understanding of the project that is sufficiently detailed so that significant and costly changes in engineering, construction, and the startup phases of a project will be minimized.

The Conceptual Engineering project objective is development of the Project Plan due July 1, 2011. This will be the end of Conceptual Engineering. After that time, the Alaska Legislature will decide whether the Project will proceed to Preliminary Design, utilizing State funding, or whether the Project will be shelved or in some way modified at the end of the funding period in July 2011.

As the Project progresses into Preliminary Design and beyond, development of a large integrated project team will be needed comprised of people with a wide range of capabilities that can perform key functional roles in the project team organization. Project skill sets that will be required to move the project forward include operations, maintenance, business, process design, project controls, construction management, procurement and contracting, quality assurance, health and safety, and permitting.

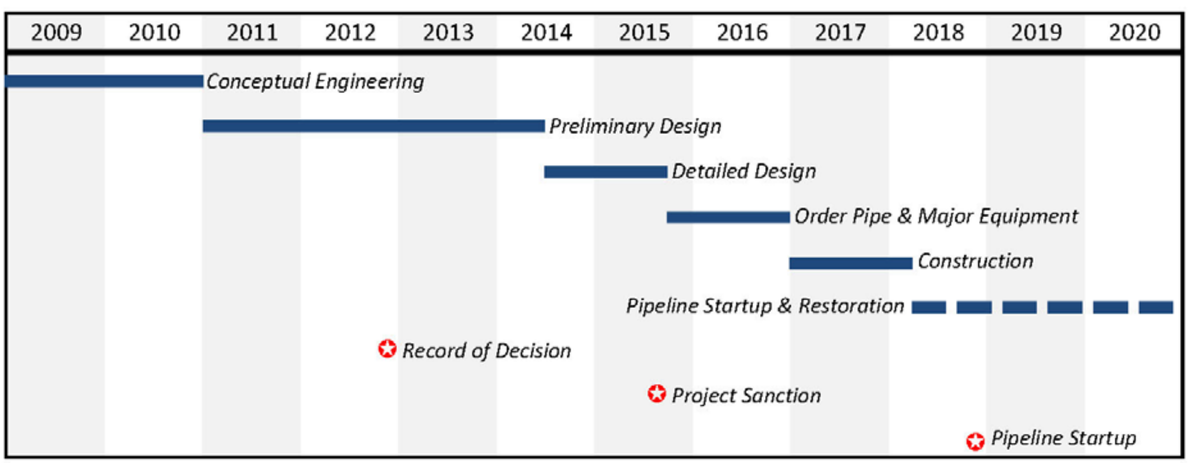

Figure 1.2 Project Schedule

1.2.2 DESIGN DELIVERABLES

The frost heave design approach is depicted in Figure 1.3 and will be explained further throughout this report. As the design progresses from Preliminary Design though Detailed Design and then Construction, information is being collated and verified to allow the design to progress along this design approach flowchart. In general, Preliminary Design follows the methodology development, scopes the data collection required for the demand and capacity to be further verified, and starts the data development for the route. Tasks scheduled to be finalized in Preliminary Design include:

- Identification of the input parameters required for the project approach that will implement this design methodology, including the analysis of the geothermal conditions and the structural analysis.
- Trial analyses completed and documented.
- The terrain units along the identified alignment are identified and captured in the project GIS – appropriate geotechnical parameters identified as required input for the methodology are assigned to the terrain units based on borehole analysis.
- The alignment route geo-database is implemented within the project GIS, concentrating on the subsurface information available along the routes from past exploratory tasks.
- Gaps in the route geo-database will be identified for required exploration.
- Potential manufacturers of the line pipe are contacted, and joints of the line pipe acquired for small-scale testing to be completed before the end of Preliminary Design.

Detailed Design will include finalizing the capacity and demand-capacity application evaluation process for the route including the following tasks:

- Finalization of the frost heave design approach methodology.
- The line pipe strain capacity is determined using the small-scale test results, and verified with full-scale testing.
- The route geo-database will be queried using the design methodology with route segments displaying potential unallowable heave potential subjected to additional scrutiny and/or mitigative measures.
- The final material and pipe order will incorporate any requirements to implement these measures.

The identified potential line segments subject to additional scrutiny identified in final design may require special mitigative measures that could be the basis of a special construction team. Baseline monitoring will be required within a practicable time after startup, followed with operational monitoring throughout the life of the project.

Design reviews by PHMSA and other agencies will occur throughout the various phases of the project.

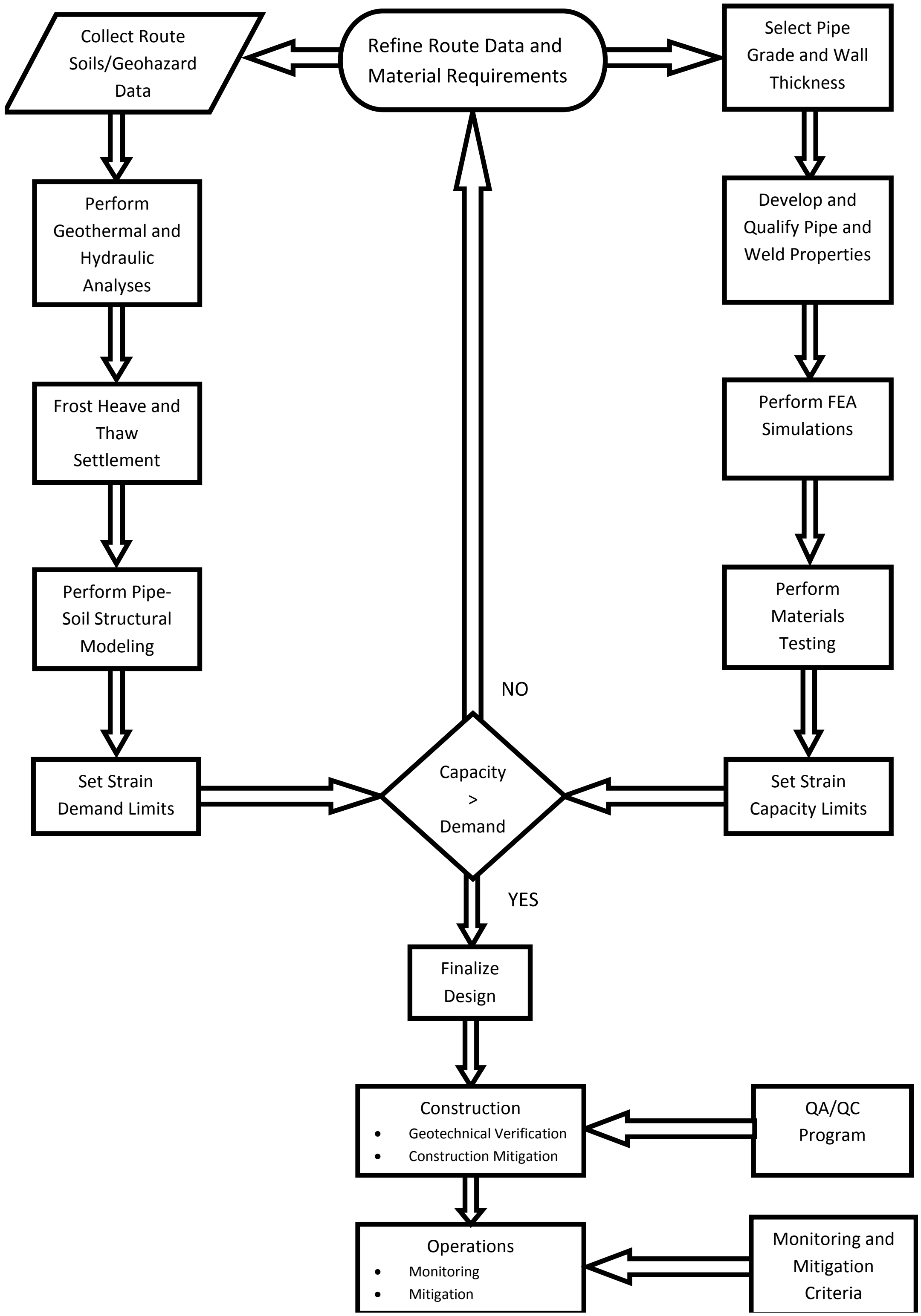

Figure 1.3 Design Approach Flowchart

1.3 ORGANIZATION OF THE REPORT

Section 1 through Section 4 introduce the ASAP design terminology as it applies to this effort. In particular, these chapters relate the development of the methodology that employs curvature limits to ensure pipeline structural integrity especially for those displacement-controlled loadings that induce transverse bending. The introductory material includes background on the determination of the loading, its associated soil and pipe resisting functions, and how these are integrated in a combined pipe-soil interaction analysis. The analytical process measures the effect of the loading and soil resisting functions on pipe response against quantitative structural integrity criteria for the range of route soils to be encountered as well as a range of operational conditions. This evaluation process for the range of alignment conditions forms the demand evaluation.

Section 5 focuses on the line pipe material and fabrication, and the corresponding development of appropriate design limits using these materials. These limits are used as the resistance capacity and are used to judge the acceptance or rejection of the demand developed in the previous chapters. Section 5 then addresses the questions:

- How are the curvature limits to be developed?
- What tests will be conducted to verify the limits?
- What material requirements will be imposed?

Section 6 outlines the application of the design methodology to the alignment. This includes an introduction to the alignment conditions where the loading under consideration in this report, frost heave, would not occur. The application methodology is presented as a progressive exclusion sieve, narrowing down the alignment conditions, and associated alignment geographical segments, where the concern needs more detailed evaluation and potential mitigation. This chapter addresses the questions:

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Section 8 addresses potential operational mitigative methods if operational monitoring concludes that the established limits may be exceeded and pipeline integrity is at risk. This chapter addresses the questions:

- What monitoring will be required during operations to ensure the limits are not exceeded?
- What mitigation measures will be employed should the limits be approached or exceeded?

SECTION 2. STRUCTURAL MECHANICS OF BURIED PIPELINES

Although some sections of the ASAP are aboveground, notably at waterway crossings and at the beginning of pipeline route on the North Slope, ASAP is primarily a buried pipeline. Buried pipelines are essentially "restrained," that is, displacement of the pipe is restricted by the soil around it.

For the problem of frost heave, advanced analytical tools, and input functions needed to characterize the components of the frost heave methodology, are required to integrate the various parts of the loading and resistance functions so as to correctly address the loading demand on the pipeline. This section reviews some of the familiar parts of the demand problem, such as the internal pressure and change in temperature, and then reviews how these are integrated into the time-dependent loading functions for the longitudinal stress components to derive a unified mechanical approach.

The basis of the structural mechanics for pipeline engineering is summarized in Appendix B. For such a straightforward "structure," a pressurized pipe can actually exhibit fairly complex behavior involving significant stress components in a biaxial stress state.

The resultant mechanical state of the pipeline that arises from the external loads imposed from different sources, causing both hoop and longitudinal pipe stress effects, is referred to as the "demand" on the pipeline. Since the overall resultant is a complex stress state, the demand is best characterized in this combined state – i.e., because the relative magnitudes of the orthogonal components are roughly of the same magnitude, the interaction mechanics must be considered.

Yet, this evaluation of the "demand" is not sufficient for design, since it must be judged where the behavior is acceptable in the design, i.e., whether the "capacity" of the pipe is sufficient to resist the demand. The basis for material regulatory acceptance of the line pipe centers on the yield point for a uniaxial condition. The yield point for pipeline engineering is defined by testing requirements to be the point at which the specified minimum yield strength (SMYS) of the pipe is recorded – 0.5% strain. As noted, this definition of the "yield" does not concisely fit classical "textbook" definitions of yield, which is often defined as the point at which non-recoverable, i.e., "plastic" deformations, initiate. For example, if the ASAP API 5L X70 pipe material was considered to be governed by Hooke's law ($\sigma = E\varepsilon$, where σ is stress, ε is strain, and E is the modulus of elasticity) to the SMYS of 70 ksi, the associated strain would be only:

$$\varepsilon = 70ksi / 29{,}500ksi / in / in = 0.00237in / in = 0.237\%$$

Thus, to reach the strain associated with SMYS, an additional 0.263% strain occurs, which cannot be accounted for by an elastic relationship. Alternative yield point characterizations are defined using an "offset" method where a line with the elastic slope is drawn from a specified strain offset point – again confirming the necessary incorporation of non-recoverable (plastic) deformation just to reach the SMYS of the pipe.

In addition, as noted the SMYS value is defined in a uniaxial condition. Again because the orthogonal stress components are roughly comparable in magnitude, the simple uniaxial relations must be extended to consider actual biaxial conditions. Generally, the extensions involve structural mechanics relationships that allow the combined stress conditions to be related back to uniaxial tests and uniaxial stress conditions or "effective" stresses that characterize the biaxial conditions, often by reference to a skewed reference frame.

2.1 PRESSURE CONTAINMENT

The governing regulatory document for the ASAP pipeline, 49 CFR 192, addresses the "…design pressure for steel pipe…" in 49 CFR 192.105. The design factor used in this formula for the design pressure is addressed in 49 CFR 192.111.

Although there are provisions for alternative approaches to this design factor, with additional associated requirements for utilizing this alternative formulation, AGDC has elected to everywhere avoid this alternative formulation for the design factor. Thus, requirements relating to this alternative formulation, including those cited in 49 CFR 192.620, are not applicable to ASAP and are not further addressed in this report.

The design pressure formula cited in the federal regulations ($P = (2\ St/D) \times F \times E \times T$) is recognized as the classical Barlow's formula derived from basic equilibrium considerations (see Appendix B). The derivation does not depend on the material type (e.g., steel, aluminum, etc.), the mechanical state of the pipe material (elastic, inelastic, plastic…) nor consideration of pipe behavior in the orthogonal longitudinal direction. The robustness of this formulation makes it ideal for the focus of pressure containment guidance, both in regulations and consensual standards.

On the other hand, and somewhat because there are no associated limiting conditions arising from the derivation for the application of this formula, there are no associated explicit requirements for other types of loadings that can be deduced from this design pressure formula. In particular, there are no requirements associated with the design pressure formula that impose any conditions or limitations upon the longitudinal stress/strain behavior of the pipeline. There are more exact formulations for thick-walled pipes (generally defined as having a diameter to wall thickness ratio (D/t) of less than 20), but typical transmission lines, including ASAP, are thin-walled pipes.

Thus, the design pressure formula cited in the regulations will be met regardless of the design limitations imposed on the longitudinal effects, i.e., if the pipeline diameter, thickness, and operating pressure meet a 72% specified minimum yield strength (SMYS) requirement at startup, the same combination of these input parameters into the design pressure formula cited in the regulations will produce the same limiting stress of 72% SMYS, and thus identically meet these regulatory requirements indefinitely throughout operations, regardless of the longitudinal behavior. This is a conclusion from the stress mechanics of pipelines, and is not peculiar to any aspect of the ASAP nor to any transmission pipeline.

2.2 TREATMENT OF LONGITUDINAL LOADINGS

In contrast to the explicit requirements for the design pressure formula, the federal regulations contain only general guidance for additional types of loadings, and no explicit limitations. General guidance is contained in 49 CFR 192.103 which states:

> *Pipe must be designed with sufficient wall thickness, or must be installed with adequate protection, to withstand anticipated external pressures and loads that will be imposed on the pipe after installation.*

More specifics about potential hazards to be investigated are contained in 192.317:

> *(a) The operator must take all practicable steps to protect each transmission line or main from washouts, floods, unstable soil, landslides, or other hazards that may cause the pipeline to move or to sustain abnormal loads…*

If additional thickness is found to be required for reasons other than pressure containment, the allowable pressure must not be increased through a re-computation of the design pressure formula to take advantage of this additional thickness as per 49 CFR 192.105.

The requirements of 49 CFR 192 quoted above, though general in nature, are an explicit reminder to all operators that prudent oversight of the potential detrimental effects from external loads requires diligent investigation and cannot be waived. To satisfy this requirement, the pipeline industry has addressed the lack of explicit requirements in the regulatory framework through consensual standards so as to satisfy the general regulatory requirements.

The U.S. gas industry accepted standard for requirements in areas where the regulations give only general guidance is ASME B31.8, Gas Transmission and Distribution Piping Systems. To be clear, where there is a disagreement in ASME B31.8 with the regulations, the regulations are followed.

In particular, ASME B31.8 Section 833 addresses longitudinal loads and is the basis for industry analysis of longitudinal stresses – in compliance with the need for such an analysis of external loads as required by the regulations, and in no way contradictory or contraindicating any specific requirements in the regulations as to the details of such an undertaking. These requirements are incorporated in all commercial pipe stress analysis programs such as CAESAR II and AUTOPIPE. Section 833.3 sets the longitudinal stress requirements for restrained pipe with a limitation of 90% of SMYS, while Section 833.4 sets the combined stress requirements for restrained pipe with a limitation of 90% of SMYS for long term loading and 100% of SMYS for short term loading (ASAP has no temperature derating), while Section 833.5 details the requirements for design to utilize a stress greater than yield.

AGDC follows the procedure as described above, which adheres to regulatory requirements, using explicit industry recommended procedures to satisfy those requirements. AGDC has identified no exceptions to this described procedure.

2.3 EFFECTIVE STRESS

To characterize the combined effects of the operational circumferential load, i.e. the hoop stress due to pressure containment, with the longitudinal effects from frost heave, a method of determining the combined effect is required. Further, this combined effect must be able to be compared to the actual material tests that are typically performed and/or required for material requisition, which are uniaxial.

As noted above, the SMYS value is defined in a uniaxial condition. Again because the orthogonal stress demand components are roughly comparable in magnitude, the simple uniaxial relations must be extended to relate to the actual biaxial conditions. Generally, the extensions involve structural mechanics relationships that allow the combined stress conditions to be related back to uniaxial tests and uniaxial stress conditions or “effective” stresses that characterize the biaxial conditions, often by reference to a skewed reference frame. This section presents the background for the “effective stress” combinatorial techniques, which are used within the frost heave design methodology.

The two most commonly used theories for determining effective stresses in pipelines are the maximum shear stress theory, commonly referred to as the Tresca theory, and the maximum distortion energy theory, commonly referred to as the von Mises’ theory. The effective stresses that result from these theories are both represented in ASME B31.8.

The first approach is the Tresca yield criterion, and as described in more detail in Appendix B, for the biaxial stress conditions that exist in pipelines the yielding criterion is expressed as follows:

$$|\sigma_H| \le \sigma_y \quad \text{and} \quad |\sigma_L| \le \sigma_y \quad \text{and} \quad |\sigma_H - \sigma_L| \le \sigma_y$$

where:

σ_H is the hoop stress;

σ_L is the longitudinal stress; and

σ_y is the yield stress of the pipe.

The hexagonal Tresca yield function is illustrated in longitudinal stress vs. hoop stress space in Figure 2.1 for an elastic-plastic material with a yield strength of 70 ksi. Any stress falling within the hexagon indicates that the material behaves elastically while points on the hexagon indicate that the material is yielding. This criterion is implemented under B31.8 Section 833.4 to limit combined stress for restrained pipe as:

$$|\sigma_H - \sigma_L| \le k \cdot S \cdot T$$

where:

k is an allowable stress multiplier (for loads of long duration, k is 0.90, and for occasional non-periodic loads of short duration it is 1.0);

S is the pipe SMYS; and

T is the temperature derating factor (T=1.0 for temperatures ≤ 250°F, per B31.8 Section 841.116).

The second approach is the von Mises' yield criterion, which defines a different effective stress to compare against the uniaxial "yield point" as:

$$\sqrt{\sigma_1{}^2 - \sigma_1 \cdot \sigma_2 + \sigma_2{}^2} = \sigma_y$$

This is the equation of an ellipse as also shown in Figure 2.1 for an elastic-plastic material with a yield strength of 70 ksi. Any stress falling within the ellipse indicates that the material behaves elastically while points on the ellipse indicate that the material is yielding. This criterion is implemented under B31.8 Section 833.4 to limit combined stress for restrained pipe as:

$$[\sigma_L{}^2 - \sigma_L \cdot \sigma_H + \sigma_H{}^2] \leq k \cdot S \cdot T$$

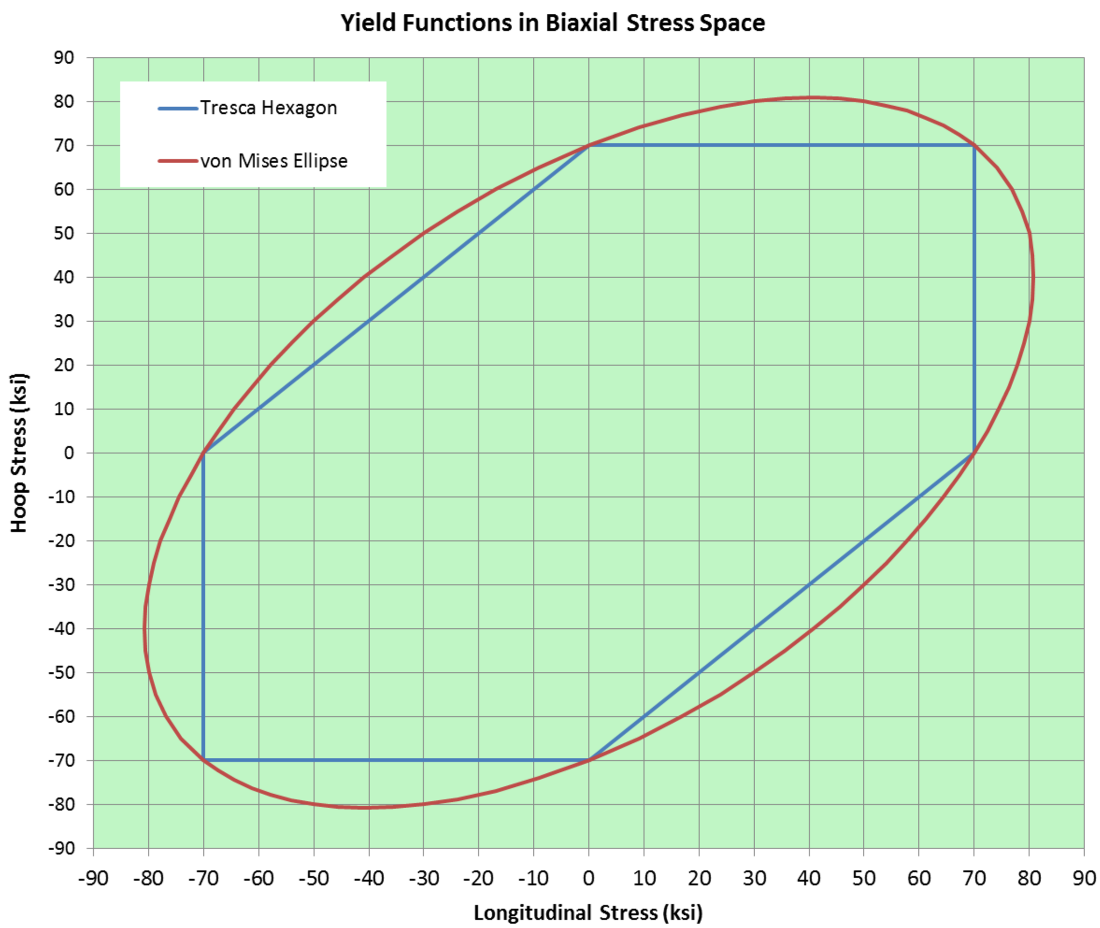

Figure 2.1 Illustration of Tresca and von Mises Yield Functions

Note that the Tresca hexagon meets the von Mises ellipsoid at certain points around the periphery of the ellipsoid and is elsewhere contained within the ellipsoid. Since points located within the yield function boundaries are said to define elastic states while those on the yield function boundaries define a yielded condition, the Tresca criterion can be seen to be slightly more conservative than the von Mises criterion. The differences, however, are small and both approaches are accepted. In general, the von Mises theory is the more widely used in computer applications and advanced inelastic analysis because of its smooth surface and corresponding continuously differentiable function. The Tresca theory, because of its simplicity, is often used in manual/hand calculations.

