ALASKA GASLINE DEVELOPMENT CORP.
GAS FOR ALASKANS

ALASKA STAND ALONE GAS PIPELINE/*ASAP*

Project Plan
July 1, 2011

ALASKA STAND ALONE GAS PIPELINE PROJECT

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EXECUTIVE SUMMARY

This document presents the findings and recommendations of the Alaska Gasline Development Corporation (AGDC) regarding how an in-state natural gas pipeline to deliver North Slope natural gas to Fairbanks, the Southcentral region of the state, and other communities whenever practicable can be designed, financed, constructed, and made operational. House Bill 369, passed by the 26th Alaska Legislature in April 2010, tasked the Alaska Housing Finance Corporation (AHFC) with developing a project plan, and AHFC established AGDC as a subsidiary corporation to pursue the project. AGDC built on previous work completed in July 2010 by the Alaska Department of Natural Resources under House Bill 113.

The Alaska Stand Alone Pipeline/***ASAP*** is a proposed 737-mile-long, 24-inch-diameter pipeline meant to supply natural gas to the Railbelt region of Alaska and meet the requirements of its enabling legislation.

This document recommends a plan to execute the commercial, financial, engineering, and permitting aspects of the ASAP Project and provides analyses to support the findings and recommendations related to the explicit and implicit work required under House Bill 369.

AGDC FINDINGS

- Using a reasonable set of economic assumptions, the project is likely to be commercially feasible with an un-inflated consumer cost in Anchorage of about $9.63 per million Btu (MMBtu)[1]. This cost is less than the next most practical alternative, imported liquefied natural gas (LNG), which would cost about $16 to $21/MMBtu (about $14 to $19/MMBtu plus local distribution charges of $2/MMBtu). The current cost of gas to Anchorage consumers is $8.85/MMBtu.[2]
- The un-inflated estimate of the cost of gas to Fairbanks consumers using the same set of reasonable assumptions as for Anchorage is $10.45/MMBtu. The current published natural gas cost for Fairbanks is $23.35/MMBtu.
- No other single project alternative is likely to address the same Cook Inlet energy-supply shortfall in a comparable timeframe; gas storage and hydroelectric projects are complementary to ASAP.
- The project, as described in this project plan, will cost $7.52 billion (in 2011 dollars) with an uncertainty range of ±30%.

[1] The Anchorage Bowl consumer cost of $9.63/MMBtu assumes a $2/MMBtu netback and a $2/MMBtu LDC and local pipeline cost.

[2] Source: http://enstarnaturalgas.com/ratesregulatory.aspx. See graph entitled "Commodity Cost vs. ENSTAR Charge."

- A public ownership model, because of the lower cost of debt and zero equity requirement, provides the lowest tariff; however, this ownership model requires enabling legislation in the near term.
- There are builder/owner/operators prepared to assume execution of the project after a successful open season is concluded if the private ownership model is selected and the State of Alaska funds project development. (An open season, which is a solicitation of firm commitments from gas shippers to use the pipeline, is successful if it results in transport agreements that fill the pipeline).
- An LNG industrial anchor tenant that enables a maximum throughput capacity of 500 million standard cubic feet per day (MMscfd) provides one of the lowest tariffs and appears to be commercially feasible. (An anchor tenant is an industrial user that signs pipeline transport agreements or pipeline off-take agreements to use large quantities of gas.)
- The principal business risks of the ASAP Project are a failed open season, increased construction costs, and project delay caused by regulatory or environmental permitting.
- Only the Parks Highway route as described, with a spur line to Fairbanks, meets the requirements of House Bill 369 and routing criteria for the environmental impact statement process.
- Completion of the pipeline by 2015 as required by House Bill 369 is neither necessary because of the forecast Cook Inlet gas supply recently released by AGDC/DNR nor achievable in light of current design/permitting requirements to successfully execute an open season and procure financing.
- The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) intends to require a special permit for ASAP based on its design and operating environment. This could add significant costs and schedule implications to the ASAP Project.
- The State Lease Right-of-Way obtained by AGDC is the first non-conditional pipeline right-of-way granted by the State for the purpose of transporting natural gas from the North Slope to market, and will likely be perceived as a significant milestone and increase project interest and confidence among potential shippers and developers.

AGDC RECOMMENDATIONS

- The ASAP Project schedule should be adjusted for delivery of first gas in 2018 and first firm transmission in 2019.
- The State of Alaska should appropriate $210 million[3] to complete the next phase of project design development, recognizing that approximately $130 million more will be required either through capital funding or financing to complete the design before project approval (sanction).
- The Legislature, as soon as possible, should consider the recommended legislation including whether to enable the public ownership model. Non-action is de facto approval of the private ownership model.
- AGDC should procure a builder/owner/operator in the case of private ownership or a builder/operator in the case of public ownership as soon as practical.

[3] Assumes approval of $29 million appropriation by 27th Alaska Legislature.

- AGDC should execute the commercial, finance, engineering, and permitting plans as detailed in this project plan.
- The route selected in this project plan should be adopted as the final route and that no more study or analysis of route selection be undertaken or supported by AGDC or any other state agency as specified in House Bill 215 in the 27th Alaska Legislature.

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LIST OF ACRONYMS

°C	degrees Celsius
°F	degrees Fahrenheit
AAAQS	Alaska Ambient Air Quality Standards
AAC	Alaska Administrative Code
AACE	Association for the Advancement of Cost Engineering
ACCE	Aspen-Tech Capital Cost Estimating
ACMP	Alaska Coastal Management Plan
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
AGIA	Alaska Gasline Inducement Act
ADOT&PF	Alaska Department of Transportation and Public Facilities
AES	ASRC Energy Services
AGDC	Alaska Gasline Development Corporation
AHFC	Alaska Housing Finance Corporation
AHRS	Alaska Heritage Resources Survey
ANGDA	Alaska Natural Gas Development Authority
APDES	Alaska Pollutant Discharge Elimination System
APP	Alaska Pipeline Project
ARPA	Archaeological Resources Protection Act
ARRC	Alaska Railroad Corporation
AS	Alaska Statute
ASAP	Alaska Stand Alone Gas Pipeline
ASRC	Arctic Slope Regional Corporation
B&V	Black & Veatch
BLM	Bureau of Land Management
Btu	British thermal unit
C&R	Citigroup Global Markets, Inc. and Samuel A. Ramirez & Co., Inc.
CAPEX	capital expenditure
CEO	chief executive officer
CFR	Code of Federal Regulations
CGF	Central Gas Facility (North Slope)
CIF	commodity-insurance-freight
CNG	compressed natural gas
CO_2	carbon dioxide
DBFOM	design/build/finance/operate/maintain

DGGS	Alaska Division of Geological & Geophysical Survey
DNP&P	Denali National Park and Preserve
DNR	Alaska Department of Natural Resources
DOR	Alaska Department of Revenue
Dth	dekatherm
EIS	environmental impact statement
ENSTAR	ENSTAR Natural Gas Company
EOI	Expression of Interest
EPA	Environmental Protection Agency
ERL	environmental, regulatory, and lands
FEED	front-end engineering design
FEL	front-end loading
FEL 1	front-end loading phase 1
FEL 2	front-end loading phase 2
FEL 3	front-end loading phase 3
FERC	Federal Energy Regulatory Commission
FOB	freight on board
FY	fiscal year
GCF	Gas Conditioning Facility
GIS	geographic information system
GTL	gas to liquids
H_2S	hydrogen sulfide
HB	House Bill
HDD	horizontal directional drilling
IPA	Independent Project Analysis, Inc.
JD	Jurisdictional Determination
LDC	local distribution company
LiDAR	light detection and ranging
LNG	liquefied natural gas
LOA	Letter of Authorization
LPG	liquefied petroleum gas
MAOP	maximum allowable operating pressure
MI	miscible injectant
MMBtu	million Btu
MMscfd	million standard cubic feet per day
MP	milepost
NEPA	National Environmental Policy Act
NGL(s)	natural gas liquid(s)
NMFS	National Marine Fisheries Service
NPV	net present value

O&M	operation and maintenance
P3	public-private partnership
PBU	Prudhoe Bay Unit
PERS	Public Employees' Retirement System
PHMSA/OPS	Pipeline Hazardous Materials Safety Administration/Office of Pipeline Safety (U.S. Department of Transportation)
PJD	Preliminary Jurisdictional Determination
PLR	private letter ruling
POD	Plan of Development
PODS	Pipeline Open Data Source
ppm	parts per million
PS	pump station
psi	pounds per square inch
psig	pounds per square inch gauge
QA/QC	quality assurance/quality control
RCA	Regulatory Commission of Alaska
RFAI	request(s) for additional information
RFP	request for proposals
RIK	royalty-in-kind
ROD	Record of Decision
ROE	return on equity
ROW	right-of-way
SAGP	Stand Alone Gas Pipeline
SAIC	Science Applications International Corporation
SDA	special design area
SO_2	sulfur dioxide
SPCO	State Pipeline Coordinator's Office
TAPS	Trans Alaska Pipeline System
WTI	West Texas Intermediate
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service

1. INTRODUCTION

This document presents a project plan for designing, financing, constructing, and making operational an Alaska in-state natural gas pipeline from Prudhoe Bay to the Cook Inlet region. The mandate for this project was expressed in House Bill 369, passed by the 26th Alaska Legislature in May 2010 in light of declining North Slope oil production, impending shortages of natural gas in Southcentral Alaska, and uncertainty regarding timing of a large-diameter pipeline to Canada to export Alaskan gas and to provide Alaskan gas to the Fairbanks area and to the Southcentral region.

This project plan is the culmination of the efforts of the Alaska Gasline Development Corporation (AGDC) to refine the engineering and cost analyses previously undertaken by the Alaska Department of Natural Resources (DNR) in response to House Bill 113 and develop an economically feasible plan for building the project. AGDC contacted potential pipeline construction and operation companies for interest in developing the project, studied financing alternatives, optimized route selection and engineering, and continued work with permitting agencies for rights-of-way and environmental impact statement (EIS) activities.

1.1 LEGISLATIVE MANDATE

House Bill 369 established the Joint In-State Gasline Development Team in the Alaska Housing Finance Corporation (AHFC) and defined the team's mission as follows:

> "The Joint In-State Gasline Development Team shall produce a project plan for the development of an in-state natural gas pipeline. The development team shall ensure that the project plan is completed and delivered to the legislature by July 1, 2011. The project plan must specify and document how an in-state natural gas pipeline can be designed, financed, constructed, and made operational by December 31, 2015." [AS 38.34.040(a)]

House Bill 369 goes on to set guidelines for the project plan stating that:

- "The project plan must include specific plans to coordinate and facilitate construction, ownership, operation, and management of a natural gas pipeline serving Fairbanks, the Southcentral region of the state, and other communities whenever practicable, connecting with or enhancing the existing gas pipeline system, and reaching to tidewater in the Southcentral region of the state."
- "The development team's work product shall include an analysis of alternative possible routes and the selection of a route that, consistent with the other requirements of this section,
    - is economically feasible;
    - makes natural gas available to residents at the lowest possible cost;

- allows for connecting lines to serve industrial, residential, and utility customers along the entire route, and in other regions of the state that can be served at commercially feasible rates;
- uses state land and existing state highway and railroad rights-of-way to the maximum extent feasible;
- uses existing highway and railroad bridges, gravel sources, equipment yards, maintenance facilities, and other existing facilities and resources to the maximum extent feasible." [AS 38.34.040(c) and (d)]

1.2 HISTORY OF PROJECT

Work on a small-diameter in-state gas pipeline has been ongoing for several years. Original work was undertaken by ENSTAR Natural Gas Company and targeted gas reserves in the Gubik gas field of the central North Slope region. The Gubik reserves were not sufficiently delineated to establish threshold reserves capable of supplying 100% of the pipeline capacity. In 2009, the Alaska Legislature passed House Bill 113, which established the Stand Alone Gas Pipeline (SAGP) Project to continue and enhance the original effort and to maintain a back-up plan to the large-diameter export gas pipeline that was designed to serve in-state needs via a spur line. The work product and permits generated by the state-funded SAGP team were envisioned capable of reducing project risk so the information and permits could be sold and transferred to an entity able to build and maintain the line. The team for this project, which was led by DNR, analyzed alternatives, performed preliminary engineering, developed cost estimates, and began the permitting process.

The original SAGP project team was made up of state management that coordinated and directed the various contractors performing the tasks outlined in the enabling legislation. Project management was initially performed by Harry Noah, and later by Bob Swenson, both employees of DNR on special assignment to the Office of the Governor. The original work plan and schedule were maintained and kept on track throughout fiscal year (FY) 2009/2010.

The SAGP team transferred all of its reports and work product to AGDC on July 1, 2010. The findings of the SAGP project team were presented to AGDC in a July 15, 2010 report[4]. Included in the team's deliverables were reports, cost estimates, modeling results, and permit applications that serve as the baseline data as the project is optimized and project plans are developed.

In taking over the work from the SAGP team, AGDC made every effort to avoid duplicating studies, plans, and designs that have already been produced or obtained by the SAGP team and other state entities. The SAGP project team's principal findings are summarized in Table 1-1, along with AGDC's advancement of those findings.

[4] *Alaska Stand Alone Gas Pipeline Project Update and FY 2010 Deliverables.* Presented to AGDC by the State of Alaska In-State Gasline Coordinator, July 15, 2010.

Table 1-1. Comparison of Findings: SAGP and AGDC

CATEGORY	SAGP JULY 2010 FINDING	AGDC JULY 2011 FINDING
Route	The Parks highway route was chosen as the preferred alternative based on a comparison of potential project cost, environmental impacts, and potential customers.	AGDC continued work on the Parks Highway route, refined the alignment, and confirmed that the route meets the requirements of House Bill 369.
Cost	Cost of pipeline, not including facilities or contingency costs, is projected at $3.8 billion. Preliminary capital cost estimates for the entire project could range from $5.7 billion to $11.8 billion, depending on the configuration, number, and location of gas handling facilities. These estimates also do not include contingency costs or potential cost ranges, which were captured in the cost-of-service modeling.	The capital cost of the pipeline is estimated to be $5.68 billion, and the Gas Conditioning Facility is estimated to be $1.84 billion. The total capital is estimated to be $7.52 billion. (These estimates have a confidence factor of ±30%.) See Section 3.1.1 of this project plan for more detail.
Tariffs	The tariffs associated with a 737-mile 24-inch high-pressure pipeline that would transport natural gas and/or natural gas liquids from the North Slope to tidewater in Southcentral Alaska could range from over $14 to less than $7 per dekatherm (Dth). (A dekatherm is energy equivalent to 1 million Btu.)	The base case tariff from Prudhoe Bay to Anchorage (Big Lake meters) is estimated to be $5.63 per million Btu (MMBtu) in 2011$ or $7.75/MMBtu in nominal dollars assuming 3% inflation.
	Sensitivity models run on increased flow rates show the majority of tariff reduction occurs when ramping up flow rates from 250 million standard cubic feet per day (MMscfd) to 500 MMscfd.	The ASAP tariff from Prudhoe to Anchorage (Big Lake meters) for a throughput of 250 MMscfd is estimated to be $4/MMBtu higher than for the 500 MMscfd case.
Cost of Service	The final cost to consumers must include the cost of the natural gas from the producer, carbon dioxide disposal costs, and the cost of transport on a local distribution system. These costs would be in addition to the pipeline tariff costs and could vary significantly.	AGDC agrees with these findings.
	All cost of service models run indicate the predicted cost to consumer will be higher than the current costs in the Cook Inlet.	
	A combination of market demand increase, reduced project costs, and alternate finance and commercial parameters will be necessary to reduce the cost to current levels of service.	

1.3 PURPOSE AND NEED FOR THE ALASKA STAND ALONE GAS PIPELINE PROJECT/*ASAP*

Southcentral Alaska relies primarily on the Cook Inlet gas fields for heating and electric power. The deliverable reserves from the developed fields are in decline and are projected to fall short of demand as early as 2014. If investment in these fields is not made to increase supply and if new reserves are not developed, the gas shortfall will increase. The ASAP Project will provide gas to Alaskan consumers to offset these projected shortages. The project, combined with gas storage, will meet the region's peak seasonal gas demand and long-term energy needs.

The ASAP Project 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 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 development opportunities for Alaska citizens. New jobs and tax revenues will be created.

The expected public benefit of ASAP is the potential for delivery of a long-term, reasonably priced supply of natural gas and propane to the Cook Inlet area and to Fairbanks and other communities along the pipeline corridor. Specifically, this supply could be used for the following:

- 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 local distribution system, and for the Fairbanks area and other Railbelt communities.
- Promoting compressed natural gas (CNG) or propane 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; and for use by Anchorage and communities on the Kenai Peninsula.
- Potentially providing CNG or propane 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.

Economic benefits of the project include the creation of new jobs and state and local tax revenues. Employment will include temporary jobs during engineering, procurement, and construction, and long-term jobs during pipeline operation. The project has the potential to stimulate existing industries and encourage new industrial activities, including mining. Industrial users are essential to the project, since the project's initial capacity exceeds the expected demand for residential use and power generation.

1.4 RELATIONSHIP TO OTHER PIPELINE PROJECTS

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 has advanced past the feasibility study period.

ASAP is an intrastate project independent of proposed interstate natural gas pipeline projects. The Alaska Pipeline Project (APP), the project sponsored by the Alaska Gasline Inducement Act (AGIA), is studying the feasibility of exporting Alaska's North Slope natural gas via a large-diameter pipeline. (A second project, Denali–The Alaska Gas Pipeline project, was recently halted). As export plans and studies continue, the near-term need exists for additional natural gas supplies to supplement Cook Inlet reserves and to serve developed and developing markets within Alaska. The ASAP Project was conceived as a smaller-diameter in-state gas pipeline that could be built sooner and help meet the urgent energy needs in Alaska, particularly in the population centers in Fairbanks and the Cook Inlet region.

Several intrastate gas pipeline projects have been granted conditional right-of-way leases by DNR, but the ASAP Project has a non-conditional lease. Yukon Pacific Corporation received a conditional lease, but it has been relinquished. DNR applied for the Eastern North Slope pipeline oil and gas rights-of-way as conditional leases, but they were never issued and have not been worked actively for several years. The Alaska Natural Gas Development Authority (ANGDA) received a conditional lease, but they have not addressed the conditions to date. The ASAP lease is the first non-conditional pipeline right-of-way granted by the State for the purpose of transporting natural gas from the North Slope to market, and will likely be perceived as a significant milestone and increase project interest and confidence among potential shippers and developers.

The ASAP Project is designed for a throughput of 500 MMscfd. The reason for this design throughput is that AGIA provides that the State will pay the AGIA licensee a significant penalty if a competing natural gas pipeline project is supported by the state:

> "If, before the commencement of commercial operations, the state extends to another person preferential royalty or tax treatment or grant of state money for the purpose of facilitating the construction of a competing natural gas pipeline project in this state, and if the licensee is in compliance with the requirements of the license and with the requirements of state and federal statutes and regulations relevant to the project, the licensee is entitled to payment from the state of an amount equal to three times the total amount of the expenditures incurred and paid by the licensee that are qualified expenditures…" [AS 43.90.440(a)]

In AGIA, "competing natural gas pipeline project" is defined as a "project designed to accommodate throughput of more than 500,000,000 cubic feet a day of North Slope gas to market" [AS 43.90.440(c)(1)].

1.5 PROJECT PLAN DEVELOPMENT

1.5.1 Project Organization

This project plan was developed by the AGDC, under the direction of the Joint In-State Gasline Development Team established by House Bill 369 (AS 38.34.030). Figure 1-1 shows the organization of the Development Team, which is comprised of five members:

- The Commissioner of the Department of Transportation and Public Facilities.
- The Chair of the Board of the Alaska Railroad Corporation.
- The Chief Executive of the Alaska Natural Gas Development Authority.
- The In-State Gasline Project Coordinator.
- The Executive Director of the Alaska Housing Finance Corporation who serves as the Chair of the Joint In-State Gasline Development Team.

The team is responsible for hiring staff, entering into contracts, and any other activities necessary to carry out its functions. Quarterly expenditure reports and monthly progress reports are submitted to the Legislature.

AGDC was established as a subsidiary of AHFC to develop this project plan and pursue the tasks outlined in House Bill 369. The AGDC project team staff is comprised of personnel from AHFC augmented with personnel from the private sector under various contractual arrangements. Due to the short duration of the planning process (July 1, 2010 to July 1, 2011), a decision was made to not establish direct-hire employees for AGDC staff. Instead, some employees of AHFC were made available to the project on either a part-time or full-time basis, and others were brought to the project under various contractual arrangements.

The AGDC organization chart in Figure 1-2 shows the breakdown of responsibilities for production of the project plan.

- The President of AGDC is Dan Fauske (AHFC).
- The Vice-President and Chief Financial Officer is Joe Dubler (AHFC).
- Project management is the responsibility of Dave Haugen (contract).
- Commercial activities are handled by Michael Rocereta and Lieza Wilcox (both contract).
- Engineering and permitting activities are the responsibility of Dave Norton (AHFC).
- Administration and external affairs are managed by Leslye Langla (AHFC), assisted by administrative specialist Doreen Calahan (AHFC) and public affairs specialist Meda Snyder (AHFC).
- Contract administration is managed by Kathy Gallaher (contract).
- Project control is provided by George Heywood (contract).

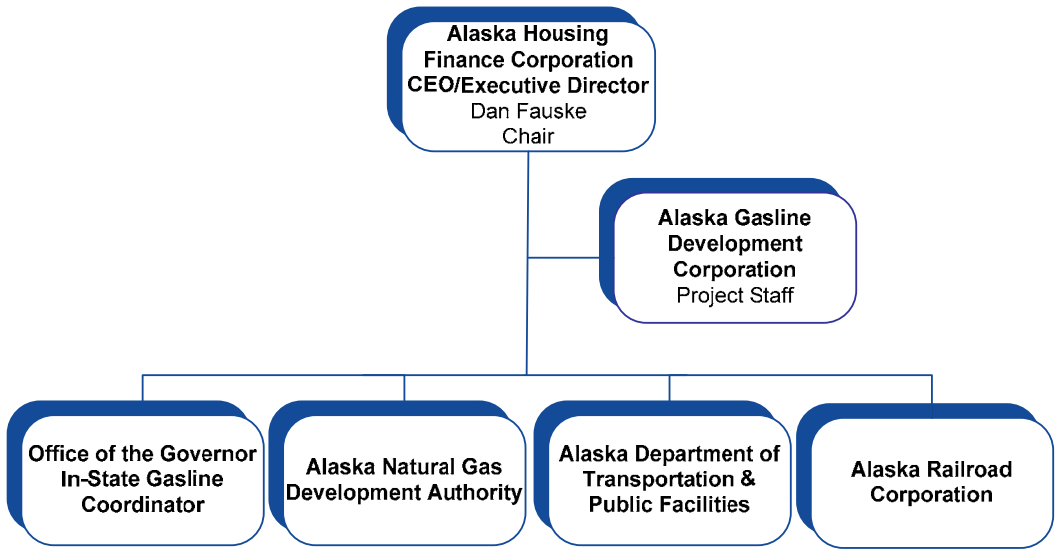

Figure 1-1. Joint In-State Gasline Development Team

AHFC provides additional support to AGDC including issuing contracts, office administration/acquisition, financial (including budgeting and tracking) payroll services, human relations support, information technology and communications services, and many other services. The support furnished by the AHFC organization has been critically important to the AGDC staff.

1.5.2 Contracting Strategy

Due to the short time frame for developing the project plan, contractors were employed to perform a substantial amount of work. Table 1-2 identifies the contractors AGDC retained for support in project management/engineering, environmental and regulatory issues, and economic/market studies.

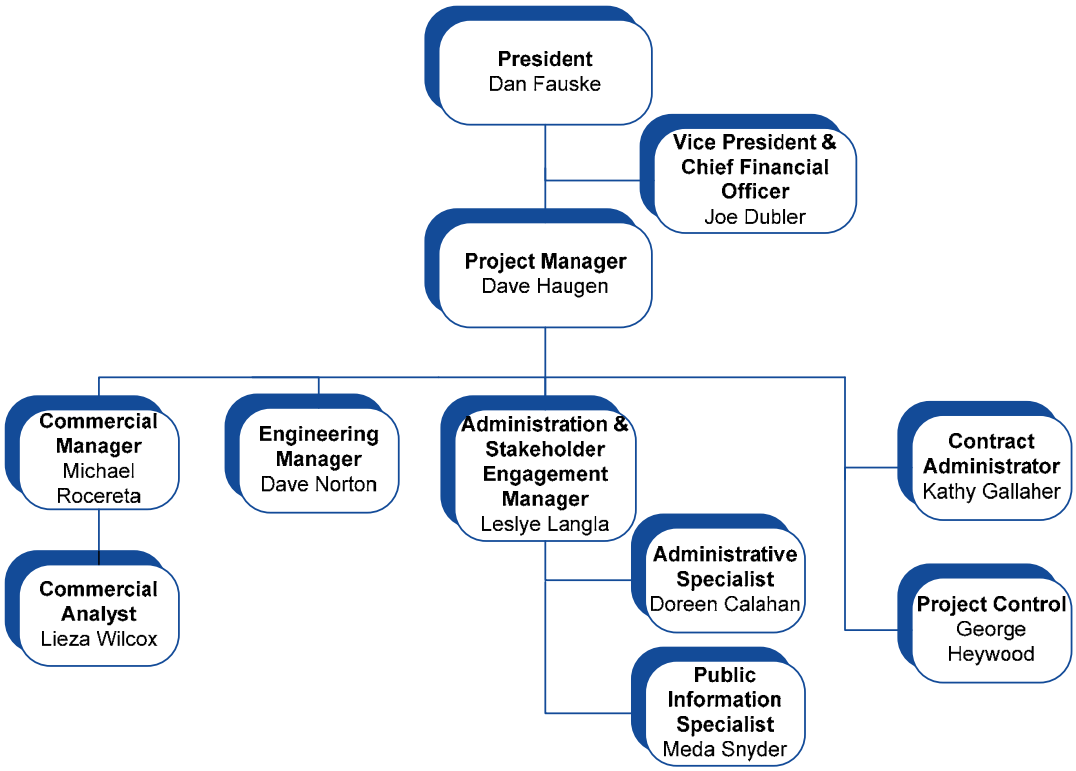

Figure 1-2. AGDC Organization Chart

Contractors were selected based on the following factors:

- Some of the activities were underway before July 2010. The work on developing the environmental impact statement (EIS) has been underway since 2009. Consequently, a decision was made to retain the incumbent contractors, which include Michael Baker, Jr., Inc. as the lead in providing engineering services, ASRC Energy Services (AES) providing environmental services, and Cardno ENTRIX as the third-party contractor preparing the EIS for the U.S. Army Corps of Engineers.
- For tariff modeling, Black & Veatch was retained because they had an existing model that was used in developing tariffs in earlier studies of the in-state gas pipeline.
- Some areas of analysis required special skill sets. For instance, the project pacing and review analysis was conducted by Independent Project Analysis, Inc. (IPA). IPA used its unique database of over 1,500 megaprojects to help AGDC determine the progress of the in-state gas pipeline. The stage-gated system that forms the basis of the IPA analysis is also being used as the road map for the future by AGDC. In addition, WorleyParsons was retained to perform a peer review of the facilities cost estimate. WorleyParsons has a long track record developing processing facilities on Alaska's North Slope.
- Birch Horton Bittner & Cherot is providing legal assistance for the commercial and legislative work, while Stoel Rives LLC provides regulatory assistance for progressing the EIS.

Table 1-2. AGDC Contract Support

ACTIVITY	CONTRACTOR
PROJECT MANAGEMENT/ENGINEERING	
Project Management	Hawk Consultants LLC
Engineering Services	Michael Baker Jr., Inc. DoyonEmerald Larkspur Associates LLC
Legal Services	Birch Horton Bittner & Cherot
Project Pacing and Review	Independent Project Analysis (IPA)
Facilities Peer Review	WorleyParsons
ENVIRONMENTAL/REGULATORY	
Environmental Services	ASRC Energy Services (AES)
Third Party EIS	Cardno ENTRIX
Regulatory Advisor	Stoel Rives LLC
FINANCIAL	
Financial Advisor	Citigroup Global Markets, Inc. and Samuel A. Ramirez & Co., Inc. (C&R)
Tariff Modeling	Black & Veatch
ECONOMIC/MARKET STUDIES	
Gas to Liquids	Hatch Associates Consultants, Inc.
Liquefied Natural Gas	Science Applications International Corporation (SAIC)
Natural Gas Liquids	R.W. Beck Inc.

- Contract staffing is obtained from Hawk Consultants LLC, an organization that specializes in providing project management personnel.
- A formal request for proposal (RFP) process was followed for the financial advisor contractor and contractors for three economic/market studies. In a two-step process, potential contractors were asked to provide their qualifications for the specific scope of work requested by AGDC, and then to provide their pricing proposal in a separate submittal. A scoring matrix was established that combined the technical qualifications with the pricing proposal. The matrix determined which contractor had provided the proposal that represented the best value to AGDC for the work to be performed. The financial advisor selected was Citigroup Global Markets, Inc. and Samuel A. Ramirez & Co., Inc. (C&R). The gas-to-liquids (GTL) study was awarded to Hatch Associates Consultants, Inc.; the liquefied natural gas (LNG) study was awarded to Science Applications International Corporation (SAIC); and the natural gas liquids (NGL) study was awarded to R.W. Beck Inc.

1.5.3 Management of Project Plan Development

The AGDC team used two project management delivery techniques. The first is the Project Management Institute's *A Guide to the Project Management Body of Knowledge* (2008), which was developed over the last 30 years to serve as a template for managing projects in a wide range of industries including oil and gas, petrochemical, and mining. Five project management process groups are outlined in the guide: initiating, planning, executing, monitoring and control, and closing. The second system, the stage-gated approach, is described in Section 2.1 of this project plan. Both project management systems emphasize the need to perform the project definition phase adequately. AGDC chose the IPA stage-gated process to provide a road map for advancing the in-state gasline project.

The management approach to producing the ASAP project plan was to use best project management practices. A work breakdown structure was established and compiled into activities. The activities were prioritized and scheduled accordingly, and task orders were executed with various contractors to perform the work.

AGDC used AHFC contracting personnel and procedures in performing contract initiation and procurement. After contract award, AGDC administered and controlled the contracts through the execution phase. Project controls were established to manage project costs and schedule. Weekly staff meetings were established to review progress on the schedule and to take corrective action on costs being incurred.

1.5.4 Stakeholder Engagement

In developing this project plan, AGDC has engaged with project stakeholders to develop and build long-term relationships with state and federal regulatory agencies, non-governmental organizations, communities potentially affected by the project, and Alaskans in general. A detailed stakeholder engagement plan has been developed and implemented, and this plan is described in detail in the project plan.

2. THE PROJECT PLAN

This section presents AGDC's proposed plan for the ASAP Project. This plan is designed around the "stage-gated process," which emphasizes front-end loading in project planning to achieve a successful project that avoids cost overruns and delays. This approach, which is the industry standard for projects such as the ASAP Project, is discussed in Section 2.1 below. Section 2.2 contains a description of the proposed project, followed by a discussion of the project delivery approach in Section 2.3. Details of the project plan are presented in Sections 2.4 through 2.8 for commercial; financial; engineering; environmental, regulatory, and lands (ERL); and stakeholder engagement. The analyses and detailed information supporting the plan are contained in Sections 3 through 7.

Table 2-1 provides a cross-reference of the sections of this document to the requirements of House Bill 369.

Table 2-1. Cross-Reference of Project Plan to House Bill 369, AS 38.34

ALASKA STATUTE (AS)	HOUSE BILL 369 TEXT	PROJECT PLAN SECTION
38.34.040(a)	The Joint In-State Gasline Development Team shall produce a project plan for the development of an in-state natural gas pipeline. The development team shall ensure that the project plan is completed and delivered to the legislature by July 1, 2011. The project plan must specify and document how an in-state natural gas pipeline can be designed, financed, constructed, and made operational by December 31, 2015.	This entire document; Sections 2.1 and 2.3 describe AGDC's proposed schedule.
38.34.040(b)	The Joint In-State Gasline Development Team shall assume executive authority over and managerial responsibility for all activities enumerated under sec. 19, ch. 14, SLA 2009, including work previously completed, work in process, and work for which money has been encumbered but that is not completed on the effective date of this subsection.	—
38.34.040(c)	The project plan must include specific plans to coordinate and facilitate construction, ownership, operation, and management of a natural gas pipeline serving Fairbanks, the Southcentral region of the state, and other communities whenever practicable, connecting with or enhancing the existing gas pipeline system, and reaching to tidewater in the Southcentral region of the state.	Section 2
38.34.040(d)	The development team's work product shall include an analysis of alternative possible routes and the selection of a route that, consistent with the other requirements of this section,	Section 5.2
	(1) is economically feasible;	Sections 3.1.5, 5.2
	(2) makes natural gas available to residents at the lowest possible cost;	Sections 3.1, 5.2
	(3) allows for connecting lines to serve industrial, residential, and utility customers along the entire route, and in other regions of the state that can be served at commercially feasible rates;	Sections 3.1.3, 3.1.5, 5.2.2.3
	(4) uses state land and existing state highway and railroad rights-of-way to the maximum extent feasible;	Section 5.2.2.4
	(5) uses existing highway and railroad bridges, gravel sources, equipment yards, maintenance facilities, and other existing facilities and resources to the maximum extent feasible.	Section 5.2.2.5

Table 2-1 (Cont'd). Cross-Reference of Project Plan to House Bill 369, AS 38.34

ALASKA STATUTE (AS)	HOUSE BILL 369 TEXT	PROJECT PLAN SECTION
38.34.040(e)	With the intent that any project-related assets acquired or developed be available for transfer or sale to the entity best able to complete the project, the development team shall (1) prepare plans and designs necessary for construction of the in-state natural gas pipeline project;	Entire document
	(2) coordinate with entities qualified to build, own, and operate the natural gas pipeline;	Sections 3.1.7, 3.2
	(3) identify, apply for, and obtain rights-of-way and other permits for the project route;	Section 6.4
	(4) work with other entities to promote gas supply and purchase contracts required for the project to be commercially viable;	Section 3.3.1
	(5) prepare cost estimates for the project design, construction, and operation to determine the project's economic feasibility and the projected cost of natural gas to consumers;	Sections 3.1, 5.6
	(6) coordinate with and, to the fullest extent possible, use existing work by other state agencies and entities before contracting for new reports and research and analysis;	Section 1.2
	(7) determine regulatory authority over the pipeline project and perform any necessary compliance requirements;	Section 6.3
	(8) identify and apply for, or support extension of, existing permits for export of Alaska natural gas if that export improves project economics and will reduce the price of natural gas to in-state consumers.	Section 2.7
38.34.040(f)	Notwithstanding any other provision of law, any rights to a natural gas pipeline corridor obtained by a state agency under eminent domain may be transferred to a private entity.	—
38.34.040(g)	Notwithstanding any other provision of law, a state agency acquiring an interest in land by eminent domain may grant a permit authorizing a private person to construct, manage, and operate a gas pipeline over, under, along, across, or upon the land.	—
38.34.040(h)	In preparing the project plan required in this section, the development team may consider all aspects of the in-state natural gas pipeline project, including	—
	public, private, or joint construction alternatives,	Section 6
	marketing of natural gas,	Section 3.3.3
	financing alternatives for pipeline construction,	Section 4
	procurement of natural gas from producers,	Section 3.1
	maximization of local hire,	Section 2.3.4
	opportunities for promoting value added industries,	Section 3.1.5.3
	gas-to-liquids manufacturing opportunities,	Section 3.1.5.3
	production and delivery of liquefied natural gas or propane to Yukon River, interior, and coastal communities,	Section 3.3.2
	alternatives for transporting natural gas to other locations in the state,	Section 3.3.2
	the acquisition of natural gas commitments sufficient to ensure the long-term feasibility of the in-state natural gas pipeline project,	Section 3.3.1

Table 2-1 (Cont'd). Cross-Reference of Project Plan to House Bill 369, AS 38.34

ALASKA STATUTE (AS)	HOUSE BILL 369 TEXT	PROJECT PLAN SECTION
38.34.040(h) (Cont'd)	the development of a global natural gas trading hub in the state, and	Section 3.3.3
	facilitating the project developer's commitment, to the maximum extent permitted by law, to (1) hire qualified residents from throughout the state for management, engineering, construction, operations, maintenance, and other positions on the proposed project; (2) contract with businesses located in the state; (3) establish hiring facilities or use existing hiring facilities in the state; and (4) use, as far as is practicable, the job centers and associated services operated by the Department of Labor and Workforce Development and an Internet-based labor exchange system operated by the state.	Section 2.3.4
38.34.040(i)	The Joint In-State Gasline Development Team shall take all action necessary to complete its responsibilities under this section.	—
38.34.050(b)	…The development team shall avoid duplicating studies, plans, and designs that have already been produced or otherwise obtained by other state entities.	Sections 1.2, 2.1
Transitional Provisions (a)	In discharging its obligations, the Joint In-State Gasline Development Team shall	—
	(1) seek letters of intent from buyers and sellers of natural gas to ship gas using the facilities of the project and, from information obtained, define the project parameters that would allow the project to be commercially viable;	Section 3.3.1
	(2) seek letters of interest from private pipeline construction and operating companies to develop the project;	Section 3.2
	(3) prepare and submit to the governor and the presiding officer of each house of the legislature, by December 15, 2010, any initial legislation necessary to advance the project;	—
	(4) prepare and submit a report to the governor, the speaker of the house of representatives, and the president of the senate when each duty set out in (1) - (3) of this subsection is complete.	—

2.1 PROPOSED PROJECT APPROACH: THE STAGE-GATED PROCESS

In July 2010, the team for the Stand Alone Gas Pipeline (SAGP) Project transitioned all project files and work product to AGDC. As part of the effort to evaluate the work, AGDC retained Independent Project Analysis, Inc. (IPA) to assess the status of the project and to assist in developing this project plan. IPA is internationally known for its *stage-gated project delivery approach*, which is the industry standard for megaprojects such as the ASAP Project. IPA conducts statistical analysis of projects from a database compiled of over 1,500 megaprojects conducted in the oil, chemicals, consumer products, and other capital-intensive industries. IPA uses statistical models and database comparisons to evaluate a project's status.

IPA's key recommendation was that this project plan be based on the "stage-gated approach". Stage-gated project delivery emphasizes what is called "front-end loading" or "FEL", whereby the definition of a project progresses through three distinct phases, with decision points ("stage gates") to proceed or not following each phase. As the project passes through FEL 1, FEL 2, and FEL 3, the uncertainty of the cost and schedule are progressively reduced. The FEL phases are followed by Execution and then Operation. Figure 2-1 illustrates the stage-gated process.

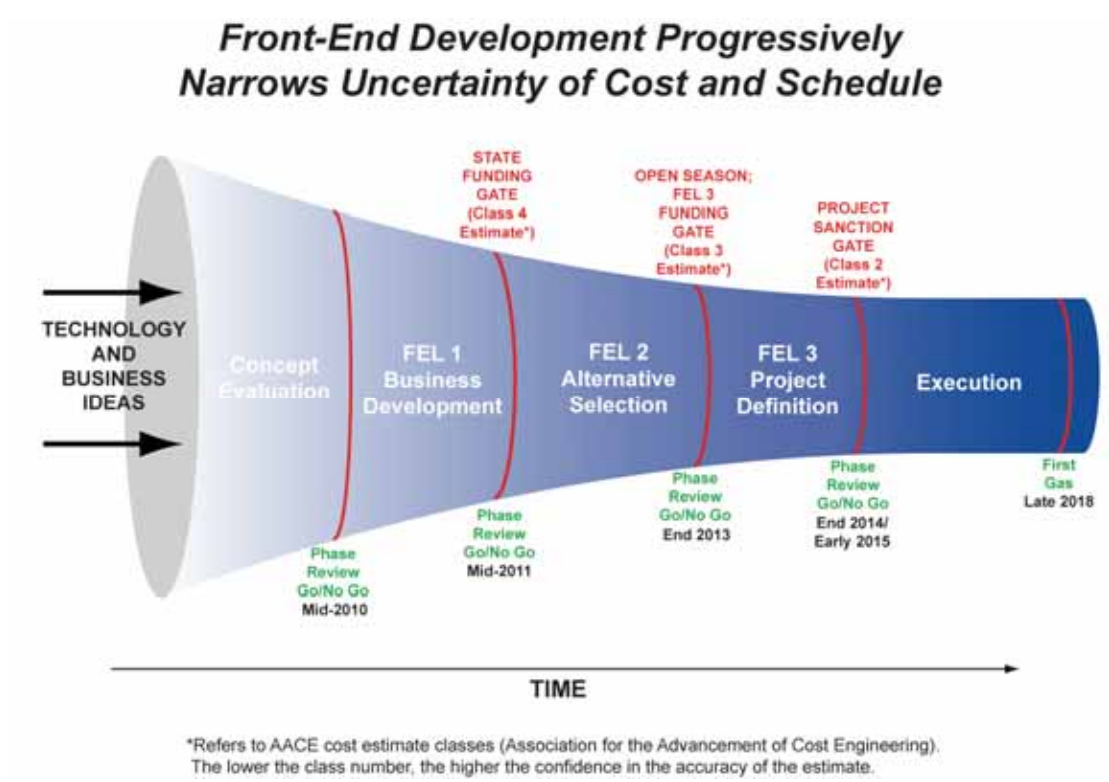

Figure 2-1. Stage-Gated Project Delivery Approach

Following is a summary of the five phases of the stage-gated project delivery approach:

- **FEL 1:** This is the early phase of project definition, where the feasibility of the project is assessed. During this phase, the business case for the project is developed, along with basic engineering and cost estimates. The cost estimate at the end of this phase is an AACE Class 4 estimate. (AACE is the Association for the Advancement of Cost Engineering. The lower the class number, the higher the confidence in the accuracy of the estimate.). During FEL 1, a roadmap for FEL 2 is developed, so that management can determine whether to proceed through the gate between FEL 1 and FEL 2.
- **FEL 2:** Project definition continues, along with development of a business plan, acquisition of permits, and holding of an open season. More detailed engineering is conducted, and the cost estimate is refined to an AACE Class 3 estimate.
- **FEL 3:** Project definition and engineering are finalized. Materials are purchased and contracts are issued for construction. The cost estimate is refined to AACE Class 2 at the end of FEL 3.
- **Execution:** The project is built.
- **Operation:** Operation of the project begins.

