ALASKA LNG

DOCKET NO. PF14-21-000

RESOURCE REPORT NO. 5

SOCIOECONOMICS

PUBLIC

DOCUMENT NUMBER: USAI-PE-SRREG-00-000005-000

RESOURCE REPORT NO. 5 SUMMARY OF FILING INFORMATION[1]	
Filing Requirement	**Found in Section**
1. For major aboveground facilities and major pipeline projects that require an EIS, describe existing socioeconomic conditions within the project area. (18 C.F.R. § 380.12(g)(1))	5.2 and 5.3
2. For major aboveground facilities, quantify impact on employment, housing, local government services, local tax revenues, transportation, and other relevant factors within the project area. (18 C.F.R. § 380.12(g)(2-6))	5.4
Additional Information Often Missing and Resulting in Data Requests	
Evaluate the impact of any substantial immigration of people on governmental facilities and services and describe plans to reduce the impact on local infrastructure.	5.4.2.6
Describe onsite manpower requirements, including the number of construction personnel who currently reside within the impact area, would commute daily to the site from outside the impact area, or would relocate temporarily within the impact area.	5.4.2.2
Estimate total worker payroll and material purchases during construction and operation.	5.4.2.2
Determine whether existing housing within the impact area is sufficient to meet the needs of the additional population.	5.4.2.3
Describe the number and types of residences and businesses that would be displaced by the project, procedures to be used to acquire these properties and types and amounts of relocation assistance payments.	5.4.2.5
Conduct a fiscal impact analysis evaluating incremental local government expenditures in relation to incremental local government revenues that would result from construction of the project. Incremental expenditures include, but are not limited to, school operating costs, road maintenance and repair, public safety and public utility costs.	5.4.2.8

[1] Guidance Manual for Environmental Report Preparation, Volume I (FERC, 2017). Available online at: https://www.ferc.gov/industries/gas/enviro/guidelines/guidance-manual-volume-1.pdf.

Resource Report No. 5 Agency Comments and Requests for Information Concerning Socioeconomics			
Agency	**Date**	**Comment**	**Response/Resource Report Location**
EPA		The proposed project purpose is to ship LNG to foreign countries. Therefore, the project may have reasonably foreseeable direct and indirect transboundary effects on physical, social and/or economic resources of other countries. We recommend that the Reports evaluate transboundary effects consistent with CEQ guidance on the application of NEPA to proposed federal actions in the United States with transboundary effects (July 1, 1997).	FERC will discuss the applicability of transboundary effects. Of note, the National Environmental Policy Act (NEPA) directs federal agencies to "analyze the effects of proposed actions to the extent they are reasonably foreseeable consequences of the proposed action, regardless of where those impacts might occur" (CEQ Guidance, 1997).
EPA	9/30/2016	Area of Interest (AOI) - The Reports indicate that the Alaska State is included in the AOI. Since the direct and indirect socioeconomic effects of this Project can be experienced in the lower 48 contiguous states and the Pacific Rim, should the AOI be expanded? Employees for project construction and operations would be hired from the lower 48 states, and supplies, fuel, cargo, modules, pipes, etc. would also be manufactured and shipped from the lower 48 states and abroad, as well. LNG would be shipped overseas to foreign countries and would result in direct/indirect socioeconomic impacts to those countries. We recommend that the Reports include a process identifying the scale of the AOI.	The scale of the Area of Interest (AOI) and the process for determining the AOI are outlined in Section 5.2. It is unknown at this time to what extent other countries and lower 48 states will be involved to assess impacts. See above.
EPA	9/30/2016	Out-of-State Area - At this point in the project, is it known where certain materials and supplies, such as the pipes for the pipeline would be manufactured and/or sourced? And the individual modules for the GTP and the LNG plant? Would these materials be manufactured/sourced in the U.S. or abroad? We recommend the Reports consider these aspects of the project to evaluate their potential direct, indirect and cumulative impacts.	Material, supplies, modules, etc., would be sourced through a bidding and procurement process. Therefore, the associated direct, indirect, and cumulative impacts are unknown at this time.
EPA	9/30/2016	Environmental Justice - We recommend that the EJ Section (8.16) page 8-219 to 8-224, be moved to Report 5. The information regarding income, poverty levels, demographics, and human health are included in Report 5.	The Environmental Justice discussion has been moved to Sections 5.3.7, 5.4.2.10.1, and 5.4.3.8.
EPA	9/30/2016	Potential Construction Impacts and Mitigation Measures – We recommend that the Reports include a list of general mitigation measures proposed to avoid and minimize impacts from construction related impacts. Include as an appendix.	The Applicant will address this comment prior to the issuance of the DEIS.
EPA	9/30/2016	As described in Section 5.4.2.5, ADOT&PF anticipates that some roads, highways, and bridges would need improvements to bear the heavier and more frequent truckloads during Project construction…We recommend that a Transportation Improvements Plan be developed to evaluate the need for road improvements and/or modifications to public and non-public roads in the project area. This Plan should identify segments of roads that would need improvements, and specify the type of road improvements, i.e., installing culverts, bridges, grading rough areas, widening roadbeds and shoulders, etc.	These issues will be addressed directly with ADOT&PF in the Highway use Agreement.
EPA	9/30/2016	Railroads - In addition to Figure 5.4.2-1, Estimated Use of Rail Transportation in the Area of Interest during Project Construction. We recommend including a table, similar to Table 5.3.6-3 (p. 5-119) that includes a projection of the cargo volume and distance of rail routes during project construction. This information would serve as a comparison with the baseline estimates.	**The Applicant will address this comment prior to the initiation of the EIS process**

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EPA	9/30/2016	Table 5.4.2-5. Cargo quantities are indicated in forty-foot equivalents (FEUs)… Can Number of FEUs be converted to short tons, so the information can be compared with the baseline information on Table 5.3.6-4 (p. 5-121) for each Primary/Secondary Port? Table 5.4.2-5. We recommend including the number of projected vessel calls for light/deep tankers, cargo, vessels, etc. at the Port of Anchorage during project construction.	**The Applicant will address this comment prior to the initiation of the EIS process**
EPA	9/30/2016	Table 5.4.2-6. Can Number of FEUs be converted to short tons, so the information can be compared with the baseline information on Table 5.3.6-4 (p. 5-121) for each Primary/Secondary Port? Table 5.4.2-6. We recommend including the number of projected vessel calls for light/deep tankers, cargo, vessels, etc. at the Port of Seward during project construction.	**The Applicant will address this comment prior to the initiation of the EIS process**
EPA	9/30/2016	The Port Nikiski, Port of Whittier and Port of Dutch Harbor – We recommend including similar projections of estimated use during construction. The Point Thomson marine facility has not been discussed in this section of the Reports. We recommend including additional description of the Point Thomson marine facility.	The Applicant will address this comment prior to the issuance of the DEIS.
EPA	9/30/2016	Construction of the marine terminal at Nikiski could impact Cook Inlet set gillnet fishery in the Salamantof and Tyonek management areas for up to five years. What mitigation measures are proposed to avoid and minimize these impacts, such as timing of marine vessels, scheduling around fishing season, etc. We recommend that the Reports include these mitigation measures.	Section 5.4.2.7.1.2 provides additional information on the impact to the setnet fishery. Additional information associated with shore fishery leases during Project construction is addressed in Section 8.11.1.1.2.1 of Resource Report No. 8. Recommended measures to mitigate potential Project impacts to subsistence activities are also found in Appendix D of Resource Report No. 5, Section 6.5.

Resource Report No. 5
Agency Comments and Requests for Information Concerning Socioeconomics

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EPA	9/30/2016	Air Transportation – For each of the smaller “tactical” airstrips, we recommend including a table that identifies the types of minor upgrades that may be needed to make them useable for project construction activities, including installation of buildings, fuels storage, secondary containment structures, powered traffic controls, etc. Also, we recommend including the estimated projected worker use of air transportation to these smaller “tactical” airstrips.	Section 5.3.5.4 has been revised to reflect that Anchorage, Kenai, Fairbanks, and Deadhorse will be used as regional air hubs for personnel. The majority of personnel will be transported from the regional hubs to project sites by bus. If used, the tactical airstrips will be used within the constraints of their design and existing condition. Table 5.3.5-10 was added to provide the general characteristics of the airports and airstrips in the area of interest. Section 5.4.2.7.4 has been modified to indicate that the current Project execution plans anticipate busing workers from Kenai, Anchorage, Fairbanks, and Deadhorse to the construction camps, Further discussion is provided that no improvements at these tactical airstrips are anticipated.
EPA	9/30/2016	Potential Operational Impacts and Mitigation Measures – We recommend including a list of general mitigation measures proposed to avoid and minimize impacts from operation related impacts. We recommend this information be Included as an appendix.	The Applicant will address this comment prior to the initiation of the EIS process.
EPA	9/30/2016	Additional sources of traditional ecological knowledge could be obtained from the Local Environmental Observers (LEO) Network. https://www.leonetwork.org	Comment acknowledged.
EPA	9/30/2016	Health Impact Assessment (HIA) - As part of the HIA development process, we recommend that the draft HIA be included as an Appendix in the Draft EIS and made available for public review and comment. We recommend that the Draft HIA be peer reviewed prior to adoption in the Draft EIS.	Public health impacts are addressed during the EIS. See Section 5.4.2.10.1 for Public Health impacts and mitigations.
KPB	10/5/2016	troubling in Draft Resource Report No. 5 are references to needed upgrades on Alaska's highway system, without details as to the exact work and who would pay for the work. Pages 5-166 through 5-171 of Draft Resource Report No. 5 statements: "Construction-related traffic would contribute to the current congestion on the Glenn and Parks Highways. Section 5.3.6.1 notes that the section between Wasilla and Houston is designated by ADOT&PF...." "In addition, as with the Elliott Highway, the Glenn and Parks Highways have weigh stations that are limited in capacity...." "During the three years of active Liquefaction Facility construction, some general cargo for construction would likely be trucked along the Seward, Sterling, and Kenai Spur Highways from the Ports of Seward and Anchorage to Nikiski..." "Project-related traffic would contribute to the congestion that already exists along sections of the Seward, Sterling, and Kenai Spur Highways. ..."	These issues will be addressed directly with ADOT&PF in the Highway use Agreement.

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KPB	10/5/2016	The Kenai Borough believes the anticipated highway improvements are of such importance not only to the project's successful development, but also to the safety and economic health of community residents that the issues of what improvements are needed, who would pay for the improvements, and when would the work be done should not be left to the end of project development. Considering that the work the design, scheduling and funding would likely involve the state, and could well involve the Alaska State Legislature, in addition to community input and federal agency involvement, the borough urges the project sponsor(s) to move ahead with identifying the work soon, rather than waiting and possibly jeopardizing the project schedule. Particularly if state funding is required, the state's currently constrained (severely constrained) finances could be an impediment to any expedited design and construction schedule.	Comment acknowledged. These issues will be addressed directly with ADOT&PF in the Highway use Agreement.
KPB	10/5/2016	...In addition, possible state management and/or ownership of the Alaska LNG project raises the question as to whether such an ownership structure would follow the impact aid funding (conceptual) negotiated in 2015 or establish an entirely different source of funding and disbursement plan. As you would expect, the Kenai Borough and its residents are wondering just how they will pay for community impacts from the project. And the impacts will be real, as noted below. Page 1-157 (Section 5.4.2.5.1 Municipal Impacts) of Draft Resource Report No. 5 states: ""To some extent, the magnitude of Project impacts on public infrastructure and services would depend on when and to what level the requirements of in-migrants are addressed..." "Impact payments to offset costs borne by State and local government during [Alaska LNG} construction have been proposed. These impact payments are tentative and subject to required changes under existing property tax Jaws." "The report also notes (Page 5-155) that "potential impacts to housing may be mitigated by impact payments as described in Section 5.4.2.5.1...." "The report concludes: "Information is not yet available on how a potential fund addressing the Project's impact on statewide and on unincorporated communities would be implemented....." The purpose in raising impact aid in this letter is to ensure that FERC is fully aware of the uncertainty of impact assistance to communities that would be affected by the project. The borough fully expects this matter will be resolved before construction starts, but as of now it remains a major question mark for communities.	The Applicant is aware of the desire of communities to receive municipal assistance to help offset impacts associated with construction. Resource Report No. 5 provides information that will show the potential economic impacts throughout construction and operation phases. As a State Corporation, AGDC will work with the Legislature to resolve and address the potential impacts that may occur during construction.
KPB	10/5/2016	...Whether that compensation comes from the state or other project sponsor(s), if not the state does not alter the fact that the project (and the state) will need to confront this issue if the project goes ahead. Which means the setnet sites should be included in the list of issues that the state and project sponsor(s) might as well deal with now, rather than waiting until later in the process.	Section 5.4.2.7.1.2 provides additional information on the impact to the setnet fishery. Additional information associated with shore fishery leases during Project construction is addressed in Section 8.11.1.1.2.1 of Resource Report No. 8. The Applicant will address this comment after the FEIS but prior to construction start.

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KPB	10/5/2016	Pages 5-178 and 179 of Draft Resource Report No. 5 -As noted in Draft Resource Report No. 5, the financial loss to displaced setnetters and their crew members would be substantial. And, as also noted below, a separate issue that must be addressed is whether setnetters who are prevented from working their sites during project construction but who are allowed to return after construction is complete would lose their state leases due to non-activity during construction.	.See Section 5.4.2.7.1.2. for additional information on how the Applicant will work with ADNR to address this issue.
ADNR / SHPO	9/25/2016	RR 4 and the Subsistence/TEK section of RR 5 may need to be cross-checked/referenced, especially with respect to Changes over Time.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
ADNR / SHPO	9/25/2016	RR 4 needs to cross-reference other, related resource reports, including but not limited to as RR 5, RR 8 (for visual), and RR 6.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
ADOT&PF	9/25/2016	Table 5.1.2-2 This table refers to a “consultation” with ADOT on 7/21/2014. I’m not sure whom the consultation was with but as noted in our comments on RR#1, the list of existing infrastructure and projects planned to take place over the next 10 years doesn’t really account for what is in the STIP and AIP.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
ADOT&PF	9/25/2016	The 2nd paragraph states “The Seward Highway provides regional mobility for movement of goods and services and is the only road access from Anchorage southward to communities along Turnagain Arm, the Kenai Peninsula, and the Alaska Marine Highway System.” Please clarify – Valdez and Haines both have road access and also are on the AMHS.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
ADOT&PF	9/25/2016	This section and table list Transportation as a Socioeconomic Resource and the Impact Indicators as “Effect of Project on roads, railroad system, ports and harbors, and airports”, and Effect of Project on other transportation users.” After reading thru this section it is unclear as to how road safety is addressed in this analysis. Much of the discussion centers on the increase in truck traffic generated by the Project (and this is valuable information) and the possible mitigation, such as pullouts, weigh station enhancements, and truck staging and waiting areas. What seems to be missing is an analysis of the potential highway safety impacts – A discussion on current accidents/rates and projected accidents/rates are warranted and could be based on past experience when TAPS was constructed. In addition to the mitigation considered in the report the Project should identify/locate existing passing lanes and determine where the need for additional passing lanes is warranted to mitigate congestion and safety concerns. This could be part of the ‘highway use agreement” mentioned in 5.4.2.7.1. The project should identify locations in the urban centers (Fairbanks and Anchorage) that are expected to see increased congestion as a direct or indirect result of the Project. For example, if pipe is to be hauled from the rail yard in Fairbanks to the Steese Highway and north along the Dalton Highway, what route will be used and what increase in traffic is expected? Are additional improvements required to mitigate or facilitate the Project traffic?	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.

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ADOT&PF	9/25/2016	Assuming Public Services includes design, construction, maintenance and daily operation of the States roads and facilities; will the models identify the impact to ADOT's ability to employ engineers and equipment operators during construction of the Project? A drain on qualified staff was experienced during TAPS – is that to be expected again? Is this something the Project will mitigate? What impact will the Project have on projects that ADOT develops and puts out to competitive bid? Will these contracts and individual unit price items escalate as a result of the Project - fewer contractors available, less competition, higher bids??	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
ADOT&PF	9/25/2016	Will impact payments apply to increased need for maintenance of highways and facilities? For example, if the Dalton Hwy requires additional grading or plowing, beyond what is normally budgeted for this route, to facilitate the Project construction, will this be eligible for Impact payments?	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
ADOT&PF	9/25/2016	2nd paragraph, reference to Table 1-5 should be 1.5.1-1?	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
ADOT&PF	9/25/2016	ADOT highly recommends that the applicant meet with MSCVE to discuss truck traffic, overloads, and other logistic factors.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
ADOT&PF	9/25/2016	This section and others indicates there will be oversized and overweight loads. The report should indicate where there are restrictions and truck traffic will need to be diverted (e.g. truck routes through Fairbanks and Steese / Chena Hot Springs Road Interchange) to local or adjacent road systems.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
ADOT&PF	9/25/2016	In the 1st paragraph reference to Section 5.4.2.5 appears to be a mistake and it is unclear what section should be referred too.This paragraph refers to a "potential highway use agreement". We whole heartedly agree this would be a good mechanism to identify needs and mitigation for highway and bridge impacts. The 2nd paragraph states, "…, all highway movements of Project-related equipment and materials would be within the current load and size limits of the existing highway system." Does this mean no overload permits will be requested for the Project? This seems improbable.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
ADOT&PF	9/25/2016	In the first paragraph, should add Elliot Highway to highways needing to be refurbished after 2027. Second paragraph, Pavement conditions on the Elliot Highway are poor and are an example of road improvements that could be needed before or during gasline project construction. Evaluation of projects effect on pavement residual life should be included on all truck routes.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
ADOT&PF	9/25/2016	Tables 5.4.2-1 and 5.4.2-1 Primary Truck Routes through Fairbanks is not identified which would be Parks (Mitchell), Peger, Johansen or Parks, Sheep Creek, Goldstream, Steese. These additional truck routes should be included the report along with any impacts and traffic volumes.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.

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ADOT&PF	9/25/2016	Top of Page – Data to be available for seasonal differences in traffic volumes identify summer and winter, but also indicates larger truck volumes precede summer peak. There appears to be a data gap for Spring truck volumes in needed to assess impacts and identify seasonal weight restrictions during Spring break up. This information needs to be included. Traffic on the Dalton seems to be increasing and may not be appropriate to hold Dalton volumes constant. There also appears to have been an increase in motorcycle and bicycle tourism in the last couple of years.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
ADOT&PF	9/25/2016	Some sort of quasi-intermodal rail to truck facility is described in the first paragraph. Access to/from this type of stockpiling facility, especially with large trucks has potential for impacts and may necessitate improvements to mitigate these impacts. Need details exactly where this facility will be located, the size, access locations and projected traffic volumes in order to evaluate further. Not many places adjacent to the railroad are available, so there are likely improvements needed along the Johansen, maybe Peger, Phillips Field, Danby etc.…	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
ADOT&PF	9/25/2016	The mitigation discussion is limited to rest requirements as a result of haul distance/time. Additional mitigation discussion should address dust generated by the additional traffic, adequacy of the existing road surface, safety of the existing highway (as mentioned previously), and other operational concerns for what the Project will be hauling up and down the road. How would the Project address the occurrence of a flood or other natural disaster? Will there be any protocols in place for this type of occurrence? This section states, "If additional pullouts, passing lanes, weigh station enhancements, and truck staging and waiting areas are needed by the Project and non-jurisdictional facilities, they would be identified when a more precise schedule of deliveries along the routes is defined." At what point in the Project development process will "a more precise schedule of deliveries along the routes" be defined? These improvements must be coordinated with and through ADOT. They also will require other agency permits and approvals. The timing for this work is unclear.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
ADOT&PF	9/25/2016	Same comment as above regarding the timing of improvements and "when a more precise schedule of deliveries along these routes is defined." This section also mentions development of a traffic management plan prior to construction. Please clarify what this includes and intended for.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
ADOT&PF	9/25/2016	It is unclear how the numbers of estimated trucks (up to 20,000 to 25,000) listed in the 1st paragraph correspond to the truck loads listed in table 5.4.2-2. This paragraph is confusing as it mentions "general cargo for construction" and then the 20,000 to 25,000 trucks that "would also be used to transport materials…". Please clarify. The last paragraph on this page refers to "Project related passenger traffic…". Should this be 'truck traffic'? Same comment as noted from the previous section, this section also mentions development of a traffic management plan prior to construction. Please clarify what this includes and intended for.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.

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ADOT&PF	9/25/2016	Table 5.4.2-10 Please check the numbers/percentages regarding passenger increases on these pages. For example, it indicates the project related passenger traffic at Ted Stevens International would peak in 2021 and be about a 5% increase in departing passengers over 2013. It appears from table 5.4.2-10 that 2022 has the highest numbers and the percentage doesn't match the 5%. References to minor upgrades needing to be made should be coordinate with/through ADOT. Once it is determined which airports will be used, Project staff should meet with ADOT staff to discuss necessary improvements and to what standard.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
ADF&G	9/25/2016	Subsistence is also essential for cultural reasons, not just for dietary reasons.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
ADF&G	9/25/2016	Suggested rewrite of sentence three: This understanding includes knowledge of anatomy and biology of resources based on centuries of harvest and processing, observations about distribution of resources….	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
ADF&G	9/25/2016	"Traditional workshop interviews…" in sentence 2 should be restated as "traditional knowledge interviews…".	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
ADF&G	9/25/2016	In paragraph 1, instead of "Traditional knowledge updated…" change to "Updated traditional knowledge studies…"	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
DHSS	9/25/2016	Please provide an estimate of number of workers than may be needed to support construction	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
DHSS	9/25/2016	End of first paragraph: Consider adding that these local volunteer fire departments have extremely limited capacity.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
DHSS	9/25/2016	A discussion of medically underserved communities in the AOI would be useful	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
DHSS	9/25/2016	Add an estimate of employment numbers somewhere in this section for additional context for the reader (even though the information is in another RR)	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
DHSS	9/25/2016	While population may increase due to the project, people may move from smaller communities in AK to the larger supply/construction hubs for the project. This could decrease population size in those communities due to out-migration. Discuss this and indicate whether the REMI models accounts for out- migration.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.

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DHSS	9/25/2016	While income and employment may be generated, people may move from smaller communities in AK to the larger supply/construction hubs for the project. This could decrease income/employment in those communities due to out-migration. Discuss this and indicate whether the REMI models accounts for out- migration.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
DHSS	9/25/2016	1st full paragraph on page: Clarify if all construction camps are expected to be closed camps	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
DHSS	9/25/2016	Include an estimate of how many people/businesses may be displaced	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
DHSS	9/25/2016	If workers will be transported using existing aviation infrastructure, increased demand could strain resources at airports, esp. in Kenai	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
DHSS	9/25/2016	2nd paragraph: Discuss impacts that could arise due to the use of the Fairweather Deadhorse Medical Clinic, Prudhoe Bay Operations Center, and/or the BP Base Operations Center. I.e., do they have the capacity to treat additional patients and respond to emergencies?	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
DHSS	9/25/2016	3rd paragraph: Also add discussion that some skilled people may take a job with the project, leaving to staffing needs, esp. in terms of volunteer firefighters and ambulance services in smaller communities.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
DHSS	9/25/2016	Statements throughout this section could be supported by more recent ‘boomtown’ literature, i.e. North Dakota	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
DHSS	9/25/2016	Include data on current capacity of school districts in the AOI, esp. Anchorage, the KPB, and the MSB	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
DHSS	9/25/2016	Due to the uncertainty surrounding the impact funds at this point, it seems too early to make a broad statement on the potential use of the funds to mitigate any impacts to educational facilities	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
DHSS	9/25/2016	Due to the uncertainty surrounding the impact funds at this point, it seems too early to make a broad statement on the potential use of the funds to mitigate any impacts to health care facilities	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
DHSS	9/25/2016	Due to the uncertainty surrounding the impact funds at this point, it seems too early to make a broad statement on the potential use of the funds to mitigate any impacts to emergency services	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
DHSS	9/25/2016	Statements throughout this section could be supported by more recent ‘boomtown’ literature, i.e. North Dakota	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.

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DHSS	9/25/2016	Due to the uncertainty surrounding the impact funds at this point, it seems too early to make a broad statement on the potential use of the funds to mitigate any impacts to law enforcement	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
DHSS	9/25/2016	Due to the uncertainty surrounding the impact funds at this point, it seems too early to make a broad statement on the potential use of the funds to mitigate any impacts to water facilities	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
DHSS	9/25/2016	Statements throughout this section could be supported by more recent 'boomtown' literature, i.e. North Dakota	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
SOA / DOLWD	9/25/2016	Clarification of the applicability of Alaska's "Right to Return Transportation" law (AS 23.10.380) and its effect in minimizing the number of workers stranded in Alaska at project conclusion may be appropriate, as it would only return to the Lower 48 the relatively small number of workers whose transportation from there had been provided by the employer. Most union workers coming to Alaska when the local hiring hall has been exhausted pay their own way to Alaska and are dispatched from hiring halls in Fairbanks or Anchorage, from which points they then travel to the work location at the employer's expense. Union agreements and state law would only require that these workers be provided return transportation to that point of dispatch. In any event, these workers are unlikely to be stranded at project end, though many may choose to remain in Alaska, as was the case after completion of TAPS. A more likely scenario of workers being stranded would involve those who came to Alaska with limited skills and no connection to the construction or oil and gas industries and were unsuccessful in finding work or lost employment when the job market slackens at project end.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
SOA / DOLWD	9/25/2016	"The construction camps are expected to be closed, with workers required to remain within the camps while off duty. Activities of camp security staff would include securing the camp perimeter from unauthorized entry or exit." It may be problematic if camps are closed with, as implied, workers confined to them in off-duty hours – particularly in areas with access to public roads and facilities. If such a rule is enforced, turnover may be increased as workers leaving camp in off-duty hours are disciplined for violation of camp rules.	The Applicant will address State of Alaska agency comments during the State permitting processes and timeframes.
USFWS	9/26/2016	Hydrocarbon Spills- The RRs do not contain an in-depth spill analysis for LNG and other petroleum products. A thorough discussion of impacts associated with accidental releases of liquefied natural gas and/or fuel spills into watercourses and the coastal and marine environments of Cook Inlet and the Beaufort Sea is warranted. Section 4.12 of the NPR-A IAP/EIS (2012) (http:www.blm.gov/ak) could be used as a template for this discussion. The Service would appreciate reviewing the spill analysis before the RRs are finalized.	A discussion of LNG spills is presented in Resource Report No. 11.

Resource Report No. 5
Agency Comments and Requests for Information Concerning Socioeconomics

Agency	Date	Comment	Response/Resource Report Location
FERC	11/16/2016	The following commitments were made by Alaska LNG in the resource report as information to be provided or pending in response to previous comments made by FERC or other agencies. If the information will not be included in the application as indicated by Alaska LNG, provide a schedule for when it will be filed with FERC or provided to the requesting agency as applicable.	See below.
FERC	11/16/2016	a. a. Quantitative economic modeling results with available data.	The results of economic modeling with the available data is presented in Section 5.4.
FERC	11/16/2016	b. b. Estimates of the number of persons who would be directly employed by the Project and who currently reside within the socioeconomic study area or would relocate temporarily/permanently within the area will be included in the FERC application.	See Section 5.4.2.2.1.1 for estimated change in direct employment in the AOI during Project construction.
FERC	11/16/2016	c. Estimates of the number of persons indirectly employed by the Project, including the number who currently reside within the study area or who would relocate temporarily/permanently within the area.	See Section 5.4.2.2.1.2 for estimated change in indirect employment in the AOI during Project construction.
FERC	11/16/2016	d. Total worker payroll estimates.	See Section 5.4.2.2.1.2 for estimated change in wages and salaries in the AOI during Project construction.
FERC	11/16/2016	e. Estimates of local Alaska expenditures.	See Section 5.4.2.2.2 for estimated change in purchases in the AOI during Project construction.
FERC	11/16/2016	f. Estimates of sector employment, wages, and output from the REMI model during construction.	See Section 5.4.2.2.3 for estimated change in sector average annual employment, output, and compensation during Project construction.
FERC	11/16/2016	g. The potential impact of the Project on local housing	See Section 5.4.2.3 for estimated impact on housing in the AOI during Project construction.
FERC	11/16/2016	h. The impact of in-migration on public infrastructure and services	See Section 5.4.2.6 for estimated impact of in-migration on public infrastructure and services in the AOI during Project construction.
FERC	11/16/2016	i. If available, information on how a potential impact fund would be implemented.	Section 5.4.2.6.1 provides information on the potential impact fund.
FERC	11/16/2016	j. A quantification of fiscal impacts, where possible, and a qualitative discussion for the items that cannot be quantified at that time.	Fiscal impacts have been quantified where possible in Section 5.4.2.8, and a qualitative discussion is provided where information is not available at this time.

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Agency	**Date**	**Comment**	**Response/Resource Report Location**
FERC	11/16/2016	k. The approach used to estimate the economic value of timberlands and agricultural/pastureland that will be removed temporarily or permanently from production once the corridor and facility footprint is better defined.	See Section 5.4.2.9 for estimated economic value of removal of agricultural/pasture land or timberland from production during Project construction. The methodology used for this analysis is described in Section 2.8 of Appendix B.
FERC	11/16/2016	l. The racial ethnic composition of the in-migrants during the operations phase.	In-migrant demographics are unknown at this time.
FERC	11/16/2016	m. Data on the additional employment created by the multiplier effects of spending by Project employees, expenditures during operations, and state and local government spending during operations.	See Section 5.4.3.2.1.2 for estimated total (direct, indirect, and induced) change in employment during Project operations. The additional employment would be long-term but minor.
FERC	11/16/2016	n. Data on operations payroll.	See Section 5.4.3.2.1.1 for estimated direct change in wages and salaries in the AOI during Project operation.
FERC	11/16/2016	o. Operational expenditure data.	See Section 5.4.3.2.1.5 for estimated change in purchases in the AOI during Project operation. The effect on purchases would be long-term but minor.
FERC	11/16/2016	p. Estimates of sector employment, wages, and output during the operations phase.	See Section 5.4.3.2.2 for estimated change in sector employment, wages, and output during Project operation. The effect would be long-term but minor.
FERC	11/16/2016	q. The indirect effects on housing in the Area of Influence (AOI) during the operations phase. (section 5.4.3.3, page 5-187)	See Section 5.4.3.3 for estimated change in housing during Project operation.
FERC	11/16/2016	r. The effect of operations of the Project on local community services and facilities. (section 5.4.3.5, page 5-188)	See Section 5.4.3.5 for estimated effect of operations of the Project on local community services and facilities.
FERC	11/16/2016	i. Potential modifications to highway and railroad bridges, overpasses, and tunnels. (see the response to the U.S. Environmental Protection Agency [EPA] comment on April 21, 2015)	These issues will be addressed directly with ADOT&PF in the Highway use Agreement.
FERC	11/16/2016	ii. Assessment with Alaska Department of Transportation and Public Facilities (ADOT&PF) of preliminary projects potentially required to facilitate construction of the Project. (see response to ADOT&PF agency comment on April 3, 2015 and EPA agency comment on April 21, 2015)	These issues will be addressed directly with ADOT&PF in the Highway use Agreement.

Resource Report No. 5 Agency Comments and Requests for Information Concerning Socioeconomics			
Agency	**Date**	**Comment**	**Response/Resource Report Location**
FERC	11/16/2016	iii. Indirect effects on the transportation system due to the population changes that would occur as a result of the Project, including people that migrate into a region seeking Project employment, or seeking work in other sectors of the economy. (see section 5.4.2.6, page 5 164 of Resource Report 5)	The anticipated transportation effects are detailed in Sections 5.4.2.7.1 through 5.4.2.7.4 and the population projections and analysis were developed using estimates of in-migration from construction. No additional discussion of indirect effects on the transportation system is anticipated. Additional transportation impacts analysis would be available prior to construction once project executions plans have been developed.
FERC	11/16/2016	s. Dock and Handling Yards: Additional information regarding the dock and handling yards at the Ports of Anchorage, Seward, and Portage, and other potentially affected ports, including: the current sizes of the dock and handling yards, required modifications to these dock and handling yards require modifications to meet the Project needs. (section 5.3.6.3)	Section 5.3.5.1 has been revised to include more information about the ports, docks, and handling yards. The project planned use, impacts, and required modifications to these ports is discussed in Section 5.4.2.7.1.1. The Applicant will address this comment after the DEIS but prior to the issuance of the FEIS; additional information would be available once contractors and suppliers have been contracted for the Project.
FERC	11/16/2016	t. Additional information on the use of the West Dock causeway. (section 5.3.6.3.1.12)	The Applicant will address this comment prior to the issuance of the DEIS.
FERC	11/16/2016	u. Summaries of additional discussions held with U.S. Coast Guard in 2016, including discussion of the possible application of Cook Inlet (and Nikiski, Alaska) winter operations and tidal current guidelines to vessels engaged in construction and operation of Alaska LNG. (section 5.3.6.3)	The Applicant will address this comment prior to the initiation of the EIS process.
FERC	11/16/2016	v. Health Impact Assessment. (section 5.6)	See section 5.4.2.10.1.
FERC	11/16/2016	Ensure that the subsistence and traditional knowledge studies respond to the letter dated December 4, 2015 from the Tanana Chiefs Conference stating that the cultural resources review should include outreach on traditional and customary use areas and the development of mitigation measure to minimize impacts on subsistence economies where incomes are low and unemployment is high. The eastern Minto Flats area was identified as one area of concern. Also, an interdisciplinary approach to assess potential impacts was recommended, including historical ethnogeography. Include detail on the outreach effort with the Villages of Allakaket, Alatna, Evansville, Stevens Village, Rampart, Minto, and Nenana to identify their traditional and customary use areas.	The Applicant will address this comment prior to the issuance of the DEIS.

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Agency	Date	Comment	Response/Resource Report Location
FERC	11/16/2016	Include an analysis of impact payments potentially being a source of increased revenues during construction. Describe whether the payments would be a net positive to communities or would allow them to break even as they use the money to pay for increased demand for public services and infrastructure demands.	The fiscal impact analysis can be completed once the revenue inputs and assumptions have been finalized. Preliminary community level economic modeling results have been updated in the draft Resource Report, but deal primarily with population-related revenues and expenditures.
FERC	11/16/2016	Include a description of the ongoing training for the Alaska workforce referenced in section 5.2.4 and how it will impact the hiring of workers from within the AOI, Alaskans outside the AOI and workers outside of Alaska.	Impacts on workforce demand would be determined after final constructing planning is complete and resource needs finalized.
FERC	11/16/2016	Describe any impacts to the tourism workforce, particularly in the Denali area, if these workers transition into the construction workforce. Include detail on any mitigation measures resulting from this potential shifting of the workforce.	The regional economic impact model (see Section 5.4.1.1.1) includes Project impacts on employment and income for various economic sectors in Alaska, including tourism. The results of this economic modeling and Project economic impacts have been added to the Resource Report. It is unknown to what extent the workforce shifts employment sectors. Additional text has been added to Section 5.4.2.2.3 regarding the potential impact on the tourism industry.
FERC	11/16/2016	Include actual economic data of current employment, wage rates, and total compensation for each important industrial sector in the AOI at the borough level from sources such as the U.S. Bureau of Labor Statistics' Quarterly Census of Employment or the Alaska Department of Labor and Workforce Development's local employment and wage statistics. Do not rely only on the results of the Regional Economic Models, Inc. model for the existing environment discussion.	The detailed structure of the REMI model requires an extensive amount of data. Of particular importance are data used to estimate industrial sector employment, income, and output. Most of the data for the REMI model come from the U.S. Bureau of Economic Analysis, U.S. Bureau of Labor Statistics, and U.S. Census Bureau. In addition, the model uses several supplementary data sources. As a result of this combination of data sources, the REMI model data are more robust compared to data from a single source. A brief summary of data sources for the REMI model is provided in Appendix B. To further clarify the data used in the model and the industry sector tables in Section 5.3.2.2, This summary has been expanded. It should be noted that the 2013 data presented in the industry sector tables in Section 5.3.2.2 are based on historical data incorporated in the REMI model, and are not projections resulting from the model.

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Agency	**Date**	**Comment**	**Response/Resource Report Location**
FERC	11/16/2016	Include a description and impact analysis of the commercial fishing industry including the fish processing industry within the AOI of the Project. Include data on number of establishments, number of employees, wages paid, earnings data, landing data, species caught, market or landing values and fishing areas/ports utilized that are within the AOI as well as references for the information.	See Section 5.3.5.1.2 for a description of the commercial fishing industry within the AOI as well as references for the information. Information on the fish processing industry has been added to this section. See Section 5.4.2.7.1.2 for an estimate of the impacts on the commercial fishing industry during Project construction. See Resource Report No. 8 for additional information on potential Project effects on beach access by set gillnet permit holders and proposed measures to mitigate those impacts. Resource Report No. 2 and Resource Report No. 3 provide information on potential water quality impacts, including the effects of offshore dredging, on Cook Inlet fishery resources and proposed mitigation measures.
FERC	11/16/2016	Include a description and impact analysis on tourist destinations located in the AOI, such as the Denali National Park or the Northern Lights tours. For each tourist destination, include information on months open, average and peak visitor's levels, and annual visitor expenditures. Include a discussion on how the Project will mitigate for the displacement of tourists as a result of the construction and operations of the Project.	Specific tourist destination impacts are unknown at this time and cannot be estimated until detailed construction plans are available. At that time the Project Team would develop mitigation specific to displacement of tourists as a result of construction and operations. Section 5.4.2.2.3 shows the estimated change in tourism sector average annual employment, income, and output during project construction. Additional detail on the economic importance of tourist destinations, in particular Denali National Park and Preserve, has been added in Section 5.3.2.2.4. Impacts to Recreation and Special Use Areas and mitigation measures are described in RR8 and referenced in Section 5.4.2.2.3. Project construction impacts to tourist accommodations are discussed in Section 5.4.2.3.1.
FERC	11/16/2016	To assist in determining if there is available capacity in each school district, include a column to table 5.3.4-1 showing the capacity of the total school facilities by district. Include references for the information shown.	See Section 5.3.4.1 for estimated percent of school facility capacity used by school district.
FERC	11/16/2016	Include an analysis of the Project's impact on the local government expenditures during construction and operation phases. Include a table showing the amount and percentage of local government expenditures by use category (i.e., education, public safety, transportation, social services etc.) located in the AOI of the Project.	The Applicant will address this comment after the FEIS but prior to construction.

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Agency	Date	Comment	Response/Resource Report Location
FERC	11/16/2016	Data shown in section 5.3.6.3.2 (salmon fishing areas) and section 5.3.2.2 (salmon catch data) should be cross referenced and additional analysis provided to demonstrate the role that salmon fishing has on the local and state economic health. Include references. In addition, include economic information and analysis that demonstrates the economic value of this industry in section 5.3.2.2.	The level of information provided on the salmon fishing industry is commensurate with the Project's potential for adverse impacts to the industry. The industries described in Section 5.3.2.2 are limited to those that would likely be most affected by Project construction on a statewide basis. Alaska's commercial fishing industry is not expected to be one of those industries. As described in Section 5.4.2.7.1.2, Project construction effects on the commercial fishing industry are anticipated to be significant but would be temporary and restricted to a small (approximately 16) group of fishermen operating in a localized area.
FERC	11/16/2016	Correct the numbering of section 5.4. For example while section 5.4.2.6 is titled “Transportation,” the subsequent transportation-related discussions are under section 5.4.2.7, Government Revenues and Expenditures. Correct this discrepancy.	The discrepancy has been corrected.
FERC	11/16/2016	Include a detailed breakdown on the total number of full-time equivalents (FTE) construction workers (including third-party contractors) that will be employed by the Project by construction spread and duration. In addition, include the number of FTEs broken down by hires from within the AOI, hires from outside the AOI and Alaskans, and hires from outside Alaska. Include a discussion of the measures The Applicant will take to recruit local and Alaskan hires.	Detailed breakdowns of workforce would be available prior to construction, once construction planning has been completed and contractors hired.
FERC	11/16/2016	Identify what impacts, both positive and negative, that are expected to occur in the state and regional economy in response to the end of Project construction activities.	Section 5.4.3.2.1.2 describes impacts, both positive and negative, that are expected to occur in the state and regional economy in response to the end of Project construction activities. As the economic stimulus from Project construction dissipates, the number of jobs indirectly created by the construction activity would decline. Operation of the Project would offset the decline from construction with modest increases in statewide employment. However, the additional employment is not significant in any region of the AOI.

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Agency	**Date**	**Comment**	**Response/Resource Report Location**
FERC	11/16/2016	Include the estimate of the local dollar expenditures that will be made by the Project directly into Alaska, the AOI, and the specific communities within the AOI. Include a break-out of the expenditures over the construction schedule and include a discussion of Alaska LNG's plan for these local purchases that will benefit the community without creating shortfalls for existing businesses and the community.	Section 5.4.2.2.2 provides estimates of the local Project expenditures in Alaska and the AOI. The models used in RR5 to estimate socioeconomic impacts do not provide reliable estimates of community-level changes in expenditures. Appendix B describes the types of socioeconomic impacts that were quantitatively estimated at the community level in RR5. A statement was added in this section noting that The Applicant will also initiate discussions with appropriate entities to identify ways to minimize and mitigate impacts.
FERC	11/16/2016	Section 5.4.2.5.1 discusses the possibility that Alaska LNG may provide impact payments to local, regional, and/or state governments to help offset some of the negative, indirect socioeconomic impacts that would be caused by the Project. Include more information on the proposed impact payments, including the range of dollars that will be available, how the dollars will be allocated, which levels of governments will be eligible, when will the payments be distributed, and any restrictions on the payment use.	Text has been added in Section 5.2.3 indicating that the objective of the impact payments is to enable the municipalities to cover the costs of additional public services and infrastructure demands and avoid adverse fiscal impacts. The range of dollars that might be available, the allocation process, eligibility, payment schedule, and other details are unknown at this time. The Applicant will further address this comment after the FEIS but prior to construction start
FERC	11/16/2016	Assess the effect of the permanent facilities on the AOI property values with a discussion that describes current property values, historical changes in property values in the AOI as well as an analysis of impacts from the Project.	See Section 5.4.2.4 for a discussion on the effect of permanent facilities on property values of adjacent properties. It is unclear at this time how the Project facilities would impact oil and gas property assessed values in the jurisdictions where the facilities would be located. There is a proposal for payments-in-lieu of taxes to be paid to affected jurisdictions but it is still tentative and subject to required changes under existing property tax laws.
FERC	11/16/2016	To assist in the analysis of existing conditions and to provide the basis for evaluation of impacts, include the information identified below regarding road transportation.	See below
FERC	11/16/2016	a. Describe the design capacity (i.e., vehicles per hour) along affected segments of all highways (accounting for seasonal variation, if needed).	Resource Report No. 5, Section 5.3.5.2 Highways, has been modified to describe the design capacity of the affected highways.

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Agency	**Date**	**Comment**	**Response/Resource Report Location**
FERC	11/16/2016	b. Include information on the capacity and condition of weigh stations and pullout areas on the Steese/Elliott/Dalton Highways, to support the statement that these areas “would accommodate most statutory rest periods.” Describe the criteria that would be used to determine the need for “additional pullouts, weigh station enhancements, and truck staging and waiting areas.”	Section 5.4.2.7.2.1 clarifies that "If additional pullouts, weigh station enhancements, and truck staging and waiting areas are needed by the Project, they would be identified when a more precise schedule of deliveries along these routes is defined." At this time, the Project intends to adhere to the weight restrictions on existing roadways.
FERC	11/16/2016	c. Include information to support the statement that “the Glenn and Parks Highways have weigh stations that are limited in capacity.” Describe the criteria that would be used to determine the need for “additional pullouts, passing lanes, weigh station enhancements, and truck staging and waiting areas.”	These issues will be addressed directly with ADOT&PF in the Highway use Agreement.
FERC	11/16/2016	d. Identify locations where site-specific traffic studies (i.e., evaluation of level of service and the potential need for signalization or road improvements) may be required, particularly at existing intersections near proposed rail sidings or rail yards, in response to ADOT&PF comments at the August 22, 2016 agency workshop. Include Alaska LNG’s plan for developing these studies, as well as the types of mitigations that such studies may recommend be implemented to minimize existing traffic disruptions.	The Applicant will address this comment after the FEIS but prior to construction.
FERC	11/16/2016	e. Describe the likely contents of the traffic management plans identified for the Glenn/Parks and Seward/Sterling/Kenai Spur Highways, such as scheduling of equipment deliveries during non-peak hours, signage, use of flaggers or other traffic control devices, and notification of planned road closures. Also state why a traffic management plan is not an option for the Steese/Elliott/Dalton Highways.	The Applicant will address this comment after the FEIS but prior to construction.
FERC	11/16/2016	f. Describe proposed pipeline crossings of, or colocation within the right-of-ways of highways. List the proposed or likely method of each crossing, discuss whether these crossings would occur in “safety corridors” or areas of existing congestion, and identify proposed mitigation measures to reduce the impacts of these crossings.	There are no highway crossings or pipeline collocation within highway right of ways within “safety corridors”. Dalton, Elliot and Parks Highway crossings will be performed using horizontal bores. Access for equipment crossings will be via short access road connections to the highway on either side of the bore. There are 2 locations where the pipeline will be in close proximity to the highway along the Dalton and Parks Highways. These areas (Atigun Pass, Nenana River Gorge) have detailed traffic management plans which are described in Section 5.4.2.7.2 of Resource Report No. 5.
FERC	11/16/2016	Include more detail detailed information on road maintenance that The Applicant will undertake and that will be required by the ADOT&PF during construction and operations, including a description and timing for infrastructure improvements and consideration of weight restrictions (including during spring break-up), as identified in the comments by ADOT&PF on April 3, 2015, and EPA on April 21, 2015. Specifically, address the items below.	See below

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Agency	Date	Comment	Response/Resource Report Location
FERC	11/16/2016	a. Revise section 5.4.2.7.1 to include a more detailed discussion of the anticipated location, type, extent, and timing of improvements to public highways and roads affected by Project construction and operations.	These issues will be addressed directly with ADOT&PF in the Highway use Agreement.
FERC	11/16/2016	b. Expand on the statement "For public roads that would be used during construction of the Project, the potential need for roadway improvements would be evaluated." At a minimum, identify a timeframe for these evaluations, who would be responsible for evaluating the need for improvements, and identify who would be responsible for implementing necessary road improvements and repairs before and after Project construction and during operations.	These issues will be addressed directly with ADOT&PF in the Highway use Agreement.
FERC	11/16/2016	c. Include more detail to support the following statement, and clarify if the statement also applies to spring break-up weight limitations: "Bridges would often be the primary constraints, limiting weight and width of loads. As noted in Resource Report 1, all highway movements of Project-related equipment and materials would be within the current load and size limits of the existing highway system." Specifically, identify the load and size limits in question (including for spring break-up), the locations of these constraint points (i.e., bridges and road segments), and procedures that would be adopted to ensure compliance.	These issues will be addressed directly with ADOT&PF in the Highway use Agreement.
FERC	11/16/2016	Include updated information about the Kenai Spur Highway relocation, under its own heading. Specifically, the discussion of the Kenai Spur Highway relocation should address the items below.	See below
FERC	11/16/2016	a. Describe and include relevant data and maps related to the criteria and analyses used to select and evaluate possible Kenai Spur Highway relocation segments and to identify alternative routes.	The Applicant will address this comment prior to the initiation of the EIS process.
FERC	11/16/2016	b. Include maps and specific descriptions of the associated road improvements (i.e., reconfigured intersections and property access, new traffic controls, interim traffic patterns during construction, etc.) that will be required for the Kenai Spur Highway.	The Applicant will address this comment prior to the initiation of the EIS process.
FERC	11/16/2016	c. Describe how access to businesses and residences would be preserved during the Kenai Spur Highway relocation project. List the businesses, residences, or properties that would permanently lose road access, and describe measures to address that lost access.	The Applicant will address this comment prior to the initiation of the EIS process.
FERC	11/16/2016	Include references for the conclusion regarding the impact of the Project to railroads. The draft states that "While additional railcars would be required to meet Project demand, no modifications of the Alaska railroad system infrastructure would be necessary to accommodate the additional freight, nor would additional locomotives or railway operating crews be needed." Specifically, include a source and discrete data points (rather than just graphics) for figure 5.4.2-1. Additionally describe the mitigation measures Alaska LNG proposes to ensure current customers of the railway are not displaced due to the Project transportation needs.	The Applicant will address this comment prior to the issuance of the DEIS.

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FERC	11/16/2016	Revise the analysis of traffic impacts to include highway segments that carry “local traffic,” as well as segments that are “representative of long-haul truck traffic,” and state which communities are served by the “local traffic” segments. Revise table 5.4.2-3 to include (and identify) both types of highway segments. Discuss the impacts of Project traffic on local users of these highways.	The Applicant will address this comment prior to the issuance of the DEIS.
FERC	11/16/2016	Include the following information on estimated Project-related construction trips:	See below.
FERC	11/16/2016	a. list the number of peak daily trips generated by individual Project components by duration, construction spread, and by construction season. (i.e., GTP, LNG Terminal, Pipeline Facilities);	See Section 5.4.2.7.
FERC	11/16/2016	b. describe the methodology for how trips were assigned to individual road mileposts;	Resource Report No. 5, Section 5.4.2.7.2, has been modified to explain the methodology of how trips were assigned to individual road mileposts.
FERC	11/16/2016	c. clarify if bus/worker trips are included in the road trips. If not included, revise to include bus/worker trips; and	Section 5.4.2.7.2 has been modified to include personnel transportation by bus.
FERC	11/16/2016	d. include the linear regression model that was used to project future “Other Traffic” volumes, as well as the source of the 2004-2013 traffic counts used.	Section 5.3.5.2 provides the historical traffic counts from the ADOT&PF Traffic Reports. Section 5.4.2.7.2 has been revised to clarify and to provide the estimated use of highway transportation in the AOI during construction.
FERC	11/16/2016	Address the discrepancy in statements about the use of rail transportation as mitigation for truck traffic impacts. On one hand, section 5.4.2.7.1.2 states that “the primary mitigation method for limiting additional traffic on the Glenn and Parks Highways would be to use ARRC’s rail system as much as possible to transport Project construction equipment and materials.” On the other hand, section 5.4.2.7.2 indicates rail demand from Project construction would exceed railway system capacity, and increased freight may result in rail congestion during tourist season, and could require the purchase of additional tank cars.	The Applicant will address this comment prior to the initiation of the EIS process.
FERC	11/16/2016	Include information supporting the following conclusion regarding non-vessel transportation during operations: “Other transportation requirements during Project operations are anticipated to be long-term but minor in comparison to the current level of transportation activity in Alaska and the capacity of the State’s different transportation modes.”	The Applicant will address this comment prior to the initiation of the EIS process.
FERC	11/16/2016	Clarify the following, and consolidate to a single location, if possible: Resource Report 8 provides a list of major road crossings and indicates disruptions to traffic would be expected, but refers the reader to Resource Report 5. Appendix N of Resource Report 1 provides collocation opportunities of the Mainline with highways, but does not provide the name of the highway.	See reference to Resource Report 8 added in Section 5.4.2.7. These items have been consolidated in Resource Report 8 Appendix F. Currently, there are no plans to add highway or road names to Appendix N of Resource Report 1.

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Agency	**Date**	**Comment**	**Response/Resource Report Location**
FERC	11/16/2016	Address impacts on highway segments identified by ADOT&PF as "safety corridors." Resource Report 5 identifies these corridors as roads that "are considered to be at or near traffic volume capacity." Clarify how this relates to estimated construction trips impacts (e.g., are selected mileposts near highway segments designated as safety corridors?) and potential infrastructure improvements.	Section 5.3.5.2 has been revised to provide more information on the safety corridors. The milepost locations shown in Table 5.3.5-8 are not located in the safety corridors, but are a representative selection of locations along project relevant transportation routes where DOT has collected traffic count data. Section 5.4.2.7.1.3 identifies the following mitigations methods: The primary mitigation method for reducing additional traffic on the Seward, Sterling, and Kenai Spur Highways would be to use barges and other vessels as much as possible to transport Project construction equipment and materials to work sites. In addition, authorities that have jurisdiction over roads and highways affected by construction of Project facilities, including ADOT&PF, would be consulted to develop traffic management plans prior to construction.
FERC	11/16/2016	Revise figure 5.3.6-1 to only show the ports that could be used by the Project and discussed in the resource report. If Alaska LNG intends to reference all of the ports shown on figure 5.3.6-1, expand the analysis to include these ports. Additionally, in the figure, use separate symbols to denote the location of primary and secondary ports.	The Applicant will address this comment prior to the initiation of the EIS process.
FERC	11/16/2016	Include Alaska LNG's proposed mitigation measures to address capacity limitations at ports that would be used for the Project's construction and operations. For example, in section 5.4.2.7.3.1, the mitigation for addressing potential capacity shortages at the Port of Anchorage is "the planned port of entry could be shifted to another location temporarily." Include informational detail sufficient to demonstrate and allow analysis of the mitigation measure such as shift in the port of entry.	The Project currently intends to adhere to the existing conditions found in each Port intended for use. Details on mitigation measures or use of alternative locations would be determined when contractors are selected and construction planning are complete.
FERC	11/16/2016	Include additional discussion and references for the existing Port of Nikiski and whether it could be modified or expanded to accommodate the Project needs of the Liquefaction Facility. Include in the analysis information about the type of expansion that would be needed, and the likelihood of such expansion.	Section 5.4.2.7.1.1 has been revised and identifies the Port of Seward and Port of Valdez as alternatives and their available capacity. The Project currently intends to adhere to the existing conditions found in each Port intended for use. Details on mitigation measures or use of alternative locations would be determined when contractors are selected and construction planning is complete.