2.4 APPLICATION OF THE METHODOLOGY

The methodology described above for the combination of the orthogonal stresses in the pipe that arise from the operational load acting concurrently with the imposed frost heave, are effectively combined within the analytical pipe stress program PIPLIN, which will be described in more detail in Section 4 of this report.

SECTION 3. GEOHAZARDS

A geohazard is defined as a naturally occurring or project-induced geological, geotechnical, or hydrological phenomenon that could load the pipeline, causing a pipeline integrity concern, or that could impact the ROW, causing an environmental concern. The principal geohazards of concern for ASAP design are frost heave and thaw settlement.

3.1 GEOTHERMAL CONSIDERATIONS

Geothermal design considers the coupled effect of soil mechanics and heat transfer principles that drive physical processes that can impact the operational reliability and performance of the pipeline. Examples of these processes are:

- Frost bulb formation;
- Frost heave beneath the pipe;
- Thaw bulb formation; and
- Thaw settlement of the soils supporting the pipe.

The preferred mode for the ASAP is buried and it is anticipated the pipeline will encounter thermal states ranging from continuous permafrost in the north, to discontinuous permafrost in the center, and thawed muskeg, alluvial, lacustrine, glacial moraine, and outwash type soils in the central and southern regions (see Figure 3.1). These conditions require designs that allow for pipeline deformations caused by frost heave and thaw settlement.

In general, the pipeline will be operated chilled (≤32°F) in the continuous and discontinuous permafrost regions, but may operate above freezing at least during parts of the year along the southern portion (south of Nenana). As a result, frost heave is likely in unfrozen frost-susceptible soils where the pipeline operating temperature is below freezing, and there is a potential for thaw settlement to occur in frozen, ice-rich soils where the pipeline operating temperature is above freezing.

To reduce potential impacts along the northern portion, the gas will be chilled to 30°F before leaving the North Slope Gas Conditioning Plant. As the gas travels southward, the operating temperature will fluctuate based on several factors including time of year, surrounding ambient ground temperature, and the Joule-Thompson effect.

With chilling of the gas, it is anticipated that the majority of the pipeline will operate below freezing for most or all of the year. As indicated in Figure 3.1, permafrost is typically continuous or discontinuous until the south flank of Alaska Range. For the remainder of the alignment to the pipeline terminus, the permafrost is mapped as sporadic or isolated and the pipeline will be buried in glacially derived landforms that are typically frost susceptible.

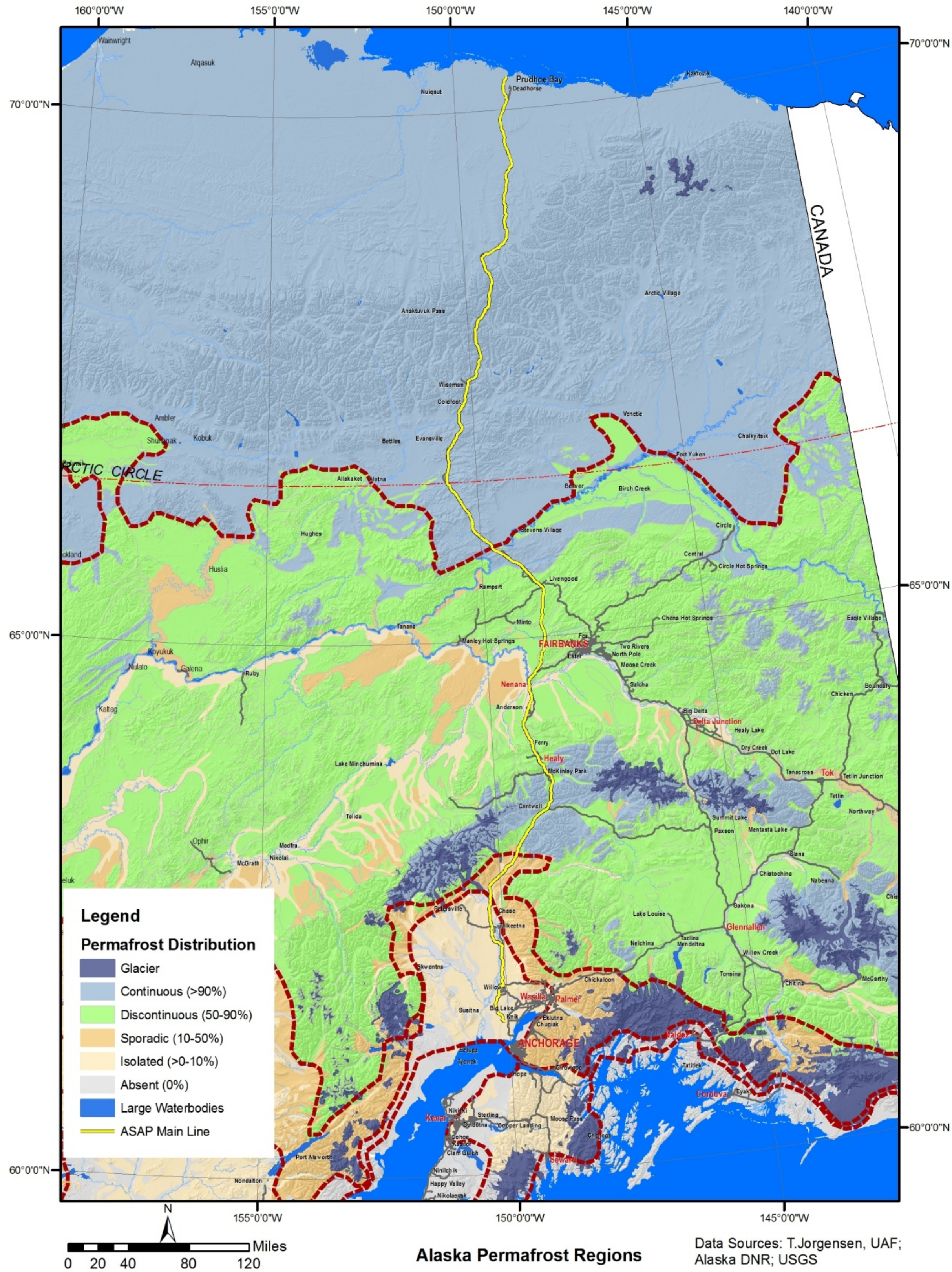

Figure 3.1 ASAP Permafrost Characteristics

Frost heave is anticipated where unfrozen frost-susceptible soils exist in combination with other critical conditions such as available water. Frost heave mitigation may involve removing/replacing frost-susceptible soils within the influence zone of the pipeline or providing insulation or heat to prevent the frost-susceptible soils below the pipe from freezing. A heater may be installed near Willow to raise the pipeline operating temperature above freezing and mitigate potential frost bulb development between Willow and the terminus (i.e., eliminate the frost bulb during the summer). However, basic design details such as the size, location, and expected operating schedule will only be determined after extensive geothermal analysis has been completed.

3.2 DESIGN DEVELOPMENT

3.2.1 GEOTECHNICAL/GEOTHERMAL DATA

Geotechnical/geothermal data will be used for general and specific geotechnical analysis for the gas pipeline. The following data have been gathered and available to the project:

- Soils, thermal state, and groundwater data from historical borehole and from test pit logs drilled by the project (Tanana River at Nenana), ADOT&PF, ARRC, the University of Alaska Fairbanks (UAF) Water and Environmental Research Center, and the UAF Geophysical Institute.
- Laboratory data from index property and engineering property tests done on borehole and field samples acquired by the project and ADOT&PF.
- General and specific geological and geotechnical data from published sources including the State of Alaska Division of Geological and Geophysical Surveys (DGGS) and U.S. Geological Survey (USGS).
- Orthoimagery and other aerial or satellite based imagery acquired for the project or available from DGGS 2011 LiDAR survey.
- Topographic data from project field survey work, aerial photography, and published maps.
- Bedrock data from borehole logs, laboratory testing of samples, field reconnaissance, and available public sources such as ADOT&PF, DGGS, and USGS.
- Terrain unit and landform data developed by the project and from published maps and reports.
- General reconnaissance data from field programs.

3.2.2 SELECTION OF GEOTECHNICAL/GEOTHERMAL PARAMETERS FOR DESIGN

Many design parameters are site specific and will be obtained over time as field studies from the various disciplines are completed. Additional guidelines and the basic approach to geotechnical and geothermal analyses are discussed below.

Geotechnical parameters necessary for frost heave analysis and design will initially be estimated based on terrain unit analyses already completed and calibrated against legacy borehole and lab test data recovered for the project. This approach will be augmented by field and laboratory test results from planned geotechnical investigations. Frost susceptibility is primarily a function of soil grain size where non-plastic fines (typically silt) create pore spaces that facilitate capillarity and freezing point depression. The U.S. Army Corps of Engineers frost design and classification system is a universal standard for addressing frost heave behavior (see Table 3.1). Critical conditions for pipeline frost heave distress occur where the pipeline traverses abrupt contrasts in soil conditions and the soils freeze and thaw repeatedly (seasonally).

Note that the frost classification system is based primarily on soil particle size distribution. Geotechnical tests to properly classify and analyze frost heave potential include the following tests with corresponding standard test methods.

Table 3.1 **U.S. Army Corps of Engineers Frost Design Soil Classification System**

Frost Susceptibility[a]	Frost Group	Note	Kind of soil	Amount finer than 0.02mm (wt%)	Typical soil type under USCS[b]
Negligible to low	NFS[c]	a	Gravels	0 to 1.5	GW, GP
		b	Sands	0 to 3	SW, SP
Possible	PFS[d]	a	Gravels	1.5 to 3	GW, GP
		b	Sands	3 to 10	SW, SP
Low to medium	S1		Gravels	3 to 6	GW, GP, GW-GM, GP-GM
Very low to high	S2		Sands	3 to 6	SW, SP, SW-SM, SP-SM
Very low to high	F1		Gravels	6 to 10	GM, GW-GM, GP-GM
Medium to high	F2	a	Gravels	10 to 20	GM, GM-GC, GW-GM, GP-GM
Very low to very high		b	Sands	6 to 15	SM, SW-SM, SP-SM
Medium to high	F3	a	Gravels	>20	GM, GC
Low to high		b	Sands except very fine silty sands	>15	SM, SC
Very low to very high		c	Clays, I_p>12	-	CL,CH
Low to very high	F4	a	All silts	-	ML, MH
Very low to high		b	Very fine silty sands	>15	SM
Low to very high		c	Clays, I_p>12	-	CL, CL-ML
Very low to very high		d	Varved clays and other fine-grained banded sediments	-	CL and ML; CL, ML, and SM; CL, CH, and ML; CL, CH, ML, and SM

[a] Based on laboratory frost-heave tests
[b] G, gravel; S, sand; M, silt; W, well graded; P, poorly graded; H, high plasticity; L, low plasticity
[c] Non-frost susceptible
[d] Requires laboratory frost-heave test to determine frost susceptibility
Source: Johnson et. al. 1986

(Andersland and Ladanyi 2004)

Table 3.2 Geotechnical Tests for Frost Heave Potential

Test	Standard
Moisture content	ASTM D2216
Gradation (sieve analysis)	ASTM C136
Gradation (sieve with hydrometer)	ASTM D422
Atterberg Limits	ASTM D4318

Table 3.3 Additional Geotechnical Tests for Frost Heave Evaluation

Test	Standard
Moisture-Density Relationship	ASTM D1557
Specific Gravity	ASTM C127
Unit Weight of Frozen Soil	Gravimetric test of undisturbed frozen soil

Additional geotechnical parameters needed to forecast frost heave include permeability, pressure on the freezing front; frost penetration rate and frost heaving rate; longitudinal, bearing and uplift resistance; soil load/deflection and creep characteristics; soil temperature gradient, and climatic data. Many of these parameters can be empirically correlated with the results of geotechnical tests listed above. A probabilistic approach to assigning soil properties may be adopted if sufficient sample data is acquired by the project. When data gaps are identified, they will be filled as necessary. Climatic data will be updated to include most recent data from stations along the route. Limits of applicability of climatic data will be based on geographic similarities along the line.

The approach to frost heave analysis will be to combine route soils data with climatic data and pipeline thermal predictions and pipe deformation analysis. Thermal conditions of the pipeline and ground will be predicted using a coupled hydraulics/geothermal model. This model will be comprised of a linear hydraulics model of the pipeline with two-dimensional “slices” of soil defined at intervals along the pipeline. The slices are defined principally by the terrain unit analysis, thus geotechnical information will accompany each slice that allows prediction of frost heave. The hydraulics model will predict temperatures along the pipeline for a given throughput, inlet temperature and pressure, initial soil temperatures, and gas properties. The pressure and temperature of the flowing gas depends upon the heat flux through the pipe wall which, in turn, depends on the pipe interaction with the subsurface thermal state (ground temperatures).

Predictions of the ground temperatures surrounding the pipe will be made by the geothermal model. The model will consider a two-dimensional “slice” of the pipe surrounded by soil regions and bounded on the surface by location dependent varying climatic functions. A finite element approach will be applied to develop a series of "snapshots" along the pipeline of the changing thermal condition of the subsurface over time, which is in turn used to estimate the heat flux along the alignment to the flowing gas. The result is an estimate of the magnitude and timing of freezing of initially thawed ground including the geometry of the evolving frost bulb. The same process is used to predict thawing of initially frozen ground.

The pipe/soil thermal regime and geotechnical properties that define the soil's frost susceptibility will then be used to predict the amount of heave beneath the pipeline. The frost heave predictions will be calibrated against results of previous frost heave laboratory and field testing performed by the research community and special testing completed by industry for other projects.

3.3 APPLICATION OF THE METHODOLOGY

Similar to the data describing the pipe material properties and the associated functional behavioral description, the geotechnical properties are also integrated in the pipe-soil interaction analysis within the program PIPLIN, described in Section 4 of this report. These geotechnical properties describe two parts of the soil interaction analysis: the displacement imposed on the pipe ditch bottom over time (i.e., the restrained heave), and the resistance to the pipe movement by the soils surrounding the buried pipe. As described in Section 4, the pipe strain demand resulting from the predicted frost heave is determined through a series of pipe-soil interaction analyses that consider heave of the soils beneath the pipe as a function of time and take into account pressure feedback from the pipe at the base of the frost bulb, and the resistance of the soil to differential pipe movement.

Problematic areas identified in performing this route-wide analysis will be subject to site-specific analysis. The site-specific analysis will follow the same general approach, but will utilize more refined soil and thermal inputs. If the site-specific analysis results in unacceptable levels of pipe strain demand (i.e., pipe strain demand that exceeds the pipe strain capacity), then mitigative measures would be employed as described in Section 6.3.

SECTION 4. STRAIN DEMAND DETERMINATION

4.1 PIPE-SOIL INTERACTION ANALYSIS OVERVIEW

The mechanism of pipeline frost heave has been investigated in detail for many previous arctic gas pipeline projects. Frost heave occurs when a chilled pipeline freezes water in frost-susceptible soil in which it is buried. As the soil freezes, it expands and forms a frost bulb around the pipe. Upward heave of the pipe is produced by swelling at the bulb face as the bulb grows. Significant pipe stresses and deformations can occur when the buried pipeline runs between a stable soil and a frost-susceptible soil. Because the pipe heaves in the frost-susceptible soil section but remains stationary in the adjacent stable soil section, a differential vertical heave displacement profile is produced across the transition between the stable and frost-susceptible soil sections.

The strain demand analyses for frost heave of ASAP will be carried out using the PIPLIN computer program (SSD 2011). PIPLIN is a special-purpose finite element program developed to perform stress and deformation analysis of two-dimensional pipeline configurations. The analyses will consider several nonlinear aspects of pipeline behavior, including pipe yield, large-displacement effects, and nonlinear frozen soil support.

A heaving section of a pipeline together with a schematic view of the corresponding PIPLIN model is illustrated in Figure 4.1. To reduce the required size of the model, a symmetric boundary condition (i.e., zero rotation and zero longitudinal translation) is normally imposed at the end of the model corresponding to the center of the heave span. The sufficient model length is such that the boundary condition specified at the remote end of the model has no influence on the key analysis results. The pipe is typically assumed to be initially straight with a uniform depth of soil cover.

The pipe is modeled using beam type elements in which the stresses and strains are monitored at a number of fiber points around the pipe cross section at the element ends. PIPLIN achieves additional economy by considering a plane of symmetry through the pipe centerline (e.g., the vertical plane in frost heave model) so that only one-half of the pipe cross section is analyzed. In these analyses, the pipe cross-section is assumed to remain circular and plane sections are assumed to remain plane. The pipe element accounts for large displacement effects (i.e., changes in the equilibrium due to large displacements) by adding geometric stiffness coefficients to the element stiffness matrix. This allows PIPLIN models to accurately capture important column buckling and cable tension effects.

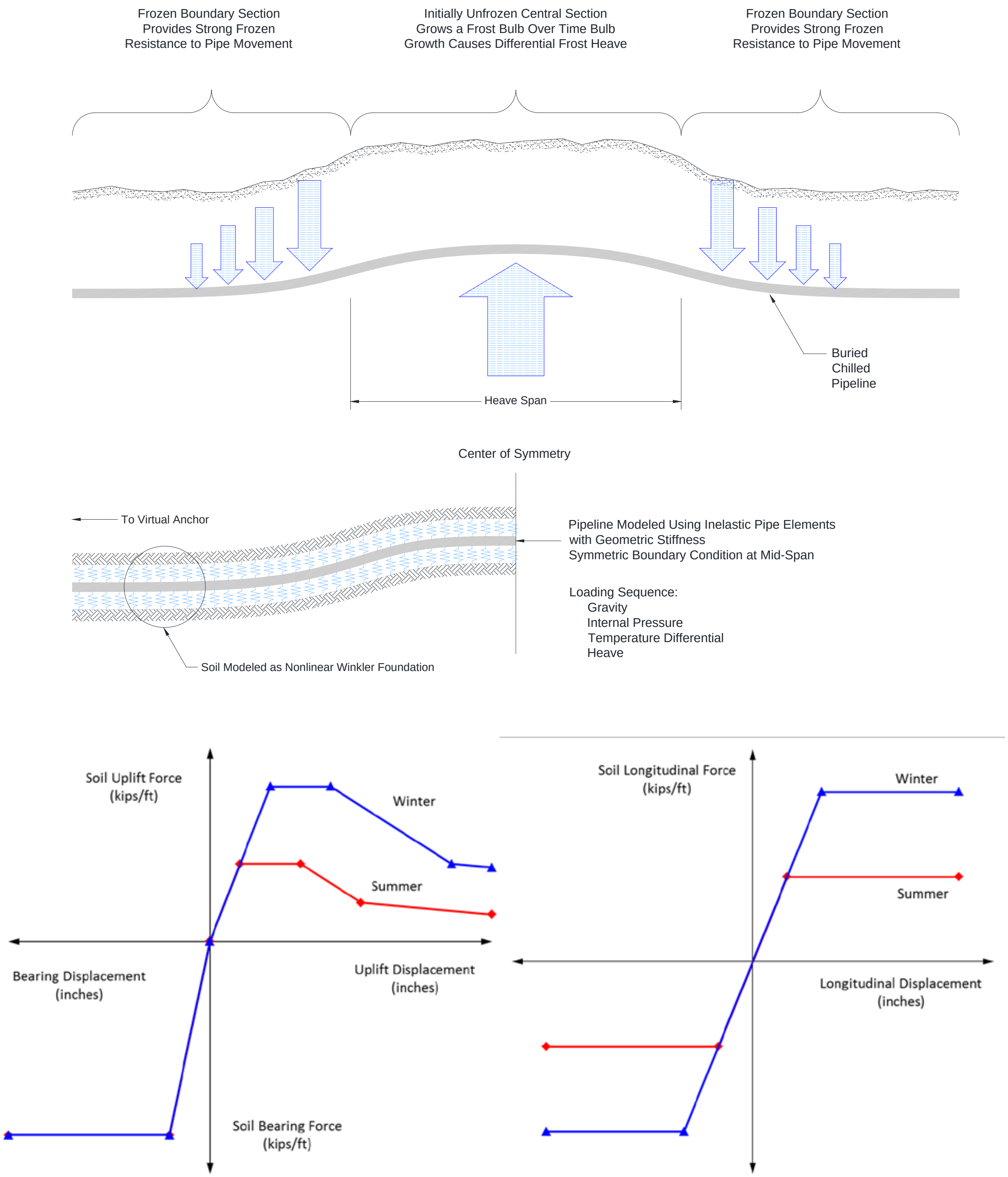

Figure 4.1 Frost Heave Illustration

Pipe yield at the fiber points around the pipe cross section is taken into account assuming the von Mises yield criterion so that interaction between hoop and longitudinal stresses is included. The pipe steel material is modeled using the Mroz (Mroz 1967) multi-linear kinematic hardening plasticity model which is able to accurately capture anisotropic pipe steel stress-strain relationships (e.g., pipe that has different stress-strain curves in the longitudinal tension/compression vs. hoop tension/compression directions). The pipe material model provides a very reasonable representation of steel behavior under monotonic, unloading and cyclic load conditions.

The soil is modeled as a nonlinear Winkler foundation. This means that the soil support is idealized as a series of discrete, independent, nonlinear springs lumped at the element midpoints. In effect, this assumes that the soil can be regarded as a series of plane "slices". The basic assumption is that the slices deform independently of each other. The pipe-soil springs are assumed to have uniform properties over any pipe segment.

The frost heave analyses are typically initiated with the application of gravity, internal pressure and temperature differential loads. If desired, a hydrostatic test loading/unloading sequence can be considered prior to applying the operating loads. A multi-year (typically 20 to 30 years) frost heave simulation of the pipe-soil interaction model is then undertaken. The frost heave analyses are nonlinear time-history analyses performed using small steps through time. Within the heave span, the frost bulb geometry and frost heave vary with time. Seasonal variations of the uplift, longitudinal, and bearing creep soil temperatures (and corresponding resistance) are also specified with each heave time step. The heave is imposed progressively at the base of the pipe-soil springs within the heave span. The amount of heave at the ditch bottom is calculated separately for each transverse pipe-soil support in turn accounting for the important pressure feedback from the pipe at the base of the frost bulb. A transition length between the finite length section of heaving soil and the adjacent non-heaving soil section can be specified if desired.

The complete pipe-soil deformation state is established at each increment of the analysis. The program output includes pipe displacements, soil support deformations and reactions; pipe axial forces, bending moments and curvatures; axial, hoop and von Mises stresses and axial and hoop strains in the pipe. The maximum pipe tension and compression strain demands are established at each output state to provide time-history plots of these key response quantities.

4.2 PIPE MATERIAL PROPERTIES

As implemented in PIPLIN, the Mroz plasticity model assumes that the pipe material yields according to the von Mises theory under plane-stress conditions. The bi-axial stress-strain behavior is defined by a set of progressively larger, non-overlapping elliptical yield surfaces in longitudinal stress vs. hoop stress space. The Mroz theory specifies that as the steel yields, the individual ellipses translate without changing size or shape, which is the well-known kinematic hardening assumption. The theory also specifies the direction of movement of each ellipse – essentially, any ellipse moves so that when the stress point reaches the next larger ellipse, the yielding ellipses do not overlap.