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 is employing the stage-gated approach.

2.1.1 Evaluation of the Pace of the ASAP Project

IPA's evaluation of the project is contained in a report prepared for AGDC entitled *An Early Pacesetter Evaluation of the Alaska Stand Alone Gas Pipeline Project* (January 2011). AGDC used this document as the basis for this project plan. According to IPA, the ASAP Project is in the early stages of project definition and reaches the end of FEL 1 with the completion of this project plan on July 1, 2011. 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.

Figure 2-2 outlines the front-end loading phases for the ASAP Project. As of June 30, 2011, the project has spent about $30 million and has reached the end of FEL 1. The end of an FEL phase is called a "stage gate". AGDC recommends proceeding through FEL 2, which requires the spending of an additional $240 million sourced from the State of Alaska. At that point, the project will reach a level where a binding open season can be held. The results of the open season will determine the FEL 3 financial requirements necessary to deliver a decision support package to the pipeline owner that will enable project approval or sanction of construction. Currently, AGDC estimates that FEL 3 will cost $130 million. This estimate is based on industry experience and could be more or less depending on the requirements of the sanctioning entity. Whether the FEL 3 funding is sourced by the State of Alaska or another entity depends on the strength of the commitments made for firm transportation at the open season and the ownership business model chosen.

IPA concluded that the House Bill 369 schedule of completing the ASAP Project by the end of 2015 is impractical because it does not allow enough time for project definition. Moving too fast on project definition is the primary root cause of poor performance including cost overruns and delays for megaprojects such as the ASAP Project. Such large, complex projects have inherent difficulties that are exacerbated by proceeding too quickly through the project definition phase. Figure 2-3 shows both the current schedule based on the December 31, 2015 project completion date required in House Bill 369 and an optimized schedule based on the stage-gated approach.

2.1.2 Summary of Issues that Drive the Recommended Schedule

Following is a summary of the reasons for using the stage-gated process and for extending the project completion schedule:

- Potential builders/owners/operators contacted by AGDC have emphasized the need to use the stage-gated process so that the transition of the project from AGDC to the builder/owner/operator can be accomplished smoothly and with minimal delay. In developing

a front-end loaded project plan, AGDC is proceeding the way any builder/owner/operator would.

- Proper levels of project definition are needed to get commitments for gas.
- Accelerating front-end loading leads to increases in cost and delays in schedule. Costly design changes also lead to delays.
- No private developer is willing to take the project at this time.

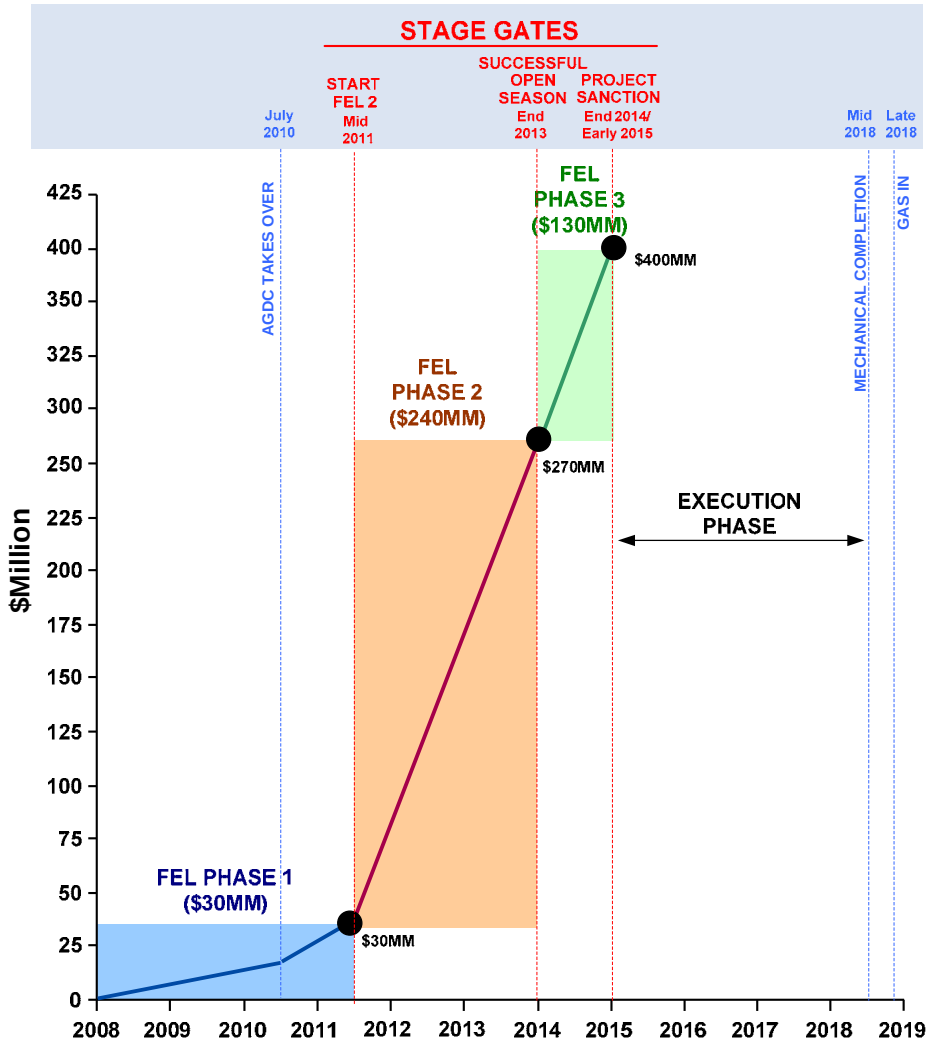

Figure 2-2. Front-End Loading Financial Requirements for the ASAP Project

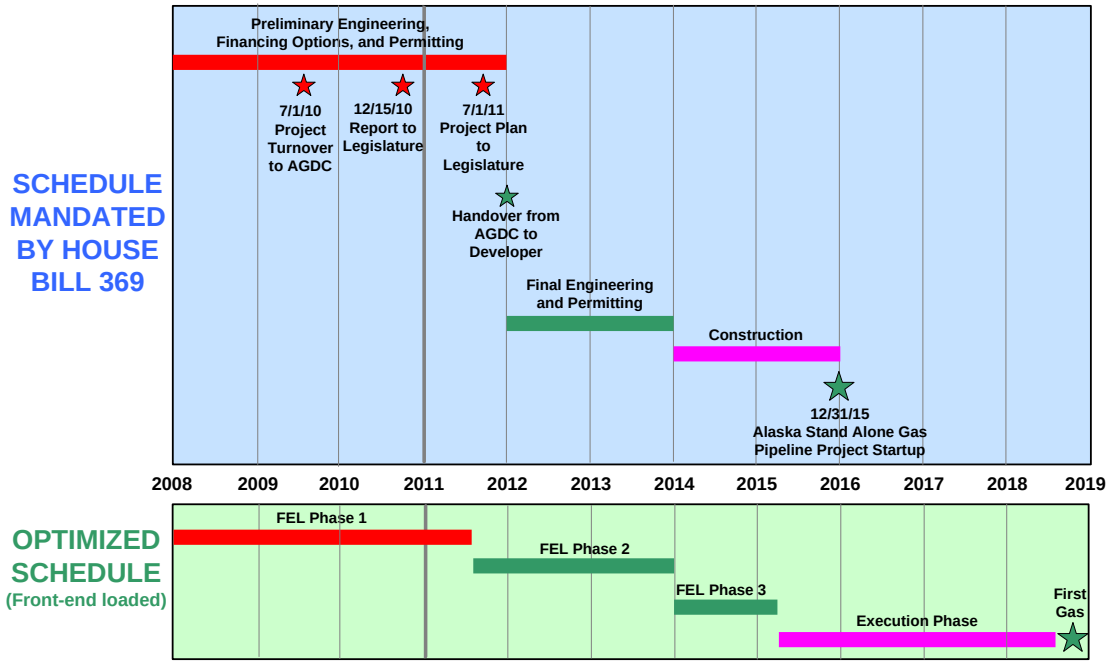

Figure 2-3. Current Schedule vs. Optimized Project Schedule

2.2 THE PROPOSED PROJECT

2.2.1 Selection of the Base Case for the Proposed Project

When AGDC took over the project in July 2010, a total of 16 cases had been selected for study based on varying pipeline capacities and products[5] (see Section 3.1.1 of this project plan for a detailed discussion of the cases). These cases involved flow capacities from 250 to 1,000 MMscfd (million standard cubic feet per day) and products including conditioned, unconditioned, and utility-grade gas with or without natural gas liquids (NGLs). AGDC eliminated the cases over 500 MMscfd to conform to the terms of the Alaska Gasline Inducement Act (AGIA), which limits other projects receiving state support to 500 MMscfd. The cases involving processing North Slope gas at Cook Inlet were eliminated because of the higher resulting tariffs, the inefficiency

[5] *Alaska Stand Alone Pipeline Project Update and FY 2010 Deliverables*, submitted to AGDC on July 15, 2010 by the Alaska In-State Gasline Coordinator.

associated with carrying 10% carbon dioxide in the pipeline, and the issues associated with levels of water vapor and hydrogen sulfide not conducive to safe and low-cost operation of a pipeline.

Section 3.1.1 of this project plan discusses in detail the criteria for selection of the Base Case, which is a 500 MMscfd pipeline carrying conditioned natural gas and an enriched stream of NGLs. This Base Case was used for commercial, financial, engineering, and environmental/regulatory work done by AGDC over the past year to develop this project plan.

The pipeline route and facilities included in the Base Case are discussed below. It is important to note that the 500 MMscfd capacity minimizes the tariff for use of the pipeline but requires an industrial anchor to underpin full capacity. An industrial anchor is a consumer or exporter of natural gas or NGLs who reserves a dependable, long-term portion of the capacity with minimal seasonal variation above the residential, commercial, and power generation demand of the pipeline. Historically, the Kenai Agrium Fertilizer Plant and the Nikiski LNG Plant have served as industrial anchors for the natural gas industry in the Cook Inlet. Enriched natural gas (containing NGLs) also helps minimize the cost of service. NGLs add significantly to the energy content of the gas stream and hence its value. NGLs must be removed at the terminus, separated into their components, stored, and shipped to market. The capital cost of downstream industrial anchors like an NGL extraction/export plant or an LNG export plant are not in the scope of this project since they are stand-alone facilities that would typically be owned by the LNG or NGL exporter. AGDC has undertaken studies to determine whether they are feasible; the open season will determine whether shippers concur.

2.2.2 Proposed Project Facilities

The pipeline system is being designed to transport a conditioned natural gas that is highly enriched in non-methane hydrocarbons. Table 2-2 provides a description of project facilities. A map of the proposed ASAP system is shown in Figure 2-4, and the system is depicted schematically in Figure 2-5.

Although the principal inlet connection is assumed to be at Prudhoe Bay, other inlet connections could be accommodated for suppliers anywhere along the pipeline route. Based on the most recent gas exploration activity, the most likely interconnects would be at the Brooks Range Foothills (which could include Gubik Field), near the Yukon River (Yukon Basin), and from the Nenana Basin south of Dunbar. AGDC assumes that supplier proposals for new inlet connections will become apparent during the open-season process or after that as *proposals to expand capacity* where it is allowed under the provisions of AGIA (south of the 68th parallel).

The system includes a 24-inch-diameter mainline pipeline that will run 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, connecting at MP 39 of the Beluga Pipeline near Big Lake (ENSTAR Beluga Distribution System). A lateral pipeline to Fairbanks will take off from the main pipeline a few miles north of Nenana near Dunbar and will travel northeast to Fairbanks, a distance of approximately 35 miles. The mainline

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.

Table 2-2. Summary of Proposed ASAP Project Facilities

FACILITY	DESCRIPTION
Mainline Pipeline	• Prudhoe Bay to milepost (MP 39) of the Beluga Pipeline near Big Lake (ENSTAR Beluga Distribution System). • 737 miles long. • 24-inch-diameter. • 2,500 psi maximum operating pressure.
Fairbanks Lateral	• 35 miles long. • 12-inch-diameter. • 1,400 psi maximum operating pressure. • Tie-in with mainline at MP 458.
Gas Conditioning Facility	• A 70-acre facility at Prudhoe Bay to provide conditioning necessary to remove carbon dioxide, hydrogen sulfide, 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 Gas Conditioning Facility.
Compressor Stations	• A maximum of two compressor stations will be required: the pipeline head compressor station at MP 0 and one pipeline compressor station near MP 286. • Gas turbine-driven centrifugal compressors. • Propane-cycle gas-chiller plants will be installed at compressor stations located north of Minto Flats. • Two gas-turbine-driven electric-power generators per station. • Each compressor station site will be on a gravel pad and will be fenced.
Straddle and Off-Take Facility	• Located at the Fairbanks Lateral tie-in at MP 458 near Dunbar. • Will separate NGLs from the gas stream to Fairbanks, providing 60 MMscfd of utility-grade gas to Fairbanks. NGLs will be re-injected into the main pipeline.
Cook Inlet NGL Extraction Facility	• Located at MP 737 (mainline terminus at the Beluga Pipeline near Big Lake). • Will separate NGLs from the gas stream and inject utility-grade gas into the ENSTAR local distribution system. NGLs extracted from the gas stream will be sold separately. • Not included in tariff, an NGL fractionation plant would be needed to make marketable products from the NGL stream.
Custody-Transfer Gas-Metering Stations	• At Dunbar and at Big Lake terminus.
Other Permanent Facilities	• Mainline block valves at a maximum of every 20 miles. It is expected that 30 mainline block valves will be required and that two valves will be required along the Fairbanks Lateral. • A pig launcher will be located at the Gas Conditioning Facility. Pig launcher/receiver assemblies will be located at the compressor stations, and 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 facilities will be located in Prudhoe Bay, Fairbanks, and Wasilla.
Material and Water Sources	• Material sites (gravel pits) will be distributed along the route minimizing hauling distances. Existing material sites will be used whenever possible. • Water for construction needs will be collected from surface water sources such as lakes and streams.
Construction Support Facilities	• Project offices, personnel housing and support, and logistics support sites. • Port facilities. • Access roads. • Construction workpads (gravel, ice or snow, and grade). • Laydown yards and storage facilities. • Airports and airstrips.

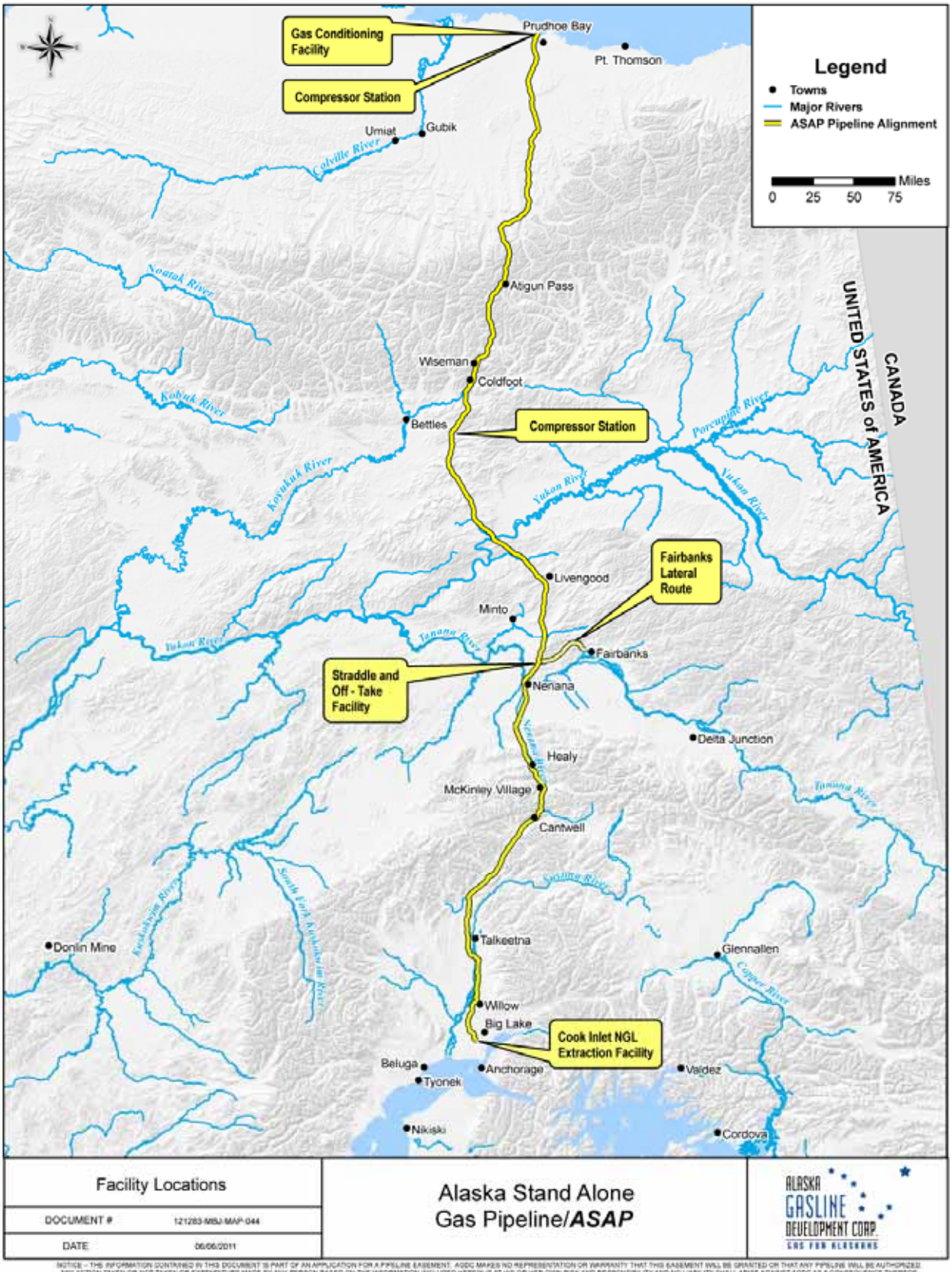

Figure 2-4. ASAP Route Map and Major Facilities

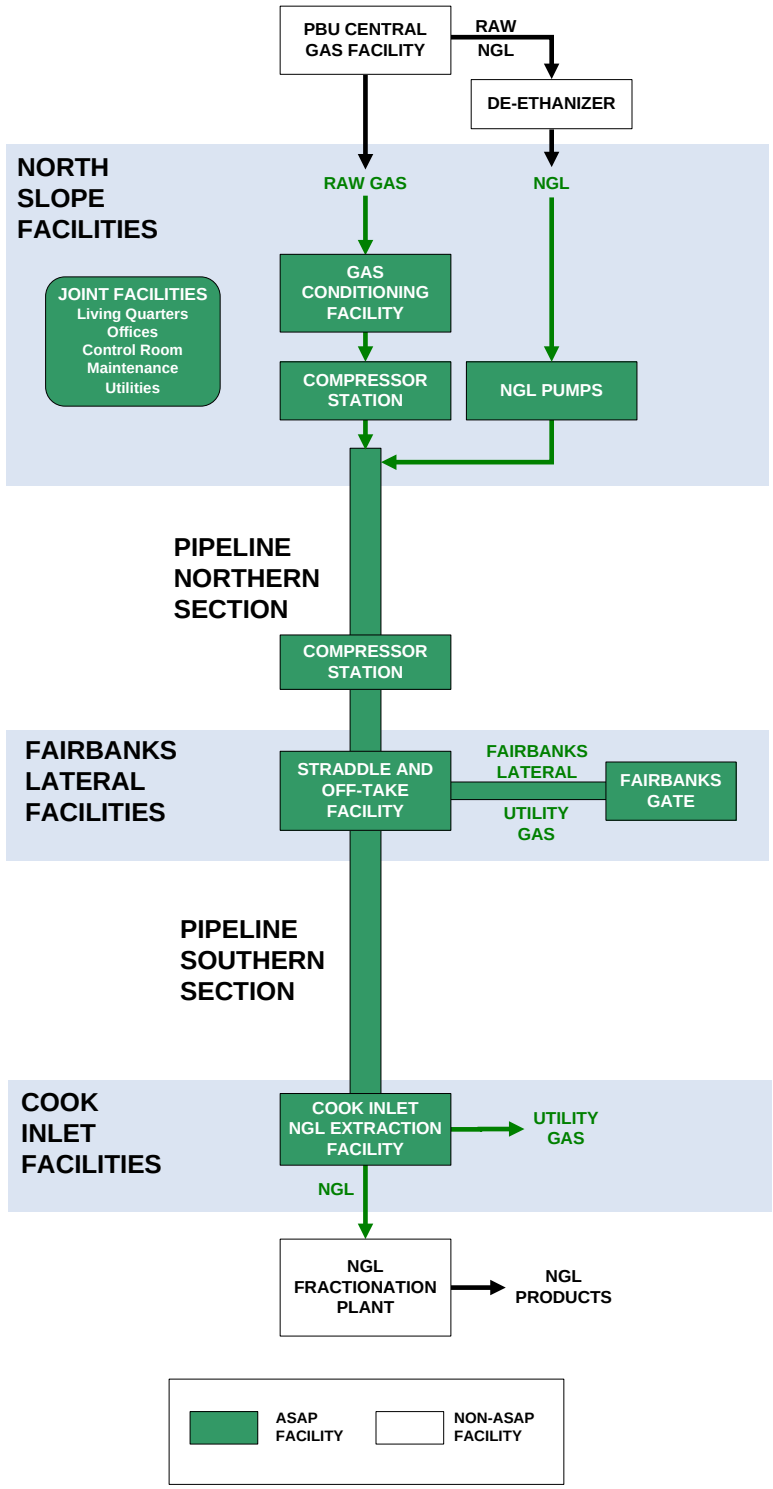

Figure 2-5. Flow Schematic of ASAP Facilities

The proposed 24-inch-diameter mainline has a capacity of 500 MMscfd with a maximum allowable operating pressure (MAOP) of 2,500 pounds per square inch (psi). The capacity of the proposed 12-inch-diameter Fairbanks Lateral is 60 MMscfd with an MAOP of 1,400 psi. The natural gas and NGLs would be received from the Prudhoe Bay Central Gas Facility and would be conditioned at the ASAP Gas Conditioning Facility (GCF) at Prudhoe Bay to remove such contaminants as carbon dioxide, water vapor, and hydrogen sulfide. NGLs would be added to the line at the GCF and would be removed at the Cook Inlet NGL Extraction Facility to be located near Big Lake. The NGLs would then have to be delivered to a new NGL fractionation plant and sent to market. The Straddle and Off-Take Facility will be built at the start of the Fairbanks Lateral near Dunbar to provide utility-grade natural gas to the Fairbanks area.

The project includes two compressor stations for the initial design throughput: the pipeline head compressor station at MP 0 and one pipeline compressor station near MP 286. For future expansion beyond 500 MMscfd throughput, additional stations will be required. After responses to an open season are evaluated, the final number and location of the compressor stations will be confirmed. Through the FEL 2 phase, two alternative sites, besides those mentioned above, are being carried forward in the project plan and associated environmental impact statement (EIS) and permitting efforts.

2.3 PROJECT DELIVERY

2.3.1 Project Team

As the ASAP Project progresses into the FEL 2 stage and beyond, it will be necessary to develop an integrated project team comprised of people with a wide range of capabilities who can perform key functional roles in the organization. Project skill sets that will be required to move the project forward include business, process design, operations, maintenance, project design, project controls, construction management, procurement and contracting, quality assurance, health and safety, and permitting. Figure 2-6 illustrates the early stages of the FEL 2 organization. When the owner organization does not have sufficient resources to staff positions, the balance will shift from direct employees to contractor staff.

For ASAP, the overall execution will be initiated and controlled under the supervision of AGDC until such time that the pipeline builder/owner/operator or builder/operator has been selected and transition plans initiated.

2.3.2 FEL 2 Stage Activities and Deliverables

FEL 2 activities focus first on the open season, including preparing all the necessary information needed for conducting the open season, holding the open-season solicitation, and finalizing the open-season agreements/commitments. This step will eliminate alternatives and provide the business premises to move the project forward towards FEL 3. Figure 2-7 charts the activities that will occur during FEL 2.

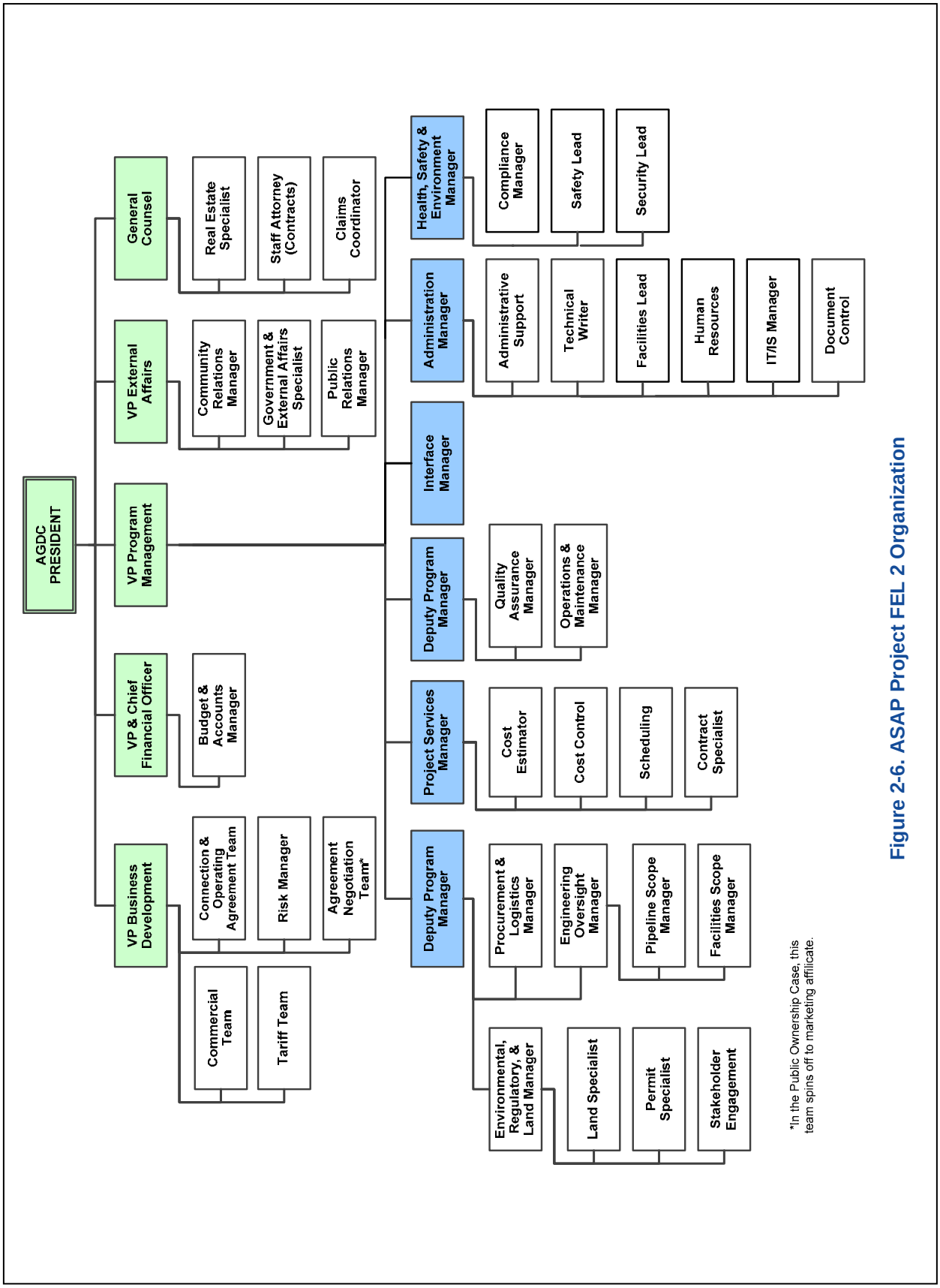

Figure 2-6. ASAP Project FEL 2 Organization

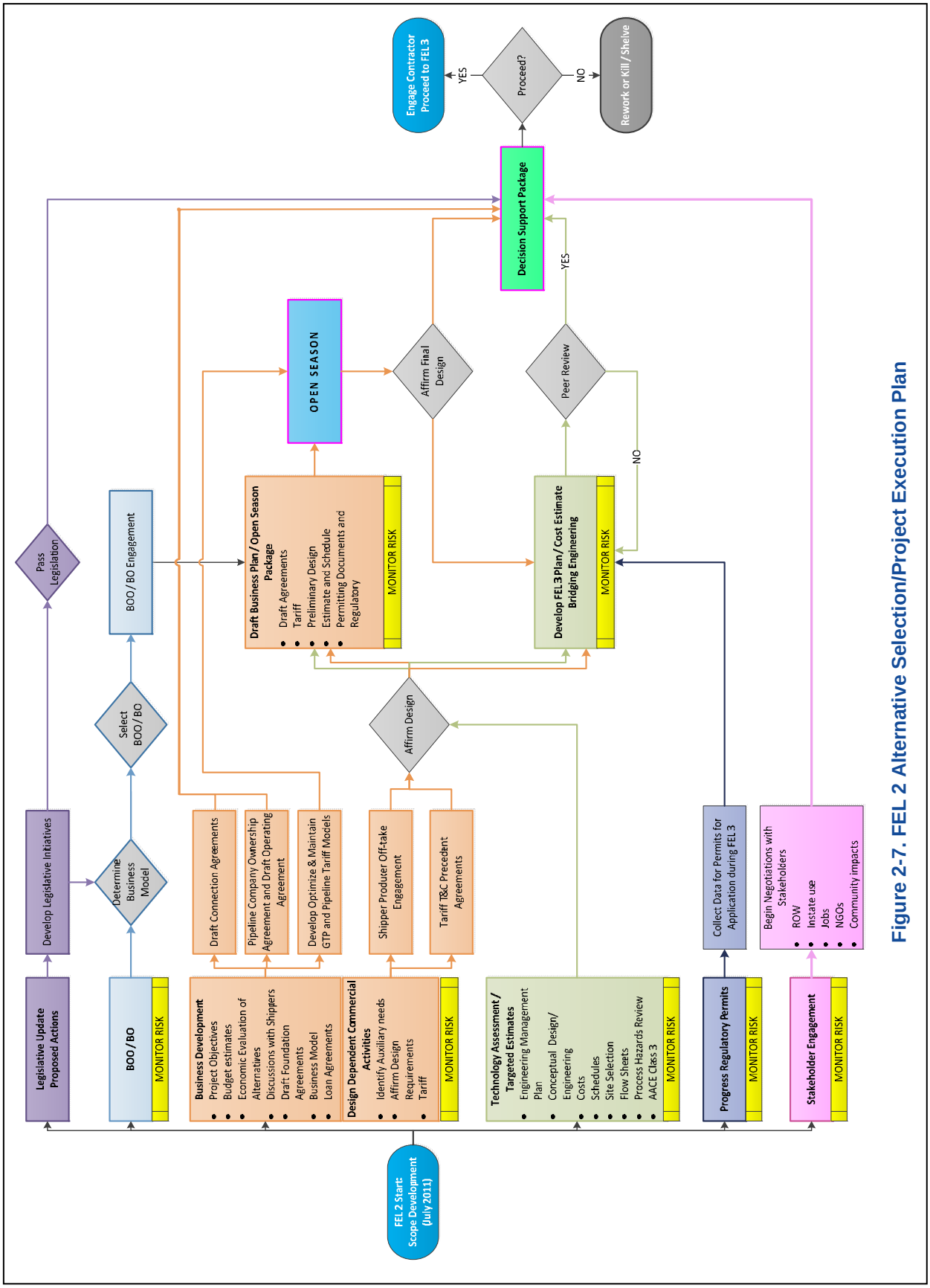

Figure 2-7. FEL 2 Alternative Selection/Project Execution Plan

Based on the open-season agreements, adjustments will be made to the design basis and then integrated into the engineering design, cost estimates, and schedules for the AACE Class 3 level estimates. The estimates will provide the basis for evaluating the overall status of the project to determine if the project is ready to move to the next project funding and development stage — FEL 3.

The deliverables for each of the FEL 2 activities represent the progression of project definition, narrowing of the scope, and the development/refinement of the work products. The key for FEL 2 is tightening the project definition, locking down the scope, and increasing the project level of maturity in line with the commercial agreements made during the FEL 2 phase.

2.3.3 ASAP Project Schedule

The project execution schedule spans several years. Figure 2-8 provides a high-level schedule of activities commencing with FEL 2 and progressing through project startup. Any effort to shorten the project schedule and rush the execution poses a significant risk to project success. Not thoroughly completing the project definition work before starting detailed engineering often results in significantly longer project schedules and much higher costs.

2.3.4 Contracting and Procurement Strategies

Several primary groups will need to be brought onto the project during FEL 2 — pipeline and facilities engineering, environmental, and the pipeline operator, along with numerous minor contracts. AGDC will develop the project requirements and deliverables for each contract along with the commercial requirements. Potential contractors will be solicited for level of interest. Before sending out a request for proposals (RFP), AGDC will prepare a selection evaluation process of technical and commercial issues for use in making the final selection.

The project is expected to generate thousands of jobs as it progresses through design, construction, and into operations. AGDC is committed to maximizing local hire. All contracts and agreements will include language requiring each contractor to support our commitment to local hire.

During FEL 2, the level of procurement will be relatively minor. There will be some discussions with potential suppliers of major engineered equipment and construction services, but these discussions will be to support development of engineering data and cost estimates. No commitments for major equipment will be solicited until later project phases.

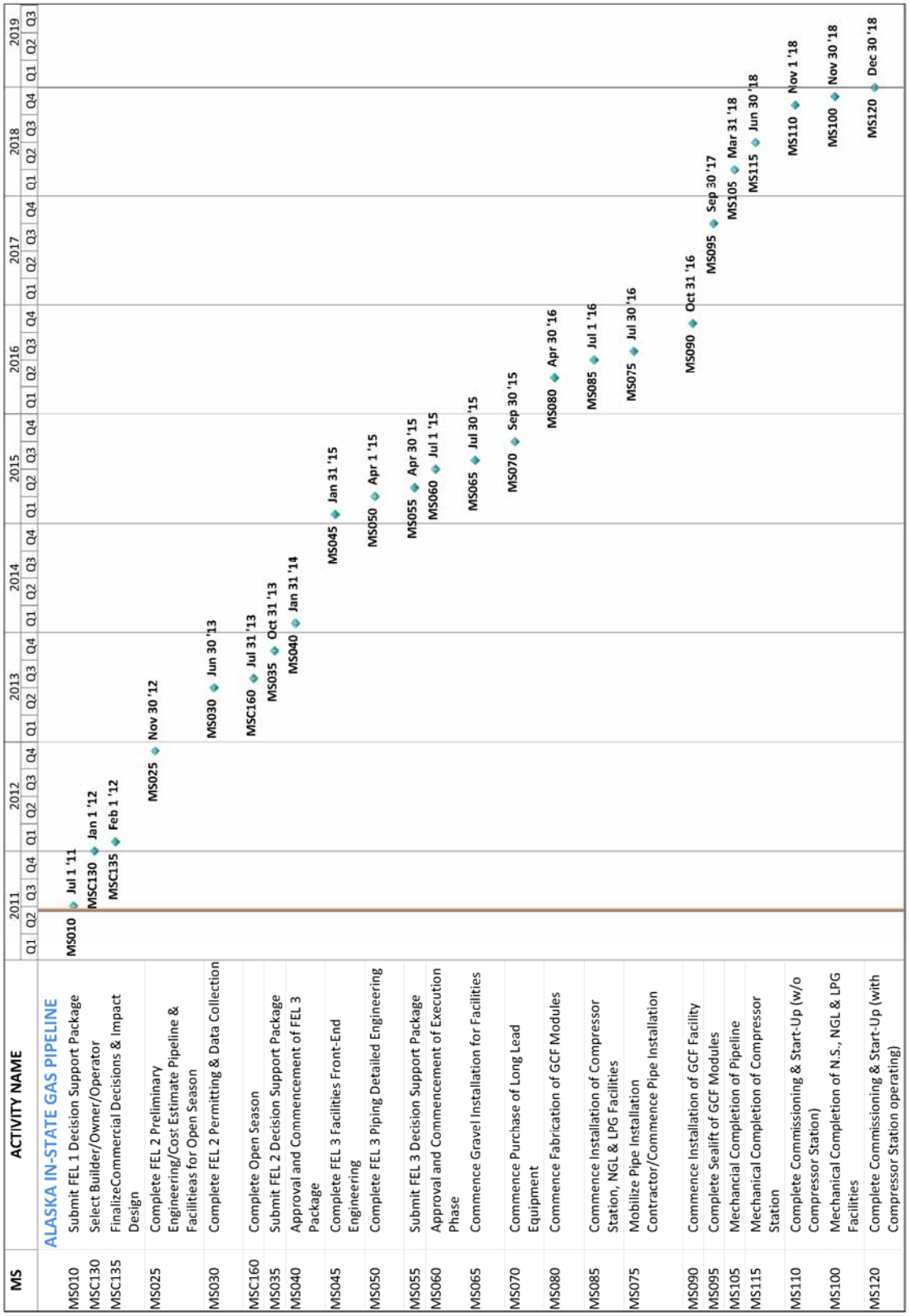

Figure 2-8. ASAP Project Schedule

2.3.5 Recommended Legislative Actions

Currently pending state legislation addressing AGDC and ASAP will contribute greatly to the success of the project. AGDC recommends passage of these measures.

- **House Bill 189:** This bill provides that, to the extent AGDC enters into confidentiality agreements, information provided pursuant to such agreements is not subject to the Public Records Act. Further, it adjusts board participation to include the Alaska Railroad Chairman's designee and elimination of ANGDA participation. The bill passed the House, and was referred to Senate Resources. It has not been heard.
- **House Bill 203:** This legislation creates a fund for AGDC. The bill passed the House, and was referred to Senate Finance. It has not been heard.
- **House Bill 215:** This legislation limits the judicial review of a right-of-way lease or the development or construction of an oil or gas pipeline on state land. The bill passed the House and was referred to both Senate Judiciary and Finance. It has not been heard. This legislation is modeled after the Trans-Alaska Pipeline legislation that was adopted by Congress in 1973. Similar legislation was passed by the Alaska State Legislature in 1973 (Senate Bill 3) related to the Trans-Alaska Pipeline.

In addition, AGDC believes that several other legislative measures are important to address issues identified during its investigation and studies of the past year. AGDC recommends the following:

- ***Address the issue of contract vs. common carrier:*** Shippers will be reluctant to bid firm transportation as long as ASAP is required to operate as a common carrier for intrastate transport of gas. A common carrier operation by definition will not have 100% capacity covered through firm transportation agreements. The Alaska Legislature should amend the Alaska Pipeline Act to conform to the changes proposed in House Bill 215 or otherwise exempt ASAP from the common carrier provisions of the act. ASAP has virtually no chance of attracting adequate shipping commitments as a common carrier.
- ***Empower AGDC with ratemaking authority over its projects:*** For AGDC projects, AGDC needs to have the sole right to determine the ratemaking methodology and settle tariff disputes for intrastate gas shipments (including Gas Conditioning Facility tariffs) over the life of the initial firm transportation commitments or during the period of AGDC financing, whichever is longer.
- ***Stabilize property taxes:*** AGDC recommends that the State of Alaska fix the methodology and assessed mill rates for the first 20 years of the ASAP Project.
- ***Request waiver of rental on state land:*** The Alaska Legislature should consider whether it should pass a law waiving rental from AGDC for rights-of-way on state land or state agency land unless and until ASAP is transferred to a builder/owner/operator. Such legislation would preclude the Legislature from having to appropriate money to AGDC that is then transferred to another state entity.

With regard to the first two recommendations, AGDC staff will work with counsel to have proposed language ready by September 15, 2011.

2.4 COMMERCIAL PLAN

The commercial plan for the project was developed with the assistance of Science Applications International Corporation (SAIC), R.W. Beck Inc., and Hatch Associates Consultants, Inc. for economic feasibility studies, and Black & Veatch for tariff modeling. The commercial work completed by AGDC in the past year was focused to address the specific commercial questions raised or implied by House Bill 369. Those include:

- Assess the commercial viability of the project investment for pipeline owners and industrial anchors utilizing optimized capital costs and tariffs.
- Determine the business risks for the builder/owner/operator or builder/operator.
- Evaluate the commercial requirements of a potential builder/owner/operator.
- Address other commercial considerations of House Bill 369.
- Determine the actions required and define the commercial work plan to ensure commercial viability, mitigate business risk, and attract a competent builder/owner/operator.

The proposed commercial plan for FEL 2 establishes the process for selecting a builder/owner/operator, describes the agreements that must be created in the front-end-loading phase of the project (before sanction), and lays out the activities necessary to execute the open-season process. Also, the following sections identify the commercial tasks and activities required in FEL 2 to facilitate project development and execution.

2.4.1 Commercial Strategy, Targets and Milestones for the FEL 2 Phase

The overarching strategy for the commercial team will be to select a builder/owner/operator as early as possible in 2012, then execute a successful open season at the end of FEL 2, negotiate pre-emptive transportation agreements with foundation shippers[6] before open season, and complete drafts of the required commercial agreements in an appropriate timeframe.

Also, the team will work with the State of Alaska, the Prudhoe Bay Unit (PBU) owners, and other stakeholders to encourage them to undertake the supporting actions outlined below.

2.4.2 Commercial Tasks and Actions for AGDC in FEL 2/FEL 3

AGDC will undertake the following commercial tasks and actions for completion during the FEL 2 and FEL 3 phases:

- Support the legislative effort to address carrier operation status (common vs. contract), confidentiality, and in the case of state ownership, grant AGDC certain regulatory powers. The legislative actions should be complete by May 2012.

[6] Foundation shippers are a class of shippers that have made long-term capacity commitments (usually above a fixed level) on a pipeline prior to the close of open season that entitles them to certain distinct rights to capacity and tariff, separate and apart from all other shippers.