Resource Report No. 5 Agency Comments and Requests for Information Concerning Socioeconomics			
Agency	**Date**	**Comment**	**Response/Resource Report Location**
FERC	11/16/2016	Discuss whether lightering the GTP modules at the Prudhoe Bay West Dock is an option to avoid dredging, per EPA's April 21, 2015 comment. The resource report indicates that section 10.5.6 addresses this question however upon review, it does not provide sufficient information on whether lightering was considered.	The West Dock design no longer requires dredging, therefore lightering will not be required.
FERC	11/16/2016	Specify what is meant by (from the applicant's response), "when more detail is available on future port requirements and vessel calls," since this is the trigger for port stakeholder engagement. What details are needed, and when is that information likely to be available?	The Applicant will address this comment prior to the initiation of the EIS process.
FERC	12/14/2016	1. The following commitments were made by Alaska LNG in the resource report as information to be provided or pending in response to previous comments made by the Federal Energy Regulatory Commission (FERC) or other agencies. If the information will not be included in the application as indicated by Alaska LNG, provide a schedule for when it will be filed with FERC or provided to the requesting agency as applicable.	See below.
FERC	12/14/2016	a. Final Updated Subsistence and Traditional Knowledge Study Report that includes the following information to demonstrate adherence to FERC's "Guidance on Subsistence Data Requirements:" (agency omments table, pages 5-xvii – 5-xix)	See Appendix D, Final Subsistence and Traditional Knowledge Study Report.
FERC	12/14/2016	i. current subsistence participation levels, status of resources to subsistence users, and intensity of subsistence use;	See Appendix D, Final Subsistence and Traditional Knowledge Study Report.
FERC	12/14/2016	ii. identification of impacts on subsistence resources and users, and mitigation measures	See Appendix D, Final Subsistence and Traditional Knowledge Study Report.
FERC	12/14/2016	iii. role of wild resources in the lives, communities, and culture of Alaska residents;	See Appendix D, Final Subsistence and Traditional Knowledge Study Report.
FERC	12/14/2016	iv. access to subsistence resources, temporarily or permanently, either through Project-related activities or through Project-related activities that alter migration patterns;	See Appendix D, Final Subsistence and Traditional Knowledge Study Report.
FERC	12/14/2016	v. cultural cohesion and dynamics in communities affected by the Project;	See Appendix D, Final Subsistence and Traditional Knowledge Study Report.
FERC	12/14/2016	vi. changes to income levels so that more villagers can buy the necessary equipment to engage in subsistence activities;	See Appendix D, Final Subsistence and Traditional Knowledge Study Report.
FERC	12/14/2016	vii. information sources used to characterize the mixed economy; and	See Appendix D, Final Subsistence and Traditional Knowledge Study Report.
FERC	12/14/2016	viii. potential impacts on communities by altering the balance of the mixed economy due to increased incomes.	See Appendix D, Final Subsistence and Traditional Knowledge Study Report.

Resource Report No. 5
Agency Comments and Requests for Information Concerning Socioeconomics

Agency	Date	Comment	Response/Resource Report Location
FERC	12/14/2016	b. Necessary information for the BLM to meet its procedural requirement to conduct, in combination with the environmental impact statement process, an Alaska National Interest Lands Conservation Act Section 810 evaluation. (agency comments table, page 5-xix)	The information necessary to support the BLM ANILCA 810 analysis is contained in several Resources Reports as follows: Hydrology and Water Quality, (Resource Report No. 2 - Water Use and Quality), Riparian and Fisheries (Resource Report No. 3 - Fish, Wildlife and Vegetation Resources), Wildlife Resources (Resource Report No. 3 - Fish, Wildlife and Vegetation Resources), Cultural and Paleontological Resources (Resource Report No. 4 - Cultural Resources), and Explosive Catastrophic Failure (Resource Report No. 11 - Reliability and Safety, Appendix I). In addition, pursuant to BLM's "Guidance Concerning the Adequacy and Use of Data for Making 810 Evaluations", information regarding 1) Ethnographic Accounts and Community Studies, 2) Mapped Data, 3) Household Harvest Survey Data and ADF&G Harvest Reports, and 4) Nonpublished Sources are located in Resource Report No. 5, Appendix D (Final Subsistence and Traditional Knowledge Studies Report).
FERC	12/14/2016	2. Reference the Subsistence Plan of Cooperation for the Arctic OCS (Plan, to be included as Appendix O to Resource Report 3) in Resource Report 5 and summarize the communications with and comments by subsistence stakeholder groups that contributed to the development of this Plan (e.g., groups included in the subsistence and traditional knowledge study).	A subsistence plan of cooperation would be completed after permitting. A reference to this plan has been added to the text.
FERC	12/14/2016	3. Reference the Wildlife Avoidance and Interaction Plan (to be included as Appendix J to Resource Report 3) in Resource Report 5 and indicate whether this plan will address Project policy regarding recreational hunting, fishing, and trapping of subsistence resources by Project personnel.	The Wildlife Avoidance and Interaction Plan will be completed prior to initiation of field activities. It is anticipated that this will be a requirement of the State right-of-way lease and the Federal grant of right-of-way. The plans typically must be submitted and approved before the State Pipeline Coordinator and Federal Authorized Officer will issue and notice-to-proceed. Work camps will be closed and personnel would be transported to/from camps. A reference has been added to the text.
FERC	12/14/2016	4. Include cross references between resource reports for information applicable to multiple reports so it is clear where information can be found.	Cross references added.

Resource Report No. 5
Agency Comments and Requests for Information Concerning Socioeconomics

Agency	Date	Comment	Response/Resource Report Location
FERC	12/14/2016	5. Provide a schedule for the completion of household subsistence surveys by the Alaska Department of Fish and Game and publication of the technical paper.	The ADF&G Subsistence Division data was acquired and is incorporated into this Resource Report. The final technical report will be delivered to AGDC June 15, 2017.
FERC	12/14/2016	6. The Proposed Subsistence Impact Analysis Approach identifies four general impact source criteria and indicates that these criteria will be developed as the Project description is finalized for inclusion in the FERC application. For the purposes of the National Environmental Policy Act review, provide detailed criteria based upon the predicted construction and operational impacts of the current Project design prior to the submittal of the application. (section 5.5.1.4, page 5-195 and appendix E, attachment 2, pages 6 and 9)	See Appendix D for the results of the analysis. The Applicant will address this comment prior to the issuance of the DEIS.
FERC	12/14/2016	7. Assess the knowledge gained from participants in the subsistence and traditional knowledge studies and analyses included for subsistence resources in Resource Report 3 to identify and summarize any potential temporary or permanent changes in subsistence species diversity, abundance and distribution, and habitat quality in the Project area that could be attributed to direct, indirect, and cumulative effects of Project construction and operational activities.	The Applicant will address this comment prior to the issuance of the DEIS.
FERC	12/14/2016	8. Describe how information gained from the subsistence and traditional knowledge study will direct monitoring plans for species or habitats of cultural, social, and economic importance to subsistence users and considered sensitive to potential effects of the Project.	The Applicant will address this comment prior to the issuance of the DEIS.

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ACRONYMS AND ABBREVIATIONS

ABBREVIATION	DEFINITION
Abbreviations for Units of Measurement	
FEU	forty-foot equivalent unit
kWh	kilowatt hour
MSCF	thousand standard cubic feet
MMBtu	million British thermal units
Other Abbreviations	
§	section or paragraph
AADT	average annual daily traffic
ACS	U.S. Census, American Community Survey
ADCCED	Alaska Department of Commerce, Community and Economic Development
ADF&G	Alaska Department of Fish and Game
ADHSS	Alaska Department of Health and Social Services
ADM	average daily membership
ADOLWD	Alaska Department of Labor and Workforce Development
ADOT&PF	Alaska Department of Transportation and Public Facilities
AGDC	Alaska Gasline Development Corporation
AIDEA	Alaska Industrial Development and Export Authority
ANCSA	Alaska Native Claims Settlement Act
ANV	Alaska Native Village
ANVSA	Alaska Native Village Statistical Area
AOI	area of interest
Applicant	Alaska Gasline Development Corporation
ARRC	Alaska Railroad Corporation
ASAP	Alaska Stand Alone Pipeline
ASRC	Arctic Slope Regional Corporation
CDP	census designated place
CEA	Chugach Electric Association
CT	chlamydia trachomatis
CIRI	Cook Inlet Region Inc.
DEED	Alaska Department of Education and Early Development
DOF	Alaska Department of Natural Resources, Division of Forestry
FERC	United States Department of Energy, Federal Energy Regulatory Commission
FNSB	Fairbanks North Star Borough
FR	Federal Register
FY	fiscal year
GDP	gross domestic product
GIS	geographic information system
GTP	gas treatment plant
HEC	health effects category
HIA	health impact assessment
KPB	Kenai Peninsula Borough

ABBREVIATION	DEFINITION
Liquefaction Facility	natural gas liquefaction facility
LLC	limited liability company
LNG	liquefied natural gas
Lo/Lo	lift-on/lift-off
LP	limited partnership
Mainline	an approximately 800-mile-long, large-diameter gas pipeline
MGS	major gas sales
MOF	material offloading facility
MP	State of Alaska highway milepost
MSB	Matanuska-Susitna Borough
NEPA	National Environmental Policy Act
NGA	Natural Gas Act
North Slope	Alaska North Slope
NSB	North Slope Borough
OCS	Outer Continental Shelf
OCONUS	outside contiguous U.S.
PAC	potentially affected community
PBTL	Prudhoe Bay Gas Transmission Line
PBU	Prudhoe Bay Unit
PCE	Power Cost Equalization
Project	Alaska LNG Project
PTTL	Point Thomson Gas Transmission Line
PTU	Point Thomson Unit
REAA	Regional Educational Attendance Area
REMI	Regional Economic Models, Inc.
Ro/Ro	roll-on/roll-off
SDH	social determinants of health
STI	sexually transmitted infection
TAPS	Trans Alaska Pipeline System
ULSD	ultra-low sulphur diesel
U.S.	United States
USACE	United States Army Corps of Engineers
VPSO	Village Public Safety Officer

5.0 RESOURCE REPORT NO. 5 – SOCIOECONOMICS

5.1 PROJECT DESCRIPTION

The Alaska Gasline Development Corporation (Applicant) plans to construct one integrated liquefied natural gas (LNG) Project (Project) with interdependent facilities for the purpose of liquefying supplies of natural gas from Alaska, in particular from the Point Thomson Unit (PTU) and Prudhoe Bay Unit (PBU) production fields on the Alaska North Slope (North Slope), for export in foreign commerce and for in-state deliveries of natural gas.

The Natural Gas Act (NGA), 15 U.S.C. § 717a (11) (2006), and Federal Energy Regulatory Commission (FERC) regulations, 18 Code of Federal Regulations (C.F.R.) § 153.2(d) (2014), define "LNG terminal" to include "all natural gas facilities located onshore or in State waters that are used to receive, unload, load, store, transport, gasify, liquefy, or process natural gas that is ... exported to a foreign country from the United States." With respect to this Project, the "LNG Terminal" includes the following: a liquefaction facility (Liquefaction Facility) in Southcentral Alaska; an approximately 807-mile gas pipeline (Mainline); a gas treatment plant (GTP) within the PBU on the North Slope; an approximately 63-mile gas transmission line connecting the GTP to the PTU gas production facility (PTU Gas Transmission Line or PTTL); and an approximately 1-mile gas transmission line connecting the GTP to the PBU gas production facility (PBU Gas Transmission Line or PBTL). All of these facilities are essential to export natural gas in foreign commerce and will have a nominal design life of 30 years.

These components are shown in Resource Report No. 1, Figure 1.1-1, as well as the maps found in Appendices A and B of Resource Report No. 1. Their proposed basis for design is described as follows.

The new Liquefaction Facility would be constructed on the eastern shore of Cook Inlet just south of the existing Agrium fertilizer plant on the Kenai Peninsula, approximately 3 miles southwest of Nikiski and 8.5 miles north of Kenai. The Liquefaction Facility would include the structures, equipment, underlying access rights, and all other associated systems for final processing and liquefaction of natural gas, as well as storage and loading of LNG, including terminal facilities and auxiliary marine vessels used to support Marine Terminal operations (excluding LNG carriers [LNGCs]). The Liquefaction Facility would include three liquefaction trains combining to process up to approximately 20 million metric tons per annum (MMTPA) of LNG. Two 240,000-cubic-meter tanks would be constructed to store the LNG. The Liquefaction Facility would be capable of accommodating two LNGCs. The size of LNGCs that the Liquefaction Facility would accommodate would range between 125,000–216,000-cubic-meter vessels.

In addition to the Liquefaction Facility, the LNG Terminal would include the following interdependent facilities:

- Mainline: A new 42-inch-diameter natural gas pipeline approximately 807 miles in length would extend from the Liquefaction Facility to the GTP in the PBU, including the structures, equipment, and all other associated systems. The proposed design anticipates up to eight compressor stations; one standalone heater station, one heater station collocated with a compressor station, and six cooling stations associated with six of the compressor stations; four meter stations; 30 Mainline block valves (MLBVs); one pig launcher facility at the GTP meter station, one pig receiver facility at the Nikiski meter station, and combined pig launcher and receiver facilities at each of the compressor stations; and associated infrastructure facilities.

- Associated infrastructure facilities would include additional temporary workspace (ATWS), access roads, helipads, construction camps, pipe storage areas, material extraction sites, and material disposal sites.

- Along the Mainline route, there would be at least five gas interconnection points to allow for future in-state deliveries of natural gas. The approximate locations of three of the gas interconnection points have been tentatively identified as follows: milepost (MP) 441 to serve Fairbanks, MP 763 to serve the Matanuska-Susitna Valley and Anchorage, and MP 807 to serve the Kenai Peninsula. The size and location of the other interconnection points are unknown at this time. None of the potential third-party facilities used to condition, if required, or move natural gas away from these gas interconnection points are part of the Project. Potential third-party facilities are addressed in the Cumulative Impacts analysis found in Appendix L of Resource Report No. 1;

- GTP: A new GTP and associated facilities in the PBU would receive natural gas from the PBU Gas Transmission Line and the PTU Gas Transmission Line. The GTP would treat/process the natural gas for delivery into the Mainline. There would be custody transfer, verification, and process metering between the GTP and PBU for fuel gas, propane makeup, and byproducts. All of these would be on the GTP or PBU pads;

- PBU Gas Transmission Line: A new 60-inch natural gas transmission line would extend approximately 1 mile from the outlet flange of the PBU gas production facility to the inlet flange of the GTP. The PBU Gas Transmission Line would include one meter station on the GTP pad; and

- PTU Gas Transmission Line: A new 32-inch natural gas transmission line would extend approximately 63 miles from the outlet flange of the PTU gas production facility to the inlet flange of the GTP. The PTU Gas Transmission Line would include one meter station on the GTP pad, four MLBVs, and pig launcher and receiver facilities—one each at the PTU and GTP pads.

Existing State of Alaska transportation infrastructure would be used during the construction of these new facilities including ports, airports, roads, railroads, and airstrips (potentially including previously abandoned airstrips). A preliminary assessment of potential new infrastructure and modifications or additions to these existing in-state facilities is provided in Resource Report No. 1, Appendix L. The Liquefaction Facility, Mainline, and GTP would require the construction of modules that may or may not take place at existing or new manufacturing facilities in the United States.

Resource Report No. 1, Appendix A, contains maps of the Project footprint. Appendices B and E of Resource Report No. 1 depict the footprint, plot plans of the aboveground facilities, and typical layout of aboveground facilities.

Outside the scope of the Project, but in support of or related to the Project, additional facilities or expansion/modification of existing facilities would be needed to be constructed. These other projects may include:

- Modifications/new facilities at the PTU (PTU Expansion project);
- Modifications/new facilities at the PBU (PBU Major Gas Sales [MGS] project); and
- Relocation of the Kenai Spur Highway.

5.1.1 Purpose of Resource Report

As required by 18 C.F.R. § 380.12, this Resource Report has been prepared in support of a future application under Section 3 of the NGA to construct and operate the Project facilities. The purpose of this Resource Report is to:

- Describe the existing and likely socioeconomic conditions in the general area of the Project; and
- Describe the potential effects the Project might have on those conditions.

Specific areas addressed include the following topics: population, employment, housing, public services, construction payroll and material purchase, tax revenue, land use, transportation and traffic management, subsistence, and health impacts.

5.1.2 Agency and Organization Consultations

This section describes consultations that have been conducted to date with federal and State agencies and other interested parties to the Project.

5.1.2.1 Federal Agencies

Discussions were held with multiple federal agencies regarding various Project details. TABLE 5.1.2-1 includes meetings and correspondence where socioeconomic issues were discussed.

A list of the required federal permits for the Project is provided in Resource Report No. 1, Appendix C. A summary of public, agency, and stakeholder engagement is provided in Resource Report No. 1, Appendix D.

TABLE 5.1.2-1

Summary of Consultations with Federal Agencies for Resource Report No. 5

Entity	Date	Summary
Office of the Federal Coordinator for Alaska Natural Gas Transport-ation Projects	25-Jun-14	Discussed Arctic OCS development, More Alaska Production Act, Trans Alaska Pipeline System (TAPS), oil and gas revenues, gas-to-liquids, interconnection points for offtake of gas, a no-action alternative to the Project, and energy costs throughout the State
Bureau of Land Management	4-Aug-14	Discussed National Petroleum Reserve–Alaska and the Integrated Activity Plan (2013), Outer Continental Shelf (OCS), and the North Slope, and Ambler and Donlin mines
Bureau of Ocean Energy Management	7-Aug-14	Discussed OCS development in the Beaufort, Chukchi, and Cook Inlet, labor resources needed to support OCS activities, and the impact of the Project on current development plans
U.S. Forest Service	13-Feb-15	Discussed changes in timber lands over time in the Fairbanks area

5.1.2.2 State Agencies

Discussions were held with multiple State agencies regarding various Project details. Table 5.1.2-2 includes meetings and correspondence where socioeconomic issues were discussed.

A summary of public, agency, and stakeholder engagement is provided in Resource Report No. 1, Appendix D.

TABLE 5.1.2-2

Summary of Consultations with Alaska State Agencies for Resource Report No. 5

Entity	Date	Summary
Alaska Department of Fish and Game (ADF&G)	6-Jan-14	Discussed ADF&G study plan related to Alaska LNG
Alaska Department of Natural Resources (ADNR)	3-Apr-14	Talked about the commissioner's perspective on the future of Alaska's economy with and without the Project and the Governor's new advisory board
Ted Stevens Anchorage International Airport	13-Jun-14	Discussed airport’s current operations, Anchorage's strategic position, surface transportation options, Flint Hills Refinery, tourism, the State budget, and economic diversification
Alaska Department of Labor & Workforce Development (ADOLWD)	7-Jul-14	Discussed the future of the Alaskan economy including feasibility of proposed infrastructure projects, federal and State spending
Alaska Industrial Development and Export Authority (AIDEA)	11-Jul-14	Discussed proposed pipeline projects, the Susitna-Watana Hydroelectric project, Cook Inlet gas, proposed mining projects, and the demand for energy in Alaska
Alaska Department of Transportation & Public Facilities (ADOT&PF)	21-Jul-14	Reviewed ADOT&PF's existing infrastructure and projects planned to take place over the next 10 years. Mining, the Knik Arm Bridge, roads to resources, and the future with and without the Project were also topics discussed
ADOLWD	24-Jul-14	Discussed techniques and methods used by ADOLWD to gather employment data and make projections. Also talked about a potential number of jobs created by the Project and how many jobs might be filled by Alaska residents; migration projections, and wages
Alaska Railroad Corporation	8-Aug-14	Reviewed current Alaska Railroad operations, Fort Greely/Big Delta bridge, Port Mackenzie, the Alaska Railroad's ports and real estate, and the impact of the Project
ADCCED	20-Aug-14	Discussed the Alaskan labor pool, housing markets, taxes, and State revenues
Alaska Department of Natural Resources, Division of Forestry (DOF)	21-Jan-15	Discussed timber conversion ratios in the Fairbanks area
ADF&G	5-Nov-15	Discussed current status of ADF&G fieldwork related to Alaska LNG. Also outlined plan for requesting ADF&G household data to meet FERC's request for analysis of average household ratio of cash employment and subsistence
ADF&G	29-Dec-15	Discussed specific approach and data needs related to analysis of average household ratio of cash employment and subsistence
Alaska Department of Education and Early Development, School Finance & Facilities (DEED)	13-Jan-16	Identified appropriate DEED sources to be used in the calculation of percent of school capacity currently in use for schools in districts contained in the AOI
Alaska Energy Authority (AEA)	9-Feb-16	Discussed process for sharing traditional knowledge data collected for the Susitna-Watana Hydro Project with the Alaska LNG Project
ADOLWD	22-Mar-16 and 24-Mar-16	Discussed potential approach to estimate the number and percent of Alaska residents that may work on the Project using ADOLWD data on potential supply of labor by occupation and Project labor force requirements by occupation
Alaska Commercial Fisheries Entry Commission	20-Apr-16	Data request for setnet fisheries in proximity to the Project.
ADNR	20-Apr-16	Discussed the potential effect of additional access on timber harvesting

5.1.2.3 Other Interested Parties

Discussions were held with multiple other interested parties regarding various Project details. TABLE 5.1.2-3 includes meetings and correspondence where socioeconomic issues were discussed.

A summary of public, agency, and stakeholder engagement is provided in Resource Report No. 1, Appendix D.

TABLE 5.1.2-3

Summary of Consultations with Other Interested Parties for Resource Report 5

Entity	Date	Summary
Anchorage Economic Development Corporation	6-Jun-14	Discussed Alaska's workforce, socioeconomic impacts of a large project such as the Project, skills gap, and State of Alaska spending
Anchorage Chamber of Commerce	11-Jun-14	Discussed federal spending, State revenues, OCS, State sales and income taxes, proposed infrastructure projects, the Port of Anchorage, the Anchorage airport, and housing
Lynden Transportation	13-Jun-14	Discussed the Port of Anchorage, land availability, scheduled services, and freight flows throughout the State
Alaska Travel Industry Association	23-Jun-14	Reviewed trends in the tourism industry and discussed potential visitor traffic issues (particularly between Talkeetna and Denali), environmental concerns, and the Susitna-Watana Dam
Dan E. Dickinson, CPA	24-Jun-14	Discussed recent oil and gas legislation, taxes, and the impact regulations have on oil and gas development
Copper Valley Electric Association	3-Jul-14	Reviewed current system, Allison Creek Hydro, energy demand in eastern Alaska, the Northeast Intertie, and the potential impacts of the Project in eastern Alaska
Totem Ocean Trailer Express (TOTE)	11-Jul-14	Discussed TOTE's current operations and future trends as well as demand from consumer market versus demand from oil and gas industry
Manley Hot Springs, Active and Knowledgeable Harvesters	14-17-Jul-14	Conducted traditional knowledge workshops with Manley Hot Springs residents
Doyon Ltd.	16-Jul-14	Discussed Doyon's plans for new and on-going natural resource projects, job market, employee training plans, socioeconomic impacts on region, and the potential impacts of the Project
Kenai Peninsula Borough (KPB)	17-Jul-14	Discussed the economy in the KPB, infrastructure developments in the area, what would the future look like with and without the Project
Alaska Village Electric Co-operative	23-Jul-14	Discussed possible impacts of proposed projects such as the Susitna-Watana dam, the Project, and the influence these projects would have on rural Alaska and rural Alaskan's utilities
Cook Inlet Region Inc. (CIRI)	23-Jul-14	Discussed CIRI's land ownership, proposed infrastructure projects, North Slope oil, Cook Inlet gas, and rural Alaska
Chugach Electric Association	4-Aug-14	Discussed technological developments, job creation, Cook Inlet gas, heat/energy security, the Watana Dam, and other proposed infrastructure projects
Anderson, Active and Knowledgeable Harvesters	6-Aug-14	Conducted subsistence mapping interviews with Anderson residents
Cook Inlet Energy	7-Aug-14	Discussed demand for Cook Inlet gas, development plans in Cook Inlet, available labor force, and the potential impacts of the Project
Arctic Slope Regional Corporation (ASRC)	8-Aug-14	Discussed demand for ASRC's services, potential partnerships, non-local competition, impact on rural Alaskans, and logistical issues that the Project would have to overcome
Healy, Active and Knowledgeable Harvesters	8-Aug-14	Conducted subsistence mapping interviews with Healy residents

TABLE 5.1.2-3

Summary of Consultations with Other Interested Parties for Resource Report 5

Entity	Date	Summary
McKinley Park, Active and Knowledgeable Harvesters	8-Aug-14	Conducted subsistence mapping interviews with McKinley Park residents
Ninilchik, Traditional Knowledge Respondents	2-5-Sep-14	Conducted traditional knowledge workshops with Ninilchik residents
Seldovia, Active and Knowledgeable Harvesters; Traditional Knowledge Respondents	15-19-Sep-14	Conducted subsistence mapping and traditional knowledge workshops/interviews with Seldovia residents
Chase, Active and Knowledgeable Harvesters	6-10-Oct-14	Conducted subsistence mapping interviews with Chase residents
Talkeetna, Active and Knowledgeable Harvesters	6-10-Oct-14	Conducted subsistence mapping interviews with Talkeetna residents
Trapper Creek, Active and Knowledgeable Harvesters	6-10-Oct-14	Conducted subsistence mapping interviews with Trapper Creek residents
Chase, Active and Knowledgeable Harvesters	16-Oct-14	Conducted subsistence mapping interviews with Chase residents
Anderson, Active and Knowledgeable Harvesters	20-24-Oct-14	Conducted subsistence mapping interviews with Anderson residents
McKinley Park, Active and Knowledgeable Harvesters	20-24-Oct-14	Conducted subsistence mapping interviews with McKinley Park residents
Wiseman, Active and Knowledgeable Harvesters	4-11-Nov-14	Conducted subsistence mapping interviews with Wiseman residents
Coldfoot, Active and Knowledgeable Harvester	4-11-Nov-14	Conducted subsistence mapping interviews with Coldfoot residents
Kenai, Traditional Knowledge Respondents	11-16-Nov-14	Conducted traditional knowledge workshops with Kenai residents
Ninilchik, Traditional Knowledge Respondents	11-16-Nov-14	Conducted traditional knowledge workshops with Ninilchik residents
Seldovia, Active and Knowledgeable Harvesters; Traditional Knowledge Respondents	11-15-Nov-14	Conducted subsistence mapping and traditional knowledge workshops/interviews with Seldovia residents
Seldovia, Active and Knowledgeable Harvesters; Traditional Knowledge Respondents	1-5-Dec-14	Conducted subsistence mapping and traditional knowledge workshops/interviews with Seldovia residents
Anderson, Active and Knowledgeable Harvesters	2-8-Dec-14	Conducted subsistence mapping interviews with Anderson residents
Ferry, Active and Knowledgeable Harvesters	2-8-Dec-14	Conducted subsistence mapping interviews with Ferry residents
McKinley Park, Active and Knowledgeable Harvesters	2-8-Dec-14	Conducted subsistence mapping interviews with McKinley Park residents
Chase, Active and Knowledgeable Harvesters	8-15-Dec-14	Conducted subsistence mapping interviews with Chase residents
Talkeetna, Active and Knowledgeable Harvesters	8-15-Dec-14	Conducted subsistence mapping interviews with Talkeetna residents
Trapper Creek, Active and Knowledgeable Harvesters	8-15-Dec-14	Conducted subsistence mapping interviews with Trapper Creek residents
Cantwell, Active and Knowledgeable Harvesters	5-10-Jan-15	Conducted subsistence mapping interviews with Cantwell residents
Ferry, Active and Knowledgeable Harvesters	7-15-Jan-15	Conducted subsistence mapping interviews with Ferry residents
Healy, Active and Knowledgeable Harvesters	7-15-Jan-15	Conducted subsistence mapping interviews with Healy residents
Kenai Peninsula Borough (KPB)	14-Jan-15	Discussed timber sales from Borough lands and stumpage rates

TABLE 5.1.2-3

Summary of Consultations with Other Interested Parties for Resource Report 5

Entity	Date	Summary
Salamatof, Traditional Knowledge Respondents	14-15-Jan-15	Conducted traditional knowledge workshops with Salamatof residents
Minto, Active and Knowledgeable Harvesters; Traditional Knowledge Respondents	10-Feb-15	Conducted subsistence mapping and traditional knowledge workshops/interviews with Minto residents
Port Graham, Active and Knowledgeable Harvesters; Traditional Knowledge Respondents	16-19-Feb-15	Conducted subsistence mapping and traditional knowledge workshops/interviews with Port Graham residents
Nanwalek, Active and Knowledgeable Harvesters; Traditional Knowledge Respondents	19-Feb-15	Conducted subsistence mapping and traditional knowledge workshops/interviews with Nanwalek residents
Talkeetna, Active and Knowledgeable Harvesters	23-28-Feb-15	Conducted subsistence mapping interviews with Talkeetna residents
Healy, Active and Knowledgeable Harvesters	6-16-Mar-15	Conducted subsistence mapping interviews with Healy residents
Alexander Creek (Susitna), Active and Knowledgeable Harvesters	11-15-Mar-15	Conducted subsistence mapping interviews with Alexander Creek residents
Port Graham, Active and Knowledgeable Harvesters; Traditional Knowledge Respondents	16-23-Mar-15	Conducted subsistence mapping and traditional knowledge workshops/interviews with Port Graham residents
Nenana, Active and Knowledgeable Harvesters; Traditional Knowledge Respondents	23-30-Mar-15	Conducted subsistence mapping and traditional knowledge workshops/interviews with Nenana residents
Nanwalek, Active and Knowledgeable Harvesters; Traditional Knowledge Respondents	26-Mar-3-Apr-15	Conducted subsistence mapping and traditional knowledge workshops/interviews with Nanwalek residents
Minto, Active and Knowledgeable Harvesters; Traditional Knowledge Respondents	6-12-Apr-15	Conducted subsistence mapping and traditional knowledge workshops/interviews with Minto residents
Cantwell, Active and Knowledgeable Harvesters	15-18-Apr-15	Conducted subsistence mapping interviews with Cantwell residents
Four-Mile Road, Active and Knowledgeable Harvesters	19-22-Apr-15	Conducted subsistence mapping interviews with Four-Mile Road residents
Healy, Active and Knowledgeable Harvesters	19-25-Apr-15	Conducted subsistence mapping interviews with Healy residents
Minto, Active and Knowledgeable Harvesters; Traditional Knowledge Respondents	21-24-Apr-15	Conducted subsistence mapping and traditional knowledge workshops/interviews with Minto residents
Nanwalek, Active and Knowledgeable Harvesters; Traditional Knowledge Respondents	27-Apr-1-May-15	Conducted subsistence mapping and traditional knowledge workshops/interviews with Nanwalek residents
Kenai Peninsula Borough (KPB)	2-Jul-15	Discussed how construction of Liquefaction Plant and Marine Terminal in Nikiski would place increased demand on existing infrastructure and public services in KPB communities
Manley Hot Springs, Active and Knowledgeable Harvesters	20-22-Jul-15	Conducted traditional knowledge workshops with Manley Hot Springs residents
Bettles, Active and Knowledgeable Harvesters	7-12-Oct-15	Conducted subsistence mapping interviews with Bettles residents
Evansville, Active and Knowledgeable Harvesters	7-12-Oct-15	Conducted subsistence mapping interviews with Evansville residents
Nenana, Active and Knowledgeable Harvesters; Traditional Knowledge Respondents	18-24-Nov-15	Conducted subsistence mapping and traditional knowledge workshops/interviews with Nenana residents

TABLE 5.1.2-3

Summary of Consultations with Other Interested Parties for Resource Report 5

Entity	Date	Summary
Stevens Village, Active and Knowledgeable Harvesters	1-5-Dec-15	Conducted subsistence mapping interviews with Stevens Village residents
Stevens Village, Active and Knowledgeable Harvesters	9-12-Dec-15	Conducted subsistence mapping interviews with Stevens Village residents
Matanuska-Susitna Borough (MSB)	11-Jan-16	Discussed MSB timber sales program and stumpage rates from recent sales
Alaska Travel Industry Association	12-Jan-16	Discussed how Project-related employment, truck traffic, and construction activity could impact cruise line operations in Anchorage and around Denali National Park and Preserve
Skwentna, Active and Knowledgeable Harvesters	18-23-Jan-16	Conducted subsistence mapping interviews with Skwentna residents
Skwentna, Active and Knowledgeable Harvesters	31-Jan-1-Feb-16	Conducted subsistence mapping interviews with Skwentna residents
Alatna, Active and Knowledgeable Harvesters	8-13-Feb-16	Conducted subsistence mapping interviews with Alatna residents
Allakaket, Active and Knowledgeable Harvesters	8-13-Feb-16	Conducted subsistence mapping interviews with Allakaket residents
Nikiski, Active and Knowledgeable Harvesters	1-10-Mar-16	Conducted subsistence mapping interviews with Nikiski residents
Ice Services, Inc.	1-Apr-16	Contacted regarding data for landfill near Prudhoe Bay
Fairweather LLC	16-Mar-17	Discussed current capacity at the Fairweather Deadhorse Medical Clinic

5.2 SOCIOECONOMIC STUDY AREA

5.2.1 Alaska Political Jurisdictions

The State of Alaska's Constitution, Article X, Section 2, provides that two forms of municipal government, cities and organized boroughs, form the basic structure of Alaska's system of local government. Both cities and boroughs are municipal corporations (Alaska Statute 29.04.010-020), and use of the term "municipality" applies to all incorporated political entities in the State. There are currently 18 boroughs in Alaska (Figure 5.2.1-1). In addition, 11 census areas were created by dividing the State's one unorganized borough into smaller statistical areas. The census areas do not have local governments.

The two place-level geographic entities for which the U.S. Census Bureau publishes data are incorporated places (cities in Alaska) and census-designated places (CDPs). Cities are governmental entities sanctioned by the State of Alaska to perform general-purpose functions. CDPs are unincorporated places delineated by State and borough officials in Alaska and are intended to encompass all people at a given location. Cities and CDPs are mutually exclusive of each other because, by definition, a CDP represents a named, unincorporated area (*Federal Register* 73 (4 November 2008): 65572-65582).

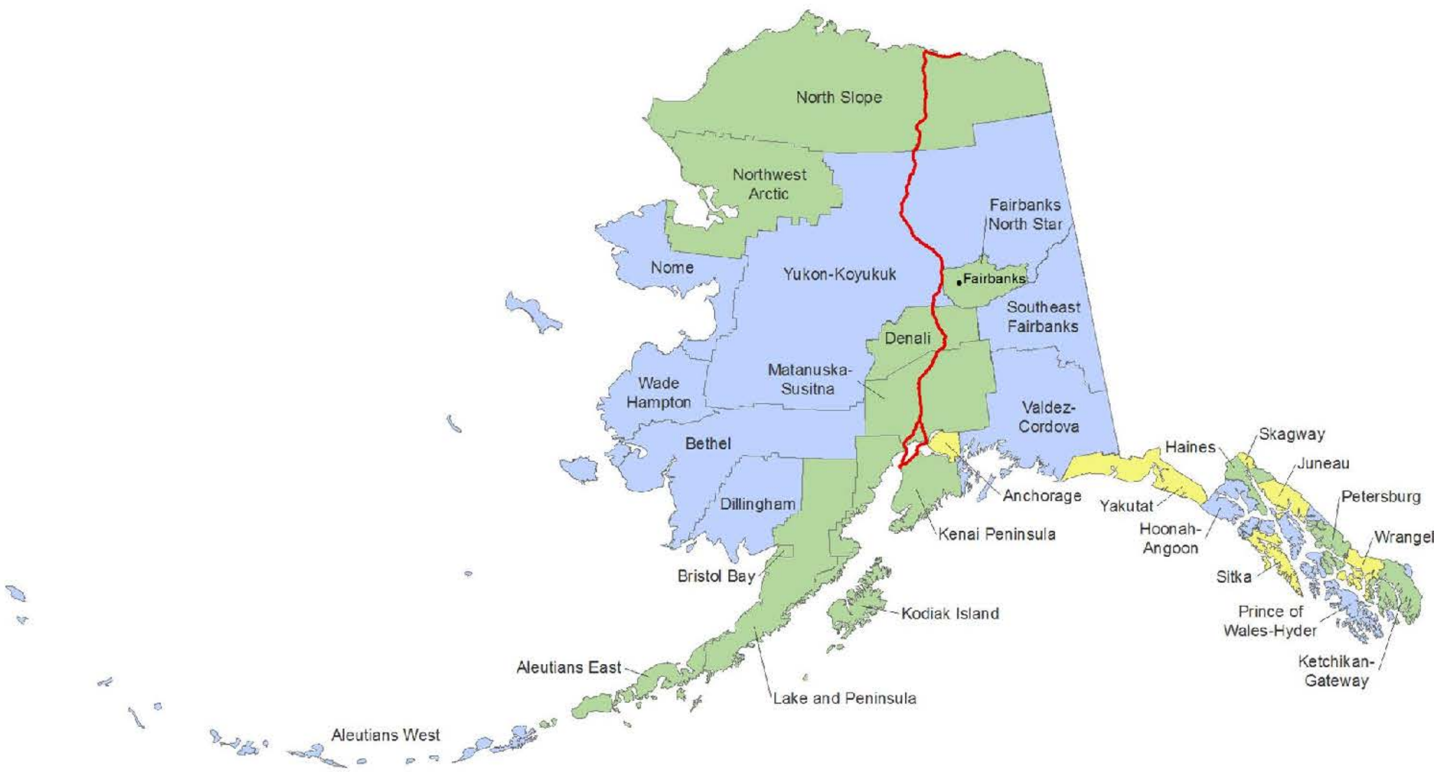
In addition, Alaska Native Village Statistical Areas (ANVSAs) were reported or delineated for the 2010 U.S. Census. The U.S. Census Bureau states that ANVSAs are statistical geographic entities representing the residences, permanent and/or seasonal, for Alaska Natives who are members of or receive governmental services from the defining Alaska Native Village (ANV), and that are located within the region and vicinity of the ANV's historic and/or traditional location. ANVSAs are intended to represent the relatively densely settled portion of each ANV and include only an area where Alaska Natives, especially members of the defining ANV, represent a substantial proportion of the population during at least one season of the year (at least three consecutive months) (*Federal Register* 73 (4 November 2008): 65572-65582).

ANVSAs are not constrained by other place-level geographic entities; that is, ANVSAs may or may not overlap cities and CDPs (*Federal Register* 73 [4 November 2008]: 65572-65582). A comparison based on 2010 U.S. Census demographic data indicates that some ANVSAs in the socioeconomic impact area have populations that differ from those of the cities or CDPs with the same name. These ANVSAs are listed separately in the description of the socioeconomic impact area to distinguish them from the corresponding cities or CDPs (TABLE 5.2.1-1).

TABLE 5.2.1-1

Alaska Native Village Statistical Areas in the Area of Interest

ANVSAs in the Area of Interest Not Described Separately		**ANVSAs in the Area of Interest Described Separately**	
Cantwell ANVSA	Salamatof ANVSA	Copper Center ANVSA	Mentasta Lake ANVSA
Chistochina ANVSA	Tanacross ANVSA	Dot Lake ANVSA	Ninilchik ANVSA
Knik ANVSA	Tyonek ANVSA	Eklutna ANVSA	Northway ANVSA
Manley Hot Springs ANVSA	Unalaska ANVSA	Evansville ANVSA	Tazlina ANVSA
Minto ANVSA		Gakona ANVSA	Tetlin ANVSA
Nenana ANVSA		Gulkana ANVSA	Nome ANVSA



LEGEND

- Borough
- City and Borough
- Census Area

DISCLAIMER

The information contained herein is for informational or planning purposes only, It does not nor should it be deemed to be an offer, request or proposals for rights or occupation of any kind. The Alaska LNG Project Participants and their respective officers, employees and agents, make no warranty, implied or otherwise, nor accept any liability, as to the accuracy or completeness of the information contained in these documents, drawings or electronic files. Do not remove or delete this note from document, drawing or electronic file.

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ALASKA BOROUGHS & CENSUS AREAS

FIGURE 5.2.1-1

Alaska LNG™

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5.2.2 Area of Interest and Alaska as a Whole

For the purposes of the socioeconomic analysis, the region encompassing the boroughs and census areas in which the Project facilities and major Project transportation routes are located is referred to as the "area of interest" (AOI) for the Project. As shown in Figure 1.1-1 of Resource Report No. 1, the Liquefaction Facility would be located in the Kenai Peninsula Borough (KPB); the Mainline would traverse the KPB, Matanuska-Susitna Borough (MSB), Denali Borough, Fairbanks North Star Borough (FNSB), Yukon-Koyukuk Census Area, and North Slope Borough (NSB); and the GTP, PBTL, and PTTL would be located in the NSB.

The boroughs and census areas in the AOI are parts of three major Alaska subregions: southcentral Alaska, Interior Alaska, and the North Slope. The KPB and MSB are part of southcentral Alaska, which is where most of the population of the State lives. This subregion also includes the Municipality of Anchorage, Alaska's most populous city and its primary transportation, communications, trade, service, and finance center. The Denali Borough, FNSB, and Yukon-Koyukuk Census Area are in Interior Alaska. This subregion, which covers most of the State, is sparsely populated and is largely remote and undeveloped. The largest city in Interior Alaska is Fairbanks, Alaska's second-largest city. The NSB is located on the North Slope, which lies between the foothills of the Brooks Range and the Arctic Ocean. The population of this subregion is concentrated in eight traditional communities (i.e., communities that were not created for the sole purpose of supporting the oil and gas industry) plus the Prudhoe Bay CDP, a community in which nearly all the population are employees of oil drilling or oil production and support companies. The Prudhoe Bay CDP population primarily resides outside the CDP when not on a work-shift rotation.

Given the scale of the Project and its potential importance to the Alaska economy, the direct socioeconomic effects of the Project would also be experienced throughout the State. These statewide effects would include employment, fiscal, and energy supply effects. For example, a wide range of occupations are needed to construct and operate a natural gas pipeline, and it is likely that workers in all regions of Alaska would benefit from the additional employment opportunities created by the Project (Rae 2009). In addition, the Project could generate or result in revenues for the State of Alaska potentially through production taxes and royalties paid in kind, income taxes, property taxes, and/or payments in lieu of taxes, bed or occupancy taxes, sales taxes, excise taxes, alcohol/tobacco taxes, and other taxes and fees. State revenues could support education, health facilities, and other public infrastructure and services in communities throughout Alaska. Finally, as described in Resource Report No. 1, an important objective of the Project is the provision of gas interconnection points along the Mainline that would allow for in-state deliveries, thereby benefiting in-state gas users and supporting long-term economic development. This gas potentially could be used for commercial, industrial, and residential uses, including heating and additional electric generation. The AOI, together with the State of Alaska as a whole, constitute the socioeconomic study area.

5.2.3 Potentially Affected Communities

Many of the direct socioeconomic effects of the Project would occur in the communities located within commuting distance (about 65 miles) of the Liquefaction Facility, in the vicinity of the Mainline corridor, or near the GTP, PBTL, and PTTL, and would result from the number of local and non-local construction workers who would work on the Project, their income and local expenditures, and their impact on traffic flow, population, housing, and public services. Some communities could also experience increased revenues during construction if impact payments are received to cover the costs of providing additional housing and public infrastructure and services. Other potential direct effects to communities are related to operation of the Project, such as impacts on the local economy, including increased tax revenue; increased job opportunities and income; and ongoing local expenditures during operation and maintenance of the Liquefaction Facility, Mainline, GTP, PTTL, and PBTL.

Direct effects during the construction phase of the Project also would occur in communities outside the Mainline and transmission line corridors, and those not in proximity to the Liquefaction Facility and the GTP as a result of the transportation of materials and equipment to Project construction sites through Alaska's ports and airports and along the State's highway and railway systems. In the Mainline corridor, transportation effects would be related to increased road and rail traffic or disruption of normal road traffic patterns. These transportation effects would be mainly concentrated in specific communities in the boroughs and census areas in which Project facilities would be constructed. Communities along the marine transportation corridors used by the Project may be affected by increased ship and tug and barge traffic. Most of these port communities are located in, or connected by highways to, the boroughs and census areas in which Project facilities would be constructed. However, a few primary and secondary port communities along the marine transportation corridors, such as Unalaska are located outside of, and have no road connection to, those boroughs and census areas.

The Project is expected to stimulate state and local economies through job creation, an enhanced tax base, and increased economic activity. To some extent, these indirect effects of the Project on economic growth would be experienced by the State of Alaska as a whole, but they are likely to be concentrated in communities adjacent to Project facilities, such as Nikiski, and in the State's population and commercial centers, including Anchorage and Fairbanks. The beneficial effects on local government revenues are expected to be especially substantial in certain boroughs, such as the NSB and KPB. These fiscal impacts, in turn, could lead to increased employment, public services, and population in the communities within the affected boroughs.

For the purposes of the socioeconomic analysis, a potentially affected community (PAC) is defined as a city, CDP, or ANVSA in the AOI where Project-related socioeconomic impacts may reasonably be expected to occur. Each PAC could experience socioeconomic impacts to a various degree, and it is important to identify all communities that could be affected. To identify the communities in the AOI in a systematic manner, a city, CDP, or ANVSA is considered a PAC based on one or more of the following three factors:

- Whether the city, CDP, or ANVSA could be potentially affected by the short-term influx of Project construction workers to any Project facility or infrastructure, such as the Liquefaction Facility, Mainline, GTP, PBTL, or PTTL, or a construction camp, compressor station, or storage yard;
- Whether the city, CDP, or ANVSA is located on or near a transportation corridor, including a port, highway, airport, or railway used to transport Project materials, equipment, or workers during Project construction and operation; or
- Whether the city, CDP, or ANVSA is a major logistical and supply center for Alaska's oil and gas industry.

Communities located in boroughs that could experience indirect socioeconomic effects as a result of the Project, such as growth-related impacts due to changes in population, employment, and economic development during Project construction and operation, are not individually listed. However, the affected boroughs are identified. These boroughs include the NSB, FNSB, MSB, KPB, and Municipality of Anchorage. For the purposes of the analysis, all communities within these boroughs are considered to have potential indirect effects.

TABLE 5.2.3-1 presents a list of PACs based on the above criteria, together with the boroughs and census areas in the AOI. PACs have been grouped together according to the borough or census area in which they are located.

As discussed above, the Liquefaction Facility would be located in the KPB; the Mainline would traverse the NSB, Yukon-Koyukuk Census Area, FNSB, Denali Borough, MSB, and KPB; and the GTP, PBTL, and PTTL would be located in the NSB. In addition, the boroughs and census areas in which Project-related transportation and economic growth effects could potentially occur are presented, with those boroughs and census areas nearest to the Project corridor and facilities listed first. PACs within each borough or census area are listed in alphabetical order. Potentially affected port communities located outside of the boroughs and census areas in which Project facilities would be situated and that have no road connections to those boroughs and census areas are placed in an "Other" category. The communities listed are those that could experience socioeconomic impacts; subsistence and health impacts may affect a different set of communities.

TABLE 5.2.3-1

Alaska Boroughs, Census Areas, Cities, Census Designated Places, and Alaska Native Village Statistical Areas in the Area of Interest for the Socioeconomic Impact Analysis

	Project Facility in the Area	Transportation Corridor	Logistical and Supply Center	Growth-Related Effects
North Slope Borough	Mainline/GTP/PTTL/PBTL			X
Prudhoe Bay CDP	Mainline/GTP/PTTL/PBTL	Dalton Hwy/primary port/airport	X	
Yukon-Koyukuk Census Area	Mainline			
Bettles		Dalton Hwy		
Coldfoot		Dalton Hwy/airport		
Evansville/Evansville ANVSA		Dalton Hwy		
Livengood		Dalton Hwy/airport		
Manley Hot Springs		Dalton Hwy		
Minto		Dalton Hwy		
Nenana	Mainline	Parks Hwy/airport		
Wiseman	Mainline	Dalton Hwy		
Fairbanks North Star Borough	Mainline			X
Fairbanks		Richardson Hwy/Parks Hwy/Steese Hwy/ airport/railway	X	
Denali Borough	Mainline			
Anderson		Parks Hwy		
Cantwell		Parks Hwy/airport		
Healy	Mainline	Parks Hwy/airport		
McKinley Park	Mainline	Parks Hwy		
Matanuska-Susitna Borough	Mainline			X

TABLE 5.2.3-1

Alaska Boroughs, Census Areas, Cities, Census Designated Places, and Alaska Native Village Statistical Areas in the Area of Interest for the Socioeconomic Impact Analysis

	Project Facility in the Area	Transportation Corridor	Logistical and Supply Center	Growth-Related Effects
Big Lake	Mainline	Parks Hwy		
Houston	Mainline	Parks Hwy		
Knik-Fairview		Knik–Goose Bay Rd		
Palmer		Parks Hwy		
Point MacKenzie	Mainline	Knik–Goose Bay Road/secondary port/railway		
Skwentna	Mainline			
Talkeetna	Mainline	Parks Hwy/airport		
Trapper Creek	Mainline	Parks Hwy		
Wasilla	Mainline	Parks Hwy		
Willow	Mainline	Parks Hwy/airport		
Kenai Peninsula Borough	Mainline			X
Anchor Point		Sterling Hwy		
Beluga		Road to Tyonek/airport/ primary barge landing		
Clam Gulch		Sterling Hwy		
Cohoe	Liquefaction Facility	Sterling Hwy		
Cooper Landing		Sterling Hwy		
Happy Valley		Sterling Hwy		
Homer		Sterling Hwy/secondary port		
Kalifornsky	Liquefaction Facility	Sterling Hwy		
Kasilof	Liquefaction Facility	Sterling Hwy		
Kenai	Liquefaction Facility	Airport		
Moose Pass		Seward Hwy		
Nikiski	Liquefaction Facility	Primary port	X	
Ninilchik/Ninilchik ANVSA		Sterling Hwy		
Salamatof	Liquefaction Facility			
Seward		Seward Hwy/ primary port/railway/airport		
Soldotna	Liquefaction Facility	Sterling Hwy		
Sterling	Liquefaction Facility	Sterling Hwy		
Tyonek	Mainline			
Municipality of Anchorage				X
Anchorage		Glenn Hwy/Seward Hwy/primary port/airport/railway	X	
Eklutna ANVSA		Glenn Hwy		
Southeast Fairbanks Census Area				
Big Delta		Richardson Hwy		
Delta Junction		Richardson Hwy		
Dot Lake/Dot Lake ANVSA		Alaska Hwy		
Dry Creek		Alaska Hwy		

TABLE 5.2.3-1

Alaska Boroughs, Census Areas, Cities, Census Designated Places, and Alaska Native Village Statistical Areas in the Area of Interest for the Socioeconomic Impact Analysis

	Project Facility in the Area	Transportation Corridor	Logistical and Supply Center	Growth-Related Effects
Tanacross		Alaska Hwy		
Tok		Alaska Hwy		
Tetlin		Alaska Hwy		
Northway Junction		Alaska Hwy		
Northway		Alaska Hwy		
Alcan Border		Alaska Hwy		
Municipality of Skagway Borough		Klondike Hwy/Alaska Hwy/secondary port		
Valdez-Cordova Census Area				
Chistochina		Tok Cutoff		
Copper Center/Copper Center ANVSA		Richardson Hwy		
Gakona		Richardson Hwy		
Gakona ANVSA		Richardson Hwy		
Glennallen		Richardson Hwy		
Gulkana		Richardson Hwy		
Gulkana ANVSA		Richardson Hwy		
Mentasta Lake/Mentasta Lake ANVSA		Tok Cutoff		
Paxson		Richardson Hwy		
Slana		Tok Cutoff		
Tazlina/Tazlina ANVSA		Richardson Hwy		
Tonsina		Richardson Hwy		
Valdez		Richardson Hwy/secondary port/ airport		
Whittier		Secondary port/railway		
Other				
Adak		Secondary port		
Nome/Nome ANVSA		Secondary port		
Unalaska		Primary port/airport		

Notes:
A city/CDP and the corresponding ANVSA are listed separately only if the populations of the two geographical units differ.

5.2.4 Out-of-State Area

The number of workers with oil and gas occupational skills necessary to support construction of the Project would be greater than what the Alaska workforce can provide, even with ongoing training for the Alaska workforce. Moreover, a portion of the jobs created during the operation phase would also likely be filled by out-of-state workers. In addition to employment effects, construction of the Project would require materials, supplies, and equipment from the rest of the U.S. and other countries. At this point however, it is uncertain what cities or counties outside of Alaska would be affected by Project-related construction and operation activities or expenditures on materials, supplies, and equipment. For the purposes of the socioeconomic analysis, the out-of-state area is generally considered outside the socioeconomic study area, and it is not included in the description of existing conditions for Resource Report No. 5.

5.3 EXISTING SOCIOECONOMIC CONDITIONS

This section provides an overview of existing demographic, economic, and fiscal conditions in the socioeconomic study area. Socioeconomic data came from a variety of State and federal agencies, including the U.S. Census Bureau, U.S. Bureau of Labor Statistics, Alaska Department of Labor and Workforce Development (ADOLWD), and Alaska Department of Commerce, Community and Economic Development (ADCCED).

Sources of population statistics from the U.S. Census Bureau included the 2000 and 2010 decennial censuses and the 2009–2013 5-year American Community Survey (ACS). The ACS was developed by the U.S. Census Bureau to obtain the same information previously collected on the long form questionnaire of the 2000 U.S. Census, but more frequently than every 10 years. In contrast to previous decennial censuses, the 2010 U.S. Census did not collect income and poverty information; consequently, the most recent community-level data for these socioeconomic variables are from the 2009–2013 ACS survey. All ACS estimates should be interpreted as average values over the designated period. The smaller overall sample size of the ACS means its estimates are subject to higher sampling error levels than estimates provided by the decennial censuses. In particular, the small populations in many communities within the AOI make it difficult to present accurate recent estimates of socioeconomic characteristics. Estimates for the populations of some small communities are subject to a high margin of error (MOE), while in other small communities there were either no sample observations or too few sample observations to compute an estimate. The tabular data presented in the description of existing socioeconomic conditions include the MOE when it is reported in the data source. It is also important to note that data at the community level are unavailable for some of the socioeconomic variables described; however, data are reported for the State and affected boroughs and census areas.