One of the key features of the PIPLIN steel model is that the elliptical yield functions can be shifted to initial positions in order to mimic the effects of the pipe expansion phase of the UOE manufacturing process. The shifts are selected such that the analytical uniaxial stress-strain results closely match a set of uniaxial longitudinal tension (LT), hoop tension (HT) target stress-strain curves. For pipe steel fabricated with the UOE process, the ellipses tend to be shifted along the HT axis. The pure HT ellipse shifting pattern tends to result in an elevated proportional limit and relatively sharp (abrupt) yielding point for the HT curve (due to work hardening and bunching of the ellipses) and a low proportional limit with progressive (well rounded) yielding for the hoop compression (HC) curve (due to Bauschinger effect). The steel model is well suited for capturing key aspects of the anisotropy patterns typically observed in UOE pipe.

As described in "A Material Model for Pipeline Steels" (Hart, et. al 1996), an 8-parameter model can be used to develop input material properties for strain levels below 2%. This portion of the steel stress-strain curve can be divided into 3 regions namely; a linear elastic region, a curved transition or "knee" region, and an essentially linear "fully plastic" region. The term "fully plastic" is not strictly correct since the steel still has a finite hardening modulus. The model requires that the HT and LT curves have the same elastic modulus and the same fully-plastic strain hardening modulus. However, the shape of the HT and LT curves in the yield transition region can be different i.e., the curves can have different proportional limits and different degrees of "sharpness" or "roundedness" through the transition from elastic to fully-plastic conditions. The strength levels of the curves in the fully-plastic strain hardening region need not be the same. A 2-root fitting process can be used to determine the ellipse sizes and initial shifts required to closely match a given "target" LT-HT pair of stress-strain curves (as well as a 3-root fitting process when a "target" LT-HT-LC triple of stress-strain curves is available).

4.3 GEOTHERMAL INPUT

Frost heave is associated with growth of a frost bulb around the chilled pipe and it is assumed that heave is produced by swelling at the bulb face as the frost bulb grows wider and deeper (see Figure 4.2). The amount of heave for a given increase in frost bulb depth is influenced by several parameters including the type of soil, the availability of moisture, the speed with which the frost bulb grows, the bearing pressure exerted by the pipe on the ditch bottom and other factors. In addition, the amount of movement at the ditch bottom depends on the depth of the frost bulb, with a given amount of swelling producing less ditch bottom heave as the frost bulb gets progressively deeper. Free heave is the heave that would occur if the pipeline provided no resistance to movement. Restrained heave, which is less than the free heave, is the heave that results accounting for the pipelines resistance to movement which tends to increases the amount of pressure at the base of the frost bulb.

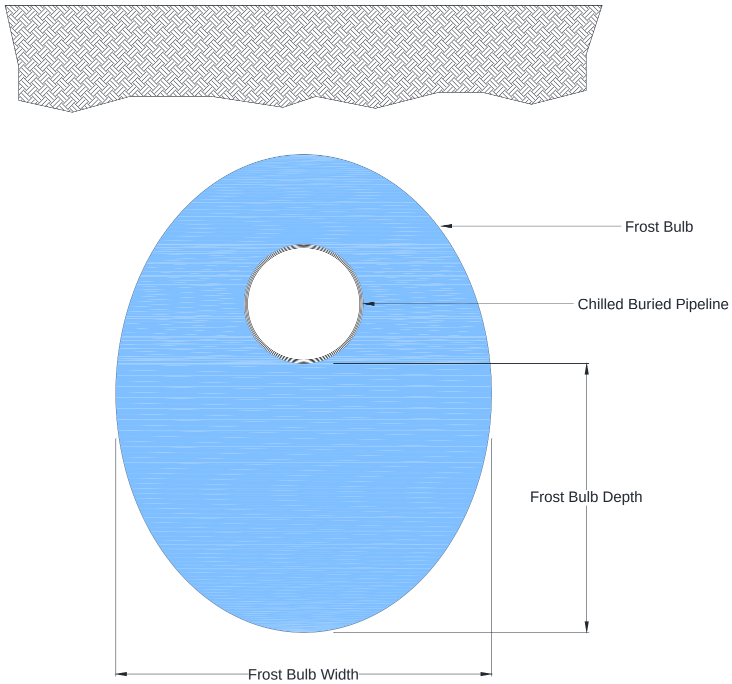

Figure 4.2 Frost Bulb Schematic

PIPLIN analyzes the effects of restrained frost heave by treating heave movements as equivalent support "settlements," applied at the ditch bottom (i.e., at the base of the bearing springs). Because heave originates at the frost bulb face, a theory is needed to convert swelling of the soil into ditch bottom movements. PIPLIN has several different options for specifying pipeline frost heave effects. The "Revised Formula Method" is the option selected for the ASAP project. In the Revised Formula Method, the program calculates ditch bottom movements using the segregation potential theory (Konrad 1981) given certain information describing the frost bulb properties.

The following time-independent parameters are specified:

(1) A reference pressure "P_o" to be used in the segregation potential equation.
(2) The frost bulb density "γ" which is used to calculate the soil pressure at the frost bulb base due to bulb self weight.
(3) The equivalent burial depth "D_o" which is used in the calculation of soil pressure.
(4) The initial overburden force correction term "F_o" which is used in the calculation of soil pressure.

In addition to the time-independent parameters described above, time-histories of the following frost bulb and soil properties are provided as an input table:

(1) Frost bulb depth "D" below pipe.
(2) Shear force per foot of pipe "S". In general, the shear force term can be due to side shear and/or end shear effects. Note that because a time-history of S is input, seasonal variations can be directly included.
(3) Bearing width "B_S" at the base of the frost bulb over which the shear force S is assumed to be distributed. That is, the soil bearing pressure at the frost bulb base due to S is S/B_S.

(4) Bearing width, B_F, at the base of the frost bulb over which the ditch bottom bearing force, F, is assumed to be distributed. The soil bearing pressure at the frost bulb base due to F is F/B_F.
(5) Temperature gradient "G", at the frost front.
(6) The coefficient "a" to be used in the segregation potential equation.
(7) A reference segregation potential "SP_o" at the reference pressure "P_o".

At any given time "t" and at any given point within the heaving section of the pipe, the values of $D(t)$, $S(t)$, $B_S(t)$, $B_F(t)$, $G(t)$, $a(t)$ and $SP_o(t)$ can be obtained from the input time-history table. Note that for most applications, the values of a and SP_o are constant with time. One exception to this is for a layered soil profile where a and SP_o may vary with depth. The variation with depth can be considered indirectly as a variation with the times that the bottom of frost bulb reaches the different soil layers. When a pipe segment has a different heave material at each end (e.g., when considering a heave material transition), the heave material properties at a given transverse support location are obtained by linear interpolation between the properties at end "I" and end "J" of the segment. The values of S, D, B_S, B_F and G are calculated at the middle of the time step, by interpolation in the input time-histories. The pressure to be used in the equation for heave rate is computed as follows:

$$P = \gamma\,(D + D_0) + \frac{S}{B_S} + \frac{(F - F_0)}{B_F}$$

where the parameters γ, D, D_o, S, B_S, F_o and B_F are defined above. The term "F" is the feedback force exerted by the pipe on the ditch bottom per unit length of pipe (i.e., F is equal to the current transverse (T) support reaction). As already noted, the quantities γ, D_o and F_o are constants and the quantities D, S, B_S and B_F vary with time. The bearing force F is obtained from analysis of the interaction between the pipe and soil, and varies with location along the pipe as well as with time. If overburden (soil plus pipe) loads are specified, the initial pipe bearing force will equal the overburden soil weight plus the pipe weight. The initial value of the pressure for heave calculations will thus include the effect of the soil weight at the ditch bottom level (in the γD_o pressure term) plus the effect of the overburden soil weight (in the $(F\text{-}F_o)/B_F$ pressure term). If no F_o correction is made, the overburden soil weight will be included in the pressure calculation twice. The parameters D_o and F_o are selected to provide the desired initial pressure for heave calculations. The shear resistance term S can be used to represent the resistance provided by the unfrozen soil on the sides of the soil "block" above the widest point of the frost bulb and/or the resistance provided by the frozen soil "abutments" at each end of the heaving span.

When the frost bulb depth increases during an analysis time step, the heave rate, $\dot{H}(t)$, is calculated using the segregation potential equation:

$$\dot{H}(t) = 1.09 SP_0(t) e^{a(t)(P(t)-P_0)} G(t)$$

and the heave increment is given by:

$$\Delta H = \dot{H}(t)\Delta t$$

If the frost bulb depth decreases (“retreats”) during a time step, thaw settlement rather than frost heave occurs. The amount of settlement is set equal to the amount of heave that occurred over that depth interval when the frost bulb depth was increasing. PIPLIN tracks the heave vs. frost bulb depth “path” for each transverse spring within the heaving segments of the model. Once the frost bulb depth starts to increase again after a decreasing interval, the “old” heave vs. frost bulb depth path is overwritten at depth levels larger than the most recent "retreated” depth (i.e., the new heave vs. frost bulb depth path need not follow the original path after retreating). This “settlement upon frost bulb depth retreat” feature can be deactivated if desired.

In any time step, increments of movement at the ditch bottom are assumed to be in the transverse direction only. If the pipe is horizontal, this will be the vertical direction. The effect of the movement is calculated using a step-by-step procedure. The amount of heave is calculated separately for each support in turn. The resulting displacement pattern is treated exactly like a settlement profile, and the response of the pipe is calculated.

During a heave analysis, the program predicts a “trial” heave displacement increment (ΔH_{trial}) at each transverse spring in the heaving section of the model for each time step based on the current bearing pressure, and applies this displacement increment profile to the model. The program then recalculates the bearing pressure and a corresponding “adjusted” heave displacement increment ($\Delta H_{adjusted}$) at each transverse spring in the heaving section of the model based on the average pressure over the time step. If $\Delta H_{adjusted}$ differs from ΔH_{trial} by more than user specified tolerances at any transverse spring in the heaving section of the model, a new prediction is made and the time step is repeated. If convergence cannot be obtained within a specified number of iterations, the time step is automatically halved, and the process is repeated. If the time step is subdivided more than a specified number of times, the program stops executing. If convergence is obtained rapidly, and if the time step has been subdivided, the subdivided step is doubled, but is never allowed to exceed the basic time step.

4.4 SOIL RESISTANCE CHARACTERIZATION

As previously noted, the soil is modeled in PIPLIN as a nonlinear Winkler foundation, i.e., the soil support is idealized as a series of discrete, independent, nonlinear springs lumped at the pipe element midpoints. The longitudinal pipe-soil springs provide resistance to longitudinal motion and the transverse pipe-soil springs provide resistance to transverse motion where longitudinal and transverse are defined relative to the original, un-deformed, geometry of the pipe axis. The pipe-soil springs are assumed to have uniform properties over any pipe segment.

Longitudinal pipe-soil spring supports are distributed along the pipe axis to represent cohesive resistance of the soil to longitudinal displacement of the pipe. For each pipe element, the longitudinal pipe-soil spring state is determined from the average of the longitudinal displacements of the pipe nodes at each end of the element. The supports are assumed to provide resistance to longitudinal movement up to a specified force per unit length of pipe and then to slip at constant load.

Transverse pipe-soil spring supports are distributed along the pipe to represent the transverse (T) resistance of the soil (e.g., upward or downward). For each pipe element, the transverse pipe-soil spring state is determined from the average of the transverse displacements of the pipe nodes at each end of the element. In any pipe segment, different properties may be specified for downwards/bearing (+T) and upwards/uplift (–T) loading on the soil. The soil bearing (+T) resistance is the resistance of the trench bottom to downward movement of the pipe. For ASAP, frost heave simulations, the bearing resistance of the soil will be accounted for in the model using elasto-plastic springs. The strength of the bearing spring is typically selected to correspond to the minimum annual pipe temperature. For ASAP, the pipe-soil bearing resistance will also consider temperature and bearing pressure dependent secondary creep. The soil uplift (–T) resistance is the resistance of the soil to upward movement of the pipe. The ASAP frost heave analyses will consider the temperature, displacement rate and displacement dependence of the uplift pipe-soil springs using PIPLIN's uplift analysis capability.

In Arctic regions, the soil around a buried pipeline may be completely frozen during the winter but significantly thawed during the summer. Also, the temperature of the pipe contents may be intentionally cycled so as to create a thaw annulus around the pipe as a means of mitigating frost heave. Under these conditions, the resistance of the soil can vary significantly. PIPLIN's uplift, longitudinal pipe-soil spring (L-spring) and creep analysis features allow strength variations of this sort to be taken into account during a frost heave simulation. During the course of a frost heave analysis, a typical year is broken up into several (typically 12) multi-step analysis sequences such that the near sinusoidal pipe and soil temperature variation, and the corresponding soil resistance variations are approximated using a piecewise-linear variation through time. A typical "steady-state" annual cycle is normally assumed to apply for each year of the analysis.

4.4.1 UPLIFT RESISTANCE

PIPLIN's uplift analysis feature allows for the specification of uplift soil spring strengths that depend on the uplift spring displacement, the uplift soil temperature, and the displacement rate of the uplift spring. Uplift force-displacement relationships can be specified based on a piecewise-linear "backbone curve" defined using up to 8 uplift force-displacement coordinates for up to 60 different soil temperatures at up to 10 different uplift deformation rates. The uplift strength will typically, but not necessarily, increase with decreasing soil temperature and increasing uplift deformation rate and will typically, but not necessarily, decrease with increasing uplift displacement after reaching a peak strength value at a relatively small displacement. For uplift soil temperatures, displacements and deformation rates between the specified input values, the strengths are obtained using 2-way linear interpolation between the input backbone relationships for different uplift displacement rates and uplift temperatures. For uplift temperatures and displacement rates outside of the specified input range, the backbone curve corresponding to the nearest specified temperature or displacement rate is used. For displacements greater than the last specified displacement, the last specified strength is assumed. Within a given uplift analysis step, the uplift properties at each spring are modified based on the uplift temperature, the current rate of uplift spring displacement, and the current uplift displacement.

As described above, PIPLIN's uplift analysis option allows for consideration of the displacement and displacement rate dependence of the pipe-soil uplift springs as well as the temperature dependence as influenced by seasonal ground surface and/or pipe temperature variations. The approach proposed for the ASAP frost heave analyses is to use a single uplift soil temperature (32°F) corresponding to thawed soil conditions together with two or more uplift soil temperatures to cover the range of frozen soil temperature conditions encountered over a typical year of operation during the frost heave analysis. The uplift temperature values and the time between adjacent temperature values are specified for a typical 1 year analysis cycle. The uplift soil temperature will be taken as equal to the pipe temperature or some measure of the average backfill temperature, both of which have a seasonal variation that resembles a sine wave. The ASAP project proposes to compute the thawed and frozen uplift pipe-soil spring properties based on publically available geotechnical procedures (e.g., see COLTKBR 2003 and COLTKBR 2007).

4.4.2 BEARING RESISTANCE

PIPLIN has sophisticated creep support analysis capabilities including pressure and temperature dependent primary and secondary creep. If desired, creep properties can be associated with any transverse segment support, and creep analyses can be carried out. The pressure and temperature dependence is considered by specifying the creep parameters at up to 5 temperatures for up to 20 pressures. For temperatures and pressures within the specified temperature and pressure ranges, the creep parameters are obtained by linear interpolation between input values. For temperatures and pressures that are outside of the specified temperature and pressure ranges, the creep parameters associated with the nearest input temperature or pressure are used.

For the ASAP frost heave analyses, it is proposed to consider secondary creep in the bearing pipe-soil supports. Including secondary creep has the effect of adding a secondary creep dashpot – a viscous support element that provides resistance proportional to the velocity – (with a dashpot coefficient C_s) in series with the elastic-perfectly plastic bearing spring associated with each pipe element. The dashpot coefficient C_s is specified to be dependent on both temperature and the bearing pressure between the pipe and soil, typically decreasing with increasing temperature and pressure. The ASAP project proposes to use publically available geotechnical procedures (COLTKBR 2007) to compute the bearing spring and dashpot properties.

4.4.3 LONGITUDINAL RESISTANCE

In any segment, the strength of the L-spring can be defined to vary with temperature, by specifying up to 20 temperatures and up to 20 corresponding strengths. For temperatures between the specified values, the strengths are obtained by linear interpolation. For temperatures outside of the specified range, the strength corresponding to the nearest specified temperature is assumed. An initial temperature (the same for all segments) is specified, and this determines the L-spring strength at the beginning of the analysis. The effect is to place an upper limit on the strength of the L-spring. If this strength is exceeded at any location, the stiffness is reduced to zero. The effect, initially, is exactly as if a stiffness (K) value of zero had been specified for the support. However, the behavior differs from that with K=0, because the strength can subsequently be changed.

In any load sequence, it can be specified that the longitudinal (L-spring) soil temperature changes progressively, so that the cutoff on the strength also changes. If the strength decreases, the resistance developed by the support is progressively reduced, leading to a redistribution of load along the pipeline. If the strength increases, the support force remains unchanged but the stiffness becomes nonzero (the value on the basic force-displacement relationship for the current support force). In this case there is no redistribution of load. The strength may be cycled in any desired way, for as many seasonal cycles as desired.

As described above, L-spring analysis allows for consideration of the temperature dependence of the pipe-soil longitudinal springs as influenced by seasonal surface and/or pipe temperature variations. The approach proposed for the ASAP frost heave analysis is to specify a single longitudinal soil temperature corresponding to thawed soil conditions together with several additional longitudinal soil temperatures to cover the range of frozen soil temperature conditions encountered over a typical year of operation during the frost heave analysis. The longitudinal temperature values and the time between adjacent temperature values are specified for a typical one year analysis cycle. The longitudinal soil temperature will be taken as equal to the pipe temperature which has a seasonal variation that resembles a sine wave. For ASAP, the thawed longitudinal pipe-soil spring properties will be computed using conventional procedures (e.g., see ASCE 1984, Hart et. al 2001, and Honegger et. al 2004). For frozen soil conditions, the ASAP project proposes to utilize publically available geotechnical procedures (COLTKBR 2007) for estimating the pipe-soil longitudinal spring relationship.

4.5 MODEL GEOMETRY

The typical model geometry consists of a straight, horizontal section of the pipeline with a uniform depth of frozen soil cover. The chilled pipeline is assumed to cross an initially thawed span – this is the location where a frost bulb will grow around the pipe resulting in differential frost heave. A plane of symmetry is assumed at the center of the heaving span so that only one-half of the heaving pipeline configuration is analyzed. A transition length (or ramp) between the finite length section of heaving soil and the adjacent non-heaving soil section can be specified if desired. A multi-span analysis approach is undertaken considering different simulations for on the order of 10 different span lengths ranging from very short spans (e.g., down to say 10 feet) to very long spans (e.g., up to say 150 feet). The variation in span length is an important consideration because shorter spans, which are often associated with relatively high levels of strain per inch of heave tend to be “shut down” due to pressure feedback effects (i.e., high bearing pressures increase the stresses at the base of the frost bulb which tends to shut down frost heave). For very long spans, the imposed heave profile approaches a step-change (e.g., similar to a fault crossing). The end result of the multi-span evaluation approach is that it leads to a “critical span” corresponding to the span with the highest strain demand at a given point in time. The critical span length depends on several parameters including the pipe stiffness, the soil resistance and the pressure sensitivity of the heaving soil.

4.6 IMPOSED LOADS

As previously mentioned, frost heave analyses are typically initiated with the application of gravity, internal pressure and temperature differential loads. If desired, a hydrostatic test loading and unloading sequence can be included prior to applying the operating loads. A multi-year frost heave evaluation of the pipe-soil interaction model is then undertaken holding the gravity and internal pressure loads constant. The applied temperature differential can be varied in a sinusoidal pattern over each year of the simulation based on the difference between the time-varying pipe temperature and the constant tie-in temperature. The frost heave analyses are nonlinear time-history analyses performed using small steps through time. Within the heave span, the frost bulb geometry and frost heave vary with time. Seasonal variations of the uplift, longitudinal and creep soil temperatures are specified with each heave time step. The heave is imposed progressively at the base of the pipe-soil springs within the heave span. The amount of heave at the ditch bottom is calculated separately for each transverse pipe-soil support in turn accounting for pressure feedback.

For a selected heave span length, the results from a PIPLIN frost heave analysis include a detailed output of the state of the pipe-soil interaction model at each time step. The output state includes the current time, the pipe axial force, bending moment, hoop stress, top and bottom fiber von Mises stress, longitudinal stress, hoop strain and longitudinal strain and the curvature at each node of the pipeline model. The output state also includes the uplift, creep and longitudinal soil control temperatures, the longitudinal and transverse spring forces and displacements, the uplift spring displacement rate and the creep displacements for each element of the pipeline model. At the pipe-soil spring locations within the heaving section of the model, the frost bulb width, depth and shear are available together with the pressure components at the base of the frost bulb due to the frost bulb weight, the transverse pipe-soil spring, and shear as well as the total pressure. The current unrestrained mid-span free heave is also provided. The results described above can be post-processed in a number of different ways. Spatial plots and time history plots of various response quantities usually provide the most useful methods for understanding and interpreting the results. It is also possible to develop animations of various spatial response plots to gain a better understanding of how the overall results vary over the course of the multi-year analysis duration.

The most important results from a frost heave simulation for a given span length are the time histories of the maximum tension and compression strain demands. Detailed processing of the PIPLIN deflected shape at each point in time is used to develop time history plots of “digitally pigged” bending strains or curvatures which provides a basis for relating geometry monitoring data (e.g., smart pig survey data) to the corresponding nodal tension and compression strain demands. A schematic illustration of the maximum pig curvature is presented in Figure 4.3 for a 25-year frost heave simulation. Note that the “wiggles” in the curvature time history plots are due to the seasonal variations in the pipe-soil spring resistance.

Figure 4.3 can be used to illustrate, on a conceptual basis, the pipeline curvature monitoring approach to be utilized for ASAP for a high heave location. The dashed yellow horizontal line corresponds to the intervention curvature criterion while dashed red horizontal line corresponds to the curvature associated with the governing pipe strain limit. Note how the intervention threshold is reached in the 13^{th} year of the simulation while the governing strain limit threshold is reached in the 16^{th} year of the simulation.