- Develop the process and select a builder/owner/operator or builder/operator as early as possible in 2012.
- Negotiate with anchor/foundation shippers for tariff and capacity before the open season occurs at the end of FEL 2.
- Establish and maintain an ongoing dialogue with shippers on changes in cost or design.
- Define the pipeline specifications for NGLs entering the pipeline through the miscible injectant (MI) pumps above the pipeline inlet manifold for the purposes of the tariff specification as part of the open-season package.
- Define the pipeline specifications for natural gas entering the ASAP Gas Conditioning Facility for the purposes of the tariff (H_2S and rare metals) and as part of the open-season package.
- Define the pipeline specifications for natural gas entering the pipeline inlet manifold from the Gas Conditioning Facility or any other connection delivering gas to the pipeline compressors as part of the open-season package.
- Formalize the Gas Conditioning Facility tariff methodology.
- Determine the variety of pipeline tariffs to be offered and the methodology used for computing each in preparation for the open season.
- After the open season, negotiate precedent agreements.
- Draft standard connection agreements for the Gas Conditioning Facility, Fairbanks LDC, and ENSTAR connections.
- Draft CO_2/ethane disposal and connection agreement.
- Draft the shared services agreements between ASAP and PBU.
- Draft the shared services agreement between ASAP and TAPS owners.
- Plan open season.
- Hold open season.
- Monitor Cook Inlet supply developments.
- Maintain a current commercial risk register with mitigation plans throughout FEL 2 and FEL 3.
- Execute cogeneration agreements, if practical, with North Slope Borough, Livengood, Golden Valley Electric Association, or other parties ready and willing to receive power from ASAP facilities.

The following supplemental tasks are required in the public ownership case:

- Establish a gas marketing affiliate.
- Negotiate supply contracts with gas producers (through gas marketing affiliate).
- Negotiate off-take agreements (through gas marketing affiliate).

2.4.3 Actions Required for the State of Alaska

AGDC will support the efforts by the State of Alaska to:

- Evaluate the merits of the recommended legislation and take appropriate actions.
- Establish the option to bid firm transportation of royalty-in-kind (RIK) gas.
- Continue to support the FEL 2 and FEL 3 funding of AGDC.

2.4.4 Commercial Actions Required for the Prudhoe Bay Unit Owners and Other Potential Suppliers

AGDC will work with the PBU owners and other potential suppliers to help expedite the following commercial actions:

- Link the producers with potential off-takers to negotiate supply or off-take agreements.
- Request amendments to the unit operating agreements that address gas balancing in a manner that enables individual unit owners to ship freely without undue gas balancing requirements (in public ownership case).
- Negotiate gas-supply agreements (through AGDC gas marketing affiliate) in the public ownership case.

2.4.5 Commercial Actions Required by Shippers/Off-takers

AGDC will enlist potential shippers to do the following:

- Negotiate foundation shipper agreements prior to open season.
- Attend open season.
- Keep abreast of project developments.
- Negotiate precedent agreements.
- Negotiate gas-supply and off-take agreements (through AGDC gas marketing affiliate in the public ownership case).

2.4.6 Commercial Actions Required by the Fairbanks Community

The Fairbanks community should develop the natural gas infrastructure necessary to position Fairbanks to take their forecast capacity as soon as possible after startup.

2.4.7 Commercial Actions Required by Mining Entities

Mining entities should undertake the following:

- Negotiate agreements with gas suppliers subject to project completion.
- Fund and build interconnects.

2.5 FINANCING PLAN

The financing of ASAP will be dependent upon the ultimate ownership structure. AGDC has recommended the state ownership model and with the assumption that it is the chosen structure, will undertake the following plan:

- Financing using debt issued by the Alaska Railroad:
    - Determine, through a Private Letter Ruling (PLR) request to the Internal Revenue Service, the ability of the Alaska Railroad to finance ASAP with the issuance of tax-exempt debt.

  - Negotiate agreements with the Alaska Railroad for the issuance of debt.
  - Issue an RFP for a financial advisor, bond counsel, and special tax counsel for the debt issuance; review the responses received for each; and negotiate contracts with the winning respondents.
  - Create and distribute an RFP for bond underwriters to leading investment banks. Review and evaluate the responses; appoint a team of underwriters.
  - Create a plan for investment options by individual Alaskans, with options to include possible mutual fund or preferred stock issuance.
  - Construct a bond issuance calendar based upon expected cash draws to fund construction, including letters of credit or other facilities to finance the project during the construction period.
  - Issue debt in multiple series to minimize negative arbitrage.
- Assuming the PLR is unsuccessful, debt would need to be issued by the State or AGDC. There would be additional steps involved with this scenario.
  - Negotiate with State Department of Revenue to determine the optimal credit structure for the debt, including drafting and supporting necessary legislation.

If a private ownership model is the preferred structure, the financing function will be limited as the builder/owner/operator will obtain its own financing.

2.6 ENGINEERING PLAN

The engineering plan for FEL 2 includes work necessary to support an open-season package, development of a draft business plan, and production of a decision support package for FEL 3 gate review and endorsement. This work includes the following activities:

- Affirm design requirements.
- Finalize site selection.
- Perform preliminary engineering (as compared to FEL 1 conceptual work).
- Perform process hazard reviews.
- Refine capital cost estimates to AACE Class 3 level.
- Perform pipeline stress design capacity/demand testing for a special permit from the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA).
- Acquire field data for regulatory and design requirements.
- Develop an engineering plan for FEL 3.

Table 2-3 provides a comparison of ASAP Project engineering work completed to date against work planned for FEL 2. This effort is organized by engineering deliverables with a breakdown by general project data, facilities engineering deliverables, and pipeline engineering deliverables.

Table 2-3. Maturity Matrix for Engineering Deliverables: Present vs. End of FEL 2

ELEMENT	STATUS AT END OF FEL 1	STATUS PLANNED FOR END OF FEL 2
GENERAL PROJECT DATA		
Scope	Preliminary	Defined
Plant Production	Preliminary	Defined
Location	Approximate	Specific
Soils	Approximate	Defined
Integrated Project Plan	Preliminary	Defined
Master Schedule	Preliminary	Defined
Escalation	None	Defined
Work Breakdown	Preliminary	Defined
Project Code	None	Defined
Contracting Strategy	Assumed	Preliminary
ENGINEERING DELIVERABLES - FACILITIES		
Block Flow	Preliminary	Complete
Plot Plans	Preliminary	Complete
Process Flow Diagrams (PFDs)	Preliminary	Complete
Utility Flow Diagrams (UFDs)	Preliminary	Complete
Piping & Instrumentation Diagrams (P&IDs)	Preliminary	Complete
Heat & Material Balances (H&MB)	Started	Complete
Process Equipment List	Preliminary	Complete
Utility Equipment List	Started	Complete
Electrical One-Line Drawings	Started	Complete
Specification and Datasheets	Started	Preliminary
General Equipment Arrangement Drawings	Started	Complete
Spare Parts Lists	None	Started/Preliminary
Mechanical Discipline Drawings	None	Started
Electrical Discipline Drawings	None	Started
Instrumentation/Control System Drawings	None	Started
Civil/Structural/Site Discipline Drawings	None	Started
ENGINEERING DELIVERABLES - PIPELINE		
Alignment Sheets	Started	Preliminary
Special Design Areas	Preliminary	Complete
Logistics Plan	Preliminary	Complete
Material Specifications	Started	Preliminary
Terminus Configurations	Started	Preliminary
Trench Details	Started	Preliminary

2.7 ENVIRONMENTAL, REGULATORY, AND LANDS (ERL) PLAN

The environmental, regulatory, and lands (ERL) plan for FEL 2 includes work necessary to support an open-season package and draft business plan, and production of a decision support package for FEL 3 gate review and endorsement.

Plans for the FEL 2 phase include continued work on permits, particularly support of the efforts to obtain the federal and state rights-of-way. Critical to this work is support of the ongoing EIS process required for the federal right-of-way. In addition, obtaining agreements from public and private landowners, leaseholders, Native allottees, and other parties is required before construction. A survey and complete title verification will be needed to identify the number of parcels and land ownership. Field surveys will be undertaken to support data development for regulatory and permitting requirements. Development of an ERL plan for FEL 3 is included in this work plan.

In the past year, AGDC developed a permit acquisition plan to identify the necessary permits and develop a timeline for obtaining them. This permit acquisition plan will be updated for FEL 2 activities.

Permits were categorized in three "tiers" based on when applications should be submitted and their relative importance.

- **Tier 1 Permits:** Permits or permit applications that trigger other activities, such as National Environmental Policy Act (NEPA) review, or which are long-lead items.
- **Tier 2 Permits:** Those not required to kick off the NEPA process but may require several months to develop data for inclusion in the permit applications or for agency review.
- **Tier 3 Permits:** Less time-sensitive or may be required late in the permitting process.

The following environmental fieldwork will be conducted during FEL 2 to support Tier 1 and 2 permits:

- Cultural resources survey and sensitivity model.
- Wetlands survey and evaluation.
- Stream crossing surveys for fish and fish habitat.
- Water resources availability studies.
- Air quality baseline data collection.

AGDC's permitting plan also includes proactive coordination with federal, state, and local regulatory agencies and quick response to agency requests for information.

Title work is needed on a regular schedule to maintain the land database with applicable lands sales, exchanges, and third-party encumbrances. The most significant future land work includes:

- Title examination as a follow-up to preliminary title work.
- Mining claims (federal and state).
- Identification of third-party interest (leases, occupational interests, trapping).
- Right of entry and access agreement acquisition for studies.

- Survey control (property surveys, platting, right-of-way mapping).
- Agency land-use permits (utility, letter of non-objection).
- Preconstruction private property inventory, also known as encroachment inventory.
- Appraise and acquire.
- Right-of-way lease appraisal.
- Utility encroachment coordination and relocation.
- Eminent domain.

Discussions were conducted with ConocoPhillips, operator of the Nikiski LNG export facility, to confirm that existing permits for the facility would continue if and when the plant was mothballed, in order to preserve the option of exporting natural gas from the North Slope. Other permits for export of Alaska natural gas would be sought by potential exporters at a time subsequent to reaching successful agreements for transporting their product through ASAP.

2.8 STAKEHOLDER ENGAGEMENT PLAN

The mission of AGDC's stakeholder engagement plan is to connect Alaskan communities and ASAP stakeholders through collaborative and effective outreach. The goal of stakeholder engagement is to support the project mission by providing the most effective avenue for delivering the project message while encouraging the opportunity for stakeholders to have a voice in the project so that ASAP can receive information critical to achieving a successful project outcome.

The calendar for stakeholder engagement spans the life of the project. AGDC's stakeholder engagement plan identifies the tasks and schedule for outreach activities to support project communication needs, including AGDC's participation in the formal regulatory permitting, consultation, and EIS activities. AGDC's goal is to develop and build long-term relationships with Alaskan people, communities, and entities along the ASAP route.

Following are the elements of the FEL 2 plan, which is discussed in detail in Section 7:

- Create a project message to educate the public and stakeholders on the importance and purpose of the ASAP Project.
- Continue presenting project information in a variety of forums and to a wide array of audiences, such as Chamber of Commerce forum presentations in Kenai and Fairbanks, Alaska Oil and Gas Congress, Industry Trade Alliance meeting, radio appearances in Kenai and Anchorage, Anchorage Mayor's Energy Task Force meeting, Joint In-State Gasline Development Team meeting, board of directors meetings, and public education at community council meetings and community planning meetings.
- AGDC will meet with specific communities on a heightened schedule to maintain a balance of communication within population areas along the route. The communities of Barrow, Kenai, Nuiqsut, Minto, Fairbanks, Nenana, and Willow will be visited quarterly during FEL 2 to keep the project progress in front of these stakeholders and to answer questions and concerns in a timely manner.
- Other communities will be visited for the first time, and subsequent visits will be planned based on the issues discovered during the community diligence. These communities in-

clude but are not limited to Anderson, Anaktuvuk Pass, Livengood, Talkeetna, and Trapper Creek.

- Throughout the project, AGDC will work with Native corporations, non-governmental organizations, and tribal organizations including Ahtna, Cook Inlet Region, Inc., Toghotthele Corporation, Minto Development Corporation, Nenana Native Association, Seth-De-Ya-Ah Corporation, Tanana Chiefs Council, Doyon Regional Corporation, Kenaitze Indian Tribe, Arctic Slope Regional Corporation, and other organizations identified in the 2011 stakeholder engagement process. AGDC plans to continue dialogue with these entities and incorporate meetings into the stakeholder calendar.
- AGDC will progress the stakeholder communication database and maintain a record of all engagements and requests for information.
- Methods of communication will include:
    - Meetings and consultations.
    - Reports and updates to legislators and local government officials.
    - Community presentations.
    - Public appearances.
    - Industry forums.
    - Electronic communication via the project website and contributions to other websites such as those of state and federal regulatory agencies.
    - Newsletters and direct mail to stakeholders.

3. COMMERCIAL ANALYSIS AND FINDINGS

The commercial plan proposed for this project is based on the commercial work completed prior to passage of House Bill 369 (formation of AGDC), the commercial work completed to address the requirements of House Bill 369 in FY 2011, and the commercial activities and analysis known to be required by stakeholders (builder/owner/operator, pipeline shippers, and pipeline product buyers/consumers) to sanction a pipeline project of this size.

The commercial work completed prior to the formation of AGDC includes an analysis of 16 different capacity, facility siting, and throughput scenarios for a gas conditioning facility and pipeline. The cost of each scenario was estimated and tariffs were run for each case. The results of this analysis are summarized in the report *Alaska Stand Alone Pipeline Project Update and FY 2010 Deliverables* submitted to AGDC on July 15, 2010[7]. The requirement of House Bill 369 that the recommended commercial case result in the lowest cost to consumers led to the selection of a FY 2011 Base Case with the highest legal throughput (500 MMscfd), the most NGLs, and a gas conditioning facility sited on the North Slope.

The commercial work completed by AGDC in the past year was focused on addressing the specific commercial questions raised or implied by House Bill 369. Those include the following:

- Assessing the commercial feasibility of the project investment for pipeline owners and industrial anchors using optimized capital costs and tariffs.
- Determining the business risks for the principal stakeholders (builder/owner/operator, pipeline shippers, and pipeline product buyers/consumers). See also Section 4 of this project plan.
- Evaluating the commercial requirements of a potential builder/owner/operator.
- Defining the financial options and estimating the cost of debt (see Section 4).
- Addressing other commercial considerations of House Bill 369.
- Determining the actions required and defining the commercial work plan to ensure commercial viability, mitigate business risk, and attract a competent builder/owner/operator.

The proposed commercial plan presented for this project establishes the process for selecting a builder/owner/operator, describes the agreements that must be created in the front-end loading phase of the project (before sanction), and lays out the activities necessary to execute the open-season process. Section 4 addresses the business and pipeline ownership model.

[7] *Alaska Stand Alone Gas Pipeline Project Update and FY 2010 Deliverables.* Presented to AGDC by the State of Alaska In-State Gasline Coordinator, July 15, 2010.

3.1 COMMERCIAL VIABILITY OF THE PROJECT

The purpose of this section is to:

(1) Update and optimize the full capital costs of the project to be used in the tariff.
(2) Reassess the natural gas supply and demand requirements to determine when adequate demand exists for the pipeline capacity.
(3) Update the tariff model with the new estimate for capital from (1) and start-up schedule based on (2).
(4) Use the new optimized tariff to determine whether the cost of delivered natural gas from this pipeline project will be low enough to compete with the next best natural gas alternative for Southcentral consumers (imported liquefied natural gas, or LNG) and low enough to allow industrial anchors to procure long-term gas sales agreements.

3.1.1 Capital Costs of the Project

The last major effort to quantify the capital cost of this project was the report *Alaska Stand Alone Pipeline Project Update and FY 2010 Deliverables* submitted to AGDC on July 15, 2010. At that time, capital costs had been determined for 16 options for different capacities and products (Table 3-1). AGDC eliminated the cases over 500 MMscfd to conform to the terms of the Alaska Gasline Inducement Act (AGIA), which limits other projects funded by the State of Alaska to 500 MMscfd. The cases involving processing North Slope gas at Cook Inlet have been eliminated because of the higher resulting tariffs, the inefficiency associated with carrying 10% carbon dioxide in the pipeline, and the issues associated with levels of water vapor and hydrogen sulfide not conducive to safe and low-cost operation of a pipeline.

The commercial options were further narrowed to three primary commercial cases for study over the past year:

(1) **Option 4: 250 MMscfd capacity[8] carrying conditioned natural gas and an enriched NGL stream:** The capital estimated for this case allows for calculating a tariff when no commercial anchor is available.
(2) **Option 7: 500 MMscfd capacity carrying utility-grade natural gas:** The capital determined for this case provides the maximum gas that can be delivered through the pipeline without violating the terms of AGIA but without the benefit of NGL for in-state consumption or export. It eliminates the need for Btu balancing and NGL handling in Fairbanks and Big Lake.
(3) **Option 8: 500 MMscfd capacity carrying conditioned natural gas and an enriched stream of NGLs:** *This is currently the commercial Base Case against which all other options and variances will be measured.* The capital determined for this case provides for the maximum pipeline capacity that can be carried without violating the terms of AGIA,

[8] "Capacity" used in this context means the pipeline is capable of carrying this volume under continuous optimum operating conditions. The actual annual throughput will be approximately 8% less after accounting for fuel, seasonal compression variations, and annual maintenance turnarounds.

while delivering enough natural gas and NGLs to satisfy the long-term forecast needs of Southcentral Alaska including residential, commercial, power generation, and the existing LNG export plant at Nikiski.

Capital and tariffs for some other options were estimated to determine variances[9].

Option 8 was selected as the recommended option and Base Case because it delivers both natural gas and NGLs, and has the lowest tariffs to most consumers. The Base Case (500 MMscfd enriched with NGLs) is currently estimated to cost $7.52 billion (in 2011$), as show in Table 3-2. This estimate includes capital for all pre-sanction engineering, pipeline owner costs, the 12-inch-diameter Fairbanks Lateral, the Straddle and Off-Take Facility, the Cook Inlet NGL Extraction Facility, North Slope infrastructure, and initial rolling stock for emergency response.

Table 3-1. Summary of Options for Capacities and Products

OPTION	PIPELINE CAPACITY (MMscfd)	PRODUCT TRANSPORTED	DISPOSITION OF OPTION
1	250	Conditioned Natural Gas	Eliminated based on unacceptable tariff
2	250	Unconditioned Natural Gas	Eliminated based on unacceptable tariff and integrity concerns
3	250	Utility-Grade Natural Gas	Eliminated based on unacceptable tariff
4	250	Conditioned Natural Gas and Enriched NGL Stream	Unacceptable tariff but maintained as an option for comparative purposes
5	500	Conditioned Natural Gas	Eliminated based on unacceptable tariff
6	500	Unconditioned Natural Gas	Eliminated based on unacceptable tariff and integrity concerns
7	500	Utility-Grade Natural Gas	Maintained as an option subject to non-binding open season
8	500	Conditioned Natural Gas and Enriched NGL Stream	Determined to be the base commercial case
9	750	Conditioned Natural Gas	Eliminated to conform to AGIA
10	750	Unconditioned Natural Gas	Eliminated to conform to AGIA
11	750	Utility-Grade Natural Gas	Eliminated to conform to AGIA
12	750	Conditioned Natural Gas and Enriched NGL Stream	Eliminated to conform to AGIA
13	1000	Conditioned Natural Gas	Eliminated to conform to AGIA
14	1000	Unconditioned Natural Gas	Eliminated to conform to AGIA
15	1000	Utility-Grade Natural Gas	Eliminated to conform to AGIA
16	1000	Conditioned Natural Gas and Enriched NGL Stream	Eliminated to conform to AGIA

[9] "Variances" used in this context means a change in input, such as capacity, to understand the relative impact of that change on the economic outcome of the project.

Table 3-2. Summary Capital Costs for ASAP Base Case (2011$)

FACILITY	CAPITAL COST ($BILLION)
Gas Treatment Plant and Related Infrastructure	$1.84
Pipeline North Slope to Dunbar	3.41
Fairbanks Straddle and Off-Take Facility and Fairbanks Lateral	0.28
Pipeline Dunbar to Big Lake	1.99
Total Estimated ASAP Capital	$7.52

This estimate excludes interest on financing or return on equity during construction, linefill, ad valorem tax during construction, and financing fees. This estimate does not include the capital required to fractionate NGLs, transport, and load NGLs downstream of a fractionation plant near Big Lake ($954 million in 2011$), the cost of investment for any anchor tenant (for example, the cost on an LNG plant), or the cost of the local distribution system in Fairbanks.

To arrive at the above capital estimate, the July 2010 estimate of $8.4 billion was:

- Revised and optimized for a pipeline and facilities carrying 500 MMscfd of natural gas and NGLs.
- Adjusted to include contingencies to reflect a Class 4 AACE[10] estimate with an expected probability that the actual outcome has an equal likelihood of being above or below the estimate (p50).
- Adjusted to ensure that NGL costs upstream of the discharge side of the NGL pumps at the compressor station located at the Gas Conditioning Facility and NGL costs downstream of the outlet flange of the Cook Inlet NGL Extraction Facility at Big Lake are separated from pipeline and Gas Conditioning Facility tariff costs since those are not services the project intends to provide. This ensures consistency with LNG and gas-to-liquids (GTL) anchor tenants.
- Peer-reviewed by Independent Project Analysis, Inc. (IPA).
- Peer-reviewed by WorleyParsons.

For details on the basis for this estimate, see Section 5.6 of this project plan.

During the next phase of the project (FEL 2)[11], the capital estimate will be further refined to an AACE Class 3 estimate[12]. At that point, the estimate will be sufficient to support an open season for reserving firm capacity.

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[10] AACE is the Association for the Advancement of Cost Engineering. See AACE International Practice No. 18R-97, *Cost Estimation Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries, TCM Framework: 7:3 – Cost Estimating and Budgeting*, 2005.

[11] "FEL 2" refers to the project development period between July 2011 and the successful conclusion of an open season. It primarily involves continued design engineering but also includes commercial activities such as rate design and draft agreement preparation.

3.1.2 Southcentral Alaska Natural Gas Supply and Demand

The objective of this section is to review the most recent forecasts of Cook Inlet natural gas supply and make a forecast judgment to be used as an assumption for the expected future demand for capacity in the ASAP pipeline.

3.1.2.1 Natural Gas Supply

The supply of natural gas to consumers of Southcentral Alaska has historically come from large natural gas reserves discovered in the Cook Inlet as a consequence of oil exploration during the period 1963-2000. To monetize these gas reserves, industrial exporters were established at the Agrium and Nikiski LNG export facilities near Kenai, and a regional pipeline system was built to accommodate Southcentral users.

By 2002, significant declines in Cook Inlet production led to the closing of the first train of the Kenai Agrium Fertilizer Plant. By late 2011, continued field declines will have contributed to the closing of both the Agrium and Nikiski LNG plants. Further expected declines in the period 2011-2014 have led to significant private investments in natural gas storage anticipating an imminent inability of the local distribution system to meet peak residential and commercial demand. Industry forecasts[13] have led private investors to evaluate importing LNG as early as 2014 anticipating that the field declines may not meet the threshold demand for natural gas even if "perfect storage"[14] is in place.

A number of useful natural gas production forecasts were created in the past three years.[15] The most recent is a study undertaken for the Alaska Department of Natural Resources (DNR) and AGDC that forecasts a production stream as a function of gas price assuming effectively perfect investment [all reserve development and rate acceleration projects envisioned by the DNR with a positive net present value (NPV) are completed]. This study forecasts that the principal gas fields could maintain their current production levels until 2018, after which investment is likely to rapidly diminish and production is likely to fall at annual rate of more than 8%.

Based on the recent upstream natural-gas investment history in the Cook Inlet area, AGDC believes that upstream investment should not be expected to be "perfect" and that some fraction of the low-NPV or low-reserve projects identified in the study will be deferred or never drilled. It

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[12] AACE International Practice No. 18R-97, 2005, p. 4.

[13] "Cook Inlet Natural Gas: The Way Forward", Petrotechnical Resources Alaska, Tom Walsh, March 13, 2010 RDC Special Luncheon Presentation.

[14] "Perfect storage" describes a scenario when every gas field produces at maximum capacity throughout the year and that when consumers cannot take gas production, it is flowed into gas storage, and then released into the distribution system when peak demand exceeds the collective instantaneous gas production.

[15] See the following: (a) "Cook Inlet Natural Gas: The Way Forward", Petrotechnical Resources Alaska, Tom Walsh, March 13, 2010 RDC Special Luncheon Presentation. (b) *Preliminary Engineering and Geological Evaluation of Remaining Cook Inlet Reserves* DNR report by Hartz et al., edited by Paul Decker, December 2009. (c) *An Economic Evaluation and Forecast of Remaining Cook Inlet Production*, DNR/AGDC Report in Progress, 2011 by Jeff Dykstra et al.

should be noted that lowering the natural gas supply forecast neither materially improves nor degrades the commercial viability of ASAP; it merely changes the construction start date.

The AGDC forecast of Cook Inlet production assumes that upstream natural gas projects identified in the DNR study with an NPV less than $5 million will not be brought on stream. This assumption can be tested during the FEL 2 phase by monitoring the level of upstream projects (development wells completed) by the Cook Inlet operators. The AGDC/DNR forecast of Cook Inlet production is shown in Figure 3-1.

3.1.2.2 Natural Gas Demand for ASAP Capacity

AGDC has relied upon previous studies of in-state demand for natural gas and NGLs — specifically, the Northern Economics, Inc. et al. *In-State Gas Demand Study Prepared for TransCanada Alaska Company, LLC* (January 2010). In addition, AGDC has studied the effect of potential hydroelectric projects, and the demand created by mining projects not envisioned in the Northern Economics study. AGDC has undertaken economic feasibility studies of the potential demand by industrial anchors such as GTL, NGLs, and LNG[16]. Using a reasonable set of economic assumptions, these studies indicate that both LNG and NGL projects would likely achieve close to a 12% return on equity (ROE) and still provide a positive North Slope netback to upstream producers with product prices pegged to a forecast of $82.40/barrel for West Texas Intermediate (WTI) for the Pacific Rim (2011$).

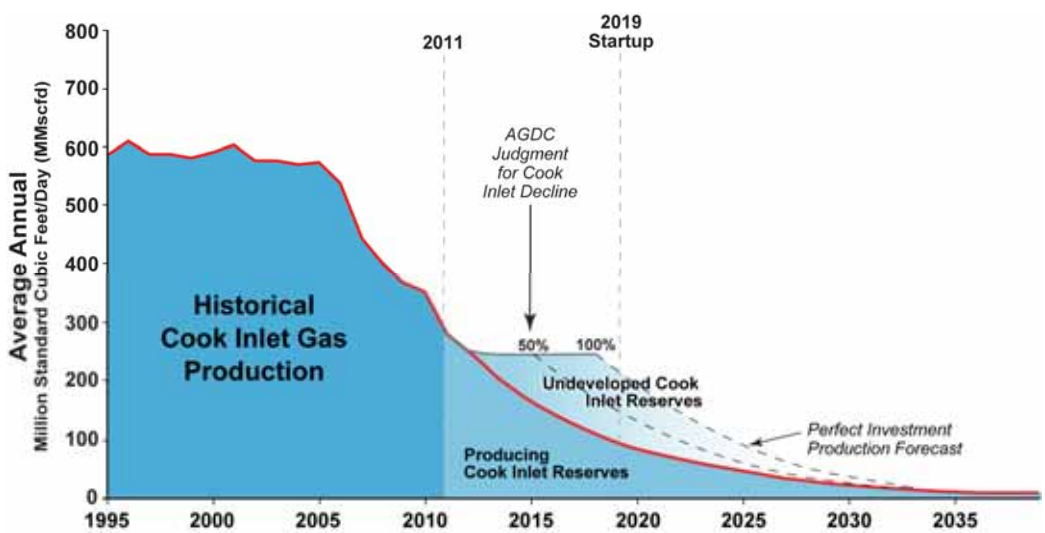

Figure 3-1. AGDC/DNR Cook Inlet Production Forecast

[16] (a) Hatch Associates Consultants, Inc.: *Alaska Stand Alone Gas Pipeline/ASAP Gas to Liquids Feasibility Study*, prepared for AGDC, June 2011. (b) R.W. Beck Inc.: *Economic Feasibility Study of the Transportation and Sale of the Natural Gas Liquids for the Alaska Gasline Development Corp*., prepared for AGDC, June 2011. (c) Science Applications International Corporation (SAIC): *Greenfield LNG Economic Feasibility Study*, prepared for AGDC, June 2011.

As a result, AGDC's forecast for demand assumes that either the existing Nikiski LNG Plant, a greenfield LNG plant, or some other industrial anchor will export or consume about 250 MMscfd of LNG and that NGLs will be marketed locally and also exported to Pacific Rim markets.

The forecast demand for ASAP capacity is shown in Figure 3-2.

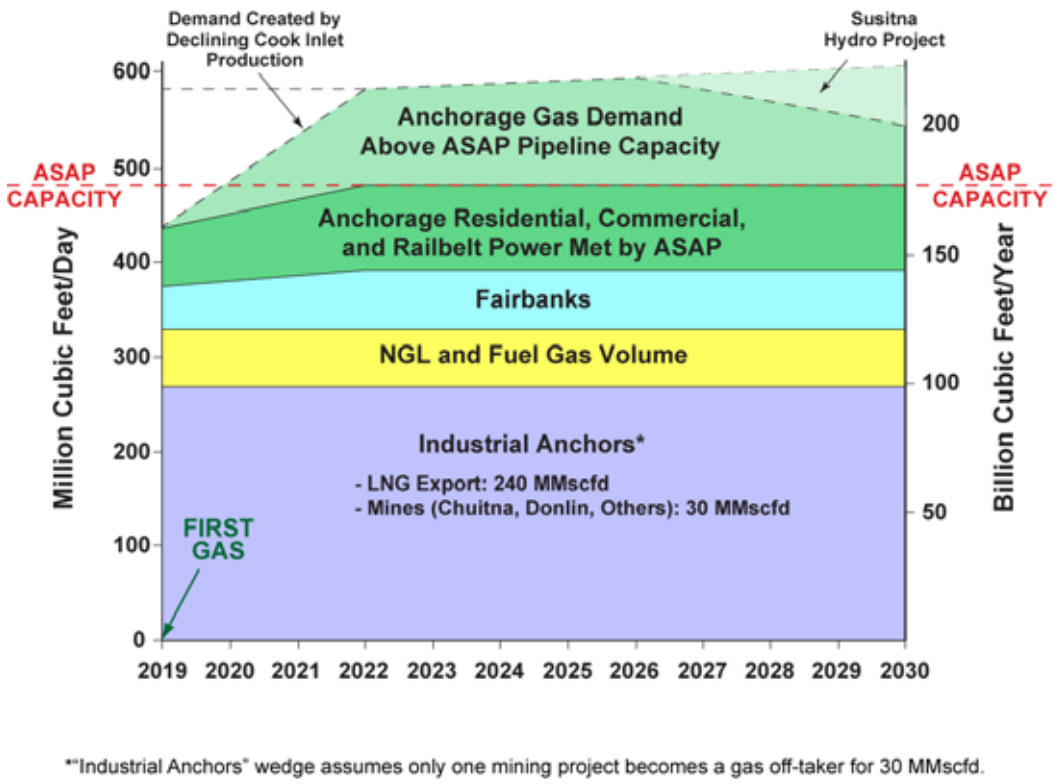

Figure 3-2. AGDC Cook Inlet Demand Forecast for ASAP Gas (Demand Net of Cook Inlet Production)

3.1.3 Tariff Estimates

Although the tariffs computed in this section assume a single supplier inlet connection at Prudhoe Bay, other suppliers who connect at other points (for example, Brooks Range Foothills including Gubik Field, the Yukon Basin at the Yukon River, or the Nenana Basin just south of Dunbar) should assume a distance-based tariff methodology will apply. AGDC assumes that supplier proposals for new inlet connections will be presented during the open-season process or after that as *proposals to expand capacity* where it is allowed under the provisions of AGIA (south of the 68th parallel).

The tariffs for the ASAP Project Base Case presented below were estimated[17] using the following assumptions:

- **Tariff Structure**
  - The tariff will be levelized[18] over 20 years.
  - The tariff will be calculated on a heating value basis, in dollars per MMBtu.
  - Facilities and pipeline will be depreciated over the initial 20-year contract term.
- **Financing Structure**
  - Financing will be arranged at a 5.7% average cost of debt (see Section 4).
  - Debt-to-equity ratio will be 70/30%.
  - Return on equity will be 12%.
- **Capital and Operating Costs**
  - The total capital investment in the project will be $7.52 billion (2011$).
  - Operating costs will average about 2% of capital investment per year in 2011$.
  - Capital and operating costs will escalate at 3% from 2011.
- **Throughput and Operating Assumptions**
  - The Gas Conditioning Facility will be sized for volumes above 500 MMscfd in order to accommodate fuel and allow for pipeline design capacity of 500 MMscfd.
  - Ramp-up of capacity from about 90% to 100% will occur over 3 years starting in 2019. The pipeline will remain full for the rest of the 20-year contract term.
  - ASAP will have an operating efficiency of 96.5% of design capacity on an annual average basis.
  - Fuel for each section of the project will be contributed in-kind by the shippers. In total, fuel will constitute approximately 7% of gas required above pipeline inlet quantities on a heating value basis. For example, a shipper that reserves

[17] Tariff estimates were calculated using the Black & Veatch tariff model. This is essentially the same model used for AGIA and for tariff calculations done for the July 2010 report*, updated with current capital cost estimates, billing determinants, and rate structure assumptions. *(*Alaska Stand Alone Gas Pipeline Project Update and FY 2010 Deliverables.* Presented to AGDC by the State of Alaska In-State Gasline Coordinator, July 15, 2010).

[18] A levelized tariff is one that is fixed at a nominal rate over the life of the firm transportation commitment. In this case, it means that the tariff stated in the first year is the same tariff in nominal dollars for the last year of the contract.

100,000 MMBtu/day capacity on the project will be charged tariffs based on that quantity, but will deliver approximately 107,000 MMBtu/day at the receipt point.

- **Taxes**
  - Property and income tax assumptions made in the ASAP tariff model by Black & Veatch were consistent with current federal and state tax requirements and with Black & Veatch's previous analysis of AGIA.
- **State of Alaska Contribution**
  - The State of Alaska will contribute 100% of the initial linepack from royalty-in-kind (RIK)[19].
  - The State of Alaska will contribute $320 million[20] to project development costs, which are not reflected in the tariff. This is a tariff modeling assumption and the actual amount may be higher or lower depending on the results of the open season.

Figures 3-3, 3-4, and 3-5 summarize the estimated tariffs for the Base Case and two comparison options described in Section 3.1.1. The tariffs represent estimated cost of delivering gas on a dollar-per-MMBtu basis to the Big Lake meters and to the Fairbanks city gate, excluding any costs associated with LDCs or North Slope gas purchase. The Base Case tariffs are presented as levelized nominal tariffs (taking into account assumed inflation of costs over time) and levelized tariffs without any cost escalation from 2011 dollars.

Figure 3-3 illustrates the estimated Base Case levelized tariff in nominal dollars over the first 20 years of the pipeline life. This case is optimized for throughput, capital, and NGLs. It assumes conventional private industry ownership. This tariff is the basis for the transportation costs used to determine economic feasibility. Section 4 presents alternative ownership models that provide an opportunity to further reduce the transportation tariff.

Figure 3-4 restates Figure 3-3 with no cost inflation from 2011 dollars. The purpose is to illustrate the estimated ASAP tariffs if the project were built today. This means that assuming gas-supply cost of $2/MMBtu and local distribution charges of $2/MMBtu, Anchorage homeowners would pay $9.63/MMBtu for gas at the burner tip if there were no future cost inflation. Fairbanks would pay $10.45/MMBtu, assuming equivalent local distribution costs.

Figure 3-5 illustrates that the 250 MMscfd (spiked with NGL) case has a transportation cost of $11.82/MMBtu to Big Lake in nominal dollars. If you assume the gas-supply cost to be $2.53/MMBtu ($2 inflated at 3%), the 250 MMscfd case delivers gas to Cook Inlet at slightly more than $14/MMBtu in 2019. Figure 3-5 also includes a comparison of the utility gas case and illustrates that eliminating NGLs significantly increases the tariff to a majority of off-takers (Anchorage).

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[19] This assumes the Prudhoe Bay Unit will allow the State of Alaska to contribute a non-cash benefit to the pipeline by accelerating "out-of-balance" royalty-in-kind as an incentive to all shippers and the builder/owner/operator.

[20] This is the portion of the state contribution that was used in the tariff calculations.

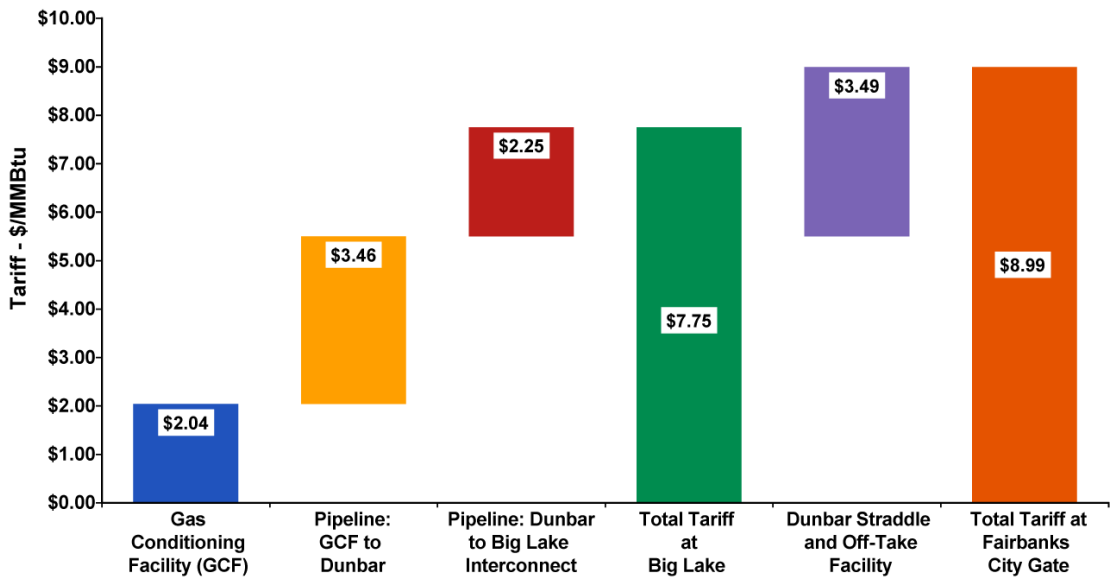


Figure 3-3. Estimated Tariff Build-Up for Base Case Design in Nominal Dollars (Option 8)

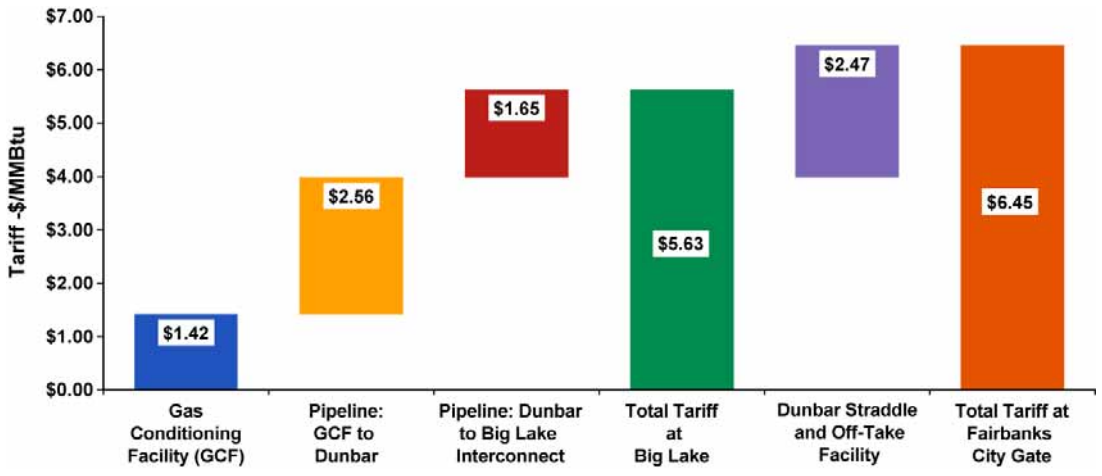
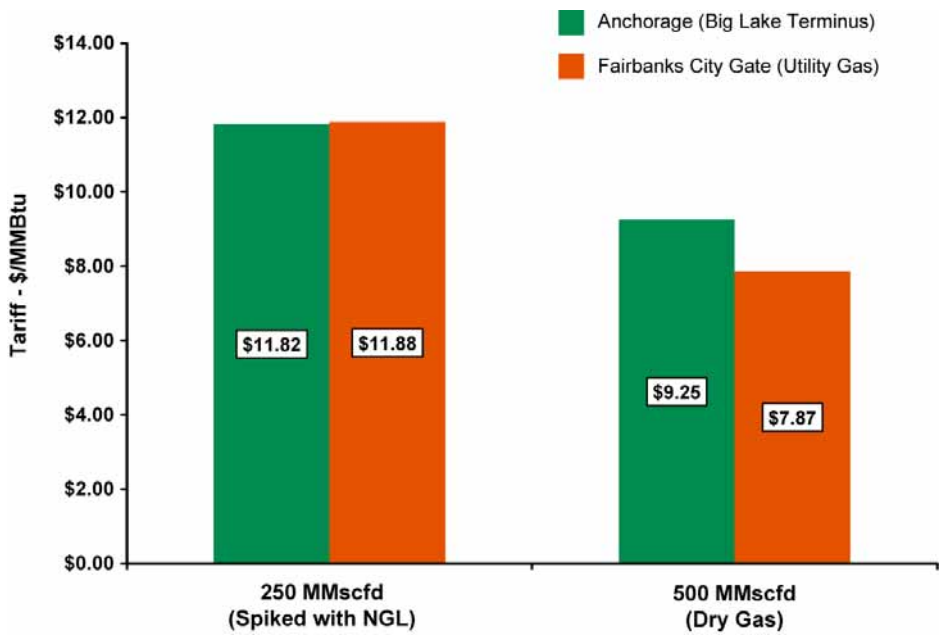


Figure 3-4. Estimated Tariff Build-Up for Base Case Design with No Inflation from 2011 Dollars (Option 8)



NOTE: Tariffs for the 250 MMscfd (Spiked with NGL) case were derived from respective tariffs listed on p. 8 of *Alaska Stand Alone Gas Pipeline - Tariff Report* by Black & Veatch Corporation, July 2010, by subtracting the portion associated with NGL processing and adjusting for 2019 start-up.