5.3.1 Demographics

5.3.1.1 Population Size and Density

In 2013, the population of Alaska was 735,662, a 17 percent increase since 2000 (TABLE 5.3.1-1). Although Alaska went through several years of negative net migration during that period, the birth rate in those years outweighed the number of people who left the State (Alaska Department of Labor and Workforce Development 2015b).

Nearly 80 percent of the State's population, or around 587,000 people, resided in the boroughs and census areas within the AOI in 2013. The major populations are clustered in and around the Municipality of Anchorage and Fairbanks, which together accounted for approximately half of the AOI's population.

Population growth in the AOI between 2000 and 2013 was highest by far in the MSB, which is adjacent to Anchorage. Population growth in the borough was 62 percent, as compared to 17 percent in Alaska as a whole. The MSB is in many ways an Anchorage suburb, with almost a third of the borough's residents commuting to Anchorage daily for work (Fried 2013b). While the Municipality of Anchorage has net gains from the rest of the state, it has consistently lost population to the MSB. During the 2000–2008 period, 14.5

percent of the average annual movement out from Anchorage was to the MSB. The movement to the MSB reached its peak in 2005–2006; after that, migration to the borough declined, and migration from the borough increased (Williams 2010). Nevertheless, the MSB continues to be Alaska's fastest growing area (Sandberg 2016). The FNSB also experienced population increases exceeding the State average. The NSB's substantial increase in population is due primarily to the inclusion in the ACS of oil and gas industry workers occupying employer-provided housing in the Prudhoe Bay CDP; these workers were not counted in the 2000 U.S. Census. Six of the eight traditional communities in the NSB lost population between 2000 and 2013.

Other boroughs and census areas within the AOI experienced moderate growth similar to the State average, with the exception of the Denali Borough, Yukon-Koyukuk Census Area, and Valdez-Cordova Census Area, which lost population from 2000 to 2013. In particular, residents of rural villages located on the road system in Interior Alaska appear to be migrating to Fairbanks or southcentral Alaska in search of better employment opportunities (Williams and Moro 2010).

The average population density of the State was 1.3 persons per square mile in 2013, and the boroughs and census areas in the AOI are predominantly rural and sparsely populated. The highest population density in the AOI was in Fairbanks and Palmer, with over 1,000 persons per square mile in 2013. The lowest population density in the AOI was in the Yukon-Koyukuk Census Area, which had a density of less than 0.1 persons per square mile. This census area is the largest and least populated of all the nation's counties or equivalents (Shanks 2013). The Denali Borough also is sparsely populated. Denali National Park and Preserve accounts for 70 percent of the borough's land area, and nearly all the borough's residents live along a 70-mile stretch of the Parks Highway (Fried 2009).

TABLE 5.3.1-1

Population and Population Density in the Socioeconomic Study Area, 2000 and 2013

	Population			**Population Density (persons per square mile)**	
Area	**2000**	**2013**	**Percent Change 2000–2013**	**2000**	**2013**
Alaska	626,932	735,662	17	1.1	1.3
North Slope Borough	7,385	9,869	34	0.1	0.1
Prudhoe Bay CDP	—	2,174	—	—	5.7
Yukon-Koyukuk Census Area	6,551	5,639	-14	0.0	0.0
Bettles	43	13	-70	26.2	7.5
Coldfoot	13	11	-15	0.4	0.3
Evansville	28	8	-71	1.3	0.4
Evansville ANVSA	71	20	-72	3.0	3.3
Livengood	29	14	-52	0.1	0.1
Manley Hot Springs	72	127	76	1.3	2.3
Minto	258	214	-17	1.9	1.6
Nenana	402	399	-1	66.6	67.6
Wiseman	21	15	-29	0.3	0.2
Fairbanks North Star Borough	82,840	99,549	20	11.2	13.6
Fairbanks	30,224	32,185	6	948.7	1,015.6
Denali Borough	1,893	1,790	-5	0.1	0.1

TABLE 5.3.1-1

Population and Population Density in the Socioeconomic Study Area, 2000 and 2013

Area	**Population**			**Population Density (persons per square mile)**	
	2000	**2013**	**Percent Change 2000–2013**	**2000**	**2013**
Anderson	367	235	-36	7.9	5.4
Cantwell	222	196	-12	1.9	1.7
Healy	1,000	1,064	6	1.5	1.5
McKinley Park	142	178	25	0.8	1.0
Matanuska-Susitna Borough	59,322	95,994	62	2.4	3.9
Big Lake	2,635	3,585	36	20.0	30.9
Houston	1,202	2,037	69	53.7	90.9
Knik-Fairview	7,049	16,304	131	101.0	196.2
Palmer	4,533	6,079	34	1,206.3	1,180.4
Point MacKenzie	111	1,533	1281	0.8	10.1
Skwentna	111	33	-70	0.3	0.1
Talkeetna	772	859	11	18.6	32.1
Trapper Creek	423	474	12	1.2	1.5
Wasilla	5,469	8,355	53	466.8	674.9
Willow	1,658	2,116	28	2.4	3.1
Kenai Peninsula Borough	49,691	56,813	14	3.1	3.5
Anchor Point	1,845	2,038	10	20.3	22.2
Beluga	32	16	-50	0.3	0.2
Clam Gulch	173	194	12	12.6	14.5
Cohoe	1,168	1,381	18	16.7	19.8
Cooper Landing	369	279	-24	5.6	4.2
Happy Valley	489	572	17	5.5	6.5
Homer	3,946	5,131	30	372.9	371.0
Kalifornsky	5,846	8,328	42	84.5	120.9
Kasilof	471	588	25	45.4	56.4
Kenai	6,942	7,239	4	232.2	253.2
Moose Pass	206	249	21	11.4	14.1
Nikiski	4,327	4,588	6	62.2	66.1
Ninilchik	772	854	11	3.7	4.1
Ninilchik ANVSA	13,264	14,755	11	14.7	16.4
Salamatof	954	1,167	22	117.7	144.3
Seward	2,830	2,489	-12	196.0	176.4
Soldotna	3,759	4,280	14	541.9	620.3
Sterling	4,705	5,789	23	60.9	74.4
Tyonek	193	178	-8	2.9	2.6
Municipality of Anchorage	260,283	300,780	16	153.4	176.4
Eklutna ANVSA	394	54	-86	31.9	11.9
Southeast Fairbanks Census Area	6,174	7,092	15	0.2	0.3
Alcan Border	21	27	29	0.1	0.2

TABLE 5.3.1-1

Population and Population Density in the Socioeconomic Study Area, 2000 and 2013

	Population			Population Density (persons per square mile)	
Area	**2000**	**2013**	**Percent Change 2000–2013**	**2000**	**2013**
Big Delta	749	549	-27	13.6	12.0
Delta Junction	840	1,101	31	48.7	65.5
Dot Lake	19	19	0	0.1	0.1
Dot Lake ANVSA	38	50	32	10.5	11.7
Dry Creek	128	104	-19	0.8	0.7
Northway	95	80	-16	5.0	4.3
Northway ANVSA	107	255	138	40.5	7.1
Northway Junction	72	64	-11	8.5	8.0
Tanacross	140	137	-2	1.7	1.7
Tetlin	117	112	-4	1.7	1.7
Tetlin ANVSA	—	115	—	—	0.6
Tok	1,393	1,264	-9	10.5	9.5
Municipality of Skagway Borough	862	981	14	1.9	2.2
Valdez-Cordova Census Area	10,195	9,811	-4	0.3	0.3
Chistochina	93	95	2	0.3	0.3
Copper Center	362	315	-13	26.4	25.2
Copper Center ANVSA	492	429	-13	29.6	27.8
Gakona	215	217	1	3.5	3.6
Gakona ANVSA	84	121	44	20.0	3.3
Glennallen	554	512	-8	4.9	4.4
Gulkana	88	117	33	2.4	3.4
Gulkana ANVSA	164	134	-18	20.0	30.9
Mentasta Lake	142	129	-9	0.5	0.4
Mentasta Lake ANVSA	125	106	-15	1.4	2.8
Paxson	43	33	-23	0.1	0.1
Slana	124	138	11	0.5	0.5
Tazlina	149	295	98	22.7	35.9
Tazlina ANVSA	339	318	-6	27.7	25.9
Tonsina	92	86	-7	0.6	0.5
Valdez	4,036	4,097	2	18.2	18.9
Whittier	182	229	26	14.5	18.7
Other					
Adak	316	282	-11	2.6	8.3
Nome	3,505	3,656	4	279.7	289.5
Nome ANVSA	3,583	3,737	4	28.9	29.9
Unalaska	4,283	4,735	11	38.6	42.4

Source: ADOLWD (2015b); U.S. Census Bureau (2016a)
Notes:
A “—” indicates that the measure is unavailable.

TABLE 5.3.1-1

Population and Population Density in the Socioeconomic Study Area, 2000 and 2013

	Population			Population Density (persons per square mile)	
Area	**2000**	**2013**	**Percent Change 2000–2013**	**2000**	**2013**

[a] Oil and gas industry workers residing in group quarters in the Prudhoe Bay CDP were excluded from the population count in the 2000 census.

TABLE 5.3.1-2 shows the projected population in the socioeconomic study area based on forecasts from ADOLWD that cover the period 2015 to 2045 (Alaska Department of Labor and Workforce Development 2016b). The data for 2046 to 2060 were extrapolated using the preceding years' (2040 to 2045) annual growth rate. ADOLWD's population forecast is based on population age structure and historical trends in each of the components of population change: birth rates, death rates, and migration. Areas expected to have positive levels of net-migration throughout the projection period include the MSB, KPB, FNSB, and Southeast Fairbanks Census Area, while the Yukon-Koyukuk Census Area and Valdez-Cordova Census Area are projected to experience negative net-migration strong enough to cause a substantial population decline.

TABLE 5.3.1-2

Projected Population in the Socioeconomic Study Area, 2015 to 2060

	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060
Alaska	754,816	791,753	825,869	856,830	885,618	913,682	942,210	971,535	1,001,772	1,032,951
North Slope Borough	9,672	9,580	9,495	9,462	9,523	9,678	9,875	10,074	10,277	10,484
Yukon-Koyukuk Census Area	5,648	5,372	5,107	4,870	4,642	4,465	4,357	4,268	4,182	4,097
Fairbanks North Star Borough	104,153	110,386	116,021	121,050	125,694	130,219	134,782	139,497	144,376	149,426
Denali Borough	1,856	1,824	1,785	1,741	1,684	1,631	1,580	1,532	1,486	1,441
Matanuska-Susitna Borough	100,630	112,709	125,058	137,456	149,659	161,519	173,679	186,641	200,571	215,540
Kenai Peninsula Borough	58,216	60,513	62,410	63,838	64,785	65,431	65,982	66,545	67,113	67,685
Municipality of Anchorage	307,440	321,215	333,420	343,873	353,009	361,528	369,929	378,516	387,303	396,293
Southeast Fairbanks Census Area	7,606	8,277	8,923	9,547	10,168	10,827	11,541	12,292	13,093	13,946
Municipality of Skagway Borough	976	1,004	1,018	1,018	1,014	1,007	999	989	979	969
Valdez-Cordova Census Area	9,893	8,797	8,660	8,497	8,325	8,153	7,988	7,825	7,666	7,511

Source: ADOLWD (2016b)

5.3.1.2 Age Characteristics

TABLE 5.3.1-3 shows the age distribution of the population in the socioeconomic study area in 2010, the most recent year for which reliable age-cohort data are available. Among the boroughs and census areas in the AOI, the NSB has the highest proportion of working-age (16 years and over) adults. The borough's high proportion of working-age individuals can be traced to the large oil and gas industry work camp in the Prudhoe Bay CDP. The port communities of Unalaska and Whittier also have high percentages of working-age adults. The Yukon-Koyukuk Census Area has the lowest proportion of working-age adults. A smaller proportion of working-age people is fairly typical of rural areas in Alaska due to a higher birthrate and out-migration of those seeking educational and employment opportunities elsewhere. This is also true of the NSB's traditional communities.

Within the FNSB, Fairbanks has a comparatively low median age because of the presence of the University of Alaska Fairbanks' student population. While the traditional communities in the NSB have a median age lower than that of the State, the Prudhoe Bay CDP has a relatively high median age due to the absence of families with children in this industrial enclave. The large contingent of baby boomers living in the Denali Borough resulted in the highest median age of all areas in the AOI (Fried 2009).

Both the KPB and Yukon-Koyukuk Census Area have larger proportions of people aged 65 or older compared to the State as a whole. The KPB maintains a high retiree population (Shanks and Rasmussen 2010), while the out-migration of working-age adults likely accounts for the high percentage of seniors in the Yukon-Koyukuk Census Area (Shanks 2013).

Out-migration from the Yukon-Koyukuk Census Area accounts also for the large proportion of people under 16. As noted above, out-migration is common for working-age adults. The young and middle-aged adults that remain have higher-than-average birth rates, which translate into a higher percentage of children (Shanks 2013). The MSB has the highest proportion of people under 16, likely because families in search of more affordable real estate outside Anchorage tend to gravitate toward the borough (Fried 2010).

TABLE 5.3.1-3

Age Characteristics in the Socioeconomic Study Area, 2010

	Age (Percent)			
	Under 16	**16-64**	**65 and Over**	**Median Age**
Alaska	23.4	68.9	7.7	33.8
North Slope Borough	21.3	74.4	4.3	35.1
Prudhoe Bay CDP	0.0	97.9	2.1	49.1
Yukon-Koyukuk Census Area	24.4	65.4	10.2	35.3
Bettles	0.0	91.7	8.3	55.7
Coldfoot	20.0	70.0	10.0	43.0
Evansville	6.7	80.0	13.3	51.3
Evansville ANVSA	3.8	88.5	7.7	53.0
Livengood	0.0	84.6	15.4	50.8
Manley Hot Springs	21.3	63.0	15.7	49.5
Minto	26.7	63.8	9.5	29.6
Nenana	19.8	65.6	14.6	48.0
Wiseman	21.4	71.5	7.1	28.5

TABLE 5.3.1-3

Age Characteristics in the Socioeconomic Study Area, 2010

	Age (Percent)			Median Age
	Under 16	16-64	65 and Over	
Fairbanks North Star Borough	23.0	70.5	6.5	31.0
Fairbanks	23.8	68.9	7.3	27.9
Denali Borough	19.9	72.6	7.5	41.5
Anderson	17.5	73.6	8.9	45.3
Cantwell	17.4	68.9	13.7	42.7
Healy	22.2	72.3	5.5	40.1
McKinley Park	11.4	82.1	6.5	44.3
Matanuska-Susitna Borough	25.5	66.6	7.9	34.8
Big Lake	20.5	68.3	11.2	42.4
Houston	24.0	67.4	8.6	35.4
Knik-Fairview	29.0	65.2	5.8	31.2
Palmer	25.4	65.0	9.6	30.1
Point MacKenzie	15.9	76.0	8.1	32.8
Skwentna	2.7	81.1	16.2	52.8
Talkeetna	17.4	72.4	10.2	45.4
Trapper Creek	16.8	70.3	12.9	48.0
Wasilla	26.1	63.6	10.3	32.2
Willow	18.6	66.7	14.7	46.4
Kenai Peninsula Borough	20.6	68.1	11.3	40.6
Anchor Point	17.9	68.1	14.0	47.1
Beluga	10.0	60.0	30.0	55.5
Clam Gulch	13.6	72.8	13.6	51.7
Cohoe	16.7	71.8	11.5	46.3
Cooper Landing	8.0	62.6	29.4	55.6
Happy Valley	15.3	67.7	17.0	51.3
Homer	19.1	66.4	14.5	44.0
Kalifornsky	23.3	67.6	9.1	37.8
Kasilof	17.5	69.6	12.9	44.5
Kenai	24.6	65.6	9.8	34.7
Moose Pass	21.0	67.6	11.4	41.5
Nikiski	23.9	66.2	9.9	39.4
Ninilchik	14.3	67.6	18.1	51.8
Ninilchik ANVSA	19.3	68.0	12.7	44.6
Salamatof	11.8	80.0	8.2	38.2
Seward	13.1	77.4	9.5	38.3
Soldotna	23.7	63.0	13.3	36.7
Sterling	19.0	68.5	12.5	44.1
Tyonek	27.5	65.5	7.0	33.6
Municipality of Anchorage	23.0	69.8	7.2	32.9
Eklutna ANVSA	20.4	64.8	14.8	44.5
Southeast Fairbanks Census Area	23.1	67.5	9.4	37.4
Big Delta	24.7	66.2	9.1	40.0

TABLE 5.3.1-3

Age Characteristics in the Socioeconomic Study Area, 2010

	Age (Percent)			
	Under 16	**16-64**	**65 and Over**	**Median Age**
Delta Junction	25.6	65.7	8.7	32.4
Dot Lake	15.4	84.6	0.0	48.5
Dot Lake ANVSA	38.7	54.8	6.5	28.0
Dry Creek	27.7	55.3	17.0	37.3
Tanacross	23.5	63.3	13.2	38.5
Tok	20.5	66.8	12.7	44.1
Tetlin	28.3	63.0	8.7	30.6
Tetlin ANVSA	28.5	63.0	8.5	30.5
Northway Junction	31.5	46.3	22.2	35.0
Northway	22.5	64.8	12.7	35.5
Northway ANVSA	24.0	57.4	18.6	37.0
Alcan Border	30.3	69.7	0.0	34.5
Municipality of Skagway Borough	13.2	77.7	9.1	41.2
Valdez-Cordova Census Area	21.5	70.2	8.3	39.8
Chistochina	21.5	61.3	17.2	43.5
Copper Center	28.0	65.3	6.7	35.3
Copper Center ANVSA	26.7	67.2	6.1	36.8
Gakona	22.5	65.6	11.9	40.7
Gakona ANVSA	20.5	67.2	12.3	42.3
Glennallen	22.8	67.7	9.5	35.8
Gulkana	36.1	54.7	9.2	26.3
Gulkana ANVSA	33.1	54.4	12.5	29.3
Mentasta Lake	27.7	59.8	12.5	34.0
Mentasta Lake ANVSA	31.5	58.7	9.8	30.8
Paxson	10.0	85.0	5.0	54.0
Slana	19.0	68.1	12.9	53.1
Tazlina	21.2	67.0	11.8	38.5
Tazlina ANVSA	22.6	66.4	11.0	36.8
Tonsina	9.0	82.0	9.0	49.3
Valdez	22.3	72.2	5.5	36.7
Whittier	12.3	75.4	12.3	48.0
Other				
Adak	10.7	83.8	5.5	45.5
Nome	25.0	67.9	7.1	31.6
Nome ANVSA	25.2	67.7	7.1	31.7
Unalaska	12.0	85.3	2.7	40.7

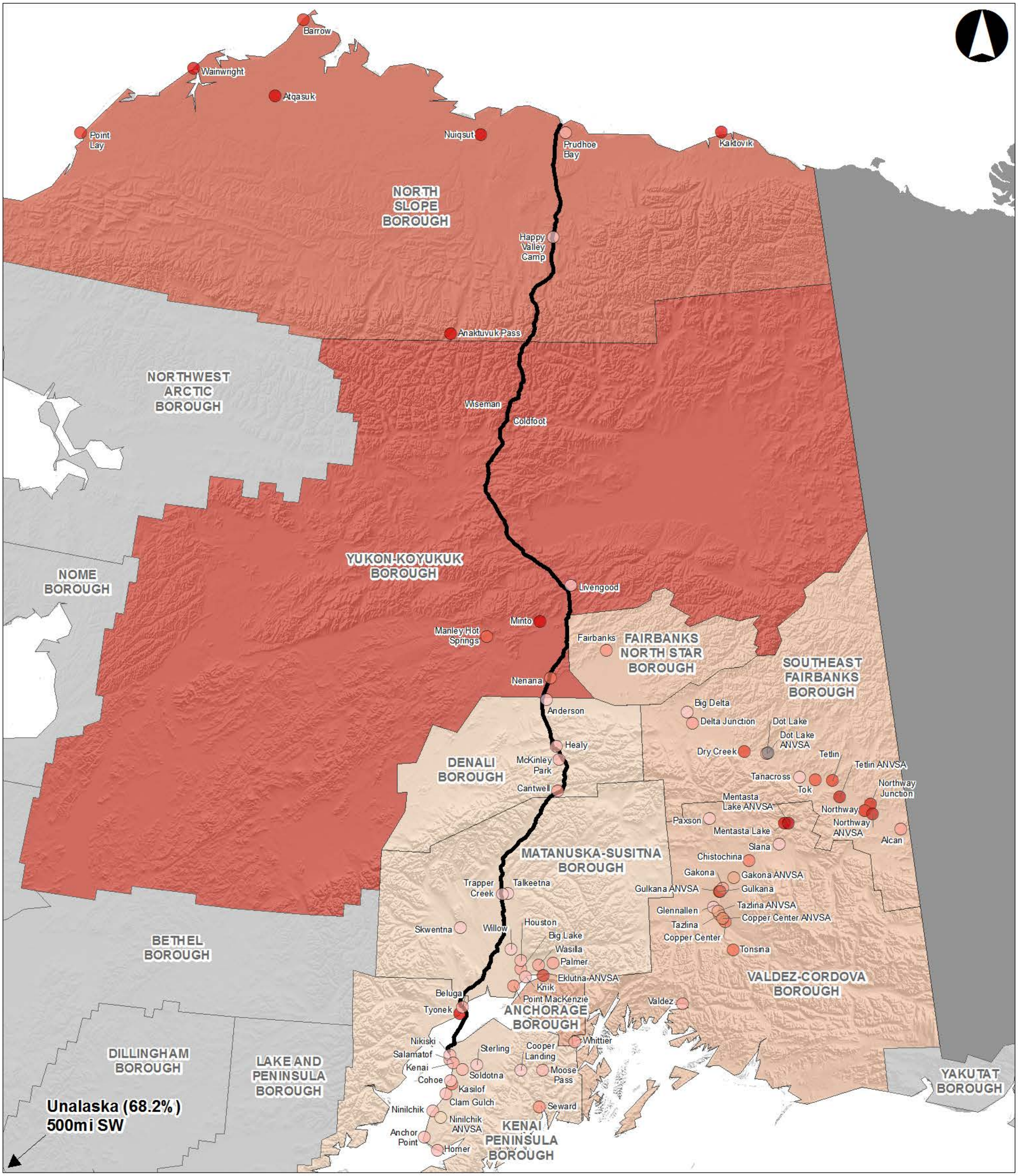
Source: U.S. Census Bureau (2016a)

5.3.1.3 Race and Ethnicity

Figure 5.3.1-1 shows the racial/ethnic minority percentage of the average 2009–2013 population in the AOI and adjacent regions of the State. Census tracts are the smallest geographic level of census data for which complete and reliable race and ethnicity estimates are available from the ACS.

As shown in TABLE 5.3.1-4, whites comprise the largest racial grouping in Alaska, followed by Alaska Native/American Indians, the vast majority of whom are Alaska Native. Larger populations tend to correspond with lower proportions of Alaska Native residents. In 2010, places in Alaska with more than 10,000 residents were only 8 percent Alaska Native, while places with fewer than 2,500 were over 40 percent Alaska Native (Goodman 2011). Within the AOI, the Yukon-Koyukuk Census Area and NSB have the highest minority populations due to a large number of predominantly Alaska Native communities in those areas. Residents of the Yukon-Koyukuk Census Area are mainly Athabascan, while NSB residents are primarily Iñupiat. Many of the Alaska Natives in these areas speak an indigenous language, in addition to English.

Whites make up the large majority of the populations in the KPB, MSB, Denali Borough, FNSB, and Municipality of Skagway. The Denali Borough has the lowest minority population among the boroughs and census areas in the AOI. Minority and white populations in Fairbanks and the Municipality of Anchorage are close to the State averages.



VICINITY MAP

LEGEND

Minority Percent

- No Data
- 0% - 10%
- 10% - 20%
- 20% - 30%
- 30% - 40%
- 40% - 50%
- 50% - 60%
- 60% - 70%
- 70% - 80%
- 80% - 90%
- 90% - 100%

Pre-FEED Mainline Study Corridor

0 37.5 75 150 Miles

DISCLAIMER

PREPARED BY:	AECOM
SCALE:	1:6,000,000
DATE: 2016-05-27	SHEET: 1 of 1

RACE AND ETHNICITY AVERAGE 2009-2013

FIGURE 5.3.1-1

Alaska LNG™

I:\26221163 SCLNG Studies\10 - Geospatial\10.06 - MXD\2016 Reporting\NEI\Template Update\Figure 5.3.1-1 Percent Racial and Ethnic Minorities by Census Tract 2009-2013.mxd

TABLE 5.3.1-4

Race and Ethnicity in the Socioeconomic Study Area, Average 2009–2013

	White[a]		**Black or African American[b]**		**Alaska Native and American Indian[b]**		**Native Hawaiian and Other Pacific Islander[b]**		**Asian[b]**		**Some Other Race**		**Hispanic or Latino[c]**		**Minority[d]**	
	(%)	**MOE (+/-)**	**(%)**	**MOE (+/-)**	**(%)**	**MOE (+/-)**	**(%)**	**MOE (+/-)**	**(%)**	**MOE (+/-)**	**(%)**	**MOE (+/-)**	**(%)**	**MOE (+/-)**	**(%)**	**MOE (+/-)**
Alaska	63.5	0.1	5.0	0.1	19.4	0.1	1.6	0.1	7.2	0.1	1.6	0.1	5.9	0.1	36.5	0.1
North Slope Borough	32.1	0.2	1.1	0.8	58.6	0.9	1.8	0.4	5.3	0.2	1.6	1.0	3.0	—	67.9	0.2
Prudhoe Bay CDP	84.7	4.4	0.2	0.5	9.9	4.2	0.0	0.9	2.5	2.4	1.6	2.3	2.9	2.8	15.3	4.4
Yukon-Koyukuk Census Area	21.8	0.1	1.0	0.2	75.8	0.6	0.6	0.6	0.7	0.4	0.3	0.3	1.4	—	78.2	0.1
Bettles	100.0	53.4	0.0	53.4	0.0	53.4	0.0	53.4	0.0	53.4	0.0	53.4	0.0	53.4	0.0	53.4
Coldfoot	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Evansville	10.5	17.7	0.0	53.4	78.9	21.5	10.5	17.0	10.5	17.0	0.0	53.4	0.0	53.4	89.5	17.7
Evansville ANVSA	55.3	23.0	0.0	37.7	39.5	23.6	5.3	9.3	5.3	9.3	0.0	37.7	0.0	37.7	44.7	23.0
Livengood	100.0	43.2	0.0	43.2	0.0	43.2	0.0	43.2	0.0	43.2	0.0	43.2	0.0	43.2	0.0	43.2
Manley Hot Springs	41.8	18.0	0.0	22.1	58.2	18.0	0.0	22.1	0.0	22.1	0.0	22.1	0.0	22.1	58.2	18.0
Minto	3.2	2.6	0.0	8.8	96.8	2.6	0.0	8.8	0.0	8.8	0.0	8.8	0.0	8.8	96.8	2.6
Nenana	56.5	7.1	3.4	2.0	39.0	7.0	0.0	4.4	0.0	4.4	0.0	4.4	1.1	1.6	43.5	7.1
Wiseman	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Fairbanks North Star Borough	73.1	0.1	6.2	0.3	10.8	0.2	0.8	0.2	4.3	0.2	1.2	0.4	6.6	—	26.9	0.1
Fairbanks	60.5	2.4	11.5	1.5	13.3	1.6	1.5	0.4	5.7	1.2	2.1	0.9	9.3	1.4	39.5	2.4
Denali Borough	87.5	5.7	0.7	1.1	5.1	2.9	0.0	1.0	4.1	5.7	0.0	1.0	2.6	2.9	12.5	5.7
Anderson	91.3	6.1	2.4	3.6	4.5	3.0	0.0	6.7	0.0	6.7	0.0	6.7	1.7	3.3	8.7	6.1
Cantwell	79.0	10.3	0.0	9.7	20.5	10.2	0.0	9.7	0.5	1.4	0.0	9.7	0.0	9.7	21.0	10.3
Healy	87.6	10.5	0.0	1.8	2.2	2.3	0.0	1.8	7.4	9.9	0.0	1.8	2.8	4.7	12.4	10.5
McKinley Park	89.1	12.4	1.9	4.4	5.0	9.2	0.0	4.6	0.0	4.6	0.0	4.6	4.0	6.9	10.9	12.4
Matanuska-Susitna Borough	82.1	0.1	1.8	0.1	10.2	0.2	0.8	0.2	2.3	0.1	1.0	0.2	4.0	—	17.9	0.1
Big Lake	75.6	5.8	3.5	3.3	15.7	5.0	1.3	1.4	1.4	1.2	0.6	0.9	5.0	2.8	24.4	5.8
Houston	82.5	5.3	0.7	1.0	14.3	4.7	0.4	0.4	0.0	1.1	1.3	1.1	2.0	1.4	17.5	5.3
Knik-Fairview	81.8	3.0	1.4	0.8	10.6	2.4	0.9	0.9	4.3	1.8	0.1	0.2	3.3	1.8	18.2	3.0
Palmer	74.6	3.2	2.9	1.2	14.9	2.5	0.9	0.6	2.2	0.9	2.3	1.3	6.6	1.9	25.4	3.2
Point MacKenzie	69.7	13.8	3.9	3.9	26.1	12.4	0.0	4.8	0.2	0.7	0.0	4.8	0.5	0.8	30.3	13.8

TABLE 5.3.1-4

Race and Ethnicity in the Socioeconomic Study Area, Average 2009–2013

	White[a]		Black or African American[b]		Alaska Native and American Indian[b]		Native Hawaiian and Other Pacific Islander[b]		Asian[b]		Some Other Race		Hispanic or Latino[c]		Minority[d]	
	(%)	MOE (+/-)	(%)	MOE (+/-)	(%)	MOE (+/-)	(%)	MOE (+/-)	(%)	MOE (+/-)	(%)	MOE (+/-)	(%)	MOE (+/-)	(%)	MOE (+/-)
Skwentna	100.0	46.5	0.0	46.5	0.0	46.5	0.0	46.5	0.0	46.5	0.0	46.5	0.0	46.5	0.0	46.5
Talkeetna	91.7	6.3	0.0	3.6	6.5	6.5	0.0	3.6	1.7	2.1	0.2	0.4	0.2	0.4	8.3	6.3
Trapper Creek	98.0	3.6	0.0	3.9	0.0	3.9	0.0	3.9	0.0	3.9	2.0	3.6	2.0	3.6	2.0	3.6
Wasilla	77.2	3.5	3.1	1.5	13.4	3.0	0.4	0.4	2.9	1.5	0.3	0.3	4.4	1.7	22.8	3.5
Willow	91.9	3.7	0.0	1.1	4.3	2.8	1.4	2.1	0.7	0.7	0.0	1.1	1.6	1.5	8.1	3.7
Kenai Peninsula Borough	82.5	0.1	1.0	0.1	11.7	0.2	0.5	0.1	2.2	0.2	0.7	0.3	3.3	—	17.5	0.1
Anchor Point	88.5	3.8	0.1	0.2	6.8	2.6	0.9	1.4	2.6	2.0	0.5	0.6	3.3	2.0	11.5	3.8
Beluga	71.4	51.4	0.0	87.9	28.6	51.4	0.0	87.9	0.0	87.9	0.0	87.9	0.0	87.9	28.6	51.4
Clam Gulch	80.3	16.3	0.0	15.7	12.8	15.5	0.0	15.7	0.0	15.7	6.8	10.3	6.8	10.3	19.7	16.3
Cohoe	81.5	7.9	0.5	0.6	15.6	8.1	0.3	0.9	0.2	0.4	0.0	1.4	1.9	2.2	18.5	7.9
Cooper Landing	100.0	8.4	0.0	8.4	0.0	8.4	0.0	8.4	0.0	8.4	0.0	8.4	0.0	8.4	0.0	8.4
Happy Valley	91.4	4.3	0.3	0.6	5.0	3.3	0.0	3.4	1.4	1.6	0.0	3.4	1.9	2.7	8.6	4.3
Homer	87.6	3.0	1.2	0.8	6.4	2.1	0.1	0.1	2.0	1.1	0.7	0.7	3.4	1.5	12.4	3.0
Kalifornsky	82.8	4.9	0.4	0.3	10.8	3.4	0.5	0.8	3.7	2.4	0.0	0.2	4.2	2.9	17.2	4.9
Kasilof	56.9	23.5	0.0	3.9	13.0	10.8	0.0	3.9	8.3	11.4	0.0	3.9	27.0	25.9	43.1	23.5
Kenai	77.4	3.1	2.3	1.0	17.8	2.6	0.1	0.1	0.8	0.6	0.7	0.8	2.5	1.6	22.6	3.1
Moose Pass	89.0	14.4	0.0	4.2	8.4	13.6	0.0	4.2	0.0	4.2	0.0	4.2	2.6	4.6	11.0	14.4
Nikiski	86.1	5.1	0.7	0.9	9.6	4.2	0.0	0.4	0.5	0.6	1.5	1.4	7.0	4.2	13.9	5.1
Ninilchik	89.6	4.3	0.7	1.1	9.1	4.2	0.0	2.8	1.3	2.2	0.0	2.8	0.0	2.8	10.4	4.3
Ninilchik ANVSA	88.6	1.7	0.6	0.3	6.8	1.3	0.4	0.5	1.6	0.6	0.5	0.3	2.7	0.9	11.4	1.7
Salamatof	74.5	5.7	2.8	1.6	18.8	5.4	1.4	2.3	0.9	1.0	0.8	1.1	2.7	1.9	25.5	5.7
Seward	65.7	8.9	2.1	0.9	22.7	7.7	0.3	0.6	7.6	7.9	0.0	0.7	1.8	1.6	34.3	8.9
Soldotna	81.9	4.3	0.5	0.6	14.1	4.6	0.4	0.6	1.8	1.2	0.5	0.7	1.8	1.3	18.1	4.3
Sterling	93.0	3.0	1.4	1.7	4.3	2.3	0.0	0.4	0.5	0.6	0.0	0.4	1.2	1.5	7.0	3.0
Tyonek	6.6	6.0	1.6	2.5	91.8	6.6	8.2	12.0	0.0	7.9	0.0	7.9	0.0	7.9	93.4	6.0

TABLE 5.3.1-4

Race and Ethnicity in the Socioeconomic Study Area, Average 2009–2013

	White[a]		Black or African American[b]		Alaska Native and American Indian[b]		Native Hawaiian and Other Pacific Islander[b]		Asian[b]		Some Other Race		Hispanic or Latino[c]		Minority[d]	
	(%)	MOE (+/-)	(%)	MOE (+/-)	(%)	MOE (+/-)	(%)	MOE (+/-)	(%)	MOE (+/-)	(%)	MOE (+/-)	(%)	MOE (+/-)	(%)	MOE (+/-)
Municipality of Anchorage	61.8	0.1	8.3	0.3	12.4	0.2	2.8	0.2	10.6	0.1	2.2	0.3	8.0	—	38.2	0.1
Eklutna ANVSA	25.4	20.4	0.0	24.2	73.2	20.6	0.0	24.2	1.4	5.2	0.0	24.2	0.0	24.2	74.6	20.4
Southeast Fairbanks Census Area	77.9	0.1	1.7	0.2	14.0	1.3	0.5	0.6	2.4	1.3	0.9	0.7	4.0	—	22.1	0.1
Big Delta	79.6	11.3	0.0	3.0	2.5	3.5	0.0	3.0	4.6	6.8	0.0	3.0	13.3	9.0	20.4	11.3
Delta Junction	86.9	5.9	0.3	0.7	4.7	3.5	0.0	2.1	0.5	0.6	0.4	0.6	7.1	5.1	13.1	5.9
Dot Lake	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Dot Lake ANVSA	24.0	16.4	10.0	24.8	66.0	25.4	0.0	31.7	0.0	31.7	0.0	31.7	0.0	31.7	76.0	16.4
Dry Creek	100.0	24.5	0.0	24.5	0.0	24.5	0.0	24.5	0.0	24.5	0.0	24.5	0.0	24.5	0.0	24.5
Tanacross	12.1	15.2	0.0	13.2	87.9	15.2	0.0	13.2	0.0	13.2	0.0	13.2	0.7	1.6	87.9	15.2
Tok	74.8	5.4	0.0	1.4	22.8	5.0	0.0	1.4	1.9	2.1	0.3	0.6	0.5	0.6	25.2	5.4
Tetlin	11.7	13.6	0.0	14.4	87.5	13.3	0.0	14.4	0.0	14.4	0.0	14.4	2.3	6.1	88.3	13.6
Tetlin ANVSA	11.7	13.6	0.0	14.4	87.5	13.3	0.0	14.4	0.0	14.4	0.0	14.4	2.3	6.1	88.3	13.6
Northway Junction	14.3	16.7	0.0	32.2	85.7	16.7	0.0	32.2	0.0	32.2	0.0	32.2	0.0	32.2	85.7	16.7
Northway	34.5	26.9	0.0	15.8	65.5	26.9	0.0	15.8	0.0	15.8	0.0	15.8	0.0	15.8	65.5	26.9
Northway ANVSA	21.0	14.4	0.0	7.9	79.0	14.4	0.0	7.9	0.0	7.9	0.0	7.9	0.0	7.9	79.0	14.4
Alcan Border	100.0	44.0	0.0	44.0	0.0	44.0	0.0	44.0	0.0	44.0	0.0	44.0	0.0	44.0	0.0	44.0
Municipality of Skagway Borough	76.1	18.9	0.0	1.9	8.0	4.2	0.0	1.9	14.7	21.0	0.2	0.3	1.2	1.5	23.9	18.9
Valdez-Cordova Census Area	70.9	0.8	0.6	0.6	20.1	1.5	0.7	0.8	4.5	0.2	1.1	1.0	3.9	—	29.1	0.8
Chistochina	50.4	32.6	0.0	16.2	49.6	32.6	0.0	16.2	0.0	16.2	0.0	16.2	0.0	16.2	49.6	32.6
Copper Center	46.4	13.1	0.8	1.0	51.7	13.3	0.0	5.1	0.0	5.1	0.0	5.1	1.6	3.0	53.6	13.1
Copper Center ANVSA	56.9	10.8	0.6	0.7	41.7	10.7	0.0	3.7	0.0	3.7	1.9	3.1	3.0	3.5	43.1	10.8
Gakona	78.2	13.3	0.0	9.6	15.2	11.6	0.0	9.6	0.0	9.6	0.0	9.6	6.6	10.3	21.8	13.3
Gakona ANVSA	63.2	20.4	0.0	15.7	25.6	18.7	0.0	15.7	0.0	15.7	0.0	15.7	11.1	17.3	36.8	20.4
Glennallen	95.8	4.4	0.0	4.5	4.2	4.4	0.0	4.5	0.0	4.5	0.0	4.5	1.4	2.8	4.2	4.4
Gulkana	18.6	17.4	0.0	15.5	81.4	17.4	0.0	15.5	0.0	15.5	0.0	15.5	0.0	15.5	81.4	17.4
Gulkana ANVSA	33.3	17.2	0.0	12.9	66.7	17.2	0.0	12.9	0.0	12.9	0.0	12.9	0.0	12.9	66.7	17.2

TABLE 5.3.1-4

Race and Ethnicity in the Socioeconomic Study Area, Average 2009–2013

	White[a]		Black or African American[b]		Alaska Native and American Indian[b]		Native Hawaiian and Other Pacific Islander[b]		Asian[b]		Some Other Race		Hispanic or Latino[c]		Minority[d]	
	(%)	MOE (+/-)	(%)	MOE (+/-)	(%)	MOE (+/-)	(%)	MOE (+/-)	(%)	MOE (+/-)	(%)	MOE (+/-)	(%)	MOE (+/-)	(%)	MOE (+/-)
Mentasta Lake	6.8	7.4	0.0	9.9	84.8	13.8	8.4	11.8	0.0	9.9	0.0	9.9	0.0	9.9	93.2	7.4
Mentasta Lake ANVSA	2.2	3.3	0.0	10.4	89.0	12.9	8.8	12.4	0.0	10.4	0.0	10.4	0.0	10.4	97.8	3.3
Paxson	100.0	41.1	0.0	41.1	0.0	41.1	0.0	41.1	0.0	41.1	0.0	41.1	0.0	41.1	0.0	41.1
Slana	92.5	14.2	0.0	10.2	7.5	14.2	0.0	10.2	0.0	10.2	0.0	10.2	0.0	10.2	7.5	14.2
Tazlina	64.1	11.9	0.0	6.4	34.9	11.7	0.0	6.4	0.0	6.4	0.0	6.4	1.0	1.9	35.9	11.9
Tazlina ANVSA	65.5	11.2	0.0	6.2	33.5	11.0	0.0	6.2	0.0	6.2	0.0	6.2	1.0	1.8	34.5	11.2
Tonsina	44.6	32.0	0.0	26.0	55.4	32.0	0.0	26.0	0.0	26.0	0.0	26.0	0.0	26.0	55.4	32.0
Valdez	75.0	5.4	1.0	1.4	14.8	4.6	0.9	2.0	1.6	1.6	2.1	2.2	7.9	1.5	25.0	5.4
Whittier	73.4	13.9	0.0	7.9	11.9	8.4	3.3	5.7	9.0	10.8	0.0	7.9	2.5	3.4	26.6	13.9
Other																
Adak	39.8	21.1	3.7	4.2	36.1	18.7	1.9	2.6	5.6	7.8	14.8	14.3	21.3	15.9	60.2	21.1
Nome	36.2	2.1	3.3	2.3	58.5	3.7	0.5	0.8	2.3	1.0	0.3	0.4	2.5	0.8	63.8	2.1
Nome ANVSA	34.2	2.7	3.4	2.3	59.2	3.9	0.5	0.9	2.7	0.9	1.0	0.6	2.6	0.8	65.8	2.7
Unalaska	31.8	1.6	7.6	2.5	7.6	1.3	2.4	1.1	41.6	3.2	7.7	2.4	12.4	2.7	68.2	1.6

Source: U.S. Census Bureau (2016b)
Notes:
"—" indicates that the measure is unavailable
[a] Alone, non-Hispanic or Latino
[b] Alone or in combination with one or more other races
[c] Hispanic or Latino can be of any race
[d] 100 percent minus "White, non-Hispanic or Latino"

5.3.2 Economy

This section describes the AOI in terms of employment and income, discusses the primary economic drivers in the AOI and State of Alaska, and provides additional information on rural Alaska and the Alaska Native population in the AOI.

5.3.2.1 Employment and Major Industries

In this subsection information is provided on the average annual employment and top three industries in each AOI borough and census area, and the distribution of Alaska residents with occupational skills used in the oil and gas industry. In 2013, the total number of jobs in the boroughs and census areas of the AOI was about 267,700, representing around 80 percent of the jobs statewide. As shown in TABLE 5.3.2-1, top employment sectors in the AOI include health care and education, government, leisure and hospitality (including tourism-related employment), and trade, transportation and utilities. Over the past decade, health care created more new jobs than any other sector of Alaska's economy, as an increasing population of senior citizens drove up demand for health services (Stimpfle and Rasmussen 2011). The local, State, or federal government is among the top three employers in eight of the nine boroughs and census areas in the AOI, reflecting the continued economic importance of the public sector in Alaska.

TABLE 5.3.2-1

Average Annual Employment and Top Three Industries in the Socioeconomic Study Area, 2013

	Average Annual Employment[a]	Top Industries by Employment (Percent of total employment)
Alaska	335,366	Trade, Transportation and Utilities (18)
		Educational and Health Services (14)
		Local Government (12)
North Slope Borough	14,366	Natural Resources and Mining (59)
		Local Government (13)
		Professional and Business Services (12)
Yukon-Koyukuk Census Area	2,429	Local Government (55)
		Trade, Transportation and Utilities (10)
		Other Services (5)
Fairbanks North Star Borough	38,859	Trade, Transportation and Utilities (19)
		State Government (14)
		Educational and Health Services (13)
Denali Borough	2,014	Leisure and Hospitality (55)
		Federal Government (11)
		Trade, Transportation and Utilities (9)
Matanuska-Susitna Borough	21,400	Trade, Transportation and Utilities (19)
		Educational and Health Services (19)
		Local Government (15)
Kenai Peninsula Borough	20,704	Trade, Transportation and Utilities (18)
		Educational and Health Services (16)

TABLE 5.3.2-1

Average Annual Employment and Top Three Industries in the Socioeconomic Study Area, 2013

	Average Annual Employment[a]	**Top Industries by Employment (Percent of total employment)**
		Local Government (15)
Municipality of Anchorage	155,720	Trade, Transportation and Utilities (20)
		Educational and Health Services (16)
		Professional and Business Services (13)
Southeast Fairbanks Census Area	2,482	Natural Resources and Mining (18)
		Federal Government (17)
		Trade, Transportation and Utilities (15)
Municipality of Skagway Borough	983	Trade, Transportation and Utilities (41)
		Leisure and Hospitality (25)
		Local Government (11)
Valdez-Cordova Census Area	4,867	Trade, Transportation and Utilities (23)
		Local Government (18)
		Leisure and Hospitality (11)
Other - Unalaska	3,861	Manufacturing (60)
		Local Government (13)
		Educational and Health Services (3)

Source: Alaska Department of Labor and Workforce Development (2014e)
Notes:
[a] Average annual employment is the sum of the reported number of wage or salary jobs from January to December divided by 12. It includes both full- and part-time jobs and allows for multiple counting of jobs, i.e., if a person worked two jobs, they are counted twice.

About 46 percent of the State's employed workforce lives in Anchorage and another 6 percent in the adjoining MSB, home to a large number of Anchorage and North Slope commuters. Nearly one-third of MSB residents work in Anchorage and another eight percent work in the NSB, reflecting the MSB's role as home to a large share of the oil and gas industry workforce (Fried 2013b). Other areas in which employment is concentrated include the FNSB, and KPB, with much smaller employment totals in other boroughs and census areas.

The Denali Borough has the smallest share of the workforce within the AOI. Compared to other lightly populated, rural areas of Alaska, the borough's economy is one of the most stable and diverse in the State (Fried 2009). The Denali Borough's leisure and hospitality sector, which is tied to Denali National Park and Preserve, is the largest source of employment. Local government and natural resources jobs, the latter driven by the Usibelli Coal Mine in Healy, are the next largest employers. Federal employment is also high because of Denali National Park and Preserve and Clear Air Force Station (Fried 2012).

The Yukon-Koyukuk Census Area is a very sparsely populated region where jobs are scarce and many communities lie off the road system. Like many rural parts of Alaska, government is a top employer. It is especially common for the government to account for a large share of jobs in small rural communities, as private sector jobs are limited. Plus, given their geographical remoteness, even the smallest villages tend to have their own separate public infrastructure and services, including utilities and schools (Shanks 2013).

In recent years, approximately 14,000 individuals have been employed annually in jobs directly related to Alaska's oil and gas industry, including jobs in support activities for oil and gas operations (Fried 2013a). Moreover, there are many Alaska residents who are not currently employed in the industry but have the occupational skills to be employed in the construction and operation of the Mainline and other Project facilities. ADOLWD (2014d) identified more than 270 occupations relevant to the oil and gas industry. The job categories range from office and field engineering to safety, camps, and catering. As shown in TABLE 5.3.2-2, the largest concentration of Alaska residents with relevant occupational skills is in the highly populated areas of southcentral Alaska, including the Municipality of Anchorage and MSB; however, when the percentage of workers with such experience is considered, it is apparent that substantial segments of the worker population in all areas of the State are employed in jobs relevant to the oil and gas industry, including areas outside the AOI.

TABLE 5.3.2-2

Distribution of Alaska Residents Employed in Occupations Important to the Oil and Gas Industry, 2013

	Number of Workers	Percent of Total Workers[a]
Alaska	57,973	19
Aleutians East Borough	108	21
Aleutians West Census Area	346	19
Municipality of Anchorage	22,761	17
Bethel Census Area	1,432	19
Bristol Bay Borough	56	19
Denali Borough	136	24
Dillingham Census Area	338	18
Fairbanks North Star Borough	7,386	20
Haines Borough	154	22
Hoonah-Angoon Census Area	154	23
City and Borough of Juneau	2,256	15
Kenai Peninsula Borough	5,558	24
Ketchikan Gateway Borough	1,055	18
Kodiak Island Borough	796	15
Lake and Peninsula Borough	174	28
Matanuska-Susitna Borough	8,371	22
Nome Census Area	631	16
North Slope Borough	712	24
Northwest Arctic Borough	757	27
Petersburg Borough	146	16
Prince of Wales - Hyder Census Area	516	22
City and Borough of Sitka	510	15
Municipality of Skagway Borough	47	19
Southeast Fairbanks Census Area	567	27
Valdez-Cordova Census Area	1,213	30

TABLE 5.3.2-2

Distribution of Alaska Residents Employed in Occupations Important to the Oil and Gas Industry, 2013

	Number of Workers	Percent of Total Workers[a]
Kusilvak Census Area	768	23
City and Borough of Wrangell	120	20
City and Borough of Yakutat	61	34
Yukon-Koyukuk Census Area	844	33

Source: ADOLWD (2014b)

[a] A worker is a person who earned wages covered under Alaska's unemployment insurance system. Workers are assigned to the occupation and industry in which they earned the most money. A person is counted only once, even if they worked in multiple occupations. Workers are counted where they reside rather than where they work.

ADOLWD maintains an annual occupational database that includes information on the potential supply of qualified workers for the direct jobs that would be created during construction and operation of the proposed Project. The database includes Alaska residents who are qualified to fill one of the possible jobs but are working in a different occupation, are working in an occupation that is both different and lower-paying, or are unemployed. TABLE 5.3.2-3 summarizes the supply of workers for an assortment of Project-related occupations.

TABLE 5.3.2-3

Potential Supply of Qualified Alaska Residents by Occupation, 2014

	Residents Who are Qualified but		
Occupation	**Working in Another Occupation**	**Working in Another Occupation That is Lower Paying**	**Unemployed**
Boilermakers	15	7	35
Carpenters & Helpers	1,015	552	1,346
Cement Masons & Concrete Finishers	95	11	144
Construction Laborers	2,038	496	2,758
Culinary Workers	6,043	582	2,238
Divers	5	4	15
Electricians & Helpers	582	245	762
Instrument Fitters	30	12	13
Insulation Workers, Floor, Ceiling, and Wall	42	12	45
Marine Constructors (Derrick Barges)	0	0	95
Millwrights	36	26	29
Operating Engineers and Other Construction Equipment Operators	974	401	29
Painters, Construction and Maintenance	165	54	1,381
Plumbers, Pipefitters, and Steamfitters & Helpers	397	216	190
Sheet Metal Workers	72	37	609
Structural Iron and Steel Workers	143	99	111
Surveyors	70	54	102
Truck Drivers	1,038	276	975

TABLE 5.3.2-3

Potential Supply of Qualified Alaska Residents by Occupation, 2014

Occupation	Residents Who are Qualified but: Working in Another Occupation	Working in Another Occupation That is Lower Paying	Unemployed
Welders, Cutters, Solderers, and Brazers	210	25	155
Total	13,709	3,605	11,032

Source: ADOLWD (2016a)

During the past several years, recognition that construction of a major natural gas pipeline in Alaska would require the development of a skilled workforce has led to increased efforts to address workforce development in the State. In 2008, ADOLWD developed the "Alaska Gasline Inducement Act Training Strategic Plan," the overall purpose of which is to enhance Alaska's existing training programs so that Alaskans are afforded the opportunity to upgrade skills and acquire new ones in preparation for replacing an aging workforce and for possible jobs in the oil and gas industry. The U.S. Department of Labor made a federal grant award of $7.5 million for ADOLWD to spend on skill training programs for jobs in pipeline construction and maintenance (Office of the Governor 2007). Over the ensuing years training opportunities have been provided to 1,646 individuals (Alaska Department of Labor and Workforce Development 2014d). In addition, there have been significant Alaska legislative investments that connect with oil and gas industry-related occupations, including funding for construction academies in various communities in the State and a comprehensive facility in Fairbanks to provide training opportunities for Alaskans to enter into registered construction apprenticeship programs for careers in the oil and gas industry (Alaska Department of Revenue and Department of Natural Resources 2009). In 2014, ADOLWD released a workforce development plan for Alaska's oil and gas industry that includes a new action agenda to increase alignment of education, training, and incentives to produce a qualified resident workforce (Alaska Department of Labor and Workforce Development 2014d).

More recently, however, it has been difficult to expand or even maintain these training programs because the precipitous drop in global crude oil prices that started in mid-2014 has led to a State fiscal shortfall. Moreover, capital budget cuts have affected the ability of Alaska construction contractors to support expansion of contractor-related training programs. The cuts to the capital budget also mean fewer union workers are contributing training program fees, which hampers the functioning of union apprenticeship programs. Given these constraints, it is anticipated that current training programs will only provide replacements for the persons retiring over the next decade (Robinson and Krieger 2016).