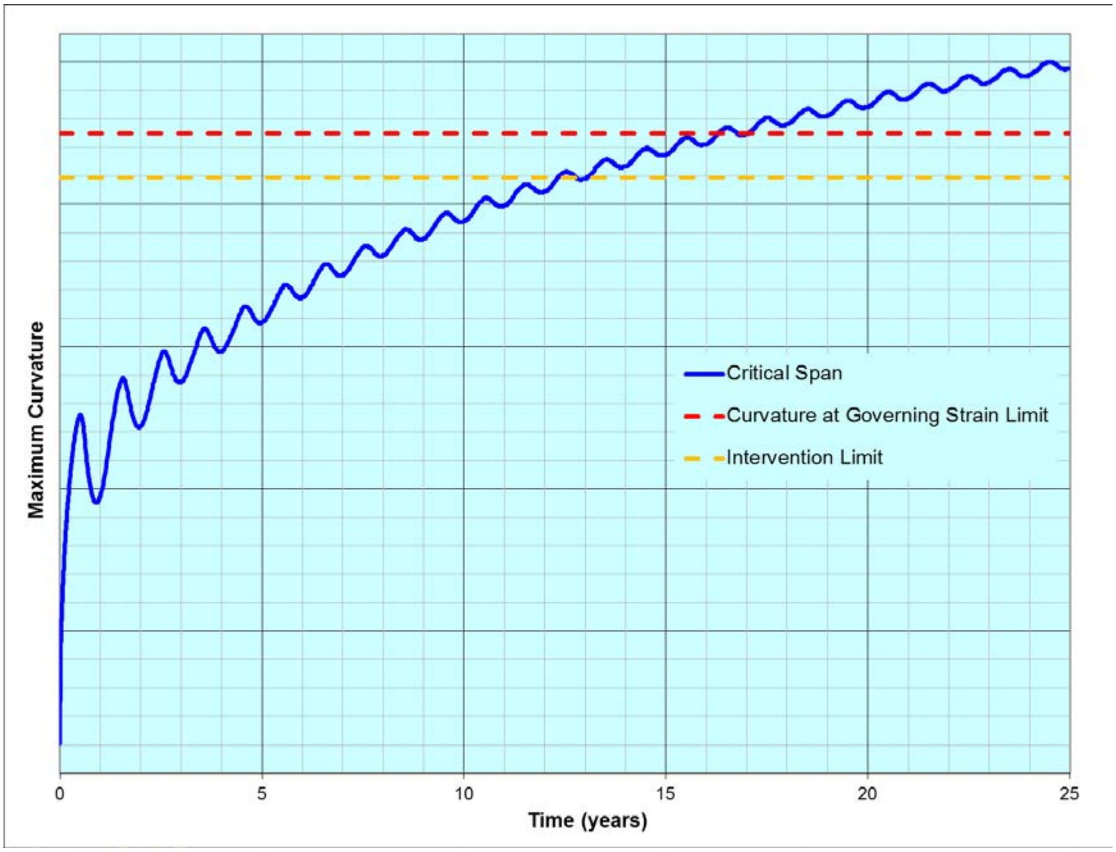

Figure 4.3 Illustration of Maximum Curvature Time History

SECTION 5. STRAIN CAPACITY DETERMINATION

5.1 MATERIAL REQUIREMENTS

The ASAP will be constructed of API 5L X70 line pipe with a wall thickness that varies between 0.595 inches and 0.857 inches as appropriate for the Location Class (i.e., design factor of 0.72, 0.60, and 0.50 for Class Locations 1, 2, and 3, respectively).

5.1.1 LINE PIPE

A generic stress-strain relationship where various properties of the stress vs. strain curve are highlighted is presented in Figure 5.1. For the purposes of strain demand calculations, the maximum strain range of interest typically runs out to about 2% strain. The initial elastic slope of the curve, frequently called "Young's modulus" is denoted in Figure 5.1 as E_{start}. The point at which the tangent slope of the curve first departs from a projection of the elastic slope is called the proportional limit. The tangent slope of the curve at high strains (i.e., the slope to the right of the point labeled "fully plastic") is denoted as E_{end}. Note that the term "fully plastic" is not strictly correct since the steel still has a finite hardening modulus (slope) at this point whereas fully plastic implies a slope of zero. The section of the curve between the proportional limit and the fully plastic point is often referred to as the "knee" region where the steel transitions from elastic to plastic conditions. The dashed line tangent projections from the curve passing through the proportional limit and the fully plastic point (bounding the knee region) make up what is referred to as the backbone curve. For pipe steels, the yield strength is defined as the stress at a strain of 0.5% per API 5L, shown as the stress coordinate denoted as "Y" in Figure 5.1. Note that for nominal pipe size (NPS) 8 and above, the yield strength is defined based on the hoop tension stress-strain curve.

The shape of the pipe steel stress-strain relationship can have a significant effect on the pipe strain demand and as well as the pipe strain capacity (particularly the compressive strain capacity). An illustration of pipe steel stress-strain relationships with different behaviors across the knee region of the curve is presented in Figure 5.2. In general, pipe steel stress-strain curves with a relatively abrupt or "sharp" elastic-to-plastic transition (purple and red curves) tend to lead to larger strain demands and lower strain capacities than stress-strain curves with a relatively rounded elastic-to-plastic transition (blue curve). Similarly, stress-strain curves with relatively low strain hardening modulus (slope) characteristics (e.g., the red curve in the flat "Lüders plateau" region) tend to lead to larger strain demands and lower strain capacities than stress-strain curves with relatively high strain hardening modulus characteristics. Deformation analyses should consider a range of bounding input steel stress-strain relationships that have been developed to be consistent with exemplar stress-strain test results from the project pipe material.

In addition, the shape of stress-strain curves can be significantly different for pipe steel tests performed in the LT, HT, LC and HC directions, especially for higher grade pipe materials and for UOE pipe. In other words, these materials are anisotropic. Based on experience with UOE pipe test results, it is generally observed that over the strain range from approximately 0.2% to 0.8% strain (i.e., in the so-called "knee" region), the four stress-strain curves tend to have the following relative strength ranking: HT > LC ≥ LT > HC and that the HT curve usually tends to be the "sharpest" of the four curves. Unlike the specifications under API 5L which are focused on the hoop tension yield and ultimate tensile strengths (in order to satisfy the pressure induced hoop stress design requirements), the following sections are focused on the longitudinal tension stress-strain characteristics.

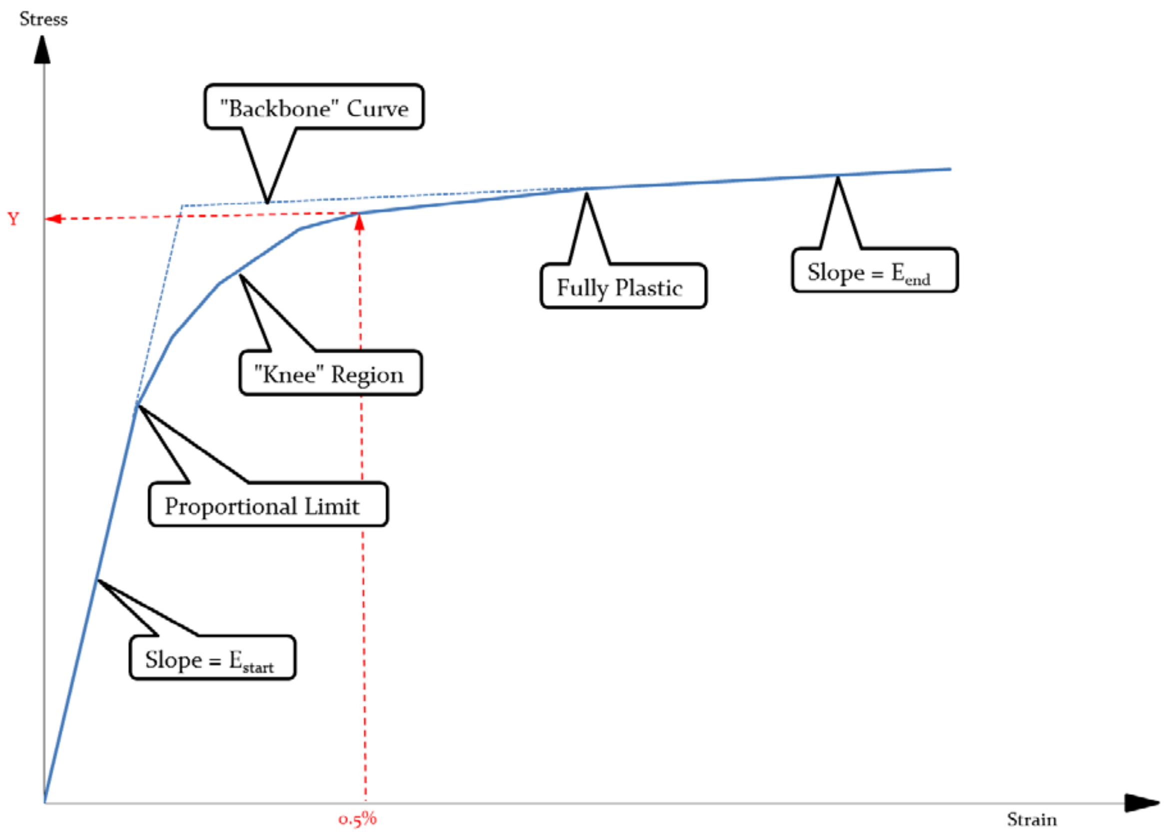

Figure 5.1 Normative Properties of a Steel Stress-Strain Relationship

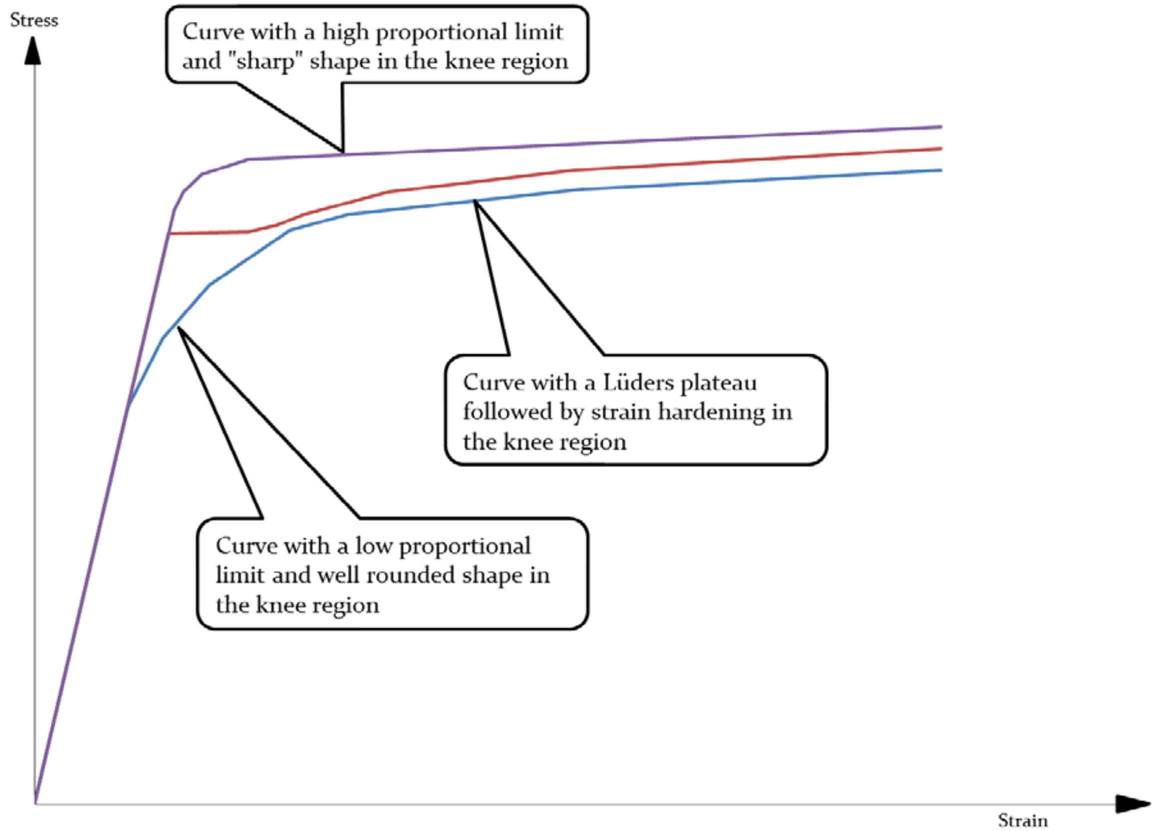

Figure 5.2 Illustration of Differing Stress-Strain Behavior in the Knee Region

(1) MINIMUM LONGITUDINAL YIELD STRENGTH

As noted above, the longitudinal tension (LT) stress-strain curves tend to be slightly weaker than the hoop tension (HT) stress strain curves in the knee region (e.g., in the region where yielding is defined). In many cases, the LT yield stress is actually below the specified minimum yield strength. This is not normally a cause for concern since as previously noted, the pipe SMYS is defined in the hoop tension direction.

(2) LONGITUDINAL TENSILE STRENGTH

Consideration will be given to specifying a minimum longitudinal tensile strength, as well as to specifying a relative low yield to tensile ratio to ensure a sufficient work hardening rate to avoid strain localization.

(3) MINIMUM UNIFORM LONGITUDINAL ELONGATION

Likewise, consideration will be given to specifying a minimum uniform longitudinal elongation to further avoid strain localization.

(4) LONGITUDINAL STRESS-STRAIN CURVE

Basic pipe mill certificates will always provide a direct characterization of the yield and ultimate strengths in order to demonstrate that the material meets the specified minimum strength requirements. For ASAP strain-based design, it is anticipated that representative fully digital stress-strain curves will be obtained from both the LT and HT directions. It may also be desirable to obtain representative LC stress-strain curves.

Given the digital stress-strain data from representative pipe samples, it will be straight-forward to compute various measures of anisotropy such as the ratio of HT/LT yield and ultimate strengths or strengths at several selected strain levels of interest (e.g., at 1.5%, 2%, etc.). It will also be possible to compute various measures of curve shape or sharpness for the different curve directions such as the ratio of strengths at different levels of strain across the knee region and/or the plastic complementary energy at various levels of strain. These parameters can be used to characterize the variability of the project stress-strain relationships.

(5) LUDERS PLATEAU

Localized bands of plastic deformation may occur in certain materials before fracture. These bands are commonly referred to as Lüders bands as they were first reported by Guillaume Piobert and W. Lüders. These localization deformations result in a slight drop in strength below the initial yield strength, which is maintained for a moderate increase in imposed strain. The overall range of formation of the bands may form a flat yield, or Lüders, plateau.

Increasing imposed strain beyond the end of the plateau results in an increase in strength through strain-hardening. Strain-hardening continues to a peak that typically exceeds the yield strength by thirty to sixty percent.

For strain-based design applications, it is advisable to avoid excessive sharpness in the knee region of the stress-strain curves from any direction (e.g., LT or HT) and also to avoid a Lüder's plateau. These characteristics can significantly increase the pipe strain demand (while at the same time decreasing the pipe strain capacity).

5.1.2 COATING EFFECT

Strain aging of pipe (e.g., due to heating during coating application) can tend to increase the sharpness of the knee region particularly for the HT curve with higher temperatures leading to higher levels of sharpness. Strain aging is also known to increase the pipe yield and ultimate strengths. Because strain aging tends to increase the yield strength more than it increases the ultimate tensile strength, it also tends to reduce the strain hardening modulus (i.e., as characterized by the Y/T ratio and/or the slope parameter E_{end}) in the region of interest for strain demand. For these reasons, it may be desirable to develop pipe specifications that include review of both as-received and aged stress-strain curves as well as to limit the heat to which the pipe is exposed during coating application if practicable.

5.1.3 DIMENSIONAL CONTROL

Dimensional imperfections within a single length of line pipe can act as buckle initiation points and need to be minimized. However, the key concern for strain-based design is variation from pipe to pipe that acts as an imperfection and results in strain concentrations at girth welds. Any aspects of pipe geometry, such as ovality, variations in thickness, or tolerances in pipe diameter, that can result in misalignment across the weld can impact strain capacity. This is particularly true for thicker pipes, where internal or external alignment clamps may not be able to fully 'round out' pipe for welding.

5.1.4 GIRTH WELDS

Several welding techniques can be employed on girth welds joining lengths of pipe together. All have some impact on strain capacity. For example, GMAW with low CO_2 content shielding gases produces the best combinations of strength and toughness but can be prone to generation of long defects if the welding procedure is not adequately optimized prior to field deployment. It is commonly used for mainline girth welding of long, large diameter pipelines. The various torch configurations such as single torch, dual torch, tandem wire, etc., also have implication on strain capacity. Single torch welding tends to give better results due to the lower heat input, but can affect construction efficiency and pipeline cost, especially in the arctic regions where the construction period is limited and logistics are challenging. Again, a well-balanced approach is needed to select the appropriate welding processes for the double jointing, mainline, tie-in, and infield repair procedures. The requirements of selecting welding procedures for these different types of welds to achieve both high strength and toughness may be challenging. The selected welding processes will need to be properly qualified and tested to confirm that the required strain capacity is met reliably.

5.1.5 WELD OVERMATCH

The key difference between welding for typical pipelines and those subject to high strain is the need for substantial and reliable strength overmatch of the weld metal relative to the base pipe. Reliable overmatch is critical for ensuring flaw tolerance adequate to allow for cost effective pipeline construction while ensuring safe design. This has been demonstrated in full-scale pressurized testing, where high weld overmatch was able to prevent failure at a large manufactured defect, resulting in fracture in the pipe body instead of the welds at high strain. The level of yield strength overmatch required to ensure a safe design depends on project-specific factors such as pipe grade, pipe geometry, flaw acceptance criteria, and the required strain capacity.

5.1.6 WELDMENT TOUGHNESS

Toughness of the weld metal and heat affected zone are critical to strain-based pipeline performance. Upper shelf behavior is required to resist fracture initiation by cleavage. It is also important to ensure adequate upper shelf toughness, which relates to ductile tearing resistance. The Charpy impact test is an excellent tool for assessing toughness and providing a quality check during weld procedure qualifications but is not sufficient for the detailed engineering of strain-based design pipelines. For these applications, fracture mechanics tests, such as the crack tip opening displacement (CTOD) test, should also be used to ensure adequate resistance to fracture with weld imperfections. Achieving high toughness in small scale testing is necessary but not sufficient to ensure a safe and cost effective strain-based design. The relationship between small scale toughness and full scale performance at high strain has not been adequately established by industry.

5.2 TESTING REQUIREMENTS

A number of small-scale and full-scale tests will be conducted to assist in determining the actual strain capacity of the line pipe to be used on the Project.

5.2.1 CURVED WIDE PLATE TESTING

Curved Wide Plate Testing (CWPT) has been used by industry as a proof test for qualifying strain-based design for many years. The test specimen consists of a large dog bone shape samples cut from a pipe containing the specific girth weld to be qualified. A flaw is saw-cut or electrical discharge machined (EDM) into the desired zone of the weld, and the specimen is pulled to failure in tension. Unfortunately, CWPT is not capable of quantifying the effect of biaxial loading due to internal pressure. It is also impractical to use CWPT to evaluate the effect of high-low misalignment on strain capacity. Recent full scale data have shown that these effects on strain capacity can be very significant. However, CWPT is still considered a cost effective and useful test for line pipe and weld procedure qualification and to establish initial estimates of the strain capacity.

5.2.2 FULL-SCALE TENSION TESTING

Although research is underway to develop suitable alternatives, pressurized full-scale tension testing remains the only fully validated method to confirm tensile strain capacity. If a limited number of tests are planned, an effective strategy is to use these tests to examine lower bound behavior. The goal is to confirm that the design meets the strain demand requirement when the key parameters are at the extremes of the acceptable construction envelope. Care should be taken to select test samples representative of the worst expected combination of the key fabrication parameters. On the other hand, selecting overly conservative parameters can result in an undesirable outcome. Another consideration is the availability of test frames to conduct these full scale tests. At this time, 30-inch pipe with a 0.630-inch wall thickness is near the limit of testing capability, which should be adequate for ASAP. Full-scale bend tests with internal pressure have been used, but are less efficient due to the limited weld length reaching the maximum strain. Additionally, modeling of the load/response behavior can be very challenging relative to a tension test.

5.2.3 COMPRESSIVE STRAIN VALIDATION

Industry has developed and validated empirical equations and finite element modeling methods for estimating the compressive strain capacity of pipelines. The most widely used measure of pipe compressive strain capacity is that associated with the peak moment from an imposed curvature test on a full-scale pipe specimen or finite element analysis of a pipe stub section. Note that this strain limit is a serviceability limit state with a significant post-wrinkling reserve margin before the pipe pressure integrity is compromised (usually due to the development of high local strains within the wrinkle(s)). Empirical equations of this sort will be used to establish preliminary pipeline compressive strain capacity. Finite element analyses (FEA), and possibly pressurized full-scale bend tests, will be conducted to establish the compressive strain capacity. These studies will account for the effects of pipe anisotropy, material work hardening characteristics, girth weld misalignment or high-low, internal pressure fluctuations, axial loading, and thermal aging. The FEA method will be the primary tool to quantify the effect of variability in all major parameters; full-scale bend or buckling tests will only be used to validate the finite element models and provide useful experimental design data, if deemed necessary. A large number of finite element analyses may be required to cover a full range of parametric studies in support of a design reliability assessment. Because the compressive strain is defined over a certain gauge length (typically one to two pipe diameters), the selection of gauge length will accommodate geometric deformation effect and ensure the practical strain detectability by ILI tools. A common gauge length in finite element compressive strain capacity assessment, strain demand assessment, operation ILI monitoring, and any full-scale bend tests will be used.

SECTION 6. ROUTE APPLICATION

6.1 DESIGN APPROACH

A number of approaches can be used when considering a strain-based design, ranging from a relatively simple and straightforward deterministic design approach, where estimates of the strain demand and strain capacity are compared, to more elaborate methods that consider the probability of failure or the reliability of the pipeline.

For the ASAP, a deterministic design approach will be utilized and materials that have strain capacity well in excess of the maximum expected strain demand will be select. All of the parameters used in determining either strain demand or capacity will be conservatively selected. An appropriate safety margin between the conservatively estimated demand and capacity will be applied. The margin will be determined based on the uncertainty level of the key parameters used in ascertaining the design values.

6.2 SEGMENT-BY-SEGMENT DESIGN

Using route geotechnical data in conjunction with the results of the demand and capacity analyses, a segment-by-segment design will be completed to identify the frost heave potential along the alignment. The segment-by-segment design approach is presented in Figure 6.1. The four possible outcomes from application of the flow chart are briefly described below:

- Areas of continuous permafrost, low water table, or where the pipeline operating temperature is greater than 32°F will not be susceptible to frost heave and therefore no rigorous frost heave analysis will be required.
- Areas where the predicted combined pipe stress due to frost heave for the critical span length remain below the allowable combined stress as per ASME B31.8 are classified as having low heave potential and no special mitigative measures will be implemented.
- Areas where the predicted curvature (from digital pigging analysis) due to frost heave for any span length remain below the allowable curvature are classified as being heave susceptible and will require ongoing monitoring. Should the measured curvature reach the intervention curvature limit over time then mitigative measures will be implemented.
- Areas where the predicted curvature (from digital pigging analysis) due to frost heave for any span length exceed the allowable curvature are classified as having high heave potential and mitigative measures will be implemented during design and construction.