Figure 3-5. Estimated Nominal-Dollar Tariffs for Alternative Design Options (Option 4 and Option 7)

3.1.4 Lowest-Cost Alternative to ASAP Gas

3.1.4.1 Imported LNG Alternative

AGDC assumes that imported LNG is the only practical commercial alternative that can deliver gas to the Cook Inlet area in a timeframe that materially addresses the forecast natural gas supply shortfall. The technology exists to bring imported LNG to Cook Inlet via tankers that are able to re-gasify LNG and pump it into Cook Inlet storage.[21] In addition, permanent facilities could be built onshore to re-gasify LNG, or a floating LNG re-gasification facility could be moored in Cook Inlet to provide the same service.

A study undertaken by SAIC on behalf of AGDC[22] forecasts that imported natural gas will cost from $14 to $19/MMBtu (2011$) depending on the period over which the facility investors are allowed to recover capital costs. In nominal dollars, LNG imports will cost, assuming 3% infla-

[21] See SAIC: *Greenfield Liquefied Natural Gas (LNG) Economic Feasibility*, prepared for AGDC, June 2011, pp. 2-10 through 2-20.
[22] Ibid., p. 4-20.

tion, $17.75 to $24/MMBtu in 2019. This forecast is for the price of gas at the re-gasification facility connection with the ENSTAR system. As a result of this analysis, AGDC assumes that for the ASAP Project to be commercially viable, it must deliver gas to an ENSTAR connection for less than $14/MMBtu (2011$).

3.1.4.2 Large-Diameter Pipeline Projects as an Alternative

The large-diameter pipeline project (Alaska Pipeline Project, or APP) would likely bring natural gas to the greater Fairbanks and Anchorage areas (assuming construction of a spur line) for a significantly lower tariff than the ASAP Project. The ASAP Project was never intended to compete with a large-diameter pipeline project. Rather, ASAP has been developed through House Bill 369 as a fallback if the large-diameter pipeline open seasons do not result in precedent agreements in a timeframe that makes a spur line a viable alternative to a stand-alone pipeline. ASAP is predicated on the uncertainty of the timing of APP, which is therefore not considered a comparable economic alternative to ASAP.

An economic analysis could be done comparing the net present value of the two alternatives; however, for either the State of Alaska, the pipeline owners, or the producers, the outcome would depend heavily on forecasts of the sales price and demand in the product destination markets. For APP, that market is the Alberta Hub and for the ASAP it is the Pacific Rim product markets. It is not in the scope of this project to forecast the price or demand for Alaskan gas at the Alberta Hub. The open-season process established for APP compels the producers/shippers to evaluate that opportunity competitively, and the measure of success will be determined by the commitments for firm transportation. An additional consideration may be the ability of the State and producers to reach mutually agreed-upon fiscal terms for natural gas.

It is in the scope of this project to forecast the sales price and demand in Pacific Rim markets for products transported through ASAP. The economic feasibility studies for the ASAP Project assume about half the gas transported will be sold into the Pacific Rim at a price related to $82.40/barrel WTI (2011$) and the historic South Korean LNG price[23] and that NGLs will be sold at their historic WTI discount in Pacific Rim markets. The assumptions used by AGDC to test economic feasibility (netbacks) similarly can be validated or invalidated only in an open-season process. The economic assessments of commercial viability for industrial anchor tenants in this study were done by industry experts in the respective fields of LNG, NGLs, and GTL based on current market assessments.

3.1.4.3 ANGDA Spur Line Alternative

The Alaska Natural Gas Development Authority (ANGDA) spur line to Anchorage is only viable if the APP route to the Alberta Hub successfully negotiates precedent agreements that enable a startup timeframe that coincides with depletion of the Cook Inlet supply. The ASAP Project is predicated on the uncertainty of that timing.

[23] The price of LNG in the South Korean market is based on a pricing formula tied to the long-term South Korea liquefied natural gas CIF (commodity-insurance-freight) price correlated to WTI. The study assumed the price of WTI will be $82.40/barrel (2011$) for the term of the contracts.

3.1.4.4 Alaska Gasline Port Authority All-Alaskan Gas Pipeline Project

This project, in various forms over the past 20 years, is currently structured as a combination of several parts. It relies on TransCanada constructing the gas pipeline to Valdez (one of the AGIA alternatives), TransCanada or a North Slope producer constructing the gas treatment plant, and ANGDA building the spur line to Southcentral. The Alaska Gasline Port Authority is focused on development of a greenfield LNG terminal in Valdez, and is planning "significant technical, environmental, and other development work," according to its public statements. While not subject to the AGIA capacity limitations, this project is dependent on the two projects above being progressed to the stage of firm shipping commitments. It is therefore subject to the timing uncertainties described above, along with the significant undertaking of constructing a greenfield LNG terminal on Prince William Sound.

3.1.4.5 Hydroelectric Development as an Alternative

The current plan for hydroelectric development assumes that the Susitna River Hydroelectric Project (Lower Watana Dam)[24] will be completed by 2026. This project is planned to generate about 50% of the base-load electric-power demand currently generated using natural gas for Southcentral Alaska. Since the commercial power-generation demand for natural gas (average annual) without hydroelectric is forecast to be 100 MMscfd in 2020-2025, AGDC assumes that the project will displace about 50 MMscfd of total natural gas demand at that time. Since the total natural gas demand in 2025 is forecast to be about 600 MMscfd (if ASAP is built) and the Cook Inlet supply is forecast to be effectively depleted by then, the lower power-generation demand will have no impact on the ASAP Project. Simply said, the demand for natural gas is projected to be about 600 MMscfd in 2025. If hydroelectric displaces 50 MMscfd, forecast natural gas demand in 2025 is high enough that capacity expansion of the pipeline or more hydroelectric expansion would be required to create an adequate supply of energy for Southcentral Alaska.

Furthermore, any delay in startup of the Susitna River Hydroelectric Project could be addressed with ASAP natural gas supplies into existing commercial power plants. As a result, AGDC views the ASAP Project as complementary to the hydroelectric projects and not an exclusive alternative.

3.1.5 Commercial Feasibility of ASAP in Current Phase of Project Development

The objective of this section is to test whether the ASAP Project is commercially feasible. This section defines commercial feasibility and sets out the economic feasibility criteria set by AGDC[25]. It then analyzes whether the transportation costs implied by this pipeline project are likely to achieve a natural gas price to in-state consumers less than the next best alternative and is likely to attract sufficient industrial anchors to satisfy 100% capacity requirements for the ASAP Project.

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[24] See Alaska Energy Authority Railbelt Large Hydro Evaluation Preliminary Decision Document, November 23, 2010.

[25] This section addresses the requirement of House Bill 369 [AS 38.34.040(d)(1) and (3)]: The development team shall select a route that "is economically feasible" [and] serve[s] industrial, residential and utility customers…at commercially feasible rates.

3.1.5.1 AGDC Definition of Commercial Feasibility for a Pipeline Project

AGDC's definition of a commercially feasible pipeline project has three elements:

- A commercially feasible project is one that meets a set of economic criteria and addresses and mitigates the principal identified business risks of a project.
- The economic criteria are set at a level sufficient to encourage investment by the private sector in the pipeline and sufficient to attract shippers to use 100% of pipeline capacity.
- The principal business risks are identified and are mitigated to a level sufficient to procure a builder/owner/operator and long-term firm-transportation commitments needed to finance the construction and pay for operation of the pipeline.

3.1.5.2 Principal Economic Criteria that Determine Commercial Feasibility

The criteria listed below represent the minimum economic hurdles assumed for the project:

- Pipeline investors will receive at least a 12% ROE.
- Natural gas and NGL prices at consumer delivery points must be significantly[26] less than the lowest price practical and available alternative energy source or fuel. Examples of alternatives considered not practical are nuclear, tidal generated power, wind, and the burning of biomass.
- The price of natural gas delivered to industrial anchors must be sufficient to allow them at least a 12% ROE invested assuming conservative price forecasts.
- Producers will require at least a $2/MMBtu (2011$) netback price at the inlet flange to the ASAP Gas Conditioning Facility.

The 12% ROE on pipeline investments comes from discussions AGDC had with 11 potential builder/owner/operators. The requirement that natural gas from the project be delivered at a price less than LNG imports assumes that any pipeline that delivers gas at a higher price would face market competition that would never deliver 100% capacity commitments. The assumption that a $2/MMBtu netback (2011$) will be sufficient to incentivize producers to enter into long-term gas-sales agreements is based on the historical sales price of North Slope natural gas by the Prudhoe Bay Unit (PBU) owners to their pipeline affiliates in the Trans Alaska Pipeline System (TAPS) at Pump Station 1. Those transactions are required under the federal Elkins Act to be at fair price without prejudice to the affiliate relationship.

3.1.5.3 Commercial Feasibility for Industrial Anchors (LNG, NGL, GTL)

The estimated levelized tariff for the 500 MMscfd NGL-saturated case ($5.63/MMBtu 2011$) combined with a reasonable assumption for North Slope netback and LDC cost ($4/MMBtu 2011$) illustrates that the cost of gas for residential and commercial sectors ($9.63/MMBtu) will be less than the forecast cost of imported LNG ($14/MMBtu imported LNG plus $2/MMBtu

[26] In this context "significantly" means the upper range of uncertainty in the ASAP tariff must be less than lowest cost alternative. So, for example, if the range of uncertainty in the tariff is ±$2, then the tariff plus the uncertainty plus the gas supply cost must be less than the lowest-cost alternative.

LDC fee or $16/MMBtu total). For 500 MMscfd throughput to be commercially feasible, it must also support one or more industrial anchors to use the additional capacity since only 250 MMscfd are required to satisfy residential/commercial burnertip users and power generation.

To determine commercial feasibility each potential industrial anchor was evaluated separately. Each study determined the likely gas product price at the destination market (where the gas product was assumed to be consumed). Then transportation costs from the plant locations to the sales market were determined and subtracted from the destination price. Then the studies determined the plant inlet price required to generate an acceptable return on equity, making assumptions on plant capital and operating costs, typical capital structures for each type of project, taxes, construction schedules, and other relevant economic modeling parameters. The cost of pipeline service was then subtracted from the required inlet gas price, and the remainder was determined to be the "North Slope netback". The computed North Slope netbacks for the three principal industrial anchors are shown in Figure 3-6.

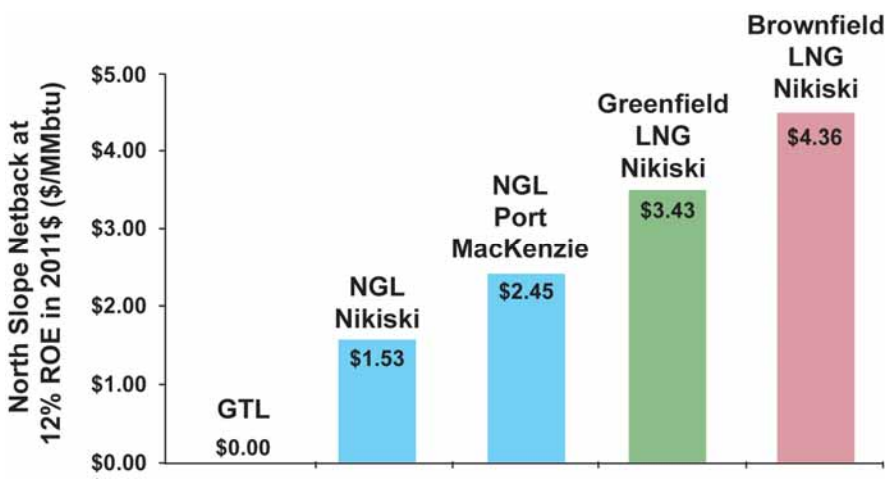

Figure 3-6. North Slope Netbacks for Industrial Anchors

Assuming that WTI oil prices are $82.40/barrel (2011$) inflated at 3% per year, and that LNG and NGL product markets demand their historical pricing relating to WTI for long-term gas sales prices,[27] AGDC's economic feasibility studies indicate that a ROE more than 12% and an acceptable North Slope netback could likely be achieved by either an LNG anchor tenant in Nikiski exporting 250 MMscfd or an NGL exporter located near Port MacKenzie. The economic feasibility study of a Fischer-Tropsch GTL conversion plant did not result in a 12% ROE under any reasonable scenario in Fairbanks or the Anchorage Bowl.[28] This means that satisfying economic break-even conditions for the ASAP and GTL projects would not allow for any positive North Slope gas netbacks at the assumed price forecasts for GTL products.

Regarding GTL, it is not the purpose of this study to eliminate any potential industrial anchor from consideration as a potential shipper but rather to show that one or more industrial anchors meet the economic criteria. AGDC encourages all potential shippers to negotiate with North Slope producers to better refine their understanding of possible inlet gas prices to determine the commercial viability of their individual projects.

The industrial anchor feasibility studies are AACE Class 4 or Class 5 estimates. Applying the same criteria for *significance* as we did for the next best supply alternative would suggest that the North Slope netbacks should be 30% to 50% higher than the $2/MMBtu hurdle to demonstrate a *significant* measure of feasibility for industrial anchors. AGDC will leave it up to the industrial anchor shipper/off-takers to decide the margin of significance required to offset the risks implied with corresponding transportation agreements.

3.1.6 Business Risks that Must be Mitigated for Commercial Feasibility

The commercial feasibility of pipeline projects cannot be viewed without an assessment of business risks. The investment decision of builder/owner/operators depends on their assessment of the project ROE and the business risk that the forecast ROE will be delayed or not achieved. Therefore, AGDC's ability to attract a builder/owner/operator depends on the expected rate of return for the pipeline investment and the perceived risk of achieving that level of return.

To obtain financing, pipeline projects ask shippers to enter into long-term commitments to pay for capacity in the pipeline. These commitments are sometimes called "firm transportation" or simply "transport agreements". To obtain adequate financing, shippers and buyers will be ***required*** to enter into contracts for firm transportation. Before these commitments are made, producers and buyers of natural gas typically enter into long-term contracts to sell and buy natural gas from each other. The gas sales contracts are the "backstop" for the transportation agreements.

Producers and gas buyers enter into long-term sales contracts when the seller and buyer both believe they can lock in a sales price for gas that meets their financial criteria for margins and re-

[27] These studies satisfy House Bill 369 requirement that promoting value-added industries be considered [AS 38.34.040(h)].
[28] This document satisfies House Bill 369 requirement that GTL manufacturing opportunities be considered [AS 38.34.040(h)].

turns. For this project, the transportation cost of the natural gas appears to be the largest component of the supply cost, and the transportation cost can significantly erode the margin for the seller and buyer if that cost increases. Therefore, stability of the transportation cost in this project is very important, and the uncertainty that the transportation cost will be arbitrarily changed is a significant risk for potential sellers and buyers of natural gas in the ASAP Project.

The purpose of this section is to deal only with the principal business risks perceived by the builder/owner/operators and conveyed in the face-to-face interviews we had with them. Other financial risks are discussed in detail in Section 4.

3.1.7 Risks Identified for the Builder/Owner/Operator

The source of business risks and commercial requirements for builder/owner/operators was a series of interviews AGDC held with 11 North American pipeline companies or their parent affiliates.[29] AGDC's approach was to address the issue in a series of frank interviews with potential builder/owner/operators. AGDC retained the retired CEO of Colonial Pipeline, Mr. David Lemmon, to establish links with the key business development executives at El Paso Natural Gas, Enbridge, Kinder Morgan, and Williams Energy. AGDC management already had contacts with producer pipeline affiliates, ATCO, and Mid-American Energy Pipeline Group. Each meeting included an overview of the project as it was presented to AGDC by the State of Alaska In-State Gasline Coordinator in July 2010,[30] and the overview was followed by an informal question-and-answer session on the commercial requirements and portfolio fit for each company.

Following are the principal business risks they identified, along with recommended mitigating measures:

1. ***There is a risk that at the open season, shippers will not make firm long-term commitments for 100% of the pipeline capacity through the first 20 years of operations.***

Builder/owner/operators were generally not willing to assume the risk of open capacity. Currently, there are a number of issues that could either enable shippers to sign up for firm capacity or exist as barriers to shippers committing to firm capacity.

A major barrier to shippers is the requirement that ASAP be a common carrier pipeline under the state statutory requirements of the Alaska Pipeline Act. Shippers will be reluctant to bid reserve capacity as long as ASAP is required to operate as a common carrier for intrastate transport of gas. A common carrier operation by definition will not have 100% capacity covered through enforceable transportation agreements over the financing term. Common carrier rules introduce the possibility that some future shipper could move volumes of gas into the pipeline that cause foundation shippers to be prorated and fail to meet their contractual requirement to deliver gas to their customers.

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[29] AGDC held interviews with Williams Energy, Mid-Continent, Enbridge, El Paso, Kinder Morgan, ATCO, ONEOK, ExxonMobil, Anadarko, BP, and ConocoPhillips during August-November 2010.
[30] *Alaska Stand Alone Gas Pipeline Project Update and FY 2010 Deliverables.* Presented to AGDC by the State of Alaska In-State Gasline Coordinator, July 15, 2010.

To mitigate this risk, the Legislature needs to address the requirement for ASAP to be a common carrier. ASAP has virtually no chance of attracting adequate firm transportation shipping commitments as a common carrier.

Another significant enabling action, as expressed by builder/owner/operators, would be for the State of Alaska to make firm transportation commitments of royalty-in-kind (RIK) gas to ASAP. Their view is that the State of Alaska can demonstrate faith in the project by assuming some of the transportation commitment risk and backstop a shortfall in capacity if it exists after an open season.

The Prudhoe Bay Unit Agreement specifically does not allow the State of Alaska to take RIK at a percentage greater than the royalty percent of the total gas leaving the unit. In other words, the unit agreement forbids the State to be "out of balance" with unit production. That requirement introduces conditions on State of Alaska gas production that make long-term sales of State of Alaska RIK gas almost impossible.

Enabling this action is not an easy or simple process. The PBU owners would need to agree to amend the Prudhoe Bay Unit Agreement to allow the taking of royalty gas at levels not limited by the unit production. As oil production is currently limited by gas handling capabilities in the PBU, it is possible that this action by the State would serve to debottleneck[31] some oil production and benefit both the State (by increasing royalty production) and the unit owners (by increasing unit production).

As an alternative, the State of Alaska could negotiate with individual unit owners to exchange RIK gas for an owner's share of unit production. This would likely involve negotiating an agreement with respect to operating costs and would likely require the State to pay an exchange cost of some kind.

2. There is a risk to builder/owner/operators that the actual capital cost of the pipeline will significantly exceed the planning estimate.

Builder/owner/operators generally assume some level of risk associated with construction capital overruns, but their tolerance is low. To mitigate this risk, AGDC must ensure the pipeline and Gas Conditioning Facility are built at the lowest possible capital cost and that the estimate used to determine the proposed tariffs is accurate.

There are three key mitigating measures:

- The design needs to be appropriate and optimized for the expected throughput of shippers.

[31] "Debottleneck" in this context means to remove the limiting physical factor, in this case wellhead gas handling, in such a way that it improves the productivity or throughput of the primary resource or product (oil).

- AGDC must execute the FEL 2 engineering to decrease the uncertainty of the capital cost estimate.
- The builder/owner/operator must plan and execute the final design and construction in the most efficient and cost-effective manner (FEL 3 and execution phases of the project).

3. There is a risk that the actual operating cost of the pipeline will greatly exceed the planning estimates.

Builder/owner/operators cannot be expected to accept a risk that they will be prevented from recovering all their operating costs through a tariff. This risk is best mitigated by developing a tariff structure that recovers all costs, including capital overruns and operating costs.

4. There is a risk that the federal government or the State of Alaska will make significant adverse changes in the fiscal regime relating to the netback value, margin, or commodity price of North Slope natural gas or gas liquids that undermine the firm transportation commitments.

The State of Alaska is well aware of the commercial risks associated with making changes to the fiscal regime in the oil sector. The natural gas business has thinner wellhead margins, much longer term sales commitments, contractual obligations to use capacity (reserved capacity), higher transportation costs as a percent of the value chain, major financial obligations, and take-or-pay commitments in gas sales contracts. Once the firm transmission and gas sales contracts are in place, any change in the fiscal rules could have a far-reaching impact on all involved parties.

It is the perception of most of the PBU owners that for natural gas, the Federal Energy Regulatory Commission (FERC) and Congress have been relatively predictable and stable influences on the fiscal stability of interstate shipments of natural gas. The extent to which the executive and legislative branches of state government can address through legislation the fiscal stability over the first 20-year term of the project would serve to increase the confidence that the business climate is conducive to stable investment.

3.2 COMMERCIAL REQUIREMENTS OF A BUILDER/OWNER/OPERATOR[32]

The objective of this section is to communicate the commercial requirements that the potential builder/owner/operators conveyed to AGDC during the process for seeking letters of intent to participate in the project. (See Section 3.1.7 above.)

In June 2011, AGDC officially solicited and received letters of interest from potential builder/owner/operators. Those responding with interest will be invited to participate in a request for proposals meant to select either a builder/owner/operator or builder/operator as early as possible in 2012. AGDC asked each potential builder/owner/operator the following questions:

[32] This section satisfies House Bill 369 requirements that the development team "coordinate with entities qualified to build, own, or operated the natural gas pipeline" [AS 38.34.040(e)(2)].

1. ***Having seen our outline of the project, do you see any aspects of this project that make it impossible for you to consider yourself as a potential builder/owner/operator?***

One company asked not to be considered as a potential builder/owner/operator because they only invested in pipeline projects in which they had an affiliate shipper interest.

One company asked not to be considered as a potential builder/owner/operator because they were wholly unfamiliar with the physical and commercial operating climate.

All the other builder/owner/operator candidates stated that their participation was possible under the right set of conditions and circumstances.

2. ***What rate of return would you expect from a project of this size and risk?***

The builder/owner/operators expressed an opinion that their expected return on equity would depend on the relative risk implied by the tariff structure, the terms of the precedent agreements, the participation by the State of Alaska, and the perceived fiscal stability during the investment period. Generally, they gave a range between 12% and 14%, consistent with the returns currently allowed under FERC ratemaking.

3. ***What other commercial requirements do you see as enablers for your participation?***

There was a broad spectrum of feedback on this issue, but the recurring themes focused on firm transportation bids equivalent to 100% of the pipeline capacity. This could only be achieved by a contract carrier operation and would preclude the pipeline from being a common carrier.

Most of the builder/owner/operators were reluctant to accept risk associated with capital cost overruns, and many expressed the opinion that the State of Alaska should participate through both a capital subsidy, if necessary, and through firm transportation bids of royalty gas to help guarantee capacity.

Most of the builder/owner/operators said that the State of Alaska needs to wholly subsidize the project development costs (engineering and permitting) before a successful open season. Their view generally was that the uncertainty of the outcome and the cost during that phase were too high.

Others had requirements concerning minimum working interest.

The producer parent affiliates generally gave the same message. They welcome any proposal that can help monetize their resources, but participation will depend on the fundamental economics of the project and how the investment opportunity compares on a portfolio basis. Generally, the producer parent affiliates were underwhelmed with the scale of the project. One producer affiliate parent asserted that no pipeline would carry their gas without their equivalent equity ownership in the pipeline.

4. What role do you see the State of Alaska playing in this project?

The principal response was for the State of Alaska to reserve firm transportation for its royalty gas and fund project development through the open season.

5. If ASAP were a fit to your future portfolio, at what point would you be interested in participating and at what level?

Companies said that if they elected to participate, the appropriate time to enter the project with financial and organizational support would be during and after a successful open-season process. Two companies said they would be willing to participate sooner with organizational support but not financial support.

3.3 OTHER COMMERCIAL CONSIDERATIONS OF HOUSE BILL 369

The purpose of this section is to address specific commercial requirements of House Bill 369 not addressed in other sections of this project plan.

3.3.1 Letters of Intent from Buyers and Sellers of Natural Gas[33]

On April 25, 2011, AGDC announced a Non-Binding Expression of Interest (EOI) process on its website and by publication in the *Petroleum News* (a weekly industry newspaper based in Anchorage). AGDC directly contacted a number of parties that it considered the most likely and material participants in the EOI, based on their readiness to participate in a binding open season for pipeline shippers on ASAP within the desired timeframe. The parties contacted included North Slope and Cook Inlet producers with known gas reserves, Railbelt utility companies and aggregators, and major mining projects under development along the route of the pipeline that could use natural gas as a source of power.

Twelve separate organizations signed confidentiality agreements and participated in a project information meeting held on May 18, 2011. In the meeting, AGDC shared a technical and commercial summary of ASAP prior to its release in this project plan in order to enable the EOI participants to respond as to their intent prior to June 15, 2011.

The results of the EOI are summarized below:

- All expressions were of a non-binding nature, and AGDC will treat all individual responses as confidential.
- A diverse group of stakeholders participated, including producers, utilities, and mining interests.
- The total interest expressed to off-take natural gas is near the pipeline capacity.

[33] This section fulfills the House Bill 369 requirement to seek letters of intent from buyers and sellers of natural gas [Transitional Provisions (a)(1)].

- AGDC believes that there is additional upside to achieve full capacity at the open season, since not all potential shippers participated in the EOI process.
- AGDC's estimate of achieving the necessary threshold capacity demand by 2019 appears to roughly match expressions of interest in off-taking gas.
- Potential gas suppliers expressed an interest in negotiating gas-supply agreements with interested off-takers.
- Some potential natural-gas buyers intend to reserve firm transportation, and others will rely on other shippers to deliver gas to their desired off-take point(s).
- Shippers and off-takers generally expressed a desire to enter into long-term contracts.

3.3.2 In-State Propane Use and Alternatives for Transporting Energy to Other Locations in the State[34]

The commercial feasibility of in-state propane use was evaluated by R.W. Beck Inc. as part of an expanded phase of its NGL economic feasibility study. Of the available natural gas liquids, propane is the most likely product to lend itself to cost-competitive storage and transportation for in-state use outside the pipeline's reach.

The price of propane sold at any connection to ASAP will be determined by the competing price of the least expensive alternative fuel (low-sulfur No. 2 diesel oil) and the export price of the propane netted back to the competing sales point. So, for example, if shippers are selling propane FOB[35] to South Korea at the Alaskan loading terminal, Alaskan propane users should expect to pay not less than the propane price at Nikiski plus an adjustment for transportation costs anywhere else in Alaska. The export price will likely set a floor for propane market pricing. The retail propane price ceiling will likely be set by the cost of the next lowest-cost fuel alternative. The market dynamics between the buyers and retail marketers will determine where the actual retail price falls between the floor and ceiling. The R.W. Beck Inc. study indicates the potential exists for substantially lower-cost propane along the road system. Consumers should be cautioned that uncertainties around the price North Slope producers will demand, margins retail marketers will require, and the effect of foreign export prices all have the potential to erode perceived savings.

The SAIC analysis shows that communities accessible by truck along the Railbelt will likely have a price incentive to replace diesel oil with propane. Communities within barge distance from Nikiski will not have a price incentive to replace fuel oil with propane. Similarly, communities along the river transportation system will not likely have an incentive to replace fuel oil with propane because the high cost of transportation, delivery, and storage will more than offset the lower wholesale price of the propane.

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[34] This section and the *In State Propane Utilization Study for the Alaska Gasline Development Corp*, SAIC, June 2011, fulfill the requirements of House Bill 369 to consider production and delivery of liquefied natural gas or propane to Yukon River, interior, and coastal communities, as well as alternatives for transporting natural gas to other locations in the state [AS 38.34.040(h)].

[35] FOB is an acronym for "freight on board" and means sold to a buyer after it is metered (or loaded onto) to a vessel, excluding shipping costs or insurance.

3.3.3 Development of a Global Trading Center in the State of Alaska[36]

Natural gas trading centers or "hubs" are created as an outfall of transportation projects and usually occur at a major transshipment intersection. An example is the pipeline interconnect at the Henry Hub Gas Plant in southern Louisiana. Natural gas is wheeled through the hub from shipper to shipper to delivery on any of the connecting systems. The pipelines upstream from the Henry Hub carry gas primarily from producing fields to the interconnect, while pipelines downstream from the interconnect carry gas from the hub to major regional distribution centers for consumers. The center of the hub is the logical point for markets to price natural gas.

The major transshipment point for ASAP gas and NGLs will be at transshipment meters linking the ASAP system with the ENSTAR distribution system near Big Lake. At that point, utility-grade gas will be metered into the ENSTAR system for sales to gas-storage customers, the ENSTAR LDC, power companies on the ENSTAR system, and to the LNG plant (or other industrial anchors) in Nikiski. Propane and butane will be extracted and metered into either a pipeline to Nikiski or Port MacKenzie for export to Pacific Rim markets.

The establishment of the physical facilities for a trading center at the ASAP Cook Inlet NGL Extraction Facility will happen when the pipeline and facilities are completed. The vision of a global trading center implies that gas merchants will use that location as the basis for pricing North Slope gas sales export contracts for delivery to the ASAP Big Lake meters or for purchase at the meters. Whether they will or will not depends on a variety of complex marketing factors known only to the individual gas merchants and their customers. The expectation that most of the export gas will be sold under long-term contracts suggests the ASAP Cook Inlet NGL Extraction Facility will not be an active trading center. However, some individual merchant shippers may elect to commit to some capacity under the expectation of sales on a short-term or even a spot basis. This is especially true of the sales of propane and butane, but to some extent could also be true for LNG.

The results of the EOI indicate that some natural gas consumers intend to reserve firm transportation and others will rely on other shippers to deliver gas to the Big Lake meters. This appears to substantiate the contention that there will be more than one pricing point for gas moving into and out of the ASAP system. Also, shippers and off-takers generally expressed a desire to enter into long-term contracts, further substantiating the contention that once the transport agreements are in place, little active trading will occur.

[36] This section fulfills the requirement under House Bill 369 that the development team consider development of a global natural gas trading hub in the state [AS 38.34.040(h)].

4. FINANCIAL OPTION EVALUATION

The development of financial options for ASAP involved evaluating potential ownership structures and the impact of their inherent risks on the projected cost of financing for each case.

The three project-delivery scenarios which were analyzed for ASAP are summarized in Table 4-1 and discussed in detail below. It is important to note that the tariffs in Table 4-1 do not include a wellhead netback to the producers nor the local distribution costs (i.e., it is only for transportation from the North Slope to the Cook Inlet NGL Extraction Facility). It is estimated that those costs will add $4.00 (2011$) to the transportation tariffs. Tariff results represent levelized transportation costs over the initial 20-year operating term of the project ("lifecycle tariff"). Those tariff differentials are quoted in 2019 dollars assuming 3% inflation per year.

The state/public ownership scenario yields the lowest tariff and therefore is AGDC's recommended model. Alternatives to the base case scenarios pose issues which in AGDC's view make them impractical. The scenarios presented for both a 30-year-term and a shortened construction time frame add additional risk that makes these options unacceptable. The former will require shipper contracts of 30 years, which are commercially unlikely, while the latter adds construction risk into the stage-gated process that will be used for construction management. Thus, while in theory both of these options could reduce the overall tariff, their ability to *actually* reduce the tariff is limited at best. Financing by the Alaska Railroad Corporation (ARRC) is discussed in Section 4.3.4 below.

Table 4-1. Lifecycle Transportation Tariff Differentials ($/MMBtu)

	PRIVATE OWNERSHIP (RATE REGULATED)	PUBLIC-PRIVATE (AVAILABILITY FEE)	STATE/PUBLIC OWNERSHIP(1)
Base Case	Benchmark	($1.38)	($1.55)
Alaska Railroad (ARRC) (Tax-exempt Financing)	($0.20)	($1.73)	($2.16)
30-year Term	($0.91)	($1.80)	($1.93)
Shortened Construction	($0.09)	($1.48)	($1.60)
Combination: 30-year Term, ARRC and Shortened Construction	($1.19)	($2.20)	($2.56)

(1) In addition, there is approximately $0.45/MMBtu in free cash flow to the State of Alaska as a result of a 1.10x debt service coverage. This could be used to reduce the tariff in future years.

4.1 BACKGROUND

Financing of megaprojects such as the ASAP Project is challenging in the best of economic times. The economic crash experienced by most countries in the world during the last three years has increased those challenges. As a result of large losses during the financial crisis, some investors now have an aversion to risk at any cost. Investors who are willing to commit capital are demanding higher returns, with the resulting challenges to financing plans.

As a result, AGDC issued a request for proposals (RFP) for a financial structuring advisor to assist in preparing a financing plan and selected a joint proposal of Citigroup Global Markets, Inc. and Samuel A. Ramirez & Co., Inc. (C&R), two firms with international experience with large infrastructure projects, including gas pipelines.

To optimize the financing plan, the project must be modeled around project risks and identify which entity or entities are willing to take the risks and at what cost. Major risks to be undertaken with ASAP include the following:

- Supply and demand (as they impact the ability to achieve 100% capacity).
- Environmental, permitting, and rights-of-way (as they relate to project delays).
- Cost escalation.
- Completion.
- Operations and maintenance.

To the extent an entity controls a particular risk, it will typically require a lower return for assuming that risk. Therefore, the focal point of any successful financing plan is the appropriate allocation of risks between parties that results in the parties accepting those risks which they either control or understand the best. For instance, a contractor that understands and controls completion risk would be more willing to take that risk than a bond investor. The optimal allocation of risk will result in the overall lowest cost of capital for the project, which will give the project the lowest possible tariff and the best opportunity for success.

4.2 OWNERSHIP

The decision as to what entity or entities will make a capital investment in ASAP will help determine most of the other variables in the financing plan. Making this determination early will aid in the development of a comprehensive plan for ASAP.

The range of ownership possibilities presented below begins with full privatization and ends with state ownership and control. It is the transfer of risk that will eventually determine the structure of the project; or in other words, the more risk a private entity is willing to accept, the closer to private ownership the project will be. As mentioned above, in the current economic environment, many companies and investors are highly risk-averse. Specifically, the majority of build-

er/owner/operators will not be willing or in many cases, financially able to carry all the risk of a project of this magnitude.[37]

The three scenarios analyzed by C&R are outlined in Figure 4-1.[38]

While the above scenarios include the analysis by C&R, it is important to note that preliminary feedback from potential builder/owner/operators indicates that their appetite for certain risks is very limited. If that feedback is confirmed through the process of selection and negotiation with a builder/owner/operator, then more state involvement will be necessary to complete the project.

Potential builder/owner/operators have also indicated their desire to take firm transportation commitment risk is limited. This led to the assumption that 100% firm transportation commitments will be required to secure financing for ASAP.

Different financing assumptions are applicable to each of the scenarios presented above, and they are described in Table 4-2.[39] There are benefits to both public and private ownership, as well as a hybrid public-private partnership ("P3") and each is discussed below.

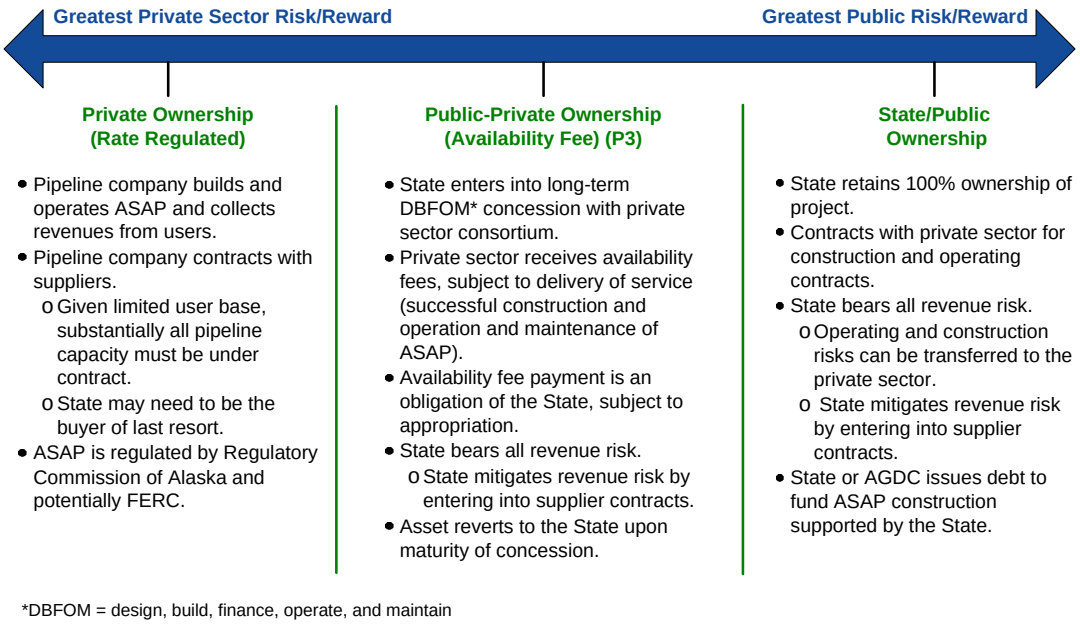

Figure 4-1. Three Financing Scenarios Analyzed by C&R

[37] *Industrial Megaprojects*, Edward W. Merrow. John Wiley & Sons, Inc., Hoboken, New Jersey. 2011.
[38] *Alaska Gasline Development Corp. Plan of Finance*. Prepared by Citigroup Global Markets Inc. & Samuel A. Ramirez & Co., Inc. for AGDC, 2011.
[39] Ibid.

Table 4-2. Financing Assumptions for the Three Scenarios

	DEBT TO EQUITY RATIO[1]	TAXES PAID	DEBT SERVICE COVERAGE	RETURN ON INVESTMENT (ROE)	TARIFF STRUCTURE
Private Ownership (Rate Regulated)	65:35	Income, Property	Driven by return on equity (ROE)	12.0% after tax	Level annual
Public-Private Partnership (Availability Fee) (P3)	88:12	Income, Property	Driven by ROE with minimum 1.15x coverage	12.0% pre-tax	Increases by 0.75% annually
State/Public Ownership	100:0	Property Only (Payments-in-lieu-of-taxes)	1.10x debt service coverage	–	Increases by an average of 0.25% annually

(1) As percentages of construction draws.

4.2.1 Private Ownership

A privately owned and operated pipeline is the typical model for gas transmission in the United States and is considered the base case for this analysis. Such pipelines are built to connect large gas sources (historically in the Gulf Coast of the U.S.) with large customer bases or distribution systems and are designed to move enough gas such that the amortization of the cost results in a commercially viable tariff. They are financed by capital contributions and debt issued by the builder/owner/operators and supported by shipper and customer contracts for throughput in the line. The risks, which are similar to the risks on ASAP, are assumed by both bondholders and equity investors and require returns in excess of those on more typical investments such as municipal bonds or corporate debt.

What makes ASAP different from the classic private ownership model outlined above is that unlike its continental U.S. counterparts, its small customer base does not generate enough demand to allow sufficient throughput without industrial anchor tenants. Without large volumes of gas moving through the pipe, amortization of the large capital expenditure for construction will result in a tariff that is not commercially viable, and the pipeline would not be built.

4.2.1.1 Cost of Capital

Debt

Many pipeline companies have relatively low ratings when compared to the State of Alaska which will result in a higher cost of debt if that debt is to be sold by the builder/owner/operator (Table 4-3). The expected cost of debt increases without state support from 21% to nearly 50% depending on the term. This fact makes a 100% privately owned and financed pipeline the least likely scenario to yield an acceptable tariff.

Table 4-3. Potential Builder/Owner/Operators

BUILDER/OWNER/OPERATOR	MOODY'S	S&P
The Williams Companies, Inc.	Baa3	BB+
Mid-American Energy	Baa1	BBB+
Enbridge Inc.	Baa1	A-
El Paso Corp.	Ba3	BB
Kinder Morgan Energy Partners, L.P.	Baa2	BBB
ATCO Ltd.	Not rated	A
OneOK	Baa2	BBB
ExxonMobil Corporation	Aaa	AAA
Anadarko	Ba1	BBB-
BP p.l.c.	A2	A
ConocoPhillips Company	A1	A

Equity

Feedback from pipeline companies surveyed by AGDC indicates that a return of more than 11% (post-tax) is expected for equity investors to participate in a pipeline project (see Section 3.2 of this project plan). For this return, builder/owner/operators are willing to take surprisingly little risk and indicated that additional risk could push the required return greater than 13%. While such returns may seem high from a state perspective, they are in line with the 12% to 13% quoted by the Alaska Department of Revenue (DOR) report *State Financial Participation in an Alaska Natural Gas Pipeline*, dated January 31, 2002. The combination of high cost of debt, 12% ROE, and highest required equity makes the private ownership option the most costly to finance.

4.2.1.2 Project Control

Total private ownership of a pipeline will result in the State having little, if any, control over the project. It may be argued that private ownership will improve the likelihood of project success because the State of Alaska is not in the business of building or operating gas pipelines and therefore, any input it has into the project may be seen as uninformed and detrimental to the project. However, since the private sector has been unwilling to date to accept the development risks and the project will be financed at least in the development stage by the State, some form of project oversight by the State will be necessary.

4.2.2 Public-Private Partnership (P3)

The focus of the public-private partnership (P3) option is allowing a project with a desired public purpose to proceed with a measure of public support that, lacking such support, would never be completed. A project in this category typically has risks that private sector contractors are unwilling to take on their own. It also allows the State to take advantage of the expertise that private sector contractors have to design, build, finance, operate, and maintain (DBFOM) a facility while the State retains long-term ownership of the project.

A majority of P3 financings completed to date have been transportation projects in the continental U.S. and abroad. The work is done through a DBFOM concession contract with a large, capable contractor (concessionaire). Upon completion of the contract term, the ownership reverts to the sponsor, in this case the State of Alaska.

4.2.2.1 P3 Transfer of Risk

Typical P3 projects have one or more categories of risk that the private sector either cannot or will not undertake. Risk categories for ASAP include usual project risks such as environmental, permitting and rights-of-way, cost escalation, completion, and operations and maintenance. They also include risks specific to a gas pipeline such as upstream supply and downstream demand.