5.3.2.1.1 Income and Unemployment Rate

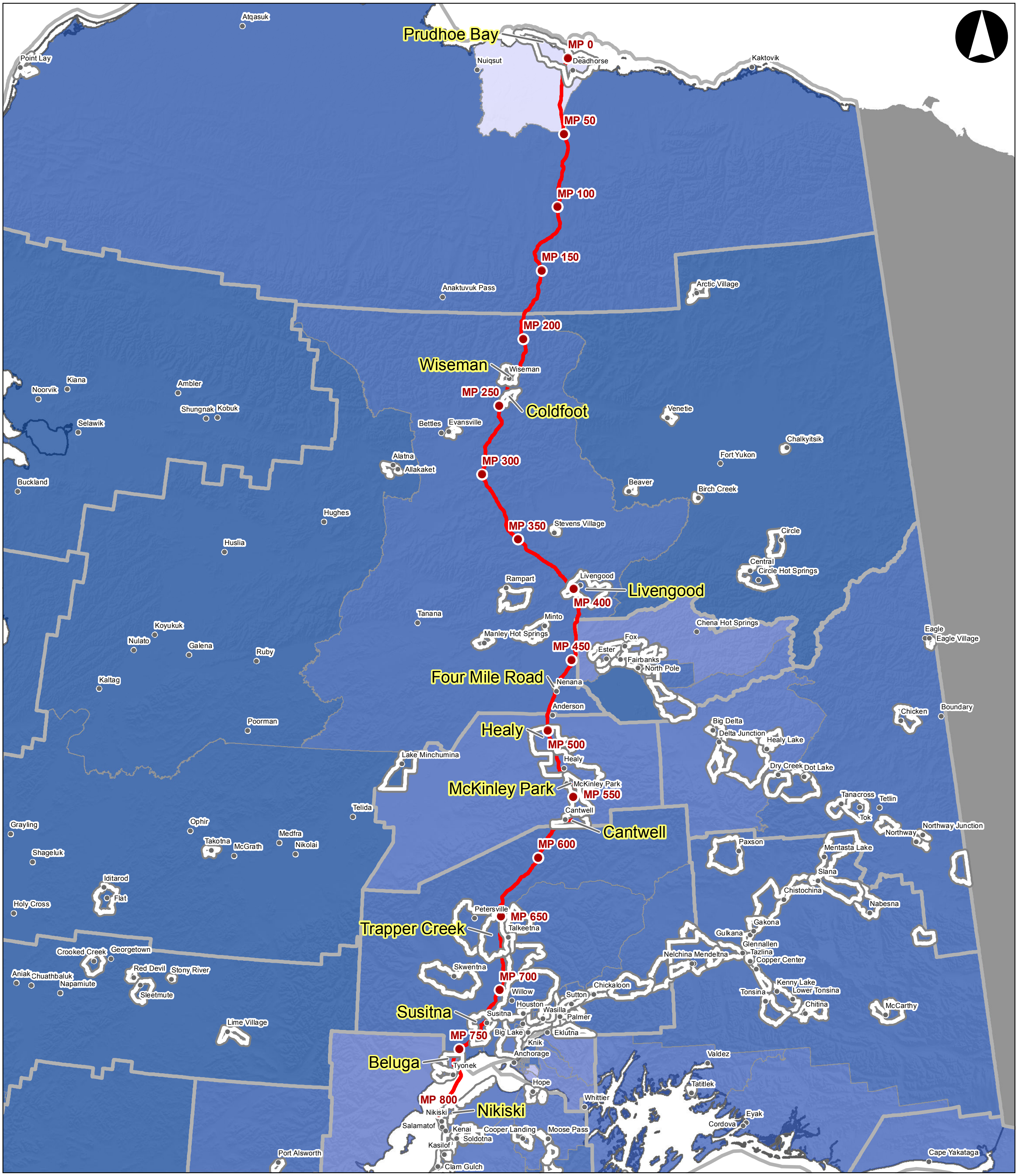
Wages in Alaska have historically been high, and at times have been the State's primary draw for job seekers (Fried 2015c). In 2014, Alaska's median hourly wage was $25.98, the highest in the nation. The national median was $17.09, or 65 percent of Alaska's (U.S. Department of Labor 2015).

Among the boroughs or census areas in the AOI, the average personal per capita income in the NSB, Denali Borough, Municipality of Skagway, and Municipality of Anchorage is more than the State's as a whole

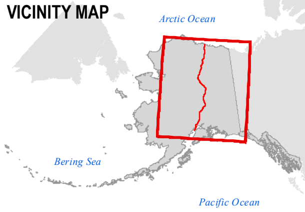
(TABLE 5.3.2-4). The NSB has the highest per capita income in Alaska, at around $46,500. The high wages of oil and gas industry jobs in the Prudhoe Bay CDP skew the per capita income of the borough upward. The traditional communities in the NSB have per capita incomes lower than the State average. The difference between the per capita income in the Prudhoe Bay CDP and other census tracts in the NSB is readily apparent in Figure 5.3.2-1.

As for the other areas exceeding the State’s average per capita income, two of the four PACs in the Denali Borough have high-paying, year-round employers: Anderson has the Clear U.S. Air Force Base, and Healy has Usibelli Coal Mine, Inc. The relatively high per capita income in the Municipality of Anchorage reflects the robust economic conditions generated by the State’s most urbanized and populated area.

Per capita income was lowest in the Yukon-Koyukuk Census Area. This area most closely represents trends in personal income in small, rural Alaskan villages, which often lack significant job opportunities. Moreover, the higher cost of living in rural areas of Alaska exacerbates the negative economic effect of lower incomes, although many rural Alaskans continue to secure subsistence harvests (e.g., hunt and fish), which substantially reduce their food costs (Leask et al. 2001; Abrahamson 2013).



VICINITY MAP



LEGEND

2010 Census Tracts with Per Capita Income

- $10 k - $20 k
- $20 k - $30 k
- $30 k - $40 k
- $40 k - $50 k
- $50 k - $60 k
- $60 k - $70 k
- $70 k - $80 k
- $100 k +

- 2010 Census Designated Places Along Pipeline Study Corridor
- Alaska Borough and Census Area Boundaries
- Pre-FEED Mainline Study Corridor

0 37.5 75 150 Miles

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PER CAPITA INCOME AVERAGE 2009-2013

FIGURE 5.3.2-1

Alaska LNG™

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TABLE 5.3.2-4

Income and Labor Force Characteristics in the Socioeconomic Study Area[a]

	Average Per Capita Income		Median Household Income		Average Unemployment Rate		Labor Force[b]		Percent Not in Labor Force	
	Dollars	**Margin of Error (±)**	**Dollars**	**Margin of Error (±)**	**Percent**	**Margin of Error (±)**	**Number**	**Margin of Error (±)**	**Percent**	**Margin of Error (±)**
Alaska	32,651	288	70,760	732	6.5	—	380,080	2,298	29.0	0.3
North Slope Borough	46,457	3,288	80,761	9,439	5.0	—	6,024	151	19.3	2.4
Prudhoe Bay CDP	94,906	11,207	—	—	2.9	2.3	2,526	455	2.2	2.1
Yukon-Koyukuk Census Area	19,729	836	34,710	3,271	14.8	—	2,535	66	38.8	1.9
Bettles	43,884	12,213	76,250	69,227	15.8	—	9	6	36.8	17.9
Coldfoot	—	—	—	—	—	—	7	16	—	—
Evansville	29,505	14,792	30,625	19,016	15.8	77.5	9	6	50.0	26.0
Evansville ANVSA	36,695	11,774	32,188	34,082	15.8	50.8	18	9	43.2	15.0
Livengood	24,517	15,767	—	—	40.0	60.0	0	9	82.8	37.3
Manley Hot Springs	23,386	10,992	43,125	25,309	17.9	16.1	44	16	56.9	20.6
Minto	12,645	2,725	25,417	9,911	33.3	12.6	108	28	33.6	8.7
Nenana	30,465	3,986	56,250	15,849	21.7	7.5	245	37	26.6	4.8
Wiseman	—	—	—	—	—	—	4	5	—	—
Fairbanks North Star Borough	32,143	1,234	69,223	2,598	5.8	—	50,610	948	27.0	1.0
Fairbanks	26,872	1,557	54,781	3,711	9.9	2.2	13,847	611	29.0	1.8
Denali Borough	35,295	4,714	72,500	5,450	8.8	—	1,204	145	24.6	4.9
Anderson	44,005	12,889	74,375	6,873	2.3	3.8	111	61	20.8	9.7
Cantwell	28,576	5,685	53,438	10,870	8.8	9.3	97	24	43.8	11.2
Healy	38,493	7,057	99,464	19,560	2.1	2.5	597	153	29.2	9.0
McKinley Park	25,281	9,955	44,537	8,041	1.1	2.1	399	188	6.6	8.1
Matanuska-Susitna Borough	29,534	685	71,037	1,783	7.3	—	44,568	580	35.5	0.8
Big Lake	27,916	3,468	63,512	7,835	11.7	3.8	1,870	214	38.4	4.8
Houston	26,442	3,475	51,974	8,656	20.8	6.1	744	105	41.0	5.0
Knik-Fairview	30,497	1,847	81,338	2,153	12.4	2.5	7,448	543	31.6	3.0

TABLE 5.3.2-4

Income and Labor Force Characteristics in the Socioeconomic Study Area[a]

	Average Per Capita Income		Median Household Income		Average Unemployment Rate		Labor Force[b]		Percent Not in Labor Force	
	Dollars	**Margin of Error (±)**	**Dollars**	**Margin of Error (±)**	**Percent**	**Margin of Error (±)**	**Number**	**Margin of Error (±)**	**Percent**	**Margin of Error (±)**
Palmer	25,352	1,449	59,966	4,542	10.8	2.0	3,001	181	35.8	2.7
Point MacKenzie	13,872	4,589	41,125	21,379	0.0	28.1	65	41	84.8	11.1
Skwentna	17,488	4,185	28,750	30,464	0.0	67.2	30	23	40.0	38.4
Talkeetna	27,100	7,747	37,656	18,048	6.1	8.3	297	85	31.2	13.3
Trapper Creek	19,815	6,978	36,250	54,280	9.5	14.2	167	56	48.9	15.3
Wasilla	29,008	2,433	57,669	7,536	9.2	2.7	3,976	227	36.7	3.6
Willow	29,978	4,061	56,612	7,912	12.6	6.5	947	161	42.5	6.1
Kenai Peninsula Borough	31,256	956	61,793	2,391	7.5	—	28,354	601	36.6	1.2
Anchor Point	27,745	3,049	53,500	5,654	12.1	4.5	1,055	141	38.5	4.9
Beluga	13,714	13,987	13,125	24,654	0.0	100.0	1	2	71.4	51.4
Clam Gulch	32,322	12,564	28,750	40,408	0.0	30.4	64	41	47.5	24.5
Cohoe	28,249	3,074	58,958	7,005	16.6	6.7	774	158	36.3	5.6
Cooper Landing	36,362	11,539	60,357	72,513	0.0	11.7	177	102	24.1	21.5
Happy Valley	27,370	8,978	43,977	12,031	16.8	10.9	232	65	48.7	9.7
Homer	32,046	2,036	53,750	4,732	6.9	1.8	2,651	149	37.2	2.9
Kalifornsky	30,420	2,866	75,193	8,761	9.0	3.3	3,726	387	33.7	3.3
Kasilof	20,652	8,053	70,586	29,919	32.2	27.7	179	91	29.5	17.5
Kenai	31,710	2,938	63,019	5,478	11.2	3.3	3,834	264	30.2	4.0
Moose Pass	36,927	12,551	89,808	23,616	18.1	17.7	276	134	16.0	14.2
Nikiski	32,337	3,248	71,116	6,826	6.0	3.1	2,470	337	37.3	4.9
Ninilchik	26,932	4,298	49,444	15,478	16.3	6.2	372	86	39.4	8.7
Ninilchik ANVSA	29,710	1,082	53,786	2,943	10.3	1.4	7,343	352	37.4	1.9
Salamatof	23,342	3,585	73,125	15,169	9.5	5.7	339	79	62.5	5.3
Seward	28,902	6,039	46,971	11,757	7.5	6.1	1,238	238	48.6	8.9
Soldotna	31,295	7,367	54,931	10,018	12.8	5.1	2,142	196	39.6	5.4
Sterling	35,917	4,166	68,401	12,001	7.8	3.8	2,947	349	37.4	3.9

TABLE 5.3.2-4

Income and Labor Force Characteristics in the Socioeconomic Study Area[a]

	Average Per Capita Income		Median Household Income		Average Unemployment Rate		Labor Force[b]		Percent Not in Labor Force	
	Dollars	Margin of Error (±)	Dollars	Margin of Error (±)	Percent	Margin of Error (±)	Number	Margin of Error (±)	Percent	Margin of Error (±)
Tyonek	18,427	6,189	26,875	31,512	21.7	13.6	124	39	24.1	9.4
Municipality of Anchorage	36,214	513	77,454	1,344	5.0	—	162,486	1,711	25.8	0.6
Eklutna ANVSA	12,325	4,272	25,000	1,801	10.0	23.7	43	40	50.8	36.2
Southeast Fairbanks Census Area	29,437	2,558	56,801	4,641	11.1	—	3,276	216	35.1	3.2
Big Delta	23,059	4,435	57,885	10,015	15.5	6.8	264	102	34.6	12.9
Delta Junction	33,476	5,277	81,875	16,130	7.8	5.5	485	104	37.0	8.4
Dot Lake	—	—	—	—	—	—	0	9	—	—
Dot Lake ANVSA	11,394	7,441	22,500	31,260	57.1	21.2	18	13	27.6	20.7
Dry Creek	16,867	4,509	48,542	40,058	0.0	36.7	60	52	25.9	32.8
Tanacross	12,666	3,391	47,708	30,565	20.8	22.9	29	11	77.1	13.1
Tok	23,858	3,768	47,946	15,109	14.4	5.9	651	100	35.6	6.2
Tetlin	10,088	3,973	21,875	36,648	9.4	11.9	28	18	59.0	19.1
Tetlin ANVSA	10,088	3,973	21,875	36,648	9.4	11.9	35	18	59.0	19.1
Northway Junction	17,482	9,429	38,750	40,942	25.0	24.4	20	14	50.0	29.3
Northway	20,931	7,378	88,482	33,891	19.2	11.3	71	38	44.1	19.4
Northway ANVSA	16,616	4,492	41,875	23,286	23.9	11.4	32	26	50.8	13.4
Alcan Border	—	—	—	—	0.0	64.5	0	9	53.6	7.5
Municipality of Skagway Borough	37,139	4,603	71,667	4,017	7.8	5.9	695	146	14.4	5.2
Valdez-Cordova Census Area	32,579	2,724	74,878	9,654	8.7	—	4,928	271	31.1	3.6
Chistochina	21,100	5,630	24,219	43,126	5.6	9.8	45	27	48.6	16.7
Copper Center	22,786	5,031	42,917	29,096	9.7	7.5	151	50	45.0	10.5
Copper Center ANVSA	25,130	4,329	60,938	12,561	10.3	6.1	225	65	39.5	8.7
Gakona	37,491	12,199	100,625	53,481	9.4	11.2	63	24	27.9	17.0
Gakona ANVSA	46,395	18,829	88,750	67,381	13.2	16.4	36	15	25.5	22.4

TABLE 5.3.2-4

Income and Labor Force Characteristics in the Socioeconomic Study Area[a]

	Average Per Capita Income		Median Household Income		Average Unemployment Rate		Labor Force[b]		Percent Not in Labor Force	
	Dollars	Margin of Error (±)	Dollars	Margin of Error (±)	Percent	Margin of Error (±)	Number	Margin of Error (±)	Percent	Margin of Error (±)
Glennallen	21,858	6,727	47,500	45,109	8.7	7.2	220	103	39.9	20.3
Gulkana	23,534	5,034	49,583	47,516	5.0	11.2	55	31	36.8	14.3
Gulkana ANVSA	20,590	4,562	56,250	41,187	5.3	11.8	49	27	41.8	14.5
Mentasta Lake	12,060	4,370	26,071	7,737	37.8	16.4	126	50	38.8	14.4
Mentasta Lake ANVSA	12,301	4,563	26,786	8,493	34.1	16.0	122	50	38.4	15.1
Paxson	33,238	7,192	—	—	0.0	87.9	8	13	78.1	24.1
Slana	14,883	5,470	24,643	9,873	18.9	33.5	54	35	54.3	10.3
Tazlina	33,195	4,420	63,625	7,836	15.7	8.7	184	72	36.8	10.6
Tazlina ANVSA	32,213	4,293	63,875	7,332	15.6	8.6	186	72	37.8	10.7
Tonsina	32,835	9,356	—	—	0.0	38.2	9	14	17.8	27.2
Valdez	35,243	5,659	93,625	23,176	6.2	4.0	2,060	234	25.1	6.0
Whittier	29,583	5,804	42,500	13,018	9.7	7.7	156	53	26.2	11.0
Other										
Adak	34,871	10,795	88,750	22,278	12.2	11.7	72	26	1.2	3.9
Nome	32,374	2,407	71,643	8,476	9.6	2.3	2,079	106	26.2	4.0
Nome ANVSA	33,402	2,370	72,365	12,681	9.6	2.2	2,122	120	24.2	3.7
Unalaska	32,331	2,048	89,706	6,157	3.4	2.2	3,428	223	10.2	2.1

Source: U.S. Census Bureau (2016b); ADOLWD (2014b)

Notes:

A "—" indicates that the measure is unavailable.

[a] State, borough and census area unemployment data are for 2013. Data for per capita income, median household income, labor force, labor force participation, and community-level unemployment are an average for 2009–2013.

[b] The labor force includes all people classified in the civilian labor force, plus active duty members of the military. The civilian labor force consists of people classified as employed or unemployed. Excluded are people 16 years old and over who are not actively looking for work, such as students, homemakers, retired workers, seasonal workers who are not looking for work, institutionalized people, and people doing only incidental unpaid family work. Also excluded are working-age individuals who have stopped looking for work because they believe there is simply no work available.

A marked variation in unemployment rates existed among the boroughs or census areas in the AOI in 2013 (TABLE 5.3.2-4). Both the Municipality of Anchorage and NSB had 5.0 percent unemployment rates, as compared to the State average of 6.5 percent. As noted above, Anchorage is Alaska's largest and most economically diverse city. Among communities in the NSB, the unemployment rate was low in the Prudhoe Bay CDP, but the rate in most of the borough's traditional communities was far higher than the State average. Unalaska also has a low unemployment rate, primarily because of the availability of fishing-related jobs. Unalaska's Port of Dutch Harbor routinely lands more fish by volume than any other port in the U.S. The Yukon-Koyukuk Census Area had the highest unemployment rate, at 15 percent. Employment opportunities are limited n the small, rural villages of the census area, particularly during the winter when there is little alternative market-based activity (U.S. Department of the Interior 2002).

It is likely that unemployment data underestimate the number of people who would like to work, particularly in Alaska's more rural communities, because the unemployment rate includes only persons who are looking for work (Robinson 2009). Aside from the small number of jobs in the villages, much of rural Alaska is off the road system, making commuting to a job in another town or city often impractical. Consequently, some people may cease to actively search for work (U.S. Department of the Interior 2002; Robinson 2009). In the MSB and KSB, however, the large retiree populations account for the high percentage of persons not in the labor force.

TABLE 5.3.2-5 shows the seasonality of unemployment in the socioeconomic study area in 2013. The unemployment rate fluctuated substantially in the Denali Borough and Municipality of Skagway Borough, both of which are heavily dependent on summer tourism. The Denali Borough had the largest seasonal difference in the unemployment rate in 2013, with the rate varying from 29.1 percent in January to 5.0 percent in July and August. The bedrock of the Denali Borough's economy is the leisure and hospitality sector, which is closely tied to Denali National Park and Preserve. While the park is open during the winter months, the large majority of park visitors arrive between late May and early September. Consequently, it is during these months that the hotels, rafting operations, sightseeing tours and other visitor-related activities in the area are most active. The smallest seasonal difference in the unemployment rate occurred in Anchorage, which has a diverse economy that helps stabilize the unemployment rate.

TABLE 5.3.2-5

Seasonal Difference in Unemployment Rates in the Socioeconomic Study Area, 2013

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Percent Unemployment											
Alaska	7.8	7.8	7.4	7.0	6.9	7.0	6.2	6.0	6.2	6.6	6.9	7.0
North Slope Borough	6.9	7.4	7.2	6.9	7.3	8.1	7.4	7.1	7.2	7.1	7.1	5.7
Yukon-Koyukuk Census Area	19.6	20.2	18.8	17.9	17.8	16.7	17.3	15.8	17.2	17.4	19.9	19.9
Fairbanks North Star Borough	7.0	6.7	6.3	6.0	5.8	6.1	5.3	5.1	5.1	5.3	5.7	5.6
Denali Borough	29.1	29.5	27.5	21.7	9.0	6.0	5.1	5.0	5.9	12.7	23.5	24.1
Matanuska-Susitna Borough	9.3	9.3	9.1	8.5	8.1	8.3	7.5	7.1	7.3	7.6	7.9	8.0
Kenai Peninsula Borough	9.7	9.7	9.3	8.3	7.5	7.3	6.4	6.3	7.0	7.7	8.2	8.3
Municipality of Anchorage	5.6	5.6	5.4	5.3	5.2	5.5	5.0	4.8	4.8	4.9	5.0	4.8
Southeast Fairbanks Census Area	15.4	15.0	14.5	13.0	12.2	12.6	11.2	10.4	11.1	12.4	13.5	14.1

TABLE 5.3.2-5

Seasonal Difference in Unemployment Rates in the Socioeconomic Study Area, 2013

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Percent Unemployment											
Municipality of Skagway Borough	23.8	24.3	21.0	15.8	6.4	5.4	4.8	4.4	5.1	12.9	21.6	23.1
Valdez-Cordova Census Area	13.1	12.9	12.0	10.7	9.3	7.6	6.8	6.4	7.6	10.9	11.9	12.1

Source: ADOLWD (2014c)

TABLE 5.3.2-6 shows the residency of workers in the socioeconomic study area. The Municipality of Anchorage is Alaska's most populous city and was the workplace of 168,529 people in 2013, or 40.2 percent of all workers in the State. More individuals who are not Alaska residents work in Anchorage than in any other borough or census area, but they were only 13.5 percent of the Anchorage workforce in 2013. The 22,734 nonresidents working in Anchorage were most heavily concentrated in the accommodation and food services and administrative support and waste management industries, which were both 20 percent nonresident or more in 2013 (Alaska Department of Labor and Workforce Development 2015a). Denali Borough has the highest percent of nonresidents of any region in the State. The major sources of nonresident workers in the borough were the accommodation and food services industry and mining, which are concentrated in Denali National Park and Preserve and the Usibelli Coal Mine, respectively. Another 19.8 percent of workers in Denali Borough were nonlocal Alaska residents, leaving just 15.8 percent of the jobs filled by locals (Alaska Department of Labor and Workforce Development 2015a).

The oil and gas industry accounts for the high percentage of both nonlocal resident workers and nonresident workers in the NSB. The oil and gas industry on the North Slope is camp-supported, and employees work a fly-in/fly-out rotational schedule. These workers permanently reside in communities throughout the State, as well as Lower 48 locations. There are 40 Alaska communities where five or more oil and gas industry workers reside, with Anchorage being home to the largest segment (McDowell Group 2012b). The percentage of nonresident workers in Alaska's oil and gas industry has historically been higher than the statewide average for all industries, although the percentage is substantially less than that of the State's seafood processing industry (Alaska Department of Labor and Workforce Development 2016c).

TABLE 5.3.2-6

Worker Residency in the Socioeconomic Study Area, 2013

	Total Workers[a]	Percent Nonlocal Residents[b]	Percent Nonresidents[c]
Alaska	413,006	12.5	19.9
North Slope Borough	20,234	50.5	32.8
Yukon-Koyukuk Census Area	3,989	23.3	16.1
Fairbanks North Star Borough	45,857	7.0	16.2
Denali Borough	4,041	19.8	64.4
Matanuska-Susitna Borough	29,099	10.0	12.0
Kenai Peninsula Borough	29,157	7.4	21.2
Municipality of Anchorage	168,529	11.3	13.5

TABLE 5.3.2-6

Worker Residency in the Socioeconomic Study Area, 2013

	Total Workers[a]	Percent Nonlocal Residents[b]	Percent Nonresidents[c]
Southeast Fairbanks Census Area	3,256	28.1	16.6
Municipality of Skagway Borough	1,478	6.8	61.9
Valdez-Cordova Census Area	7,655	11.4	39.8

Source: ADOLWD (2015a)

[a] Total workers is the cumulative number of people who worked in an occupation over the course of a year. A single position can be filled by more than one person over a period of time due to turnover. Excludes self-employed and federal workers who are covered by federal unemployment insurance.

[b] Nonlocal workers are those who didn't live in the borough or census area where they worked.

[c] Nonresident workers are those who didn't apply for a Permanent Fund Dividend in 2013 or 2014.

5.3.2.2 Industrial Sectors

This section describes the existing conditions of those industrial sectors in the socioeconomic study area that would likely be most affected by Project construction. These sectors include the oil and gas, construction, transportation, tourism, and professional, scientific, and technical services industries, and state and local government. The current economic conditions in each sector are described in terms of employment, compensation, wage rate, and output where data are available. Employment comprises estimates of number of jobs, full-time plus part-time, by place of work. Employees, sole-proprietors, and the military are included. Compensation is the sum of wage and salary disbursements and supplements to wages and salaries. Output is the amount of production, including all intermediate goods purchased as well as value added.

The employment, compensation, wage rate, and output data in TABLE 5.3.2-7 to TABLE 5.3.2-15 were obtained from a model of the Alaska economy developed by Regional Economic Models, Inc. (REMI). These estimates include the self-employed and military, and, therefore, differ from information provided by ADOLWD, which reports only persons covered by unemployment insurance. Additional information about the REMI model is available in Section 5.4.1.1 and Appendix B.

5.3.2.2.1 Oil and Gas Industry

The oil and gas sector, whose focus lies on Alaska's hydrocarbon-rich North Slope, is the largest private economic driver in the State. The industry includes those companies engaged in oil and gas extraction and support activities for oil and gas operations. In 2013, Alaska's crude oil production ranked fourth in the U.S. (U.S. Energy Information Administration 2014). Oil production (not including support activities) directly accounts for a quarter of total gross state product. An 8 percent decrease in mining activity in 2013, reflecting a drop in oil production from the North Slope, contributed to the decline of Alaska's total gross domestic product (GDP) by 2.5 percent in 2013, the largest decline of any state (U.S. Energy Information Administration 2014). The State's per capita real GDP, however, remained the highest in the nation (U.S. Department of Commerce 2014a).

TABLE 5.3.2-7 presents an overview of the oil and gas industry in the socioeconomic study area in terms of employment, income, wage rate, and output in 2013. TABLE 5.3.2-8 presents the same data for activities that support mining, including oil and gas mining. In total, approximately 14,000 people are employed in Alaska's oil and industry, including the activities that support the extraction of oil and gas. While this figure represents less than five percent of the State's wage and salary employment (Fried 2013a), it is estimated that one-third of all jobs in the State can be traced to the oil and gas industry (Goldsmith 2010b). In addition to the direct jobs created by the oil and natural gas industry, thousands of other jobs in Alaska are generated by the industry, including security, catering, accommodations, facilities management, transportation companies, engineering services, and logistics (Fried 2013a). Moreover, taxes and royalties collected from oil and gas activities generate thousands of additional jobs in the State (Goldsmith 2010b). It is also noteworthy that the payroll impact of the oil and gas industry is pronounced because its average earnings are more than two-and-a half times the average for all Alaska industries (Fried 2013a). While the average hourly wage of an unskilled or semiskilled laborer in Alaska's oil and gas industry in 2014 ($24.11) was slightly less than the average hourly wage of all occupations in the State ($25.98), petroleum engineers made $73.69 per hour (U.S. Department of Labor 2015). In addition, hourly workers on the North Slope typically accrue large amounts of overtime pay during their 14-day, 12-hours per day rotation schedules. Even service workers such as cooks and janitors make much more on the North Slope than they would in Anchorage or Fairbanks (Bell 2016).

As noted previously, the percentage of nonresident workers in Alaska's oil and gas industry has historically been higher than the statewide average for all industries. Over the past decade, the proportion of nonresident oil and gas industry workers has fluctuated between 26 and 31 percent (Fried 2013a). By comparison, the nonresident hire rate for all industries in the State averages approximately 20 percent (Alaska Department of Labor and Workforce Development 2014d).

TABLE 5.3.2-7

Oil and Gas Industry Employment, Income, Wage Rate, and Output in the Socioeconomic Study Area, 2013

	Employment (Thousands)	Compensation ($ Millions)	Average Annual Wage Rate ($ Thousands)	Output ($ Millions)
Alaska	4.75	992.48	176.06	18,773.51
North Slope Borough	2.01	431.88	180.86	9,437.43
Yukon-Koyukuk Census Area	0.00	0.00	0.00	0.00
Fairbanks North Star Borough	0.00	0.00	0.00	0.00
Denali Borough	0.00	0.00	0.00	0.00
Matanuska Susitna Borough	0.00	0.00	0.00	0.00
Kenai Peninsula Borough	0.61	69.99	94.90	1,263.33
Municipality of Anchorage	2.11	490.08	195.30	8,056.06
Southeast Fairbanks Census Area	0.00	0.00	0.00	0.00
Valdez-Cordova Census Area	0.00	0.22	72.94	6.99

Source: Regional Economic Models, Inc.

TABLE 5.3.2-8

Support Activities for Mining Industry Employment, Income, Wage Rate, and Output in the Socioeconomic Study Area, 2013[a]

	Employment (Thousands)	Compensation ($ Millions)	Average Annual Wage Rate ($ Thousands)	Output ($ Millions)
Alaska	9.98	1,259.45	109.36	5,501.17
North Slope Borough	6.05	814.28	116.87	3,744.32
Yukon-Koyukuk Census Area	0.01	0.34	49.90	1.82
Fairbanks North Star Borough	0.75	78.86	90.97	326.37
Denali Borough	0.00	0.00	0.00	0.00
Matanuska Susitna Borough	0.04	2.73	58.96	12.51
Kenai Peninsula Borough	1.52	117.51	66.43	509.67
Municipality of Anchorage	1.45	228.57	136.33	828.58
Southeast Fairbanks Census Area	0.01	0.60	114.01	37.14
Valdez-Cordova Census Area	0.03	1.45	40.08	7.13

Source: Regional Economic Models, Inc.
Notes:
[a] Businesses in this industry category primarily provide support services, on a contract or fee basis, required for the mining and quarrying of minerals and for the extraction of oil and gas.

Direct employment in the oil and gas sector is concentrated in the NSB, which became the center of Alaska's oil boom in 1977 with the completion of TAPS. Currently, over half the State's oil and gas industry workforce is employed in the NSB, and nearly half of the borough's employment is in the industry, which is the highest concentration in the State (Fried 2013a). All of the top 10 private sector employers in the borough are companies involved in the oil and gas industry (Alaska Oil and Gas Association 2014a).

Of the approximately 8,400 jobs created in the NSB by the oil and gas industry and support activities (TABLE 5.3.2-7 and TABLE 5.3.2-8), only about 69 jobs were held by North Slope residents (Fried 2013a). The vast majority of workers are drawn from other areas of the State and nation. Most North Slope oil and gas industry employees follow a fly-in/fly-out commute work arrangement whereby they spend a certain number of days working on site and living in company-provided quarters, after which they return home for a specified rest period. Moreover, the oil and gas industry infrastructure and worksites on the North Slope are hundreds of miles away from most of the borough's resident population. As a result of these factors, North Slope oil and gas workers have minimal participation in the local economy (Shell Offshore Inc. 2011). In contrast, the boroughs in which most North Slope oil and gas industry workers who are State residents reside, including the Municipality of Anchorage, MSB, and KPB, enjoy substantial economic benefit from the payroll dollars spent locally by those workers (Fried 2013a).

Although few NSB residents are directly employed by the oil and gas industry, many are indirectly employed by the industry. Property tax payments by North Slope oil producers are the main source of revenue for the borough. After the oil and gas industry, local government is the borough's next largest source of employment, and it is the top employer of North Slope residents. In 2014, 59 percent of the NSB's working year-round residents were employed by the borough and other local governments (Bell 2016), and borough residents comprised about 80 percent of local government employment (Alaska Department of Labor and Workforce Development 2016c).

The KPB historically has also provided many of Alaska's oil and gas industry jobs as a result of the discovery of large oil and gas deposits in the Cook Inlet basin during the late 1950s and early 1960s. The heart of the Cook Inlet oil and gas industry is in the industrial area of Nikiski. Numerous oil and gas service companies support the Nikiski area infrastructure with a diverse workforce, including onshore and offshore services, and Nikiski docks provide access to offshore drilling platforms. A significant portion of Cook Inlet's crude oil, together with oil from the North Slope and out-of-state sources, is transported to Tesoro Alaska's oil refinery in Nikiski, which produces jet fuel, gasoline, and other products (Shanks and Rasmussen 2010). A 69-mile pipeline transports petroleum products from the refinery to the Port of Anchorage and Ted Stevens Anchorage International Airport. In addition, for decades Cook Inlet natural gas has supplied all of southcentral Alaska's residential, commercial, and industrial demand, as well as supported export of LNG (Thomas et al. 2004).

ConocoPhillips Alaska's Kenai LNG Plant located in Nikiski began operating in 1969, and for more than 40 years was the only LNG export plant in the U.S. (ConocoPhillips Alaska 2013). In 2013, the plant's export license expired. However, due to a change in market conditions, including additional gas supplies in the Cook Inlet Basin, ConocoPhillips Alaska pursued a new license, which was granted by the U.S. Department of Energy, and LNG exports occurred seasonally in 2014 (ConocoPhillips Alaska 2014).

A fertilizer plant that relied on Cook Inlet gas feedstock for its production processes was among the largest private employers in the KPB until its closure in 2007 as a result of the high price and low supply of gas. The closure led to job losses, but the oil and gas industry continues to be an important source of employment in the borough (McDowell Group 2014c). Further, average earnings in the industry remain among the highest of any industry in the borough (Shanks and Rasmussen 2010).

While most of the direct jobs created by the oil and gas industry are concentrated in the NSB and KPB, a substantial number of these jobs also are located in Anchorage and Fairbanks (TABLE 5.3.2-7 and TABLE 5.3.2-8). Anchorage, which accounted for a quarter of the State's oil and gas industry jobs in 2012, often serves as the headquarters or service center for many companies involved in the industry (McDowell Group 2014c). For example, BP Exploration (Alaska) and ConocoPhillips Alaska were among Anchorage's top 15 employers in 2010 (Alaska Oil and Gas Association 2014b). Fairbanks' direct oil and gas employment is relatively small, but the City is a major logistical and supply center for the North Slope (Fried 2013a). In addition, until one refinery was converted into an oil shipping and storage terminal in 2014, Fairbanks had two refineries processing North Slope crude oil (Cole 2014).

After years of reduced activity as a result of declining oil production and low oil prices, employment levels in Alaska's oil and gas industry began to grow in the mid-2000s and rose to a record-high over the next 10 years. Between 2002 and 2012, the oil and gas industry's payroll grew by 106 percent, considerably more than the 56 percent growth for all industries (Fried 2013a). The primary cause of this employment growth was rising oil prices, which spurred workovers of production wells, construction of new connecting pipelines, initiation of heavy oil drilling operations, and continued development of a number of satellite fields (Fried 2013a). In addition, as Alaska's oil production facilities age, additional labor is required for repair and maintenance, as well as extraction (Schultz 2013). In late 2014, however, the steady decline in Alaska's oil production was accompanied by a sharp drop in global crude oil prices. Oil prices and employment in the State's oil and gas industry have historically been correlated (Fried 2015a), and the industry is forecast to lose jobs due to the sustained low oil prices (Martz 2016; Schultz 2016). Additional information on the importance of Alaska's oil and gas industry to the State's economy is provided in Section 5.3.2.2.6.

5.3.2.2.2 Construction Industry

The construction industry is one of Alaska's largest industries, employing about six percent of workers in the State (Alaska Department of Labor and Workforce Development 2015a). Construction employment fell each year between 2006 and 2011, but in 2012 it changed course and grew substantially. Alaska's construction employment started falling one year before the industry declined nationwide due to the national recession of 2007–2009 and three years before Alaska lost jobs across all industries. The industry likely started to soften before the recession due to the end of a housing boom in the MSB. Public construction had been the bright spot in an otherwise dimming industry, and is likely largely responsible for the industry's turnaround in 2012. Alaska's capital budget in FY2012 was $2.8 billion, which buoyed the construction industry across the State (Schultz 2013). More recently, however, the precipitous drop in crude oil prices, together with the ongoing decreases in oil production, has led to a State fiscal shortfall, and the industry is predicted to lose jobs as public investment in civil construction projects declines (Martz 2016; Schultz 2016). Moreover, expected decreased investments by the oil and gas industry in pipelines and related structures will also have a significant adverse effect on the number of construction jobs (Martz 2016).

TABLE 5.3.2-9 presents an overview of the construction industry in the socioeconomic study area in terms of employment, income, wage rate, and output. In 2013, construction employment statewide was approximately 25,000, with about 45 percent of those jobs occurring in Anchorage. Average quarterly wages in construction are higher than the State average (Alaska Department of Labor and Workforce Development 2014a). While the average hourly wage of laborers in Alaska's construction industry in 2014 ($21.52) was less than the average hourly wage of all occupations in the State ($25.98), first-line supervisors of construction trades made $44.13 per hour (U.S. Department of Labor 2015). The number of nonresidents fell to about 21 percent of all construction workers in 2013, down from around 22 percent in 2012 (Alaska Department of Labor and Workforce Development 2015a).

TABLE 5.3.2-9

Construction Industry Employment, Income, Wage Rate, and Output in the Socioeconomic Study Area, 2013

	Employment (Thousands)	Compensation ($ Millions)	Average Annual Wage Rate ($ Thousands)	Output ($ Millions)
Alaska	24.63	1,613.74	53.96	5,843.76
North Slope Borough	0.48	59.55	103.53	302.17
Yukon-Koyukuk Census Area	0.36	13.69	29.07	66.17
Fairbanks North Star Borough	3.59	238.48	54.61	877.03
Denali Borough	0.04	2.31	49.31	11.37
Matanuska Susitna Borough	3.25	148.88	37.00	604.81
Kenai Peninsula Borough	1.93	85.73	36.37	358.29
Municipality of Anchorage	11.13	836.17	62.31	2,673.26

TABLE 5.3.2-9

Construction Industry Employment, Income, Wage Rate, and Output in the Socioeconomic Study Area, 2013

	Employment (Thousands)	Compensation ($ Millions)	Average Annual Wage Rate ($ Thousands)	Output ($ Millions)
Southeast Fairbanks Census Area	0.12	5.63	38.61	25.10
Valdez-Cordova Census Area	0.28	13.60	40.33	66.86

Source: Regional Economic Models, Inc.

5.3.2.2.3 Transportation Industry

Alaska's transportation industry is also one of the State's larger employers. Transportation plays a much bigger role in Alaska's economy than it does in the rest of the nation because the vast distances and lack of highway access for many communities make it considerably more difficult to move people or goods in the State. Nationally, only three percent of all private wage and salary employment is tied to transportation, versus almost six percent in Alaska (Fried and Keith 1999).

Alaska's transportation industry is also unusually diverse (Fried and Keith 1999). It encompasses the air, water, rail, and truck transportation sectors. The air transportation sector accounts for around half of all transportation employment in Alaska versus less than one-third nationally (Fried and Keith 1999). TABLE 5.3.2-10 presents an overview of the air transportation industry in the socioeconomic study area in terms of employment, income, wage rate, and output. As of 2013, more than 6,300 jobs existed in the industry statewide. Anchorage is the industry's center due in large part to the Ted Stevens Anchorage International Airport, the largest airport in the State and one of the busiest cargo airports in the world. It is estimated that 1 in 10 jobs in Anchorage is directly or indirectly related to the airport (McDowell Group 2012a). In 2014, the average weekly wage in scheduled freight air transportation was $1,256, as compared to $1,027 in all industries in the State. Nonresidents made up about 22 percent of the worker total in air transportation in 2013 (Alaska Department of Labor and Workforce Development 2015a). Additional information on Ted Stevens Anchorage International Airport and other airports in the AOI is provided in Section 5.3.5.4.

TABLE 5.3.2-10

Air Transportation Industry Employment, Income, Wage Rate, and Output in the Socioeconomic Study Area, 2013

	Employment (Thousands)	Compensation ($ Millions)	Average Annual Wage Rate ($ Thousands)	Output ($ Millions)
Alaska	6.35	460.12	51.36	2,390.53
North Slope Borough	0.11	11.25	70.35	70.05
Yukon-Koyukuk Census Area	0.08	2.14	9.02	10.13
Fairbanks North Star Borough	0.59	37.99	46.04	204.64
Denali Borough	0.01	0.43	47.55	2.68
Matanuska Susitna Borough	0.18	11.51	44.29	69.35
Kenai Peninsula Borough	0.28	16.28	41.08	94.47
Municipality of Anchorage	2.91	267.37	65.78	1,265.64
Southeast Fairbanks Census Area	0.02	0.81	34.29	5.29

TABLE 5.3.2-10

Air Transportation Industry Employment, Income, Wage Rate, and Output in the Socioeconomic Study Area, 2013

	Employment (Thousands)	Compensation ($ Millions)	Average Annual Wage Rate ($ Thousands)	Output ($ Millions)
Valdez-Cordova Census Area	0.06	2.14	26.82	13.91

Source: Regional Economic Models, Inc.

In addition, no state in the Lower 48 depends on water transportation as much as Alaska does (Fried and Keith 1999). Water transportation may be one of the smaller transportation sectors in terms of employment, but it handles the greatest tonnage of freight coming into the State. The Port of Anchorage, which is an enterprise department within the Municipality of Anchorage, is the largest port in the State, handling 90 percent of all consumer goods sold in southcentral Alaska and serving approximately 80 percent of the State's population (Fried and Keith 1999). Additional information on the Port of Anchorage and other ports in the AOI is provided in Section 5.3.5.1.1.

TABLE 5.3.2-11 presents an overview of the water transportation industry in the socioeconomic study area in terms of employment, income, wage rate, and output. In 2013, approximately 46 percent of the workers in the industry were nonresidents (Alaska Department of Labor and Workforce Development 2015a). The average hourly wage of employees in Alaska's water transportation industry in 2014 ranged from $21.87 for ship loaders to $34.39 for vessel captains, mates, and pilots (U.S. Department of Labor 2015).

TABLE 5.3.2-11

Water Transportation Industry Employment, Income, Wage Rate, and Output in the Socioeconomic Study Area, 2013

	Employment (Thousands)	Compensation ($ Millions)	Average Annual Wage Rate ($ Thousands)	Output ($ Millions)
Alaska	1.12	107.82	71.55	797.89
North Slope Borough	0.01	1.36	203.17	11.09
Yukon-Koyukuk Census Area	0.02	1.04	44.09	9.85
Fairbanks North Star Borough	0.01	0.58	75.72	4.29
Denali Borough	0.00	0.00	0.00	0.00
Matanuska Susitna Borough	0.01	0.80	73.92	6.38
Kenai Peninsula Borough	0.15	10.86	55.04	82.46
Municipality of Anchorage	0.15	20.76	103.18	6.38
Southeast Fairbanks Census Area	0.00	0.00	0.00	0.00
Valdez-Cordova Census Area	0.35	29.82	63.60	232.84

Source: Regional Economic Models, Inc.

In contrast to air and water transportation, trucking's share of the transportation industry in Alaska is considerably smaller than its share in the nation's transportation industry due to the absence of a network of interstate highways in the State. Nevertheless, Alaska has a large number of trucking companies with heavy haul capabilities, and these companies are major employers in the State, accounting for nearly 4,000 jobs in 2013. TABLE 5.3.2-12 presents an overview of the truck transportation industry in the socioeconomic study area in terms of employment, income, wage rate, and output. The Port of Anchorage and Ted Stevens Anchorage International Airport, together with the State's highway system, make Anchorage the center of Alaska's truck transportation industry. Fairbanks serves as Interior Alaska's transportation hub. Nonresidents accounted for about 14 percent of the truck transportation workforce in 2013 (Alaska Department of Labor and Workforce Development 2015a). The average hourly wage of heavy and tractor-trailer truck drivers in Alaska's truck transportation industry in 2014 ($26.00) was similar to the average hourly wage of all occupations in the State ($25.98) (U.S. Department of Labor 2015). Additional information on the highway system in the AOI is provided in Section 5.3.5.2.

TABLE 5.3.2-12

Truck Transportation Industry Employment, Income, Wage Rate, and Output in the Socioeconomic Study Area, 2013

	Employment (Thousands)	Compensation ($ Millions)	Average Annual Wage Rate ($ Thousands)	Output ($ Millions)
Alaska	3.98	241.35	46.89	1,061.80
North Slope Borough	0.07	6.10	71.63	31.89
Yukon-Koyukuk Census Area	0.00	0.00	0.00	0.00
Fairbanks North Star Borough	0.88	51.12	44.81	240.07
Denali Borough	0.00	0.00	0.00	0.00
Matanuska Susitna Borough	0.12	5.15	33.89	24.26
Kenai Peninsula Borough	0.22	9.82	33.88	48.44
Municipality of Anchorage	2.21	144.83	51.02	594.77
Southeast Fairbanks Census Area	0.02	0.79	35.16	4.31
Valdez-Cordova Census Area	0.01	0.10	11.47	0.56

Source: Regional Economic Models, Inc.

The Alaska Railroad Corporation (ARRC), a public corporation, owns and operates the Alaska Railroad for the State of Alaska. ARRC only employs around 600 year-round workers (Alaska Railroad Corporation 2013), but it plays an important role in moving people, materials, and equipment from Seward and Whittier in the south through Anchorage to Fairbanks in the north. Dock and handling yards are maintained by ARRC at or near the ports of Anchorage, Seward, and Whittier for handling freight reaching Alaska by ship and barge (Fried and Keith 1999). Customers can load their goods onto a railcar in the Lower 48 and it will be transferred to Alaska and communities along the rail lines via the contracted barge services that operate from Seattle and Prince Rupert, British Columbia. Additional information on ARRC is provided in Section 5.3.5.3.

5.3.2.2.4 Tourism Industry

The tourism industry consists of a combination of the scenic and sightseeing transportation sector; museums, historical sites, and similar institutions sector; amusement, gaming, and recreation sector; food services and drinking places sector; and accommodation sector. Since the 1990s, the tourism industry has been one of the fastest growing contributors to the State's economy. Approximately half of visitors to

Alaska arrive by cruise ship, nearly half come by air, and much smaller numbers come by highway or ferry. The number of visitors climbed from 39,000 in 1961 to 1,966,700—the largest annual visitor count in Alaska's history—for the 12-month period of May 2013 through April 2014 (Leask et al. 2001; McDowell Group 2014b). During that same 12-month period, visitors spent an estimated $1.82 billion in the State (this figure excludes the cost of transportation to and from the State, such as air tickets, cruise or cruise/tour packages, and ferry tickets) (McDowell Group 2014a). Annual visitation volume is largely driven by the summer market, which represents 86 percent of full-year volume (McDowell Group 2014b).

While total tourist expenditures in Alaska are small compared to other western states, Alaska ranks high on the basis of per-capita visitor spending. These expenditures support employment, expand the payrolls, and generate profits for restaurants, hotels, sightseeing, and other businesses linked to the travel industry. The tourism industry accounts for about nine percent of the State's employment (McDowell Group 2014b). The percentage of tourism industry workers who are nonresidents differs across the various sectors that make up the industry, but it is generally high; in 2013, about 52 percent of the employees in the scenic and sightseeing transportation sector were nonresidents, 43 percent in the accommodation sector, and 30 percent in the museums, historical sites, and similar institutions sector (Alaska Department of Labor and Workforce Development 2015a). The largest driver of nonresident employment in the industry is its dramatic seasonality. Individuals from out-of-state fill tourism jobs that would be difficult or impossible to fill with residents due to the sheer number of jobs created during the busy summer (Alaska Department of Labor and Workforce Development 2015a). Moreover, wages in occupations that support Alaska's tourism industry tend to be relatively low. For example, while lodging managers earned $36.73 per hour on average in 2014, maids and housekeeping cleaners made $11.90, and tour guides made $14.98 (U.S. Department of Labor 2015).

TABLE 5.3.2-13 presents an overview of the tourism industry in the socioeconomic study area in terms of employment, income, wage rate, and output in 2013. Employment in the industry is highest in Alaska's largest city, Anchorage. However, the tourism industry makes up the largest portion of total employment in the Denali Borough, at about 40 percent of all jobs. This high percentage is due to the attraction of Denali National Park and Preserve for visitors to Alaska. In 2015, visitors to Denali National Park and Preserve spent an estimated $567 million, and this spending, plus re-spending, generated through the multiplier effect about 7,300 jobs, $269 million in income, and $810 million in output (Thomas and Koontz 2016). Many of these jobs are located in communities that are "gateways" to the park and are directly tied to the park for economic health. It is estimated that of the total visits to Denali National Park and Preserve, approximately half are made by tourists staying overnight outside the park (National Park Service 2017).

See Resource Report No. 8 for additional information on recreation and special interest areas that would be potentially affected by the Project.

TABLE 5.3.2-13

Tourism Industry Employment, Income, Wage Rate, and Output in the Socioeconomic Study Area, 2013[a]

	Employment (Thousands)	Compensation ($ Millions)	Average Annual Wage Rate ($ Thousands)	Output ($ Millions)
Alaska	44.93	1,250.34	22.49	4,488.45
North Slope Borough	0.55	32.91	49.19	155.20

TABLE 5.3.2-13

Tourism Industry Employment, Income, Wage Rate, and Output in the Socioeconomic Study Area, 2013[a]

	Employment (Thousands)	Compensation ($ Millions)	Average Annual Wage Rate ($ Thousands)	Output ($ Millions)
Yukon-Koyukuk Census Area	0.10	0.80	5.86	4.81
Fairbanks North Star Borough	5.40	137.49	20.57	519.82
Denali Borough	1.17	44.15	30.36	44.15
Matanuska Susitna Borough	3.76	67.21	14.23	281.16
Kenai Peninsula Borough	4.37	86.69	15.92	358.15
Municipality of Anchorage	20.05	623.87	25.37	2,002.75
Southeast Fairbanks Census Area	0.22	6.71	25.04	30.20
Valdez-Cordova Census Area	0.96	17.86	14.80	85.90

Source: Regional Economic Models, Inc.
Notes:
[a] This industry consists of the scenic and sightseeing transportation sector; museums, historical sites, and similar institutions sector; amusement, gaming, and recreation sector; food services and drinking places sector; and accommodation sector.

5.3.2.2.5 Professional, Scientific, and Technical Services

The professional, scientific, and technical services industry includes businesses providing architectural, engineering, and drafting services; legal advice and representation; accounting and bookkeeping; and management, scientific, and technical consulting services. The industry plays a larger role in the economy of Alaska than in the economies of most other states because Alaska has generally had a robust construction industry, and a strong construction industry generates a high demand for architects and engineers. Both the mining and oil and gas industries are also large consumers of engineering services (Fried and Windisch-Cole 2007). The recent downturn in Alaska's oil and gas industry due to persistent low oil prices is expected to have a significant negative effect on employment in the professional, scientific, and technical services industry (Martz 2016; Schultz 2016).

Many of the high-skilled occupations within this industry are highly remunerative. Occupations such as civil engineers and electrical engineers earned around $53.00 per hour on average in 2014, which was twice the average hourly wage of all occupations in the State ($25.98) (U.S. Department of Labor 2015). The industry has a fairly large concentration of nonresidents, with about 22 percent of the workers being out-of-state (Alaska Department of Labor and Workforce Development 2015a).

TABLE 5.3.2-14 presents an overview of the professional, scientific, and technical services industry in the socioeconomic study area in terms of employment, income, wage rate, and output in 2013. More than three-quarters of the jobs in the industry were in the urban areas of the Municipality of Anchorage and Fairbanks.

TABLE 5.3.2-14

Professional, Scientific, and Technical Services Industry Employment, Income, Wage Rate, and Output in the Socioeconomic Study Area, 2013

	Employment (Thousands)	Compensation ($ Millions)	Average Annual Wage Rate $ Thousands)	Output ($ Millions)
Alaska	24.76	1,344.07	45.30	4,276.38
North Slope Borough	0.24	19.73	70.50	73.08
Yukon-Koyukuk Census Area	0.04	0.86	17.64	4.70
Fairbanks North Star Borough	2.55	103.44	33.60	368.00
Denali Borough	0.12	9.10	65.52	33.92
Matanuska Susitna Borough	1.34	52.73	32.20	211.38
Kenai Peninsula Borough	1.14	37.91	27.50	155.27
Municipality of Anchorage	17.34	1,042.62	50.32	3,121.03
Southeast Fairbanks Census Area	0.26	11.37	35.91	48.74
Valdez-Cordova Census Area	0.18	5.34	23.95	24.36

Source: Regional Economic Models, Inc.

5.3.2.2.6 State and Local Government

Local government is Alaska's single largest "industry employer" (Fried and Windisch-Cole 2006). In some small, rural communities, local government employment, which also includes tribal government employment, may represent nearly all the wage and salary jobs because of the scarcity of private sector jobs. But even in the Municipality of Anchorage, the Anchorage School District is the single largest employer, and it is closely followed by the municipal government (Fried and Windisch-Cole 2006). Nearly all of Alaska's local governments generate some of their own revenue through taxation, including property taxes, sales taxes, and special taxes.

The oil and gas industry indirectly pays for a large share of State government employment, as well as local government employment. It is estimated that the oil and gas industry historically supported 75 percent of State government jobs and more than half of local government jobs through revenues for State and local governments (Goldsmith 2008). The industry accounts for most of the "unrestricted" revenue available to the State for spending for general purposes, and about 40 percent of local government revenues come either through taxes on oil and gas property or State aid. No other state depends so much on a single industry to support state and local activities (Goldsmith 2008).

Federal grants for operations also generate State and local government jobs. Nearly all tribal government revenue comes from the federal government (Fried and Windisch-Cole 2006). Some of the recent sluggishness in State and local government employment is due to federal budget problems and spending cuts from the budget sequestration. For example, school districts have faced reduced federal funding. This downward pressure on State and local government employment has been compounded by budget pressure at the State and local levels due to the drop in oil prices (Martz 2014; Schultz 2015).

In 2014, the average weekly wage in the State of Alaska government ($1,089) was higher than that in all industries in the State ($1,027), while the average weekly wage in local government ($916) and tribal government ($562) was lower. The percentage of employees of local and State government that were nonresidents was about seven percent in 2013 (Alaska Department of Labor and Workforce Development 2015a).