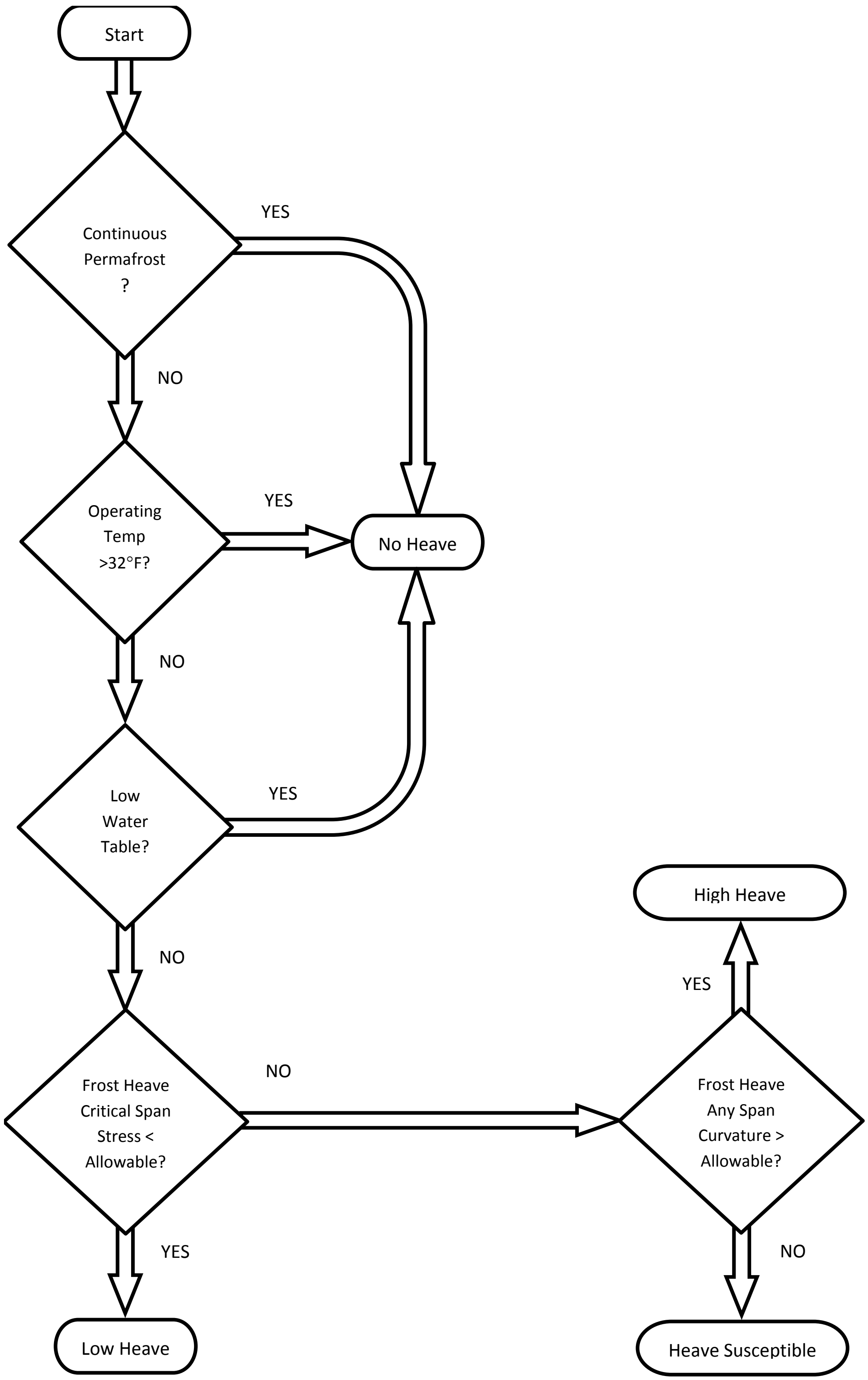

Figure 6.1 Frost Heave Route Assessment Flow Chart

6.3 POTENTIAL DESIGN MITIGATIVE MEASURES

For those pipeline route segments where the estimated heave potential may exceed the ability of the pipe to withstand the imposed displacement, a number of mitigative options, or combinations of options, could be employed to reduce the potential for deleterious movement including:

- Reroute within the alignment corridor to a non-frost-susceptible terrain unit, if available;
- Investigate the subsurface of the suspect terrain segment more closely so as to reduce the conservatism inherent in the station to station approach;
- Change the operating temperature profile of the segment so as to reduce the freeze potential, e.g., by adding heater stations, cycling the temperature, etc.;
- Insulate the pipe ditch to reduce the heat flux through the frost-susceptible soil;
- Increase the pipe wall thickness to increase the resistance of the pipe to ditch displacements, as well as increasing the ability of the pipe to withstand higher displacements;
- Over-excavate the frost-susceptible soil beneath the buried pipeline and replace with non-frost-susceptible soils;
- Excavate soils with high uplift resistance above the pipe springline and replace with soils with low uplift resistance;
- Elevate the pipeline aboveground placing it in an embankment. Elevating the pipe would reduce or eliminate the heat extracted from the ground;
- Elevate the pipeline aboveground placing it on overhead supports. Elevating the pipe would eliminate the heat extracted from the ground and uncouple the pipe from the soil resistance;
- Heat trace the soil underneath the pipe to counteract frost penetration;
- Emplace stand-alone heat pipes to freeze the soil quickly, reducing the ability of the frost-susceptible soil to cause large soil volume changes; and
- Combine compatible concepts presented above.

SECTION 7. CONSTRUCTION RELATED ISSUES

7.1 WELDING PROCEDURES

To ensure high quality welds, a reasonable amount of flexibility is needed in welding parameters to allow welders the ability to manipulate the process and reduce the likelihood of producing unacceptable weld imperfections. The acceptable ranges of parameter variability that are intended to provide the performance that is similar to the completed qualification test welds will be established.

Weld qualification testing will bound the variability of critical parameters. In particular, heat input is critical because heat input modifies the metallurgical features of the HAZ and weld metal. Weld procedures will be qualified to a full suite of small scale tests and may also include large scale performance testing such as curved wide plates or full-scale tension tests with artificial defects. A test program that confirms the adequacy of the welds to provide resistance to fracture with a weld defect at the extreme of the welding process parameters acceptable during construction will be conducted.

7.2 AUTOMATED ULTRASONIC TESTING

Qualification of inspection equipment is critical to the successful implementation of a strain-based design for the pipeline. Materials qualification for strain-based design is intimately tied to the establishment of defect acceptance criteria with height and length restrictions. Radiographic testing does not give qualitative information about defect height and is therefore not suitable for a strain-based design. In order to determine both defect height and length with confidence, automated ultrasonic testing (AUT) will be required. A qualification program will be required to establish not only the detection capability, but also the sizing accuracy of the AUT system to be used during construction. The AUT system will be capable of detecting the critical defect height with high confidence. The sizing error of the system will be established for the range of defect dimensions at the acceptance limit. This error will be subtracted from the critical defect size to establish the acceptance criteria to be used during pipeline welding.

SECTION 8. OPERATIONS AND MAINTENANCE

8.1 MONITORING POTENTIAL FROST HEAVE

During design the frost heave potential along the alignment will be evaluated using the available route alignment data combined with the line pipe capacities and advanced engineering simulation methodology to explore the potential interaction between the soil subsurface and the pipe during its operational life. To address the differential values along the route, soil displacements and resistance values will be estimated using the landform characteristics along the route derived from the project geo-database. Scrutiny will continue throughout the operational life of the pipeline.

A key consideration in any strain-based pipeline design is the "monitor and maintain" component of the design philosophy. Periodic monitoring of the pipeline will identify locations that are of concern with respect to the pipe structural integrity. The monitoring interval is selected such that there will be enough time to plan and undertake intervention prior to the pipe experiencing a loss of structural integrity.

The best way to monitor curvature along ASAP is through periodic ILI surveys. An ILI geometry survey provides the most practicable and reliable way to accurately characterize the geometry of the entire length of the pipeline. Use of a high resolution inertial navigation system (INS) based geometry tool will result in the highest possible level of survey accuracy.

Several ILI vendors offer high resolution INS tools. The instrumentation on these tools includes a strap down, tri-axial fiber optic gyroscope based Inertial Measurement Unit (IMU), a tri-axial accelerometer, an odometer as well as a multi-arm mechanical caliper. The gyroscopes measure the change in orientation of the pig in terms of the pitch, azimuth, and roll angles; the odometer measures the along-the-pipe distance coordinate tie-points; and the calipers measure pipe ovality or dents and also locate the pipeline girth welds. The gyroscope and odometer data can be numerically differentiated to compute the pipeline curvature (which is proportional to the bending strain) or numerically integrated to estimate the pipe position between coordinate tie-points. Typical accuracies of inertial survey tools are as follows:

- Curvature Detection: ±0.02% Strain
- Bend Angle Detection: ±0.1°
- Dent/Ovality: ±2.5 mm
- Weld-to-Weld Distance: ±12.5 mm
- Mapping Accuracy 1:2000 (depends on distance between coordinate tie-points)

Since the early 1990's, the pipeline industry has gained experience with these tools and they have become a key component of pipeline systems which incorporate the "monitor and maintain" component of the strain-based design philosophy. While the pipeline (X-Y-Z) position mapping is useful for GIS applications and pipeline location, the most important result from an inertial survey of a pipeline for structural integrity assessments is the curvature/bending strain not associated with intentional bends. The caliper data can also be extremely useful for establishing out-of-roundness and incipient wrinkling deformations of the pipe wall at high curvature/bending strain locations.

Note that the terms curvature (Ψ) and bending strain ($\varepsilon_{bending}$) are used somewhat interchangeably herein (since $\varepsilon_{bending}=\Psi\ D/2$).

An important consideration of the ASAP ILI program will be an initial/baseline geometry survey of the pipeline as soon as practicable after construction. This survey will provide a detailed characterization of the as-installed pipeline geometry for comparison with subsequent surveys. Survey-to-survey curvature changes can be used as a basis for estimating the rate of curvature accumulation at any areas of concern. The ASAP curvature monitoring program will establish a curvature limit associated with the governing pipe tension or compression strain limits and an intervention curvature limit will be established as some fraction of the curvature associated with the governing strain limit. The idea is that when high curvature locations are identified, the current curvature and the rate of curvature change can be measured against the intervention curvature limit which will provide a threshold condition at which an intervention can be planned and executed with sufficient time before the curvature reaches that associated with the governing strain limit. This monitoring approach is illustrated conceptually in Figure 4.3.

8.2 POTENTIAL OPERATIONAL MITIGATIVE MEASURES

For those pipeline route segments where the evaluation of ILI or other measurement data shows that the effect on the pipe due to the soil frost heave may exceed the ability of the pipe to withstand the imposed displacement, mitigative options, or combinations of options, could be employed to reduce the criteria exceedance potential during operations. Some of these are seen to be the same as for design, although the practical ability to employ them during operations may be limited. The options include:

- Insulate the pipe ditch to reduce the heat flux through the frost-susceptible soil;
- Excavate soils with high uplift resistance above the pipe springline and replace with soils with low uplift resistance;
- Elevate the pipeline aboveground placing it in an embankment. Elevating the pipe would reduce or eliminate the heat extracted from the ground;
- Emplace stand-alone thermosyphons to freeze the soil quickly, reducing the ability of the frost-susceptible soil to cause large soil volume changes; and
- Combine compatible concepts presented above.

8.2.1 TEMPERATURE CONTROL

Another potential operational philosophy that might be considered is temperature control or temperature cycling. In areas of continuous permafrost, the line is not susceptible to frost heave and operating the line below 32°F will ensure the supporting soils do not thaw and possibly be subjected to another geothermal phenomenon – thaw settlement. Conversely, operating the line above 32°F in areas of thawed ground will guard against frost heave.

In areas of discontinuous or sporadic permafrost, temperature cycling, i.e., fluctuating the operating temperature from below 32°F to above during the course of the year, may limit the overall potential for frost heave or thaw settlement over the life of the line.

8.2.2 LINE LEVELING

Line-leveling is one possible form of intervention/mitigation that can be employed should the measured curvature approach or exceed the curvature limits established for the project. This would entail excavating the line in areas experiencing frost heave and re-leveling the line to reduce the curvature.

SECTION 9. CONCLUSION

The design approach to frost heave explained in this report is summarized in Figure 1.3 which shows the flow of the various steps needed to define and begin the assembly of the components of the project approach in preliminary design; finalize the assembly and verification and apply the approach to the alignment in final design; and continue route monitoring and potential mitigation throughout operations. In the current front end loading phase of the project, the design approach is being developed and scoped of initiation during the next phase - preliminary design.

Although only the approach to frost heave is developed in this report, the approach is illustrative of the design approach to other displacement loadings that may cause longitudinal stress in the pipe such as thaw settlement.

AGDC is committed to the complete development and verification of the design approach for application throughout the design life. As the development progresses, AGDC will share the ongoing verification and application studies with PHMSA throughout this process to ensure concurrence and heighten confidence in the safety and integrity of the pipeline.

SECTION 10. REFERENCES

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APPENDIX A PHMSA CORRESPONDENCE

1. U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration Letter to Mr. Bob Swenson, Alaska Stand Alone Pipeline, dated March 3, 2010
2. State of Alaska, Office of the Governor letter to Mr. Jeffrey Weise, Associate Administrator for Pipeline Safety, US Department of Transportation, dated April 12, 2010
3. U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration Letter to Mr. Daniel Fauske, President Alaska Gasline Development Corporation, received May 4, 2010

U.S. Department of Transportation

Pipeline and Hazardous Materials Safety Administration

1200 New Jersey Ave, S.E.
Washington, D.C. 20590

March 3, 2010

Mr. Bob Swenson
Alaska Stand Alone Pipeline
Natural Gas Transportation Project
411 W. 4th Avenue, Suite 2C
Anchorage, AK 99501-2343

Re: Alaska Stand Alone Pipeline Natural Gas Transportation Project

Dear Mr. Swenson:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) is writing to request information about the nature of the proposed Alaska Stand Alone Pipeline Natural Gas Transportation Project (ASAP Project) and plans for the submission of special permit applications for the project pursuant to 49 C.F.R. § 190.341. A special permit is an order by which PHMSA waives compliance with one or more of the Federal Pipeline Safety Regulations under the standards set forth in 49 U.S.C. 60118(c) and 49 C.F.R. § 190.341, subject to conditions and limitations set forth in the order. A special permit may be issued to a pipeline operator (or prospective operator) for specified facilities that, absent waiver, would be subject to the regulation.

PHMSA would appreciate a project briefing to review any need that the ASAP Project may have for a special permit. To avoid project delays, PHMSA requests that the ASAP Project submit any special permit applications as soon as possible. PHMSA advises the ASAP Project to submit its applications before making design-related decisions that could require special permits.

Additionally, to facilitate our review of the project for compliance with the gas pipeline safety regulations at 49 C.F.R. Part 192 and any special permit application(s), please provide the safety and environmental information listed in the informal preliminary information requests enclosed with this letter as Enclosures A and B. Depending on your response, PHMSA may request additional information, including, but not limited to: data, reports, studies, documents, and independent third party analyses. PHMSA expects a detailed safety and environmental review to take a minimum of 12 months or more, depending upon the extent and nature of the request, any requirements for additional information or studies, and the quality of submittal documents.

PHMSA is required to conduct an environmental review in accordance with the National Environmental Policy Act. An overview of the preliminary environmental information needed to support your anticipated special permit applications is provided in Enclosure B. Your timely submission of permit applications and detailed safety and environmental information will enable

PHMSA to properly analyze potential risks to public safety and to the environment that could result from our decision to grant or deny a special permit.

Please contact Dennis Hinnah at 907-271-4937, or Alan Mayberry, Director of Engineering and Emergency Support, at 202-366-5124, if you have any questions.

Sincerely,

Jeffrey D. Wiese
Associate Administrator for Pipeline Safety

Cc: With Enclosures

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888 First Street, NE, Room 1A
Washington, DC 20426

Enclosure A

Information Request for the Proposed ASAP Project

1.0 Introduction

This document outlines preliminary information PHMSA will need to begin both review of project compliance with 49 Code of Federal Regulations (CFR) Part 192 and consideration of anticipated special permit applications. It is not an exhaustive listing of required information, but identifies initial information needs on the types of issues PHMSA believes might require more extensive review.

Gas pipeline operators must comply with 49 CFR Part 192 (the Regulations), and the industry codes and standards incorporated by reference into the Regulations, when designing, constructing, inspecting, testing and operating natural gas pipelines. Compliance with the Regulations, codes, and standards provides a substantial basis for concluding that pipelines have been designed, fabricated, constructed, inspected, and tested in a manner that will protect public safety.

If an operator (or prospective operator) of a pipeline facility wishes to deviate from one or more Regulations, the operator may apply for a special permit to do so. Pursuant to 49 USC 60118(c) PHMSA has the authority to issue orders (special permits) granting a waiver of compliance with the Regulations with respect to such pipeline facility on terms PHMSA considers appropriate if PHMSA determines that the special permit is not inconsistent with pipeline safety. PHMSA often places conditions on special permits designed to address any safety issues that are identified during the special permit review process. The procedures for processing special permits are set out in 49 CFR § 190.341.

PHMSA anticipates that the ASAP Project will propose alternative design methods, most notably the use of a Reliability Based Design approach addressed in Supplement to ASME B31.8R-2008. The use of Reliability Based Design is not recognized under current Regulations. In addition, PHMSA anticipates ASAP Project may apply for special permits to waive other regulations including, but not limited to, requirements regarding post construction pressure tests, depth of cover, and valve spacing.

Use of design, material, construction, operational and integrity management approaches not recognized under current Regulations will have potential effects on many functional areas, including specified design attributes, fabrication, construction, operation, monitoring, and integrity management. This information request outlines our preliminary information needs in each functional area. Within each functional area, the criteria being assessed are identified together with the underlying technical requirement (code, standard, rule, etc.). The required information associated with the criteria statement is then identified. There is also a general set of required information that enables definition of the scope of anticipated special permit (waiver) requests. This information request is not comprehensive. As design and operating intent matures, it is expected that additional information will be identified in these functional areas:

- General Requirements (Section 2)
- Design Requirements (Section 3)
- Material and Fabrication Requirements (Section 4)
- Construction Requirements (Section 5)
- Corrosion Control Requirements (Section 6)
- Testing Requirements (Section 7)
- Operation and Maintenance (O&M) Requirements (Section 8)
- Integrity Management Requirements (Section 9)

2.0 General Requirements

2.1 Applications for Special Permits (Waivers)

2.1.1 Criterion: In order to understand the impact of anticipated special permits, PHMSA must be provided with sufficient information early in the design phase of the pipeline.

Basis: Federal Law 49 U.S.C. 60118(c); 49 C.F.R. § 190.341.

(a) Required Information: A summary of codes, consensus industry standards and special assurance practices (design, operational, maintenance, and integrity management) that ASAP Project will apply to the full life cycle of the Project.

(b) Required Information: An overview summary of the extent to which the design will comply with, go beyond, and/or deviate from, existing regulatory requirements.

(c) Required Information: A listing of all regulations (including consensus industry standards and other material incorporated into the regulations by reference [Re: 49 CFR § 192.7]), by specific section, that will be the subject of a special permit request. For any regulation/requirement not listed, it will be assumed that the ASAP Project intends full compliance in accordance with the pipeline safety regulations contained in 49 CFR Part 192. The nature of the deviation from the requirement must be identified. If you do not submit any applications for a special permit when replying to this request, please note when you will submit special permit requests. For each regulation for which a special permit (waiver) will be sought, the applicable pipeline segments to which these special permits apply must be identified. If the deviation applies to the entire pipeline, identify as "all segments."

(d) Required Information: It is anticipated that one condition of any special permit would be full-time oversight by federal PHMSA inspectors, both in the ASAP Project's headquarters design and operations offices and at construction camps. This oversight will require suitable office space and/or accommodations both at headquarters offices and at all construction camps, and unfettered access by federal inspectors to documents, records, and activities subject to federal oversight. The ASAP Project should commit to satisfy these conditions.

(e) Required Information: Identify the pipeline stationing and mile posts for the location or locations of the applicable special permit segment(s)

2.2 Quality Management System

2.2.1 Criterion: The unique challenges associated with the ASAP Project's proposed project, including the anticipated need for special permits from established pipeline safety regulations, places a greater burden on the ASAP Project's quality and management systems to assure pipeline integrity, safety, and environmental protection for the life of the pipeline. A robust quality management system is essential to meet these objectives and to provide PHMSA with the confidence in the pipeline design, operational, maintenance, and integrity management plans to approve anticipated special permits.

Basis: 49 CFR § 192.13

(a) Required Information: Provide the prospective Quality Management System plan/program. Please indicate whether you will conform to, and implement, API Specification Q1. Please describe and justify any exceptions taken to API Specification Q1.

2.3 Construction Quality Assurance and Quality Control

2.2.1 Criterion: The unique challenges associated with the ASAP Project's proposed project, including the anticipated need for special permits from established pipeline safety regulations, places a greater burden on the ASAP Project's quality of construction to assure pipeline integrity, safety, and environmental protection for the life of the pipeline. A robust construction quality assurance and quality control process is essential to meet these objectives.

Basis: 49 CFR § 192.13

(a) Required Information: Provide the ASAP Project's construction quality assurance and quality control plans and procedures. Please identify and indicate your commitment to conform to, and implement, applicable construction quality standards.

3.0 Design Requirements

3.1 Reliability Based Design

3.1.1 Criterion: It is implicit in 49 CFR 192 that operators are to apply stress-based design practices for pipeline design. Since many specific regulations assume this approach and are predicated on a stress-based design, the application of other design practices requires a special permit. Use of a Reliability Based Design and Assessment (RBDA) approach requires review of extensive information in order to reach the conclusion that pipeline safety is not compromised.

Basis: 49 CFR Part 192, Subpart C.

(a) Required Information: Provide pipeline design criteria and identify associated limit states associated with each criterion for applicability to the reliability based model.

(b) Required Information: Identify all target reliability values associated with pipeline and component design and provide the basis for their determination, including specific identification of any assumptions used and the basis for validity of each assumption. Also identify where target values have been increased to improve the margin of safety.

(c) Required Information: Provide the model used to determine the reliability of the pipeline, including the value of the applicable limit states and the associated limit state functions. Include the basis for any non-conservative inputs, such as wall thickness, when compared to similar values that would be derived from a design determined using methods that comply with 49 CFR 192 requirements. Include the basis for any segmentation of the pipeline for purposes of establishing the reliability target.

(d) Required Information: Identify any time-dependent inputs that could affect model results, such as population density determinations. For such time-dependent inputs, provide programs or procedures that will evaluate these inputs and their impact on the model.

(e) Required Information: Provide the basis for the use of empirical or test data when developing the reliability model, including documented evidence that the data used is representative for its intended purpose. Justify applicability of the data used to new pipeline construction and operation in the service conditions expected.

(f) Required Information: Provide the basis for key assumptions and any simplifications in the model.

(g) Required Information: Provide a listing of the hazards considered by the model, including natural phenomena hazards (e.g., seismic, slope instability, freeze-thaw effects), and the basis for their contribution to the probability of pipeline failure.

(h) Required Information: Provide the basis for uncertainty that exists with the model and identify safety margins applicable to the pipeline.

(i) Required Information: If any risks, such as environmental risks, are not considered by the model, give the basis for elimination of such risks.

3.2 Strain Based Design

3.2.1 Criterion: It is implicit in 49 CFR Part 192 that operators are to apply stress-based design practices for pipeline design. Since many specific regulations assume this approach and are predicated on a stress-based design, the application of other design practices requires a special permit. Use of a Strain Based Design approach requires review of extensive information in order to reach the conclusion that pipeline safety is not compromised.

Basis: 49 CFR Part 192, Subpart C.

(a) Required Information: Identify applicable threats and limit states for which strain based design techniques will be used for each pipeline segment.

(b) Required Information: Because a comprehensive consensus industry standard has not yet been developed for strain based design, it is incumbent upon the ASAP Project to establish, document, and justify the design process/procedure, design criteria, and safety margins. The ASAP Project must submit its formal design process description and design criteria. This material must include the basis for all design criteria, how the criteria were established, data used to determine acceptability of design criteria, justification for design/safety factors incorporated into the design criteria, and means incorporated in the design or operation to verify the consistency of operational conditions with design basis assumptions. This applies to line pipe (including special pieces/joints such as induction bends) and pipeline components (such as compressor stations, valves, pressure vessels, etc.)