Availability Fee

Under a P3 structure, revenue risk for the concessionaire is mitigated by the State paying an "availability fee" when certain conditions are met — generally when the asset is available for its intended use. Thus, with ASAP the State will pay the concessionaire a fee when the pipeline is complete and ready to ship gas. That fee will service the project debt, provide a return on the concessionaire's equity, and fund operations and maintenance costs.[40] The availability fee will be subject to appropriation by the Legislature on an annual basis. Availability-fee payments are expected to be recovered by revenues the State receives from shippers and/or customers for gas transportation.

This transfer of risk shifts the credit profile of the financing toward the State's credit rating, which is currently higher [Aaa/AA+/AA+ (Moody's/Standard & Poor's/Fitch)] than most of the potential concessionaires (typically between BB and BBB), and as a result, lowers the cost of debt and the resulting tariff. With the shift of revenue risk to the State of Alaska, the availability-fee approach is assumed by C&R to result in "A" ratings during operations and gives a projected tariff reduction of $1.38/MMBtu from the base case.

Concessionaire Contract

The contract between the State and the concessionaire could be segmented to allow for different contractors to perform the portion of the DBFOM in which they specialize, thus reducing overall risk exposure on the project and reducing the tariff. For example, a contractor may be in the best position to take construction risk but may not have any expertise in operating a facility. The firm that will eventually operate the facility will need to be included in overseeing design to ensure the facility is constructed for operational efficiency.

[40] *Alaska Gasline Development Corp. Plan of Finance*. Prepared by Citigroup Global Markets Inc. & Samuel A Ramirez & Co., Inc. for AGDC, 2011.

4.2.2.2 P3 Cost of Capital

Debt

Since the bonds issued by the concessionaire will be backed by the availability fee to be paid by the State, the rating on the bonds will be based in part on the State's credit rating. The result will be a more attractive tariff structure. Reliance on the State's credit may affect the State's credit rating (see Section 4.3); however, project revenues should help to mitigate that risk. Thus, the State is assuming similar risks in the P3 model as in the public ownership model, but at a higher tariff to account for the concessionaire's return on equity.

Equity

With state backing through the availability fee, a 12% concessionaire equity contribution is assumed. As the concessionaire is taking less risk than the strictly private case, a 12% pre-tax return on its equity is assumed. The lower borrowing cost and reduced ROE make this scenario more likely to result in a lower tariff than the private ownership case.

4.2.3 Public Ownership

Ideally, a project like ASAP would be designed, financed, and built entirely by the private sector; however, that has not, and in all probability will not, happen in a timeframe that will prevent critical shortages of natural gas in Southcentral Alaska.

The public ownership scenario involves the State providing all of the capital for the construction of the project, and the source for this report was assumed to be 100% debt. Through an RFP process, AGDC would select a firm (or firms) to design, build, operate, and maintain ASAP. This would allow the State to take advantage of the considerable expertise available in the private sector while achieving the lowest cost of capital to finance the project.

The State would be assuming most of the risk in this scenario, but as discussed, it is likely that the State will have to assume similar risks regardless of the ownership structure. Under the private ownership and P3 scenarios, the private sector firms that build and operate ASAP will be earning a 12% return, but may be unwilling to take on significant project risks. Under the State-owned scenario, the State is able to reduce the tariff by replacing that 12% equity with debt, resulting in the lowest projected tariff — $1.55/MMBtu lower than the base case and $0.17 lower than the P3 model.

A risk the State will be taking under the current regulatory structure is that when ASAP is completed, a determination is made that the tariff methodology upon which ASAP was structured is unacceptable. This will have the effect of requiring an annual subsidy by the State to buy down the tariff from one based upon actual costs of ASAP to a lower tariff. This is AGDC's rationale for requesting legislation to create an entity — similar to one in place in other gas-producing states — which is set up to own and self-regulate pipelines.

4.2.3.1 Cost of Capital

In its analysis, C&R assumed 100% debt financing for the public ownership scenario. The resulting cost of capital is the lowest of the three scenarios. "State/AGDC ownership may actually reduce or eliminate the State's potential level of required support, may decrease its net risk versus required guarantees/backup credit on Availability Fee P3 or Private Ownership structures, and should lead to higher credit ratings and significantly lower financing costs."[41]

The return to the State for the risks it assumes is in the 1.10x debt service coverage ratio.[42]

Debt

Bonds issued by the State or a state entity such as AGDC will be highly rated and will most likely[43] have the lowest interest rate of any of the three scenarios. To minimize the impact on the State's credit rating, the bonds should be structured as "double-barreled" project revenue bonds, secured by revenues received from ASAP and backing by the State. Debt service on the bonds will be subject to appropriation and will not require a state vote for approval.

Equity

The state equity contribution required is the same as the other two scenarios: an initial capital outlay of approximately $292 million for project definition. The return of that capital with interest could come from the 10% debt service coverage ratio required with the structured financing.

4.3 STATE SUPPORT

If the impetus for construction of ASAP was to make a profit, then it would be designed, financed, and built entirely with private capital. In such a case, tariffs generated from the operation of the pipeline would be sufficient to service the debt, fund operations, and provide an acceptable return on the owners' equity contribution.

While acceptable returns on capital are important on any project, the primary reason for the ASAP Project is stated in House Bill 369 passed by the 26th Legislature, "completion of construction of an in-state natural gas pipeline that will provide significant direct benefit to the people of the state at the earliest possible date" [Section 1(a)(7)]. Had the project been able to yield acceptable returns to a private contractor, one could argue that a private contractor would have already built it.

Since the State has determined that its citizens have a need for natural gas that will not be met by the private sector and that it is unacceptable for those citizens to be without natural gas, some

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[41] *Alaska Gasline Development Corp. Plan of Finance.* Prepared by Citigroup Global Markets Inc. & Samuel A Ramirez & Co., Inc. for AGDC, 2011.
[42] A debt service coverage ratio is cash flow in excess of debt service required to obtain a given rating.
[43] "Most likely" due to the chance that, under the private scenario, an AAA-rated oil company could build the pipeline.

support for ASAP by the State will likely be necessary. The exact nature and size of that support will be determined after negotiations with the builder/owner/operator but may take one or more of the following forms.

4.3.1 Capital Contribution/Investment

Assistance provided by the State could be in the form of a capital contribution or equity investment; the distinction is the State would have no expectation of repayment for the contribution, while an investment would yield a return to the State.

In the State Department of Revenue's *State Financial Participation in an Alaska Natural Gas Pipeline* report dated January 31, 2002, DOR questions the constitutionality of a cash subsidy by the State. Article IX, Section 6 of the Alaska Constitution provides that public funds cannot be appropriated except for a public purpose. The public purpose of the subsidy was questioned in the context of a pipeline from Alaska's North Slope through Canada to the Lower 48 states. In House Bill 369, the Legislature determined that construction of a pipeline would "provide significant direct benefit to the people of the state," significantly alleviating this concern for ASAP.

The purpose of a capital contribution would be to lower the tariff to an acceptable level and fund development costs when no other party is willing to do so. All three ownership scenarios assume a $292 million up-front cash contribution from the State to fund a portion of the project development costs, which includes amounts expended to date.

4.3.2 Debt Issued by State

The State of Alaska is very highly rated, as shown in Table 4-4.[44]

Table 4-4. State of Alaska Credit Rating History

MOODY'S INVESTOR SERVICE		STANDARD AND POOR'S CORP.		FITCH INVESTORS SERVICE	
DATE	RATING	DATE	RATING	DATE	RATING
July 13, 1961	Baa	June 4, 1971	A	May 3, 1994	AA
September 12, 1969	Baa1	January 23, 1975	A+	March 25, 2010	AA+
August 29, 1974	A1	June 14, 1980	AA-		
June 13, 1980	Aa	August 5, 1992	AA		
November 26, 1998	Aa2	March 27, 2008	AA+		
November 22, 2010	Aaa				

[44] Alaska Public Debt, State of Alaska Department of Revenue, January 2011.

The approximately $8 billion debt required for ASAP if the entire project was bond-financed would make the entire State-supported debt nearly $12 billion — which would make Alaska's percentage of debt compared to gross domestic product three times any other state.

State financing of ASAP through the issuance of debt may result in a downgrade of the State's ratings, depending on the rating agencies' views of the risks and reliability of the ASAP revenues that are anticipated to offset the additional debt. AGDC takes this risk very seriously and will demonstrate to the rating agencies the credit positives of ASAP in terms of tariffs, increased state royalty income, and essential services provided to the citizens of Alaska.

In response to inquiries by AGDC staff, Deputy Commissioner of the Department of Revenue Jerry Burnett said that he would "expect this to be a very significant credit negative for the State of Alaska as an entity in the near term." A downgrade to the State could have an impact statewide, as the ratings on political subdivisions and state corporations (whose ratings generally cannot be higher than the State) could be downgraded as well.

4.3.3 State Credit Enhancement on Contractor Debt

If the State were to elect to contract with a builder/owner/operator for construction and financing of ASAP, the State could reduce the tariff by providing credit enhancement on the debt issued by the builder/owner/operator. The benefit is a lower tariff but again at the expense of potential impact to the State's credit rating.

4.3.4 State Financing Options

Assuming that the State will finance some or all of ASAP, there are a number of different models that could be utilized to provide necessary capital.

- The Alaska Railroad Corporation may have broad powers to issue tax-exempt debt for a variety of purposes. A literal reading of the law [45 USC § 1207(a)(6)] says that debts of the Alaska Railroad Corporation are deemed to be state obligations not subject to private activity volume cap, without regard to the purpose of the debt issuance. This means that in theory the ARRC could issue such debt for any project including ASAP. Such a broad interpretation of the language would be an aggressive position, and AGDC would not proceed with that approach without seeking out a private letter ruling (PLR) from the Internal Revenue Service. AGDC will begin the PLR process immediately as it could be quite time-consuming and the outcome is uncertain.
- Upon completion of construction and after first firm transportation of gas, the State could offer ASAP for sale. This would result in a lower tariff than the private equity model due to the operator taking no up-front risk. The tariff would be slightly higher than the state-owned option due to private sector financing having a higher cost than the state cost of funds.
- The state capital budget is funded annually with cash — cash that could be used to fund ASAP if the State were to sell bonds for its capital projects. In the State-owned model, the tariff would be available as General Fund revenue of the State, allowing it to be used

to pay the debt service on the capital project bonds. This could have the effect of financing ASAP with tax-exempt debt.

- A similar approach could be worked out with a state corporation that was created to finance state capital projects. If annual budget General Fund surpluses (prior to capital budget expenditures) were to be swept to the corporation and the capital budget appropriated from bond proceeds of that corporation, the cash it received could finance ASAP. Remaining cash and project revenues would be available for debt service on the bonds. Some very important technical tax issues are associated with this approach, but AGDC believes it could be accomplished.
- An option for equity participation could be individual investments by citizens of the State — either through Alaska Permanent Fund Dividend "check-offs" or direct cash investment. This program could be structured like a mutual fund or preferred stock purchase plan. An equity participation by Alaskans in the ASAP Project could provide a solid return for their investment and help build a strong constituency of in-State support for the project.
- A final option for consideration results from an opportunity and a challenge facing the State. The opportunity is a budget surplus in recent years which is projected to continue in the near term, while the challenge is a 38.2% (as of June 30, 2009) unfunded liability in the State's Public Employees' Retirement System (PERS). If the State were to use some of the surplus cash to finance all or a portion of the construction of ASAP, the cash flow from ASAP could be contributed to the PERS and help to narrow the gap between assets and liabilities. AGDC estimates that a 6% to 8% return on the investment would be likely. The result of this approach would be the State ensuring that Fairbanks and Southcentral Alaska have access to reasonably priced energy while removing a large off-balance sheet liability from its books.

5. ENGINEERING ANALYSIS

5.1 INTRODUCTION

This section contains a summary of the engineering work conducted by AGDC and its engineering contractors Michael Baker, Jr., Inc., DoyonEmerald, Larkspur, and WorleyParsons since July 2010. The engineering team continued work it began for the Alaska Department of Natural Resources (DNR) for the Stand Alone Gas Pipeline (SAGP) Project. As of June 2011, the engineering work has been completed for FEL 1 and work has begun on building the project execution plan that will serve as the basis for subsequent project phases.

The engineering work focused on the Base Case developed from the 16 options for different capacities and products identified in July 2010. The Base Case, which involves a 500 MMscfd pipeline carrying natural gas enriched with natural gas liquids (NGLs), is discussed in detail in Section 3.1.1 of this project plan.

In support of development of this project plan, the engineering team undertook the following:

- Optimized the route, diameter, and design for Special Design Areas (SDAs) for the Base Case pipeline configuration.
- Performed field reconnaissance to establish baseline data for detailed design.
- Optimized cost estimates for facilities using the Base Case configuration.
- Conducted peer review of facilities design.
- Provided technical support to the U.S. Army Corps of Engineers (USACE) environmental impact statement (EIS) process.

5.2 SELECTION OF ROUTE

5.2.1 Alternatives Analysis

House Bill 369 requires that the AGDC project plan include 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 below 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.

Following are the House Bill 369 guidelines for analysis and selection of the pipeline route [see AS 38.34.040(c) and (d)]:

- “The project plan must include specific plans to coordinate and facilitate construction, ownership, operation, and management of a natural gas pipeline serving Fairbanks, the

Southcentral region of the state, and other communities whenever practicable, connecting with or enhancing the existing gas pipeline system, and reaching to tidewater in the Southcentral region of the state."

- "The development team's work product shall include an analysis of alternative possible routes and the selection of a route that, consistent with the other requirements of this section,
    - is economically feasible;
    - makes natural gas available to residents at the lowest possible cost;
    - allows for connecting lines to serve industrial, residential, and utility customers along the entire route, and in other regions of the state that can be served at commercially feasible rates;
    - uses state land and existing state highway and railroad rights-of-way to the maximum extent feasible;
    - uses existing highway and railroad bridges, gravel sources, equipment yards, maintenance facilities, and other existing facilities and resources to the maximum extent feasible."

The proposed ASAP route was identified as the most efficient route by the work summarized in the *Stand Alone Gas Pipeline Route Alternatives Analysis* published by the State in September 2009[45]. As part of this project plan, AGDC confirmed that the routing requirements specified by House Bill 369 were addressed by the proposed route, and AGDC optimized the selected route with various alignment changes in 2011. The selected route, along with alternative routes and alignments, were also analyzed to support development of the Plan of Development (see Section 5.3) and the project description for the EIS being prepared by the USACE for the project.

The analysis of other reasonable routes for ASAP considered the following alternatives to the proposed Parks Highway route:

- **The Richardson Highway Pipeline Alternative** shares a common routing with the proposed 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.
- **The Parks Highway Spur Route Alternative** route assumes construction of an Alaska-Canada gas pipeline and an off-take 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.
- **The Richardson Highway Spur Route Alternative** route assumes construction of an Alaska-Canada gas pipeline and an off-take point at Delta Junction and follows the Richardson Highway to Glennallen heading west generally following the Glenn Highway to

[45] *Stand Alone Gas Pipeline Route Alternatives Analysis*, prepared by Michael Baker Jr., Inc. for the In-State Gas Program, State of Alaska, Office of the Governor, September 17, 2009.

MP 39 of the Beluga Pipeline. A lateral connecting the local distribution network in Glennallen would be required.

The two spur line alternatives were not pursued as part of this project plan because the timing requirement in House Bill 369 requires a plan for gas earlier than any of the Alaska-Canada pipeline projects forecast such a mainline to be available.

Substantial analysis has been applied to the relative cost-effectiveness, public benefits, and environmental impacts of pipeline route alternatives, such as the Richardson Highway route and numerous smaller pipeline segment alternatives. These analyses have been conducted by AGDC and its predecessors at DNR on the commercial side, and, with respect to environmental impacts, by the USACE and the cooperating agencies under the National Environmental Policy Act (NEPA).

5.2.1.1 Background on EIS Alternatives

As part of the EIS process, it is necessary to evaluate alternative routes and concepts. In general, three evaluation categories are relevant to the selection of alternatives for any EIS:

- Ability to meet the overall project purpose and need.
- Technical, logistical, regulatory, and economic practicability.[46]
- Significant environmental advantage over the proposed project.[47]

There are two categories of EIS alternatives: action and no-action alternatives. The defining element of all no-action alternatives is a federal decision denying the requested authorization.

For the ASAP Project, the no-action alternative includes any outcome that does not result in the grant of federal and state rights-of-way, or a USACE Clean Water Act Section 404 permit for a natural gas/NGL pipeline from the North Slope to Southcentral Alaska.

For EIS analysis, the ASAP Project no-action alternative also includes any non-project such as energy conservation, use of different renewable, nuclear or hydrocarbon energy sources, or complete system alternatives (e.g., a spur line from a large-diameter natural gas pipeline extending from the North Slope to Calgary) to meet the ASAP Project purpose and need definition. Even if these alternatives are practicable, these alternatives would still be a subset of the no-action alternative because they would not result in the grant of federal and state rights-of-way or an associated USACE Section 404 permit.

In the NEPA scoping and alternatives process, both a Richardson Highway route and other route alternatives have been considered. The USACE and cooperating agencies have made initial

[46] In addition to being common-sense considerations, these practicability criteria are also mandatory considerations for USACE as part of its 404(b)(1) permitting analysis. See 40 CFR 230.10(a)(2).
[47] To fulfill NEPA's purposes, it is important to focus the environmental impact analysis on those alternatives that offer potentially significant environmental advantages. It is not productive to focus detailed analysis on alternatives that merely transfer impacts from one area or group of landowners to another, or that do not present probable and significant environmental advantages.

screening decisions for alternatives and are overseeing the draft EIS analysis of AGDC's proposal and a range of alternatives. Those decisions and associated analyses will be made public and subject to comment when the draft EIS is published this fall. Consequently, the NEPA process assures interested parties of an independent and fully transparent environmental analysis of the ASAP Project.

5.2.1.2 Route Alternatives

The proposed ASAP Project right-of-way and construction corridor is the most direct feasible route, maximizes use of state lands, and maximizes use of pre-existing pipeline, highway, and railway transportation corridors. As proposed, approximately 82% of the preferred route is co-located with or closely parallels existing pipeline or highway rights-of-way. This approach generally reduces environmental impacts in comparison with route variations and alternatives that are less direct (and thus longer) or that impact lands distant from existing pipeline and highway corridors.

The number of route alternatives and variations that hold the potential for significant environmental benefits over the selected route should be relatively few. The only major route alternative is the Richardson Highway route (Figure 5-1), which diverges from the proposed ASAP Project route near Livengood. Although the Richardson Highway route is a conceivable alternative, this route offers no significant environmental benefits. Both routes are identical from the North Slope to the Livengood area, and both cross similar terrain and provide similar design challenges. The Richardson Highway alternative is 15% or roughly 100 miles longer than the proposed route (845 miles long versus 737 miles). As a result, existing data indicate that the Richardson Highway alternative would impact 23% more wetland features and 35% more wetland habitat (Table 5-1).[48] Given this information and the availability of a practicable alternative impacting substantially fewer wetland acres and features, AGDC does not see a reasonable environmental justification for detailed analysis of the Richardson Highway alternative. Furthermore, this alternative would cost approximately $580 million more than the proposed route.

Table 5-1 also shows the population along both alignments based on the 2010 Census information obtained from the State of Alaska. It will be possible to serve Eielson AFB and North Pole from either the Parks or Richardson alternatives. In either case, a local distribution system would need to be developed. It must be noted that the ASAP Project Base Case design generally precludes service to the majority of the communities on either alignment because of the expensive requirement to remove NGLs from consumer gas. It is more likely the communities such as Nenana near the Straddle and Off-Take Facility or Big Lake, Houston, and Willow near the terminus would be served in the future as there would be utility-grade gas within a reasonable proximity.

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[48] See *Stand Alone Gas Pipeline Route Alternatives Analysis*, prepared by Michael Baker Jr., Inc. for the In-State Gas Program, State of Alaska, Office of the Governor, September 17, 2009, p. 4-5 (Tables 4.1 and 4.2). Notably, the Richardson Highway route alternative, in comparison to the proposed route, also impacts more or an equal amount of wetland acreage under every wetland type. While more recent analyses of wetlands along the proposed route will increase the wetland acreage figure cited, it is likely that a similar analysis of the Richardson route would also result in similarly increased wetland acreage.

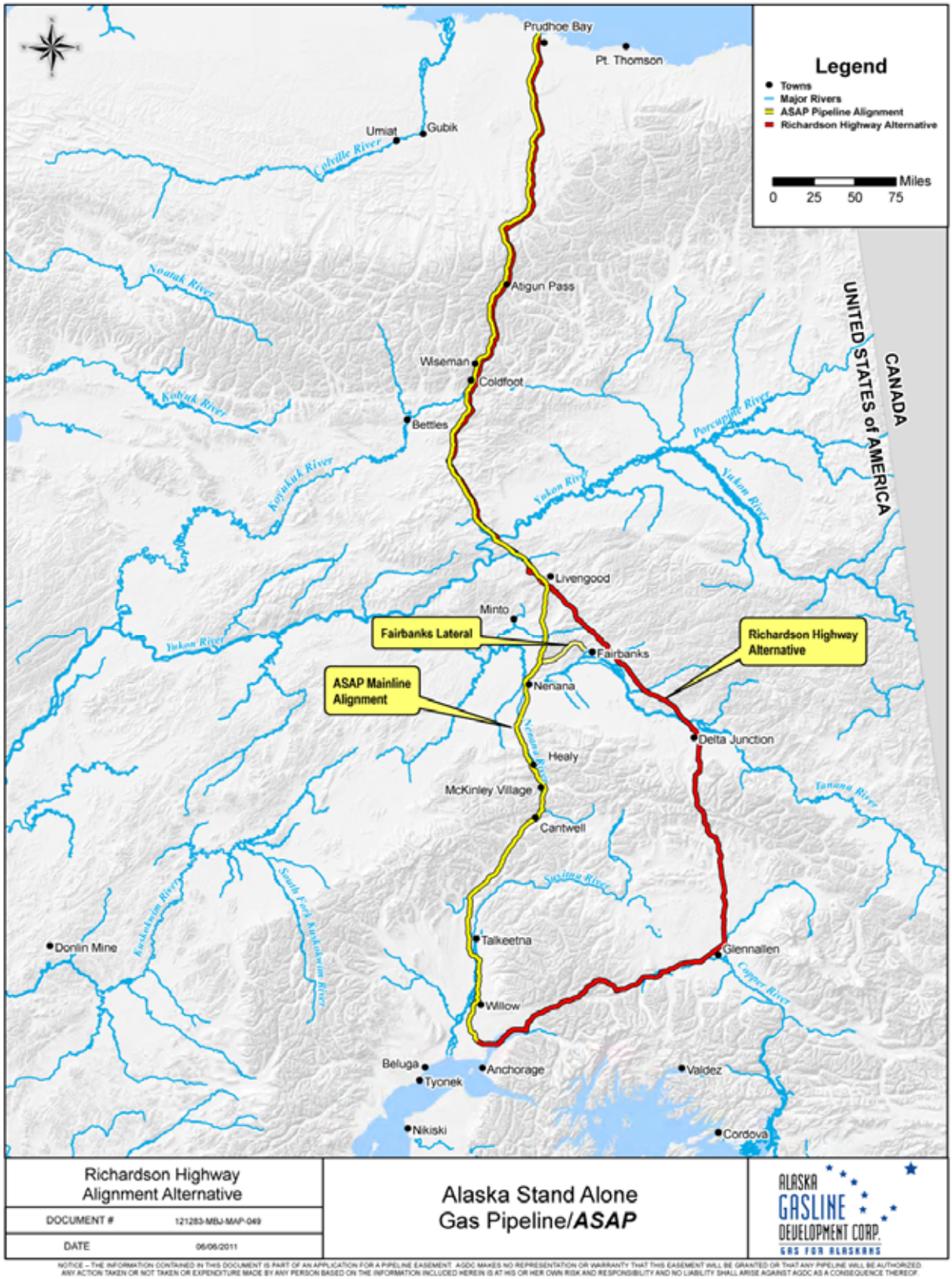


Figure 5-1. Richardson Highway Alignment Alternative

Table 5-1. Impact Comparison of Proposed Route and Richardson Highway Alternative

ROUTE ALTERNATIVE (FROM LIVENGOOD TO TERMINUS)	LENGTH*	COST DIFFERENCE	WETLAND ACREAGE IMPACTED	POPULATION ALONG ROUTE
Parks Highway	737 miles	–	1,288	10,844
Richardson Highway	845 miles	$580 million	1,735	7,274

*The millage for the ASAP line reflects the current length. The length of the Parks route in the 2009 alternatives analysis was 753 miles.

5.2.1.3 Minto Flats Alignment Options

The alignment from Livengood to Nenana is the only portion of the route that does not follow existing highway or railroad corridors. It roughly follows the upland areas of the eastern boundary of the Minto Flats State Game Refuge (Figure 5-2). Several options in the Minto Flats vicinity were evaluated during the alternatives study phase. One option was to roughly follow the existing TAPS/highway alignment from Livengood to Fairbanks and then along the Parks Highway/Alaska Railroad to Nenana (see Figure 5-3). While this option avoided an area with logistical access issues, the study identified numerous conditions not conducive to pipeline construction. Unfavorable elements included constructability constraints because of unfavorable geotechnical conditions such as permafrost, as well as excessively rugged terrain throughout the route. Additionally, this option is longer, which increases cost (by approximately $240 million) and environmental impact compared to the proposed route (Table 5-2).

Furthermore, the proposed route roughly follows an existing RS 2477 trail[49] along the eastern edge of the Minto Flats. Other routes farther west would also add mileage and potentially interfere with the Minto Flats State Game Refuge. It is also likely a compressor station would have to be located in the Fairbanks area. Because the Fairbanks area is a U.S. Environmental Protection Agency (EPA) air quality non-attainment area, permitting would be more challenging.

Table 5-2. Livengood to Dunbar Route Comparison

ROUTE (LIVENGOOD TO DUNBAR)	LENGTH	NUMBER OF STREAM CROSSINGS	NUMBER OF ROAD CROSSINGS	MAXIMUM ELEVATION
ASAP Proposed Route	51 miles	32	0	600 feet
Fairbanks Route	96 miles	52	38	2,200 feet

[49] A form of traditional-use right-of-way established under Section 8 of the federal Mining Law of 1866.

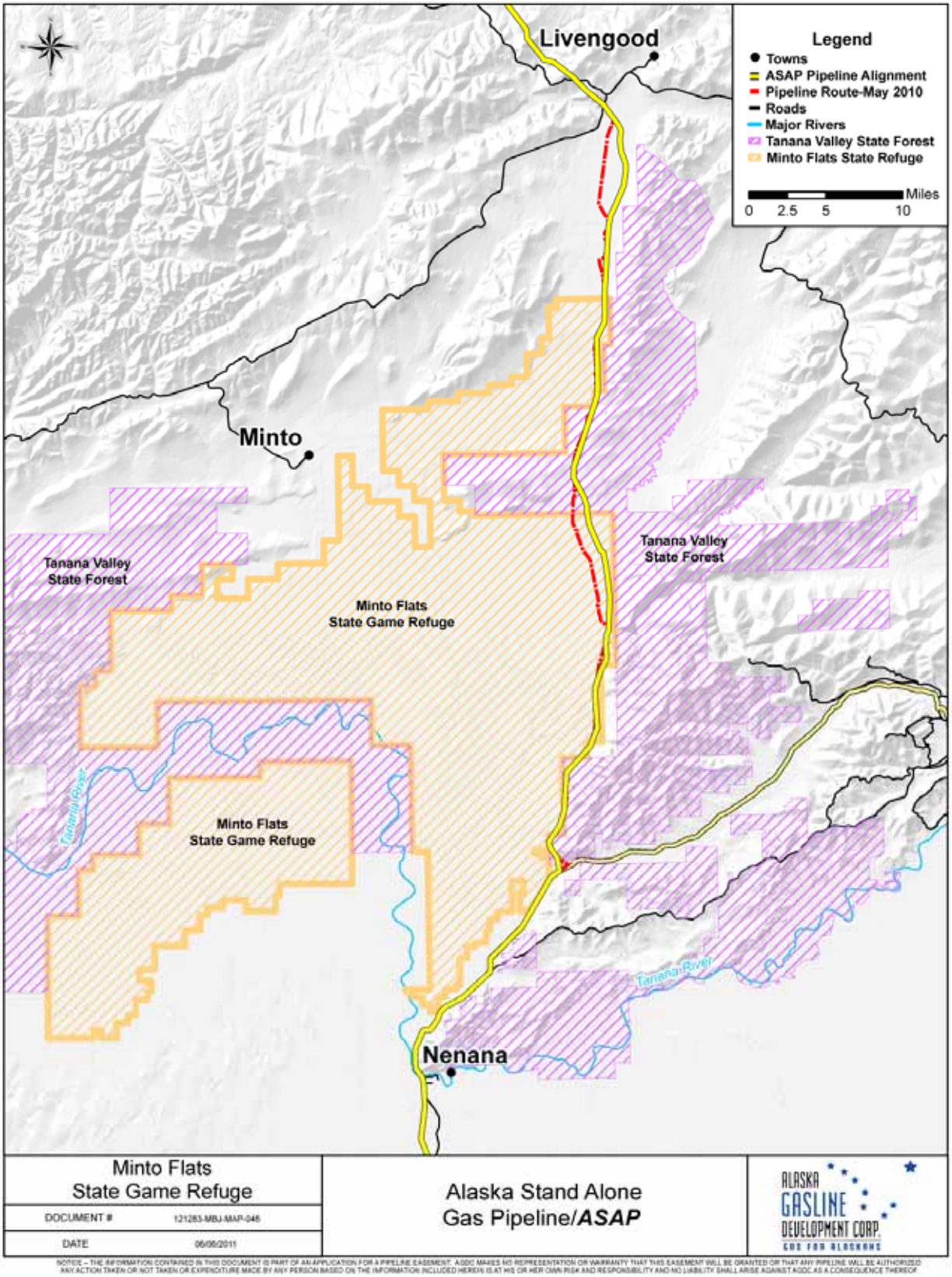


Figure 5-2. Minto Flats State Game Refuge

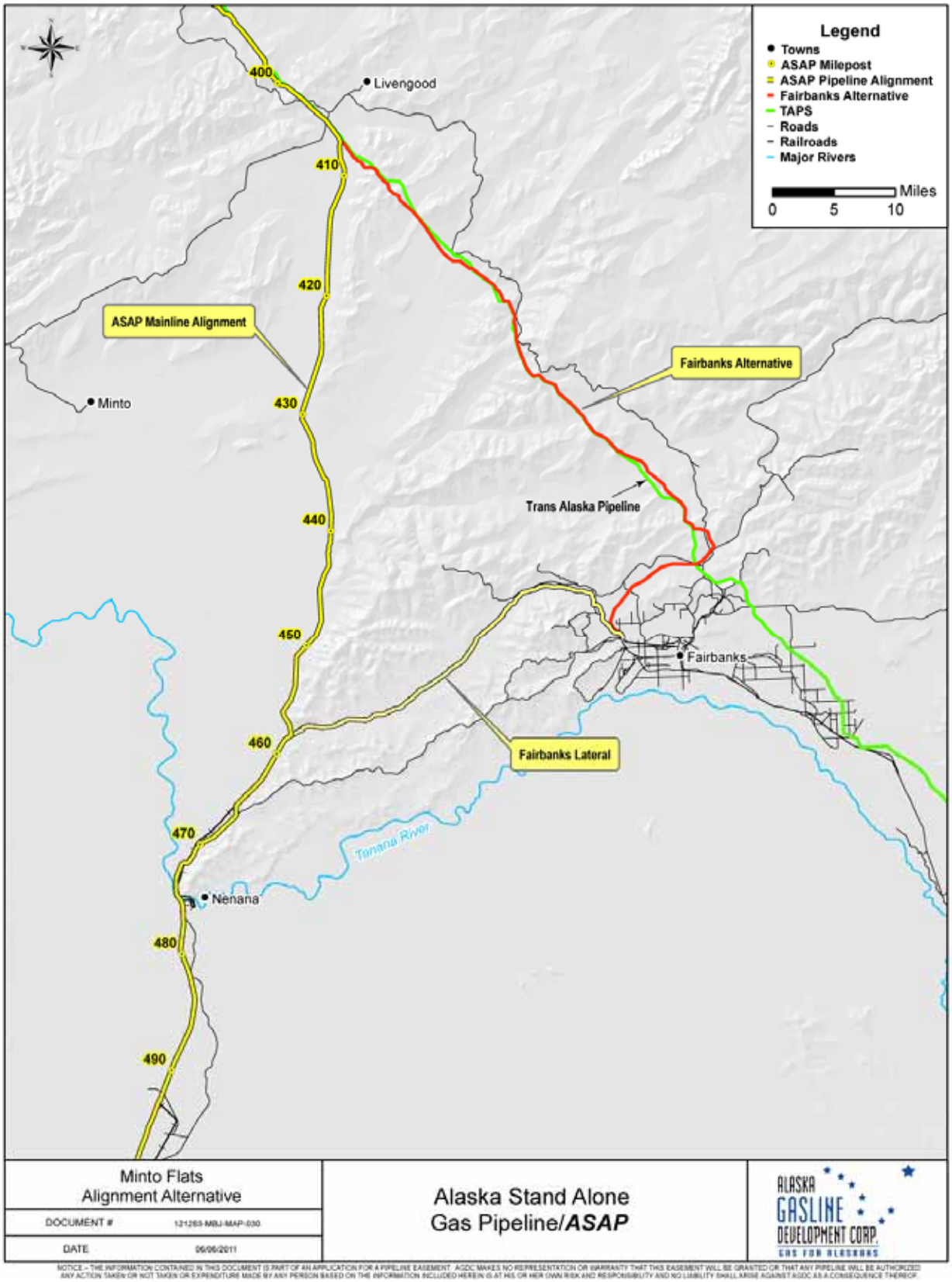


Figure 5-3. Minto Area Route Comparison

There are also significant concerns with the high-pressure portion of the pipeline being routed through Fairbanks. The route would affect several U.S. Department of Transportation designated High Consequence Areas. In addition, up to 150 schools, parks, public buildings, churches, and two known cemeteries are found along the alignment. This option would cross the most developed section of the entire ASAP line. There would be numerous conflicts with existing and future utilities, and it is likely the project would adversely affect property values and require a more expensive right-of-way. Maintenance activities could be disruptive in residential areas.

5.2.2 Discussion of Route Selection Criteria (House Bill 369)

This section discusses how the proposed ASAP route addresses the mandate in House Bill 369 AS 38.34.040 (d) that the pipeline route:

- "is economically feasible;
- makes natural gas available to residents at the lowest possible cost;
- allows for connecting lines to serve industrial, residential, and utility customers along the entire route, and in other regions of the state that can be served at commercially feasible rates;
- uses state land and existing state highway and railroad rights-of-way to the maximum extent feasible;
- uses existing highway and railroad bridges, gravel sources, equipment yards, maintenance facilities, and other existing facilities and resources to the maximum extent feasible."

5.2.2.1 Economic Feasibility

Section 3.1 of this project plan discusses the economic feasibility of the ASAP Project.

5.2.2.2 Lowest Cost of Gas to Residents

Section 3.1 of this project plan discusses how the commercial plan for the project minimizes the cost of gas to residents.

5.2.2.3 Allowance for Connecting Lines

The only gas off-take points proposed for the ASAP Project are at Fairbanks and at the terminus of the pipeline at the Beluga Pipeline.

To reduce the overall tariff for natural gas transported via the ASAP Project, AGDC's proposal includes up to 35,000 barrels of NGLs in the gas stream from the North Slope to the pipeline terminus, where the Cook Inlet NGL Extraction Facility will be located. The NGLs in the gas stream must be removed to provide utility-grade gas for residential and most commercial purposes. The current proposal accomplishes NGL removal at this facility and at the Straddle and Off-Take Facility at the intersection of the main pipeline with the proposed Fairbanks Lateral.

Due to the need for NGL removal, it is not economical to serve the smaller areas along the pipeline route, regardless of the alignment, except via a new distribution system developed off the proposed Fairbanks Lateral. Even if the main pipeline transported only utility-grade gas, development of local distribution systems for the smaller communities and users along the pipeline would very likely be cost-prohibitive regardless of the alignment.

5.2.2.4 Use of State Land and Existing Rights-of-Way

The State Pipeline Coordinator's Office (SPCO) has processed the AGDC right-of-way application for state lands along the proposed route, in accordance with guidance in House Bill 369. The right-of-way lease was signed in late June and transfers an interest in land for 30 years, with the option for renewal.

This lease is the first non-conditional pipeline right-of-way granted by the State of Alaska for the purpose of transporting natural gas from the North Slope to market, and will likely be perceived as a significant milestone and increase project interest and confidence among potential shippers and developers.

5.2.2.5 Use of Existing Infrastructure

The Alaska Department of Transportation and Public Facilities (ADOT&PF) has actively participated in the preliminary design of the ASAP pipeline, realizing that the existing highway corridors from Prudhoe Bay to Port MacKenzie will be a prominent state asset in the eventual success of this project. During the last fiscal year, ADOT&PF has supplied information on numerous bridges along the route, reviewed typical designs for utility highway crossings, investigated material sources along the corridor, and supplied right-of-way boundaries.

AGDC has identified proximity and safety issues related to the potential hazard of routing a 2,500-psi gas pipeline through residential areas such as Fairbanks or near existing infrastructure, and mitigation measures will be developed in the next phase of work. This work could result in numerous additional High Consequence Areas – for example, areas associated with the University of Alaska at Fairbanks and with tourist accommodations and attractions. Additional design, construction, maintenance, and right-of-way costs result from these proximity issues and associated risks.

According to ADOT&PF, three highway bridges along the Parks Highway are appropriate for dual use to support the pipeline and traffic. In addition, ADOT&PF agrees that the E.L. Patton Yukon River Bridge could be modified to accommodate the proposed pipeline, and negotiations with Alyeska regarding proposed modifications are ongoing. Utility permits from ADOT&PF are the typical method of approval for use of highway bridges, and the permits are usually granted near the end of final design when detailed engineering is available.

The state right-of-way lease requires that AGDC agree to a highway use agreement with ADOT&PF that addresses use of utility permits for proximity issues, permanent access road design, public airport usage, joint-use material sites, and mutual aid agreements. The highway use agreement is required prior to construction of ASAP. AGDC and ADOT&PF are working on a

memorandum of agreement to define the beneficial working relationship between the parties to jointly use highway rights-of-way and materials, and to co-exist for the benefit of both the transportation and utility needs of Alaska.

The Alaska Railroad Corporation (ARRC) owns material sites along the Parks Highway and has indicated that the material would be available to the ASAP Project. The ARRC has also indicated that gravel haul using the rail could efficiently position materials along the pipeline route.

The Foothills West transportation corridor from the Dalton Highway to Umiat/Gubik is being developed by the State to promote oil, gas, and mining exploration through more affordable access to the resources. Initially, an all-season road is envisioned to provide access; if exploration is successful, additional infrastructure may include spur roads, pipelines, pump stations, or other facilities. AGDC has been coordinating with this project as there is a future potential natural gas supply from the Umiat/Gubik gas field the Foothills West project would access. Currently, the preferred road alignment intersects the Dalton Highway just south of Toolik Lake, at approximately MP 140 of the ASAP pipeline.

5.3 PLAN OF DEVELOPMENT FOR PROPOSED PROJECT

AGDC prepared a Plan of Development (POD) to support project planning and development of the ASAP. The POD was developed as a single document to provide detailed information to support regulatory processes, permit applications, and preparation of required NEPA documents. The POD was submitted with the following applications:

- U.S. Bureau of Land Management (BLM) Application for Federal Grant of Right-of-Way.
- State of Alaska Application for Pipeline Right-of-Way Lease.
- Draft USACE Section 404 Permit Application.

The POD, which was submitted as the basis for development of the project EIS, provides the following detailed information to support regulatory processes, permit applications, and preparation of required NEPA documents. The POD[50] addresses the following topics:

- Purpose and need for the project.
- A general project description.
- Descriptions of facilities.
- Permits required.
- Construction methods:
    - How construction will be carried out, including pre-construction activities, pipeline preparation, installation, special design areas (e.g., Atigun Pass).
    - Special construction areas (e.g., road, railroad, and utility crossings).
    - Pipe installation methods at waterbody crossings (rivers and wetlands).
    - Installation of mainline block valves.

[50] See http://www.asapeis.com/ProjectDocuments.aspx.

- Natural resources within the project area and how they are likely to be affected by the project.
- Measures to be taken to stabilize and rehabilitate the project area after construction is completed.
- Operation and maintenance.
- Pipeline termination and restoration methods.

By providing a detailed project description in a single document, AGDC eliminated the risk that project details developed to respond to various permit applications or agency requests for additional information (RFAI) will provide conflicting or outdated information, and assures the reader that the information provided is accurate as of the date of publication.

Revision 0 of the Plan of Development (POD) was published in August 2010 after the Base Case for analysis was selected. Revision 1 of the POD was published in March 2011 to provide additional and updated information, to optimize revisions to the ASAP alignment, to organize the document in a more logical manner, and to respond to comments from various regulatory agencies including the Alaska Department of Fish and Game (ADF&G), BLM, EPA, the National Park Service, SPCO, and USACE.

Revision 1 of the POD contains changes in the following sections:

- **Section 1.0, Purpose and Need:** Revised to provide a more concise statement of the purpose of the ASAP and clearly identify the needs the ASAP would fulfill. Additional background information and expected public benefits were included.
- **Section 2.0, Project Description:** Additional information was included, particularly more comprehensive descriptions of major facilities and a list of construction support facilities. Major changes to the ASAP design included ASAP alignment refinements based upon summer 2010 field studies and reduction of proposed compressor stations from 11 to two.
- **Section 4.0, Facility Design Factors:** Updated with additional information about anticipated operating temperatures and how existing subsurface thermal regimes would be maintained with a buried pipeline.
- S**ection 6.0, Government Agency Involvement**: Edited to provide additional information about federally recognized tribes along the route.
- **Section 7.0, Project Construction:** Revised to include additional details about the proposed construction:
    - Development of construction plans and standards.
    - Construction labor requirements.
    - Construction support facilities including personnel housing and support; temporary land use (i.e., storage and laydown yards); health, safety, and emergency response facilities; construction workpads; and material transportation.
    - Details about major facilities including a construction timeline and what facilities would be co-located.
    - Discussion of pre-construction activities to include material sites, water sources, and land temporarily needed for construction activities.
    - Additional information regarding construction techniques.