TABLE 5.3.2-15 presents an overview of the State and local government sectors in the socioeconomic study area in terms of employment, income, wage rate, and output in 2013. While most State and local government jobs are in Anchorage and Fairbanks, some boroughs and census areas have particularly high levels of these jobs on a percentage basis. For example, State and local government jobs account for around 60 percent of all employment in the Yukon-Koyukuk Census Area, which is about three times the statewide average. As discussed in Section 5.3.2.1, among the reasons for the high percentage of local government employment are the lack of economies of scale in the delivery of public services across isolated communities and the lack of private-sector jobs.

TABLE 5.3.2-15

State and Local Government Employment, Income, Wage Rate, and Output in the Socioeconomic Study Area, 2013

	Employment (Thousands)	Compensation ($ Millions)	Average Annual Wage Rate ($ Thousands)	Output ($ Millions)
Alaska	64.07	5,602.25	55.23	9,966.80
North Slope Borough	1.86	187.96	63.72	334.39
Yukon-Koyukuk Census Area	1.40	88.52	88.52	157.48
Fairbanks North Star Borough	8.20	729.47	56.18	1,297.78
Denali Borough	0.15	11.88	48.79	21.13
Matanuska Susitna Borough	4.64	383.75	52.24	682.73
Kenai Peninsula Borough	4.41	391.04	55.98	695.68
Municipality of Anchorage	20.34	1,935.58	60.12	3,443.53
Southeast Fairbanks Census Area	0.43	35.01	51.06	62.29
Valdez-Cordova Census Area	1.17	96.14	51.82	171.03

Source: Regional Economic Models, Inc.

5.3.2.3 Rural Alaska and the Alaska Native Population

This section provides an overview of economic conditions in rural Alaska, where the majority of the population is Alaska Native. In addition to discussing the general economy, poverty rate, and cost of living in the rural communities of the AOI, information is presented on the Alaska Native Claims Settlement Act (ANCSA) corporations in the AOI.

5.3.2.3.1 Distribution of Alaska Native Population

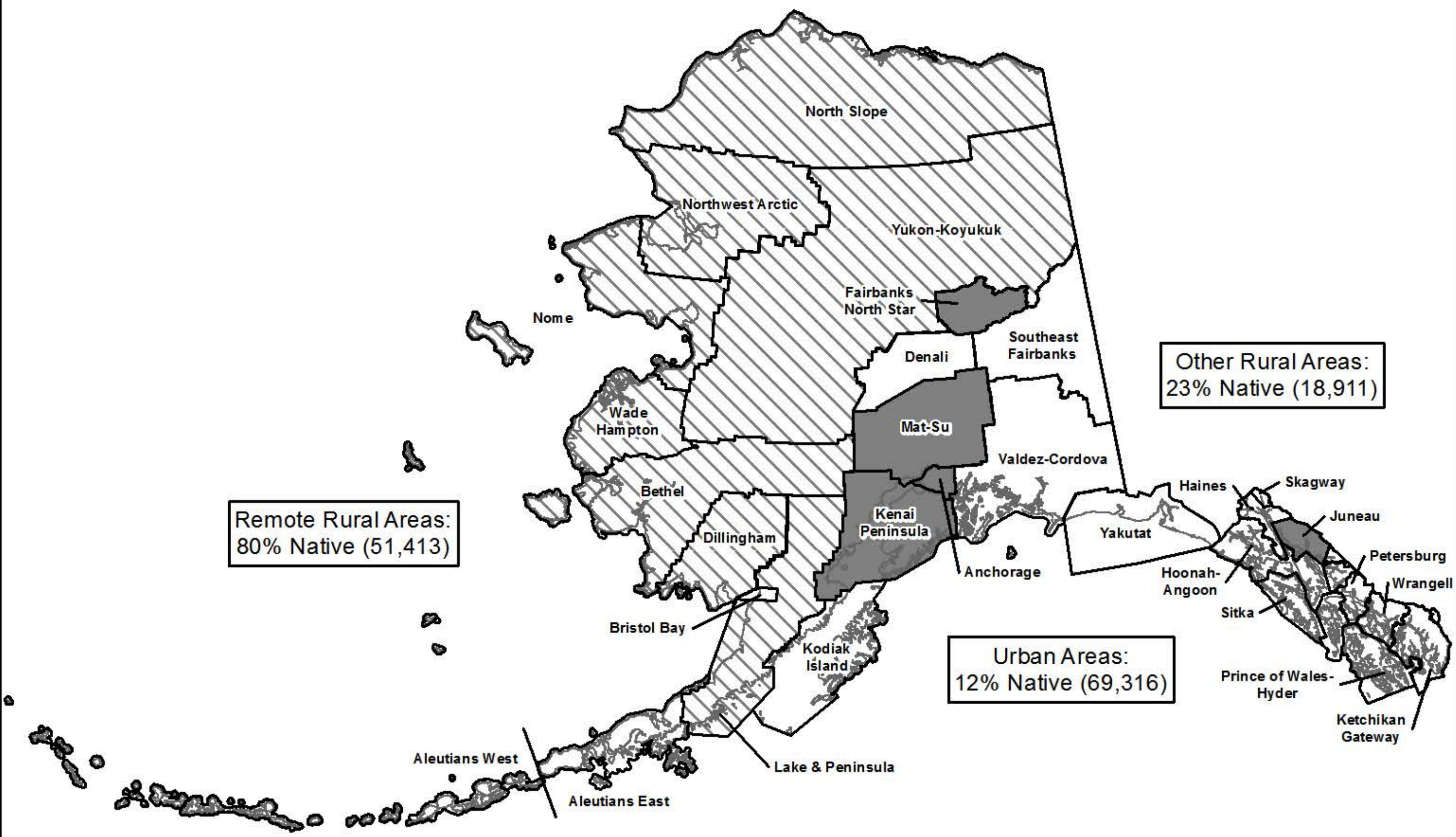
The Alaska Native population is the primary racial group in much of rural Alaska, accounting for about 79 percent of the population in remote rural areas of the State as defined by Goldsmith et al. (2004) (Figure

5.3.2-2). However, about half of the State's Alaska Native and American Indian population lives in urban areas, accounting for about 12 percent of the total population in those areas.

5.3.2.3.2 Mixed Economies

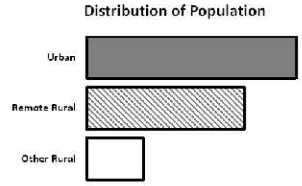
Many of the small communities in the rural parts of the AOI have "mixed" economies in which households rely on both cash income and the harvest of subsistence resources. Subsistence is essential to some residents' diets because of the low availability of jobs and the high cost of food in grocery stores. Rural households use money to purchase fuel oil, electricity, and family goods like clothing and shelter. In addition, they also use cash to purchase equipment used in subsistence activities, such as guns and ammunition; fishing nets; boats; all-terrain vehicles and snow machines (and gas and oil for these); rain gear; and more. In other words, money is used to invest in the tools for subsistence hunting, fishing, and gathering (Alaska Department of Fish and Game undated).

Cash-paying jobs tend to be temporary or seasonal in rural Alaska, so cash incomes tend to be small and insecure (Alaska Department of Fish and Game undated). Opportunities for year-round employment are primarily in local government and in small retail stores. Seasonal sources of income include construction, firefighting, commercial fishing, and fur trapping. In addition, transfer payments, including the Permanent Fund dividend, unemployment benefits, retirement benefits, and Medicaid payments, account for a much larger share of household income in rural areas of Alaska (Goldsmith 2010a).



VICINITY MAP

LEGEND



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ALASKA NATIVE POPULATION

FIGURE 5.3.2-2

Alaska LNG™

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5.3.2.3.3 Poverty Rate

TABLE 5.3.2-16 shows the poverty rate in the AOI and entire State according to data from the U.S. Census Bureau. Following the Office of Management and Budget's Directive 14, the U.S. Census Bureau uses a set of money income thresholds that vary by family size and composition to determine who is in poverty. If the total income for a family or unrelated individual falls below the relevant poverty threshold, then the family (and every individual in it) or unrelated individual is considered to be in poverty. The poverty thresholds for Alaska do not adjust for geographic differences in the cost of living.

With a few exceptions, the poverty rate is higher in Alaska’s rural areas than in more urbanized areas. Within the AOI, the poverty rate for the Yukon-Koyukuk Census Area, NSB, and Southeast Fairbanks Census Area in 2013 was higher than that of the State as a whole. The State’s most populous areas, including the Municipality of Anchorage, FNSB, MSB, and KPB, tend to have less poverty (Shanks 2012). In general, boroughs and census areas with high unemployment rates also have high poverty rates, the Yukon-Koyukuk Census Area being a case in point. However, individuals living in areas with large seasonal economies, such as the Denali Borough, have high unemployment rates but relatively low poverty rates because while few jobs are available in these areas during the winter off-season, incomes during the summer can be substantial (Shanks 2012).

TABLE 5.3.2-16

Average Poverty Rate in the Socioeconomic Study Area[a]

	Individuals Living in Poverty (Percent)	Margin of Error (±)
Alaska	10.1	0.5
North Slope Borough	13.3	2.9
Prudhoe Bay CDP	5.7	4.4
Yukon-Koyukuk Census Area	24.4	4.5
Bettles	0.0	53.4
Coldfoot	—	—
Evansville	0.0	53.4
Evansville ANVSA	0.0	37.7
Livengood	0.0	43.2
Manley Hot Springs	19.0	18.6
Minto	28.6	13.5
Nenana	15.5	6.2
Wiseman	—	—
Fairbanks North Star Borough	8.8	1.8
Fairbanks	12.8	2.0
Denali Borough	5.4	—
Anderson	0.0	10.1
Cantwell	10.3	9.5
Healy	8.2	10.3
McKinley Park	23.0	22.3
Matanuska-Susitna Borough	9.4	—
Big Lake	11.4	3.8
Houston	16.8	5.3

TABLE 5.3.2-16

Average Poverty Rate in the Socioeconomic Study Area[a]

	Individuals Living in Poverty (Percent)	Margin of Error (±)
Knik-Fairview	8.1	2.1
Palmer	11.0	2.7
Point MacKenzie	4.7	8.9
Skwentna	0.0	46.5
Talkeetna	12.7	8.3
Trapper Creek	26.0	16.9
Wasilla	12.9	3.7
Willow	13.7	5.9
Kenai Peninsula Borough	10.1	—
Anchor Point	11.0	3.6
Beluga	42.9	55.7
Clam Gulch	11.1	12.7
Cohoe	14.8	5.0
Cooper Landing	5.7	9.6
Happy Valley	12.3	5.8
Homer	10.2	2.7
Kalifornsky	3.7	1.8
Kasilof	7.7	8.0
Kenai	9.4	3.5
Moose Pass	11.1	14.6
Nikiski	4.9	2.3
Ninilchik	23.0	9.8
Ninilchik ANVSA	12.5	1.6
Salamatof	14.4	10.8
Seward	5.3	4.2
Soldotna	5.0	1.7
Sterling	8.8	4.3
Tyonek	32.8	17.3
Municipality of Anchorage	7.7	—
Eklutna ANVSA	50.7	31.5
Southeast Fairbanks Census Area	16.1	—
Big Delta	13.0	10.2
Delta Junction	9.1	4.7
Dot Lake	—	—
Dot Lake ANVSA	52.0	36.7
Dry Creek	20.0	20.2
Tanacross	5.7	5.9
Tok	14.9	6.9
Tetlin	23.4	16.1
Tetlin ANVSA	23.4	16.1
Northway Junction	34.7	32.0
Northway	7.8	9.3

TABLE 5.3.2-16

Average Poverty Rate in the Socioeconomic Study Area[a]

	Individuals Living in Poverty (Percent)	Margin of Error (±)
Northway ANVSA	23.9	13.2
Alcan Border	0.0	44.0
Municipality of Skagway Borough	4.2	—
Valdez-Cordova Census Area	9.2	—
Chistochina	15.9	22.4
Copper Center	17.9	10.4
Copper Center ANVSA	14.1	7.9
Gakona	6.6	6.2
Gakona ANVSA	11.1	10.3
Glennallen	0.0	4.7
Gulkana	2.5	3.7
Gulkana ANVSA	2.1	3.0
Mentasta Lake	51.3	18.4
Mentasta Lake ANVSA	48.9	19.5
Paxson	0.0	41.1
Slana	39.2	32.8
Tazlina	7.0	5.7
Tazlina ANVSA	6.7	5.6
Tonsina	0.0	26.0
Valdez	7.8	3.5
Whittier	18.0	9.5
Other		
Adak	15.7	14.6
Nome	10.3	3.6
Nome ANVSA	10.8	3.6
Unalaska	8.6	2.1

Source: U.S. Census Bureau (2016b); U.S. Census Bureau (2015)
Notes:
A "—" indicates that the measure is unavailable.
[a] State, borough, and census area data are for 2013. Community-level data are an average for 2009–2013.

The highest poverty rates in the AOI often are found in areas with proportionally larger Alaska Native populations, such as the Yukon-Koyukuk Census Area and NSB. Statewide, the average percentage of Alaska Natives living in poverty during the 2009–2013 period was higher than any other racial or ethnic group and more than twice that of whites (TABLE 5.3.2-17).

TABLE 5.3.2-17

Poverty Rate in Alaska by Race/Ethnicity, Average 2009–2013

	Individuals Living in Poverty (Percent)	Margin of Error (±)
One race	9.6	0.4
White	6.8	0.4
Black or African American	11.4	2.7
American Indian and Alaska Native	21.8	1.0
Asian	10.9	2.4
Native Hawaiian and Other Pacific Islander	16.3	4.8
Some other race	10.1	3.4
Two or more races	12.6	1.4
Hispanic or Latino origin (of any race)	10.5	2.0
White alone, not Hispanic or Latino	6.7	0.4

Source: U.S. Census Bureau (2016b)

5.3.2.3.4 Cost of Living

Living in the remote parts of Alaska off the road system is expensive because of the high cost of transporting goods and services. For example, Fried (2014) describes the findings of the Department of Defense's OCONUS (outside the contiguous United States) cost-of-living index, which compares costs in Alaska communities to the average prices for military bases in the continental U.S. (CONUS = 100). He reported that the cost of living in Delta Junction was 6 index points (5 percent) higher than in Anchorage in 2014, while the cost of living in Wainwright and Barrow was around 28 index points (22 percent) higher (TABLE 5.3.2-18). A major reason for the higher living costs in smaller and more remote communities is the significantly higher energy prices in these communities in comparison to more urban areas. Additional information regarding the disparate energy costs of living in rural and urban Alaska is presented in Section 5.3.4.4. Also contributing to the high cost of living in rural Alaska and the State as a whole is the rising expense of health care. Additional information regarding Alaska's health care costs is presented in Section 5.3.4.2.

The higher living costs in rural areas of the State are exacerbated by a lack of year-round employment opportunities and lower incomes (Leask et al. 2001). Several of rural Alaska's predominant industries, particularly seafood harvesting and processing, tourism, construction, and timber, are highly seasonal and result in total employment for the summer exceeding that in the winter by at least 16 percent (not counting the self-employed who are not fish harvesters) (Goldsmith 2010b). On the other hand, many rural Alaskans continue to secure subsistence harvests, which substantially reduces their costs for food (Leask et al. 2001).

TABLE 5.3.2-18

Cost of Living Index in the Area of Interest, 2014[a]

	Index
North Slope Borough	
Barrow	158
Wainwright	158
Fairbanks North Star Borough	
Fairbanks	134
Matanuska-Susitna Borough	
Wasilla	128
Kenai Peninsula Borough	
Kenai (includes Soldotna)	140
Seward	130
Municipality of Anchorage	130
Southeast Fairbanks Census Area	
Delta Junction	136
Valdez-Cordova Census Area	
Valdez	136
Other - Unalaska	138

Source: Fried (2014)
Notes:
[a] The OCONUS data do not cover all communities in the AOI.

5.3.2.3.5 Alaska Native Claims Settlement Act Corporations

The Regional and Village Corporations established under ANCSA received title to about 44 million acres of land in exchange for the extinguishment of Alaska Native aboriginal land claims. Specifically, 12 Regional Corporations received rights to the subsurface and some surface lands, and certain Village Corporations received title to surface lands. An additional Regional Corporation and its shareholders received only monetary compensation, with no land conveyance.

The ANCSA Regional and Village Corporations play a major role in Alaska's economy and an even more important role in their individual regions by creating jobs, as well as earning profits. Together, the Regional Corporations' revenues in 2010 reached almost $8.2 billion. While revenues are not strictly equivalent to the total value of goods and services produced (output) as presented in Section 5.3.2.2, for comparison these total revenues are more than 40 percent of the $18.7 billion estimated output for the oil and gas industry, the largest private sector industry in the State. As some of Alaska's largest businesses, they have extensive operations and multiple subsidiaries operating in Alaska, the Lower 48, and several foreign countries. A study by the Government Accounting Office (2012) reported that the corporations collectively operate more than 330 wholly owned subsidiaries, ranging from fewer than 10 at one Regional Corporation to more than 50 subsidiaries at another. The subsidiaries are involved in a wide array of business operations, including oil field services, construction, tourism, commercial real estate, and information technology services. Total employees at the Regional Corporations ranged from around 500 at one corporation to almost 11,000 at another (Government Accounting Office 2012).

The most broadly distributed benefits are shareholder dividends, which are drawn from a portion of each corporation's profits. In 2010, there were approximately 111,000 Regional Corporation shareholders, of which about 25 percent reside outside Alaska (Government Accounting Office 2012). However, roughly 40 percent of the individuals in the State who reported they are American Indian/Alaska Native alone or in combination with another race do not receive Regional Corporation dividends because they are not shareholders (initial enrollment in a corporation was based on a blood quantum requirement) (Government Accounting Office 2012; U.S. Census Bureau 2016a). In addition, some Regional Corporations have elected not to allow persons born after the initial enrollment period to own shares; rather the shares will be passed down to descendants over time with the death of the initial owner and at that time the descendants will receive dividends. The total dividends per share paid by each Regional Corporation varies considerably. Nevertheless, Alaska Natives who are shareholders report that dividends are often the most important benefit they receive from the corporations—the payments provide a critical source of income to help defray living expenses, such as high heating costs during the winter (Government Accounting Office 2012).

In addition to dividends, other monetary benefits offered by Regional Corporations to shareholders include employment opportunities, elder benefits, scholarships, memorial benefits, shareholders' equity, and charitable donations. Nonmonetary benefits provided by Regional Corporations—often in partnership with Village Corporations, tribal organizations, and non-profit organizations within the region—include cultural preservation, land management, and advocacy on behalf of Alaska Natives and their communities (Government Accounting Office 2012).

The Regional and Village Corporations holding rights to land areas in the AOI are listed in TABLE 5.3.2-19. The Regional Corporations that could potentially be directly affected by Project construction and operations include Arctic Slope Regional Corporation (ASRC), Doyon, Ltd, Ahtna, Inc., Cook Inlet Region Inc. (CIRI), Chugach Alaska Corporation, and the Aleut Corporation. Bering Straits Native Corporation and Sealaska Corporation are included in the table because they hold rights to land areas near secondary ports in the AOI. However, the probability that these ports would be used by the Project is relatively low. Moreover, few of the businesses owned by the two corporations are active in the oil and gas sector. Consequently, the potential direct socioeconomic impacts to the two corporations, such as an increase in revenues, are minor.

TABLE 5.3.2-19

ANCSA Corporations in the Area of Interest

	ANCSA Regional Corporation[a]	**ANCSA Village Corporation**
North Slope Borough		
Prudhoe Bay CDP	Arctic Slope Regional Corporation	(none)
Yukon-Koyukuk Census Area		
Bettles	Doyon, Limited	(none)
Coldfoot	Doyon, Limited	(none)
Evansville	Doyon, Limited	Evansville, Inc.
Evansville ANVSA	Doyon, Limited	Evansville, Inc.
Livengood	Doyon, Limited	(none)

TABLE 5.3.2-19

ANCSA Corporations in the Area of Interest

	ANCSA Regional Corporation[a]	ANCSA Village Corporation
Manley Hot Springs	Doyon, Limited	Bean Ridge Corporation
Minto	Doyon, Limited	Seth-De-Ya-Ah Corporation
Nenana	Doyon, Limited	Toghotthele Corporation
Wiseman	Doyon, Limited	(none)
Fairbanks North Star Borough		
Fairbanks	Doyon, Limited	(none)
Denali Borough		
Anderson	Doyon, Limited	(none)
Cantwell	Ahtna, Incorporated	Yedatene Na Corporation[b]
Healy	Doyon, Limited	(none)
McKinley Park	Doyon, Limited	(none)
Matanuska-Susitna Borough		
Big Lake	Cook Inlet Region, Incorporated	(none)
Houston	Cook Inlet Region, Incorporated	(none)
Knik-Fairview	Cook Inlet Region, Incorporated	Knikatnu, Incorporated
Palmer	Cook Inlet Region, Incorporated	(none)
Point MacKenzie	Cook Inlet Region, Incorporated	(none)
Talkeetna	Cook Inlet Region, Incorporated	(none)
Trapper Creek	Cook Inlet Region, Incorporated	(none)
Wasilla	Cook Inlet Region, Incorporated	(none)
Willow	Cook Inlet Region, Incorporated	(none)
Kenai Peninsula Borough		
Anchor Point	Cook Inlet Region, Incorporated	(none)
Beluga	Cook Inlet Region, Incorporated	(none)
Clam Gulch	Cook Inlet Region, Incorporated	(none)
Cohoe	Cook Inlet Region, Incorporated	(none)
Cooper Landing	Cook Inlet Region, Incorporated	(none)
Happy Valley	Cook Inlet Region, Incorporated	(none)
Homer	Cook Inlet Region, Incorporated	(none)
Kalifornsky	Cook Inlet Region, Incorporated	(none)
Kasilof	Cook Inlet Region, Incorporated	(none)
Kenai	Cook Inlet Region, Incorporated	(none)
Moose Pass	Cook Inlet Region, Incorporated	(none)
Nikiski	Cook Inlet Region, Incorporated	(none)
Ninilchik	Cook Inlet Region, Incorporated	Ninilchik Native Association, Incorporated
Ninilchik ANVSA	Cook Inlet Region, Incorporated	Ninilchik Native Association, Incorporated
Salamatof	Cook Inlet Region, Incorporated	Salamatof Native Association, Incorporated
Seward	Cook Inlet Region, Incorporated	(none)
Soldotna	Cook Inlet Region, Incorporated	(none)
Sterling	Cook Inlet Region, Incorporated	(none)
Tyonek	Cook Inlet Region, Incorporated	Tyonek Native Corporation

TABLE 5.3.2-19

ANCSA Corporations in the Area of Interest

	ANCSA Regional Corporation[a]	ANCSA Village Corporation
Municipality of Anchorage		
Eklutna ANVSA	Cook Inlet Region, Incorporated	Eklutna, Inc.
Southeast Fairbanks Census Area		
Big Delta	Doyon, Limited	(none)
Delta Junction	Doyon, Limited	(none)
Dot Lake	Doyon, Limited	Dot Lake Native Corporation
Dot Lake ANVSA	Doyon, Limited	Dot Lake Native Corporation
Dry Creek	Doyon, Limited	(none)
Tanacross	Doyon, Limited	Tanacross, Incorporated
Tok	Doyon, Limited	(none)
Tetlin	Doyon, Limited	Tetlin Native Corporation
Tetlin ANVSA	Doyon, Limited	Tetlin Native Corporation
Northway Junction	Doyon, Limited	(none)
Northway	Doyon, Limited	Northway Natives, Incorporated
Northway ANVSA	Doyon, Limited	Northway Natives, Incorporated
Alcan Border	Doyon, Limited	(none)
Municipality of Skagway Borough	Sealaska Corporation	(none)
Valdez-Cordova Census Area		
Chistochina	Ahtna, Incorporated	Cheesh-Na, Incorporated[b]
Copper Center	Ahtna, Incorporated	Kluti-Kaa Corporation[b]
Copper Center ANVSA	Ahtna, Incorporated	Kluti-Kaa Corporation[b]
Gakona	Ahtna, Incorporated	Gakona Corporation[b]
Gakona ANVSA	Ahtna, Incorporated	Gakona Corporation[b]
Glennallen	Ahtna, Incorporated	(none)
Gulkana	Ahtna, Incorporated	Sta-Keh Corporation[b]
Gulkana ANVSA	Ahtna, Incorporated	Sta-Keh Corporation[b]
Mentasta Lake	Ahtna, Incorporated	Mentasta, Incorporated[b]
Mentasta Lake ANVSA	Ahtna, Incorporated	Mentasta, Incorporated[b]
Paxson	Ahtna, Incorporated	(none)
Slana	Ahtna, Incorporated	(none)
Tazlina	Ahtna, Incorporated	Tazlina, Incorporated[b]
Tazlina ANVSA	Ahtna, Incorporated	Tazlina, Incorporated[b]
Tonsina	Ahtna, Incorporated	(none)
Valdez	Chugach Alaska Corporation	(none)
Whittier	Chugach Alaska Corporation	(none)
Other - Unalaska		
Adak	The Aleut Corporation	(none)
Nome	Bering Straits Native Corporation	Sitnasuak Native Corporation

TABLE 5.3.2-19

ANCSA Corporations in the Area of Interest

	ANCSA Regional Corporation[a]	ANCSA Village Corporation
Nome ANVSA	Bering Straits Native Corporation	Sitnasuak Native Corporation
Unalaska	The Aleut Corporation	Ounalaska Corporation

Source: ADCCED (2016)
Notes:

[a] The table lists the Regional Corporation region in which each PAC is located. Under ANCSA, Alaska was divided into twelve geographic regions, each of which was “composed as far as practicable of Natives having a common heritage and sharing common interests” and approximated the area covered by the operations of an existing Alaska Native association” (43 USC § 1606(a)). The Regional Corporation representing each geographic region was responsible for the enrollment of the eligible residents of that region.

[b] Village Corporations in the Ahtna region that merged with Ahtna, Incorporated.

For nearly two decades ASRC, whose lands are located in the NSB, has been the largest Alaskan-owned and operated company, based on revenues. ASRC is owned by and represents the business interests of the Iñupiat people of the North Slope, the primary source of Alaska’s oil and gas wealth. As of 2012, ASRC had 11,090 shareholders, 15 percent of whom lived outside Alaska. Dividends and distributions that year were nearly $74 million (Government Accounting Office 2012).

In 2012, ASRC’s gross revenues of $2.6 billion were the highest in the company’s 40 year history (Arctic Slope Regional Corporation 2013), and they have remained near that level in subsequent years. ASRC’s five major business segments are petroleum refining and marketing, energy support services, construction, government services, and resource development. ASRC Energy Services, a wholly owned subsidiary of ASRC, performs an array of oilfield engineering, operations, maintenance, construction, fabrication, regulatory and permitting, and other services for some of the world’s largest oil and gas companies. The company has emerged as one of Alaska’s largest oilfield service providers and one of Alaska’s largest private-sector employers (Fried 2011; Arctic Slope Regional Corporation 2014). Petro Star, Inc., another subsidiary of ASRC, is the only Alaskan-owned refining and fuel marketing operation in the State, with refineries in North Pole and Valdez (Arctic Slope Regional Corporation 2014). In addition, ASRC owns a portion of North Slope subsurface mineral rights under the Alpine oil field and is paid production royalties from the field (Bradner 2005). ASRC’s annual average dividend to shareholders hit a high of $10,000 in 2013, but it has recently fallen to an average of $5,000 because the corporation’s investments in oil support industries have been hit by lower oil prices and dwindling production (Bell 2016).

Village Corporations in the NSB also are active in the oil and gas sector (Linxwiler 2007). For example, the oilfield service company UMIAQ, LLC, a division of the Ukpeagvik Iñupiat Corporation, the Village Corporation for Barrow, and the Kuukpik Corporation, which is the Village Corporation for Nuiqsut, provide camp services and catering to several producers operating on the North Slope (Bradner 2005). Kaktovik Iñupiat Corporation has also supported oil and gas development in the NSB.

Doyon, Ltd., whose lands cover the Yukon-Koyukuk Census Area, also provides support for oil and gas operations in the NSB. Doyon’s other lines of business include government contracting, tourism, and natural resource development. With a land entitlement of 12.5 million acres, Doyon is the largest private landowner in Alaska and one of the largest private landowners in North America (Doyon 2014). As of 2012, Doyon had 18,536 shareholders, 25 percent of whom lived outside Alaska. Gross revenues in 2010 were $280 million. Dividends and distributions that year exceeded $7.2 million (Government Accounting Office 2012).

Ahtna, Inc., with headquarters in Glennallen and lands spanning southcentral and Interior Alaska, is involved in facilities management, construction services, environmental services, professional services and staffing, pipeline maintenance, range support and training, land management and protection services, and land and natural resource development. As of 2012, Ahtna had 1,751 shareholders, 18 percent of whom lived outside Alaska. Gross revenues in 2010 were $243 million. Dividends and distributions that year were $880,000 (Government Accounting Office 2012).

The geographic boundary of CIRI closely approximates the traditional homeland of the Dena'ina Athabascans and includes the Municipality of Anchorage (CIRI 2014). CIRI's business operations include real estate, oilfield and construction services, environmental remediation, government contracting, tourism and hospitality properties and attractions, telecommunications, and resource and energy development. As of 2012, CIRI had 7,986 shareholders, 39 percent of whom lived outside Alaska. Gross revenues in 2010 were $188 million. Dividends and distributions that year totalled more than $22 million (Government Accounting Office 2012).

The Chugach Alaska Corporation region includes more than 5,000 miles of coastline along the southern tip of the Kenai Peninsula, through the Kenai Fjords, Prince William Sound, and Gulf of Alaska (Chugach Alaska Corporation 2014a). As of 2012, Chugach Alaska Corporation had 2,520 shareholders, 40 percent of whom lived outside Alaska. Gross revenues in 2010 were $937 million. Dividends and distributions that year totalled more than $9.3 million (Government Accounting Office 2012). Major business operations include base operation services, construction, information technology and telecom services, education, engineering, oil and gas services, and mineral extraction. Among the wide range of oilfield services offered by the corporation's companies are spill response and maintenance operations for TAPS (Chugach Alaska Corporation 2014b).

The Aleut Corporation's land selections are located on the Alaska Peninsula and the Aleutian, Shumagin, and Pribilof Islands. Its business areas include real estate, government contracting, oil, gas and securities investments, and sales of sand, gravel, minerals, and rock aggregates from its subsurface rights in the region (Aleut Corporation 2014b). As of 2012, the Aleut Corporation had 3,750 shareholders, 41 percent of whom lived outside Alaska. Gross revenues in 2010 were $143 million. Dividends and distributions that year totalled $7.6 million (Government Accounting Office 2012).

Regional Corporations outside the AOI could also be affected by the construction and operation of the Project. For example, Bristol Bay Native Corporation, NANA, and Calista Corporation also have subsidiaries active in the oil and gas industry (Linxwiler 2007). Village Corporations outside the AOI that could be affected by the Project include Afognak Native Corporation, whose shareholders are the indigenous people of Afognak Island in the Kodiak Island Borough. Alutiiq, LLC, a wholly owned subsidiary of Afognak Native Corporation, currently provides remote housing facilities for oil and gas industry workers on the North Slope.

5.3.3 Housing

This section describes housing conditions in the AOI. In addition to providing an overview of housing characteristics, including the number of housing units, occupancy rate, and value, the section describes visitor accommodations, workforce camps, transitional housing and homelessness, and regional housing authorities.

5.3.3.1 Overview

A housing unit is defined by the U.S. Census Bureau as a house, apartment, group of rooms, or single room occupied or intended for occupancy as separate living quarters. In 2010, the most recent year for which reliable housing data for all PACs are available, there were 246,154 housing units within the AOI, out of a total of 306,967 in the State (TABLE 5.3.3-1). Housing in the Prudhoe Bay CDP mainly consists of employer-provided living quarters, and the occupants of those housing units are employees of oil production and support companies.

Of the total housing units in the AOI, 92 percent were occupied, compared to the State average occupancy rate of 84.1 percent. The Municipality of Anchorage and FNSB, two of the most urbanized areas in the AOI, had the highest occupancy rates, while the lowest occupancy rates were in the Yukon-Koyukuk Census Area and Denali Borough.

Median monthly rent in the boroughs and census areas within the AOI was less than that in the State as a whole, with the exception of the Municipality of Anchorage and FNSB. The Denali Borough had the lowest rental rates.

TABLE 5.3.3-1

General Housing Characteristics in the Socioeconomic Study Area

	Total Units (2010)	Occupied Units (%) (2010)	Median Value of Owner Occupied Units (Avg. 2009–2013)		Median Monthly Gross Rent (Avg. 2009–2013)	
			$	Margin of Error (±)	$	Margin of Error (±)
Alaska	306,967	84.1	241,800	1,782	1,098	13
North Slope Borough	2,500	81.2	154,600	9,358	1,025	154
Prudhoe Bay CDP	—	—	—	—	—	—
Yukon-Koyukuk Census Area	4,038	54.9	106,500	4,854	669	29
Bettles	25	36.0	—	—	—	—
Coldfoot	11	54.5	—	—	—	—
Evansville	25	48.0	78,300	69,844	—	—
Evansville ANVSA	48	41.7	78,300	78,595	950	267
Livengood	34	20.6	—	—	—	—
Manley Hot Springs	116	35.3	90,000	10,634	—	—
Minto	94	69.1	100,000	52,260	—	—
Nenana	215	79.5	67,200	31,841	625	241
Wiseman	25	20.0	—	—	—	—

TABLE 5.3.3-1

General Housing Characteristics in the Socioeconomic Study Area

	Total Units (2010)	Occupied Units (%) (2010)	Median Value of Owner Occupied Units (Avg. 2009–2013)		Median Monthly Gross Rent (Avg. 2009–2013)	
			$	Margin of Error (±)	$	Margin of Error (±)
Fairbanks North Star Borough	41,783	87.2	212,500	5,365	1,179	44
Fairbanks	13,056	88.3	195,400	5,451	1,217	42
Denali Borough	1,771	45.5	192,500	34,017	837	241
Anderson	145	62.1	130,000	39,842	975	78
Cantwell	200	52.0	159,600	22,352	767	49
Healy	711	61.0	250,300	34,709	1,313	376
McKinley Park	422	25.8	203,600	43,192	778	141
Matanuska-Susitna Borough	41,329	77.0	218,900	3,397	1,026	35
Big Lake	2,780	49.4	200,200	25,956	1,081	101
Houston	973	75.1	177,300	20,161	836	83
Knik-Fairview	5,535	91.1	214,800	8,202	1,367	139
Palmer	2,281	92.6	178,600	8,058	912	43
Point MacKenzie	257	43.6	215,600	190,101	—	—
Skwentna	353	5.7	112,500	592,790	—	—
Talkeetna	744	60.3	163,200	85,549	647	193
Trapper Creek	499	45.1	119,600	131,064	768	355
Wasilla	3,277	90.4	227,800	8,268	978	45
Willow	1,912	46.7	166,800	35,299	1,029	574
Kenai Peninsula Borough	30,578	72.5	204,900	6,400	917	32
Anchor Point	1,239	67.8	183,500	11,582	857	163
Beluga	53	18.9	—	—	—	—
Clam Gulch	160	56.9	141,700	131,355	—	—
Cohoe	894	67.1	183,200	34,277	1,167	717
Cooper Landing	395	40.8	298,800	81,501	—	—
Happy Valley	555	48.6	171,300	43,083	446	701
Homer	2,692	83.0	262,400	12,493	892	43
Kalifornsky	3,531	84.3	199,100	16,423	1.161	114
Kasilof	271	85.6	182,900	66,751	2,000	—
Kenai	3,166	88.7	184,800	10,743	885	33
Moose Pass	137	67.9	245,700	160,644	—	—
Nikiski	1,998	84.5	176,100	19,924	1,018	193
Ninilchik	967	42.6	167,200	14,010	745	208
Ninilchik ANVSA	8,976	69.9	221,100	7,740	874	32
Salamatof	300	82.0	197,800	23,630	779	78
Seward	1,124	82.6	176,300	51,010	724	129
Soldotna	1,968	87.4	213,800	16,606	990	102
Sterling	3,347	67.3	232,700	25,278	1,014	78
Tyonek	144	48.6	55,500	16,620	615	444

TABLE 5.3.3-1

General Housing Characteristics in the Socioeconomic Study Area

	Total Units (2010)	Occupied Units (%) (2010)	Median Value of Owner Occupied Units (Avg. 2009–2013)		Median Monthly Gross Rent (Avg. 2009–2013)	
			$	Margin of Error (±)	$	Margin of Error (±)
Municipality of Anchorage	113,032	95.0	282,800	2,858	1,142	19
Eklutna ANVSA	29	79.3	162,500	45,160	—	—
Southeast Fairbanks Census Area	3,915	65.6	175,000	17,194	1,175	96
Big Delta	305	67.5	168,900	14,457	—	—
Delta Junction	517	72.9	179,500	20,989	1,110	107
Dot Lake	23	30.4	—	—	—	—
Dot Lake ANVSA	28	67.9	95,000	110,576	375	522
Dry Creek	47	61.7	—	—	—	—
Tanacross	73	72.6	95,000	35,239	625	416
Tok	724	73.5	144,800	28,148	763	161
Tetlin	62	69.4	114,100	60,281	563	242
Tetlin ANVSA	68	64.7	114,100	60,281	563	242
Northway Junction	31	64.5	108,300	24,492	—	—
Northway	38	71.1	325,000	196,794	1,000	1,632
Northway ANVSA	112	75.9	145,800	112,971	388	549
Alcan Border	23	69.6	—	—	—	—
Municipality of Skagway Borough	636	68.6	305,600	31,820	1,057	96
Valdez-Cordova Census Area	6,102	65.0	177,700	20,283	871	79
Chistochina	68	52.9	310,500	173,183	243	180
Copper Center	199	61.8	164,000	15,786	621	178
Copper Center ANVSA	265	63.0	163,900	13,429	725	125
Gakona	131	65.6	194,400	83,855	950	130
Gakona ANVSA	74	64.9	187,500	23,515	—	—
Glennallen	336	60.4	162,900	40,990	—	—
Gulkana	60	60.0	120,500	152,081	600	724
Gulkana ANVSA	82	53.7	200,000	100,442	917	316
Mentasta Lake	90	51.1	126,800	36,474	538	276
Mentasta Lake ANVSA	54	64.8	117,500	39,875	538	276
Paxson	179	12.3	—	—	—	—
Slana	205	37.6	161,800	12,356	—	—
Tazlina	165	67.3	172,900	40,066	733	273
Tazlina ANVSA	174	66.7	175,000	42,636	733	273
Tonsina	79	49.4	—	—	—	—
Valdez	1,763	89.2	177,900	26,544	1,205	284
Whittier	280	40.7	59,000	16,297	750	210
Other						
Adak	500	8.8	32,500	35,649	863	196

TABLE 5.3.3-1

General Housing Characteristics in the Socioeconomic Study Area

	Total Units (2010)	Occupied Units (%) (2010)	Median Value of Owner Occupied Units (Avg. 2009–2013)		Median Monthly Gross Rent (Avg. 2009–2013)	
			$	Margin of Error (±)	$	Margin of Error (±)
Nome	1,503	80.9	195,700	21,239	1,379	120
Nome ANVSA	1,701	73.3	195,000	20,672	1,311	111
Unalaska	1,106	83.8	317,100	20,345	1,345	65

Source: U.S. Census Bureau (2016a); U.S. Census Bureau (2016b)
A “—” indicates that the measure is unavailable.

As shown in TABLE 5.3.3-2, of the vacant housing units located in the boroughs and census areas of the AOI, the majority are for seasonal, recreational, or occasional use, and are not available for rent. Temporary housing also is available in the form of daily, weekly, and monthly rentals in motels, hotels, campgrounds, and recreational vehicle parks. These visitor accommodations are located throughout the AOI but are most highly concentrated in the Municipality of Anchorage, KPB, MSB, FNSB, and Denali Borough. The majority of these accommodations are located in communities on the road system. The availability of accommodations varies and declines during the summer tourist season, during a local event, or during periods of high housing demand by other industries (e.g., mining). Approximately 9 out of 10 visitors to the State come during the summer (McDowell Group 2014a).

TABLE 5.3.3-2

Vacant Housing and Visitor Accommodations in the Socioeconomic Study Area

	Number of Vacant Units	Units for Sale (%)	Units for Rent (%)	Vacant for Seasonal, Recreational, or Occasional Use (%)	Other Vacant (%)	Hotels/ Motels	RV Parks/Camp-grounds
	(2010)					(2014)	
Alaska	48,909	5.9	13.8	57.0	19.9	—	—
North Slope Borough	471	0.6	24.6	33.3	37.6	—	—
Prudhoe Bay CDP	0	0.0	0.0	0.0	0.0	1	0
Yukon-Koyukuk Census Area	1,821	0.8	5.9	65.6	26.4	—	—
Bettles	16	0.0	0.0	37.5	62.5	0	0
Coldfoot	5	0.0	0.0	100.0	0.0	0	0
Evansville	13	0.0	0.0	46.2	46.2	0	0
Evansville ANVSA	28	0.0	0.0	42.9	53.6	0	0
Livengood	27	0.0	0.0	66.7	33.3	1	0
Manley Hot Springs	75	1.3	5.3	58.7	32.0	1	0
Minto	29	0.0	6.9	55.2	37.9	0	0
Nenana	44	2.3	11.4	31.8	54.5	3	1
Wiseman	20	0.0	5.0	95.0	0.0	2	0

TABLE 5.3.3-2

Vacant Housing and Visitor Accommodations in the Socioeconomic Study Area

	Number of Vacant Units	Units for Sale (%)	Units for Rent (%)	Vacant for Seasonal, Recreational, or Occasional Use (%)	Other Vacant (%)	Hotels/ Motels	RV Parks/Camp-grounds
	(2010)					(2014)	
Fairbanks North Star Borough	5,342	9.5	28.1	31.4	27.8	—	—
Fairbanks	1,522	15.2	51.8	12.0	18.0	87	11
Denali Borough	965	2.4	5.2	77.1	14.0	—	—
Anderson	55	9.1	12.7	41.8	36.4	1	0
Cantwell	96	6.3	13.5	64.6	15.6	9	1
Healy	277	3.2	8.3	54.5	30.0	17	3
McKinley Park	313	0.0	1.0	96.2	2.2	0	0
Matanuska-Susitna Borough	9,505	5.6	6.2	71.8	14.5	—	—
Big Lake	1,408	3.0	1.7	88.1	6.7	3	1
Houston	242	9.9	9.5	55.4	23.6	3	1
Knik-Fairview	495	20.2	12.9	31.5	30.5	0	0
Palmer	168	15.5	42.3	8.9	25.0	30	4
Point MacKenzie	145	0.7	0.7	89.7	9.0	0	0
Skwentna	333	0.0	0.6	97.6	1.8	9	0
Talkeetna	295	1.4	5.8	74.2	15.6	32	5
Trapper Creek	274	4.0	1.1	84.7	9.1	6	1
Wasilla	315	17.1	38.4	14.3	26.0	31	9
Willow	1,019	2.7	1.6	89.8	4.5	12	7
Kenai Peninsula Borough	8,417	4.8	7.8	72.3	13.0	—	—
Anchor Point	399	7.5	6.3	63.7	16.8	0	0
Beluga	43	0.0	0.0	100.0	0.0	0	0
Clam Gulch	69	0.0	1.4	79.7	18.8	3	0
Cohoe	294	6.1	2.4	72.8	17.7	0	0
Cooper Landing	234	2.6	1.7	88.5	6.4	19	3
Happy Valley	285	4.2	3.5	82.8	7.7	0	0
Homer	457	6.3	24.7	49.7	15.3	87	7
Kalifornsky	553	6.9	7.1	69.1	13.4	0	0
Kasilof	39	5.1	5.1	61.5	28.2	15	3
Kenai	357	11.2	33.1	29.1	20.4	37	7
Moose Pass	44	6.8	9.1	63.6	20.5	3	0
Nikiski	309	6.5	11.3	41.7	37.5	7	0
Ninilchik	555	1.8	2.0	91.0	4.3	19	5
Ninilchik ANVSA	2,699	5.0	7.7	72.1	12.6	19	5
Salamatof	54	14.8	7.4	46.3	22.2	0	0
Seward	196	5.6	15.8	54.6	23.5	87	4
Soldotna	248	10.9	31.9	39.5	12.9	54	14
Sterling	1,093	3.5	6.0	78.5	11.1	23	6

TABLE 5.3.3-2

Vacant Housing and Visitor Accommodations in the Socioeconomic Study Area

	Number of Vacant Units	Units for Sale (%)	Units for Rent (%)	Vacant for Seasonal, Recreational, or Occasional Use (%)	Other Vacant (%)	Hotels/ Motels	RV Parks/Camp-grounds
	(2010)					(2014)	
Tyonek	74	0.0	2.7	66.2	29.7	2	0
Municipality of Anchorage	5,700	14.9	30.0	26.3	22.7	140	11
Eklutna ANVSA	6	33.3	16.7	0.0	50.0	0	0
Southeast Fairbanks Census Area	1,348	3.1	14.8	53.7	23.0	—	—
Big Delta	99	0.0	0.0	28.6	71.4	1	0
Delta Junction	140	3.0	10.1	81.8	2.0	15	2
Dot Lake	16	2.1	46.4	23.6	6.4	1	0
Dot Lake ANVSA	9	0.0	0.0	0.0	100.0	1	0
Dry Creek	18	0.0	0.0	62.5	37.5	0	0
Tanacross	20	0.0	0.0	55.6	44.4	0	0
Tok	192	0.0	18.5	44.4	33.3	13	5
Tetlin	19	0.0	0.0	36.4	54.5	0	0
Tetlin ANVSA	24	0.0	45.5	54.5	0.0	0	0
Northway Junction	11	0.0	0.0	15.0	85.0	0	0
Northway	11	0.0	8.3	62.5	29.2	0	0
Northway ANVSA	27	0.0	10.5	57.9	31.6	0	0
Alcan Border	7	3.1	15.1	34.9	45.3	0	0
Municipality of Skagway Borough	200	2.0	7.5	24.0	65.5	7	1
Valdez-Cordova Census Area	2,136	2.4	11.5	62.8	20.8	—	—
Chistochina	32	0.0	0.0	68.8	28.1	3	2
Copper Center	76	0.0	6.6	32.9	60.5	7	1
Copper Center ANVSA	98	2.0	5.1	40.8	48.0	7	1
Gakona	45	0.0	6.7	46.7	37.8	5	3
Gakona ANVSA	26	0.0	3.8	53.8	30.8	0	0
Glennallen	133	3.8	18.0	48.9	27.8	13	4
Gulkana	24	0.0	4.2	20.8	75.0	0	0
Gulkana ANVSA	38	0.0	7.9	21.1	68.4	0	0
Mentasta Lake	44	2.3	6.8	59.1	31.8	0	0
Mentasta Lake ANVSA	19	0.0	15.8	31.6	52.6	0	0
Paxson	157	0.0	0.0	99.4	0.6	2	2
Slana	128	2.3	5.5	50.8	41.4	2	2
Tazlina	54	7.4	9.3	46.3	37.0	0	0
Tazlina ANVSA	58	6.9	10.3	44.8	37.9	0	0
Tonsina	40	0.0	12.5	52.5	15.0	0	0
Valdez	190	6.8	25.3	26.3	37.4	25	6
Whittier	166	3.6	30.1	62.7	1.8	1	0

TABLE 5.3.3-2

Vacant Housing and Visitor Accommodations in the Socioeconomic Study Area

	Number of Vacant Units	Units for Sale (%)	Units for Rent (%)	Vacant for Seasonal, Recreational, or Occasional Use (%)	Other Vacant (%)	Hotels/ Motels	RV Parks/Camp-grounds
	(2010)					(2014)	
Other							
Adak	456	8.6	4.4	7.2	39.5	0	0
Nome	287	4.5	22.6	25.1	38.7	17	0
Nome ANVSA	454	3.1	14.3	51.1	25.8	17	0
Unalaska	179	3.4	18.4	19.6	38.5	3	0

Source: U.S. Census Bureau (2016a); ADCCED (2015)
Notes:
A "—" indicates that the measure is unavailable.
A "0" indicates that no visitor accommodations were identified

5.3.3.2 Workforce Camps

Oil production companies operating on the North Slope maintain workforce camps in the Prudhoe Bay CDP area that provide quarters and meals for their employees. Also located in the AOI is the workforce camp managed by Sumitomo Metal Mining Company for its employees working at the Pogo Mine located 90 miles southeast of Fairbanks. The various operations workforce camps in the AOI vary in size, providing lodging for 20 to 400 individuals. Most workforce camp residents return to their homes in other Alaska communities or the Lower 48 when off duty. Currently, approximately 14 companies provide modular workforce camp leasing services in Alaska (TABLE 5.3.3-3). Existing modular workforce camps have an identified inventory of about 3,400 beds. About nine companies provide installation of modular workforce camps in the State.

TABLE 5.3.3-3

Modular Camp Leasing Companies in the Socioeconomic Study Area[a]

	Separate Workforce Camp Facilities Owned	Average Size of Workforce Camp
Stallion Rockies Ltd.	9	81
Alaska Frontier Constructors, Inc.	2	40
Alaska Earth Sciences, Inc.	2	30
Olgoonik Oilfield Services, LLC	1	42
Brooks Range Supply, Inc.	1	334
Afognak Leasing, LLC	13	67
Builders Choice Inc.	1	60
MagTec Alaska, LLC	3	50
Doyon Remote Facilities and Services	6	71
Colville Incorporated	1	—

TABLE 5.3.3-3

Modular Camp Leasing Companies in the Socioeconomic Study Area[a]

	Separate Workforce Camp Facilities Owned	Average Size of Workforce Camp
Global Services, Inc.	—	—
Cruz Companies	17	32
UMIAQ LLC	2	15
70 North LLC	3	30
Total estimated bed capacity		3,400

Notes:
A "—" indicates that the measure is unavailable.
[a] This is not necessarily an exhaustive list of modular camp leasing companies in the socioeconomic study area.

5.3.3.3 Transitional Housing and Homelessness

Current housing capacity in the AOI includes the availability of emergency shelters and transitional housing facilities. During Project construction, these housing facilities may be of particular importance in communities in the KPB close to the proposed Liquefaction Facility since the prospects of obtaining a job directly or indirectly generated by the Project would likely be highest in those communities. The employment opportunities could attract a temporary influx of unemployed people, some of whom may be unable to afford accommodations while they try to find work. The present overall homeless population in the KPB is difficult to enumerate because of their transience and because oftentimes a state of homelessness is variable and/or temporary. A study conducted in 2007 estimated there are roughly 400 to 500 homeless individuals in the KPB per year, with the majority in Kenai (Wilson and Lowe 2007). However, a more recent survey conducted by United Way during a one-day intake program put the borough's homeless population at around 100 (Persily 2015). Currently, there are no homeless shelters or specific housing services targeting unemployed people in the KPB. A non-profit organization operated a transitional housing facility in Kenai for a few years, but it closed in 2013. Another non-profit organization presently operates a shelter in Kenai for women and children who are victims of abuse, while a third non-profit group in Kenai provides housing and services for male ex-prisoners (Persily 2015).

The municipality in the AOI with the highest homeless population is Anchorage. Over the reporting period October 1, 2013 to September 30, 2014, an estimated 7,506 persons lived in emergency shelters, transitional housing, or permanent supportive housing in Anchorage (Alaska Coalition on Housing and Homelessness 2014a). This figure represents about 74 percent of the State's homeless population during that period (Alaska Coalition on Housing and Homelessness 2014b). Charitable organizations currently operate about a half dozen emergency shelters in Anchorage offering services to single individuals, families, victims of domestic violence, or runaway youth. All these facilities typically operate at full or over capacity (Municipality of Anchorage 2009; Springer 2015). Current initiatives by the Municipality of Anchorage to address the problem of homelessness include a shift from offering short-term transitional housing to permanent supportive housing for Anchorage residents suffering from chronic alcoholism, chronic homelessness, and mental disorders. A five-year action plan developed by the Municipality in 2015 proposes to provide 300 new units of permanent supportive housing in three years, commit municipal funds to support rental assistance, and expand the number of cold weather shelters (Municipality of Anchorage 2015).

5.3.3.4 Regional Housing Authorities

The regional housing authorities operating in the AOI are shown in TABLE 5.3.3-4. These housing authorities were originally formed to improve housing for Alaska Natives, but they currently serve all residents of their regions. The boundaries of the housing authorities are based on ANCSA Regional Corporation boundaries; consequently, Cantwell, which is located in the Denali Borough, is served by the Copper River Basin Regional Housing Authority (Ahtna, Inc.), while the remainder of the borough's communities are served by the Interior Regional Housing Authority. A similar situation exists in Valdez, which is served by the North Pacific Rim Housing Authority (Chenega Corporation), while the rest of the Valdez-Cordova Census area is served by the Copper River Basin Regional Housing Authority (Ahtna, Inc.). The Tagiugmiullu Nunamiullu Housing Authority (ASRC) only serves the eight traditional communities on the North Slope and does not provide housing services in the Prudhoe Bay CDP.

TABLE 5.3.3-4

Regional Housing Authorities in the Area of Interest

	Housing Authority
North Slope Borough	Tagiugmiullu Nunamiullu Housing Authority
Yukon-Koyukuk Census Area	Interior Regional Housing Authority
Fairbanks North Star Borough	Interior Regional Housing Authority
Denali Borough	Interior Regional Housing Authority
Cantwell	Copper River Basin Regional Housing Authority
Matanuska-Susitna Borough	Cook Inlet Housing Authority
Kenai Peninsula Borough	Cook Inlet Housing Authority
Municipality of Anchorage	Cook Inlet Housing Authority
Southeast Fairbanks Census Area	Interior Regional Housing Authority
Municipality of Skagway Borough	Tlingít and Haida Regional Housing Authority
Valdez-Cordova Census Area	Copper River Basin Regional Housing Authority
City of Valdez	North Pacific Rim Housing Authority
Adak	Aleutian Housing Authority
Nome	Bering Straits Regional Housing Authority
Unalaska	Aleutian Housing Authority

Source: Association of Alaska Housing Authorities (2014)

5.3.4 Public Infrastructure and Services

This section discusses the existing public infrastructure and services within the AOI. A wide range of public services and facilities are offered across the AOI, with higher concentrations in urban areas such as the Municipality of Anchorage and Fairbanks. These services include law enforcement, fire protection, medical facilities, schools, and utilities such as electricity and heating, solid waste disposal, sewage treatment, and drinking water. Where services are not available at the local level, they are available from the borough or State.