(c) Required Information: Identify the design basis natural phenomena and/or outside force events/hazards applicable to each pipeline segment, the associated magnitude of these events/hazards, and the bases for any assumed values. This includes seismic events (earthquake zones and fault zones), frost heave, freeze/thaw cycles, landslides, soil creep, soil collapse, severe weather events, volcanic loadings and any other credible outside force scenario. The ASAP Project should submit the design criteria, including design margin/safety factors, to address each event/hazard.

3.3 Additional Design Requirements for Alternative MAOP

3.3.1 Criterion: It is our understanding that the ASAP Project's strain based design approach and methodology for post-construction verification of pipeline integrity will likely apply for a special permit from MAOP and/or class location requirements of Subparts J and/or L. Even if a special permit is not requested, the ASAP Project may desire to operate at the alternative MAOP allowed in Part 192. In either case, the additional design requirements of 49 CFR §§ 192.112 and 192.620 apply.

Basis: 49 CFR §§ 192.112 and 192.620

(a) Required Information: Provide information that demonstrates compliance with 49 CFR §§ 192.112 and 192.620 for applicable pipeline segments.

(b) Required Information: Provide a detailed pipe fracture control plan that demonstrates compliance with 49 CFR § 192.112(b).

3.4 Depth of Cover

3.4.1 Criterion: Known deviations from depth of cover requirements must be documented and reviewed for acceptability. In these cases, the ASAP Project must apply for a special permit.

Basis: 49 CFR § 192.137(c)

(a) Required Information: Provide a description of the locations where the pipeline will be exposed and buried. Where buried, identify the depth of cover. Identify any design features which provide additional protection to the pipeline due to deviations from required depth of cover. Identify the segments and locations by milepost to which these additional protective features will be provided.

3.5 Valve Spacing

3.5.1 Criterion: Regulations require minimum block valve spacing based on the class location in which the segment is located.

Basis: 49 CFR § 192.179

(a) Required Information: The ASAP Project should identify the criteria and technical basis for establishing block valve spacing and location.

3.6 Pipeline Components

3.6.1 Criterion: The unique challenges of the ASAP project could also have significant affect on the design of compressor stations and other components of the pipeline system, besides line pipe.

Basis: 49 CFR Part 192, Subpart D

(a) Required Information: The ASAP Project should identify the criteria, specifications, and technical basis for designing pipeline components other than line pipe, including as a minimum all items listed in Subpart D.

4.0 Material and Fabrication Requirements

4.1 Steel Pipe Manufacturing Specification and Quality

4.1.1 Criterion: The proposed pipeline will operate at pressures well above those typical for US pipeline operation and therefore require very heavy wall pipe. In addition, there have been recent examples of sub-standard steel being installed in new pipelines in the lower 48 states. The steel and pipe must meet all technical and quality standards. In addition, the ASAP Project has indicated its intent to request a special permit from post-construction pressure testing. As a result, additional activities or requirements to assure pipe quality are imperative.

Basis: 49 CFR § 192.55 and Appendix B; and PHMSA Advisory Bulletin in 74 CFR 23930, May 21, 2009, Docket No. PHMSA-2009-0148; and PHMSA "Interim Guidelines for Confirming Pipe Strength in Pipe Susceptible to Low Yield Strength" dated September 10, 2009

(a) Required Information: Provide all specifications that will be used to manufacture the steel and pipe.

(b) Required Information: Identify all consensus industry standards which will be used for manufacturing, and testing the properties of, the steel and pipe.

(c) Required Information: Provide a description of the ASAP Project's quality oversight process with respect to the manufacture of steel and pipe. This should include the process used to qualify the selected steel mill(s) and pipe manufacturing facilities and the process by which the ASAP Project will provide quality oversight of steel and pipe manufacturing process.

(d) Required Information: Provide a description of testing that will be performed to verify the quality and material properties of the pipe. This should include a listing of all material properties to be tested and acceptance criteria for all properties. A special permit will be requested for post-construction pressure testing, PHMSA would expect that 100% of pipe joints be tested to verify material properties. If a sampling approach is used to verify pipe material properties, the ASAP Project must submit an engineering and technical justification for assuring that all pipe joints meet material specifications. Because of recent problems at other construction projects with pipe steel not meeting specified minimum yield strength (SMYS) specifications, the ASAP Project should explicitly address its processes and procedures for assuring that all pipe joints meet minimum material property specifications.

(e) Required Information: Provide a process description for analyzing and dispositioning material properties and flaws. If applicable, provide the basis for determining the use of Engineering Critical Assessment methodology to address the acceptability of material flaws.

5.0 Construction Requirements

5.1 Qualification of Welding Procedures

5.1.1 Criterion: Existing PHMSA regulations specify minimum requirements for welding of pipe. Welding of pipe in arctic environment presents challenges.

Basis: 49 CFR Part 192, Subpart E

(a) Required Information: Provide any special processes, procedures, or additional requirements used to qualify the weld procedure in accordance with API 1104. In particular, if strain based design is used, the destructive testing used to qualify the weld procedure should be both a hoop stress overstress test and a bending/mechanical deformation overstrain test. Include a description of all special processes (e.g., backwelding).

(b) Required Information: If API 1104, Appendix A will be used for welding and weld non-destructive testing, the ASAP Project must outline guidance documents for the testing of weld and non-destructive testing (NDT) procedures for various pipe steel suppliers and pipe manufacturers. The guidance must document how pipeline welders and NDT technicians will be qualified. The guidance document must outline how Appendix A will be developed into construction procedures that give guidance to Construction Personnel and Quality Assurance Personnel to properly handle pipe lifting and lower-in operations with out invalidating API 1104, Appendix A.

(c) Required Information: Provide a description of how the weld procedures account for very heavy wall pipe, the extreme arctic environment, and any other unique condition not typically encountered in pipeline construction in the lower 48 states. Factors such as pre-weld heat treatment, post-weld heat treatment, maintenance of heat on weld, and maximum time allowed between passes should be explicitly addressed. Demonstrate how the shop qualified weld procedure or procedure qualified in a controlled environment is appropriate for the field environment.

(d) Required Information: Provide a description of how the weld procedures account for the potential difficulties encountered with weld site preparation and pipe fit-up for any field-cut factory bends and pipe wall thickness variances. This information should include, but not be limited to, fit-up tolerance for alignment of pipe ends, joint design, accounting for wall thickness variance,

(e) Required
Information: Provide a description of how the weld procedures will be qualified and field implemented for conducting backwelding and repair welding to meet API 1104.

5.2 Qualification of Welders

5.2.1 Criterion: Existing PHMSA regulations specify minimum requirements for welder qualification. Welding of pipe in arctic environment presents challenges.

Basis: 49 CFR Part 192, Subpart E

(a) Required
Information: Provide a description of the process for qualifying individuals to weld on the pipeline. Explicitly describe any special features of the welder qualification process that address very heavy wall pipe, the extreme arctic environment, and any other unique condition not typically encountered in typical pipeline construction in the lower 48 states.

5.3 Weld Acceptance Testing and Acceptance Criteria

5.3.1 Criterion: Because the ASAP Project has indicated it intends to request a special permit from post-construction pressure testing, weld acceptance testing and acceptance criteria are critical.

Basis: 49 CFR Part 192, Subpart E

(a) Required
Information: Provide the specific written weld test program and weld acceptance criteria. Because the ASAP Project has indicated it intends to request a special permit from post-construction pressure testing, PHMSA would expect that 100% of welds would be nondestructively tested. The ASAP Project should describe and justify its weld acceptance criteria, using API 1104 as the basis; in particular, the ASAP Project should describe and justify if it intends to incorporate alternative acceptance criteria from Appendix A of API 1104 and use of any other proposed standards. the ASAP Project should describe the pipe conditions where backwelding will be used including for fittings, heavy wall pipe and transitions.

5.4 General Construction in Arctic Conditions

5.4.1 Criterion: Each transmission line or main must be constructed in accordance with comprehensive written specifications or standards that are consistent with Part 192. If the ASAP Project intends to request a special permit from post-construction pressure testing, additional measures are needed to assure that the pipeline does not sustain integrity-threatening damage during construction. In addition, extreme arctic conditions pose unique challenges to pipeline construction.

Basis: 49 CFR Part 192, Subpart G

(a) Required Information: The ASAP Project should submit its plans and processes for quality oversight of construction activities, including QC inspection of all construction activities.

(b) Required Information: The ASAP Project should submit its plan regarding how it will address the unique challenges of the arctic environment during pipeline construction (e.g., discontinuous permafrost, stability of disturbed permafrost, pinch points). The ASAP Project should address if and how it will apply API RP 2N to its pipeline construction activities.

(c) Required Information: The ASAP Project should submit its plan to assure pipe coating durability and integrity during pipe lowering, backfilling, and horizontal directional drills. The plan should describe all pipeline installation activities including procedures for handling pipe, lowering pipe into the ditch, type of backfill material to be used, and backfill procedures.

(d) Required Information: PHMSA expects that all construction personnel would be covered under the ASAP Project's Construction OQ program for the Alternative MAOP Rule, since mistakes during construction could lead to threats to pipeline integrity. The ASAP Project should describe all construction and verification related tasks to be included in its Construction OQ program. Helpful information for compliance with the Alternative MAOP Rule can be found at: http://primis.phmsa.dot.gov/maop/index.htm .

(e) Required Information: The ASAP Project should submit its plan regarding how it will address the unique challenges of the arctic environment during the time period between completion of construction for each segment and operational startup. PHMSA would expect the pipeline to be maintained and monitored sufficiently to prevent damage from outside forces, corrosion, etc. prior to being placed into service. The ASAP Project should address how it will monitor the pipeline for potential damage (including strain conditions) that could occur to the pipeline segments during long periods of disuse prior to placing the pipeline system into service.

5.4.2 Criterion: Regulations require that pipeline and components must have sufficient supports to preclude undue strain, including but not limited to, that caused by temperature-induced contraction/expansion or by high internal pressures.

Basis: 49 CFR § 192.161

(a) Required Information: Provide design and construction requirements for support structures.

5.5 Recent Construction Issues

5.5.1 Criterion: PHMSA has identified problems at recent construction projects in the lower 48 states that could present special challenges during construction in an arctic environment. PHMSA expects the ASAP Project to proactively develop its construction processes and procedures to avoid these problems.

Basis: 49 CFR Part 192, Subpart E

(a) Required Information: Provide a description of plans, processes and procedures to address/prevent the following problems: field cuts of factory or induction bends (sized for segmenting), poor weld fit-up, poor quality welding, poor backfill material, damaged or improperly installed coating, damaged pipe from improper bending in the field, hydrogen assisted cracking, damage or over-strain during lowering in ditch and backfill, and poor quality NDT.

5.6 Additional Construction Requirements for Alternative MAOP

5.6.1 Criterion: It is our understanding that the ASAP Project's strain based design approach and methodology for post-construction verification of pipeline integrity will necessitate the need to apply for a special permit from MAOP and/or class location requirements of Subparts J and/or L. Even if a special permit is not requested, the ASAP Project may desire to operate at the alternative MAOP allowed in Part 192. In either case, additional construction requirements of 49 CFR §§ 192.384 and 192.620 apply.

Basis: 49 CFR §§ 192.384 and 192.620

(a) Required Information: Provide information that demonstrates compliance with 49 CFR §§ 192.384 and 192.620 for applicable pipeline segments.

6.0 <u>Corrosion Control Requirements</u>

6.1 External Corrosion Control

6.1.1 Criterion: An effective corrosion control program is essential to long term pipeline integrity.

Basis: 49 CFR Part 192, Subpart I

(a) Required Information: Submit plans for managing external corrosion, including coating system, cathodic protection (CP), surveillance, monitoring, and periodic assessment (i.e., ILI assessment). The plans should provide comprehensive details of the CP system design, installation, operation, maintenance, and performance (including minimum performance specifications). PHMSA expects plans to include interference surveys to identify and mitigate all sources of interference (e.g., telluric currents, nearby pipelines, high voltage electric transmission lines, third party structures, etc.) and how they impact CP of the pipeline.

(b) Required Information: Submit plans for managing internal corrosion, including moisture control, inhibitors, coupons, monitoring, and periodic assessment (i.e., ILI assessment).

(c) Required Information: Submit plans for managing atmospheric corrosion on non-buried pipe, including monitoring and periodic assessment (i.e., ILI assessment).

6.2 Internal Corrosion Control

6.2.1 Criterion: An effective corrosion control program is essential to long term pipeline integrity.

Basis: 49 CFR Part 192, Subpart I

(a) Required Information: Describe your program to monitor for and mitigate the presence of, deleterious gas stream constituents, including, as applicable:

i. Provisions for use of filter separators or separators and gas quality monitoring equipment,
ii. Use of gas quality monitoring equipment including moisture analysis, chromatograph, and periodic hydrogen sulfide sampling
iii. Use of cleaning pigs and inhibitors, and sample accumulated liquids
iv. Use of corrosion coupons for internal corrosion monitoring

(b) Required Information: Describe your program to address deleterious gas stream constituents including the following as applicable:

i. Provisions to limit carbon dioxide and limits
ii. Provisions to restrict the presence of free water and limits
iii. Provisions to limit hydrogen sulfide and limits

(c) Required Information: Describe your program for review of the effectiveness of your mitigation and monitoring efforts, including anticipated frequency of formal review

7.0 Testing Requirements

7.1 Post Construction Pressure Test

Criterion: Each pipeline must be pressure tested to substantiate material strength, proposed MAOP, and that it is leak-tight. It is our understanding that the ASAP Project intends to request a special permit from this requirement. This is a critical aspect of pipeline regulations that verifies pipeline integrity prior to being placed into service. Other provisions of the pipeline safety regulations are predicated upon a successful demonstration of pipeline strength by pressure test. Any special permit from conducting a pressure test that fully complies with 49 CFR Part 192, Subpart J would require a substantial justification, including mitigation measures to assure an equal or greater level of pipeline safety.

Basis: 49 CFR Part 192, Subpart J

(a) Required Information: The ASAP Project should describe its proposed alternative methods to verify the strength and leak-tightness of the pipeline prior to being placed into service. As part of this information, the ASAP Project should describe additional compensatory measures related to pipeline design, construction, inspection, and testing of materials, operational measures and components to assure pipeline integrity. A comprehensive quality assurance and verification program description will ultimately be required of the ASAP Project.

(b) Required Information: If the ASAP Project chooses to conduct a pressure test in conformance with Subpart J, describe the test plans and procedures to be used. The procedures should address the specific challenges associated with conducting the pressure test in arctic conditions.

8.0 Operation and Maintenance (O&M) Requirements

8.1 MAOP

8.1.1 Criterion: Existing regulations require that MAOP be established based on test pressure and assuring that the hoop stress does not exceed SMYS (with safety margin) for the class location in which the pipeline segment is located. If the ASAP Project applies for a special permit from the regulations pertaining to the MAOP, and/or class location, PHMSA would expect the applicable provisions of 49 CFR § 192.620 to apply. Even if a special permit is not requested, the ASAP Project may desire to operate the pipeline in accordance with the alternative MAOP allowed by Part 192. In either case, the ASAP Project should describe its program for complying with 49 CFR § 192.620.

Basis: 49 CFR Part 192, Subparts J and L; 49 CFR § 192.620

(a) Required Information: Describe and justify your alternative process for establishing the MAOP of the pipeline, if applicable.

(b) Required Information: Describe and justify your program for complying with the O&M requirements contained in 49 CFR § 192.620(d) for operating at alternative MAOP, if applicable.

8.2 Strain Monitoring

8.2.1 Criterion: With a traditional stress based design, assuring that the pipe hoop stress is not exceeded is a relatively simple matter of enforcing the MAOP. With a strain based design, long term assurance that design basis strain loading conditions are not exceeded requires the effective use of strain gauges and an effective monitoring program. PHMSA would expect that the ASAP Project's additional preventive measures would include a formal program for monitoring strain and ROW conditions. PHMSA would expect additional monitoring in earthquake zones and fault zones, hill/mountain side cut areas, discontinuous permafrost and permafrost areas including freeze/thaw areas. Because of the anticipated special permit to use strain based design, and the proximate threat of outside forces, PHMSA expects the ASAP Project to implement a robust strain monitoring program.

Basis: 49 CFR Part 192, Subpart L

(a) Required
Information: Describe and justify the systems, tools, and plans for continually monitoring and analyzing localized strain on the pipeline, along with procedures for implementing preventive and mitigative measures to proactively address conditions that could cause design basis strain limits to be exceeded. PHMSA would expect such a program to include periodic ILI assessment with tools capable of identifying pipe deformation and other anomalies indicative of pipe movement, deformation, or other strain conditions.

8.3 Reliability Based Assessment

8.3.1 Criterion: It is implicit in 49 CFR Part 192 that operators are to apply stress-based design practices for pipeline design. Since many specific regulations assume this approach and are predicated on a stress-based design, the application of other design practices requires a special permit. Use of a Reliability Based Design and Assessment (RBDA) approach requires review of extensive information in order to reach the conclusion that pipeline safety is not compromised. A key aspect of RBDA is the periodic assessment of pipeline condition and integrity to assure that limit states are not exceeded during the life of the pipeline.

Basis: 49 CFR Part 192, Subparts C, J, L, and O.

(a) Required
Information: Provide a description of the program for monitoring pipeline integrity and the material condition of the pipeline, including assessment methodology, acceptance criteria for anomalies/defects, and frequency of assessment. PHMSA would expect such a program to include an ILI assessment program and a comprehensive strain monitoring program.

(b) Required
Information: Provide a description of the operational approach that will be used as the dense gas phase transitions between gaseous, liquid and supercritical fluid. PHMSA would expect the approach to include normal and abnormal operations and associated monitoring and mitigation.

9.0 Integrity Management Requirements

9.1 Failure Impact Zone

9.1.1 Criterion: Covered pipeline segments must comply with the integrity management requirements of 49 CFR Part 192, Subpart O. In addition, ASME B31.8S provides guidance for managing pipeline integrity. An important aspect of managing pipeline integrity is understanding the consequences of an explosion and/or fire that could occur following a failure. It is our understanding that the ASAP Project intends to request a special permit from key requirements such as design and pressure testing. As part of granting such a special permit, PHMSA would expect the ASAP Project to develop rigorous and robust failure impact zone analysis for the entire pipeline.

Basis: 49 CFR Part 192, Subpart O and ASME B31.8S

(a) Required Information: Identify the covered pipeline segments as defined by Subpart O. Identify how the covered segments are identified, including how the potential impact radius (PIR) is determined. This should include justification for derivation of the PIR formula in accordance with ASME B31.8S for the unique operating parameters contemplated, including very large pipe diameter, very high operating pressure, and very rich gas.

(b) Required Information: The ASAP Project should identify and justify how it will use the methodology in ASME B31.8S (or other methodology) to identify the leak or failure impact zone of an explosion and/or fire resulting from a leak or failure of the pipeline. The ASAP Project should also analyze and provide a report on the potential consequences arising from injury to any persons in proximity to the pipeline, population density, proximity of population with limited or impaired mobility, damage to property in proximity to the pipeline, damage to the environment, potential for secondary failures, and the impact on public convenience and necessity. The report should include a justification for the threshold heat flux and shock wave used to evaluate each type of damage receptor and consider fire duration. Note that consequences may vary based on the richness of the gas transported and as a result of how the gas decompresses. The richer the gas, the more important defects and material properties are in modeling the characteristics of the failure. Because of the unique circumstances in Alaska, it is important to assure that the impact of an explosion or fire on nearby critical infrastructure is minimized. This includes, but is not limited to, the Trans Alaska Pipeline System (TAPS), bridges, electric power transmission lines, etc. In additional, the ASAP Project should analyze the effects of un-ignited gas releases and impacts resulting from interruption of service.

9.2 Periodic Integrity Assessments

9.2.1 Criterion: The integrity management rule requires that pipeline integrity be assessed at least every 7 years. It is our understanding that the ASAP Project intends to request a special permit from key requirements such as design and pressure testing. As part of granting such a special permit, PHMSA would expect the ASAP Project to conduct integrity assessments for the entire pipeline more frequently than the minimum required in Subpart O.

Basis: 49 CFR Part 192, Subpart O and ASME B31.8S

(a) Required Information: Describe the planned integrity assessment methods, frequency, and how they address all threats applicable to the entire pipeline.

9.3 Preventive and Mitigative Measures

9.3.1 Criterion: The integrity management rule requires that pipelines in high consequence areas have additional preventive and mitigative measures, beyond those otherwise required by 49 CFR Part 192. It is our understanding that the ASAP Project intends to request a special permit from key requirements such as design and pressure testing. PHMSA would expect the ASAP Project to develop rigorous and robust preventive and mitigative measures for the entire pipeline to assure long term pipeline integrity.

Basis: 49 CFR Part 192, Subpart O and ASME B31.8S

(a) Required Information: Describe the planned preventive and mitigative measures, and how they address all threats applicable to the pipeline.

(b) Required Information: Correlate preventive and mitigative measures to the proposed application of RBDA and its associated catalog of design limits. The information must demonstrate how the ASAP Project, using RBDA, confirms consistency with the integrity management requirements.

9.4 Risk Analysis

9.4.1 Criterion: The integrity management rule requires operators to conduct a risk analysis for pipeline segments in high consequence areas and use the risk analysis results to schedule and prioritize integrity assessments, identify threats, and determine preventive and mitigative measures to manage those threats. It is our understanding that the ASAP Project intends to request a special permit from key requirements such as design and pressure testing. As part of granting such a special permit, PHMSA would expect the ASAP Project to develop and implement a rigorous and robust risk analysis methodology for the entire pipeline to assure long term pipeline integrity.

Basis: 49 CFR Part 192, Subpart O and ASME B31.8S

(a) Required Information: Describe the planned risk analysis methodology, and how it will be used to manage all threats applicable to the entire pipeline and assure pipeline integrity.

(b) Required Information: The ASAP Project should describe the methodology for using risk analysis results to identify the risk drivers for each pipeline segment and how those risk drivers will be used to determine the most effective integrity assessment and/or mitigation option. In doing so, the ASAP Project should analyze the unique circumstances associated with each special permit request as well as the failure impact zone to identify how to manage the threats and prevent or mitigate the consequences of a leak or failure, when the special permit conditions are in place, using the most effective engineering, integrity assessment and operational measures for risk mitigation.

(c) Required Information: The ASAP Project should describe how it will validate its risk analysis methodology to assure that the methods used have produced results that are usable and consistent with the operator's and industry's experience. The ASAP Project should describe how it will analyze and monitor operational, maintenance or other activities to identify areas that are inaccurately represented by the risk analysis process, and use that information to modify and continually improve its risk analysis process.

Enclosure B

Guidance for Special Permit Applicants on Providing Environmental Information

The processing of an Alaska gas pipeline special permit (SP) application will involve an environmental analysis in accordance with the National Environmental Policy Act of 1969 (NEPA), the President's Council on Environmental Quality regulations implementing NEPA (40 CFR 1500-1508), and Department of Transportation (DOT) policy. To the extent PHMSA's grant or denial of your special permit request may constitute a Federal action under NEPA, in addition to analyzing any potential risks to public safety, PHMSA also analyzes any potential risks to the environment that could result from such grant or denial. PHMSA will evaluate whether the special permit would significantly impact the likelihood of a pipeline spill or failure as compared to the environmental status quo in the absence of the special permit.

PHMSA requests that the applicant submit its special permit applications and environmental information as soon as possible. If PHMSA does not receive special permit applications and all necessary supporting information well in advance the ASAP Project decision making on design, construction and other issues, the project may be delayed.

To facilitate PHMSA's environmental analysis, the special permit applicant needs to provide certain environmental information. The purpose of this form is to provide guidance to the applicant on what information should be provided. Any information submitted by the applicant is subject to being made public.