  - Discussion of waste management.
- **Section 8.0, Resource Values and Environmental Concerns:** Updated based upon the summer 2010 field study results. Mitigation measures were provided to address potential impacts to resources.
- **Section 9.0, Stabilization and Rehabilitation:** Additional information included addressing ditch stabilization, erosion control, and control of non-native invasive plants.
- **Section 10.0, Operation and Maintenance:** Revised to include a list of items and situations to be addressed in an operations and maintenance plan and provided detailed information on pipeline inspection and testing, safety, work schedules, and contingency planning.
- **Section 11.0, Termination and Restoration:** Largely unchanged. It is expected that upon reaching the end of its useful life, the ASAP will be decommissioned in accordance with regulations in place at the time.
- **Attachments:** Revised to provide the most updated information regarding engineering details, land ownership, routing, stream crossings and proposed crossing techniques, access roads, material sites, and sensitive areas and habitats.

The revised POD reflects the optimized design for FEL 1 and addresses routing issues such as the following:

- Avoiding or reducing wetland and aquatic impacts.
- Avoiding cultural sites.
- Avoiding or reducing impacts to sensitive animal or plant habitats.
- Avoiding interference with existing facilities or uses.
- Avoiding over-crowding in existing rights-of-way.
- Responding to landowner requests.
- Improving constructability on severe slopes or in other areas where slope or soil stability is of concern.

It is anticipated that future revisions to the POD will result as engineering continues and the design and construction plan are optimized.

5.4 CONSTRUCTION PLAN/LOGISTICS PLAN

5.4.1 Pipeline Construction Plan

As part of the pipeline cost estimate study completed in July 2010, a preliminary pipeline construction plan was developed using conceptual engineering and route planning strategies. This plan was a key element in the development of the EIS planning efforts and the pipeline cost estimate reports. The July 2010 plan has been updated using the results of the cost optimization efforts, as well as the summer 2010 engineering reconnaissance field work. In addition, a preliminary logistics plan has been combined with the construction plan to consolidate and better capture the connected activities.

Following is a summary of the engineering refinements accomplished as part of this project plan:

- **Construction Season:** Adjustments were made to construction seasons as necessary to each construction spread and section (sub-spread). These changes will be reflected in the overall project construction schedule.
- **Pipe Costs:** Pipe costs were updated to reflect the 0.595-inch thickness required for line pipe. All pipeline costs were updated to reflect a 3% cost escalation.
- **Manpower Schedule:** The summary manpower schedule, derived from the detailed manpower schedule, was refined.
- **Logistics Plan and Estimate:** Likely supply-chain systems and routes have been refined. Logistical study and review elements included ports, railroad, roads, bridge capacities, airports, and transport vehicles. Cost estimates to transport materials between port(s) and laydown yards have been developed. Coordination with the Prudhoe Bay West Dock users provided a detailed understanding of the technical and regulatory constraints of using this facility for module delivery.
- **Construction Camps:** The major elements of construction camps — including size, ability and timing to mobilize/demobilize, personnel requirements to service camps, and associated infrastructure requirements (e.g., water, wastewater, solid waste) — have been reviewed and refined.
- **General and Special Pipeline Construction Procedures:** Updated written descriptions, procedures, and sketches of standard pipeline construction have been prepared. The linear construction sequence typically includes the following steps:
    - Survey and staking of the right-of-way.
    - Clearing and grading.
    - Trenching.
    - Pipe stringing, bending, and welding.
    - Lowering the pipeline into the trench.
    - Backfilling the trench.
    - Hydrostatic testing.
    - Cleanup and restoration.

  Updated written descriptions, procedures, and sketches have been prepared for special construction techniques, such as horizontal directional drilling, horizontal boring, wet/dry open cut, and push/pull. Special techniques will be used when constructing the pipeline across roads, highways, railroads, rugged topography, water bodies, wetlands, and residential areas; when blasting through rock; and when working adjacent to existing easements.
- **Wetland and Water Body Procedures:** Wetland and waterbody construction and mitigation procedures have been developed to cover the following:
    - Supervision and inspection.
    - Preconstruction planning, which includes agency coordination, and identification of special spill prevention, containment, and countermeasure requirements.
    - Notification procedures and permits.
    - Installation requirements.
    - Restoration requirements.
    - Post-construction activities such as monitoring, maintenance, and reporting.

- **Aboveground Facility Construction Procedures:** Written descriptions, procedures, and sketches of aboveground facilities including compressor stations, block valves, launcher receivers, and meters have been prepared, including site preparation and installation of aboveground piping, compressors, and buildings.

5.4.2 Construction Milestone Schedule

The overall project construction milestone schedule was updated and combined with the facility schedule (Figure 5-4 contains a simplified construction milestone schedule). The project sequencing of engineering, long-lead materials, North Slope gravel, foundations, and infrastructure, along with module fabrication and installation and start-up, has been reviewed against other historical information on large projects for verification of the facility durations. North Slope facility start-up is assumed to be June of the year following the last sealift.

5.5 SUMMARY OF COMPLETED ENGINEERING WORK

This section covers the following preliminary engineering work completed since July 2010:

- Pipeline alignment investigation.
- Pipeline diameter optimization.
- Studies of special design areas (SDA).
- Project Geographic Information System (GIS) and alignment sheets.
- Project capital cost estimates.

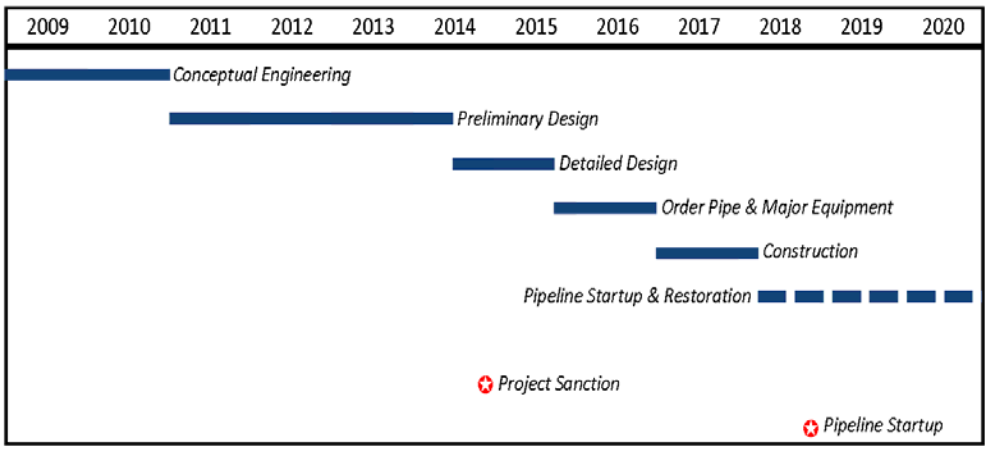


Figure 5-4. Simplified Construction Milestone Schedule

5.5.1 Pipeline Alignment Investigation

To validate assumptions made in the July 2010 Construction Plan, a field reconnaissance of the alignment was completed in August and September of 2010. The investigation led to updates in the project geodatabase and resulted in 27 changes to the pipeline alignment. The changes included minor revisions to the alignment geometry and refinements to road, stream, and foreign pipeline crossings. Changes to the geodatabase also included stream bank-full width, active channel width, verified crossing method, noted streambed material, water depth (shallow streams only), associated wetlands, buoyancy control needs, and streamside vegetation. Minor alignment changes were made to avoid interference with structural features (such as buildings, fiber optic cable, culverts, etc.) or physical features (lakes, hills, etc.) and to straighten the alignment (Table 5-3). At several locations, short sections of the alignment moved several hundred feet.

Table 5-3. Summary of 2011 Alignment Changes

LOCATION	MILEPOST RANGE	PURPOSE
1	19-20	The alignment was moved to the east approximately 185 feet to remove the alignment from the lake present at this location.
2	39-40	To move alignment to the west side of a TAPS block valve. The alignment was moved from between the TAPS block valve and the Dalton Highway (field personnel determined that there is not enough room) to 50 feet behind the TAPS block valve.
3	53.5	To move alignment to the west side of a TAPS cathodic protection shack. The alignment was moved from between the TAPS cathodic protection shack and the Dalton Highway (field personnel determined that there is not enough room) to 50 feet behind the TAPS cathodic protection shack.
4	75.75	To move alignment away from a fiber optic line access point. The alignment was adjusted 20 feet to the east to move the alignment away from a fiber optic access point. The location of this realignment is approximately 1 mile south of the Ice Cut Hill.
5	76.5	To move alignment in line with the Dalton Highway. The alignment was straightened and moved approximately 25 feet closer to the Dalton Highway.
6	80.25	To move alignment away from a TAPS block valve. The field personnel determined that the alignment was too close to a TAPS block valve so the alignment was moved 45 to the west.
7	94	To address a major road crossing that is not at right angles. The road crossing was realigned to cross the road at right angles in accordance with the design basis report. The turns have been addressed to remove any angles in the alignment greater than 60 degrees.
8	116	To cross both the Dalton Highway and TAPS with a single bore crossing instead of two. The field personnel determined that enough room is available to make the turn after the crossing; this change should save time and money.
9	182-183	To realign the pipeline over Chandalar Shelf. The pipeline was realigned at the bottom of the hill and to adjust the alignment to suit the hillside.
10	199	To realign the pipeline closer to the road. Field personnel determined that the alignment was crossing through a material site and traversing a steep side hill. The alignment is proposed to be moved closer to the Dalton Highway (approximately 50 feet from the highway toe of slope).
11	217-219	To remove two Dalton Highway (bore) road crossings. Field personnel determined that the alignment could remain on the east side of the Dalton Highway instead of crossing the road then back again.
12	252	To realign the pipeline closer to the Dalton Highway. Field personnel determined Rosie Creek could be crossed with only a slight adjustment to the alignment to cross at right angles. A slight realignment is necessary to address a groundwater monitoring station on the north bank of Rosie Creek.

Table 5-3 (Cont'd). Summary of 2011 Alignment Changes

LOCATION	MILEPOST RANGE	PURPOSE
13	266-267	To realign the pipeline to avoid two Dalton Highway (bore) road crossings. Field personnel determined that the alignment could stay on the east side of the road in this area.
14	271.75	To realign the pipeline to avoid a rest stop area at Grayling Lake. Field personnel determined that the alignment would cross a rest stop area with facilities. The Dalton Highway crossing was moved south approximately 700 feet to avoid this rest area.
15	317	To realign the pipeline to cross both the Dalton Highway and TAPS in one crossing instead of two. Field personnel determined that crossing both features at one location would be a more efficient approach.
16	321-322	To realign the pipeline closer to the Dalton Highway. Field personnel determined the stream crossing at this location (ST_238) could be crossed at right angles while staying close to the highway. The stream crossing was not large enough to warrant a larger offset.
17	324	To realign the pipeline closer to the Dalton Highway. Field personnel determined the stream crossing at this location (ST_240) could be crossed at right angles while staying close to the highway. The stream crossing was not large enough to warrant a larger offset.
18	324.5	To realign the pipeline closer to the Dalton Highway. Field personnel determined the stream crossing at this location (ST_242) could be crossed at right angles while staying close to the highway. The stream crossing was not large enough to warrant a larger offset.
19	327	To realign the pipeline closer to the Dalton Highway. Field personnel determined the stream crossing at this location (ST_244) could be crossed at right angles while staying close to the highway. The stream crossing was not large enough to warrant a larger offset.
20	334.5	To realign the pipeline closer to the Dalton Highway. Field personnel determined the stream crossing at this location (ST_252) could be crossed at right angles while staying close to the highway. The stream crossing was not large enough to warrant a larger offset.
21	350-351	To realign the pipeline to remove two Dalton Highway (bore) crossings. Field personnel determined that the pipeline could stay on the east side of the Dalton Highway instead of crossing to the west side for 1.43 miles then crossing back. Soil stability is an issue in this area on both sides of the highway. The alignment also was adjusted just north to address a TAPS crossing.
22	354	To realign the pipeline closer to the Dalton Highway. Field personnel determined the stream crossing at this location (ST_261) could be crossed at right angles and stay close to the highway. The stream crossing was not large enough to warrant a larger offset.
23	167	The alignment change allows for a more direct, perpendicular crossing of the Atigun River, which more closely follows the route specifications outlined in the Design Basis.
24	173.5	A section of this segment was re-aligned to avoid a water retention pond and a stream. The alignment change provides a more efficient route through the Atigun Pass area. During the field visit, it was determined that one Point of Inflexion at the bottom of Atigun Pass hill (north side) would be sufficient as opposed to the original. Alignment revisions also avoid culvert outflow areas, thus minimizing the potential for negative drainage impacts.
25	175	The alignment change in this area presents a more efficient route through this section of Atigun Pass. The revision keeps the alignment on the south side of the Dalton Highway, avoiding an existing fiber optic line that runs along the rain ditch on the north side of the highway and reduces the magnitude of design and construction efforts associated with installing a retaining wall along the highway. This revision also circumvents the need for two crossings of the Dalton Highway.
26	361.5	The purpose for this area of study is to realign the pipeline on the north bank of the Yukon River. The preliminary alignment design called for a bridge crossing at the Yukon River.
27	362.5	The purpose for this area of study is to realign the pipeline on the south bank of the Yukon River. Field personnel determined the alignment should be changed to better suit ground conditions and run down slope and a more direct angle to the fall line.

5.5.2 Pipeline Diameter Optimization

Earlier work centered on providing a range of gas volumes — from 250 MMscfd to 1,000 MMscfd — leaving the North Slope of Alaska for deliveries at Fairbanks and the Cook Inlet area. The primary focus was then narrowed to transporting up to 500 MMscfd of enriched natural gas from the North Slope during the winter.

A pipeline hydraulic model was built to determine the best combination of compressor stations and pipeline diameter at the 500 MMscfd flow rate to carry forward to the next level of engineering design. Results from the hydraulic modeling were used to determine the number and location of compressor stations for various pipeline diameters. Using this information, a cost optimization was done based upon historic metrics for pipeline and compressor station costs and an approximation for operating costs.

A second case was considered with about 300 MMscfd of dry gas leaving the North Slope. Besides the number of compressor stations and pipeline diameter, two different maximum operating pressures were considered, 2,500 and 2,180 psi. The cost optimization results indicated that the 18-inch and 20-inch diameter cases at both operating pressures resulted in very close to the same results.

Considering the present early stage of engineering and commercial development for transporting 500 MMscfd of enriched natural gas, additional review is necessary to improve the operating cost estimate and address the reliability impact of the remote compressor stations. Reliability is especially important considering the winter dependence local communities may have on the utility gas supply in the future with this project.

It is also important to consider how much flexibility should be allowed to address the possibility of future increases to the flow rates. Although the project is limited to 500 MMscfd due to limitations in the language of the Alaska Gasline Inducement Act (AGIA), the flow rate could be expanded to 1 billion scfd with the addition of more compressors with the 24-inch-diameter project. A smaller-diameter line could not be expanded as easily.

Based on the above factors, the project is proceeding with the 24-inch-diameter pipeline. If the future open season does not result in a fully subscribed 500 MMscfd project, the diameter may need to be reduced.

5.5.3 Studies of Special Design Areas

Similar to other linear projects such as roads and railroads, pipeline construction generally implements a select number of typical design solutions over the length of an identified alignment, requiring only minor, site-specific adjustments over the length of the project. Given the 737-mile ASAP alignment, it is inevitable that the need to vary from typical design solutions will occur.

The term “special design areas” (SDA) refers to identified locations along the ASAP alignment where departure from standard design solutions is necessary, or the construction of selected design solutions, typical or otherwise, will vary from the normal rhythm of pipeline construction.

An SDA can be characterized as a pinch point created by terrain and existing infrastructure unrelated to the pipeline system or an area where pipeline construction is significantly more complex than elsewhere along the alignment. In all cases, detailed site investigations and in-depth analysis must be conducted to define the appropriate design.

Route planning and field reconnaissance efforts have identified five SDAs along the ASAP alignment (Figure 5-5):

- Atigun Pass.
- ADOT&PF Bridges at Hurricane Gulch, Little Coal Creek, and the Chulitna River.
- Denali National Park and Preserve Vicinity.
- Yukon River Crossing.
- Tanana River Crossing at Nenana.

Design options developed for each SDA are discussed below. These designs were developed in more detail than the rest of the pipeline because of the cost risks of building a pipeline in these areas. Additional design work was required to verify earlier assumptions for building the pipeline in these areas.

5.5.3.1 Atigun Pass

The ASAP Project alignment between MP 173 and 183 is near Atigun Pass in the Brooks Range (Figure 5-6). This location is considered an SDA due to the physical and environmental challenges in the area. The alignment traverses, and is surrounded by, steep slopes and rocky soils, and this portion of the pipeline is located at a pinch point between the Trans Alaska Pipeline System (TAPS) and the Dalton Highway. In general, the Dalton Highway will provide access to the area, with access roads and work pads providing access within the right-of-way. Given the severity of the terrain and remoteness of the SDA, transporting bulk materials and other heavy construction materials may be challenging.

Existing conditions, including geotechnical information and land status, were investigated, and crossing requirements at streams and roads were analyzed. Typical sections were developed for pipeline construction both adjacent to and away from the Dalton Highway. Route challenges, including steep cross-slopes, a narrow corridor, and other geotechnical and climatic considerations, were investigated. Construction considerations such as access roads, traffic control, construction seasons, staging areas, and public involvement were also evaluated.

This analysis shows that constructing the pipeline through the Atigun Pass SDA appears feasible and did not materially affect the overall pipeline cost estimate. Additional geotechnical, survey, and hydrological analyses are needed to continue design development to address the challenges in this area.

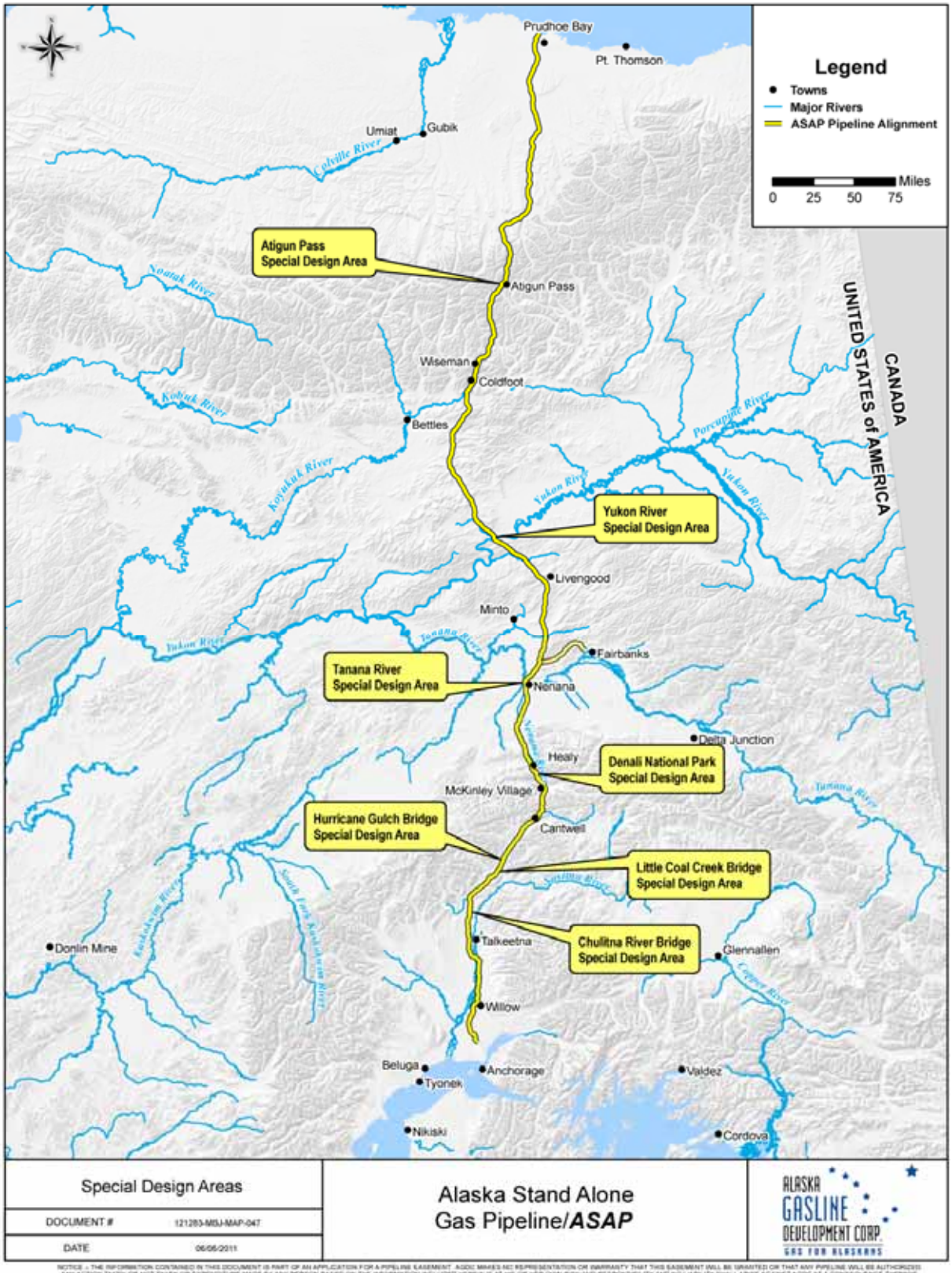


Figure 5-5. Location of Special Design Areas

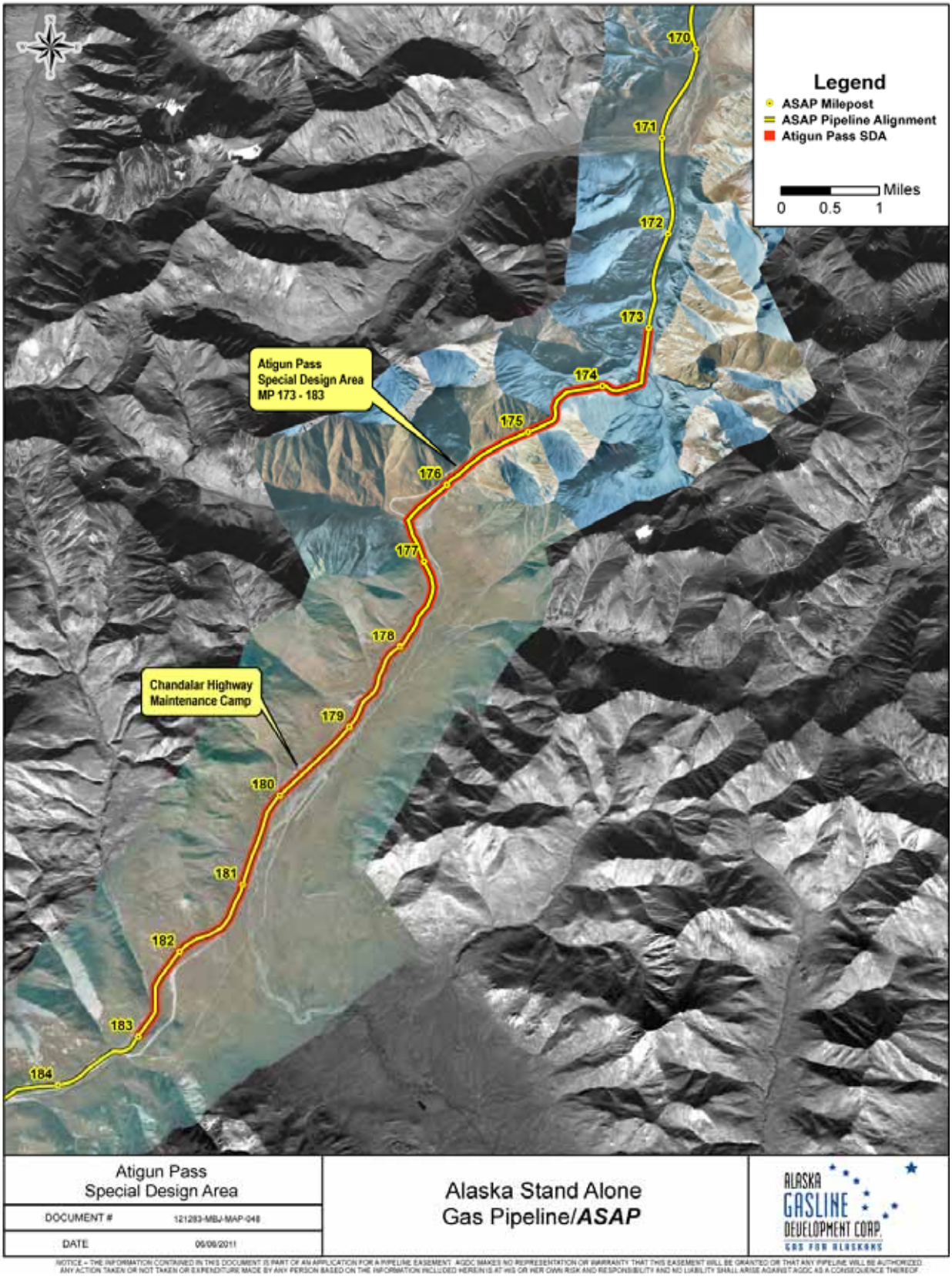


Figure 5-6. Atigun Pass SDA Vicinity Map

5.5.3.2 Alaska Department of Transportation & Public Facilities (ADOT&PF) Bridges

Along its 737-mile route from the North Slope to Southcentral Alaska, the ASAP Project crosses many rivers and streams. Four options were considered for crossing the major rivers:

- A new pipeline bridge.
- Trenchless technology, specifically horizontal directional drilling (HDD).
- Existing Alaska Railroad bridges.
- Existing highway bridges.

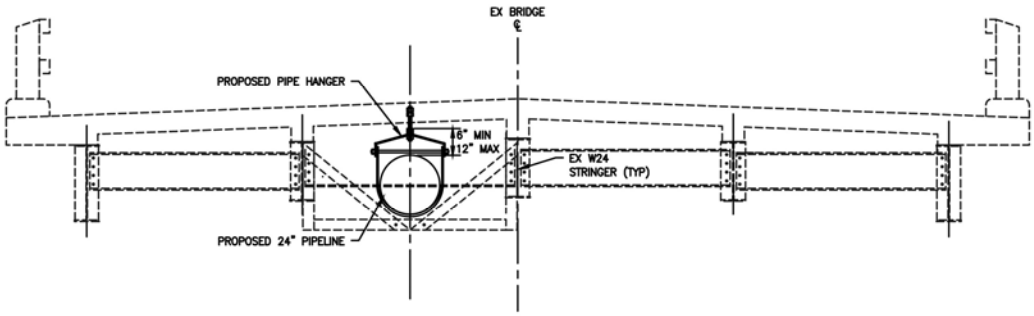
Using existing highway structures is the preferred option. ADOT&PF, the owner of the highway bridges, indicated that placing ASAP on the Hurricane Gulch, Little Coal Creek, and Chulitna River Bridges is acceptable in concept. These bridges were the subject of the SDA study.

Existing bridge information and data were analyzed and used to develop concept designs. The feasibility of each crossing was evaluated, and special considerations for each were identified. Construction considerations such as access, traffic, temporary bridges, construction seasons, and staging areas were also evaluated.

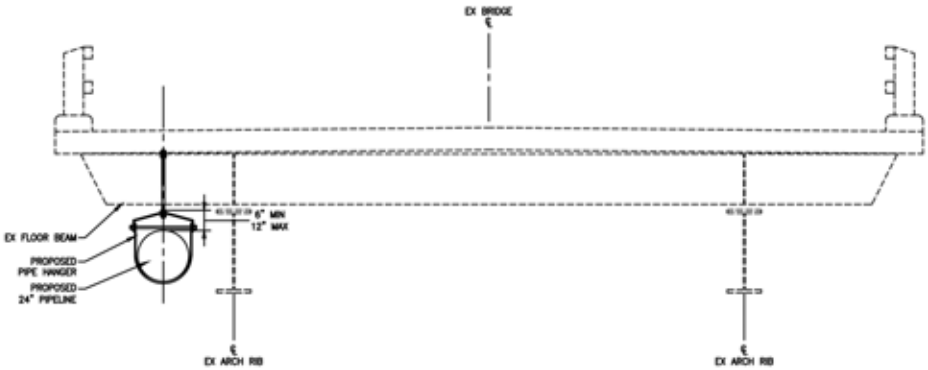
The concept design uses adjustable-clevis pipe-hanger assemblies to suspend the pipeline from the bridge superstructure. Each pipe-hanger assembly will be located according to the type of bridge, available working room, and ADOT&PF recommendations. Conceptual drawings prepared for each bridge show the proposed pipe location, profile, and details (Figure 5-7).

The concept analyses indicate that attaching the ASAP mainline to the Hurricane Gulch, Little Coal Creek, and Chulitna River Bridges appears feasible and generally acceptable to ADOT&PF. The concepts are constructible and can be accomplished with minimal impacts to the travelling public. Further design analysis and refinement of the concepts are recommended, as are additional survey and agency coordination.

Hurricane Gulch Bridge



Little Coal Creek Bridge



Chulitna River Bridge

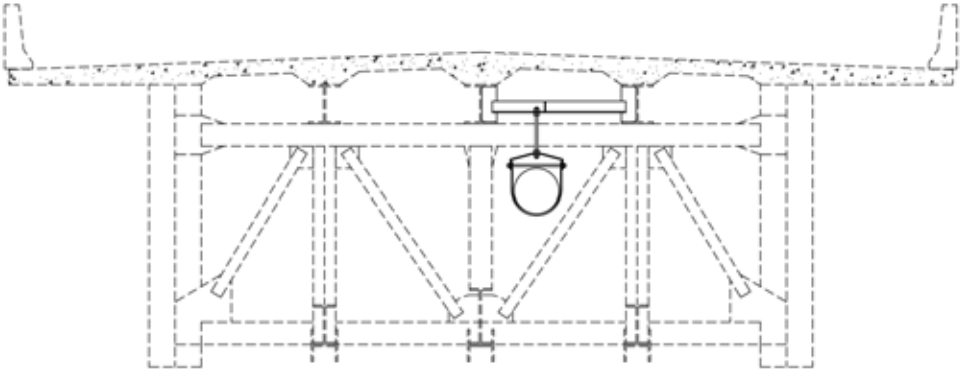


Figure 5-7. Concepts for Crossing ADOT&PF Bridges

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5.5.3.3 Denali National Park and Preserve Vicinity

The ASAP alignment between MP 533 and 555 is located near Denali National Park and Preserve (Figure 5-8). This location is considered an SDA due to the sensitivity of working near the park and because of other physical and environmental challenges in the area. The Denali National Park and Preserve SDA begins at MP 533.4, approximately 5 miles south of Healy, and continues along the Parks Highway to the south end of the commercial area known as "Glitter Gulch" just north of the park entrance near pipeline MP 539. Three alignment options were considered: Option 1 (the proposed route) is an open trench option and Option 2 is a horizontal directional drilled (HDD) option; both are located east of the Denali National Park and Preserve boundary. Option 3 follows the Parks Highway through Denali National Park and Preserve.

Existing conditions including geotechnical information and land status were investigated, and crossing requirements at streams, roads, and the Alaska Railroad were analyzed. Typical sections were developed for pipeline construction adjacent to and away from the Parks Highway. Route challenges, including steep cross-slopes, the Glitter Gulch area, and the feasibility of an HDD near MP 539, were investigated. In addition, typical section options were developed for the Nenana Canyon area. Construction considerations such as access roads, traffic control, construction seasons, staging areas, and public involvement were also evaluated.

Descriptions of the alignment options are provided below:

- **Option 1:** This option is the proposed route, and the entire alignment is located outside of Denali National Park and Preserve. It is constructed using typical open-trench construction techniques.
- **Option 2:** This alignment option is identical to Option 1, except from MP 539 to 540, where it shifts slightly to accommodate the HDD. The entire alignment is located outside of Denali National Park and Preserve.
- **Option 3.** This option is identical to Options 1 and 2 from MP 534 to 539. From MP 539 to 555, Option 3 is located within Denali National Park and Preserve.

Alignment Options 1 and 2, which avoid Denali National Park and Preserve, are feasible and recommended for further consideration. Alignment Option 3 is partially located within the park. Currently, federal laws would not allow construction of this route variation within Denali National Park and Preserve. Federal legislation that would allow the route variation has been introduced by the Alaska Congressional delegation, and is currently being reviewed by the U.S. Congress. Under the legislation, the National Park Service would be able to authorize a right-of-way for the route or mode which would result in the fewest or least severe adverse impacts on the area.

Recommendations for additional analysis within this SDA include a geotechnical field investigation, a design-level topographic survey, continued hydrology and hydraulic investigations, and continued coordination with ADOT&PF.

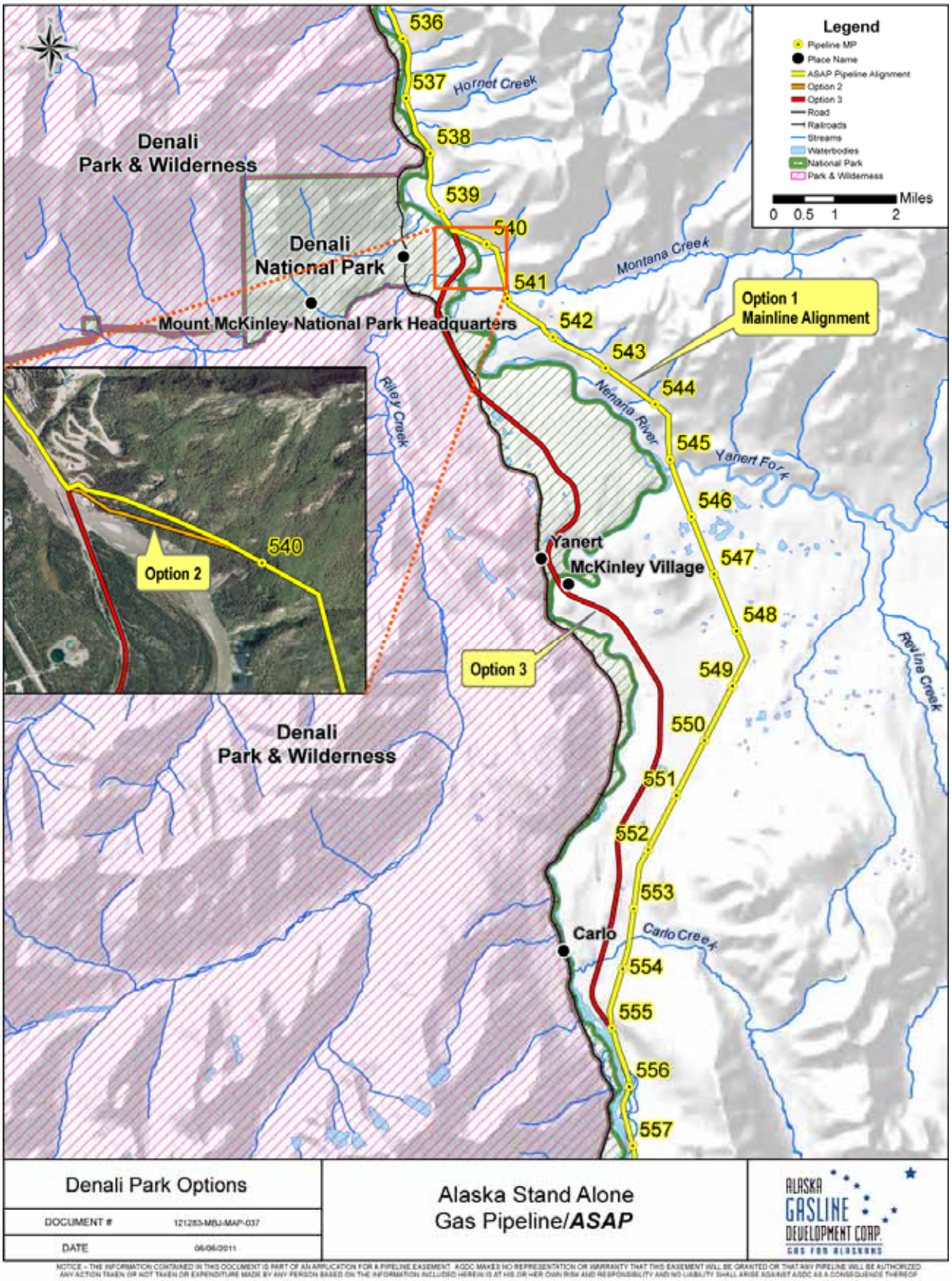


Figure 5-8. Options for Denali National Park and Preserve

5.5.3.4 Yukon River Crossing

The Yukon River is located near MP 361 of the alignment. This area is considered an SDA due to the challenges of crossing the river, which is approximately 2,200 feet wide at the crossing.

Three crossing options were investigated (Figure 5-9). Option 1 constructs a new pipeline suspension bridge, while Option 2 crosses the river using horizontal directional drilling (HDD) and Option 3 places the pipeline on the existing E.L. Patton Yukon River Bridge. Options 1 and 2 fall on the same alignment and are located approximately 0.6 miles downstream (west) of the existing highway bridge. Option 1, the new pipeline suspension bridge, is the preferred option at this time. Figure 5-10 shows conceptual views of Options 1 and 3.

Existing conditions, including geotechnical information, hydraulic information, and land status, were investigated. The feasibility of each option was evaluated, and special considerations for each were identified. In addition, the roles and responsibilities of the E.L. Patton Yukon River Bridge stakeholders were investigated. Construction considerations such as access roads, construction seasons, and staging areas were also evaluated.

Preliminary analysis suggests constructing a pipeline across the Yukon River is feasible, though topography, geology, and hydrology present challenges. Because sufficient information is not available to recommend a single option, all three options are recommended for further consideration. Additional structural, geotechnical, survey, and hydrology analyses, as well as agency coordination, are needed before the feasibility and advantages of specific options can be determined.

The default assumed crossing method for purposes of EIS analysis and cost estimating is the new suspension bridge. The cost estimates for the options are shown in Table 5-4, along with a comparison of other aspects of the options.