The provision of public services and infrastructure in Alaska is expensive, particularly in rural areas. For example, the costs to construct public buildings—including schools, health clinics, and hospitals—in remote communities are approximately twice as much per square foot as in Anchorage (Foster and Goldsmith 2008). The higher cost per square foot for rural buildings is due to a combination of higher input costs, especially freight costs (barge and air); limited supply of specialty labor (mechanical, electrical); challenging foundation conditions, including areas with abundant permafrost; weather delays; remote logistics; and the high cost of fuel. Moreover, the harsh winter climate of Alaska shortens the useful life of roads and public buildings.

5.3.4.1 Schools

TABLE 5.3.4-1 identifies the number of schools in communities within the AOI, as well as the grade levels and student enrollment at those schools in terms of average daily membership (ADM). ADM is the average number of students enrolled to attend a specific school district on any given school day. School district-level information on student-to-teacher ratio and percent of school facility capacity used is also presented in TABLE 5.3.4-1. Anchorage was the largest school district in the AOI as of FY2015, with 98 schools from pre-kindergarten through 12th grade and an ADM of 46,745 students. The Chugach School District and Skagway School District had the smallest student populations in the AOI. The aggregate school facility capacity was not exceeded in any school district, but enrollment may be above capacity at some schools within a district. For example, enrollment exceeds designated limits in a number of Anchorage School District schools. Some school districts, such as the Alaska Gateway School District, have substantial excess capacity.

Alaska schools vary greatly in size—a single high school in Anchorage may serve more than 2,000 students; schools in urbanized or semi-urbanized areas of the FNSB, KPB, and MSB may serve hundreds; and some schools in rural areas of Alaska have 20 or fewer students at a variety of grade levels (Alaska Teacher Placement 2014). The State of Alaska does not provide State funds for schools with fewer than 10 students.

The State of Alaska provides parents the option of home-schooling their children. Under State law, children schooled at home by their parents or guardians are exempt from compulsory attendance. Parents are not required to register with the State or their local school district, and no testing or other requirements are placed on home-schools not funded with public dollars. The Alaska Department of Education and Early Development oversees the regulation of correspondence schools available to home-school families. As of 2014, this department's website listed 33 correspondence schools, of which 14 are available to students from all over the State, and 19 serve students in individual school districts (Alaska Department of Education and Early Development 2014a). Some school districts in the AOI have a high correspondence ADM. For example, the correspondence ADM of the Yukon-Koyukuk School District in FY2015 was 1,169 students, while the non-correspondence ADM was 287. Other school districts in the AOI with large numbers of correspondent students include the Nenana City School District, Denali Borough School District, and Chugach School District.

TABLE 5.3.4-1

Characteristics of School Districts in the Area of Interest, FY2015

	Number of Schools						Average Daily Membership	Student to Teacher Ratio	Percent of School Facility Capacity Used
	All grades	Elementary	Secondary	High	Other	Total			
North Slope Borough									
North Slope Borough School District	7	1	1	2		11	1,739	11.1	33
Yukon-Koyukuk Census Area									
Yukon-Koyukuk School District	9				1	10	287	27.7	29
Fairbanks North Star Borough									
Fairbanks North Star Borough School District	2	17	4	4	8	35	13,512	17.2	75
Denali Borough									
Denali Borough School District	4					4	208	33.8	27
Nenana City School District	2					2	177	45.9	49
Matanuska-Susitna Borough									
Matanuska-Susitna Borough School District	6	20	5	6	9	46	15,825	19.6	84
Kenai Peninsula Borough									
Kenai Peninsula Borough School District	12	14	4	6	7	43	8,131	14.6	62
Municipality of Anchorage									
Anchorage School District	6	60	10	10	12	98	46,745	17.0	84
Southeast Fairbanks Census Area									
Alaska Gateway School District	7				1	8	305	11.4	20
Delta-Greely School District	2	1		2	1	6	720	16.7	56
Skagway School District									
Skagway School District	1					1	84	7.6	47
Valdez-Cordova Census Area									
Chugach School District	4					4	61	18.5	29
Copper River School District	3	1			1	5	382	17.3	42
Cordova City School District	1	1			1	3	325	14.7	50
Valdez City School District	1	1	1	1		4	595	13.0	36

TABLE 5.3.4-1

Characteristics of School Districts in the Area of Interest, FY2015

	Number of Schools						Average Daily Membership	Student to Teacher Ratio	Percent of School Facility Capacity Used
	All grades	Elementary	Secondary	High	Other	Total			
Other									
Aleutian Region School District	2					2	37	8.2	48[a]
Nome Public Schools	1	1			3	5	676	12.6	61
Unalaska City School District		1			1	2	396	12.4	85

Source: Alaska Department of Education and Early Development ; Alaska Department of Education and Early Development ; Alaska Department of Education and Early Development ; ADCCED (2016)

Notes:

[a] Excludes ADM and gross square feet for Adak School because the school is leased by the State and its GSF is unavailable. Moreover, the Alaska Department of Education and Early Development does not include the gross square feet of leased properties in its calculations of percent capacity in use.

TABLE 5.3.4-2 presents the revenue per ADM, an indication of the cost per student, and funding sources in school districts in the AOI. The average revenue per ADM in Alaska is higher than in any other state, reflecting the costs of maintaining educational services among geographically dispersed communities (U.S. Department of the Interior 2002). As shown in TABLE 5.3.4-2, the revenue per ADM in 2013 was highest in the North Slope Borough School District (where more funding comes from local government than in any other region) and lowest in the Anchorage School District. State law establishes a formula by which a guaranteed level of funding, known as "basic need," is determined for each school district. This formula is weighted in favor of small, isolated sites and takes into consideration the total number of students enrolled in the entire district, the number of students in each school within the district, regional cost differentials ("district cost factors"), special needs funding, intensive services funding, and enrollment in correspondence programs. The components of public school funding are State aid, required local contribution, federal Title VIII impact aid, special revenue (which includes a wide array of revenue sources, such as federal funds and public and private grants), and other sources. Federal impact aid provides funds to school districts for children with parents living and/or working on federal property, "in lieu of local tax revenues" (Alaska Department of Education and Early Development 2013b). Boroughs, together with cities in the unorganized borough that have particular types of governments, are required to pay into their school districts, while regional education attendance areas in other parts of Alaska are fully funded by the State. Historically, municipalities across the State have funded their respective school districts at levels higher than the required contribution (Information Insights 2004).

TABLE 5.3.4-2

Average Annual Cost per Student and Funding Sources for School Districts in the Area of Interest, FY2014

School District by Area	Revenue Per Average Daily Membership	Share of Funding by Source (%)				
		Local Govt.	State Govt.	Federal Govt.	Special Revenue	Other Govt.
North Slope Borough						
North Slope Borough School District	$38,540	53	25	10	9	3
Yukon-Koyukuk Census Area						
Yukon Koyukuk School District	$14,088	0	62	6	25	6
Fairbanks North Star Borough						
Fairbanks North Star Borough School District	$14,314	24	60	7	8	0
Denali Borough						
Denali Borough School District	$10,808	24	69	0	6	1
Nenana City School District	$9,094	0	79	0	19	2
Matanuska-Susitna Borough						
Matanuska-Susitna Borough School District	$12,497	24	69	0	7	1
Kenai Peninsula Borough						
Kenai Peninsula Borough School District	$15,177	29	49	0	22	6
Municipality of Anchorage						
Anchorage School District	$12,506	32	55	3	9	1
Southeast Fairbanks Census Area						
Alaska Gateway School District	$23,954	0	84	1	12	4

TABLE 5.3.4-2

Average Annual Cost per Student and Funding Sources for School Districts in the Area of Interest, FY2014

School District by Area	Revenue Per Average Daily Membership	Share of Funding by Source (%)				
		Local Govt.	State Govt.	Federal Govt.	Special Revenue	Other Govt.
Delta/Greely School District	$13,391	0	87	3	8	2
Skagway School District	$28,870	46	8	0	6	0
Valdez-Cordova Census Area						
Chugach School District	$20,563	0	43	3	50	4
Copper River School District	$16,707	0	87	5	7	1
Cordova City School District	$18,367	29	63	0	5	2
Valdez City School District	$21,802	60	34	0	6	1
Other						
Aleutian Region School District	$48,285	0	83	4	5	9
Nome Public Schools	$18,753	14	67	1	13	5
Unalaska School District	$19,910	35	56	0	8	2

Source: Alaska Department of Education and Early Development (2014b)

5.3.4.2 Health Care

There are 13 hospitals in the AOI—five in the Municipality of Anchorage, two in Fairbanks, and one each in Palmer, Barrow, Nome, Soldotna, Homer, and Seward (TABLE 5.3.4-3). The largest is Providence Alaska Medical Center in Anchorage, with 326 acute care beds as of 2014. The smallest hospital is Seward Medical Center, with six acute care beds. All Alaska hospitals use some telemedicine applications to compensate for the cost and transportation obstacles facing patients who live in communities without hospitals (Alaska State Hospital and Nursing Home Association 2014). Health clinics or federally qualified health centers offering primary care are located in the majority of other communities in the AOI. Trauma cases and serious illness cases that occur in these communities must be sent to hospitals. Transport in emergency situations usually is by airplane or helicopter. Communities with hospitals that provide air medical services include Anchorage, Fairbanks, Seward, Homer, Soldotna, Palmer, and Barrow. If a helicopter is required, medevacs can cost $100,000 or more, depending on the distance and route. The average cost of medical evacuation in Alaska with a fixed wing aircraft exceeds $22,000 (Schoenfeld 2013; Alaska Federal Health Care Partnership 2016). Many Alaska residents have added supplements to their regular insurance plans to cover this service. Most communities in the AOI provide emergency medical services, often through local volunteer fire departments. The staff, equipment, and other resources of many of these local volunteer fire departments are limited.

Alaska has the highest health insurance premiums in the nation. In 2013, the premium for family coverage in the State was 29 percent above the national average. One reason for the high premiums is higher hospital costs and margins (Fried 2015b). As in most industrial sectors in Alaska, the State's health care industry has higher costs than the U.S. average because of the distance from its main source of goods and services in the Lower 48. Moreover, the small markets in Alaska's remote areas mean providers can't take advantage of economies of scale and have limited competition (Sebelius 2010; Foster and Goldsmith 2011). Another reason for the high premiums is the much higher physician reimbursements (Fried 2015b). Alaska is isolated; it has long, harsh winters; and many of its communities are not on the road system. To attract health-care workers, the State often has to offer them the opportunity to earn more or have other benefits (Foster and Goldsmith 2011). Even with the higher physician reimbursements, Alaska ranks nearly last in the nation in terms of the number of providers compared to the number of patients. Rural areas have the greatest difficulty attracting qualified providers. About 80 percent of all providers practice in and near Anchorage, and virtually all specialty care is limited to Anchorage and Fairbanks. Both of the State's Level II-certified trauma centers (Alaska Native Medical Center and Providence Alaska Medical Center) are located in Anchorage (Alaska Department of Health and Social Services 2015a; Alaska Federal Health Care Partnership 2015). However, even Alaska's urban areas face workforce shortages, ranging from a complete lack of many specialists in Fairbanks and other towns, to a relative shortage of primary care providers and many specialists in Anchorage (Sebelius 2010).

In an effort to control health care costs, Alaska law requires that health care facilities seeking to expand their services, such as number of acute care beds, must demonstrate a need for the proposed services and obtain a certificate of need from Alaska Department of Health and Social Services (ADHSS). According to State regulations, a demonstrated need for an expansion of services includes public information about service area population changes expected over the planning horizon, such as a major economic project (Alaska Department of Health and Social Services 2005). Statewide, there are 1,485 licensed beds in Alaska hospitals, not including those operated by the military (Alaska Department of Health and Social Services 2014b). A number of health care facilities occasionally operate at full capacity. For example, Central Peninsula Hospital in Soldotna, which is licensed for 49 beds, reports that it was at capacity on its medical/surgical floor several times in 2014. When the hospital reaches capacity, it activates its surge plan, which means holding patients for an extended length of time in the Emergency Department and moving select patients from the medical/surgical floor to the obstetrical unit. If the hospital runs out of room in these units, the only option is to transfer the patient to an Anchorage hospital on a medevac flight (Persily 2015). Two rural hospitals in the AOI—Norton Sound Regional Hospital in Nome and Samuel Simmonds Memorial Hospital in Barrow—recently expanded their facilities and increased capacity (Alaska Department of Health and Social Services 2014b).

Within the AOI are a number of federally designated Medically Underserved Areas (MUA), which are defined by the U.S. Department of Health and Human Services as areas that have too few primary care providers, high infant mortality, high poverty, and/or high older adult population. In terms of Alaska's geopolitical jurisdictions, a designated area may encompass one or more census tracts or other areas within a borough or census area, a whole borough or census area, or a group of contiguous boroughs or census areas. Designated areas are assigned an Index of Medical Underservice Score, which ranges from 1 to 100; the lower the score, the higher the need. In order to be designated as a MUA, the area's score must be equal to or less than 62. Designated areas in the AOI and their Index of Medical Underservice Score include the NSB (57.00); Koyukuk-Middle Yukon (59.90), McGrath-Holy Cross Service Area (47.70), and Yukon Flats Service Area (57.00) in the Yukon-Koyukuk Census Area; Municipality of Skagway Borough (59.90); City of Whittier in the Valdez-Cordova Census Area (50.00); and 15 census tracts in the Municipality of Anchorage (61.70) (U.S. Department of Health and Human Services 2017). Even if there are a reasonable number of health care providers located in one community in a borough or census area, residents of other communities in that area may have to travel a considerable distance to reach the providers, costing both excessive time and money (University of Alaska Anchorage 2017).

TABLE 5.3.4-3

Medical Services in the Area of Interest

	Hospitals	Health Clinics and Federally Qualified Health Centers	Emergency Medical Services		
			Local Service Available	**Level (see notes)**	**Access (see notes)**
North Slope Borough					
Barrow	Yes	Simmonds Memorial Hospital	North Slope Borough Search and Rescue Department	3	c, h, sp
Prudhoe Bay CDP	No	Fairweather Deadhorse Medical Clinic/Prudhoe Bay Operations Center	Greater Prudhoe Bay Fire Dept.	2-Isolated	lh, c, ap
Yukon-Koyukuk Census Area					
Bettles	No	Evansville/Bettles Clinic	Bettles Volunteer Fire Department	1-Isolated	r, a
Coldfoot	No	No	Coldfoot Volunteer Fire/EMS Dept.	1-Isolated	hw, a
Evansville	No	Evansville/Bettles Clinic	No	1-Isolated	hw, a
Evansville ANVSA	No	Evansville/Bettles Clinic	No	1-Isolated	hw, a
Livengood	No	No	No	1-Isolated	hw, a
Manley Hot Springs	No	Manley Health Clinic	Manley Rescue Squad	1-Isolated	hw, r, a
Minto	No	Minto Health Clinic	Minto Volunteer Fire/EMS Dept.	1-Isolated	hw, a
Nenana	No	Nenana Clinic	Nenana Volunteer Fire/EMS Dept.	2-Highway	hw, r, ap
Wiseman	No	Wiseman Health Clinic	No	1-Isolated	lh, a, r, s
Fairbanks North Star Borough					
Fairbanks	Fairbanks Memorial Hospital; Bassett Army Community Hospital	Interior Community Health Center; Chief Andrew Isaac Health Center; and others	Chena-Goldstream Fire and Rescue; Fairbanks Fire Dept.; and others	4	hw, ap, sp
Denali Borough					
Anderson	No	No	Anderson Fire Dept./EMS	1-Isolated	hw, a, s
Cantwell	No	Cantwell Clinic	Cantwell Volunteer Ambulance	1-Isolated	hw, a, hp
Healy	No	Healy Clinic; Tri-Valley Community Center	Denali National Park Ambulance	2-Isolated	hw, a
McKinley Park	No	No	Denali National Park Ambulance	1-Isolated	hw, a
Matanuska-Susitna Borough					

TABLE 5.3.4-3

Medical Services in the Area of Interest

	Hospitals	Health Clinics and Federally Qualified Health Centers	Emergency Medical Services		
			Local Service Available	**Level (see notes)**	**Access (see notes)**
Big Lake	No	No	Big Lake Volunteer Fire/EMS Dept.	2-Highway	hw, a, s
Houston	No	No	Houston Volunteer Fire/EMS Dept.	1-Highway	hw, h, s
Knik-Fairview	No	No	Knik Volunteer Fire/EMS Dept.	1-Highway	hw, c, h, s
Palmer	Mat-Su Regional Medical Center	No	Matanuska-Susitna Borough EMS	4	hw, a, sp, h
Talkeetna	No	Sunshine Community Health Center	Talkeetna Volunteer Fire/EMS Dept.	2-Highway	hw, a, hp
Trapper Creek	No	No	Trapper Creek EMS	1-Highway	hw, a
Wasilla	No	Mat-Su Health Services; Providence Matanuska Health Care	Matanuska-Susitna Borough EMS	2-Highway	lh, m, c, fp, h, s
Willow	No	Willow Clinic	Willow Volunteer Fire/EMS Dept.	1-Highway	hw, a
Point MacKenzie	No	No	No	—	—
Kenai Peninsula Borough					
Anchor Point	No	Seldovia Village Tribe Health & Wellness	Anchor Point Volunteer Fire Dept. & Rescue Inc.	2-Highway	hw, c, a
Beluga	No	Beluga Public Health Nursing - Kenai Itinerant Nursing	No	—	—
Clam Gulch	No	Clam Gulch Public Health Nursing - Kenai Itinerant Nursing	No	1-Highway	c, a
Cohoe	No	Cohoe Public Health Nursing - Kenai Itinerant Nursing	No	1-Highway	hw, c, h
Cooper Landing	No	Cooper Landing Health Center, Inc. (seasonal)	Cooper Landing Volunteer Ambulance, Inc.	1-Highway	hw, a, r, l
Happy Valley	No	Happy Valley Public Health Nursing - Homer Itinerant Nursing	No	1-Highway	hw, c, h
Homer	South Peninsula Hospital	Homer Public Health Center; Seldovia Village Tribe Health & Wellness	Homer Volunteer Fire Dept.	3	hw, m, ap, sp
Kalifornsky	No	Kalifornsky Public Health Nursing -	No	2-Highway	hw, c, a

TABLE 5.3.4-3

Medical Services in the Area of Interest

			Emergency Medical Services		
	Hospitals	**Health Clinics and Federally Qualified Health Centers**	**Local Service Available**	**Level (see notes)**	**Access (see notes)**
		Kenai Itinerant Nursing			
Kasilof	No	Kasilof Public Health Nursing - Kenai Itinerant Nursing	No	1-Highway	hw, a
Kenai	No	Kenai Health Center	Kenai Fire Dept.	2-Highway	hw, c, ap, sp, s
Moose Pass	No	No	Moose Pass Volunteer Fire Dept. and EMS	1-Highway	hw, h, s
Nikiski	No	No	Nikiski Fire Dept.	2-Highway	hw, c, h
Ninilchik	No	NTC Community Clinic	Ninilchik Emergency Services	1-Highway	hw, c, a
Ninilchik ANVSA	No	NTC Community Clinic	Ninilchik Emergency Services	1-Highway	hw, c, a
Salamatof	No	No	No	1-Highway	hw, c, a
Sterling	No	No	Central Emergency Services (Soldotna)	2-Highway	hw, h, s
Soldotna	Central Peninsula Hospital	Cottonwood Health Center	Central Emergency Services (Soldotna)	4	hw, ap, sp
Seward	Providence Seward Medical Center	North Star Health Clinic-Chugachmiut; Seward Public Health Center	Bear Creek Fire/EMS Dept.; Seward Volunteer Ambulance Corp.; Seward Fire Dept.	3	hw, lm, ap
Tyonek	No	Indian Creek Health Clinic	Tyonek Volunteer Fire Dept.	1-Isolated	c, a
Municipality of Anchorage	Alaska Native Medical Center; Alaska Regional Hospital; Providence Alaska Medical Center; St. Elias Hospital; Anchorage Military Hospital	Anchorage Neighborhood Health Center; and others	Anchorage Fire Dept.; and others	5	hw, c, ap, sp, hp
Eklutna ANVSA	No	Eklutna Village Clinic (Chugiak)	Chugiak Volunteer Fire and Rescue	—	—
Southeast Fairbanks Census Area					
Alcan Border			Alcan Rescue Squad	1-Isolated	hw, a
Delta Junction	No	Delta Junction Family Medical Center; Delta Junction Public Health Center; Fairbanks Memorial Hospital	Delta Junction Volunteer Fire Dept.; Delta Rescue Squad; Dry Creek EMT Response Team; Rural Deltana Volunteer Fire Dept.	2-Isolated	hw, ap

TABLE 5.3.4-3

Medical Services in the Area of Interest

			Emergency Medical Services		
	Hospitals	**Health Clinics and Federally Qualified Health Centers**	**Local Service Available**	**Level (see notes)**	**Access (see notes)**
Big Delta	No	Delta Junction Family Medical Center; Fairbanks Memorial Hospital	Rural Deltana Volunteer Fire Dept.; Delta Junction Rescue Squad	2-Isolated	hw, a, s
Dot Lake	No	Dot Lake Clinic	No	1-Isolated	hw, a
Dot Lake ANVSA	No	Dot Lake Clinic	No	1-Isolated	hw, a
Dry Creek	No	Dry Creek Public Health Nursing - Delta Junction Itinerant Nursing	Dry Creek EMT Response Team	1-Isolated	hw, a
Northway Junction	No	Northway Clinic	No	1-Isolated	hw, h, a
Northway	No	Northway Clinic	Northway First Responder Service	1-Isolated	hw, ap
Northway ANVSA	No	Northway Clinic	Northway First Responder Service	1-Isolated	hw, ap
Tanacross	No	Tanacross Clinic	No	1-Isolated	hw, a
Tetlin	No	Tetlin Clinic	No	1-Isolated	a
Tetlin ANVSA	No	Tetlin Clinic	No	1-Isolated	a
Tok	No	Upper Tanana Health Center	40 Mile Air, Ltd.	2-Isolated	hw, a
Municipality of Skagway Borough	No	Dahl Memorial Clinic	Skagway Volunteer Fire Department	2-Isolated	lh, m, a, sp, h
Valdez-Cordova Census Area					
Chistochina	No	Chistochina Clinic - Mount Sanford Tribal Consortium	No	1-Isolated	hw, a
Copper Center	No	Kluti-Kaah Health Clinic	Copper Center Volunteer Fire/EMS Dept.	1-Isolated	hw, a, s
Copper Center ANVSA	No	Kluti-Kaah Health Clinic	Copper Center Volunteer Fire/EMS Dept.	1-Isolated	hw, a, s
Gakona	No	Gakona Health Clinic	Gakona Volunteer Fire/EMS Dept.	1-Isolated	hw, a, s
Gakona ANVSA	No	Gakona Health Clinic	Gakona Volunteer Fire/EMS Dept.	1-Isolated	hw, a, s
Glennallen	No	Cross Road Medical Center	Copper River EMS Council	2-Isolated	hw, h
Gulkana	No	Gulkana Community Clinic	Gulkana Volunteer Fire/EMS Dept.	1-Isolated	a, s
Gulkana ANVSA	No	Gulkana Community Clinic	Gulkana Volunteer Fire/EMS Dept.	1-Isolated	a, s
Mentasta Lake	No	Mentasta Lake Clinic	Mentasta Rescue Squad	1-Highway	hw, a, l
Mentasta Lake ANVSA	No	Mentasta Lake Clinic	Mentasta Rescue Squad	1-Highway	hw, a, l

TABLE 5.3.4-3

Medical Services in the Area of Interest

	Hospitals	Health Clinics and Federally Qualified Health Centers	Emergency Medical Services		
			Local Service Available	Level (see notes)	Access (see notes)
Paxson	No	No	Paxson Volunteer Fire/EMS Dept.	1-Isolated	hw, l, a
Slana	No	Slana Public Health Nursing - Mat-Su Itinerant Nursing	No	1-Isolated	hw, r
Tazlina	No	Tazlina Health Clinic	Tazlina Volunteer Fire/EMS Dept.	1-Isolated	hw, a, sp, s
Tazlina ANVSA	No	Tazlina Health Clinic	Tazlina Volunteer Fire/EMS Dept.	1-Isolated	hw, a, sp, s
Tonsina	No	No	Tonsina Volunteer Fire/EMS Dept.	1-Isolated	hw, a
Valdez	No	Providence Valdez Medical Center; Valdez Medical Clinic; Valdez Public Health Center	Valdez Fire Dept.	3	h, m, ap
Whittier	No	Whittier Community Health Center	Whittier Volunteer Fire/EMS Dept.	2-Isolated	lh, m, a
Other					
Adak	No	Adak Medical Clinic	Adak Fire Department	2-Isolated	c, ap
Nome	Norton Sound Regional Hospital	No	Nome Volunteer Ambulance Department	3	lh, c, ap
Nome ANVSA	Norton Sound Regional Hospital	No	Nome Volunteer Ambulance Department	3	lh, c, ap
Unalaska	No	Ounalaska Wellness Center	Unalaska Fire/Emergency Medical Services	2-Isolated	lh, lm, ap

Source: ADHSS (2015b)

Notes:

Level

1-Isolated: Limited air or marine highway access to a Level 3 or higher community; road access exceeds 60 miles.
1-Highway: Limited air or marine highway access to a Level 3 or higher community; year-round, 60 minute or less road access.
2-Isolated: Marine highway or daily air access to closest Level 3 or higher community; air service to Level 1 communities in area.
2-Highway: Marine highway or daily air access to closest Level 3 or higher community; year-round, 60 minute or less road access.
3: Daily airline service to Level 3, 4 & 5 communities; air service to Level 1 & 2 communities in area; road or marine highway access all year.
4, 5: Daily airline service to Level 2, 3, 4 & 5 communities; road or marine highway access all year.

Access

hw: Linked to the Alaska highway network throughout the year.
sh: Linked to the Alaska highway network during the summer only.
lh: Outlying roads but no linkage to the Alaska highway network.
m: Linked by the Alaska marine highway system.
dglm: Occasional marine highway service.
c: Ocean access without linkage to the marine highway system.
r: Along a river used as a primary transportation route (boating, winter ice road).
l: Along a lake used as a primary transportation route (boating, winter ice road).
a: Authorized landing area with small plane capacity only.
ap: Authorized landing area with regular, scheduled commercial air service.

TABLE 5.3.4-3

Medical Services in the Area of Interest

	Hospitals	Health Clinics and Federally Qualified Health Centers	Emergency Medical Services: Local Service Available	Level (see notes)	Access (see notes)

sp: Designated landing area for float planes (seaplanes).
fp: Landing area available for float planes (seaplanes).
h: Landing area available for helicopters.
hp: Designated landing area for helicopters.

A "—" indicates that the measure is unavailable.

5.3.4.3 Police and Fire Protection Services

As shown in TABLE 5.3.4-4, city or borough police departments, as well as Village Public Safety Officers (VPSOs), provide law enforcement services in boroughs and communities in the AOI; however, law enforcement in most rural areas of the State primarily is the responsibility of the Division of Alaska State Troopers under the Alaska Department of Public Safety (Alaska Department of Public Safety 2014a). The Division consists of a central headquarters and posts that provide patrol, enforcement, and search and rescue to all areas of the State. The Division has four bureaus: the Alaska Bureau of Investigation, which investigates major crimes; the Alaska Bureau of Alcohol and Drug Enforcement, which investigates bootlegging and illegal drug distribution throughout Alaska; the Alaska Bureau of Judicial Services, which is responsible for prisoner transports and providing security for Alaska courts; and the Alaska Bureau of Highway Patrol, which is responsible for highway safety (Alaska Department of Public Safety 2014a). In 2014, there were 327 Alaska State Troopers. However, in 2015, State budget cuts led to the loss of around 26 positions and the closure of Alaska State Trooper posts in Talkeetna and Girdwood (Barrick 2015; Hollander 2015).

Alaska State Troopers respond to emergencies, felonies, and misdemeanor cases as promptly as circumstances allow. Their efforts, however, often are hampered by delayed notification, long response distance, and the uncertainties of weather and transportation. In some rural villages, VPSOs assist their communities in all aspects of public safety, including law enforcement, fire protection, and search and rescue (Alaska Department of Public Safety 2014b). VPSOs are employed by non-profit organizations affiliated with ANCSA Regional Corporations and are supervised by the Alaska State Troopers. In communities with a VPSO Program, citizens enjoy timely response to law enforcement emergencies without delays caused by weather, distance, or State budgetary restraints. VPSOs are not expected to handle high-risk or complex investigative situations, but are the "first responders" to crimes committed in their communities. Part of their job involves stabilizing dangerous situations and protecting crime scenes until State Troopers can arrive. VPSOs frequently conduct and complete misdemeanor and minor felony investigations with assistance from State Troopers (Alaska Department of Public Safety 2014b). The closest law enforcement facility for those communities without a police department, VPSO, or Alaska State Trooper post is listed in Table 5.3.4-4. All communities in the AOI are covered by emergency "911" service, but some 911 dispatch centers may be insufficiently staffed. For example, the KPB's multi-agency dispatch center, which is operated by the borough government in partnership with the Alaska State Troopers, is currently understaffed relative to the number of calls received (Persily 2015).

While some communities in the AOI maintain fire departments staffed with career firefighters, volunteers provide fire protection services in most communities. Generally, fire departments are responsible for all structural firefighting within their jurisdictional boundaries. Wildland fire management in Alaska is an interagency effort involving the U.S. Bureau of Land Management, Alaska Fire Service; Alaska Department of Natural Resources, Division of Forestry (DOF); and the U.S. Forest Service. The Alaska Interagency Coordination Center, located at Fort Wainwright, serves as the focal point for initial attack resource coordination, logistics support, and predictive services for all State and federal agencies involved in wildland fire management and suppression in Alaska. In addition, the Alaska Interagency Coordination Center provides coordination and support for all-hazard emergency response activities for federal landholding agencies in Alaska (Alaska Interagency Coordination Center 2014). The U.S. Bureau of Land Management Alaska Fire Service provides wildland fire suppression services for all U.S. Department of the Interior and Alaska Native Corporation lands in Alaska (Alaska Fire Service 2014). Recent State budget cuts have forced the DOF to reduce its firefighting staff, but the Division can supplement its staffing levels through the emergency firefighter employment program when necessary (Colton 2015).

TABLE 5.3.4-4

Police and Fire Protection Services in the Area of Interest

	Local or Borough Police Department	Village Public Safety Officer	Alaska State Trooper Post	Nearest Law Enforcement Facility	Local or Borough Fire Department
North Slope Borough	Yes (headquarters in Barrow)				Yes (headquarters in Barrow)
Prudhoe Bay CDP	Yes	No	No	NSB Police Department office in Prudhoe Bay CDP	Yes
Yukon-Koyukuk Census Area					
Bettles	No	No	No	Coldfoot State Troopers Post	Yes
Coldfoot	No	No	Yes		No
Evansville	No	No	No	Coldfoot State Troopers Post	No
Evansville ANVSA	No	No	No	Fairbanks State Troopers Post	No
Livengood	No	No	No	Fairbanks State Troopers Post	No
Manley Hot Springs	No	No	No	Fairbanks State Troopers Post	Yes
Minto	No	No	No	Fairbanks State Troopers Post	Yes
Nenana	No	Yes	Yes		Yes
Wiseman	No	No	No	Fairbanks State Troopers Post	No
Fairbanks North Star Borough	No				No
Fairbanks	Yes	Yes	Yes		Yes
Denali Borough	No				No

TABLE 5.3.4-4

Police and Fire Protection Services in the Area of Interest

	Local or Borough Police Department	**Village Public Safety Officer**	**Alaska State Trooper Post**	**Nearest Law Enforcement Facility**	**Local or Borough Fire Department**
Anderson	No	No	No	Nenana State Troopers Post	Yes
Cantwell	No	No	Yes		Yes
Healy	No	No	Yes		Yes
McKinley Park	No	No	No	Healy State Troopers Post	Yes
Matanuska-Susitna Borough	No				No
Big Lake	No	No	No	Wasilla State Troopers Post	Yes
Houston	Yes	No	No		Yes
Knik-Fairview	No	No	No	Wasilla State Troopers Post	No
Palmer	Yes	No	Yes		Yes
Point MacKenzie	No	No	No	Wasilla State Troopers Post	No
Talkeetna	No	No	Yes		Yes
Trapper Creek	No	No	No	Wasilla State Troopers Post	No
Wasilla	Yes	No	No		Yes
Willow	No	No	No	Wasilla State Troopers Post	Yes
Kenai Peninsula Borough	No				No
Anchor Point	No	No	Yes		Yes
Beluga	No	No	No	Soldotna State Troopers Post	No
Clam Gulch	No	No	No	Soldotna State Troopers Post	No
Cohoe	No	No	No	Soldotna State Troopers Post	No
Happy Valley	No	No	No	Ninilchik State Troopers Post	No
Homer	Yes	No	No		Yes
Kalifornsky	No	No	No	Soldotna State Troopers Post	No
Kasilof	No	No	No	Soldotna State Troopers Post	
Cooper Landing	No	No	Yes		Yes
Kenai	Yes	No	No		Yes
Moose Pass	No	No	No	Seward State Troopers Post	Yes
Nikiski	No	No	No	Soldotna State Troopers Post	Yes

TABLE 5.3.4-4

Police and Fire Protection Services in the Area of Interest

	Local or Borough Police Department	**Village Public Safety Officer**	**Alaska State Trooper Post**	**Nearest Law Enforcement Facility**	**Local or Borough Fire Department**
Ninilchik	No	No	Yes		Yes
Ninilchik ANVSA	No	No	No	Ninilchik State Troopers Post	Yes
Salamatof	No	No	No	Soldotna State Troopers Post	Yes
Seward	Yes	No	Yes		Yes
Soldotna	Yes	No	Yes		Yes
Sterling	No	No	No	Soldotna State Troopers Post	Yes
Tyonek	No	No	No	Soldotna State Troopers Post	Yes
Municipality of Anchorage	Yes	Yes	Yes		Yes
Eklutna ANVSA	No	No	No	Anchorage Police Department and State Troopers Post	Yes
Southeast Fairbanks Census Area					
Big Delta	No	No	No	Delta Junction State Troopers Post	No
Delta Junction	No	No	Yes		Yes
Dot Lake	No	No		Delta Junction State Troopers Post	Yes
Dot Lake ANVSA	No	No		Delta Junction State Troopers Post	Yes
Dry Creek	No	No		Northway State Troopers Post	No
Tanacross	No	Yes	No	Tok State Troopers Post	Yes
Tok	No	No	Yes		Yes
Tetlin	No	No		Tok State Troopers Post	No
Tetlin ANVSA	No	No		Tok State Troopers Post	No
Northway Junction	No	No		Northway State Troopers Post	No
Northway	No	No	Yes		Yes
Northway ANVSA	No	No		Northway State Troopers Post	Yes
Alcan Border	No	No		Northway State Troopers Post	No
Municipality of Skagway Borough	Yes	No	No	Haines State Troopers Post	Yes
Valdez-Cordova Census Area					
Chistochina	No	Yes	No	Glennallen State Troopers Post	No

TABLE 5.3.4-4

Police and Fire Protection Services in the Area of Interest

	Local or Borough Police Department	Village Public Safety Officer	Alaska State Trooper Post	Nearest Law Enforcement Facility	Local or Borough Fire Department
Copper Center	No	Yes	No	Glennallen State Troopers Post	No
Copper Center ANVSA	No	Yes	No	Glennallen State Troopers Post	No
Gakona	No	Yes	No	Glennallen State Troopers Post	Yes
Gakona ANVSA	No	No	No	Glennallen State Troopers Post	Yes
Glennallen	No	No	Yes		Yes
Gulkana	No	Yes	No	Glennallen State Troopers Post	Yes
Gulkana ANVSA	No	No	No	Glennallen State Troopers Post	Yes
Mentasta Lake	No	No	No	Tok State Troopers Post	Yes
Mentasta Lake ANVSA	No	No	No	Tok State Troopers Post	Yes
Paxson	No	No	No	Delta Junction State Troopers Post	No
Slana	No	No	No	Tok State Troopers Post	Yes
Tazlina	No	Yes	No	Glennallen State Troopers Post	No
Tazlina ANVSA	No	Yes	No	Glennallen State Troopers Post	No
Tonsina	No	No	No	Glennallen State Troopers Post	No
Valdez	Yes	No	Yes		Yes
Whittier	Yes	No	No		Yes
Other					
Adak	No	Yes	No	Unalaska State Troopers Post	Yes
Nome	Yes	No	Yes		Yes
Nome ANVSA	Yes	No	Yes		Yes
Unalaska	Yes	No	Yes		Yes

Source: Alaska Department of Public Safety (2014c); Alaska Department of Public Safety (2014b); Collins (2014)

5.3.4.4 Utilities

TABLE 5.3.4-5 documents the provision of local utilities (water, sewer, solid waste, electric, natural gas) to communities within the AOI by identifying the local communities' service providers by utility type. While more urbanized areas have modern public utility systems, the systems in rural areas typically are limited. Many rural communities do not have community piped potable water or sewage treatment systems.

Water in these communities generally is provided by individual household wells, and sewage treatment facilities consist of individual septic systems or communal sewage lagoons. Households in some small rural villages lack flush toilets and running water. Solid waste is generally hauled to borough, city, or village landfills. Most rural communities have Class III landfills that do not meet the requirements of the federal Resource Conservation and Recovery Act (Colt et al. 2003).

The day-to-day operating costs of utility systems in rural Alaska are high (Colt et al. 2003). With small customer bases and limited revenue, many, if not most, of these systems are not self-supporting. The difference between customer payments and the actual cost of day-to-day operations is made up by the Power Cost Equalization (PCE) program, general city/borough revenues, several State and federal assistance programs, and the deferral or avoidance of maintenance, with public agencies often paying for major repairs or premature replacement (Colt et al. 2003).

TABLE 5.3.4-5

Utility Providers in the Area of Interest

	Community Piped Water System Operator	**Community Piped Sewage System Operator**	**Landfill Facility Operator**	**Electric Utility Operator**	**Natural Gas Utility Operator**
North Slope Borough					
Prudhoe Bay CDP	(none)	(none)	Borough	TDX North Slope Generating[a]	Norgasco, Inc.
Yukon-Koyukuk Census Area					
Bettles	(none)	(none)	Village Council-Evansville	Alaska Power and Telephone Company	(none)
Coldfoot	(none)	(none)	FNSB- South Cushman	Individual generators	(none)
Evansville	(none)	(none)	Village Council	Alaska Power and Telephone Company	(none)
Evansville ANVSA	(none)	(none)	Village Council	Alaska Power and Telephone Company	(none)
Livengood	(none)	(none)	FNSB- South Cushman	Individual generators	(none)
Manley Hot Springs	Community Association	Community Association	Community Association	TDX Manley Generating	(none)
Minto	Village Council	Village Council	Village Council	Alaska Village Electric Cooperative	(none)
Nenana	City	City	Denali Borough	Golden Valley Electric Association	(none)
Wiseman	(none)	(none)	FNSB- South Cushman	Individual generators	(none)
Fairbanks North Star Borough					
Fairbanks	Private/State	Private/State	Borough	Aurora Energy/Golden Valley Electric Association	AIDEA/Interior Gas Utility
Denali Borough					

TABLE 5.3.4-5

Utility Providers in the Area of Interest

	Community Piped Water System Operator	Community Piped Sewage System Operator	Landfill Facility Operator	Electric Utility Operator	Natural Gas Utility Operator
Anderson	City	City	Borough	Golden Valley Electric Association	(none)
Cantwell	(none)	(none)	Borough	Golden Valley Electric Association	(none)
Healy	(none)	(none)	Borough	Golden Valley Electric Association	(none)
McKinley Park	(none)	(none)	Borough	Golden Valley Electric Association	(none)
Matanuska-Susitna Borough					
Big Lake	(none)	(none)	Borough	Matanuska Electric Association	ENSTAR[b]
Houston	(none)	(none)	Borough	Matanuska Electric Association	ENSTAR[b]
Knik-Fairview	(none)	(none)	Borough	Matanuska Electric Association	ENSTAR
Palmer	City/Private	City	Borough	Enerdyne/Matanuska Electric Association	ENSTAR
Point MacKenzie	(none)	(none)	Borough	Matanuska Electric Association	(none)
Skwentna	(none)	(none)	Borough	Individual generators	(none)
Talkeetna	Borough	Borough	Borough	Matanuska Electric Association	(none)
Trapper Creek	(none)	(none)	Borough	Matanuska Electric Association	(none)
Wasilla	City/Private	City	Borough	Matanuska Electric Association	ENSTAR
Willow	(none)	(none)	Borough	Matanuska Electric Association	ENSTAR
Kenai Peninsula Borough					
Anchor Point	Private	Private	Borough	Homer Electric Association	ENSTAR
Beluga	(none)	(none)	Borough	Chugach Electric Association	(none)
Clam Gulch	(none)	(none)	Borough	Homer Electric Association	ENSTAR[b]
Cohoe	(none)	(none)	Borough	Homer Electric Association	ENSTAR[b]
Cooper Landing	(none)	(none)	Borough	Chugach Electric Association	(none)
Happy Valley	(none)	(none)	Borough	Homer Electric Association	ENSTAR[b]
Homer	City	City	Borough	Homer Electric Association	ENSTAR
Kalifornsky	(none)	(none)	Borough	Homer Electric Association	ENSTAR
Kasilof	(none)	(none)	Borough	Homer Electric Association	ENSTAR[b]
Kenai	City/Private	City	Borough	Homer Electric Association	ENSTAR

TABLE 5.3.4-5

Utility Providers in the Area of Interest

	Community Piped Water System Operator	**Community Piped Sewage System Operator**	**Landfill Facility Operator**	**Electric Utility Operator**	**Natural Gas Utility Operator**
Moose Pass	(none)	(none)	Borough	Chugach Electric Association	ENSTAR[b]
Nikiski	(none)	(none)	Borough	Homer Electric Association	ENSTAR
Ninilchik	(none)	(none)	Borough	Homer Electric Association	ENSTAR[b]
Ninilchik ANVSA	(none)	(none)	Borough	Homer Electric Association	ENSTAR[b]
Salamatof	(none)	(none)	Borough	Homer Electric Association	ENSTAR
Seward	City/Private	City	Borough	City of Seward	(none)
Soldotna	City/Private	City	Borough	Homer Electric Association	ENSTAR
Sterling	(none)	(none)	Borough	Homer Electric Association	ENSTAR
Tyonek	Village Council	Village Council	Borough	Chugach Electric Association	(none)
Municipality of Anchorage	City/Private	City	City	Chugach Electric Association/Anchorage Municipal Light and Power	ENSTAR
Eklutna ANVSA	Village Council/Private	(none)	City (Anchorage)	Matanuska Electric Association	ENSTAR
Southeast Fairbanks Census Area					
Big Delta	(none)	(none)	City-Delta Junction	Golden Valley Electric	(none)
Delta Junction	(none)	(none)	City	Golden Valley Electric	(none)
Dot Lake	(none)	(none)	Village Council	Alaska Power & Telephone Company	(none)
Dot Lake ANVSA	(none)	(none)	Village Council	Alaska Power & Telephone Company	(none)
Dry Creek	(none)	(none)	Non-Profit Corporation	Individual generators	(none)
Tanacross	Village Council	Village Council	Village Council	Alaska Power & Telephone Company	(none)
Tok	(none)	(none)	Private	Alaska Power & Telephone Company	(none)
Tetlin	(none)	(none)	Village Council	Alaska Power & Telephone Company	(none)
Tetlin ANVSA	(none)	(none)	Village Council	Alaska Power & Telephone Company	(none)
Northway Junction	(none)	(none)	Village Council-Northway	Alaska Power & Telephone Company	(none)
Northway	(none)	(none)	Village Council	Alaska Power & Telephone Company	(none)
Northway ANVSA	(none)	(none)	Village Council	Alaska Power & Telephone Company	(none)

TABLE 5.3.4-5

Utility Providers in the Area of Interest

	Community Piped Water System Operator	**Community Piped Sewage System Operator**	**Landfill Facility Operator**	**Electric Utility Operator**	**Natural Gas Utility Operator**
Alcan Border	(none)	(none)	Private-Tok	Alaska Power & Telephone Company	(none)
Municipality of Skagway Borough	City	City	City	Alaska Power & Telephone Company/Inside Passage Electric Cooperative	(none)
Valdez-Cordova Census Area					
Chistochina	(none)	(none)	Private-Glennallen	Alaska Power & Telephone Company	(none)
Copper Center	(none)	(none)	Private-Glennallen	Copper Valley Electric Association	(none)
Copper Center ANVSA	(none)	(none)	Private-Glennallen	Copper Valley Electric Association	(none)
Gakona	(none)	(none)	Private-Glennallen	Copper Valley Electric Association	(none)
Gakona ANVSA	(none)	(none)	Private-Glennallen	Copper Valley Electric Association	(none)
Glennallen	(none)	Private	Private	Copper Valley Electric Association	(none)
Gulkana	Village Council	Village Council	Private-Glennallen	Copper Valley Electric Association	(none)
Gulkana ANVSA	Village Council	Village Council	Private-Glennallen	Copper Valley Electric Association	(none)
Mentasta Lake	(none)	(none)	Private-Glennallen	Alaska Power & Telephone Company	(none)
Mentasta Lake ANVSA	(none)	(none)	Private-Glennallen	Alaska Power & Telephone Company	(none)
Paxson	(none)	(none)	Private-Glennallen	Paxson Lodge	(none)
Slana	(none)	(none)	Private-Glennallen	Alaska Power & Telephone Company	(none)
Tazlina	(none)	(none)	Private-Glennallen	Copper Valley Electric Association	(none)
Tazlina ANVSA	(none)	(none)	Private-Glennallen	Copper Valley Electric Association	(none)
Tonsina	(none)	(none)	Private-Glennallen	Copper Valley Electric Association	(none)
Valdez	City	City	City	Copper Valley Electric Association	(none)
Whittier	City	(none)	Municipality of Anchorage	Chugach Electric Association	ENSTAR
Other					
Adak	City	City	Regional Corporation	TDX Adak Generating	(none)
Nome	City	City	City	Banner Wind/Nome Joint Utility System	(none)

TABLE 5.3.4-5

Utility Providers in the Area of Interest

	Community Piped Water System Operator	Community Piped Sewage System Operator	Landfill Facility Operator	Electric Utility Operator	Natural Gas Utility Operator
Nome ANVSA	City	City	City	Banner Wind/Nome Joint Utility System	(none)
City of Unalaska	City	City	City	City	(none)

Source: ADCCED (2016)
Notes:
[a] TDX North Slope Generating, Inc. operates the power generation plant and distribution system in the Prudhoe Bay CDP; the company serves Prudhoe Bay oil service companies.
[b] Community is within ENSTAR service area, but natural gas service is not available due to low density of development.

5.3.4.5 Heating and Electricity Costs

Alaska's electrical energy infrastructure differs from the rest of the United States in that there is no extensive infrastructure of transmission interties that span the State. Nevertheless, the electrical needs of the larger communities in the AOI are currently served by public utilities connected to a regional transmission line owned by the Alaska Energy Authority. This grid extends from Fairbanks south through Anchorage and eventually reaches the tip of the Kenai Peninsula. The major utilities connected to the grid include Chugach Electric Association, Anchorage Municipal Light & Power, Golden Valley Electric Association, Matanuska Electric Association, and Homer Electric Association. As shown in TABLE 5.3.4-5, 10 PACs are in the Matanuska Electric Association service area, 8 are in the Golden Valley Electric Association service area, 5 are in the Chugach Electric Association service area, and 5 are in the Homer Electric Association service area.

In the smaller, more remote communities within the AOI, electricity is generated by stand-alone diesel generators that are not tied into the regional grid. These isolated power generation facilities create a need to build bulk fuel tanks and require backup generators in almost every village. Most of the small communities have centralized utilities operated by small entities that specialize in providing electrical service to rural Alaska, such as Alaska Power & Telephone and Alaska Village Electric Cooperative. However, a few communities, such as Coldfoot, Wiseman, Livengood, and Skwentna, have no centralized utility; households in these communities either have their own private generators or have no electricity.

For heating, homes and businesses across the PACs consume a combination of fuel oil, kerosene, natural gas, and wood (TABLE 5.3.4-6). Fuel oil/kerosene and wood are the dominant home heating fuels in most communities, as indicated by the percentage of total occupied housing units using those fuel types. Space heating consumes the majority of energy use for residential and nonresidential buildings in rural Alaska (WHPacific 2012a). ENSTAR Natural Gas Company supplies natural gas produced in Cook Inlet to many residences and businesses in southcentral Alaska. In addition, gas from the ENSTAR distribution system is liquefied in a facility at Point MacKenzie and transported by cryogenic tanker trailers to a storage and pipeline distribution system in Fairbanks that is operated by Alaska Industrial Development and Export

Authority (AIDEA), a State entity under the Alaska Department of Commerce, Community, and Economic Development. Because southcentral Alaska and Fairbanks are where a majority of the State's population resides, approximately 70 percent of Alaskans rely on gas from Cook Inlet to heat homes and businesses and generate electricity (Larsen et al. 2006). The Barrow Utilities & Electric Cooperative distributes piped natural gas produced from nearby gas fields to residences and businesses in Barrow. The NSB functions as the natural gas local distribution entity providing North Slope gas from the Alpine field to Nuiqsut.

TABLE 5.3.4-6 shows the significant differences in per unit energy costs across PACs for which data are available. For easy comparison, energy use for house heating was converted into British thermal units. The highest reported heating fuel retail price in 2014 was in Minto at around $5 per gallon, while the NSB communities reported the lowest average retail price at less than $2 per gallon. The NSB government subsidizes residential heating fuel costs in all its traditional communities except for Barrow and Nuiqsut, which heat primarily with natural gas.

Most rural communities in the AOI depend on fuel oil for both electricity generation and space heating. In the last several years, higher petroleum prices have led to higher prices for fuel oil, thus raising the cost of electricity and home heating for many rural communities (Fay et al. 2012). Consequently, some PACs—often those least able to afford it because of their relatively low per capita incomes—pay among the highest prices in the State. In contrast, communities that are supplied with natural gas for space heating and/or are connected to electric power systems that use mainly natural gas-fueled generators pay relatively low energy prices because natural gas has been less expensive than fuel oil during periods of higher oil prices. For example, Anchorage residents are connected to the ENSTAR gas distribution system, and the Municipality's electric utility, Anchorage Municipal Light and Power, uses Cook Inlet natural gas to generate most of its power. Moreover, Municipal Light and Power's cost for gas, which comes from its one-third ownership in the Beluga River Gas Field, is around half of what other electric utilities pay privately owned producers of Cook Inlet natural gas (Bradner 2011). Chugach Electric Association also generates most of its power from Cook Inlet natural gas, and Matanuska Electric Association generates most of its power from natural gas unless there is an interruption in supply; then it switches to diesel. Homer Electric Association is producing its power using mainly gas-fired generators. Golden Valley Electric Association charges a higher residential rate than other electric utilities connected to the regional grid, reflecting the utility's heavy reliance on oil-fired generation. Communities that receive their power from Copper Valley Electric Association have the highest electricity rates of any PACs with centralized utilities because Copper Valley Electric Association is not connected to the regional grid and relies on oil-fired generation supplemented by hydroelectric power. To improve the operation of the regional grid, the Regulatory Commission of Alaska recently recommended that an independent transmission company be created to operate the transmission system and to plan and execute major maintenance, transmission system upgrades, and new transmission projects necessary for the reliable delivery of electric power to Railbelt customers (Regulatory Commission of Alaska 2015).