I. Purpose and Need

[Describe pipeline and specify county and state where the affected segments located]

[Cite regulation(s) for which special permit (waiver) is sought. Paste relevant portion of regulation(s) here.]

[State the unique circumstances and reasons for your special permit request. Explain how the special permit will benefit you and the public.]

II. Site Description and Affected Environment

Describe the right-of-way and the type of environment in the vicinity of the affected pipeline segments including:

[Provide map if available]

[Describe extent to which landowners, businesses, and residential areas are in the vicinity including parks]

[Describe surface waters in the vicinity including wetlands]

[Describe drinking water aquifers in the vicinity]

[Describe soils and vegetation in the vicinity]

[Describe wildlife habitats including fisheries in the vicinity]

[Describe any geologic hazards]

[Describe any cultural resources that may be affected if a special permit were granted]

[Describe any socioeconomic impacts or special impacts on Native Americans, if any,, if a special permit were granted]

[Describe the existing infrastructure that is within the Potential Impact Radius of the pipeline]

III. Mitigation Measures

[Describe the alternative mitigation measures you are offering to implement in lieu of compliance with the regulations for which you are seeking a special permit.]

IV. Analysis and Investigation of Alternatives

[Explain the basis for the particular set of alternative mitigation measures listed in section III above. Explain whether the measures will ensure that a level of safety and environmental protection equivalent to compliance with existing regulations is maintained.]

[Discuss how the special permit would affect the risk or consequences of rupture or failure (positive, negative, or none)]

[Discuss any effects on pipeline longevity and reliability such as life-cycle and periodic maintenance. Discuss any technical innovations as well]

[Discuss how the special permit would impact human safety]

[Discuss whether the special permit would affect land use planning]

[Discuss any pipeline facility, public infrastructure, and environmental impacts associated with implementing the special permit. In particular, discuss how any environmentally sensitive areas could be impacted]

[Evaluate alternatives to the special permit and any beneficial or adverse consequences of such alternatives.]

NOTE: The ASAP Project should include the pipeline stationing and mile posts (MP) for the location or locations of the applicable ***special permit segment(s)***.

SEAN PARNELL
Governor

P.O. Box 110001
Juneau, Alaska 99811-0001
(907) 465-3500
Fax (907) 465-3532

STATE OF ALASKA
OFFICE OF THE GOVERNOR

April 12, 2010

Mr. Jeffrey D. Wiese
Associate Administrator for Pipeline Safety
U.S Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590

Dear Mr. Wiese,

The Office of the Governor is in receipt of March 3, 2010 requesting information about the nature of the proposed Alaska In-State Gas Pipeline Project and plans for the project to submit waivers for compliance with Federal Pipeline Safety Regulations under the federal standards you identified.

Our Office has reviewed Enclosure A included in your letter that requests information concerning special permits. I am enclosing a table with this letter which responds to each criterion you identified. Please note a number of concerns raised in Enclosure A are related to procedures that have been identified, or are under consideration by other proposed arctic natural gas pipeline proponents. The Alaska In-State Gas Pipeline Project (identified in your letter as the Alaska Stand Alone Pipeline) is attempting to maintain a tight timeline in order to provide for the near term energy needs of residents and commercial interests within the state of Alaska. Our team has made specific efforts throughout our planning and initial engineering design to highlight issues that might cause delay, and has worked hard to avoid the need for any request for submission of special permit applications for the project pursuant to 49 C.F.R. Section 190.341. We believe there are no special permit applications required at this time, but will remain diligent in our review of such need.

For example, we are not requesting waivers for the Alaska In-State Gas Pipeline Project (identified in Enclosure A of your March 3, 2010 letter) for the following key permits:

- application of reliability based design and assessment;
- deviation from depth of cover and valve spacing requirements;
- relief from post-construction hydrotest requirements;
- alternative MAOP requirements; or
- deviation from class location requirements.

Enclosure B to your letter contains "Guidance for Special Permit Applicants on Providing Environmental Information." An Environmental Impact Statement (EIS) in accordance with the National Environmental Policy Act (NEPA) is currently underway with the U.S. Army Corps of Engineers (USACE) as the lead federal agency with several other federal agencies acting as cooperating agencies. The EIS will assess potential risks to the public and the environment that could result from approval of the Alaska In-State Gas Pipeline Project. In the event that the Alaska In-State Gas Pipeline Project needs to deviate from one or more regulations, a special permit waiver would be filed with Pipeline and Hazardous Materials Safety Administration (PHMSA). Alaska In-State Gas Pipeline Project would coordinate with PHMSA, the USACE, and the cooperating agencies to evaluate the potential environmental effects of any special permit waiver and analyze this request in accordance with NEPA.

The Alaska In-State Gas Pipeline Project team will also stay informed on the progress of other pipeline projects in the state, and will stand ready to adopt any new policies for arctic conditions as they are developed and PHMSA deems them appropriate for our project.

We would appreciate it if you would continue to include us in any deliberations as these matters progress.

Sincerely,

Robert Swenson

Robert Swenson
Project Manager
Alaska In-State Pipeline

Enclosure

cc: The Honorable Gene Therriault, Office of the Governor
Serena Sweet, U.S. Army Corps of Engineers
Ron Denton, Bureau of Land Management
Mike Thompson, Joint Pipeline Office
Harold Heinze, Alaska Natural Gas Development Authority

In-State Gas Pipeline Project [Alaska Stand Alone Pipeline (ASAP)]
PHMSA March 3, 2010 Information Request - Response Outline

Issue	Criterion Summary	Response
2.1.1	Provide PHMSA with sufficient information early in design process	The detailed design phase of the Alaska Stand Alone Pipeline (ASAP) project is scheduled to start in 2011.
2.2.1	Quality Management System	A Quality Management System for the ASAP project would be implemented during detailed design.
2.3.1	Construction Quality Assurance	A construction QA/QC plan would be developed for construction, in conjunction with the selected construction contractors.
3.1.1	Reliability Based Design and Assessment	A Reliability Based Design and Assessment (RBDA) approach is not proposed for use by the project.
3.2.1	Strain Based Design	Strain based design for integrity assurance for arctic geohazard potential loadings would be developed, as required, in accord with American Society of Mechanical Engineers (ASME) B31.8, Para833.5: "Design for Stresses Greater than Yield".
3.3.1	Additional Design Requirements for Alternative Maximum Allowable Operating Pressure (MAOP)	No special permit for the following are being sought: • class location requirements, or • alternative MAOP
3.4.1	Depth of Cover	No special permits are being sought for deviations from depth of cover.
3.5.1	Valve Spacing	No special permits are being sought for deviations from minimum block valve spacing.
3.6.1	Pipeline Components	No special permits are being sought for pipeline components.
4.1.1	Steel Pipe Manufacturing Specification and Quality	The specifications for the proposed X70 line-pipe will be ensured to meet all regulatory requirements and PHMSA guidelines. However, detailed pipe specifications and vendor qualifications pipe are not expected to be addressed until the detailed design phase.
5.1.1	Qualification of Welding Procedures	Welding requirements would be developed during detailed design.
5.2.1	Qualification of Welders	Welder qualification requirements would be specified in the construction bid.
5.3.1	Weld Acceptance Testing and Acceptance Criteria	No special permits are being sought for deviations from post-construction pressure testing.

Issue	**Criterion Summary**	**Response**
5.4.1	General Construction in Arctic Conditions	No special permits are being sought for deviations from post-construction pressure testing. Special construction practices required for arctic conditions would be addressed in the Construction plan and Quality Assurance & Quality Control (QA/QC) manual.
5.5.1	Recent Construction Issues	Construction practices required to avoid pipe quality issues, and to remediate all identified defects would be addressed in the Construction plan and QA/QC manual.
5.6.1	Additional Construction Requirements	No special permits for the following are being sought: • class location requirements, or • alternative MAOP
6.1.1	External Corrosion Control	External corrosion control would be addressed during detailed design
6.2.1	Internal Corrosion Control	Internal corrosion control would be addressed during detailed design
7.1	Post Construction Pressure Test	No special permits are being sought for deviations from hydrotest requirements.
8.1.1	MAOP	No special permits for the following are being sought: • class location requirements, or • alternative MAOP
8.2.1	Strain monitoring	Operational monitoring techniques would be developed in accord with any strain based design measures
8.3.1	Reliability Based Assessment	A Reliability Based Design and Assessment (RBDA) approach is not proposed for use by the project.
9.1.1	Failure Impact Zone	No special permits are being sought for deviations from hydrotest requirements.
9.2.1	Periodic Integrity Assessments	No special permits are being sought for deviations from hydrotest requirements.
9.3.1	Preventive and Mitigative Measures	No special permits are being sought for deviations from hydrotest requirements.
9.4.1	Risk Analysis	No special permits are being sought for deviations from hydrotest requirements.

U.S. Department of Transportation

Pipeline and Hazardous Materials Safety Administration

1200 New Jersey Ave, S.E.
Washington, D.C. 20590

MAY 04 2011

Mr. Daniel Fauske
President
Alaska Gasline Development Corporation
P.O. Box 101020
411 West Fourth Ave., Suite 1E
Anchorage, AK 99501

Re: Supplemental to PHMSA letter dated March 3, 2010;
State of Alaska letter to PHMSA dated April 12, 2010
ASAP Plan of Development dated March 2011

Dear Mr. Fauske:

On March 3, 2010, the Pipeline and Hazardous Materials Safety Administration (PHMSA) wrote to Mr. Robert Swenson of the Alaska Gasline Development Corporation(AGDC) requesting information concerning the proposed Alaska Stand Alone Gas Pipeline Project (ASAP Project). PHMSA informed AGDC that to the extent the ASAP Project proposal called for design, materials, construction, or operating specifications that would not meet the current Federal Pipeline Safety Regulations, AGDC may need to submit one or more special permit applications for the project pursuant to 49 C.F.R. § 190.341. A special permit is an order by which PHMSA waives or modifies compliance with one or more of the Federal Pipeline Safety Regulations under the standards set forth in 49 U.S.C. § 60118(c) and 49 C.F.R. § 190.341, subject to conditions and limitations set forth in the order. A special permit may be issued to a pipeline operator (or prospective operator) for specified facilities that, absent waiver, would be subject to the regulation.

AGDC's April 12, 2010, response to our March 3, 2010 letter stated that "We believe there are no special permit applications required at this time, but will remain diligent in our review of such need." AGDC has briefed PHMSA technical experts several times on certain aspects of the project, but the level of detail has been insufficient for PHMSA to fully understand AGDC's plans and approach to some of the technical and regulatory issues described in the letter.

Based on the information on the ASAP Project provided in connection with the limited project briefings, we believe that current regulations may not allow the approach to the ASAP Project that AGDC may be proposing in certain geo-hazard areas. More specifically, one or more special permit applications may be required if the following approaches are being used:

External loads that exceed design allowable – strain based design
As prescribed in 49 CFR §§ 192.103, 192.105, 192.111, 192.317, and 192.620, natural gas pipelines must be designed to limit stresses below the specified minimum yield strength (SMYS) by a design factor based on class location. AGDC has indicated that it intends to operate under the standard maximum allowable operating pressure (MAOP) provisions of 49 CFR Part 192 and the alternative MAOP provision in section 192.620 allowing 80% SMYS under certain circumstances will not be used. Most of the pipeline is anticipated to be located in a Class 1 location. Accordingly, for those segments located in a Class 1 location, the stress must be limited to 72% SMYS. Lower allowable stresses would apply to Class 2 and 3 locations. The regulations in 49 CFR §§ 192.103 and 192.105 also require additional wall thickness sufficient to handle concurrent external loads, and require that the pipeline be protected from foreseeable hazards and conditions that may cause the pipeline to sustain abnormal loads.

AGDC has indicated that "Strain based design (SBD) for integrity assurance for arctic geo-hazard potential loadings would be developed, as required, in accordance with American Society of Mechanical Engineers (ASME) B31.8, para833.5: "Design for Stresses Greater than Yield"" (see Enclosure A, State of Alaska letter to PHMSA dated April 12, 2010). PHMSA believes this approach may result in the pipeline being subjected to indefinitely sustained loads in excess of 72% SMYS in areas of frost heave, thaw settlement, slope instability, and other areas of expected significant soil movement. To date, PHMSA is not aware that design and operational methods to predict and monitor strain to assure that external loads that exceed the pipe SMYS and approach ultimate tensile strength are detected and mitigated have been proposed for the ASAP Project.

The current Part 192 code is based on hoop strength and internal pressure. Part 192 has no provisions for the material, design, operations and maintenance, or integrity management aspects of SBD; nor do any sections of API 5L, ASME/ANSI B31.8 or B31.8S that have been incorporated by reference into Part 192. Therefore, a special permit application with detailed technical and engineering analysis of materials, design, and operating parameters and a full description of proposed mitigative measures would be required to allow PHMSA to make a determination as to whether the proposed use of SBD to allow the ASAP pipeline to indefinitely sustain external loads in excess of current design strength requirements is consistent with pipeline safety.

Fracture Control Plan
Under 49 CFR § 192.112(b), the ASAP Project is not required to have a fracture control plan if the pipeline will be operated at 72% SMYS operating pressures or less. Should the ASAP Project decide to design, construct, and operate the pipeline in accordance with the alternative MAOP Rule as prescribed in 49 CFR § 192.112, however, the pipeline must be designed for fracture initiation and fracture arrest which will require additional pipe toughness or crack arrestors to limit fracture propagation in failure situations.

Pipeline external coating

As prescribed in 49 CFR §192.455(a), a pipeline must have an external protective coating that meets the requirements of §192.461 and it must have a cathodic protection system designed to protect the pipeline in accordance with Subpart I. It is important to note, however, that use of an external coating with a shielding layer would likely prevent full cathodic protection from reaching the pipe. Therefore, all pipeline external coatings would be required to be compatible with cathodic protection as required in §192.461. If the pipeline is operated at an alternative MAOP, external coatings would also be required to meet § 192.112(f).

To avoid project delays, PHMSA suggests that ASAP submit any special permit applications for the above items or other project items that would not meet Part 192 as soon as possible. PHMSA advises ASAP to submit any special permit applications before making design-related decisions that could be adversely impacted by possible special permit conditions and measures that PHMSA may require in lieu of compliance with existing code provisions.

Additionally, to facilitate our review of your special permit application(s), please provide the information listed in Enclosures A and B of PHMSA's March 3, 2010 letter with any special permit application. Depending on your response, PHMSA may request additional information, including, but not limited to: data, reports, studies, and independent third party analyses. PHMSA expects a detailed safety and environmental review of a special permit application to take a minimum of 12 months or more, depending upon the extent and nature of the request, any requirements for additional information or studies, and the quality of submittal documents.

While the Army Corps of Engineers (COE) is currently designated as the lead agency for environmental reviews of the overall project, PHMSA is required to conduct an environmental review of any environmental impacts of its decision to grant or deny a particular special permit. An overview of the preliminary environmental information needed to support your special permit applications and facilitate PHMSA's environmental review is provided in Enclosure B. Enclosure C details information requested for a special permit for allowable external loads over 72% of Specified Minimum Yield Strength (SMYS) of the pipe – Strain Based Design.

Your timely submission of special permit applications and detailed safety and environmental information will enable PHMSA to properly analyze potential risks to public safety and to the environment that could result from our decision to grant or deny a special permit.

Please contact Dennis Hinnah, Deputy Director of Western Region at (907) 271-4937, or Jeffery Gilliam, Director of Engineering and Research Division, at (202) 366-0568, if you have any questions.

Sincerely,

Jeffrey D. Wiese
Associate Administrator for Pipeline Safety

cc: With Enclosures B and C

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Enclosure B
Guidance for Special Permit Applicants on Providing Environmental Information

The processing of an Alaska gas pipeline special permit (SP) application will involve an environmental analysis in accordance with the National Environmental Policy Act of 1969 (NEPA), the President's Council on Environmental Quality regulations implementing NEPA (40 CFR 1500-1508), and Department of Transportation (DOT) policy. To the extent PHMSA's grant or denial of your special permit request may constitute a Federal action under NEPA, in addition to analyzing any potential risks to public safety, PHMSA also analyzes any potential risks to the environment that could result from such grant or denial. PHMSA will evaluate whether the special permit would significantly impact the likelihood of a pipeline spill or failure as compared to the environmental status quo in the absence of the special permit.

PHMSA requests that the applicant submit its special permit applications and environmental information as soon as possible. If PHMSA does not receive special permit applications and all necessary supporting information well in advance the ASAP Project decision making on design, construction and other issues, the project may be delayed.

To facilitate PHMSA's environmental analysis, the special permit applicant needs to provide certain environmental information. The purpose of this form is to provide guidance to the applicant on what information should be provided. Any information submitted by the applicant is subject to being made public.

I. Purpose and Need

[Describe pipeline and specify county and state where the affected segments located]

[Cite regulation(s) for which special permit (waiver) is sought. Paste relevant portion of regulation(s) here.]

[State the unique circumstances and reasons for your special permit request. Explain how the special permit will benefit you and the public.]

II. Site Description and Affected Environment

Describe the right-of-way and the type of environment in the vicinity of the affected pipeline segments including:

[Provide map if available]

[Describe extent to which landowners, businesses, and residential areas are in the vicinity including parks]

[Describe surface waters in the vicinity including wetlands]

[Describe drinking water aquifers in the vicinity]

[Describe soils and vegetation in the vicinity]

[Describe wildlife habitats including fisheries in the vicinity]

[Describe any geologic hazards]

[Describe any cultural resources that may be affected if a special permit were granted]

[Describe any socioeconomic impacts or special impacts on Native Americans, if any, if a special permit were granted]

[Describe the existing infrastructure that is within the Potential Impact Radius of the pipeline]

III. Mitigation Measures

[Describe the alternative mitigation measures you are offering to implement in lieu of compliance with the regulations for which you are seeking a special permit.]

IV. Analysis and Investigation of Alternatives

[Explain the basis for the particular set of alternative mitigation measures listed in section III above. Explain whether the measures will ensure that a level of safety and environmental protection equivalent to compliance with existing regulations is maintained.]

[Discuss how the special permit would affect the risk or consequences of rupture or failure (positive, negative, or none)]

[Discuss any effects on pipeline longevity and reliability such as life-cycle and periodic maintenance. Discuss any technical innovations as well]

[Discuss how the special permit would impact human safety]

[Discuss whether the special permit would affect land use planning]

[Discuss any pipeline facility, public infrastructure, and environmental impacts associated with implementing the special permit. In particular, discuss how any environmentally sensitive areas could be impacted]

[Evaluate alternatives to the special permit and any beneficial or adverse consequences of such alternatives.]

NOTE: The ASAP Project should include the pipeline stationing and mile posts (MP) for the location or locations of the applicable ***special permit segment(s)***.

Enclosure C
Information Requested for the Anticipated Special Permit for Allowable External Loads over 72% Specified Minimum Yield Strength (SMYS) – Strain Based Design

Information that would be needed in a special permit application includes:

- Arctic Engineering
  - Route data, geothermal, hydraulics, and geo-technical
  - Frost heave & settlement prediction models
  - Pipe to soil structural modeling
    - Frost heave lab tests
    - Frozen soil uplift tests
    - Heave field test comparisons
    - Full scale bend tests
  - Environmental loads – soil properties, hill sides, slide areas, settlement areas outside frost heave locations
  - Strain demand basis
- Materials
  - Pipe grade and wall thickness
  - Internal pressure effects – strain capacity and combined hoop stress on pipe
  - Pipe mechanical and chemistry properties, and steel and pipe rolling practices
  - Pipe weld end and body diameter and ovality requirements to meet on a consistent basis maximum girth weld misalignment assumptions for strain capacity
  - Pipe and steel inspection procedures
  - Pipe girth weld properties and procedures
  - Non-destructive pipe girth weld inspection practices
  - Coating application temperature effects – strength increase/decrease, work hardening (Y/T), and elongation effects
  - Allowable anomalies in pipe, weld and during operations and location of them – welds and pipe such as cracked welds, weld anomalies, pipe dents, and wall loss
    - Maximum girth weld misalignment and affect on strain capacity
    - Maximum girth weld flaws and there affect on strain capacity
      - Crack driving force for which a ductile crack becomes unstable as measured by a crack tip opening displacement (CTOD) test
    - Low strength steel and there affects on strain capacity
    - Wall loss anomalies in both circumferential and longitudinal direction and there affects on strain capacity
    - Pipe dents and there affect on strain capacity
- Pipeline Engineering and Construction
  - Strain demand and strain capacity basis
    - Design –
      - Design safety factors – review of arctic data, material data, and construction specifications
      - Reliability assessment - does it meet safety design factors

            - Strain capacity design basis – how are the below properties considered and destructive test results
                - Weld strength overmatch
                - Steel and weld toughness and heat affected zone softening
                - Curved wide plate tests
                - Full scale plate tests
                - Full scale bend tests
                - Finite element simulations
            - Design safety factors – any needed adjustments
                - Allowable strain limit versus ultimate strain limit
    - Construction
        - Construction specifications
            - Weld procedures – procedure testing, welder testing, and on-going verification tests during construction
            - Geotechnical verification parameters
            - Installation specifications – including verification parameters and any specification deviation parameters
            - Quality Assurance/Quality Control (QA/QC) practices to ensure engineering parameters are meet or exceeded
                - Training procedures
                - Inspection procedures
            - Documentation of construction, QA/QC and in-place installation findings
    - Operations and Maintenance (O&M)
        - Pipeline segments
            - Type monitoring required and monitoring interval – normal and strain design locations
            - O&M integrity actions to mitigative findings – when and intervals
            - Training of O&M personnel – type
            - Integrity Management (IM) – how strain capacity design is integrated into IM
                - Strain monitoring – type and intervals
                - Strain intervention criteria
                - Reviews of program to meet special permit, code, specifications, procedures, and keep public, employees, environment, and facilities safe

APPENDIX B STRUCTURAL MECHANICS OF BURIED PIPELINES

Although some sections of the ASAP are aboveground, notably at waterway crossings and at the beginning of pipeline route on the North Slope, ASAP is primarily a buried pipeline. Buried pipelines are essentially "restrained," that is, displacement of the pipe is restricted by the soil around it.

Engineering calculations typically address the pipe in a bi-axial stress state called plane stress. The active stresses considered in pipe engineering calculations are shown in Figure B. 1 – a hoop stress and strain which act around the circumference of the pipe, and a longitudinal stress and strain which are directed along the long axis of the pipe. In general, there is a third stress, a shear stress, which could be acting on the edges of the above unit section, but this is not normally significant and usually neglected in engineering calculations of transmission pipelines. Pipelines with diameter to wall thickness ratios (D/t) greater than 20, typical of transmission pipelines, are considered "thin-walled" as the distribution of normal stress perpendicular to the surface is essentially uniform throughout the wall thickness.