Table 5-4. Comparison of Yukon River Crossing Options

DESCRIPTION	OPTION 1: NEW PIPELINE SUSPENSION BRIDGE	OPTION 2: HDD	OPTION 3: PIPELINE ON EXISTING E.L. PATTON BRIDGE
Feasible	Yes	Unknown	Yes
Cost Estimate	$41 to $88 million	$4 to $10 million	$3 to $8 million
Length (miles)	1.9	1.9	2.4
Land Status (miles)			
Federal	0.1	0.1	0
ADOT&PF	0	0	2.0
Other State	1.6	1.6	0
Additional Field Work Required	Yes	Yes	No
Navigability Permit Required	Yes	No	Yes
Stakeholder Concerns	No	No	Yes

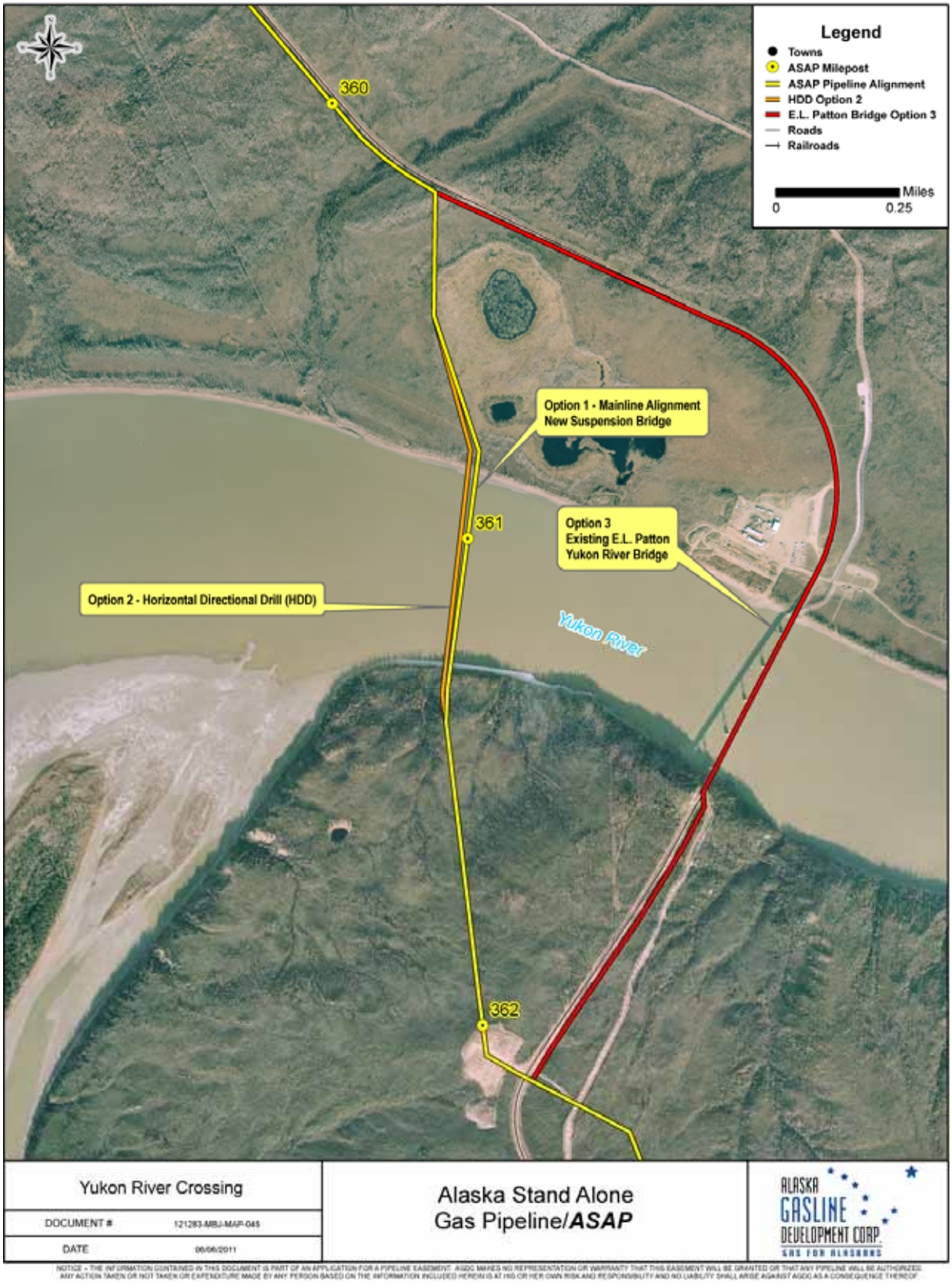
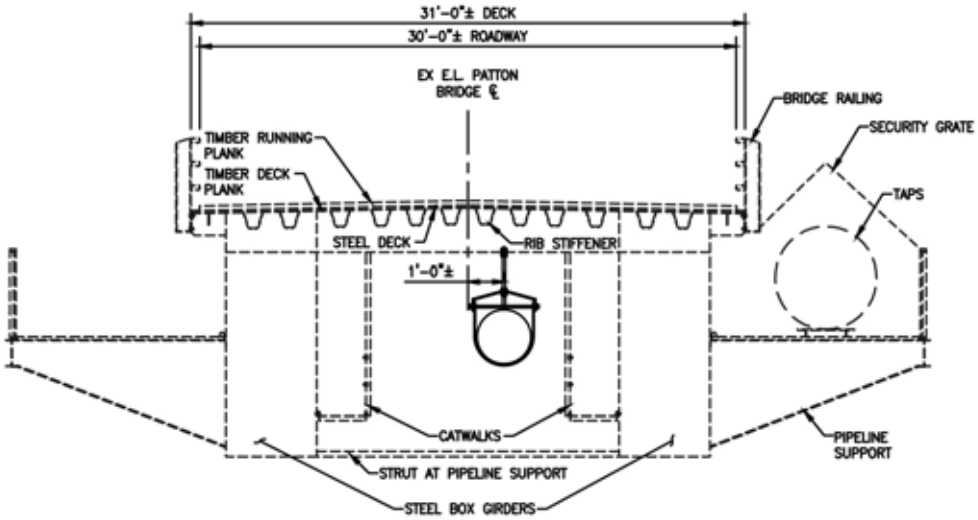


Figure 5-9. Yukon River Crossing Options

E.L. Patton Bridge



Pipeline Suspension Bridge

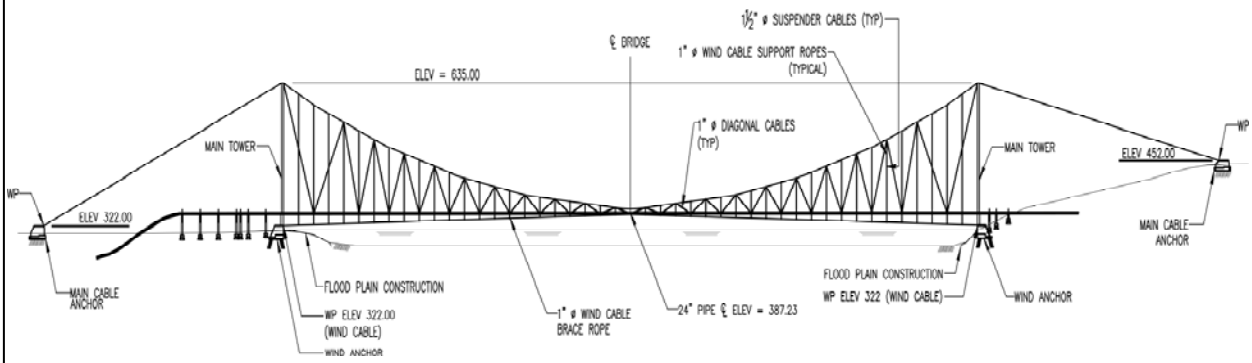


Figure 5-10. Conceptual Drawings of Bridge Options for Yukon River Crossing

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5.5.3.5 Tanana River Crossing at Nenana

The Tanana River is located near MP 476 of the ASAP route. This portion of the project is considered an SDA due to the combined challenge of crossing the Tanana River and a pinch point north of the river caused by terrain constraints and existing infrastructure. A trenchless installation (HDD) method has been selected as the preferred option for the crossing. An HDD bore would extend approximately 4,000 feet, beginning between the Parks Highway and railroad embankment on the north side of the river and ending between the railroad and highway on the south side of the river. Depending on the results of the additional field program needed for this crossing, an option for a double HDD may be more feasible or cost-effective (Figure 5-11). The HDD would be divided into two sections by using the existing island in the Tanana River.

Additional effort is needed to determine the ultimate configuration of the HDD. Crossings of this length and longer have been accomplished under rivers with 24-inch-diameter pipelines. However, final determination of the feasibility of using HDD to cross the Tanana River depends on a technical review of site-specific data, including subsurface soil and rock conditions for the crossing. Data for a feasibility assessment of the route was collected through research of available information and original field data gathering efforts. Historical borehole data was obtained from the Alaska Railroad (ARRC) and ADOT&PF. Right-of-way and land ownership status was researched and used to optimize the alignment to minimize disruption of road or railroad service from HDD construction operations, as well as avoid private property.

In September 2010, a surface reconnaissance was conducted to evaluate potential geohazards in the vicinity of the route. The work included a bathymetric survey of the river bottom. The study area extended east of the HDD alignment to the highway bridge and west of the alignment approximately 800 feet beyond the confluence of the Nenana River with the Tanana River. The most significant finding from this reconnaissance was a well-defined scour hole over 40 feet deep (reportedly often over 50 feet during summer). Channel scour above an HDD bore represents a geohazard that could lead to mud circulation problems during drilling and reduced cover over the operational life of the pipeline.

In February 2011, four geotechnical boreholes were drilled at Nenana to depths ranging from 100 to 204 feet below the ground surface or mudline. Timing the field work during the winter after sufficient river ice had developed provided access to three over-water boreholes within the main channel of the Tanana River. Generally, the test holes encountered uniform soil conditions consisting of multiple layers of saturated, poorly graded, fine sandy gravels and gravelly sands. No boulders or cobbles were encountered. Currently, five more boreholes accessible conventionally by truck or off-road equipment are planned for the summer of 2011. A geophysical survey of the crossing is also planned. Other recommendations for future work include data gathering and assessment of the potential shear zone and fault activity within the crossing, design-level topographic survey, continued hydrology and hydraulic investigations, and continued coordination with ADOT&PF, the USACE, ARRC, private landholders, and the City of Nenana.

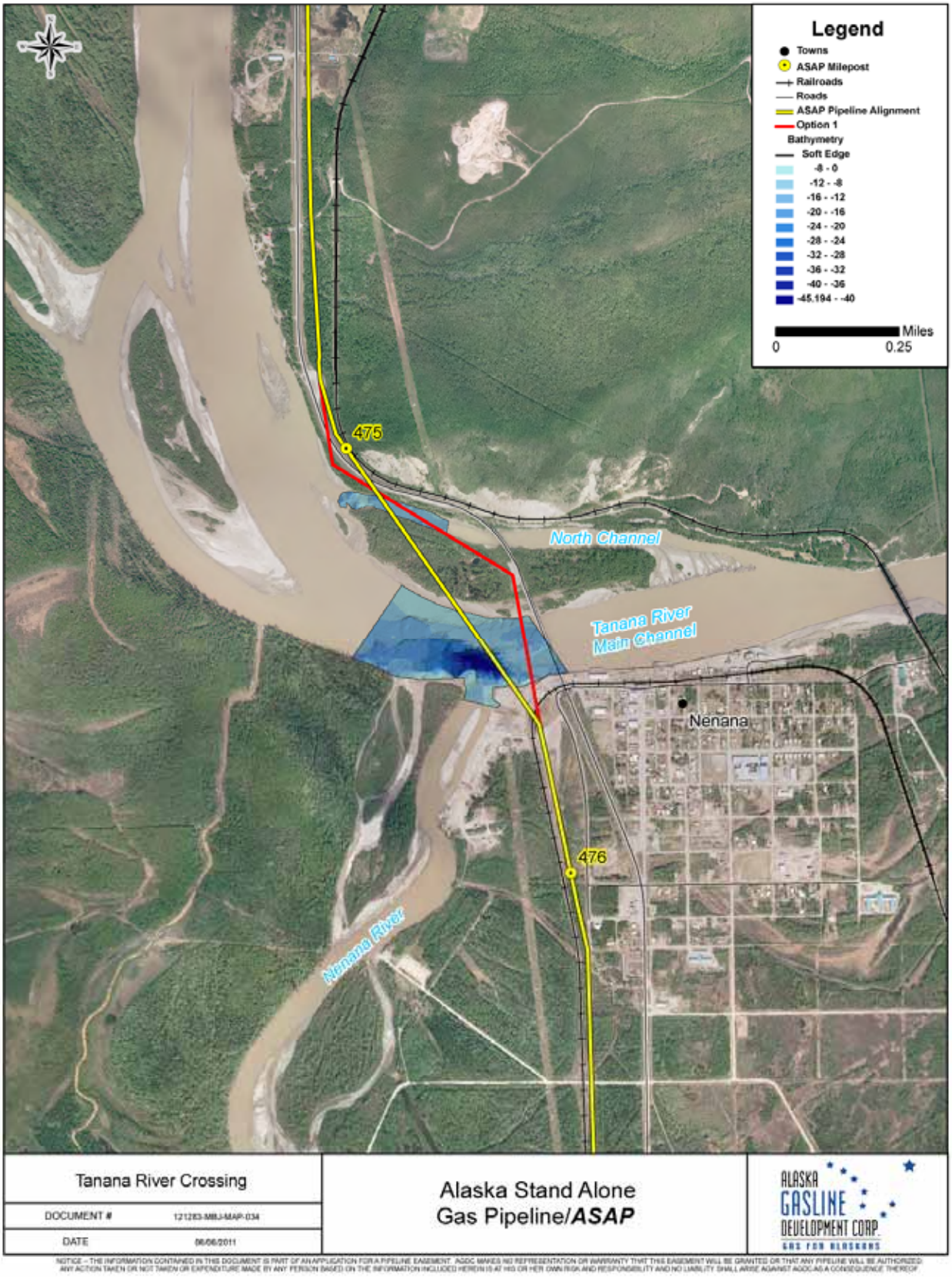

Figure 5-11. Options for Tanana River Crossing at Nenana

5.5.4 Geotechnical Analysis

5.5.4.1 Geotechnical Data Gap Analysis

Evaluation of the project geotechnical data needs has been completed. Elements of this process included developing an exploration program tailored to the pipeline facilities and probable site conditions, recovering and loading existing geotechnical data into a geodatabase, and comparing data needs against pertinent existing data to identify and prioritize data gaps for field studies:

- **Exploration Program:** An exploration plan that identifies the baseline borehole data needed for geotechnical design of the pipeline was prepared. This plan includes the data quality objectives of the typical geotechnical analyses that could be used in pipeline design studies. It comprises Geographic Information System (GIS) borehole locations and attributes. The plan will be a part of the Geotechnical Data Gap Analysis report.
- **Data Library:** The locations of all available geotechnical data (geodata) within the pipeline corridor have been loaded into the GIS database with links to PDF files of the source reports, and additional geodata will be loaded for select locations as needed to support engineering studies.
- **Data Gap Analysis and Prioritization:** The existing geodata will be compared to data needs to identify geotechnical data gaps that warrant project-specific geotechnical field studies. Data needs will be prioritized to address project issues on the critical path, or where perceived risk is higher. Gap analysis and prioritization will likely be an ongoing process as the pipeline project concepts are better defined and as new geotechnical data becomes available to compare against existing or derived geodata. The exploration plan, data recovery, and data gap analysis/prioritization will be documented in a single report.

5.5.4.2 Geohazards and LiDAR Surveys

Along the proposed route, a wide variety of geologic hazards can adversely affect pipeline routing such as processes related to active faulting, earthquake ground shaking, landslides, rockfall, permafrost, and flooding. Thus, an accurate assessment of geologic hazards is important for pipeline route selection, design, and construction.

Because of the clear importance of seismic stability for the pipeline route regardless of its location, AGDC has teamed with DNR's Division of Geological & Geophysical Surveys (DGGS) to conduct a high-resolution LiDAR (light detection and ranging) survey of the proposed alignment, followed by trenching of faults that are found to cross the proposed alignment. This work began in June 2011.

DGGS is executing a phased program to evaluate geohazards along the proposed route. The program includes map and data compilation, assessment of geologic data, acquisition and evaluation of high-resolution LiDAR data, and field characterization of geologic hazards. Important geologic hazards will be identified and evaluated with the aid of helicopter and field reconnaissance. LiDAR is an optical remote sensing technology that can measure the distance to, or other properties of a target by illuminating the target with light, often using pulses from a laser. LiDAR technology has application for airborne laser swath and contour mapping.

DGGS will use its current contract with Watershed Geosciences to expand the planned LiDAR survey for the Alaska Pipeline Project (APP) to cover the in-state gas line route from Livengood to the terminus, allowing for an efficient use of state resources.

This information will be disseminated through publicly available geohazard maps and reports. Regardless of the eventual prospect of an in-state gas pipeline, the geohazard and remote sensing data collected as part of this effort will be highly valuable for any future development (power plants, dams, highways, railroads) in Alaska and marks a significant archive of Alaska's geological profile.

5.5.4.3 Material Sites

Through coordination with ADOT&PF, potential existing material sites along the alignment have been identified and have been investigated to better understand the availability of material and the needs of the project. The following is a synopsis of the work completed;

- **Location of Material:** Material site locations were identified using existing ADOT&PF material-site information sources.
- **Material Quantity:** Material is available along most of the alignment. A few areas (such as Minto Flats) do not have developed material sites, and other stretches of alignment might require increased haul distances from neighboring sites. A Project Material Site Summary captures the material site and alignment milepost information, including the amount of overburden, material volume, material quality, generalized site planning, permit status, and restoration.
- **Material Requirements:** The estimated available borrow material was compared to anticipated project construction needs. Material requirements were determined based on the expected soil conditions along the alignment and an evaluation of whether excavated trench material can be salvaged. The material requirements were compiled with the materials needed for pipeline construction (import bedding, padding, and backfill) plus material for access roads, compressor station pads, work pads, etc.
- **Permitting:** Since most of the material site permits have expired, a permitting effort by the ASAP Project will be required to reopen the permits.

The Alaska Railroad owns material sites along the Parks Highway and has indicated that the material would be available to the project. The ARRC has also indicated that gravel haul using the railroad could efficiently position materials along the pipeline route.

5.5.5 Project Geographic Information System (GIS) and Alignment Sheets

The project Geographic Information System (GIS)-based geodatabase data model is maintained and updated as new information is developed, desktop studies and field studies are completed, and research is done. Data in the GIS includes stream crossing data, right-of-way boundaries and land ownership title research, wetlands boundaries, access roads, current infrastructure, facility locations and layouts, and the pipeline alignment.

The organization of the data in the project GIS is based on the Pipeline Open Data Source (PODS) model, which is widely used by pipeline operating companies to manage pipeline, integrity, inspection, regulatory compliance, and operational data in a GIS. Using a PODS-compliant database allows an approach to managing pipeline data in a single data repository. The GIS helps AGDC collect, verify, manage, analyze, update, maintain, and deliver all the information about the project quickly and reliably to interested parties for potential asset transfer or sale, abandonment, removal, repair, replacement or change of service.

The GIS database and alignment sheets provide geospatial information that supports the cost estimate, state right-of-way lease application, federal right-of-way application, project planning, EIS and the NEPA analysis and documentation, and design. The GIS database also facilitates coordination with state and federal agencies such as ARRC, ADOT&PF, DGGS, the National Park Service, and the Bureau of Land Management (BLM).

Current applications of the GIS during FEL 1 include the following:

- **Class Location Analysis:** The project GIS was used as a main component in the Class Location analysis. The GIS system used aerial imagery and allowed dynamic edits. The high-resolution imagery allowed for accurate calculation of class location distances away from dwelling units as required by 49 CFR 192.5.
- **Design Factor Analysis:** Building upon the Class Location analysis, Design Factor analysis was also more efficient using the project GIS. Geographic-feature crossing locations were identified as well areas of encroachment along major highways. All features were combined into a single continuous alignment comprised of unique features and their associated design factor. Summary tables were created that allowed estimation of total pipe tonnage needed.
- **Cross-Slope Analysis:** The project GIS was used to calculate average cross-slope elevations for the entire length of the pipeline. The average cross-slope was then estimated to a total surface area that would be disturbed during the construction phase. These calculations gave the environmental estimators a better understanding of how much ground surface would be impacted.
- **Timber Volume Removal Analysis:** The amount of timber to be removed prior to construction was estimated using the project GIS. This provided a more accurate depiction of the costs for site preparation. The project GIS used the high-resolution imagery and the pipeline alignment to estimate timber removal. An estimate of areas adjacent to the pipeline was determined.
- **Right-of-Way Analysis:** The amount of the pipeline that will be constructed within ADOT&PF highway right-of-way was calculated. This analysis was used to determine the amount of heavier-walled pipe that would be needed. The project GIS allowed for modifications to the alignment if the project would be better served having the pipeline moved outside of the highway right-of-way.
- **Buoyancy Control Analysis:** The project GIS was also used to determine where the alignment crosses wetlands and would require some type of buoyancy control so that the pipe would not become unstable in wet areas. The amount of buoyancy control needed directly impacts the cost estimate. Total linear footage along the alignment where buoyancy control will be required was determined.

- **Alignment Sheet Generation:** The project GIS was used to create a set of alignment sheets that show the proposed alignment and the data applicable to the alignment.

A SharePoint website was initiated in 2010 to capture and maintain information developed by the project, as well as additional state and publicly available information that may contribute to the understanding of the project. The SharePoint site was further developed in 2011 to allow the multiple contractors and organizations working on the project to collaborate in a secure environment. The SharePoint site was used for peer review of the cost estimate reports and provided the tool to host a reading room for authorized parties to access information. The SharePoint site provided logs for tracking information that had been exchanged and provided to the project team members and cooperating agencies an information-request log supporting the EIS process.

A project web service was also developed for use by the third-party EIS contractors to ensure secure access to the most current and accurate information the project is using to develop the project plan, the design and cost estimate was available.

5.6 PROJECT CAPITAL COST

The previous capital cost estimates from July 2010 were used to support a broad range of options being considered.[51] That work formed the foundation for alternative commercial and market options analysis needed to help direct the project towards the preferred development option. Also, key environmental work was initiated as part of the NEPA and 404 permitting processes, and preliminary stakeholder engagement discussions were held. These activities were used to refine and further develop the scope of the project to be used for the expression of interest discussions with potential shippers and markets. As work progressed, it has been possible to be more focused with the capital cost development especially for the facilities, compared to the previous work.

This capital cost estimate, which is summarized in Table 5-5, provided the input for the cost-of-service modeling that was performed by the AGDC commercial team.

5.6.1 Pipeline Cost Development

The July 2010 capital cost estimate for the pipeline was based upon conceptual information for the project at that time. This included primarily a pipeline route, operating conditions, location of materials, estimate for preliminary/detailed design, construction crew and equipment estimates, construction support teams, and owner costs.

In the past year, AGDC selected a number of key areas of concern for additional near-term analysis including Atigun Pass, Yukon River, ADOT&PF bridge routing, Tanana River, and Denali National Park and Preserve. These areas were selected for analysis because of the need to progress the design and because these areas present greater levels of uncertainty for the development.

[51] *Alaska Stand Alone Gas Pipeline Project Update and FY 2010 Deliverables.* Presented to AGDC by the State of Alaska In-State Gasline Coordinator, July 15, 2010, Section 3.

As a result of this analysis, no additional routing or sizing issues warranted revised cost estimates. Consequently, the pipeline portion of the capital cost estimate has been updated for escalation and to reflect pipe availability and costs (see Section 3.1.1 of this project plan).

5.6.2 Facilities Cost Development

This section provides a summary of the engineering work done to support the cost estimates provided in Section 3.1.1 of this project plan. This work refined estimates provided to AGDC in July 2010 and involved a detailed peer review of the cost estimates.

5.6.2.1 Background

The conceptual design/specification work for the Stand Alone Gas Pipeline (SAGP) Project consisted of development of 20 individual facility cost-block packages (by DoyonEmerald), which were used as the initial basis for development of a conceptual cost-estimate package (by Larkspur). This approach of using cost-blocks applied to the facility specifications allowed flexibility for developing cost estimates for 16 different facility configuration and flow-rate cases, which included the combination of four different facility cost-of-transport scenarios at four different flow rates.

Table 5-5. Breakdown of Capital Costs (2011$)

PROJECT FACILITY	CAPITAL COST ($BILLION)
PROJECT CAPITAL COSTS	
Gas Conditioning Facility	$1.84
North Slope Pipeline Support Infrastructure	0.32
Compressor Station - MP 0	0.36
Pipeline – 24-inch Mainline	4.03
Compressor Station – MP 286	0.14
Pipeline – 12-inch Fairbanks Lateral	0.06
Fairbanks Straddle and Off-Take Facility	0.21
Cook Inlet NGL Extraction Facility	0.41
Additional Owner Costs	0.15
Total Project Capital Costs	$7.52

NON-PROJECT FACILITY	CAPITAL COST ($BILLION)
NON-PROJECT CAPITAL COSTS	
North Slope Joint Facilities	$0.22
De-Ethanizer & NGL Pumps	0.25
Pt. MacKenzie NGL Fractionation and Storage	0.48
Total Non-Project Capital Costs	$0.95

As described in Section 3.1.1, one of these original cases was chosen for review and for further design development and cost optimization for this project plan. This case is the original "Cost of Transport Scenario 4 – Enriched Gas" case at the 500 MMscfd flow rate and is now referred to as the "Base Case".

Eleven of these individual facility cost-block packages comprise this single design-development Base Case, and the optimized estimate is now divided into five main facility locations:

- North Slope Gas Conditioning Plant Facilities
- Fairbanks NGL Extraction Facilities
- Cook Inlet NGL Extraction Facilities
- Port MacKenzie Fractionation and Storage Facilities
- Pipeline Facilities – Compressor Station

These facility cost packages contain an overview, assumptions, process flow diagrams, computer model workbook printouts and material balance stream information, equipment layout drawings, and spreadsheets of major equipment specifications for input into the Larkspur cost model.

5.6.2.2 Optimized Facility Cost Estimates

In the past year, several steps were taken to further develop the cost estimates for the gas processing facilities. Process computer simulations were first made with the premised gas flow rates, compositions, conditions, and product specifications to define the major equipment requirements. This information was then used to determine primary equipment sizes and conduct preliminary layouts. Assumptions were made based upon historical norms from similar facilities to get approximations for much of the support equipment, piping, and area layouts that will not be directly engineered and estimated until later stages of the project. Estimates for owner and engineering costs to develop the facilities were also factored from the core information. The SAGP work included allowances for future expansions that are no longer needed.

To get the preliminary cost estimates, the information developed in the processing modeling was then put into an estimating computer simulation tool called Aspen-Tech Capital Cost Estimating (ACCE). This simulation provided estimates for equipment, bulk material pricing, and installation hours for direct labor hours. Quantities developed through ACCE were then reviewed and adjusted based upon preliminary layouts and benchmarking experience. This program, which has been adjusted with the estimating contractor's internal database of similar projects, developed quantities for all major construction areas, such as civil, structural steel, piping, insulation, instrumentation, electrical, and painting. For the North Slope facilities, the number of modules was determined and then used to estimate the number of barges needed to transport the modules from the assembly yards to the North Slope.

Since a wide range of items need to be factored off the few pieces of major equipment, the factors used have a significant impact on the final cost estimate results and their accuracy range. To help do a quality check (peer review), WorleyParsons was retained to compare the results against what they would expect using their criteria for early-stage engineering estimation (see Section 5.6.2.3 below).

The facilities are summarized below:

- **North Slope Gas Conditioning Facility and Compressor Station**: Covers removal of impurities e.g. carbon dioxide, hydrogen sulfide, water), the de-ethanizer (prepares C_3 and heavier stream for enriching the gas with NGLs), and compression (bring the gas up to pipeline operating pressure and chill the gas to avoid impacts on the permafrost).
- **Compressor Station:** Gas pressure drops as it moves along the pipeline. Depending upon flow rates, compressors are needed at key locations to keep the gas flowing at desired rates.
- **Fairbanks Straddle and Off-Take Facility:** Removes NGLs from the gas to make a utility-grade natural gas for domestic users in the Fairbanks area. NGLs are returned to the main pipeline.
- **Cook Inlet NGL Extraction Facility:** Removes NGLs from the gas to make a utility grade natural gas to be used by domestic users in the Wasilla, Palmer, Anchorage, Kenai, and nearby areas. NGLs are pumped through a small pipeline to Port MacKenzie for further processing.
- **Port MacKenzie Fractionation:** Takes raw NGL and splits it into several products and stores them pending distribution to markets. Products include propane for intra-Alaska usage, propane/butane (LPG) for international markets, and pentane and heavier hydrocarbons for international markets. (This facility is not part of the ASAP Project.)

5.6.2.3 Facilities Peer Review

AGDC contracted with WorleyParsons to provide an independent peer review, which was conducted from December 2010 to January 2011 to help validate the suitability of the conceptual facility design and projected cost estimates for ASAP facilities. Facilities reviewed included the proposed Gas Conditioning Plant (GCP) at Prudhoe Bay, compressor stations, the Straddle and Off-Take Facility near Dunbar, and the Cook Inlet NGL Extraction Facility at the pipeline terminus. Using the Base Case of 500 MMscfd of natural gas enriched with NGLs, the review was conducted by WorleyParsons staff experienced in project management, piping, electrical, rotating equipment, architectural, cost estimating, and logistics and construction. The staff was from WorleyParsons' Arctic Business Unit in Arcadia, California.

According to WorleyParsons, the ASAP Project is in the early stages of engineering definition and what is typically termed as preliminary front-end engineering design (pre-FEED), or the Appraise/Conceptual Stage (also known as FEL 1, the early phase of project definition). Conceptual engineering focuses on providing enough engineering definition to make informed strategic decisions about the project with the desired outcome of selecting the best options for the project to be further defined during FEL 2, when more detailed engineering is conducted, and the cost estimate is refined, followed by FEL 3 when the project definition and engineering are finalized.

This peer review was geared to help validate the conceptual facility designs and the appropriateness of the projected cost estimates for the conceptual facilities. The review was not an audit, and there were no detailed compliance checks against corporate procedures and processes for this project. The review specifically excluded a review of the pipeline or review of any project execution plans or schedules.

WorleyParsons found that ASAP engineering definition is consistent with pre-FEED and is appropriate for a project still in the FEL 1 phase. Based upon the conceptual level of engineering detail contained in the cost blocks for the Base Case, the cost estimating methodology is appropriate for the estimating level of accuracy at this stage of the project. Cost metrics calculated fall within acceptable ranges based on current and historic data.

6. ENVIRONMENTAL, REGULATORY, AND LANDS (ERL) ANALYSIS

6.1 INTRODUCTION

Important activities for ensuring the success of the ASAP Project include developing a baseline environmental profile of the project route, obtaining an environmental impact statement (EIS) Record of Decision (ROD), and identifying impacts to landowners. This section summarizes the work to date on environmental, regulatory, and lands (ERL) issues associated with the project. Planned work in the next phase of the project includes completing the fieldwork necessary to establish the baseline, progressing the preliminary draft EIS to a final EIS, and completing title work on state, federal, and private land parcels.

6.2 ENVIRONMENTAL FIELD WORK

The following environmental field work was completed in 2010 to support the ASAP Project:

- Cultural resources survey and sensitivity model.
- Wetlands survey and evaluation.
- Stream crossing surveys for fish and fish habitat.
- Water resources availability studies.
- Air monitoring program preparations.

6.2.1 Cultural Resources Survey and Sensitivity Model

Cultural resources survey work began in 2008 with a desktop study of the baseline characteristics of cultural resources. In 2009, known sites were inventoried using the Alaska Heritage Resources Survey (AHRS) database, and an evaluation of the route in preparation for fieldwork was completed. This evaluation included an aerial and vehicular survey to acquire preliminary impressions of the project area and to aid in developing a cultural resources sensitivity model — a dynamic tool that will be modified as additional information is obtained. The model will help identify areas of high, medium, and low probability for archaeological sites.

Fieldwork in 2010 was developed around testing the model. Seventy-five miles of the proposed ASAP route were surveyed in 2010 (Figure 6-1). Survey areas were as far north as Happy Valley on the North Slope and Trapper Creek in Southcentral Alaska. In 2011, an additional survey of an estimated 300 miles of the proposed pipeline route is planned, which will satisfy the survey requirements of most, if not all, of the alignment south of Livengood, including the Fairbanks Lateral. Ancillary facilities, staging areas, material sites, and access roads will be evaluated as they are identified.

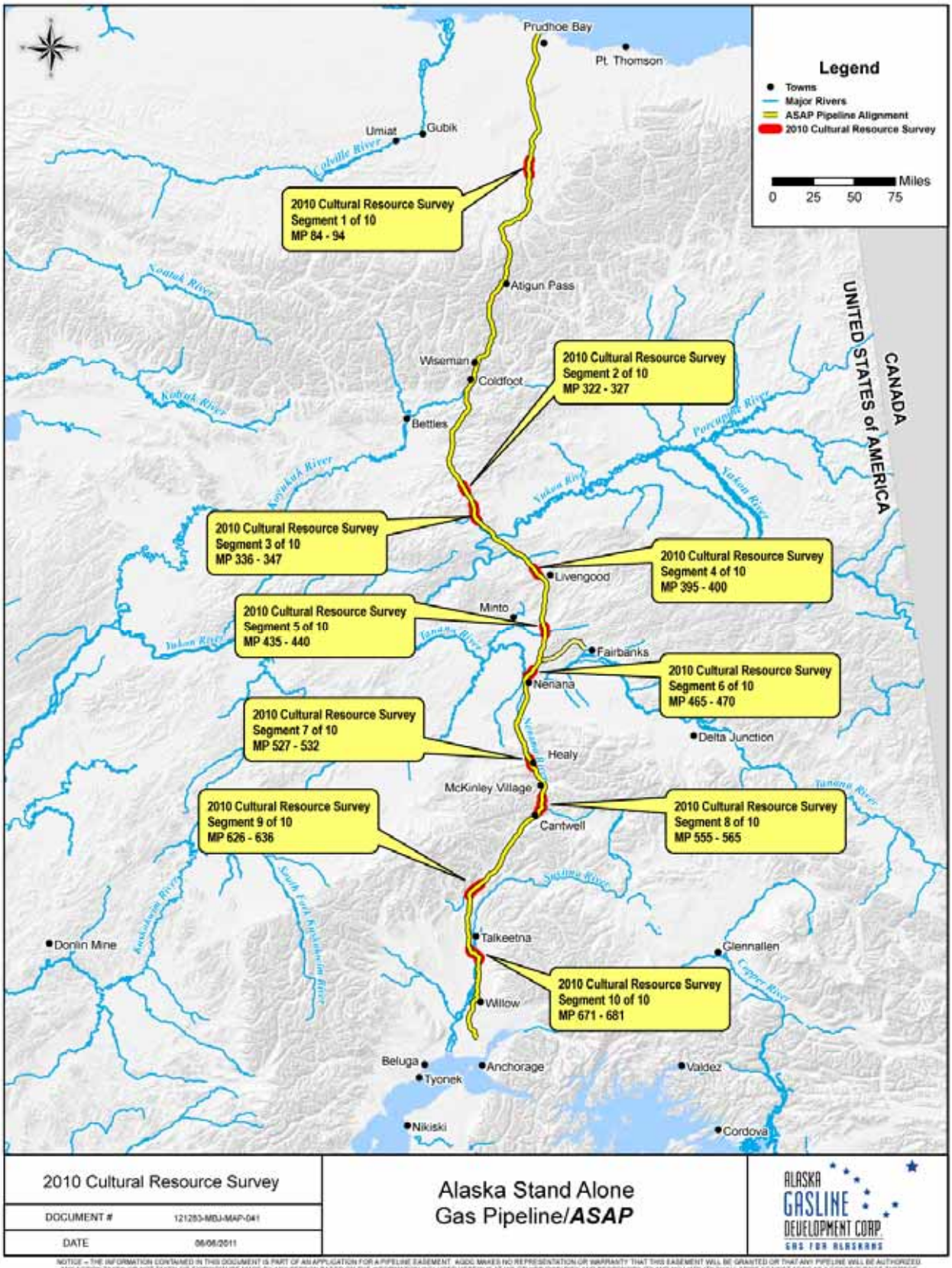

Figure 6-1. 2010 Cultural Resource Surveys

The following reports have been completed:

- **2010 Cultural Resources Technical Report for the Alaska In-State Gas Pipeline Project – April 2010:** The report describes the 2009 reconnaissance surveys and contained a brief literature review, description of known historic properties and cultural resources within the proposed corridor, and preliminary description of the predictive model.
- **Letter report to Ahtna, Inc. – October 2010:** Report describes the cultural resource investigations on Ahtna, Inc. land near Cantwell.
- **Letter report to the Alaska Railroad Corporation – October 2010:** Report describes the cultural resource investigations on ARRC land near Healy.
- **Letter report to Doyon, Limited – October 2010:** Report describes the cultural resource investigations on Doyon, Limited land near Nenana.
- **NSB Completion Report – September 2010:** Report describes the activities completed on North Slope Borough lands and documents adherence to borough stipulations.
- **Report of 2010 Cultural Resource Surveys on BLM Land – April 2011:** Report describes the cultural resource investigations on federal Bureau of Land Management (BLM) lands north of the Yukon River, fulfilling the obligations of Archaeological Resources Protection Act (ARPA) permit AA-92454.
- **Cultural Resource Report for the 2010 Field Season – March 2011:** The report describes the results of the 2010 reconnaissance surveys, provides a brief literature review, and describes known historic properties and cultural resources in the ASAP corridor.

Table 6-1 summarizes reported sites within or near the ASAP right-of-way.

Table 6-1. Reported Sites Within or Near the ASAP Right-of-Way

SITE TYPE	REPORTED SITES WITHIN 300-FT AREA OF POTENTIAL EFFECT	REPORTED SITES WITHIN 1 MILE OF PROPOSED ROUTE	REPORTED SITES WITHIN 5 MILES OF PROPOSED ROUTE
Historic/Modern Sites	4	6	7
Historic Sites	16	124	390
Prehistoric Sites	21	239	434
Proto-historic/Historic Sites	2	8	26
Unknown	2	45	161
Total	45	422	1,019

Source: *2010 Cultural Resources Technical Report,* ASRC Energy Services.

6.2.2 Wetlands Survey

During the 2008 field season, 71 potential wetland areas within the 300-foot-wide field survey corridor from Prudhoe Bay to Livengood and Healy to Willow were evaluated, all by road access (Figure 6-2). Site-specific information was documented on the standard U.S. Army Corps of Engineers (USACE) wetland data form. Each time a different wetland type was encountered, detailed data was gathered to provide a greater understanding for selection of potential wetland locations to be visited during the following field season. After the field season, a wetland assessment report was provided to the USACE.

In 2009, 152 field targets were identified and field-verified through the Minto Flats State Game Refuge to Healy using aerial photo data and information gained from the previous year. All remote areas were accessed by helicopter. The 2009 field work was completed in two phases: by ground transportation adjacent to the Parks Highway between Nenana and Healy, and by helicopter through the Minto Flats State Game Refuge between Livengood and Nenana. Following the field season, a wetland assessment technical report was provided to the USACE and State of Alaska.

During the 2010 field season, approximately 400 field targets were visited or observed over the entire corridor from Prudhoe Bay to Point MacKenzie in five trips. Table 6-2 describes the survey effort.

The Preliminary Jurisdictional Determination (PJD) was submitted to the USACE in March 2011, providing the information necessary to confirm wetland locations and to identify wetland areas needing additional information (data gaps) before the USACE makes a final wetland Jurisdictional Determination (JD). Wetland data gaps should be filled in 2011 to progress issuance of a JD and to support Section 404/10 permitting.

Data gaps for portions of the route where the alignment has been changed and along the Fairbanks Lateral will be surveyed in July and August 2011.

Table 6-2. 2010 Wetlands Surveys

SURVEY TRIP	LOCATION	DATE OF SURVEY	SITES SURVEYED
Trip One	Parks Highway Willow to Healy Fairbanks Lateral Point MacKenzie remote areas	May 17 – 25	135
Trip Two	Elliot and Dalton Highways from Fairbanks to Atigun Pass	June 22 – 28	105
Trip Three	Dalton Highway from Atigun Pass to Prudhoe Bay	July 8 – 16	105
Trip Four	Livengood section	July 26 – July 28	15
Trip Five	Denali Park section	August 11 – 16	39

Source: *March 2011 Wetlands PJD*, ASRC Energy Services.

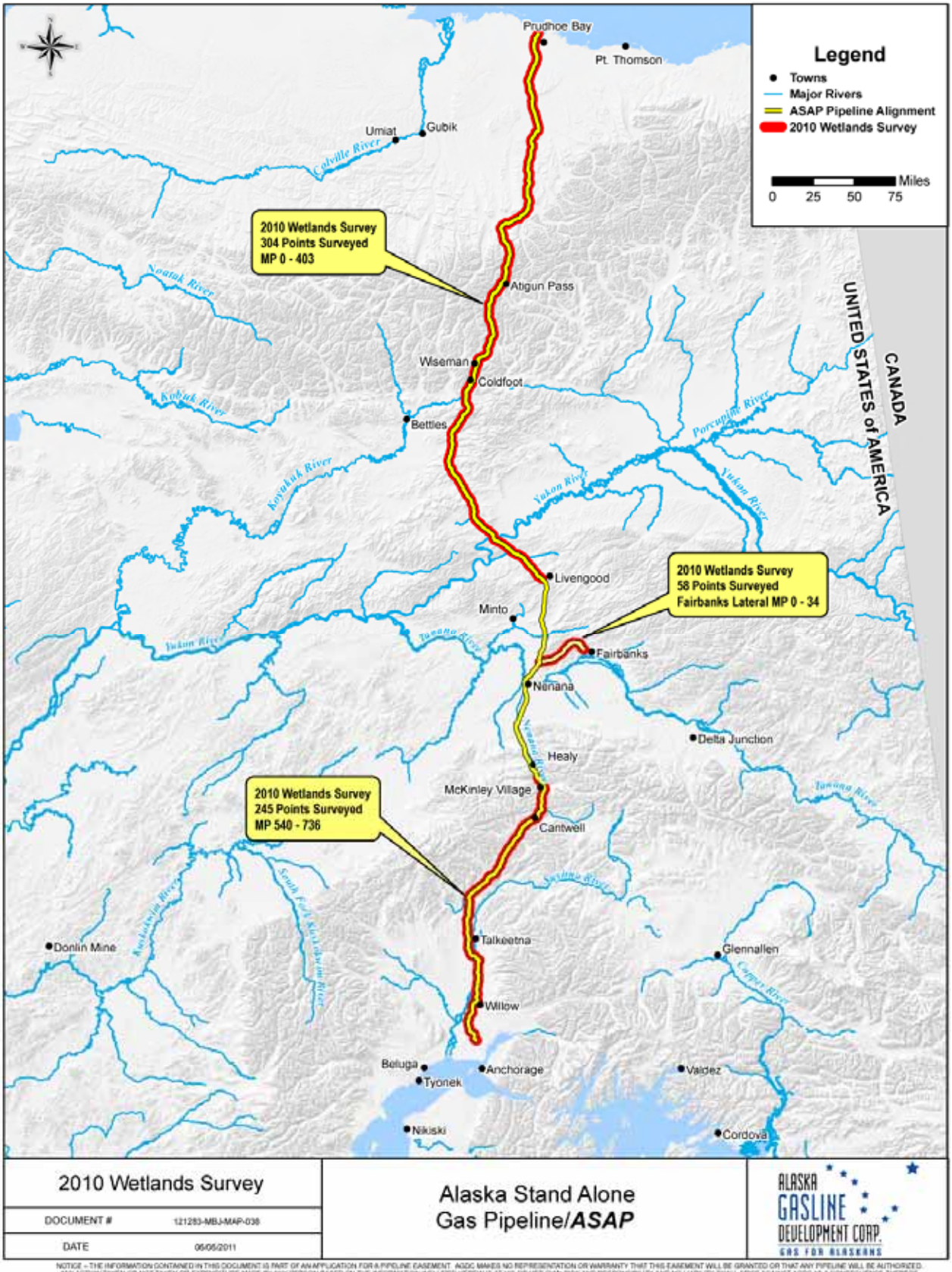

Figure 6-2. 2010 Wetlands Survey

6.2.3 Stream Crossing Surveys for Fish and Fish Habitat

In 2010, stream crossing surveys for fish and fish habitat were conducted on 174 streams crossed by the ASAP route from Point MacKenzie to Livengood (Figure 6-3). A desktop analysis was conducted in advance of the surveys to map the crossings and to determine which streams were considered anadromous by the Alaska Department of Fish and Game (ADF&G). Completion reports were sent to the land manager and landowners who granted permits to survey the crossings. A fish collection report has been submitted to ADF&G that includes data on the fish collected. A completion report has also been submitted to ADF&G describing the data used, field methods, and results from the studies. The fieldwork data was compiled and submitted for inclusion in the project database to support engineering feasibility studies and to support the EIS. Table 6-3 describes the results of the 2010 effort.

Major deliverables include:

- **North Slope Borough Completion Report – September 2010:** This report documented activities completed to meet the borough permit stipulations.
- **Ahtna Inc. Report of Activities – October 2010:** This report documented activities conducted on Ahtna Inc. lands during the 2010 field season.
- **AGDC Candidate Stream Anadromous Catalogue Nominations – October 2010:** This letter to ADF&G provided information on streams that met the criteria for nominations to the Anadromous Waters Catalogue.
- **Project Data and Metadata – October 2010:** This contains field data for the ASAP Project database to support of engineering feasibility studies and the EIS.
- **AGDC Fish Resource Permit SF2010-178, Collection Report/Data Form – December 2010:** This ADF&G form was completed with 2010 stream survey data on the fish collection effort on streams from Point MacKenzie to Livengood that crossed the ASAP.
- **2010 Stream Crossings Survey: Fish Resource Permit SF2010-178, Completion Report - April 2011:** This report documented the methods and means used during the 2010 stream surveys conducted from Point MacKenzie to Livengood that crossed the ASAP route.