TABLE 5.3.4-6

Fuel Type and Average Home Energy Costs in the Area of Interest

	Heating					Electricity		
	Primary House Heating Fuel (Avg. 2009–2013)		Average Residential Rate for # 1 Fuel Oil ($/gal.)	Average Residential Rate for Natural Gas ($/Mscf)	Estimated Per Unit Heating Cost ($/MMBTU)	PCE Program	Average Residential Rate without PCE ($/kWh)	Average Residential Rate with PCE ($/kWh)
	Fuel Type (Percent of total occupied housing units)	Margin of Error (±)	2013	2013	2013	2013	2013–2014	2013–2014
North Slope Borough								
Prudhoe Bay CDP	—		—		—	No	—	
Yukon-Koyukuk Census Area								
Bettles	Fuel oil, kerosene, etc. (60.0)	44.1	7.45		54.22	Yes	0.67	0.21
Coldfoot	—		—		—	No	—	—
Evansville	Fuel oil, kerosene, etc. (100.0)	70.1	7.45		54.22	Yes	0.67	0.21
Evansville ANVSA	Fuel oil, kerosene, etc. (81.0)	19.9	7.45		54.22	Yes	0.67	0.21
Livengood	Fuel oil, kerosene, etc. (50.0)	48.8	—		—	No	—	—
Manley Hot Springs	Wood (51.7)	26.6	4.55		33.11	Yes	0.83	0.16
Minto	Fuel oil, kerosene, etc. (82.5)	9.4	5.00		36.39	Yes	0.61	0.20
Nenana	Fuel oil, kerosene, etc. (70.0)	10.4	4.18		30.42	No	0.24	
Wiseman	—		—		—	No	—	
Fairbanks North Star Borough								
Fairbanks	Fuel oil, kerosene, etc. (68.8)	2.8	4.12	30.31	29.52	No	0.24	
Denali Borough								
Anderson	Fuel oil, kerosene, etc. (75.3)	11.5	4.18		30.42	No	0.24	

TABLE 5.3.4-6

Fuel Type and Average Home Energy Costs in the Area of Interest

	Heating					**Electricity**		
	Primary House Heating Fuel (Avg. 2009–2013)		**Average Residential Rate for # 1 Fuel Oil ($/gal.)**	**Average Residential Rate for Natural Gas ($/Mscf)**	**Estimated Per Unit Heating Cost ($/MMBTU)**	**PCE Program**	**Average Residential Rate without PCE ($/kWh)**	**Average Residential Rate with PCE ($/kWh)**
	Fuel Type (Percent of total occupied housing units)	**Margin of Error (±)**	**2013**	**2013**	**2013**	**2013**	**2013–2014**	**2013–2014**
Cantwell	Fuel oil, kerosene, etc. (76.3)	12.1	4.25		30.93	No	0.24	
Healy	Fuel oil, kerosene, etc. (45.8)	11.5	4.40		32.02	No	0.24	
McKinley Park	Fuel oil, kerosene, etc. (71.2)	24.4	—		—	No	0.24	
Matanuska-Susitna Borough								
Big Lake	Utility gas (42.4)	6.5		2.18	2.12	No	0.15	
Houston	Fuel oil, kerosene, etc. (50.6)	5.6	—		—	No	0.15	
Knik-Fairview	Utility gas (72.5)	3.6	—	2.18	2.12	No	0.15	
Palmer	Utility gas (84.0)	2.4	—	2.18	2.12	No	—	
Point MacKenzie	Fuel oil, kerosene, etc. (51.8)	26.3	—		—	No	0.15	
Skwentna	Wood (100.0)	67.2	—		—	No	—	
Talkeetna	Fuel oil, kerosene, etc. (65.1)	16.7	—		—	No	0.15	
Trapper Creek	Fuel oil, kerosene, etc. (47.5)	18.2	—		—	No	0.15	
Wasilla	Utility gas (89.6)	3.3	—	2.18	2.12	No	0.15	
Willow	Fuel oil, kerosene, etc. (57.0)	7.4	—		—	No	0.15	
Kenai Peninsula Borough								

TABLE 5.3.4-6

Fuel Type and Average Home Energy Costs in the Area of Interest

	Heating					Electricity		
	Primary House Heating Fuel (Avg. 2009–2013)		Average Residential Rate for # 1 Fuel Oil ($/gal.)	Average Residential Rate for Natural Gas ($/Mscf)	Estimated Per Unit Heating Cost ($/MMBTU)	PCE Program	Average Residential Rate without PCE ($/kWh)	Average Residential Rate with PCE ($/kWh)
	Fuel Type (Percent of total occupied housing units)	Margin of Error (±)	2013	2013	2013	2013	2013–2014	2013–2014
Anchor Point	Fuel oil, kerosene, etc. (49.4)[a]	6.5	3.85	3.18	3.10	No	—	
Beluga	Fuel oil, kerosene, etc. (57.1)	55.7	—		—	No	—	
Clam Gulch	Wood (44.1)	24.7	3.80		27.66	No	—	
Cohoe	Fuel oil, kerosene, etc. (47.2)	8.2	—		—	No	—	
Cooper Landing	Wood (44.5)	31.2	4.01		29.18	No	0.14	
Happy Valley	Fuel oil, kerosene, etc. (45.2)	12.0	—		—	No	—	
Homer	Fuel oil, kerosene, etc. (66.0) [a]	3.5	3.97	3.18	3.10	No		
Kalifornsky	Utility Gas (76.0)	4.7	3.82		27.83	No		
Kasilof	Fuel oil, kerosene, etc. (59.6)	21.7	3.76		27.37	No	—	
Kenai	Utility gas (87.8)	3.5	3.76	2.18	2.12	No	0.20	
Moose Pass	Fuel oil, kerosene, etc. (36.6)	29.4	3.83		27.87	No	0.14	
Nikiski	Utility gas (61.9)	6.9	3.66	2.18	2.12	No	0.20	
Ninilchik	Fuel oil, kerosene, etc. (53.5)	9.9	3.66	2.18	2.12	No	—	
Ninilchik ANVSA	Fuel oil, kerosene, etc. (60.1)	2.1	3.66	2.18	2.12	No		
Salamatof	Utility gas (71.8)	9.6	—	2.18	2.12	No	0.20	
Seward	Fuel oil, kerosene, etc. (67.8)	11.5	3.98		28.97	No	0.20	

TABLE 5.3.4-6

Fuel Type and Average Home Energy Costs in the Area of Interest

	Heating					**Electricity**		
	Primary House Heating Fuel (Avg. 2009–2013)		**Average Residential Rate for # 1 Fuel Oil ($/gal.)**	**Average Residential Rate for Natural Gas ($/Mscf)**	**Estimated Per Unit Heating Cost ($/MMBTU)**	**PCE Program**	**Average Residential Rate without PCE ($/kWh)**	**Average Residential Rate with PCE ($/kWh)**
	Fuel Type (Percent of total occupied housing units)	**Margin of Error (±)**	**2013**	**2013**	**2013**	**2013**	**2013–2014**	**2013–2014**
Soldotna	Utility gas (86.0)	4.8	4.03	2.18	2.12	No	0.20	
Sterling	Utility gas (75.5)	5.4	3.91	2.18	2.12	No	0.20	
Tyonek	Wood (53.6)	16.3	7.96		57.93	No	0.14	
Municipality of Anchorage	Utility gas (82.2)	0.9	—	2.18	2.12	No	0.13	
Eklutna ANVSA	Utility gas (59.4)	35.4	—		—	No	0.15	
Southeast Fairbanks Census Area								
Alcan Border	Fuel oil, kerosene, etc. (100.0)	64.5	—		—	No	0.31	
Big Delta	Wood (50.5)	18.2	—		—	No	0.24	
Delta Junction	Fuel oil, kerosene, etc. (79.8)	6.9	4.19		30.49	No	0.24	
Dot Lake	—		—		—	Yes	0.45	0.21
Dot Lake ANVSA	Wood (50.0)	36.2	—		—	Yes	0.45	0.21
Dry Creek	Wood (100.0)	53.4	—		—	No	0.31	
Northway	Wood (71.0)	22.5	4.15		30.20	Yes	0.68	0.23
Northway ANVSA	Wood (55.8)	16.1	4.15		30.20	Yes	0.68	0.23
Northway Junction	Fuel oil, kerosene, etc. (56.3)	26.9	—		—	No	—	
Tanacross	Wood (64.4)	17.7	4.05		29.48	Yes	0.45	0.21
Tetlin	Wood (56.7)	31.0	—		—	Yes	0.45	0.21
Tetlin ANVSA	Wood (56.7)	31.0	—		—	Yes	0.45	0.21
Tok	Wood (49.0)	9.1	4.05		29.48	Yes	0.45	0.21

TABLE 5.3.4-6

Fuel Type and Average Home Energy Costs in the Area of Interest

	Heating					Electricity		
	Primary House Heating Fuel (Avg. 2009–2013)		Average Residential Rate for # 1 Fuel Oil ($/gal.)	Average Residential Rate for Natural Gas ($/Mscf)	Estimated Per Unit Heating Cost ($/MMBTU)	PCE Program	Average Residential Rate without PCE ($/kWh)	Average Residential Rate with PCE ($/kWh)
	Fuel Type (Percent of total occupied housing units)	Margin of Error (±)	2013	2013	2013	2013	2013–2014	2013–2014
Municipality of Skagway Borough	Fuel oil, kerosene, etc. (80.1)	5.7	4.16		30.28	Yes	0.26	0.18
Valdez-Cordova Census Area					0.00			
Chistochina	Wood (73.9)	20.9	4.06		29.55	Yes	0.70	0.23
Copper Center	Fuel oil, kerosene, etc. (53.7)	12.1	4.06		29.55	No	0.30	
Copper Center ANVSA	Fuel oil, kerosene, etc. (58.4)	10.1	4.06		29.55	No	0.30	
Gakona	Fuel oil, kerosene, etc. (58.2)	24.2	4.10		29.84	No	0.30	
Gakona ANVSA	Fuel oil, kerosene, etc. (69.5)	24.9	4.10		29.84	No	0.30	
Glennallen	Fuel oil, kerosene, etc. (49.3)	21.5	4.29		31.22	No	0.30	
Gulkana	Fuel oil, kerosene, etc. (86.0)	14.1	4.06		29.55	No	0.30	
Gulkana ANVSA	Fuel oil, kerosene, etc. (71.4)	19.1	4.06		29.55	No	0.30	
Mentasta Lake	Wood (48.4)	16.0	4.06		29.55	Yes	0.70	0.23
Mentasta Lake ANVSA	Wood (44.8)	15.7	4.06		29.55	Yes	0.70	0.23
Paxson	Fuel oil, kerosene, etc. (100.0)	50.8	3.96		28.82	No	—	
Slana	Wood (58.5)	29.5	4.06		29.55	Yes	0.70	0.23
Tazlina	Fuel oil, kerosene, etc. (61.7)	12.6	4.06		29.55	No	0.30	

TABLE 5.3.4-6

Fuel Type and Average Home Energy Costs in the Area of Interest

	Heating					Electricity		
	Primary House Heating Fuel (Avg. 2009–2013)		Average Residential Rate for # 1 Fuel Oil ($/gal.)	Average Residential Rate for Natural Gas ($/Mscf)	Estimated Per Unit Heating Cost ($/MMBTU)	PCE Program	Average Residential Rate without PCE ($/kWh)	Average Residential Rate with PCE ($/kWh)
	Fuel Type (Percent of total occupied housing units)	Margin of Error (±)	2013	2013	2013	2013	2013–2014	2013–2014
Tazlina ANVSA	Fuel oil, kerosene, etc. (62.2)	12.5	—		—	—	—	
Tonsina	Wood (100.0)	47.5	4.20		30.57	No	0.30	
Valdez	Fuel oil, kerosene, etc. (78.4)	8.1	4.25		30.93	No	0.30	
Whittier	Utility gas (75.8)	12.4	3.99	2.18	2.12	No	—	
Other								
Adak	Fuel oil, kerosene, etc. (85.4)	16.0	4.62		33.62	Yes	1.20	0.39
Nome	Fuel oil, kerosene, etc. (93.1)	3.2	6.28		45.71	Yes	0.38	0.17
Nome ANVSA	Fuel oil, kerosene, etc. (92.9)	3.3	6.28		45.71	Yes	0.38	0.17
Unalaska	Fuel oil, kerosene, etc. (91.2)	2.6	3.64		26.49	Yes	0.46	0.23

Source: Alaska Housing Finance Corporation (2014); U.S. Census Bureau (2016b); Alaska Energy Data Gateway (2014)
Notes:
[a] Utility gas was extended to these communities in 2013, and fuel type percentages will likely change in the future.
A "—" indicates that the measure is unavailable.

The fixed costs associated with operating an electric utility are large, and if the number of customers and/or levels of consumption are small, these costs must be spread over few customers and kilowatt-hours. The lack of economies of scale leads to costly electricity per unit produced (Fay et al. 2012). On the other hand, as shown in TABLE 5.3.4-6, 25 PACs participate in the PCE program, under which the State of Alaska pays a portion of the electric bills for consumers served by participating utilities. PCE disbursements per customer are limited to 500 kilowatt hours per month, and commercial customers are disallowed from receiving PCE program assistance. Nevertheless, the PCE program is effective at lowering residential electricity rates in participating communities so that they are comparable to communities connected to the regional grid (TABLE 5.3.4-6). However, PCE program eligibility depends on having a centralized utility.

Consequently, communities such as Coldfoot, Wiseman, Livengood, and Skwentna are ineligible to participate in the program.

5.3.5 Transportation

This section describes Alaska highways, railways, ports, and airports that potentially may be used by the Project. An overview of the transportation facilities that would support the construction and operation of the Project is presented in Figure 5.3.5-1

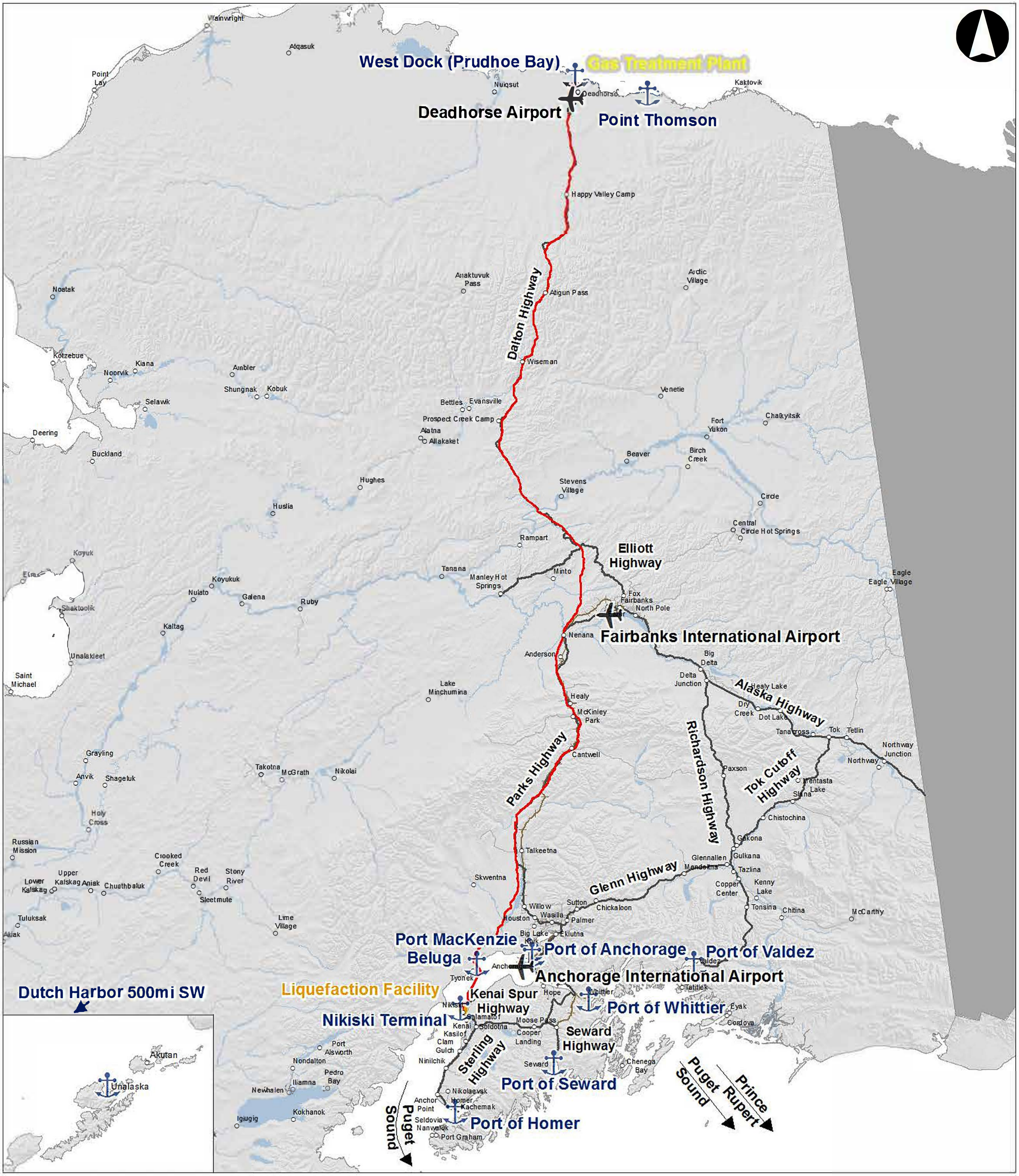
5.3.5.1 Ports, Harbors, and Marine Shipping Channels

5.3.5.1.1 Ports and Harbors

As described in Section 5.3.2.2.3, marine ports are the main points of entry for materials entering Alaska. However, the State's port facilities are fairly limited in capacity, with few berths and often shallow water access that limits vessel size. In general, marine traffic and the associated port calls in Alaska are driven by the need to import commodities to support the population of the State, build or maintain infrastructure, and export commodities produced within the State. Sixteen Alaska ports, harbors, and landings were identified as being potentially affected by Project-related transportation needs during construction and operation. TABLE 5.3.5-1 provides an overview of the characteristics of these facilities.

The Ports of Anchorage and Seward have both rail and highway connectivity, which would make them primary ports for receipt of imported Project construction equipment and materials. Existing docks near the Port of Nikiski would be used as pioneer docks to receive materials and equipment for construction of the Liquefaction Facility until a Project material offloading facility (MOF) is built near the Facility. A second MOF would be built at Beluga to support offloading of pipe and other materials and equipment for construction of the southern portion of the Mainline. The Port of Dutch Harbor is one of the most productive ports for transshipment of cargo in Alaska and would be used as a staging area and custom clearance for imported Project construction materials that would be transported onwards to the North Slope by barge. West Dock in Prudhoe Bay would be used as the unloading facility for the marine sealifts bringing in modules and other Project supplies and equipment to the Prudhoe Bay CDP area.

In addition, there are a number of secondary ports that may be considered for use during Project construction. The Port of Whittier has on-dock rail and road access and is a key alternate port for breakbulk and containerized materials that need to be delivered to locations north of Fairbanks. The Port of Homer could be used as an alternate port for receipt of Liquefaction Facility construction materials prior to construction of the Project MOF at Nikiski. Port MacKenzie has highway access and plans for a rail spur to connect to the ARRC's mainline. The Port of Skagway offers highway access to Interior Alaska. In addition, Skagway is able to receive materials from Canada by road, and these materials can be loaded onto common carriage barges heading north to other southcentral Alaska ports. The Ports of Adak and Nome could potentially be used as safe havens for barges and ships traveling to other ports in the North Slope. The privately owned landings of Badami and Oliktok have barge offloading facilities used to support North Slope oil and gas exploration and development. The Port of Valdez offers the shortest truck route to Fairbanks and Interior Alaska. None of the secondary ports are presently in Project execution plans.



VICINITY MAP

LEGEND

- Major Airport
- Major Port
- Highways
- Alaska Railroad
- Gas Treatment Plant
- Pre-FEED Mainline Study Corridor
- Liquefaction Facility

0 37.5 75 150 Miles

DISCLAIMER

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DATE:	2016-05-27	SHEET:	1 of 1

MAJOR TRANSPORTATION FACILITES

FIGURE 5.3.5-1

Alaska LNG

I:\26221163 SCLNG Studies\10 - Geospatial\10.06 - MXD\2016 Reporting\NE\Template Update\Figure 5.3.5-1 Transportation Facilities Inset Map.mxd

TABLE 5.3.5-1

Characteristics of Ports, Harbors, and Landings in the Area of Interest, 2013

	Area	Primary Freight	Freight Traffic (short tons)
Primary Harbor/Port/Landing			
Port of Anchorage	Municipality of Anchorage	Petroleum products/ manufactured equipment, machinery, and products	2,949,000
Beluga Landing	Kenai Peninsula Borough	—	—
Port of Dutch Harbor (Unalaska Bay and Island)	Aleutians West Census Area	Seafood/petroleum products	54,320
Port of Nikiski (Nikishka)	Kenai Peninsula Borough	Crude oil/other petroleum products	4,484,000
Point Thomson Marine Facilities	North Slope Borough	Construction materials/petroleum products	—
Prudhoe Bay West Dock	North Slope Borough	Construction materials/petroleum products	—
Port of Seward	Kenai Peninsula Borough	Coal/manufactured equipment, machinery, and products/manufactured goods	719,000
Secondary Harbor/Port/Landing			
Port of Whittier	Valdez-Cordova Census Area	Manufactured products/food products/seafood	292,000
Port of Adak	Aleutians West Census Area	—	—
Badami Landing	North Slope Borough	Construction materials/ petroleum products	—
Port of Homer	Kenai Peninsula Borough	Petroleum products	219,000
Port MacKenzie	Matanuska-Susitna Borough	Bulk commodities	—
Port of Nome	Nome Census Area	Petroleum products/waste and scrap	169,000
Oliktok Landing	North Slope Borough	Construction materials/petroleum products	—
Port of Skagway	Municipality of Skagway Borough	Petroleum products/seafood/ore	328,000
Port of Valdez (Valdez and Valdez Harbor)	Valdez-Cordova Census Area	Crude oil/other petroleum products	28,166,000

Source: U.S. Army Corps of Engineers (USACE) (2013)
Notes:
A "—" indicates that the measure is unavailable.

TABLE 5.3.5-2 presents the total vessel calls by vessel type by draft for each primary port, harbor, and landing in the AOI. Light draft vessels have a draft of 6.6 feet or greater but less than 26.2 feet, and deep-draft vessels have a draft of 26.2 feet or greater. The vessel call data for each port do not include fishing vessels less than 164 feet in length, other vessels less than 33 feet in length, or local vessels, such as docking tugs, tour boats, fishing charters, and commercial fishing vessels, that homeport in the port.

TABLE 5.3.5-2

Vessel Calls to Primary Ports, Harbors, and Landings in the Area of Interest, 2014[a]

Harbor/Port/Landing	Draft	Tanker	Cargo	Offshore Supply Vessel	Passenger	Tug with Barge	Tug without Barge[b]	Government	Other	Fishing	Total
Port of Anchorage	Light	0	3	0	0	118	17	3	1	0	142
	Deep	15	207	0	4	0	0	0	3	0	229
Beluga Landing	Light	0	0	0	0	160	0	0	0	0	160
	Deep	0	0	0	0	0	0	0	0	0	0
Port of Dutch Harbor	Light	0	215	0	18	114	88	37	66	825	1,363
	Deep	14	167	0	1	0	0	4	0	45	231
Port of Nikiski	Light	0	18	281	0	50	60	0	54	0	463
	Deep	86	0	0	0	0	0	0	0	0	86
Prudhoe Bay West Dock	Light	0	13	0	1	15	0	0	0	0	29
	Deep	0	0	0	0	0	0	0	0	0	0
Port of Seward	Light	0	7	4	28	91	38	4	33	0	205
	Deep	0	7	0	25	0	0	1	0	0	33

Source: USACE (2013)

Notes:

[a] Number of vessel calls only includes vessels equipped with Automated Identification System transmitters. Fishing vessels less than 164 feet in length and other vessels less than 33 feet in length are excluded.

[b] Includes tugs for which it could not be determined whether a barge was present.

A "—" indicates that the measure is unavailable.

Additional information on each of the primary and secondary ports in the AOI that could be potentially used by the Project during construction and operation is presented in the subsections below.

5.3.5.1.1.1 Port of Adak

A former naval base, the Port of Adak is currently managed by Aleut Corporation. It has 2,750 feet of deep-draft berthing space and is ice-free year-round. Pier side services include fueling, electrical power, crane support and fresh water. The port has over 300,000 square feet of warehouse space and 40,000 acres of land available for custom-built staging and storage facilities. Twenty million gallons of underground fuel storage are available. Upgrades to the fueling dock are under design for petroleum product tankers up to 700 feet in length and a 70-foot draft (Aleut Corporation 2014a).

5.3.5.1.1.2 Port of Anchorage

The Port of Anchorage is a regional port located at the head of Cook Inlet along the Knik Arm. The port is an enterprise department within the Municipality of Anchorage. The port is a key transportation asset in southcentral Alaska, with direct connections to the Ted Stevens Anchorage International Airport, Alaska highway system, and Alaska Railroad. The port is dubbed "Alaska's Lifeline" because of the large proportion of the State's population that depends on it for delivery of merchandise goods and foodstuffs (Moffatt & Nichol 2014). On average, around four million tons of cargo pass through the port each year. Over the last decade, unitized shipments (i.e., vans, flats, and containers) accounted for 37 to 52 percent of total annual imports and exports by weight (Moffatt & Nichol 2014). From 2005 through 2014, container cargo ships annually brought an average of 1.8 million tons of freight to the port, or approximately 135,000 forty-foot equivalent units (Port of Anchorage 2015). These ships arrive two times weekly throughout the year. Containers are offloaded by cranes and roll-on/roll-off (Ro/Ro) transfer bridges. Currently, there are only two providers that provide commercial ship transportation service between Anchorage and the Port of Tacoma: Matson, which provides container service, and TOTE Maritime, which provides Ro/Ro service.

An extensive tank farm adjacent to the port stores liquid fuels that are transported by a petroleum product pipeline from the Tesoro refinery at Nikiski, and imported fuels, primarily jet fuel, for air carriers operating at Ted Stevens Anchorage International Airport. ARRC operates a trailer-on-flat-car facility used to load and unload container vans for shipment to Fairbanks and other destinations. Currently, containers are loaded on chassis and transported off port approximately four miles to the existing ARRC rail yard.

The Port of Anchorage has one deep-draft wharf facility with berths for three vessels, two petroleum terminal docks, many commercial barge wharves, and two floating docks for tugs (U.S. Department of Commerce 2014b). A 220-acre industrial park adjoins the port to the east. Paved storage for unitized cargo occupies approximately 100 acres of container yard and ancillary terminal structures. Additionally, there are 24 acres of port-owned and 56 acres of ARRC-owned liquid bulk storage. The port also has 84 acres of land that could be developed for various uses, subject to limitations (Moffatt & Nichol 2014).

The Port of Anchorage is currently identifying and updating plans for modernizing the port's facilities. Plans for the modernization project include replacing Terminals 2 and 3, improving seismic resilience of the port, replacing existing obsolete infrastructure and incorporating modern technology, and enhancing operational efficiencies, including adding three new ship-to-shore cranes that will allow for larger container vessels. In addition, as part of the Port of Anchorage's intermodal expansion program, the port is planning to construct a new rail spur along the eastern port perimeter, extending from the present end of ARRC's rail line to the existing dry barge berth. By project completion, the new rail operations at the port would include new gantry cranes to transfer containers or chassis to the rail (Port of Anchorage 2014). However, these expansion plans are not currently fully funded.

Figure 5.3.5-2 shows the monthly number of vessel calls at the Port of Anchorage in 2014. In the winter months, vessel calls are primarily container ships that service Alaska twice a week. As the ice retreats with warmer weather, tugs and barges with freight and fuel also begin to call at the port along with tanker vessels. The number of vessel calls remains relatively high through the summer and then drops in late fall as ice returns to Cook Inlet waters.

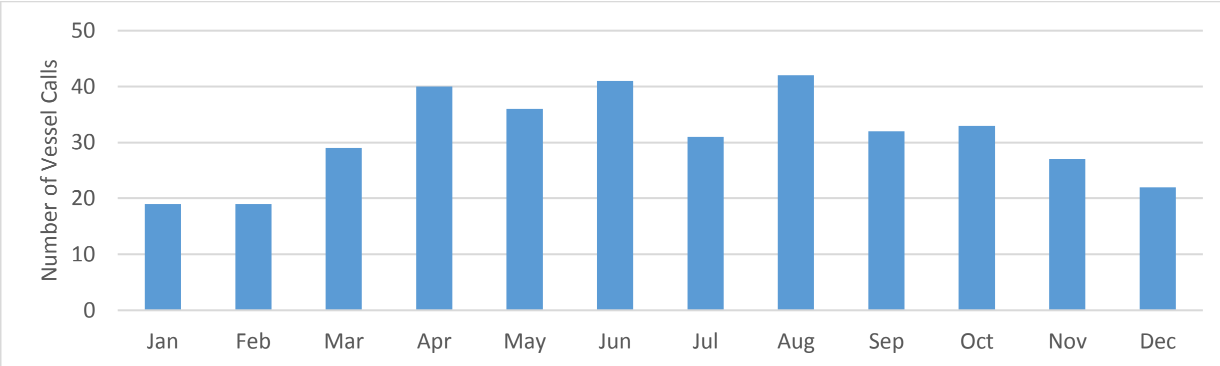


Figure 5.3.5-2 Monthly Vessels Calls to Port of Anchorage, 2014[a]

Source: Nuka Research (2015)

Notes:

[a] Number of vessel calls only includes vessels equipped with Automated Identification System transmitters. Fishing vessels less than 164 feet in length and other vessels less than 33 feet in length are excluded.

5.3.5.1.1.3 Badami Landing

A dock facility supports the Badami oil field located about 35 miles east of Prudhoe Bay. It is a privately owned and operated small-scale marine pier that can receive 200-foot tug and barge sets and miscellaneous landing craft. In its current configuration, Badami is not suitable for large (i.e., 65+ tons) loads. Seasonally, appropriately sized cargoes can be delivered during late summer's open water period, and moved onward via connecting ice roads west to the greater Prudhoe Bay area later during winter months.

5.3.5.1.1.4 Beluga Landing

Beluga Landing is a barge landing site located near Beluga and Tyonek that is owned by the KPB. The landing provides an important offloading point for equipment and supplies for the electric power plant and natural gas fields at Beluga and the domestic needs of families living in the area.

Beluga Landing is a man-made cut in the existing bluff with a single basic Ro/Ro facility consisting of an 80 foot-wide landing area with no actual dock. The landing is groomed by users before each vessel call. The landing is not readily available during the winter months due to ice, and it is tidally restricted, with approximately one to three hours of time around high tide where a barge can be offloaded while afloat. There is a five-acre laydown at the landing, which is fully occupied by current users during the normal barging season. Beluga Landing is tied into the Tyonek road system, but a sharp and steep curve in the access road restricts the equipment that can currently be loaded/offloaded at the landing to 65 feet in length.

5.3.5.1.1.5 Port of Dutch Harbor

Dutch Harbor is the name and location of Unalaska's port. Unalaska's Department of Ports and Harbors operates several marine facilities at the port, including the Unalaska Marine Center and Light Cargo Dock. The Unalaska Marine Center is a regional container facility with approximately 2,051 linear feet of dock space; Matson operates both a 30-ton and 40-ton crane on rail system for containerized cargo at the facility (City of Unalaska 2014). The Light Cargo Dock serves as an alternative offloading site. A number of other private docks are located in the port and provide services for vessels operating in the region. Common carrier tug and barge companies offer regularly scheduled barge service between the port, Tacoma, and Anchorage. American President Lines has a separate containership dock and provides service to Asian ports from the Port of Dutch Harbor. The two container shipping companies provide weekly service to the port.

Figure 5.3.5-3 shows the monthly number of vessel calls at the Port of Dutch Harbor in 2014. The number of vessels calls at the port are primarily related to the fishing seasons for various species harvested in the Bering Sea and adjacent waters. In 2014, vessels calls at the port by large (>164 feet) fishing vessels exceeded that of all other ports in the AOI, with an average of nearly 69 calls per month. Major harvests of groundfish and some crab species occur in January, February, and March. Summer vessel calls are associated with harvests of salmon, halibut, and some groundfish species, and early fall vessel calls are mainly associated with crab harvests.

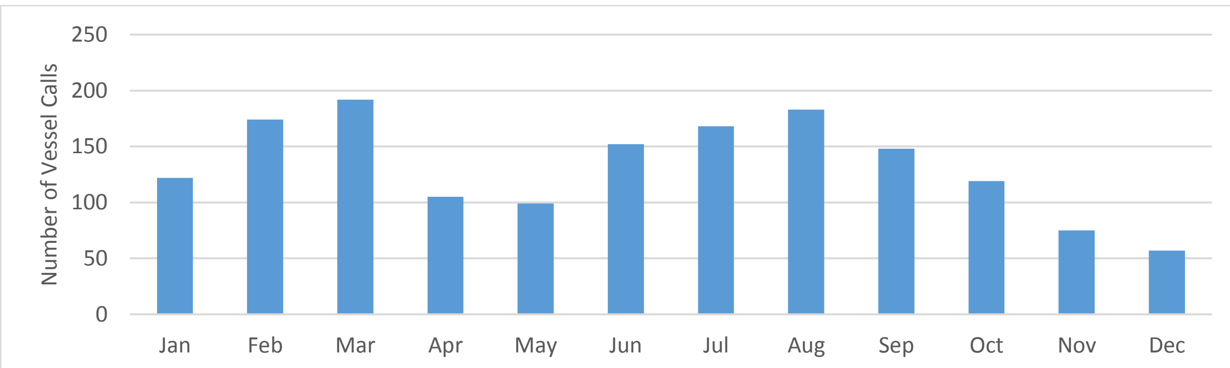


Figure 5.3.5-3 Monthly Vessels Calls to Port of Dutch Harbor, 2014[a]

Source: Nuka Research (2015)

Notes:

[a] Number of vessel calls only includes vessels equipped with Automated Identification System transmitters. Fishing vessels less than 164 feet in length and other vessels less than 33 feet in length are excluded.

5.3.5.1.1.6 Port of Homer

The Port of Homer, which is located on Kachemak Bay in the Kenai Peninsula, is owned and operated by the City of Homer. The port has two deep-draft piers and a fish dock. The Deep Water Dock (also known as the Cargo Dock) has inside, outer-face, and trestle berths available. The primary uses of the dock are occasional receipt and shipment of containerized and conventional general cargo; shipment of logs and wood chips; and receipt of seafood. In addition, the dock is occasionally used by cruise ships. Approximately 35 acres of open storage area for wood chips and logs are located at the rear of the port. The Pioneer Dock is a deep-draft pier which is mainly used by ferries of the Alaska Marine Highway System. The Pioneer Dock's face berth is available when unoccupied by ferries. The fish dock is used for receipt of seafood and handling supplies for fishing vessels.

Figure 5.3.5-4 shows the monthly number of vessel calls at the Port of Homer in 2014. Vessel calls in Homer represent vessels offloading in Homer, as well as vessels requiring pilotage to ports elsewhere in Cook Inlet. The increase in the summer is a function of the tourist season when cruise ships and excursion vessels operate in the area. In addition, tugs and barges supplying fuel and freight to Western Alaska communities and other communities in lower Cook Inlet primarily operate in the summer. While not shown in Figure 5.3.5-4, a large number of small (<164 feet) commercial fishing vessels operate from the Port of Homer during the summer when vessels harvest salmon in Cook Inlet. Fewer commercial fishing vessels operate during the rest of the year.

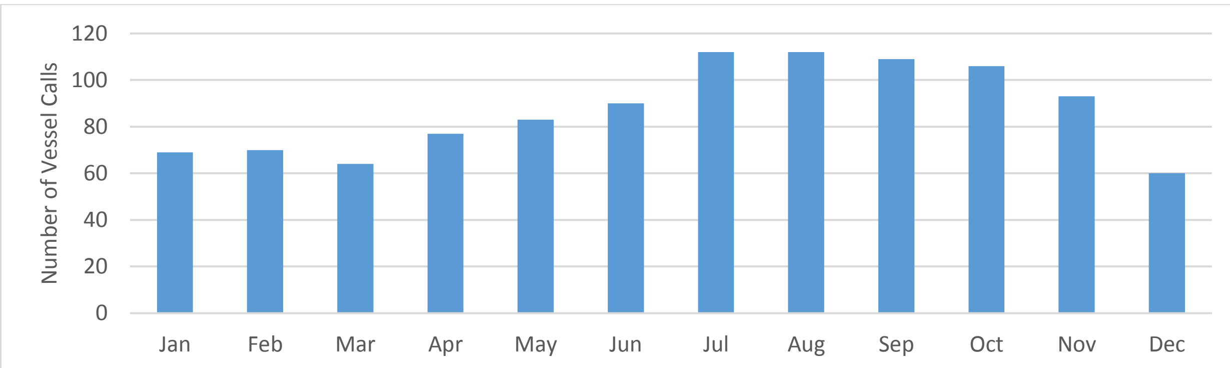


Figure 5.3.5-4 Monthly Vessels Calls to Port of Homer, 2014[a,b]

Source: Nuka Research (2015)

Notes:

[a] Number of vessel calls only includes vessels equipped with Automated Identification System transmitters. Fishing vessels less than 164 feet in length and other vessels less than 33 feet in length are excluded.

[b] Vessels transiting to the Kachemak Bay anchorage are included in the Homer vessel call data.

5.3.5.1.1.7 Port MacKenzie

Port MacKenzie is located at the head of Cook Inlet across from the Municipality of Anchorage. The port is owned and operated by the MSB. Port MacKenzie currently contains a 1,200-foot deep-draft dock and 500-foot barge dock. Infrastructure is available to handle loading of bulk commodities. Fourteen square miles of industrial uplands are available for development. A 32-mile spur line is planned that would connect the port to ARRC's rail system near Willow (Moffatt & Nichol 2014). However, the railroad is not projected to extend to the dockside at Port MacKenzie, so no Ro/Ro service would be possible for rail equipped barges. Transportation of freight between the port facilities and railhead would require an intermediate truck haul.

Figure 5.3.5-5 shows the monthly number of vessel calls at Port MacKenzie in 2014. Port MacKenzie has few vessel calls at present, with most vessels calling in the summer and early fall months when ice is not present in Cook Inlet.

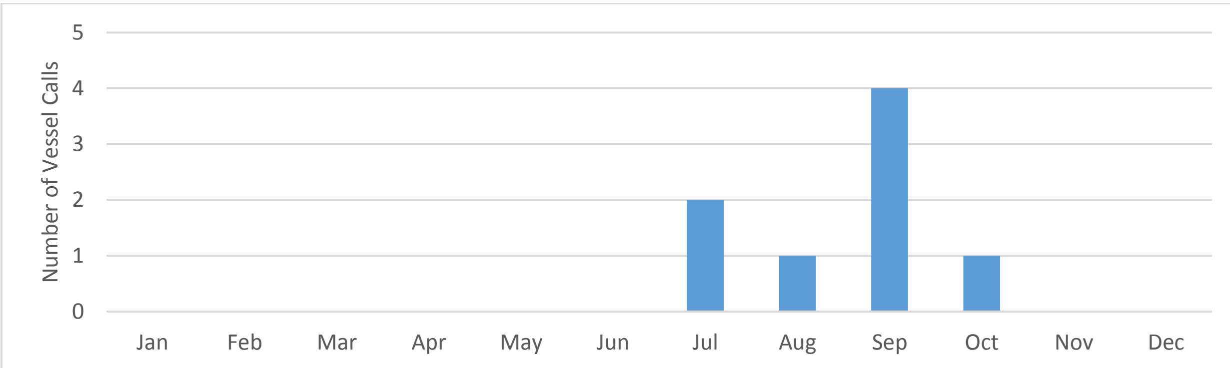


Figure 5.3.5-5 Monthly Vessels Calls to Port Mackenzie, 2014[a]

Source: Nuka Research (2015)

Notes:

[a] Number of vessel calls only includes vessels equipped with Automated Identification System transmitters. Fishing vessels less than 164 feet in length and other vessels less than 33 feet in length are excluded.

5.3.5.1.1.8 Port of Nikiski

The Port of Nikiski is located on the Kenai Peninsula, and the Kenai Spur, Sterling, and Seward Highways connect the port to Anchorage. The Tesoro Alaska oil refinery located near the port processes oil from Cook Inlet, the North Slope, and elsewhere into jet fuel, diesel, and gasoline. The port's docks also support offshore drilling.

The Port of Nikiski has one shallow-draft wharf and three deep-draft piers. Docks in the port are privately owned and operated primarily for commercial purposes. ASRC Energy Services owns and operates the Nikiski Fabrication Facility and Rig Tenders Marine Terminal, a shallow-draft pier used for handling equipment and supplies for offshore oil and gas platforms. The primary use of the dock facility is to support the module fabrication facility located at the dock. Offshore Systems Kenai owns a 600-foot dock, on-dock warehouse, upland warehouse, heliport and hangar buildings, fuel storage and distribution, and multiple outside storage and staging pads for oilfield related equipment and supplies. The Kenai Pipeline Company and Tesoro Alaska own and operate the deep-draft Port Nikiski Terminal Wharf, which receives crude oil and ships petroleum products. Kenai LNG Corporation, a subsidiary of ConocoPhillips, owns the Kenai LNG Dock, a deep-draft pier used to handle shipments of LNG. Agrium U.S., Inc. owns and operates the deep-draft Nikiski Wharf, which was used for shipment of anhydrous ammonia and dry bulk urea prior to the cessation of operations in 2007 (World Port Source 2014).

Figure 5.3.5-6 shows the monthly number of vessel calls at the Port of Nikiski in 2014.

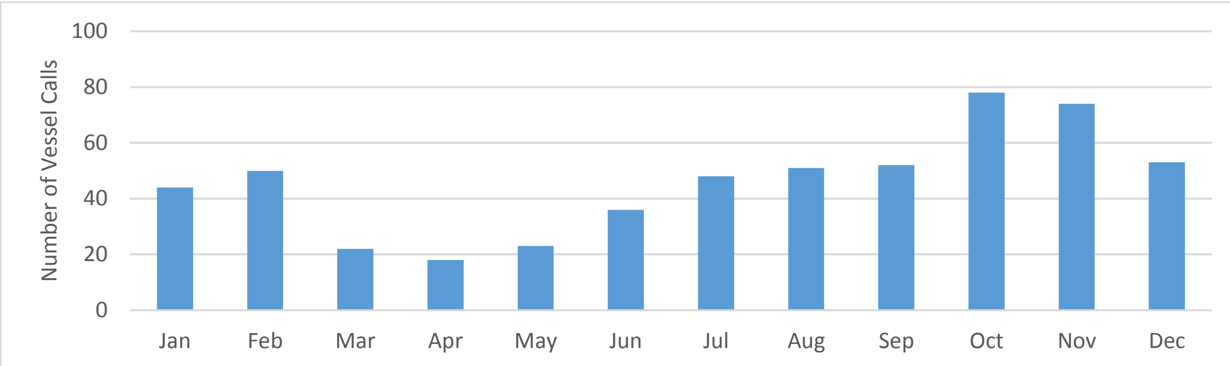


Figure 5.3.5-6 Monthly Vessels Calls to Port of Nikiski, 2014[a]

Source: Nuka Research (2015)

Notes:

[a] Number of vessel calls only includes vessels equipped with Automated Identification System transmitters. Fishing vessels less than 164 feet in length and other vessels less than 33 feet in length are excluded.

5.3.5.1.1.9 Port of Nome

The Port of Nome is a medium-draft port owned and operated by the City of Nome. It is the homeport to a commercial fishing fleet and commercial transportation fleet. Larger vessels, such as cruise ships and tankers, use small boats to transport people and goods to/from shore but are unable to enter the harbor as currently configured.

The City Dock and Westgold Dock (north) are on the causeway with 22 feet alongside. The City Dock, 200 feet in length, handles bulk cargo and fuel deliveries. The Westgold Dock, 190 feet in length, exports gravel and handles the loading and unloading of heavy equipment. Two barge ramps are in the inner harbor, one of which is used for loading cargo, while the other is for a boat launch and barge use. Smaller cargo vessels and landing craft load village freight and fuel at the east, west, and south inner harbor sheet pile docks, east beach landing, and west barge ramp for delivery in the region. The port also includes the Nome Small Boat Harbor, which has a depth of 10 feet and offers protected mooring for recreational and fishing vessels alongside two floating docks (U.S. Department of Commerce 2014b).

5.3.5.1.1.10 Oliktok Landing

Oliktok is a naturally formed beach spit west of Prudhoe Bay. The spit can support inter-port barge and landing craft arrivals/departures with Ro/Ro freight and containers. The landing is available during the open water season, late summer in the Arctic. Road access is available to the greater Prudhoe Bay area.

5.3.5.1.1.11 Point Thomson Marine Facilities

The marine facilities at Point Thomson are part of the PTU infrastructure and used exclusively to support PTU operation. The facilities are located approximately 65 nautical miles east of the greater Prudhoe Bay/West Dock area, and just west of the Arctic National Wildlife Refuge 1002 Plain on the Beaufort Sea. The principal use of the marine facilities are to provide inbound tug and barge support for the PTU's work activities. Inbound cargo includes Ro/Ro freight, non-containerized cargo, fuel, and select items of deck loaded materials. Outbound cargo is similar and considered general back haul. Marine access to Point Thomson is limited to the seasonal open-water period of mid to late summer. Seasonal ice roads connecting Point Thomson to the existing gravel road system at the Endicott Island oil field are constructed as needed to support operations.

5.3.5.1.1.12 Prudhoe Bay West Dock

The West Dock is a private dock facility located on the western shore of Prudhoe Bay and was constructed to support the transport of oil field supplies and equipment to the Prudhoe Bay area as expanding or new oil and gas industrial facilities required. The West Dock is not a traditional port, but rather an approximately 2.5 mile-long, gravel causeway used to offload cargo transported to Prudhoe Bay via barge. There are two unloading facilities off the causeway: one facility (Dock Head 2) is around 4,000 feet from shore and has a draft of 4 to 6 feet, and the second facility (Dock Head 3) is about 9,000 feet from shore and has a draft of 8 to 10 feet. In 1981, an extension elongated the causeway an additional 5,010 feet to accommodate the construction of a seawater treatment plant; however, there are no unloading facilities at this extension. Because West Dock is not a deep-water port, cargo ships and oceangoing barges typically use shallow-draft or medium-draft barges to transport cargo and people to shore. Arrival and offloading are affected by sea ice, with the ice-free window occurring generally from late July through early September. A 45-foot wide haul road exists to move materials and equipment off the causeway to specific industrial facilities in the Prudhoe Bay area. West Dock has approximately 3.2 acres of land currently leased by ExxonMobil for the staging of materials (U.S. Department of the Interior 2012; Alaska Gasline Development Corporation 2014).

There is significant activity that occurs at the West Dock causeway during each summer sealift season. Besides offloading activities, there are dock and causeway maintenance/erosion control activities, oil spill response activities, and agency activities, such as from the Alaska Department of Fish and Game and National Marine Fisheries Service, which involves travel to the seawater treatment plant at the end of the causeway, travel to the hovercraft facility, and oil production site activities. A checkpoint located at the beginning of the causeway recorded vehicle traffic during the months of July through mid-October, 2010; it showed that 20,000 vehicles had transited the causeway (an average of 210 vehicles daily). Additionally, an average of 270 persons per day crossed the checkpoint.

Figure 5.3.5-7 shows the number of vessel calls at Prudhoe Bay West Dock in 2014. Vessels calls are limited to the summer months when the sea around the dock is relatively free of ice.

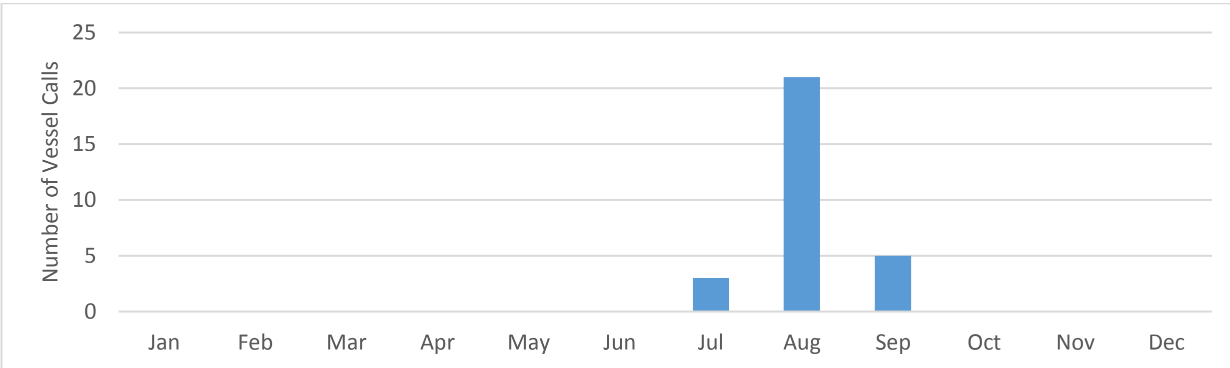


Figure 5.3.5-7 Monthly Vessels Calls to Prudhoe Bay West Dock, 2014[a]

Source: Nuka Research (2015)

Notes:

[a] Number of vessel calls only includes vessels equipped with Automated Identification System transmitters. Fishing vessels less than 164 feet in length and other vessels less than 33 feet in length are excluded.

5.3.5.1.1.13 Port of Seward

The Port of Seward is an ice-free, deep-water port located 125 miles south of Anchorage at the southern end of the Seward Highway. The port services cruise ships and exports bulk coal mined in Alaska. The port is served by ARRC, and ARRC owns the major industrial and cruise ship docks in the community. ARRC dock facilities are directly connected to the State's rail system, which carries freight, resources, and passengers to key hubs in Whittier, Anchorage, Wasilla, Palmer, Denali, Fairbanks/North Pole, and communities in between. A large percentage of Seward port users make intermodal connections through the ARRC terminus on the waterfront. Annually, more than 130,000 people and more than two million tons of cargo enter or exit Seward via the ARRC dock facilities.

The small size of the dock area restricts safe and efficient storage and staging of cargo in a secured area. There is presently a five-acre staging area adjacent to the dock. In addition, the demand for berthing at the freight dock exceeds current availability. Plans call for creating additional laydown space off the dock area, widening and lengthening the freight dock, and extending tracks and utility service to an expanded dock (Alaska Railroad Corporation 2014b). However, these expansion plans are not currently fully funded. An additional restriction is that the Divide Tunnel on the rail line to Seward does not have adequate clearance for double-stack container railcars (HDR 2015).

Figure 5.3.5-8 shows the number of vessel calls at the Port of Seward in 2014. The summer peak coincides with the cruise ship and excursion vessel season. In addition, tug and barge traffic increases in the spring months as construction companies prepare for the summer construction season. While not shown in Figure 5.3.5-8, small (<164 feet) commercial fishing vessels operate from the Port of Seward during the summer when vessels harvest salmon in Resurrection Bay.

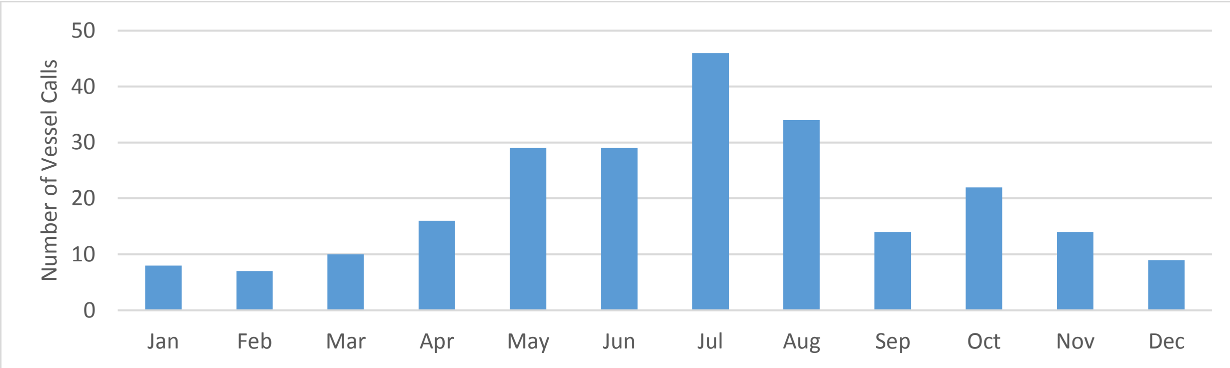


Figure 5.3.5-8 Monthly Vessels Calls to Port of Seward, 2014[a]

Source: Nuka Research (2015)

Notes:

[a] Number of vessel calls only includes vessels equipped with Automated Identification System transmitters. Fishing vessels less than 164 feet in length and other vessels less than 33 feet in length are excluded.

5.3.5.1.1.14 Port of Skagway

Owned by the City of Skagway and operated by the White Pass and Yukon Route Railroad, the Port of Skagway is a sub-regional, deep-water port located in Southeast Alaska. It is ice-free year-round. The port has traditionally been a main supporting port for the Yukon Territory, but it also maintains highway links for deliveries to Interior Alaska. Skagway is a popular port of call for the numerous cruise ships that sail the Inside Passage. The principal commodities handled at the port include petroleum products, zinc and lead ore concentrates, building and construction materials, asbestos, and general cargo (U.S. Department of Commerce 2015).

The White Pass Railroad Dock is 1,764 feet long, with a depth alongside of 35 feet, and is principally owned and operated by the White Pass and Yukon Route Railroad. It is used for mooring cruise vessels and occasional receipt and shipment of conventional general cargo. The dock has an 800-foot railroad spur onto the dock, as well as 80,000 square feet of uncovered storage space. Also owned by the White Pass and Yukon Route Railroad is the Ore Dock, a 1,250-foot-long dock designed for heavy freight transfers to rail or truck that is used by ore carriers, cruise ships, and barges. Depth at the dock is 42 feet. The dock contains a 108,000-square foot warehouse, a 64,000-pound gross vehicle weight vehicle ramp, and bulk fuel facilities. The Ferry/Barge Terminal, which is owned and operated by the State of Alaska, is used by ferry vessels of the Alaska Marine Highway and also used for receipt and shipment of conventional, containerized, and Ro/Ro general cargo. The barge dock has 100-ton GVW pass-pass capabilities (forklift on the barge passes containers to forklift on the dock), with two large forklifts of 30 and 45-ton lifting capacity. The dock and transfer bridge have 80-ton gross deck load capacity. A fenced upland staging and storage area of 120,000 square feet adjoins the Ferry/Barge Terminal. A third dock owned by the White Pass and Yukon Route Railroad is the Broadway Dock, which accommodates vessels up to 860 feet in length and is primarily a cruise ship docking facility (Skagway Chamber of Commerce 2015; Skagway Development Corporation 2015; U.S. Department of Commerce 2015).

The Skagway Ore Terminal has recently been rebuilt and refurbished to accommodate copper concentrate that has been shipped through Skagway since 2007. Currently there is 120,000 square feet of open storage adjacent to the Ore Dock, and it is well suited for large bulk cargoes, such as minerals, bulk dry goods, pipeline stock, heavy equipment, timber, and coal (Skagway Development Corporation 2015).

5.3.5.1.1.15 Port of Valdez

The Port of Valdez is an ice-free, deep-water port located in Prince William Sound. Port facilities include the General Cargo and Container Wharf, which is owned by the City of Valdez and operated by the City and North Star Terminal and Stevedore Company. The container terminal has a 700-foot concrete floating dock and containerized Ro/Ro and lift-on/lift-off (Lo/Lo) capabilities. The terminal is occupied two or three days a month during the winter and weekly during the summer (Kinney 2011). Additionally, a 21-acre marshalling yard is located near the dock.