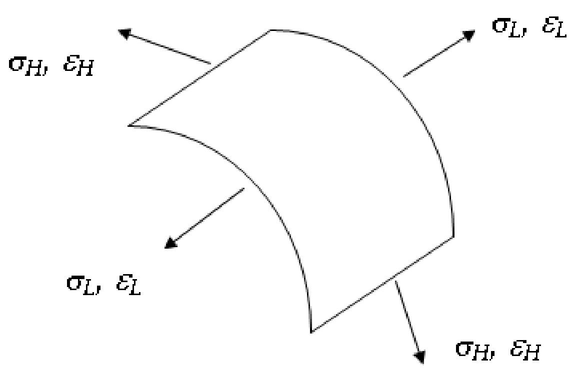

Figure B. 1 Pipe Stresses and Strains

The relation between stress (σ) and strain (ε) for pipeline steel when loaded in one direction (i.e., a unixial stress-strain curve) can be generally represented as shown in Figure B.2. Below the proportional limit, the stress is linearly related to the strain, a relation called Hooke's law, given by:

$$\sigma = E\varepsilon \qquad \text{Equation B.1}$$

with the constant "*E*" known as the Young's modulus. The yield point for pipeline engineering is defined by testing requirements to be the point at which the specified minimum yield strength (SMYS) of the pipe is recorded – 0.5% strain. Note that this definition of the "yield" does not concisely fit classical "textbook" definitions of yield, which is often defined as the point at which non-recoverable, i.e. "plastic" deformations, initiate. For example, if the pipe material was considered to be governed by Hooke's law to SMYS of 70 ksi, the associated strain would be only:

$$\varepsilon = 70ksi / 29{,}500ksi / in / in = 0.00237in / in = 0.237\%$$

Thus, to reach the strain associated with SMYS an additional 0.263% strain occurs, which cannot be accounted for by an elastic relationship. Note that alternative yield point definitions are defined using an "offset" method where a line with the elastic slope is drawn from a specified strain offset point – again confirming the necessary incorporation of non-recoverable (plastic) deformation just to reach SMYS.

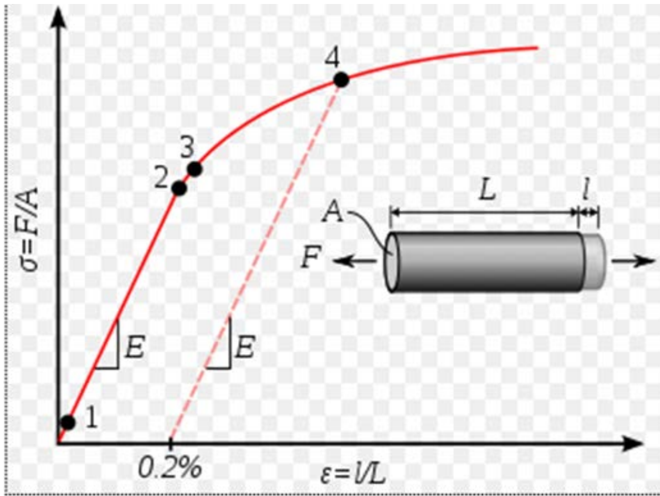

Figure B.2 Typical Pipe Stress-Strain Uniaxial Curve

where:

1. True Elastic limit (first dislocation)
2. Proportionality Limit
3. Elastic Limit
4. Yield point

Below the proportional limit of the pipe stress-strain curve, where the stresses and strains are linearly related the relationship between stress and strain under plane stress conditions can be expressed as:

$$\begin{pmatrix} \varepsilon_H \\ \varepsilon_L \end{pmatrix} = \frac{1}{E}\begin{bmatrix} 1 & -\nu \\ -\nu & 1 \end{bmatrix}\begin{pmatrix} \sigma_H \\ \sigma_L \end{pmatrix} \qquad \text{Equation B.2}$$

where:

E is the Modulus of Elasticity, sometimes called Young's modulus. For steel in the temperature range of operations, the value is approximately 29,500 ksi/in/in;

ε_H is the strain in the hoop direction;

ε_L is the strain in the longitudinal direction;

σ_H is the stress in the hoop direction;

σ_L is the stress in the longitudinal direction; and

ν is Poisson's ratio which is defined as the negative of the ratio of strain perpendicular to the load to the strain parallel to the load, and is a constant for stresses below the proportional limit. The value of Poisson's ratio for steel is 0.3.

B.1. HOOP STRESS

Hoop stress (σ_H), also known as "circumferential stress" is the normal stress on a longitudinal plane through the pipe centerline (see Figure B.3) resulting from internal forces (Q) resisting the fluid pressure force (P).

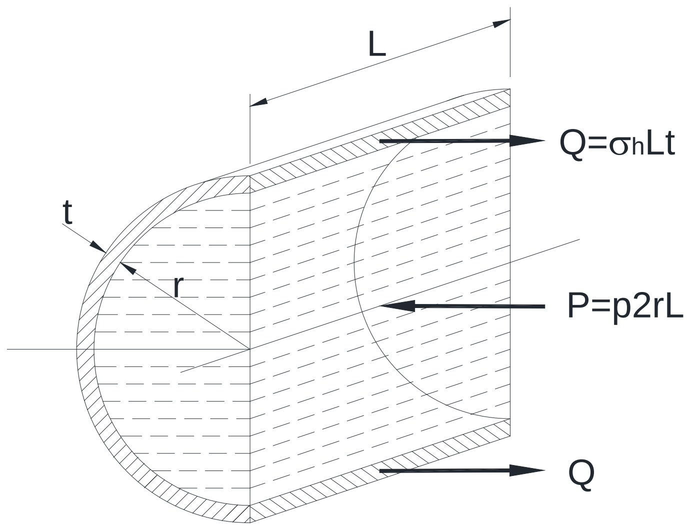

Figure B.3 Hoop Stress Free Body Diagram

To satisfy the equilibrium equation:

$$\sum F_y = 0 = P - 2Q$$

With $P - p2rL$ and $Q = \sigma_H Lt$; then

$p2rL - 2\sigma_H Lt$; or

$p2rL = 2\sigma_H Lt$; or

$\frac{p2r}{2t} = \sigma_H$; setting $2r$ to d gives:

$$\sigma_H = \frac{pd}{2t} \qquad \text{Equation B.3}$$

This formula is commonly known as **Barlow's Formula** and is the base equation used in 49 CFR 192 to determine the design pressure for steel pipe after applying a design factor, a longitudinal joint factor, and a temperature derating factor.

B.2. LONGITUDINAL STRESS

The typical causes of longitudinal stress in buried pipelines are:

- Changes in steel temperature that, under unrestrained conditions, would cause lengthening or shortening of the pipe;
- Changes in internal pressure that, under unrestrained conditions, would cause lengthening or shortening of the pipe; and
- Transverse bending (flexure) of the pipe as it conforms to outside forces/displacements, such as frost heave or thaw settlement.

In straight pipe, the longitudinal strains due to internal pressure and temperature differential act uniformly across the section of the pipe. Transverse bending causes a linear variation in longitudinal strain across the section of the pipe. These relationships are illustrated in Figure B.4.

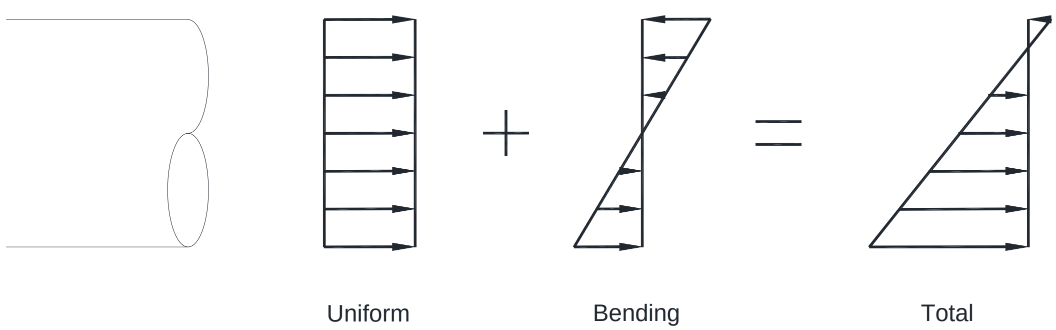

Figure B.4 Uniform, Bending and Total Longitudinal Pipe Strains

PRESSURE EFFECT ON LONGITUDINAL STRESS/STRAIN

As noted in Equation B.2, there is a relation between stress and strain for the two stress components of interest, and this relation can be used to derive additional information about the stress state. For example, although the hoop stress is directly related to the containment pressure, there is also an effect of the containment pressure on the longitudinal stress components.

In the elastic range, the associated longitudinal stress due to the pressure effect in the buried line can be found by substituting the known hoop stress for the pressure containment and noting that the longitudinal strain for a fully restrained pipe is zero, and then using this information in Equation B.2:

$$\begin{pmatrix} \varepsilon_{H-pressure} \\ 0 \end{pmatrix} = \frac{1}{E}\begin{bmatrix} 1 & -\nu \\ -\nu & 1 \end{bmatrix}\begin{pmatrix} pd/2t \\ \sigma_{L-pressure} \end{pmatrix}$$

By the second equation:

$$0 = \frac{-\nu pd}{E2t} + \frac{\sigma_{L-pressure}}{E}; \qquad \text{or:}$$

$$\sigma_{L-pressure} = \frac{\nu pd}{2t} = 0.3\sigma_H \qquad \text{Equation B.4}$$

For aboveground, i.e., unrestrained sections of the pipe, the longitudinal strain is not zero

TEMPERATURE

For a pipeline that is free to expand, the strain caused as a result of temperature differential (change in temperature of the pipe steel from its installation temperature) is defined by:

$$\varepsilon_{L-temp} = \alpha(T - T_i)$$

where:

ε_{L-temp} is the longitudinal strain due to temperature (in/in) in an unrestrained pipeline;

α is the coefficient of thermal expansion (in/in/°F);

T is the temperature for the state of interest (°F); and

T_i is the installation temperature (°F)

In aboveground segments of the pipeline, the thermal expansion and contraction is partially restrained and so produces longitudinal force and induces secondary longitudinal bending stress especially where the pipe configuration affords this partial restraint to thermal movement, such as near supports and at and near bends, and offsets. The design temperature differential is typically input into a pipe/structural analysis program in combination with other applicable loads to find the effects of these load components on aboveground segments.

A fully restrained pipeline has a net longitudinal strain of zero – i.e., it resists that tendency to expand with an equal and opposite mechanical strain of: $\varepsilon_{L-temp} = -\alpha(T - T_i)$, thus producing a total net strain of zero.

In the elastic range, the associated stress due to thermal restraint in the buried line can be found by noting that the associated hoop stress for this load is zero, and then using this information in Equation B.2:

$$\begin{pmatrix} \varepsilon_{H-temp} \\ \varepsilon_{L-tempT} \end{pmatrix} = \frac{1}{E} \begin{bmatrix} 1 & -\nu \\ -\nu & 1 \end{bmatrix} \begin{pmatrix} 0 \\ \sigma_{L-temp} \end{pmatrix}$$

By the second equation:

$$\varepsilon_{L-temp} = \frac{\sigma_{L-temp}}{E}; \qquad \text{or:}$$

$$\sigma_{L-temp} = E\varepsilon_{L-temp} = -E\alpha(T - T_i) = E\alpha(T_i - T) \qquad \text{Equation B.5}$$

As can be seen from the equation, operating temperatures that are less than the installation temperature would cause a longitudinal tensile component (stress component is positive), while operating temperatures that are greater than the installation temperature would cause a longitudinal compressive component (stress component is negative).

BENDING

When an initially straight pipe is bent into a circular arc, longitudinal strains, and stresses, develop through the pipe cross-section in the plane of the bend. Below the proportional limit the longitudinal strain and stress in the extreme fibers of the pipe cross section are defined by:

$$\varepsilon_{L-bending} = \pm r/R \qquad \text{and} \qquad \sigma_{L-bending} = \pm Er/R$$

where:

$\varepsilon_{L\text{-}bending}$	is maximum longitudinal strain due to bending (in/in);
$\sigma_{L\text{-}bending}$	is maximum longitudinal stress due to bending (psi);
r	is the outside radius of the pipe section (in); and
R	is the longitudinal radius of the arc of bend of the pipe centerline (in).

When subjected to external forces/displacements a pipe resist via beam action. This beam action induces bending moments within the pipe section, which can be converted to stress by:

$$\sigma_{L-bending} = \pm Mr/I$$

where:

I	is moment of inertia of the pipe (in^4); and
M	is bending moment (in-lbf)

B.3. COMBINED STRESS

The general state of stress in a buried pipeline under a combination of loads can be determined by considering the principal stresses within the pipe. For biaxial stress conditions that exist in pipelines, the principal stresses are the hoop stress (σ_H) and the longitudinal stress (σ_L). The longitudinal stress is the summation of longitudinal stresses from temperature, pressure, and bending ($\sigma_{L\text{-}temp}$ + $\sigma_{L\text{-}pressure}$ + $\sigma_{L\text{-}bending}$). Longitudinal stresses from other axial forces, if present, are also included.

YIELD CRITERION

The two most commonly used yield criteria for determining effective stresses in pipelines are the maximum shear stress theory, commonly referred to as the Tresca theory, and the maximum distortion energy theory, commonly referred to as the von Mises' theory.

(1) MAXIMUM SHEARING STRESSS THEORY

As discussed in "Mechanics of Materials" by Popov [Popov 1976], the maximum shearing stress theory is based on the observation that in a ductile material, slipping occurs during yielding along critically oriented planes. This suggests that the maximum shearing stress plays a key role in the yielding behavior. It is assumed that the material yielding depends on the maximum shearing stress so that whenever a critical value $\tau_{critical}$ is reached, yielding commences. The value of $\tau_{critical}$ is set equal to the shearing stress at yielding under uniaxial tension ($+\sigma_y$) or compression ($-\sigma_y$) loading:

$$\tau_{\max} \equiv \tau_{critical} = \left|\frac{\pm\sigma_y}{2}\right|$$

Hence, the maximum shearing stress is equal to ½ of the uniaxial yield stress. For biaxial stress conditions that exist in pipelines the corresponding yielding criterion is expressed as follows:

$$|\sigma_H| \le \sigma_y \quad \text{and} \quad |\sigma_L| \le \sigma_y \quad \text{and} \quad |\sigma_H - \sigma_L| \le \sigma_y$$

This is referred to as the Tresca yield criterion. The hexagonal Tresca yield function is illustrated in longitudinal stress vs. hoop stress space in Figure B.5 for an elastic-plastic material with a yield strength of 70 ksi. Any stress falling within the hexagon indicates that the material behaves elastically while points on the hexagon indicate that the material is yielding. This criterion is implemented under B31.8 Section 833.4 to limited combined stress for restrained pipe as:

$$|\sigma_H - \sigma_L| \le k \cdot S \cdot T$$

where:

k is an allowable stress multiplier (for loads of long duration, k is 0.90, and for occasional non-periodic loads of short duration it is 1.0);

S is the pipe SMYS; and

T is the temperature derating factor (T=1.0 for temperatures ≤ 250°F, per B31.8 Section 841.116).

(2) MAXIMUM DISTORTION ENERGY THEORY

As discussed by Popov [Popov 1976], a widely accepted criterion for yielding of ductile materials is based on energy concepts wherein the total elastic energy of the material is divided into two parts: one associated with volumetric changes of the material, and the other causing shearing distortions. By equating the shearing distortion energy at yield under uniaxial tension to that under combined stress, the yield criterion for combined stress is established. For plane stress conditions, with principal stresses σ1 and σ2, the yield condition for an ideal plastic material becomes:

$$\left(\frac{\sigma_1}{\sigma_y}\right)^2 - \left(\frac{\sigma_1 \cdot \sigma_1}{\sigma_y \cdot \sigma_y}\right) + \left(\frac{\sigma_2}{\sigma_y}\right)^2 = 1 \quad \text{or} \quad \sqrt{\sigma_1{}^2 - \sigma_1 \cdot \sigma_2 + \sigma_2{}^2} = \sigma_y$$

This is the equation of an ellipse as shown in Figure B.5 for an elastic-plastic material with a yield strength of 70 ksi. Any stress falling within the ellipse indicates that the material behaves elastically while points on the ellipse indicate that the material is yielding. This is referred to as the von Mises yield criterion. This criterion is implemented under B31.8 Section 833.4 to limited combined stress for restrained pipe as:

$$[\sigma_L{}^2 - \sigma_L \cdot \sigma_H + \sigma_H{}^2] \leq k \cdot S \cdot T$$

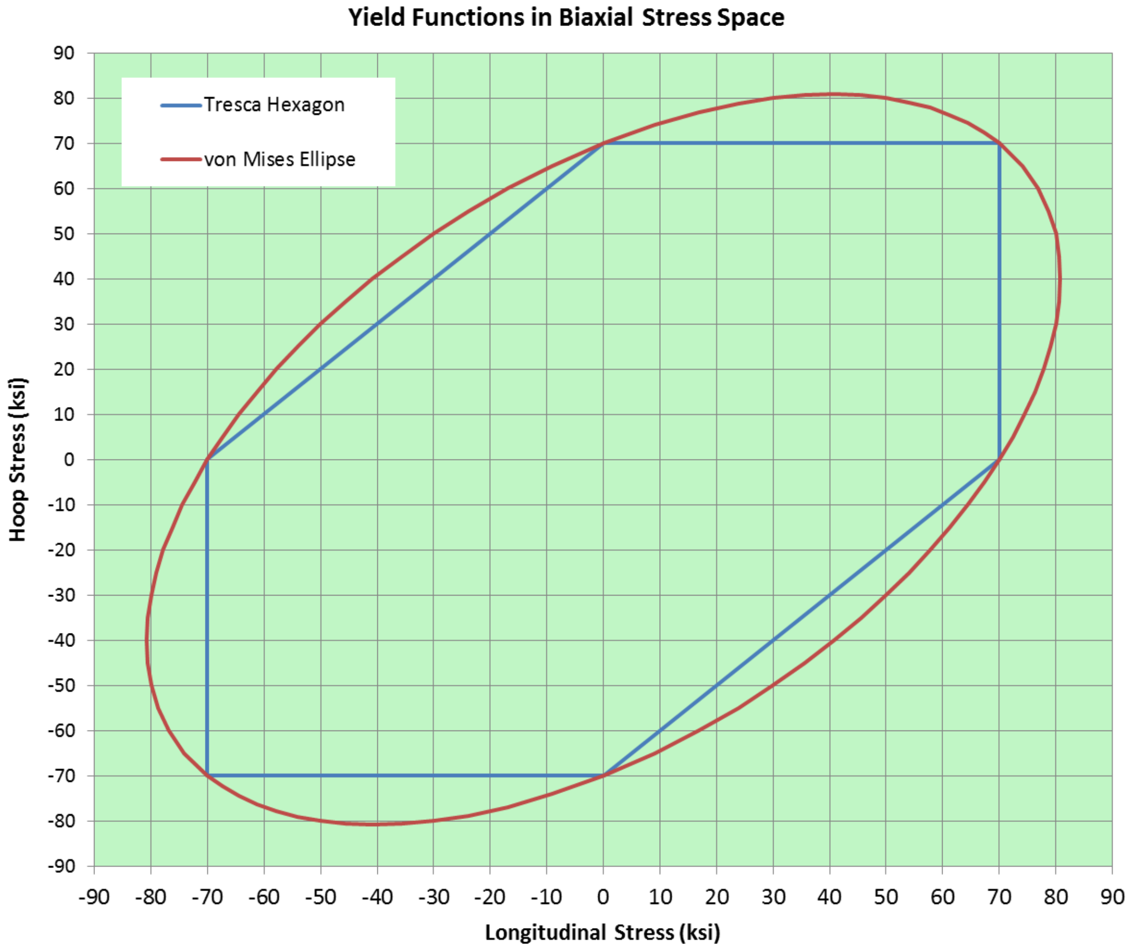

Figure B.5 Illustration of Tresca and von Mises Yield Functions

Appendix O

List of Preparers

List of Preparers

<u>Cardno ENTRIX</u>

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Hilsinger, Iris A. - Cultural Resources
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Lawrence, Paul B. – Cultural Resources; Subsistence
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Schraer, Raena K. – Subsistence
B.A., Geography/Spanish, Middlebury College, 2002

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B.S., Wildlife Biology, University of Alaska Fairbanks, 2005

Sweet, Serena – Project Manager (September 2009 – March 2011)
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Budnik, Roberta – Deputy Project Manager (February 2011 – Present)
B.S., Biological Sciences, University of Alaska Fairbanks, 2008

Cooperating Agencies

Alaska Department of Natural Resources – State Pipeline Coordinator's Office

United States Coast Guard

United States Department of the Interior

United States Department of the Interior – Bureau of Land Management

United States Department of the Interior – National Park Service

United States Department of Transportation – Pipeline and Hazardous Materials Safety Administration

United States Environmental Protection Agency

Appendix P

Distribution List

Distribution List

Lead Agency

United States Army Corps of Engineers
Mary Romero
Project Manager
P.O. Box 6898 (CEPOA-RD)
JBER, Alaska 99506-0898
Phone: (907) 753-2773
Fax: (907) 753-5567
Email: Mary.R.Romero@usace.army.mil

Cooperating Agencies

United States Environmental Protection Agency
222 West 7th Avenue, #19
Anchorage, AK 99513-7504

United States Department of the Interior
1849 C Street NW
Washington, DC 20240

United States Department of the Interior – Bureau of Land Management
222 West 7th Avenue, #13
Anchorage, AK 99513-7599

United States Department of the Interior – National Park Service
240 West 5th Avenue, Suite 114
Anchorage, AK 99501

United States Department of Transportation – Pipeline and Hazardous Materials Safety Administration
East Building, 2nd Floor
1200 New Jersey Ave., SE
Washington, DC 20590

Commander (oan)
Seventeenth Coast Guard District
Mr. James Helfinstine
P.O. Box 25517
Juneau, AK 99802

Alaska Department of Natural Resources – State Pipeline Coordinator's Office
411 West 4th Avenue, 2nd Floor
Anchorage, AK 99501

Libraries & Reading Rooms

ANCHORAGE:

Alaska Resources Library
3150 C Street, Suite 100
Anchorage, AK 99503

Anchorage Municipal Libraries
Z.J. Loussac Library
3600 Denali
Anchorage, AK 99503-6093
907-343-2975

Bureau of Land Management
Public Room
222 West 7th Avenue, #13
Anchorage, AK 99513-7599

DNR Public Information Center
550 W. 7th Ave., Suite 1260
Anchorage, AK

UAA/APU Consortium Library
3211 Providence Drive
Anchorage, AK 99508

Alaska Resources Library and Information Services (ARLIS)
Room 111
3211 Providence Drive
Anchorage, AK 99508

BARROW:

Tuzzy Consortium Library
5421 North Star Street
P.O. Box 749
Barrow, AK 99727

CANTWELL:

Cantwell Community/School Library
P.O. Box 29
Cantwell, AK 99729
907-768-2372

DENALI PARK:

Denali National Park Library
P.O. Box 9
Denali Park, AK 99755
907-683-2294

HEALY:

Tri-Valley School/Community Library
P.O. Box 518
Healy, AK 99743
907-683-2507

FAIRBANKS:

Fairbanks North Star Borough Public Library
1215 Cowles Street
Fairbanks, AK 99701-4313
907-459-1020

Bureau of Land Management
Public Room
1150 University Avenue
Fairbanks, AK 99709

DNR Public Information Center
3700 Airport Way
Fairbanks, AK

MINTO:

Minto School Library
P.O. Box 81
Minto, AK 99758
907-798-7212

NENANA:

Nenana Public Library
P.O. Box 40
Nenana, AK 99760
907-832-5812

NIKISKI:

Nikiski Middle/High School Library
P.O. Box 7112
Nikiski, AK 99635
907-776-3456

TALKEETNA:

Talkeenta Public Library
P.O. Box 768
Denali Park, AK 99676
907-733-2359

TRAPPER CREEK:

Trapper Creek Public Library
P.O. Box 13388
Trapper Creek, AK 99683
907-683-2294

WASILLA:

Wasilla Public Library
391 North Main Street
Wasilla, AK 99654
907-376-5913

WILLOW:

Willow Public Library
P.O. Box 129
Willow, AK 99688
907-495-7323