Table 6-3. 2010 Stream Crossing Surveys

SURVEY TRIP	LOCATION	DATE OF SURVEY	SITES SURVEYED
1	Willow Creek to Cantwell	July 8 –14	Stream crossings between MP 443 and 348
2	Cantwell to Nenana	July 15 – 16	Stream crossings between MP 325 and 327
3	Minto Flats State Game Refuge to Livengood: off-road helicopter access	July 17 – 22	Stream crossings between MP 326 and 283
4	Susitna Flats and Point MacKenzie Remote Areas	July 27	Stream crossings between MP 446 and 455

Source: 2010 Stream Crossing Survey Completion Report and 2010 Stream Crossing Survey Collection Report, ASRC Energy Services Alaska, Inc.

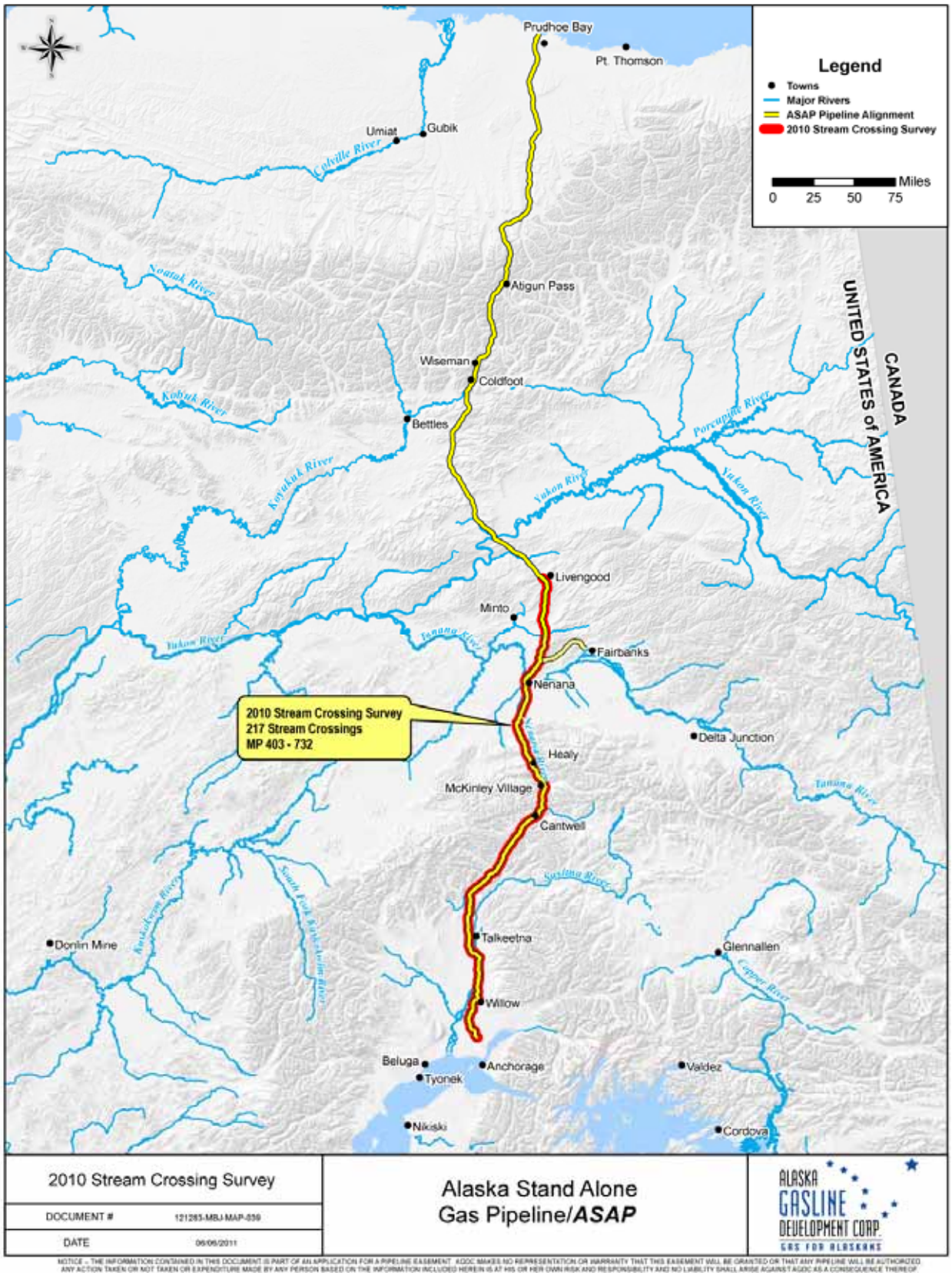

Figure 6-3. 2010 Stream Crossing Surveys

6.2.4 Water Resources Availability Studies

In 2010, a desktop study of the alignment in the North Slope Borough was conducted to identify existing water availability data sources and to coordinate with ADF&G and Alaska Department of Natural Resources (DNR) requirements for temporary water-use permits. This information helped focus the field effort to those potential water sources that could be tapped for construction and operation water needs. The lakes identified during the desktop analysis were mapped and studied according to their proximity to the route and their potential for water withdrawal. The field studies were completed for 31 lakes along the ASAP route (Figure 6-4). For the entire pipeline route, construction activities including ice roads/pads, hydro-testing, and earthwork were segregated into four construction spreads, and the lakes studies yielded estimates of water resources to cover the first of four spreads.

A total of 44 lakes were preselected during the desktop analysis for field investigation. Two crews of biologists studied 31 of the 44 candidate lakes over an 11-day period in July 2010. Approximately 575 million gallons of water were estimated to be available for withdrawal from the lakes studied for winter use for ice roads and pads, hydro-testing, and earth work between Prudhoe Bay and Atigun Pass.

Deliverables completed include:

- **North Slope Borough Completion Report – September 2010:** This report documented the activities completed to meet borough permit stipulations.
- **2010 Lake Studies: Fish Resource Permit #SF2010-179, Collection Report/Data Form, November 2010:** This ADF&G data form was completed to document the fish observed or collected from the lakes studied in 2010.
- **2010 Lake Studies: Fish Resource Permit #SF2010-179, Completion Report, March 2011:** This report documented the methods and means used to complete the lake studies and the water volumes and recommended water withdrawals for each lake studied.
- **Project Data and Metadata – October 2010:** This contains field data for the ASAP Project database to support of engineering feasibility studies and the EIS.

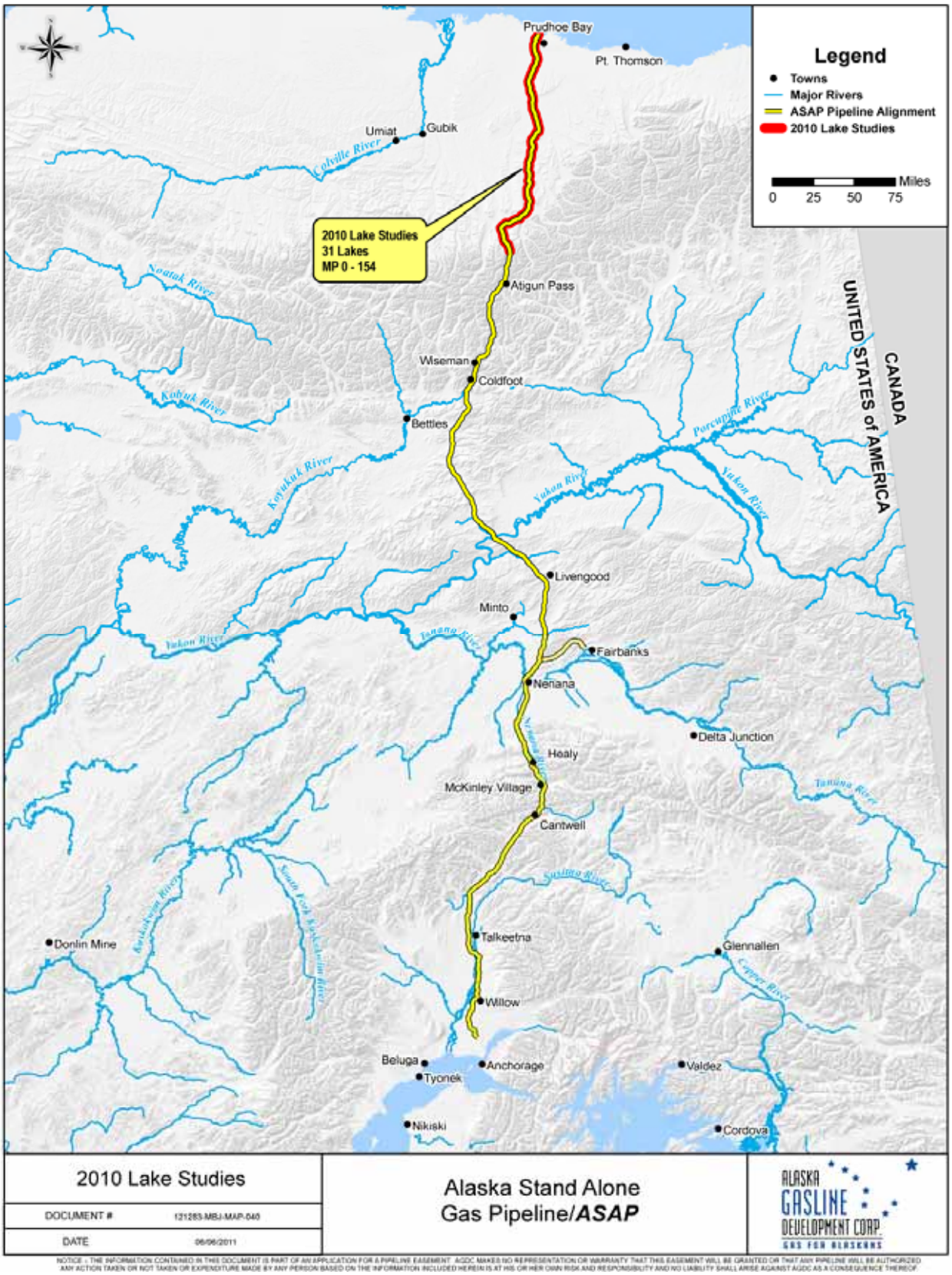

Figure 6-4. 2010 Water Resources Availability Studies

6.2.5 Air Monitoring Program Preparations

Evaluation of air monitoring sites was completed in April and May 2011. Site access and pad preparation, site construction, and monitoring station installation and calibration will occur in the summer of 2011. Monitoring data will be collected for 15 consecutive months once monitoring stations become operational. During the data collection period, quarterly quality assurance/quality control (QA/QC) audits of each monitoring station will be performed. From July through December 2011, up to six months of data collection will be completed and one quarterly audit will be performed on each monitoring station, depending on installation and calibration. Critical path items through June 30, 2011, include funding procurement of monitoring equipment and actual construction, installation, and calibration of monitoring stations.

Deliverables completed include:

- **Air Quality Preconstruction Permit Planning – February 2011:** This document detailed the permit planning needed for the project facilities in order to meet air quality monitoring regulations.

Table 6-4 describes air monitoring program activity for the ASAP Project to date.

Table 6-4. Air Monitoring Program Activity 2011

ACTIVITY		TIME PERIOD 2011
Preconstruction	Field Verification of Potential Monitoring Sites Civil Engineering Evaluation of Selected Monitoring Sites Preparation and Submittal of Land Use Permit Applications	March – May May – June May – June
	Quality Assurance Project Plan Preparation and Submittal to Alaska Department of Environmental Conservation (ADEC) for Approval	February – May
	Review and Evaluation of Existing Monitoring Data from BP's Prudhoe Bay Facilities for Determination of Air Permitting Feasibility and Additional Monitoring Requirements	May
Construction	Monitoring Equipment Procurement	May – July
	Monitoring Equipment Fabrication and Assembly	June – July
	Monitoring Site Preparation and Construction	July – September
	Monitoring Station Installation and Equipment Calibration	July – September
Operation	Monitoring Data Collection	July – December
	Monitoring Station Bi-weekly Site Checks	July – December
	Monitoring Network Systems Audit	September – November
	Monitoring Station Quarterly QA/QC Audit	October – December

6.3 REGULATORY AND PERMITTING STRATEGY

6.3.1 Permit Acquisition Plan

AGDC developed a permit acquisition plan to identify the necessary permits and develop a timeline for obtaining them. The permit acquisition plan is updated periodically. Permits were categorized in three "tiers" based on when applications should be submitted and their relative importance. Table 6-5 contains a summary of the permits required for the ASAP Project and their status.

- **Tier 1 Permits:** Permits or permit applications that trigger other activities, such as National Environmental Policy Act (NEPA) review, or which are long-lead items. Total project time may be reduced by starting these activities early in project planning. Tier 1 permit applications include the following:
    - Application for federal pipeline grant of right-of-way from the Bureau of Land Management (BLM).
    - Application for a State of Alaska pipeline right-of-way lease.
    - Application for permit from the USACE under Sections 404 of the Clean Water Act and Section 10 of the River and Harbors Act.
- **Tier 2 Permits:** Those permits not required to kick off the NEPA process but may require several months to develop data for inclusion in the permit applications or for agency review. Tier 2 permits include permits for water use, air emissions, water discharges, and local zoning.
- **Tier 3 Permits:** Permits that are less time-sensitive or may be required late in the permitting process. Some permits necessary for operation of the pipeline may be included in Tier 3 permits because they do not need to be in place until immediately before operation, allowing the application to be completed and regulatory review to take place during construction.

6.3.2 Agency Coordination

Coordination with federal, state, and local regulatory agencies is required for the permitting process and to assist with the NEPA process and preparation of an EIS. It is AGDC's policy to engage with agency personnel early and often to:

- Make sure agency personnel understand the proposed project.
- Identify issues and concerns about the project early, allowing them to be addressed as the project progresses without delaying the permitting process.
- Obtain information from agency personnel to maximize the efficiency of field data collection efforts and make sure the data collected is of sufficient type and quality so that agency personnel can evaluate the potential environmental effects of the project.
- Make sure that permit applications and supporting documents provide all the information necessary to evaluate the permit application and issue a timely permit.

Table 6-5. Summary of Required Permits

AGENCY	PERMIT TYPE	AGENCY CONSULTATION	COMMENTS	EXPECTED ISSUANCE[1]
Tier 1 Permits				
BLM[1]	Federal Pipeline Right-of-Way Grant	Ongoing consultation	Original submittal November 2009 Resubmitted March 2011	First Quarter 2012
DNR	State Pipeline Right-of-Way Lease	Ongoing consultation	Original submitted November 2009 Resubmitted March 2011	July 2011
USACE[1]	Section 404 of the Clean Water Act – for discharges into wetlands and waters of the U.S.	Ongoing consultation	Draft submittal November 2009 Final submittal dependent on Jurisdictional Determination (JD)[2]	First Quarter 2012
USACE[1]	Section 10 of the Rivers and Harbors Act – for obstruction to navigable waters	Ongoing consultation	Application is included in Section 404 permit application	First Quarter 2012
Tier 2 Permits (long-lead items)				
USCG[1]	Section 9 Bridge Permit	Ongoing consultation	Application submittal date based upon available data and agency requirements	January 2012
DNR	Alaska Coastal Management Program (ACMP) Coastal Consistency Determination[3]	March 2011 – June 2012	Phased review as per AS 46.40	October 2012
	Permit to Appropriate Water	March 2011 – June 2012	Multiple application packages for various water sources will be submitted. Extensive field studies (~1-2 years) required support applications.	Prior to construction start
	Temporary Water Use Permit	March 2011 – June 2012		
ADEC	Alaska Pollution Discharge Elimination System (APDES) Permit	March 2011 – June 2012	Application submittal date based upon available data and agency requirements	October 2012
ADF&G	Fish Habitat Protection Permits	Ongoing consultation	Multiple application packages for various water bodies will be submitted.	October 2012
ADEC	Prevention of Significant Deterioration – for emissions into air as authorized under the Clean Air Act	Ongoing consultation	Application submittal date based upon available data and agency requirements	October 2012
ADOT&PF	Utility Permit – for construction or installation of utility facilities within an ADOT&PF right-of-way	Ongoing consultation	Application submittal date based upon available data and agency requirements	October 2012
Local	Local Land Use and/or Zoning Permits	March 2011 – June 2012	Multiple application packages expected	October 2012
Supporting Activities for Major Permits				
AGDC has developed a Plan of Development (POD) that describes the proposed activity to support the EIS and NEPA process. The latest version (POD, Rev. 1) was submitted to agencies in March 2011. AGDC is meeting with Tier 2 agencies to discuss major permitting issues (material sites, stream crossings, water use, land use) March – July 2011.				

NOTES:

(1) EIS is required under NEPA. A Record of Decision is based upon the completed EIS and must be published prior to issuance of any federal permits.

(2) AGDC has developed and submitted a Preliminary Jurisdictional Determination document to USACE to provide USACE with information from field studies on locations that met the criteria for wetlands and are therefore potentially subject to USACE jurisdiction. Additional information will be gathered and submitted in 2011. Based upon this data, USACE will issue a Jurisdictional Determination.

(3) The ACMP has not been renewed by the State of Alaska. Direction regarding what actions, if any, are necessary will be obtained from DNR representatives.

It is important to keep in mind that it is to the applicant's benefit to make sure that agencies have all necessary information to provide a permit for the proposed activity. Not providing necessary information in a timely manner may delay permits, which could delay the project.

6.3.2.1 Pre-Application Meetings

Pre-application meetings are held between the applicant (AGDC) and representatives of the agencies where permit applications will be submitted. These meetings allow the applicant to describe the proposed project and the agency representatives to ask questions and explain the information they will need in the permit application.

AGDC held a pre-application meeting with BLM, the State of Alaska, and the USACE in July 2010 regarding Tier 1 permit applications. Another pre-application meeting was held in October 2010 with additional agencies and organizations including the ARRC, ADF&G, U.S. Environmental Protection Agency (EPA), ADOT&PF, Matanuska-Susitna Borough, BLM, USACE, and multiple divisions within DNR. AGDC will continue to work with agencies prior to submitting Tier 2 permit applications to make sure that agencies have sufficient information to evaluate applications and issue permits.

6.3.2.2 Requests for Additional Information

Upon submittal of permit applications, AGDC welcomes comments and questions from agency personnel, referred to as requests for additional information (RFAI). If possible, it is helpful to sit down with agency personnel to discuss the comments and make sure everyone knows the level of detailed information needed. This also provides the opportunity for agency personnel to inform AGDC about any deadlines and for AGDC to inform agencies about when information will be available. RFAIs are responded to quickly to prevent a delay in the permitting process. RFAIs will be tracked on the RFAI log included in the AGDC SharePoint site, and RFAIs associated with the permit applications are also included in the permit application tracking system.

6.3.2.3 Informal Communication

One of the most effective ways of communicating with agencies is to develop a cooperative relationship with agency personnel. Many issues that could develop into roadblocks can be identified early and addressed as part of the permitting process, making it easier for the issues to be dealt with to the satisfaction of both the applicant and agency.

Often the most effective way of communicating is by e-mail, phone, or simply sitting down together and discussing an issue. It is important when engaging in informal communication to keep a record of what was agreed upon, so that the source and context of any decisions can be determined if necessary in the future.

6.3.3 Plan of Development

AGDC prepared a Plan of Development (POD) to support the planning and development of the ASAP Project. The POD, which was developed to support permit applications and the preparation

of the required NEPA documents, provides the majority of information required to evaluate permit applications, including a detailed project description. The POD is described in more detail in Section 5.3 of this project plan.

By providing a detailed project description in a single document, AGDC eliminated risk that project details developed to respond to various permit applications or agency RFAIs will provide conflicting or outdated information, and assures the reader that the information provided is accurate as of the date of publication.

6.4 PERMIT STATUS

6.4.1 State Right-of-Way Permit Application

An application for a state pipeline right-of-way lease was originally submitted to the State Pipeline Coordinator's Office (SPCO) in November 2009 with ADOT&PF as the applicant and Harry Noah as the authorized agent. AGDC submitted a revised application with additional information in the form of the POD in August 2010.

In March 2011, AGDC submitted Revision 1 of the POD to the SPCO in response to SPCO and other agency questions and comments. AGDC met with SPCO personnel to review the available information and produce a revised application sufficient to answer all SPCO questions. Public hearings were held in Fairbanks, Barrow, Healy, Cantwell, Nenana, Willow, and Anchorage. The public comment period closed on May 27, 2011. The lease was signed in late June 2011.

6.4.2 Federal Right-of-Way Permit Application

An application for a federal grant of pipeline right-of-way was originally submitted to the BLM in November 2009 with ADOT&PF as the applicant and Harry Noah as the authorized agent. AGDC submitted a revised application with additional information in the form of the POD in August 2010.

In March 2011, AGDC submitted Revision 1 of the POD and a revised application with additional information to BLM in response to BLM and other agency questions and comments. Because BLM is a federal agency, the NEPA process must be completed and a Record of Decision (ROD) issued before the right-of-way may be granted. This is expected to occur in January 2012.

6.4.3 USACE Section 404 Application

A draft application for a permit for placement of fill or dredged material into waters of the U.S., including wetlands under Section 404 of the Clean Water Act, was originally submitted to the USACE in November 2009. The original applicant was ADOT&PF and Harry Noah was the authorized agent. AGDC submitted a revised draft application with additional information in the form of the POD in August 2010.

A Preliminary Jurisdictional Determination (PJD) was submitted to the USACE in March 2011. The PJD describes the results of initial wetland classifications determined through preliminary

desktop analyses, and the results of wetland field surveys performed during 2008, 2009, and 2010 to verify the desktop analyses. The purpose of the PJD is to provide the USACE with information sufficient to allow the USACE to make a Jurisdictional Determination (JD) about types, areas, and length of wetlands affected by the ASAP.

Upon receipt of the JD, AGDC will be able to develop and submit a complete permit application based upon the area of wetlands determined to be affected by the JD. Because the USACE is a federal agency, the NEPA process must be completed and a ROD issued before the Section 404 permit may be issued, which is expected to occur in January 2012.

6.4.4 Environmental Impact Statement

On December 4, 2009, the USACE, as lead agency, published a Notice of Intent to prepare an EIS to identify and analyze the potential impacts associated with construction of the proposed ASAP Project. As described above, a draft application for a permit for placement of fill or dredged material into waters of the U.S., including wetlands under Section 404 of the Clean Water Act, was originally submitted to the USACE in November 2009 and triggered the preparation of the EIS, which is to be used as the basis for the permit decision to ensure compliance with NEPA. The EIS will fulfill the NEPA responsibilities of those federal agencies requiring decisions or actions such as the right-of-way grant and other permits.

The USACE selected a third-party EIS contractor, Cardno ENTRIX to prepare the EIS and to facilitate the scoping process. The EIS will include the purpose and need for the proposed project, an analysis of a reasonable range of alternatives that meet the purpose and need, a description of the affected environment, and an analysis of the environmental consequences of the alternatives. The draft EIS is expected to be available in September 2011, and the final EIS and the ROD issued in January 2012.

The EIS scoping process began on December 7, 2009, and ended on March 31, 2010. The USACE held scoping meetings in Anchorage, Barrow, Delta Junction, Fairbanks, Glennallen, McKinley Park, Nenana, and Wasilla. The objectives of the scoping process were to identify potentially interested parties, identify public and agency concerns, define the range of issues to be examined, ensure that relevant issues are identified early and addressed in the EIS analysis, and to establish a public administrative record.

6.4.5 Biological Assessment Required by the Endangered Species Act

According to 50 CFR 402 et seq., any project with a federal nexus such as the ASAP Project must consult with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) to ensure that the action is not likely to jeopardize the continued existence of any species listed under the Endangered Species Act (ESA) or result in adverse modification of critical habitat. Since threatened and endangered species have been identified by NMFS and USFWS as likely to occur in the project area, AGDC submitted a Biological Assessment. Because AGDC was designated by USACE as the “non-federal representative”, AGDC contractors were able to consult with the agencies directly. The Biological Assessment is an analysis of the potential impacts caused by the ASAP on any ESA-listed species and/or that species’ designed critical habit.

Based upon their review of the Biological Assessment, USFWS and NMFS may agree or disagree with the results presented. They will develop a Biological Opinion identifying if the proposed action is likely to adversely affect ESA-listed species or critical habitat, using the Biological Assessment as the basis. If the proposed action is likely to adversely affect ESA-listed species or critical habitat, a formal Section 7 consultation (Section 7 of the ESA) will be initiated. The Biological Opinion developed and issued by USFWS and NMFS will include a "no jeopardy opinion" or a "jeopardy opinion."

For most species evaluated, the determination of effect was "may affect, but not likely to adversely affect" or "no effect". For four species (i.e., spectacled eider, polar bear and polar bear critical habitat, ringed seal, and bearded seal), the determination of effect was "likely to adversely affect." Appropriate measures will be developed to mitigate the negative impacts of the project on these four species. ASAP activities and timeline are not expected to be significantly affected by these determinations.

6.4.6 Regulatory Commission of Alaska Certification

The Regulatory Commission of Alaska (RCA) is authorized to regulate public utilities and pipeline ensuring owners are qualified providers of public utilities and pipeline services to ensure that facilities are safe and that services are provided at reasonable rates, terms, and conditions. A certificate from RCA will be required prior to construction and operation of the ASAP Project.

6.4.7 Other Permits

No other permits have been submitted for agency review. AGDC personnel have been discussing what information must be included in permit applications with agency personnel and have been developing permit applications. Upon determination that sufficient information is available to provide complete applications, the relevant applications will be submitted for agency review.

6.5 LANDS

6.5.1 Easements on Private Land

Before construction can begin, agreements must be obtained from public and private landowners, leaseholders, and Native allottees, and other parties that hold interests in the land that the ASAP route crosses. The state and federal governments are also major landowners along the route. Upon determination of the final alignment and construction right-of-way, a survey and complete title verification will be performed to identify the number of parcels and land ownership.

6.5.2 State Right-of-Way

The SPCO has processed the AGDC right-of-way application for state lands along the proposed route, in accordance with guidance in House Bill 369. The SPCO and AGDC negotiated the terms of the right-of-way lease, including updated environmental and technical stipulations. The SPCO completed a 60-day comment period and conducted seven public hearings and one public meeting on the right-of-way application. In addition, the DNR Division of Coastal and Ocean Manage-

ment conducted an Alaska Coastal Management Program consistency review of the right-of-way lease, and the ACMP consistency determination was issued in June 2011. All comments, a copy of the lease, and other related documents are available for review on the SPCO website.[52] The right-of-way lease was signed in late June and transfers an interest in land for 30 years, with the option for renewal.

The annual rental for state lands will be an estimated $188,600 (based on appraisal information for the Trans Alaska Pipeline System). The Lessee will be required to conduct an appraisal at five-year intervals, and rental amounts will be based on fair market value. The ASAP pipeline will cross approximately 427 miles of state land, and a title report is planned for 2011 to verify the ownership of the right-of-way.

This lease is the first non-conditional pipeline right-of-way granted by the State of Alaska for the purpose of transporting natural gas from the North Slope to market, and will likely be perceived as a significant milestone and increase project interest and confidence among potential shippers and developers.

6.5.3 Federal Right-of-Way

After publication of the final EIS, the BLM will prepare its Record of Decision and issue the federal grant of right-of-way. AGDC is working closely with the BLM and the SPCO to ensure that the environmental and technical stipulations will be consistently applied on state and federal lands.

[52] See http://dnr.alaska.gov/commis/pco/agdc.htm.

7. STAKEHOLDER ENGAGEMENT

The purpose of AGDC's Stakeholder Engagement Plan is to identify the tasks and schedule for outreach activities to support project communication needs, including AGDC's participation in the formal regulatory permitting, consultation, and EIS activities led by the U.S. Army Corps of Engineers (USACE). AGDC's goal is to develop and build long-term relationships with all Alaskan people, communities, and entities along the ASAP route.

Stakeholders as referred to in this document may include: Alaska Natives, citizens, organizations, regulators, residents of affected communities along the project pipeline route, local energy distribution companies, utility providers, businesses and industry, landowners, and community representatives, local government authorities, non-governmental, and other civil society organizations, local institutions, and other interested or affected parties.

The benefits of the stakeholder engagement plan include improved risk management, cooperation, and alignment of interests among all parties. Effectively managing the project stakeholder program ensures more positive project outcomes through all phases of the project and improved relations with all interested and affected parties along the pipeline route.

The principles of AGDC's stakeholder engagement plan are as follows

- Engage stakeholders early.
- Provide stakeholders with information that increases understanding.
- Provide stakeholders with multiple opportunities to comment and learn about the project
- Obtain and incorporate meaningful input into the project field work (design, construction and operation).
- Develop collaborative relationships with impacted groups to allow effective and meaningful dialogue.
- Treat all stakeholders respectfully.
- Maintain professional behavior in all project relationships.

7.1 PLAN APPROACH

The plan guarantees engagement as an integral piece of all AGDC internal and external processes. The integrated approach of the stakeholder plan ensures consistent message delivery and efficient use of staff and resources. The plan includes goals and objectives, a definition of terms and assumptions, engagement strategy, key issue and mitigation measures, communication tactics, and a description of potential community opportunities for economic investment. The plan also supports the project purpose and definition and encourages open dialogue with the people of Alaska.

7.2 STAKEHOLDER OUTREACH

AGDC is committed to ensuring stakeholders have a continuing opportunity to provide comment through all phases of the project. AGDC reinitiated engagements with communities in 2010. Engagements have occurred in the communities of Anchorage, Barrow, Cantwell, Fairbanks, Healy, Kenai, Healy, Minto, Nenana, Wasilla, and Willow. AGDC believes ongoing engagement provides a valuable opportunity to educate the public while validating a positive tone with stakeholders. The project maintains a stakeholder calendar which is updated regularly. The objective for stakeholder planning is to establish a schedule for engagements that is in sync with other community meetings in order to attract the greatest number of attendees and educate the communities at large on the project status.

In 2010 and 2011, the stakeholder engagement process was limited due to staffing and resources. Despite our attempts to meet with all stakeholders in 2010 and2011, the schedule and timing of engagements was compressed. In 2011, AGDC increased the effort on stakeholder engagement to begin educating the public about the ASAP project. AGDC developed a community engagement calendar to schedule and post the meeting schedule. As meeting dates were confirmed, AGDC developed mailers and posters to notify communities of the upcoming meetings. Meeting mailers were also sent to residents in the stakeholder database. Figure 7-1 provides a sample of web calendar postings.

The State Pipeline Coordinator's Office will be holding public hearings along the proposed route for the ASAP project. As the lease applicant, members of the ASAP project team will be on hand at the public hearings to give a brief project overview. These community meetings include information sharing, refreshments and door prizes.

- **Fairbanks: May 3, 6 – 8pm**
  Civic Center – Exhibit Hall
- **Barrow: May 4, 5:30 – 7:30pm**
  Inupiat Heritage Center
- **Nenana: May 9, 5:30 – 7:30pm**
  Nenana Public School
- **Healy: May 10, 5:30 – 7:30pm**
  Tri-Valley School
- **Cantwell: May 11, 5:30 – 7:30pm**
  Cantwell School
- **Willow: May 16, 6 – 8pm**
  Community Center
- **Wasilla: May 17, 5:30 – 7:30**
  Wasilla High School, Commons Area
- **Anchorage: May 18, 5:30 – 7:30pm**
  Z.J. Loussac Library
- **Village of Minto, Community Meeting and Presentation: June 14, 2 – 4 pm**
  AGDC will provide refreshments and a raffle will be held for door prizes
- **Kenai/Soldotna Joint Chamber of Commerce: June 16, 12:00 noon at the Soldotna Sports Center**
  Lunch Meeting and Forum: Dan Fauske to speak on the ASAP Project

Figure 7-1. Sample Calendar of Engagements

To date, more than 50 stakeholder meetings have been held with communities, local government officials and non-government organizations (see Table 7-1). A map of stakeholder communities is included as Figure 7-2.

Public meetings were held in concert with the State Pipeline Coordinator's Office public hearing schedule to combine state resources and offer communities an opportunity to learn about the project and comment on the state lease application. The meetings generated comments about the project and allowed AGDC to communicate in greater detail with interested parties.

As a critical part of the regulatory process, AGDC conducted regular meetings with state and federal agencies to collaborate on the project. These outreach efforts proved beneficial in establishing essential relationships and helped progress the EIS work and the 2010/2011 field work.

Meetings and project presentations were held throughout the year with a broad base of community, industry, and private-sector organizations to provide project roll-out information and explain the mission of the AGDC work. AGDC encountered a considerable amount of confusion from the public due to the amount of projects discussed in the media over the past two years. In general, the public was more familiar with the Alaska Pipeline Project. ASAP Project information was well received, and overall public support for the project was overwhelming. Alaskans from Barrow to Kenai offered AGDC support for the project work being performed. Consensus was common at the community meetings for building a pipeline to deliver North Slope gas to tidewater near Cook Inlet.

7.3 METHODS OF COMMUNICATION

7.3.1 Stakeholder Communication

AGDC received numerous requests for information from interested parties in 2010 and 2011. To manage these requests, AGDC:

- Created a stakeholder database to chronicle the requests.
- Identified the issues and forwarded the requests to the appropriate department for mitigation and resolution.
- Responded to stakeholder and filed response to complete the task.

7.3.2 Communication with the Alaska Legislature and Executive Branch

AGDC developed and distributed a monthly newsletter to the Executive Branch and to all members of the Alaska Legislature. Reports included activity for the previous month and were intended as a brief report on project progress throughout the year. AGDC also submitted quarterly financial reports to the Executive Branch and the Legislature which provided a financial overview on the expenses and the available resources for the ASAP Project. Both the legislative reports and the quarterly financial reports were posted on the ASAP website to encourage public awareness of the ASAP Project.

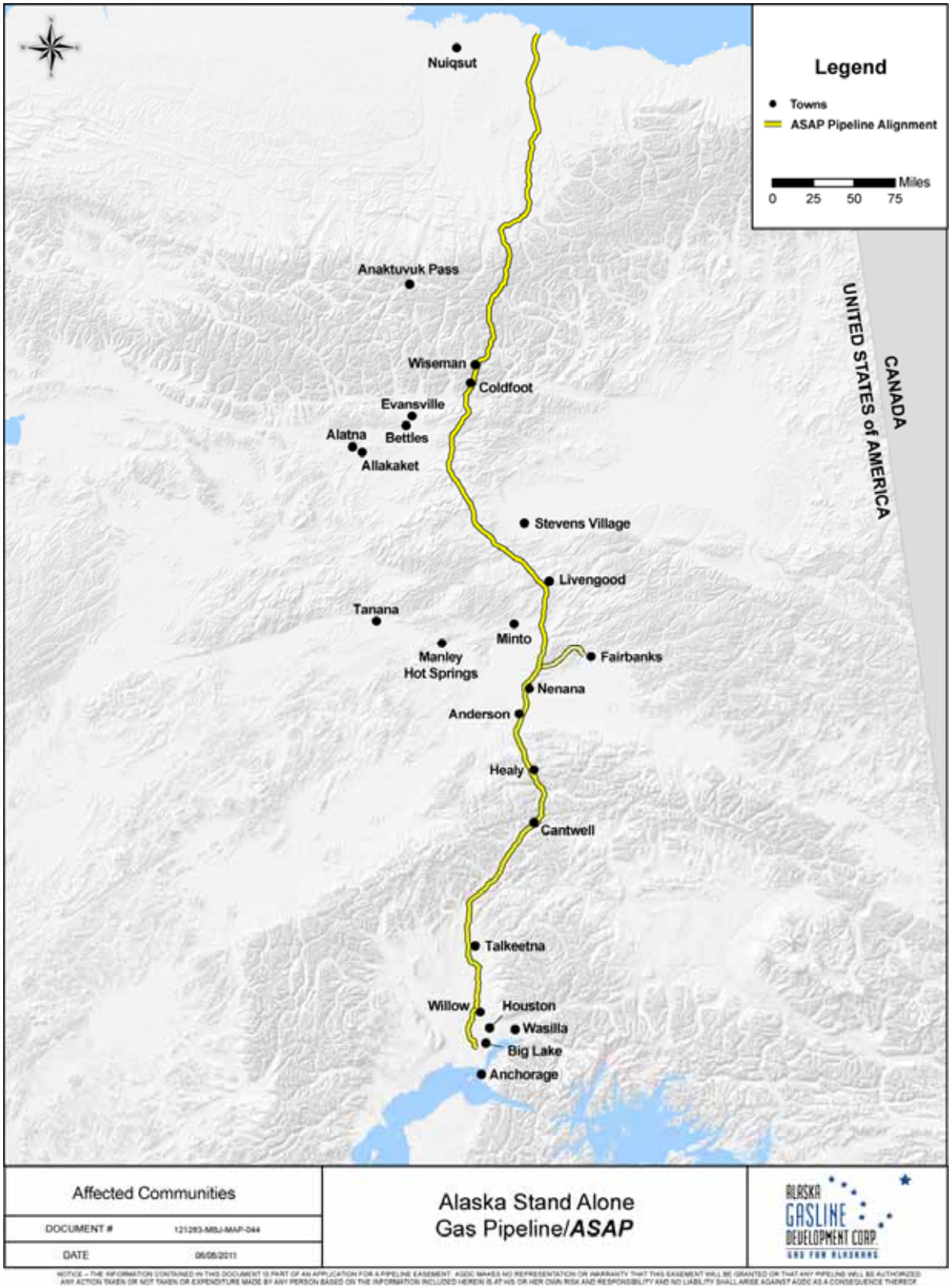

Figure 7-2. Affected Communities Along ASAP Route

Table 7-1. List of Stakeholder Contacts, January-June 2011

DATE	STAKEHOLDER	FORMAT	PURPOSE
1/6/11	Tyonek Corporation	Meeting/Presentation	Potential Mutual Benefits of Project
1/10/11	Alaska Association of Realtors Leadership Conference	Presentation	Present Project Overview
1/11/11	City of Seward	Meeting	LNG Data Gathering
1/12/11	Mat/Su Borough	Presentation	Project Roll-out
1/26/11	Ted Stevens Anchorage International Airport	Meeting	Project Roll-out
2/1/11	Mayor Sullivan	Meeting/Presentation	Project Update
2/2/11	Nenana Leadership	Meeting/Presentation	Project Roll-out
2/4/11	DOT Commissioner Luiken	Meeting/Presentation	Project Roll-out
2/16/11	Certified Residential Specialist	Presentation	Project Roll-out
2/18/11	Bush Caucus	Presentation	Project Roll-out
3/1/11	Legislative Finance	Meeting	Project Roll-out
3/3/11	U.S. Coast Guard	Meeting/Presentation	Project Roll-out
3/9/11	Village of Minto	Community Meeting/Presentation	Project Update
3/10/11	Minto Development Corporation	Meeting	Mutual Benefits/Opportunities
3/13/11	Rural Energy Committee	Presentation	Project Roll-out
3/15/11	Legislative In-State Caucus	Presentation	Project Update
3/23/11	Anchorage Mayor's Energy Task Force	Presentation	Project Roll-out
3/31/11	Alaska Railroad Corporation	Presentation	Project Update
4/8/11	Fairbanks North Star Borough Mayor and City of North Pole Mayor	Meeting/Presentation	Project Update
4/8/11	Tanana Chiefs Conference Leadership	Introduction Meeting	Project Roll-out
4/8/11	Minto Development Corporation	Meeting/Presentation	Minto Summer Field Work Opportunities
4/13/11	Office of Federal Coordinator Natural Gas Projects	Meeting/Presentation	Project Update
4/14/11	Nenana	Community Meeting	Project Roll-out
4/18/11	Golden Valley Electric Association	Meeting/Presentation	Project Update
4/21/11	Barrow Leadership	Presentation	Project Roll-out
4/28/11	North Slope Borough Planning Commission	Presentation	Project Roll-out
5/3/11	Fairbanks Community	Presentation	State Right-of-Way Public Hearing
5/4/11	Barrow Community	Presentation	State Right-of-Way Public Hearing
5/9/11	Nenana Community	Presentation	State Right-of-Way Public Hearing
5/10/11	Healy Community	Presentation	State Right-of-Way Public Hearing
5/10/11	John Katz, Director of State/Federal Relations	Meeting	Project Roll-out
5/10/11	Senator Lisa Murkowski	Meeting	Project Update
5/11/11	Cantwell Community	Meeting	State Right-of-Way Public Hearing
5/11/11	PHMSA – Washington DC	Meeting	Project Update
5/11/11	Congressman Don Young – DC Office	Meeting	Project Update
5/12/11	Kim Elton – Washington, DC	Meeting	Project Update
5/12/11	Senator Mark Begich, DC Office	Meeting	Project Update
5/16/11	Willow Community	Presentation	State Right of Way Public Hearing
5/17/11	Wasilla Community	Community Meeting	Project Roll-out
5/18/11	Anchorage Community	Presentation	State Right of Way Public Hearing

7.3.3 Electronic Communication

AGDC developed and maintains a project website which continues to host more project information (www.gasline.us.com). Items on the website include project documents, information on the project team and contractors, procurement information, project news, and links to other pertinent websites. New information is posted as it becomes available.

7.3.4 Print Material

During 2010, AGDC identified the need for a project document designed for public consumption. A project newsletter was developed and has been updated throughout the year. AGDC has distributed the project flyer throughout Alaska and the Lower 48. The project flyer has been a key collateral piece for distribution in public forums, private meetings, conferences, government agency offices, legislative offices, and at contractor meetings. Information contained in the newsletter was essential in helping the public differentiate the ASAP Project from the other energy projects facing Alaskans.

7.3.5 Project Branding

The need for a project brand was essential to establish a connection to the ASAP route. The project had been referred to as the “bullet line,” the “in-state pipeline,” and the “spur line”. While all of these terms could apply, AGDC found that branding the project with the “ASAP” title accomplishes the connection with the Alaska Stand Alone Gas Pipeline and helps deliver the message that this project is a priority. Other materials to support the ASAP brand include posters for communities along the proposed alignment, project fact sheets, and branded items for community meetings (e.g., hats, cups, and pens).

AGDC is in the process of gathering information on the public perception and degree of project understanding. AGDC will use this information to further the communication strategy. Effective public awareness and education are critical to reaching the largest audience with the project message.

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