The Valdez Marine Terminal, operated by Alyeska Pipeline Service Company, is across Valdez Arm from the Port of Valdez. The Valdez Marine Terminal is at the southern terminus for TAPS, and crude oil is loaded onto tankers for shipment to markets. The Valdez Marine Terminal provides four deep-draft berths for the shipment of crude oil.

Figure 5.3.5-9 shows the monthly number of vessel calls at the Port of Valdez in 2014. The seasonal peak in Valdez is due to relatively heavy cruise ship, excursion vessel, and Alaska Marine Highway System ferry traffic in the summer months. Fall and winter port calls are primarily related to tankers calling at the Valdez Marine Terminal to load crude oil. While not shown in Figure 5.3.5-9, small (<164 feet) commercial fishing vessels operate from the Port of Valdez during the summer when vessels harvest salmon in Prince William Sound.

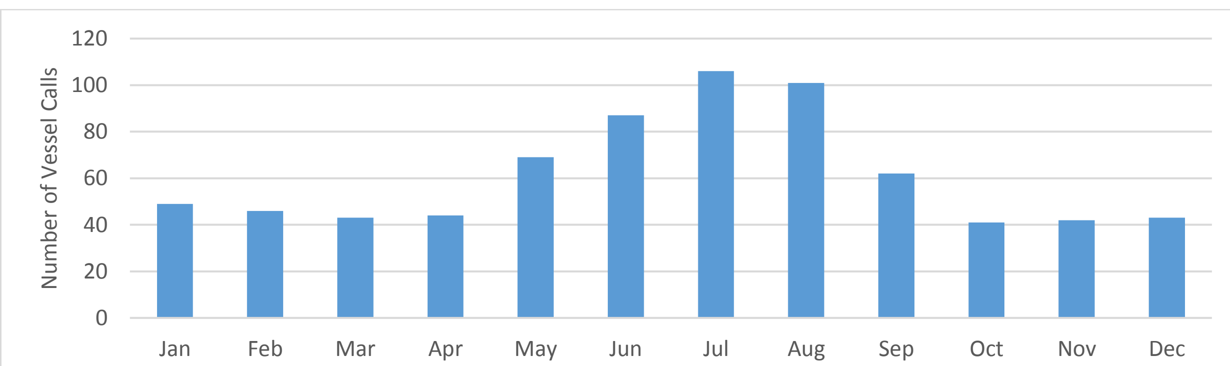


Figure 5.3.5-9 Monthly Vessels Calls to Port of Valdez, 2014[a]

Source: Nuka Research (2015)

Notes:

[a] Number of vessel calls only includes vessels equipped with Automated Identification System transmitters. Fishing vessels less than 164 feet in length and other vessels less than 33 feet in length are excluded.

5.3.5.1.1.16 Port of Whittier

The Port of Whittier is an ice-free, deep-water port located on Prince William Sound. The port is connected by highway to Anchorage and is served by ARRC with both freight and passenger trains. The freight dock currently serves Ro/Ro style barges and has a side ramp for container offloading from barges. The port is ARRC's freight interchange point for its rail barge service connecting Alaska with the Lower 48 and Canada. The port imports freight from Seattle on rail barges operated by Alaska Rail Marine, and it also services calls from the Canadian National Railway Company's rail barge from Prince Rupert, B.C. In addition, Alaska Marine Lines and Northland Services make calls for their tug and barge container operations. A passenger ship terminal in the port is used by cruise vessels in the summer months (Moffatt & Nichol 2014).

The freight barge slip operated by ARRC includes two 34-foot dock structures alongside the slip to facilitate unloading with forklifts (Alaska Railroad Corporation 2011). The rail yard and switching tracks extend the full length of the City of Whittier core area, which consists of residential, industrial, and commercial areas. The rail yard is currently used to the limits of its capacity with freight and passenger train operations. It is used to store southbound freight cars prior to barge arrival and offloading. When barges arrive, freight cars are unloaded onto tracks in the rail yard, after which the waiting cars can be loaded for transport south. Additional land serves as a staging area where flat cars are unloaded and containers are stacked prior to being loaded onto barges for transport out of Alaska (WHPacific 2012b). The port is connected to the Alaska Highway and rail systems by the Anton Anderson Memorial Tunnel and Portage Tunnel. ARRC's Portage Tunnel does not have adequate height to allow double-stack container railcars. The one-way Anton Anderson Memorial Tunnel is run as a "batch operation" with shared access between the railroad and highway users. Most ARRC freight trains operate during the evening hours when the tunnel is closed to vehicle traffic. Trains may also operate during the 15-minute period between vehicle traffic openings (HDR 2015).

Figure 5.3.5-10 shows the monthly number of vessel calls at the Port of Whittier in 2014. Port calls continue through the year as tugs and barges offload freight for Anchorage and other locations in southcentral Alaska. The summer increase is the result of more frequent activity by Alaska Marine Highway System ferries, cruise ships, and excursion vessels. While not shown in Figure 5.3.5-10, small (<164 feet) commercial fishing vessels operate from the Port of Whittier during the summer when vessels harvest salmon in Prince William Sound.

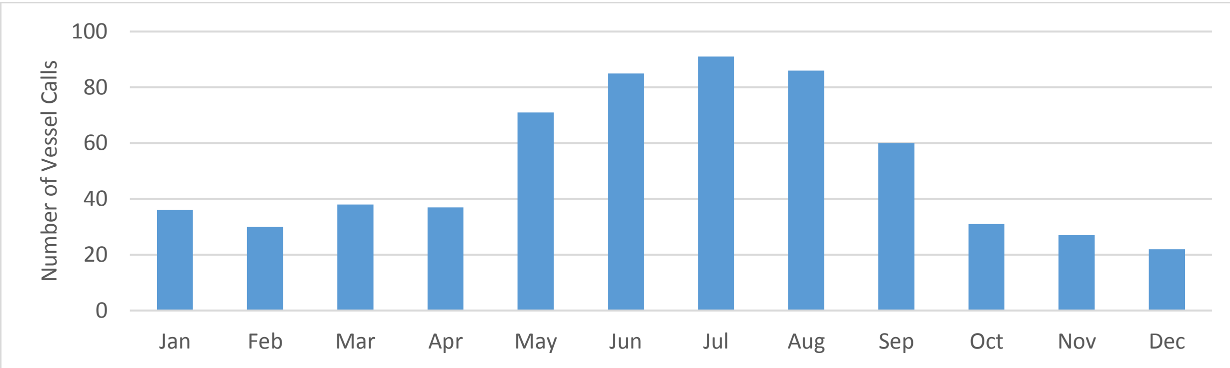


Figure 5.3.5-10 Monthly Vessels Calls to Port of Whittier, 2014[a]

Source: Nuka Research (2015)

Notes:

[a] Number of vessel calls only includes vessels equipped with Automated Identification System transmitters. Fishing vessels less than 164 feet in length and other vessels less than 33 feet in length are excluded.

5.3.5.1.2 Marine Shipping Channels and Adjacent Shorelines

TABLE 5.3.5-3 summarizes information on the shipping channels that provide access to the ports that could be affected by Project-related transportation needs during Project construction and operation.

TABLE 5.3.5-3

Characteristics of Navigation Channels/Fairways in the Area of Interest

Navigation Channel/Fairway	**Area**	**Controlling Depth (mean lower low water)**	**Primary Vessel Traffic**	**Monthly Vessel Traffic Volume**	
				Average	**Peak**
Beaufort Sea/Prudhoe Bay	North Slope Borough	4 feet in best access route	Tugs and barges/ launches	2.4	21
Bering Sea/Norton Sound	Nome Census Area	6-7 fathoms one mile off beach; 22 feet alongside City Dock	Fishing vessels, tugs and barges, landing craft	—	—
Upper Cook Inlet/Approach channel north of Fire Island	Matanuska-Susitna Borough	28.5 feet in approach channel	Bulk cargo ships	.67	4
Upper Cook Inlet/Approach channel north of Fire Island	Municipality of Anchorage	28.5 feet in approach channel	Container ships/ tugs and barges	30.9	42
Prince William Sound/Valdez Arm/Port Valdez	Valdez-Cordova Census Area	20 feet at ferry dock, 50 feet at City Dock, and 85 feet at Valdez Marine Terminal Berth 5. 90 feet at other berths	Fishing vessels/ ferries/crude oil tankers	61.1	106
Prince William Sound/Passage Canal	Valdez-Cordova Census Area	45 feet at DeLong Pier, 18 feet at ferry terminal, and 27 to 30 feet at Ocean Dock	Fishing vessels/ tugs and barges/ cruise ships	51.2	91

TABLE 5.3.5-3

Characteristics of Navigation Channels/Fairways in the Area of Interest

Navigation Channel/Fairway	Area	Controlling Depth (mean lower low water)	Primary Vessel Traffic	Monthly Vessel Traffic Volume	
				Average	Peak
Upper Cook Inlet/Nikiski	Kenai Peninsula Borough	38 feet at Agrium dock; 40 feet at Kenai LNG dock, and 42 feet at Kenai Pipeline Company dock	Tankers/barges/ LNG carriers/fishing vessels	45.8	78
Resurrection Bay	Kenai Peninsula Borough	35 feet at Alaska Railroad dock and 58 feet at coal terminal	Fishing vessels/ cruise ships/bulk cargo ships	19.8	46
Lynn Canal/Chilkoot Inlet	Municipality of Skagway Borough	Ferry terminal 25 feet; other docks from 30 to 45 feet	Fishing vessels, bulk cargo, cruise ships, tugs and barges	—	—
Kennedy Entrance/Lower Cook Inlet/Kachemak Bay	Kenai Peninsula Borough	20 to 40 feet alongside Homer Cargo Dock	Ferries/offshore supply vessels/ tugs and barges/ fishing vessels	27.5	112
Iliuliuk Bay/Iliuliuk Harbor/Dutch Harbor,/Captains Bay	Aleutians West Census Area	25 feet in entrance channel	Fishing vessels/ container ships	132.8	192
Bering Sea/Kuluk Bay	Aleutians West Census Area	30 feet alongside piers 3 and 5	Fishing vessels	—	—

Source: U.S. Department of Commerce (2014b); USACE (2013); Nuka Research (2015)
Notes:
A "—" indicates that the measure is unavailable

According to U.S. Department of Commerce (2014b), the approach to Nikiski is strewn with rocks, boulders, and other obstructions. A shoal area, about seven miles long with depths of 2.5 to 6 fathoms is about 1.8 miles off the piers at Nikiski. The shoal is marked by a seasonal buoy. Deeper water is between the shoal and the piers. There are numerous set gillnets close to the beach from Kenai to Point Possession on the east side of Cook Inlet in June and July. Tidal currents at Nikiski can reach about five knots on the flood and about 2.6 knots on the ebb. A significant swell from the southwest affects vessels laying at the Nikiski piers when there is a strong southwest wind and flood current. This wind can also extend the duration of flood currents to one to two hours later than predicted during neap tides. Ice conditions in Cook Inlet near Nikiski are a severe problem during January and February. The ice conditions are more severe on the flood than the ebb, particularly at two hours before high water slack. The combination of currents and ice floes can cause a strain on mooring lines and vessels have broken free from their moorings in the past.

The USCG has issued a Navigation Safety Advisory for Cook Inlet titled Operating Guidelines for Ice Conditions in Cook Inlet (U.S. Coast Guard 2015b). The guidelines represent a culmination of best practices for mitigating risk to life, property, and the environment during winter ice conditions. The guidelines provide different advice for vessels operating in Upper Cook Inlet (North of Nikiski) and those operating in Lower Cook Inlet (Nikiski and south). When ice conditions warrant and the Captain of the Port has issued a Phase 2 advisory for Lower Cook Inlet, there are specific guidelines for docks at Nikiski. In general, the guidelines call for filing a voyage plan with the USCG, cessation of all transfer operations when the forecast flood current exceeds four or five nautical miles per hour, use of a second vessel as an ice scout, and maintain a continuous watch with a pilot to be prepared to mitigate ice conditions. Tug and barge operations should have a second assist tug that can also act as the ice scout, file a voyage plan, keep main engines running at all times, and cease transfer operations and be prepared to disconnect hoses when the forecast flood current is estimated at four nautical miles per hour or greater. The guidelines also note that it may be prudent for tug and barge operations to suspend transfer operations and disconnect hoses during maximum flood currents, since the ice floe is heavier on the flood tide at the Nikiski docks.

Cook Inlet is a wide, long inlet with moderate to low levels of vessel traffic when compared to other large North America inlets (Cape International and Nuka Research & Planning Group 2006). However, public comments received during FERC scoping meetings and community information sessions hosted by Project representatives indicated concerns that increased vessel traffic related to Project construction and operation could affect commercial fishing vessels by interfering with fishing and navigation, and reducing the total allowable fishing area. In addition, the potential for increased vessel traffic raised concerns about the higher risk of vessel collisions. A number of commercial fisheries operate near the shipping channels that provide access to the ports that could be affected by Project-related transportation needs during Project construction and operation. The Cook Inlet salmon fishery is the primary commercial fishery surrounding the shipping lanes in Cook Inlet. This fishery also occurs in the vicinity of the proposed Marine Terminal of the Liquefaction Facility and near the proposed Mainline route across Cook Inlet. In addition, a major salmon fishery occurs near shipping lanes in Prince William Sound that would be used by the Project during construction and operation phases. Fisheries also occur in other areas listed in Table 5.3.6-6, including Norton Sound, the Bering Sea, and Lynn Canal. However, existing conditions in the fisheries in those areas are not described because the Project-related vessel traffic through the Norton Sound and Bering Sea would be limited to the annual sealift to the North Slope, and Lynn Canal is not presently in the Project execution plans.

A vessel engaged in fishing is prohibited from impeding the passage of any other vessel navigating within a narrow channel, fairway, or traffic lane (U.S. Coast Guard 2015a). Moreover, there are normative nautical rules for smaller vessels, such as fishing boats, giving way to larger vessels. Apart from these basic rules, there are no restrictions against fishing boats working in or steaming through shipping lanes. As noted by Impact Assessment, Inc. (2004), this is, in fact, a common occurrence throughout the salmon fishing season in Cook Inlet, and it is likely a common occurrence in Prince William Sound as well.

TABLE 5.3.5-4 provides an overview of the commercial salmon fisheries in Cook Inlet and Prince William Sound in 2014. Commercial fishing in Cook Inlet and Prince William Sound is mostly a summer activity, coinciding with the highly seasonal salmon fishery. It is estimated that the seafood industry in southcentral Alaska directly employs more than 10,000 workers and creates approximately 7,000 full-time equivalent jobs, including multiplier effects, as a result of seafood caught and processed within the region. Direct full-time equivalent employment in the region’s seafood industry includes 2,100 jobs in commercial fishing, 1,400 jobs in processing, and 300 jobs in hatchery operations (McDowell Group 2015).

TABLE 5.3.5-4

Characteristics of Commercial Salmon Fisheries in Cook Inlet and Prince William Sound, 2014

Fishery	Number of Permits Fished	Harvest Quantity (Pounds)	Harvest Ex-vessel Value ($)
Cook Inlet			
Salmon Drift Gillnet	496	12,630,974	23,462,734
Salmon Set Gillnet	513	6,280,851	11,899,813
Salmon Purse Seine	20	1,762,770	1,228,332
Prince William Sound			
Salmon Drift Gillnet	524	33,165,337	50,904,523
Salmon Set Gillnet	29	1,749,175	3,452,425
Salmon Purse Seine	222	130,783,092	39,066,782

Source: Alaska Commercial Fisheries Entry Commission (2015)

Other commercial fisheries occur in Cook Inlet besides the salmon fishery, including a herring roe fishery and sablefish, halibut, and groundfish fisheries (Alaska Department of Fish and Game 2015c), but the salmon fishery is by far the most economically important. More permits are issued and greater production is harvested in the salmon fishery than any other (Shields and Dupuis 2015). In 2014, the Cook Inlet salmon harvest represented approximately 3 percent of the statewide catch by weight, and nearly 13 percent of all salmon permits issued statewide were for the Cook Inlet area. The 2014 Cook Inlet commercial salmon harvest of 20.7 million pounds was approximately 25 percent less than the 2004–2013 average annual harvest of 27.6 million pounds. The estimated ex-vessel value was $37.5 million (Alaska Department of Fish and Game 2015b).

The gear types used in the Cook Inlet commercial salmon fishery are drift gillnets, set gillnets, and purse seines. In 2014, 524 drift gillnet permits were fished in the Cook Inlet salmon fishery, with 79 percent fished by Alaska residents. For set gillnet gear, 29 permits were fished, with 83 percent fished by residents. For purse seine gear, 20 permits were fished, with 95 percent fished by residents (Alaska Commercial Fisheries Entry Commission 2015).

Purse seine vessels are limited by Alaska law to 58 feet in length, while drift gillnet boats are typically 30 to 40 feet long. Fishing with set gillnets is done from shore or from a vessel operating close to shore, while vessels using drift gillnets and purse seines operate further offshore (Weil 2003; Alaska Department of Fish and Game 2009). Many Cook Inlet set gillnet permit holders also own an Alaska Department of Natural Resources shore fishery (set gillnet) lease. While a permit holder does not need a shore fishery lease in order to fish, a lease provides a permit holder the first right to fish anywhere within the area of the lease, subject to ADF&G regulations that determine minimum distances between nets, closed areas, and other considerations (Alaska Department of Natural Resources 2010; Gho et al. 2012).

Participants in the Cook Inlet commercial salmon fishery reside in communities throughout Alaska. In 2014, drift gillnet permit holders resided in 29 different Alaska communities, set gillnet permit holders resided in 30 communities, and purse seine permit holders resided in 15 communities. In addition, many permit holders reside out-of-state (Alaska Commercial Fisheries Entry Commission 2015).

Biological information on the salmon species harvested in Cook Inlet is provided in Resource Report No. 3. Sockeye salmon are the most important component of the Cook Inlet commercial salmon harvest, accounting for approximately 93 percent of the ex-vessel value in the commercial fishery in 2014 (Alaska Department of Fish and Game 2015b). Adult sockeye salmon are present from June to October in Upper Cook Inlet waters, with a historic peak return to the southern boundary of Upper Cook Inlet marine waters around mid-July (Shields and Willette 2005).

Drift gillnet fishing in the Central District of the Upper Cook Inlet generally occurs from June 25 to the end of August with fishing generally occurring during daylight hours. Drift gillnet fishing effort for sockeye salmon peaks in mid to late July. Set gillnet fishing generally occurs from June 2 to mid-September in Cook Inlet (National Marine Fisheries Service 2014a). Set gillnet fishing effort occurs during the day and night in the Upper Cook Inlet, while fishing effort occurs only during the day in the Lower Cook Inlet, except during fishery extensions (National Marine Fisheries Service 2014c).

Salmon fisheries in Prince William Sound have greatly expanded since the mid-1970s, largely due to the addition of hatchery-produced salmon. Prince William Sound is home to five salmon hatcheries, including the largest pink salmon and second largest chum and sockeye salmon enhancement programs in the State. Salmon fisheries are a major economic driver in Prince William Sound, harvesting annually upwards of 74 million fish (Alaska Department of Fish and Game 2015a). In 2014, the Prince William Sound salmon harvest represented approximately 26 percent of the statewide catch by weight, and nearly 8 percent of all salmon permits issued statewide were for the Prince William Sound area. The 2014 Prince William Sound commercial salmon harvest of 165.7 million pounds was approximately three percent more than the 2004–2013 average annual harvest of 161.3 million pounds. The estimated ex-vessel value was $104.5 million (Alaska Department of Fish and Game 2015b). While a number of other commercial fisheries occur in Prince William Sound, including shrimp and sablefish fisheries (Alaska Department of Fish and Game 2015a), the level of participation in those fisheries and their economic value is much less than that of the salmon fishery.

Gear for the Prince William Sound salmon fishery includes drift gillnet, set gillnet and purse seine. In 2014, 496 drift gillnet permits were fished in the Prince William Sound salmon fishery, with 74 percent fished by Alaska residents. For set gillnet gear, 29 permits were fished, with 83 percent fished by residents. For purse seine gear, 222 permits were fished, with 71 percent fished by residents (Alaska Commercial Fisheries Entry Commission 2015). As in Cook Inlet, participants in the Prince William Sound commercial salmon fishery reside in communities throughout Alaska. In 2014, drift gillnet permit holders resided in 27 different Alaska communities, set gillnet permit holders resided in 10 communities, and purse seine permit holders resided in 22 communities. In addition, many permit holders resided out-of-state (Alaska Commercial Fisheries Entry Commission 2015).

As in Cook Inlet, the run timing and migration routes used by the five salmon species in Prince William Sound overlap to such a degree that the commercial fishery is mostly mixed stock and mixed species in nature. Pink and sockeye salmon are the most important components of the Prince William Sound commercial salmon harvest, accounting for approximately 87 percent of the ex-vessel value in the commercial fishery in 2014 (Alaska Department of Fish and Game 2015b).

Drift gillnet fishing in Prince William Sound generally occurs from mid-May to the end of September (National Marine Fisheries Service 2014b). Purse seine fishing effort for pink salmon typically occurs from mid-June to mid-September (Alaska Department of Fish and Game 2014).

Currently, a security zone is in effect when LNG carriers transit through Cook Inlet and dock at the Kenai LNG Dock. The intent of the security zone is to protect the LNG carriers from collisions or sabotage by prohibiting all other vessels from entering the zone. The security zone includes all navigable waters within a 1,000-yard radius of a LNG carrier during its inbound and outbound transits through Cook Inlet between the Kenai LNG Dock and the Homer Pilot Station. While a LNG carrier is moored at the Kenai LNG Dock, the security zone includes all navigable waters within a 1,000-yard radius of the vessel. The security zone applies to any commercial fishing vessel, including salmon fishery drift gillnet and set gillnet vessels, unless the owner of the vessel has notified and provided information to the U.S. Coast Guard Marine Safety Detachment in Homer before fishing in the security zone (33 CFR 165.1709). Many commercial fishing vessel owners operating in Cook Inlet have routinely received approval to fish within the security zone, and implementation of the security zone regulations have not had a significant economic impact on Cook Inlet fisheries (Maw 2015). To avoid conflicts with fishing vessels operating in Cook Inlet, most large, deep-draft cargo ships, including LNG carriers, announce their presence on VHF marine radio channels at specific waypoints in the Cook Inlet shipping lane (Weil 2003; Maw 2015).

5.3.5.2 Highways

TABLE 5.3.5-5 provides an overview of the characteristics of the primary highways that would likely be used to distribute Project materials, equipment, and personnel during construction and operation. These highways are typically asphalt-paved, two-lane roads except for the Dalton Highway, which is primarily a gravel road with sections of chip seals or other asphalt surfacing and is used primarily by trucks servicing the North Slope oil fields. In population centers, such as the Municipality of Anchorage and Fairbanks, the two-lane highways become multi-lane highways. The highways that will be used by the project are classified as Class I Highways with a design capacity of a level of service (LOS) “B”. Per the Highway Capacity Manual, Class I Highways are: “highways on which motorists expect to travel at relatively high speeds, including major intercity routes, primary arterials, and daily commuter routes.” The design capacity of a Class I Highway with a LOS B is a service flow rate of 780 passenger cars per hour (pc/h) in both directions. The current and projected average daily traffic estimates in all seasons are well within this design capacity.

TABLE 5.3.5-5

Primary Highways in the Area of Interest

Steese Highway/ Elliott Highway/ Dalton Highway	Fairbanks North Star Borough/North Slope Borough	The Steese Highway begins in Fairbanks and transitions into the Elliott Highway, which trends north to the junction with the Dalton Highway. The Dalton Highway continues to the North Slope and ends at Prudhoe Bay.
Glenn Highway/ Parks Highway	Municipality of Anchorage, Matanuska-Susitna Borough/Denali Borough/ Fairbanks North Star Borough	The Glenn Highway trends northeast out of Anchorage and connects with the Parks Highway, which trends north to Fairbanks.
Seward Highway/ Sterling Highway/ Kenai Spur Highway	Municipality of Anchorage/ Kenai Peninsula Borough	In Anchorage, the Seward Highway connects with the Glenn Highway for further conveyance north to Project construction sites. The Sterling Highway begins at the intersection with the Seward Highway near Kenai Lake and trends south, ending at Homer. The Kenai Spur

TABLE 5.3.5-5

Primary Highways in the Area of Interest

		Highway splits off the Sterling Highway in Soldotna and extends beyond Nikiski.

In addition, there are a number of secondary highways that may be considered for use during Project construction. As noted in Section 5.3.5.1.1, the Port of Valdez offers the shortest truck route to Fairbanks and central Alaska via the Richardson Highway. The Alaska Highway connects Alaska to Canada and the Lower 48 and could be used for expedited freight. The Haines Highway also connects with the Alaska Marine Highway, providing access to the Lower 48 and Interior Alaska. These secondary highways are not presently in Project execution plans.

Average annual daily traffic counts on the primary highways in the AOI are presented in TABLE 5.3.5-6. There are substantial differences in traffic volumes across the highways. In 2009, for instance, the highest traffic count on the Dalton Highway at milepost (MP) 335 is typically less than one percent of that on the Glenn Highway at Eklutna Flats near Anchorage.

TABLE 5.3.5-6

Average Annual Daily Traffic Count on Primary Highways in the Area of Interest, 2004–2013

Year	Sterling Highway at Skilak Lake Road	Seward Highway at Moose Pass	Seward at Placer River	Glenn Highway at Eklutna Flats	Steese Highway North of Fox	Elliott Highway North of Fox	Parks Highway at Nenana	Dalton Highway at MP 335
2004	3,135	1,734		26,249	1,510	1,055	1,571	NA
2005	3,150	1,743	4,284	27,028	1,584	1,089	1,554	NA
2006	3,070	1,638		27,570	1,433	1,110	1,538	NA
2007	3,458	1,680	3,842	28,506	1,506	1,205	1,525	NA
2008	3,272	1,553	3,702	27,454	1,563	1,075	1,406	NA
2009	3,500	1,572	4,026	28,495	1,760	1,163	1,461	160
2010	2,943	1,614	4,011	29,644	1,804	1,207	1,513	100
2011	2,850	1,584	3,865	29,572	1,759	1,205	1,446	80
2012	2,810	1,568	3,753	29,494	1,794	1,156	1,482	105
2013	3,246	1,555	3,930	30,151	1,851	1,128	1,437	160
Maximum Percent Change	7.7%	7.6%	8.8%	4.0%	9.5%	10.8%	7.8%	37.5%

Source: Alaska Department of Transportation and Public Facilities (ADOT&PF) (2016)

As shown in TABLE 5.3.5-7, average annual daily traffic counts along a given primary highway in the AOI can vary depending on location. For example, sections of the Glenn Highway in the Municipality of Anchorage experience more than 60,000 vehicles per day on average, while portions of the Glenn Highway in the Valdez-Cordova Census Area experience traffic counts of fewer than 3,000 vehicles per day.

TABLE 5.3.5-7

Location Variation in Average Annual Daily Traffic Count on Primary Highways in the Area of Interest, 2013

	Dalton Hwy	Parks Hwy	Steese Hwy	Sterling Hwy	Seward Hwy	Glenn Hwy	Elliott Hwy
North Slope Borough	117-135						
Yukon-Koyukuk Census Area	145-355	1,437-1,836	35-115				39-558
Fairbanks North Star Borough		2,421-14,398	115-26,023				510-1,128
Denali Borough		1,206-3,615					
Matanuska-Susitna Borough		1,080-33,872				820-27,750	
Kenai Peninsula Borough				2,402-19,190	1,555-6,312		
Municipality of Anchorage					3,930-55,480	30,151-61,630	
Valdez-Cordova Census Area						881-2,395	

Source: ADOT&PF (2015b)

TABLE 5.3.5-8 shows the seasonal variation in traffic volumes on the primary highways in the AOI. On some highways, such as the Seward and Parks Highways, traffic during the summer can be more than triple the winter traffic due to the seasonal upsurge in visitors to Alaska. A number of highways in the state carry significant levels of recreational and/or slow-moving traffic during the summer months, with a relatively high percentage of the total traffic falling under the category of a vehicle pulling a trailer. Significant portions of the Dalton, Steese, Richardson, Parks, and Glenn Highways have received Alaska Scenic Byway status to promote their scenic, cultural, and recreational characteristics. A portion of the Parks Highway was designated a National Scenic Byway in 2009. Poor weather conditions during the winter months may result in traffic delays. Traffic delays can also occur on Alaska roads in the summer since that is when road repair and construction projects are generally scheduled; however, the delays are usually minimal.

TABLE 5.3.5-8

Seasonal Variation in Average Daily Traffic Count for High and Low Months and Truck Percentage on Primary Highways in the Area of Interest

	High Month	Average Daily Traffic Count for High Month	Low Month	Average Daily Traffic Count for Low Month	Estimated Average Annual Daily Traffic Count	Truck Percentage of Total Number of Vehicles[a]
Dalton Highway MP 339[b]	—	—	—	—	160	75
Elliott Hwy North of Fox[b]	June	1,370	January	810	1,130	51
Steese Highway North of Fox	August	2,280	December	1,470	1,820	13
Parks Highway MP 245[b]	July	3,660	December	680	1,860	18
Glenn Hwy at Eklutna Flats[c]	August	62,430	January	48,810	54,870	6

Sterling Highway at Skilak Lake Road[c].	August	3,246	—	—	3,250	12
Seward Highway south of Sterling Highway (Moose Pass)	July	3,700	January	640	1,560	15[d]
Seward Hwy north of Sterling Highway at Placer River[c]	July	9,400	January	890	2,100	13

Source: ADOT&PF (2016)
Notes:
[a] Includes all vehicles in Federal Highway Administration Classes 4-13.
[b] Data are for 2014
[c] Data are for 2013
[d] Truck estimates at Timber Lane Drive and Seward Highway (MP 11)
A "—" indicates that the measure is unavailable

Highways in the AOI may also differ with respect to the type of vehicles driven. TABLE 5.3.5-8 shows the percentage of traffic volume accounted for by trucks. Large commercial haulers are a dominant part of the traffic stream on the Dalton Highway. As the only established road that provides year-round access to the Prudhoe Bay area from Fairbanks, the Dalton Highway is an important conduit for transporting materials and equipment to North Slope oil fields. Trucks also account for a large percentage of the traffic on sections of the Elliott Highway. In contrast, passenger cars represent a relatively large portion of total traffic volume on other highways in the AOI for which data are available.

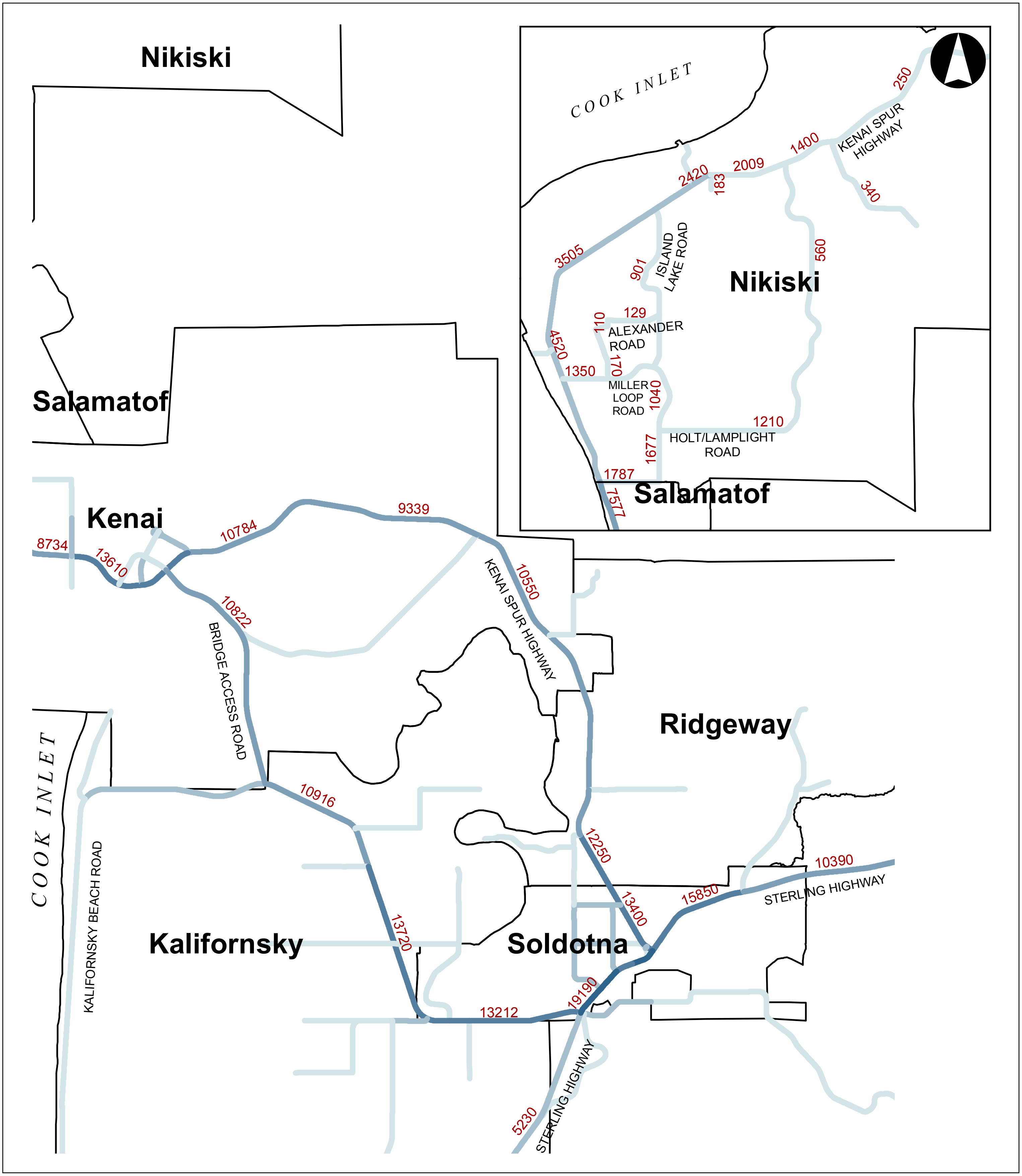
There are three highway sections in the AOI that are designated by ADOT&PF as "safety corridors." The "safety corridor" program was created by the Alaska legislature to reduce number of traffic accidents in areas that experience a higher than average incidence of fatal and serious injury crashes. Until long-term major road projects are implemented to address traffic volume issues, the safety corridor program designation provides an immediate term solution by raising public awareness of highway safety through signs, education, double fines for traffic violations, and increased enforcement actions. The safety corridors in the AOI are the 8.5-mile section on the Parks Highway (MP44.5 to MP53) between Wasilla and Houston, a 9.8-mile section of the Sterling Highway (MP83 to MP93) between Sterling and Soldotna, and the 30.6-mile section of the Seward Highway (MP87 to MP117) from Girdwood to Anchorage. As the main route between Anchorage and Fairbanks, the principal access to Denali National Park, and the main highway in the Matanuska-Susitna Valley, the Parks Highway is one of the most important roads in Alaska. Traffic count on the Parks Highway is heaviest along the Wasilla-Houston corridor because this is a highly traveled commuter route during weekdays. The Seward Highway provides regional mobility for movement of goods and services and is the only road access from Anchorage southward to communities along Turnagain Arm and the Kenai Peninsula. The highway carries a wide range of users, including commercial, recreational, tourist, and commuter traffic. The Sterling Highway is the main travel route for all traffic on the west side of the Kenai Peninsula and an important route to popular fishing and recreational areas. The traffic on all of the Alaska Highways is much higher in the summer months than in the winter months due to recreational and tourist activities that occur each summer.

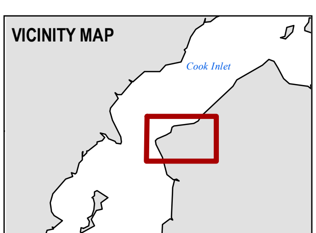
There are no highway crossings or pipeline collocation within highway right of ways within "safety corridors". Dalton, Elliot and Parks Highway crossings would be performed using horizontal bores. Access for equipment crossings would be via short access road connections to the highway on either side of the bore. There are 2 locations where the pipeline would be in close proximity to the highway along the Dalton and Parks Highways. These areas (Atigun Pass, Nenana River Gorge) have detailed traffic management plans which are described in Section 5.4.2.7.2.2.

Public comments received during FERC scoping meetings and community information sessions hosted by Project representatives indicated that there are particular public concerns about Project impacts to traffic on the Kenai Spur Highway. The planned Liquefaction Facility location would require that an approximately 1.33-mile segment of the existing Kenai Spur Highway be relocated to the east to avoid potential conflicts with the proposed Liquefaction Facility. It is anticipated that this non-jurisdictional project, which is referred to as the KSH Relocation project, would be completed prior to the start of Project construction. The relocated highway would be designed to accommodate anticipated traffic volumes in the area beyond 2025. Project representatives are working with ADOT&PF and the KPB on planning for the KSH Relocation project, including routing discussions, public engagement, permitting and construction. The ongoing relocation study examined highway relocation routes beginning near Kenai Spur Highway MP 18 and ending near MP 25. Figure 1.3.3-3 provides a summary of preliminary options under consideration. These options are being evaluated with a variety of criteria including environmental features, potential impacts to local residents and businesses, right-of-way (ROW) acquisition, traffic considerations, utilities relocation, geotechnical features, road design and construction timing.

The existing Kenai Spur Highway is a 39-mile long rural principal arterial that ranks as one of the highest traffic-carrying roadways in the KPB (Alaska Department of Transportation and Public Facilities 2012). The highway connects Kenai and Soldotna, which are two of the borough's primary population centers, and it provides sole roadway access to the communities of Nikiski and Salamatof. In addition, the highway is part of the National Highway System that provides intermodal connection between the Sterling Highway and the port facilities in the Port of Nikiski. The highway begins in Soldotna at a junction with the Sterling Highway and ends north of Nikiski at the entrance to the Captain Cook State Recreation Area. The Kenai Spur Highway is two lanes for most of its length, but within Soldotna and Kenai it consists of four traveling lanes (two in each direction), with a 12-foot center median. The highway has a 55-mph speed limit. To meet ADOT&PF standards, the relocated highway under the KSH Relocation project would also have two lanes, shoulders, and 55-mph speed limit.

Figure 5.3.5-11 shows the 2013 average annual daily traffic (AADT) volume on the Kenai Spur Highway and other major roads in the area around Nikiski, Kenai, and Soldotna. Vehicle traffic on the Kenai Spur Highway is especially high as it passes through Kenai and Soldotna, but even the Nikiski stretch of highway receives substantially more traffic than any other road in the Nikiski area. There are several Kenai Spur Highway intersections in Nikiski, Kenai, and Soldotna that regularly become congested, particularly during morning and afternoon work drive times (Persily 2015). Traffic volume on the highway is highest during the summer tourist season.





LEGEND

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2292 - 6083	17410 - 26880
6084 - 11015	000 AADT for Segment

0 1.25 2.5 5 Miles

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PREPARED BY:	NORTHERN ECONOMICS INC.
SCALE:	1:213,845
DATE: 2017-03-20	SHEET: 1 of 1

2013 ANNUAL AVERAGE DAILY TRAFFIC COUNTS

(INCLUDES BOTH DIRECTIONS)

ALASKA LNG

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5.3.5.3 Railroads

The Alaska Railroad, which is owned and operated by ARRC, includes 651 miles of track in the AOI, over which ARRC provides freight and passenger service from Seward in the south through Anchorage to Fairbanks in the north. A spur connects Whittier to ARRC's central line near Portage. As described in Section 5.3.5.1.1, dock and handling yards are maintained by ARRC at the ports of Seward and Whittier, and a handling yard near the Port of Anchorage for moving freight reaching Alaska by barge or ship.

The Alaska Rail Marine, which is managed by ARRC, operates rail-equipped barges year-round that transport freight between Seattle and Whittier. Waterborne rail cars also connect with the Canadian National Railway Company's Aquatrain, which provides freight transport to Alaska from Prince Rupert, B.C. A 32-mile spur line connecting Port MacKenzie to ARRC's rail system near Willow is planned, but completion of the spur is awaiting funding (Moffatt & Nichol 2014). In addition, ARRC plans to extend the existing rail line from its terminus near North Pole to a point near Delta Junction (Alaska Railroad Corporation 2014a).

TABLE 5.3.5-9 describes the major routes of the Alaska Railroad in terms of amount of cargo transported and route distance.

TABLE 5.3.5-9

Cargo Volume and Distance of Rail Routes in the Area of Interest, 2014

	Cargo (Tons)	Railway Miles
Anchorage to Whittier	416,405	62
Whittier to Anchorage (and points northward)	783,439	62
Healy to Seward [a]	512,000	358
Palmer to Anchorage [b]	2,344,600	43
Anchorage to Seward [c]	523,926	114
Seward to Anchorage	31,744	114
Anchorage to Fairbanks	1,559,378	356
Fairbanks to Anchorage	1,108,066	356

Source: Williams (2015); Alaska Railroad Corporation (2012)
Notes:
[a] This route mainly serves to haul coal mined near Healy to loading facilities in Seward, where the coal is shipped overseas.
[b] This route mainly serves to haul gravel mined near Palmer to processing facilities in Anchorage.
[C] This route includes cargo hauled from Healy to Seward.

In 2014, ARRC generated approximately 55 percent of its operating revenues from freight hauling and 16 percent from passenger service (Alaska Railroad Corporation 2015b). That same year the railroad hauled 4.92 million tons of freight (Alaska Railroad Corporation 2015a). Petroleum products, such as jet fuel and unleaded gasoline, accounted for the majority of ARRC's freight tonnage until the closure of the oil refinery at North Pole in 2014. However, the decline in petroleum shipments was partially offset by shipments for oil field activities. Reinvigorated North Slope oilfield exploration has spurred a significant increase in ARRC's rail-barge business (Seattle and Prince Rupert to Whittier) since 2010. Most (85–90 percent) of the freight hauled via Alaska Rail Marine is oil and gas industry-related. In 2012, ARRC hauled 24,350 tons of pipe for the oil and gas industry; by 2014, the quantity of pipe hauled had risen to 39,905 tons (Alaska Railroad Corporation 2015b). Gravel trains move between the Matanuska Junction and Palmer to locations in south Anchorage. Tourists accounted for the majority of ARRC's passenger service, especially during the months from May through September when cruise ship companies provide shore-based trips to and from Denali National Park and Preserve, Fairbanks, Seward, and Whittier. The number of trains on the track increases during the summer with the addition of daily passenger and gravel trains, as well as work trains and heavy equipment used for track maintenance.

ARRC's current railcar fleet, including passenger cars, flat cars, boxcars, tank cars, and open-top and covered hopper cars, is sized to meet the corporation's existing requirements and commitments. ARRC's freight service fleet includes 863 railcars that are owned or leased by ARRC, along with 180 railcars leased by customers (Alaska Railroad Corporation 2015a). The ARRC rail system has a current capacity of around 325 railcars per day (including 310 rail flat cars and 15 gondola cars), with an excess capacity of around 34 railcars per day.

5.3.5.4 Air Transportation

Air transportation would be used for the movement of workers, supplies, and equipment destined for remote areas of Alaska because of the large distances between cities and the limited highway and railroad infrastructure. The Anchorage International Airport, Kenai Municipal Airport, Fairbanks International Airport, and Deadhorse Airstrips will be used as regional hub airports for the distribution of project personnel. The majority of project personnel will be transported from the regional hub airports to the project sites via bus; however, there may be some use of tactical airstrips such as Point Thomson, Galbraith Lake, Chandalar, Coldfoot, Livengood Camp, Prospect Creek, Nenana, Cantwell, Summit, Talkeetna, Willow, Beluga, Home, and Seward. If tactical airstrips are used as planned on a very limited basis, the airstrips would be used within the constraints of their design and current conditions, so the aircraft selected for use at a tactical airstrip would be able to land and take off on the airstrip without additional airstrip improvements. TABLE 5.3.5-10 provides an overview of the characteristics of these airports. The facilities are owned and maintained by the State of Alaska or municipalities and are available for public use except for Prospect Creek Airstrip, which is used to support the operation of TAPS; Cantwell Airstrip, which is privately-owned but open for public use; and Beluga Airstrip and Point Thomson Airstrip, which are private airstrips used by ConocoPhillips and ExxonMobil, respectively.

The airports vary widely in runway characteristics and capacity. The airports in the Municipality of Anchorage and Fairbanks are international airports with long asphalt runways and a large number of annual flight operations per year. The two airports provide multiple types of operations, but the primary type of operation at each airport is different. Ted Stevens Anchorage International Airport is by far the State's largest hub for passenger and cargo air traffic. Nearly five million passengers traveled through the airport in 2012, and it is among the highest ranked airports in the world for cargo throughput (Alaska Department of Transportation and Public Facilities 2014). Many of the airstrips are remote and/or restricted, unimproved, and devoid of services.

TABLE 5.3.5-10

General Characteristics of Air Transportation in the Area of Interest

Airport, Airfields, and Heliports	Gravel/ Asphalt	Maximum Runway Length (feet)	Number of Flights (2013)	Primary Operation Type (% of total flights)	Volume of Commercial Air Traffic	
					Enplanements (2013)	Pounds of Cargo (2013)
North Slope Borough						
Deadhorse Airstrip	Asphalt	6,500	16,460	Commercial (49)	48,588	7,770,318
Point Thomson Airstrip	Gravel	5,000	—	—	—	—
Galbraith Lake Airport	Gravel	5,182	—	Air taxi (50)	783	205
Yukon-Koyukuk Census Area						
Chandalar Airstrip	Gravel	3,000	—	Transient (64)	29	2,527
Coldfoot Airstrip	Gravel	4,001	—	Air taxi (80)	4,067	1,043
Livengood Camp Airstrip	Gravel	3,000	—	Air taxi (100)	—	—
Prospect Creek Airstrip	Gravel	4,968	—	Air taxi (50)	—	—
Fairbanks North Star Borough						
Fairbanks International Airport	Asphalt	11,800	58,614	Air taxi (31)	457,372	9,789,251
Nenana Municipal Airport	Asphalt	4,600	—	Air taxi (42)	333	2,118
Denali Borough						
Cantwell Airstrip	Gravel	2,080	—	Transient (64)	—	—
Matanuska-Susitna Borough						
Summit Airstrip	Gravel	3,814	—	Air taxi (48)	—	—
Talkeetna Airport	Asphalt	3,500	—	Transient (53)	—	—
Willow Airport	Gravel	4,400	—	Transient (38)	—	—
Municipality of Anchorage						
Anchorage International Airport	Asphalt	12,400	132,195	Commercial (38)	2,325,030	1,597,396,428
Kenai Peninsula Borough						
Beluga Airstrip	Gravel	5,002	—	—	—	—
Homer Airport	Asphalt	6,701	—	Commercial (48)	37,705	1,322,397
Kenai Municipal Airport	Asphalt	7,830	20,331	Air taxi (58)	99,821	1,418,710
Seward Airport	Asphalt	4,533	—	Air taxi (43)	—	—

Source: AirNav.com (2015); Federal Aviation Administration (2015); GCR, Inc. (2015); U.S. Department of Transportation (2014)
Notes:
A "—" indicates that the measure is unavailable.

5.3.6 Government Revenues and Expenditures

The following section provides information on revenues and expenditures for the State of Alaska, as well as summary information for local governments in the AOI.

5.3.6.1 State of Alaska

Alaska does not levy personal income or sales taxes. The primary sources of State revenue are oil taxes and royalties, funding from the federal government, and investment earnings, primarily from the Permanent Fund. Total State revenue in FY2014 was $16.8 billion (TABLE 5.3.6-1). State revenue per capita, at $16,760 in 2013, was the highest in the U.S. (Tax Foundation 2015).

TABLE 5.3.6-1

State of Alaska Government Revenues by Source

	$ Millions		
	FY2014	**FY2013**	**FY2012**
Taxes	2,973.85	4,787.36	7,186.20
Licenses and Permits	154.99	147.79	148.06
Charges for Services	184.66	194.06	197.28
Fines and Forfeitures	17.02	30.62	13.73
Rents and Royalties	2,563.43	2,807.26	2,996.90
Premiums and Contributions	24.74	25.95	23.36
Interest and Investment Income (Loss)	8,299.90	5,248.27	344.38
Federal Grants in Aid	2,459.58	2,434.29	2,500.94
Payments in from Component Units	22.58	31.34	39.46
Other Revenues	61.19	101.71	66.76
Total Revenues	16,761.93	15,808.62	13,517.07

Source: Alaska Department of Administration (2012); Alaska Department of Administration (2013); Alaska Department of Administration (2014)

Notes:

Permanent Fund revenues are included in Rents and Royalties and Interest and Investment Income.

As described in Section 5.3.2.2.6, the oil and gas industry is a major source of State revenue. Since statehood, Alaska has received more than $164 billion in revenues from the industry (Resource Development Council for Alaska 2014). The revenues from oil and gas activities include a 1) production tax based on the value of oil and gas produced in the State; 2) property taxes; 3) oil and gas royalties, including bonuses, rents, and interest; and 4) corporate income taxes.

The net production tax is currently 35 percent and is based on the net value of oil and gas, which is the value at the point of production, less all qualified lease expenditures. Qualified lease expenditures include certain qualified capital and operating expenditures (Alaska Department of Revenue 2015a). After 2021, gas will be taxed at 13 percent of its gross value at the point of production under Alaska Statute 43.55.011(e), not gross value minus lease expenditures. Further, qualified gas producers may elect under Alaska Statute 43.55.014 to pay production tax in gas instead of the production tax levied for the gas by Alaska Statute 43.55.011(e).

Oil and gas property is annually assessed by the Alaska Department of Revenue. Alaska statute provides for a tax levy on the Department of Revenue assessment of 20 mills. Municipalities with oil and gas property in their jurisdiction may also levy a tax on the Department of Revenue assessment of the oil and gas property if all other property in their jurisdiction is taxed at the same rate. Taxes paid to a municipality on oil and gas property assessments are credited against the tax due to the State on the same oil and gas property.

The royalty rate is set individually for oil and gas leases according to the terms of the lease agreement. As an example, royalties for the PBU leases are 12.5 percent. Some leases receive royalty rate reductions from the original lease rate for new discoveries or economic considerations. Royalty can be taken in value or in kind, at the State's option subject to the terms of the lease. Royalty in value is paid in lieu of royalty being provided in kind and is based on the value of the oil or gas that would have been taken in kind. Certain leases and other agreements with certain lessees address what field expenses are paid by the State for royalty taken in kind or deducted from the sales value to calculate royalty in value and certain agreements with certain lessees address how to determine royalty value and what expenses can be deducted from the sales value to calculate royalty due.

Alaska also levies a corporate income tax. Every corporation engaged in either oil and gas production or transportation of oil or gas via regulated pipeline must file an Alaska Oil and Gas Corporation Net Income Tax Return. Oil and gas corporations apportion income using an apportionment formula applied to worldwide income (Alaska Department of Revenue 2015b).

In addition to being a major source of government revenue, the oil and gas industry is important to Alaska's fiscal health and overall economy because it is the funding source for the Alaska Permanent Fund, which is Alaska's largest financial asset. The Permanent Fund was approved in 1976 as an amendment to the Alaska Constitution to establish a savings account to hold a share of the State royalties from oil production. The amendment took effect on 21 February 1977. Since the Permanent Fund's inception, the Alaska Constitution has required that at least 25 percent of all mineral lease rentals, royalties, royalty sale proceeds, federal mineral revenue sharing payments, and bonuses received by the State be deposited into the fund. In addition, the State has made annual deposits since the early 1980s to offset the erosion of the value of the fund due to inflation, and, on occasion, special deposits also have been added to the principal, which, by law, cannot be spent. The fund is invested in a diverse portfolio of stocks, bonds, and real estate, and had grown in value to a record-high of $50.0 billion as of February 2014 (Alaska Permanent Fund Corporation 2014). All income from the Permanent Fund is deposited in the State's General Fund unless otherwise provided by law.

Federal government funding also contributes substantially to the State's revenue picture and is generally restricted to specific uses such as Medicaid payments, aid to schools, and capital projects such as road improvements. Most federal funding requires state matching funds. Overall, in FY2014, Alaska spent $640.6 million and received $2.5 billion in federal money to fund specific programs. This means Alaska received roughly $3.92 in federal funds for each dollar it spent in matching State funds (Alaska Department of Revenue 2014). Much of the funding went to Medicaid via ADHSS. Taken together, the Alaska Department of Education and University of Alaska were the second-largest federal funding recipients.

Alaska's reliance on the oil and gas industry and federal government helped the State weather the global recession of 2009 much better than the rest of the country. Oil prices remained high, supporting State revenues and employment, and government jobs tend not to have the volatility of those in other sectors of the economy (Forgey 2010). More recently, however, the State has seen growing budget deficits as revenues fall due to the continuing decline in oil production and lower oil prices (Bradner and Bradner 2013).

Between FY2013 and FY2014, unrestricted oil and gas revenues fell from $6.28 billion to $5.39 billion, and between FY2014 and FY2015 they fell to $2.29 billion (Bradner and Bradner 2015).

State general fund expenditures for FY2012–2014 are summarized in TABLE 5.3.6-2. Public expenditures per capita have fallen since 1990 as population growth in Alaska has outpaced the ability of the State to fund expenditure programs. Nevertheless, State expenditures per capita in FY2010 were the highest in the nation (National Conference of State Legislatures 2016). The largest components of State government expenditures in FY2014 were health and human services followed by education and transportation. Health and human services in FY2014 constituted 26 percent of total State general fund expenditures. The bulk of ADHSS spending, or 61 percent, went to Medicaid services (Alaska Department of Health and Social Services 2014a).

TABLE 5.3.6-2

State of Alaska General Fund Expenditures by Use

	$ Millions		
	FY2014	**FY2013**	**FY2012**
Current			
General Government	454.29	588.29	491.70
Alaska Permanent Fund Dividend	570.59	562.62	757.58
Education	2,049.93	2,081.44	1,899.38
University	551.21	568.81	491.86
Health and Human Services	2,595.08	2,741.00	2,573.86
Law and Justice	292.59	271.63	278.81
Public Protection	801.57	736.13	734.06
Natural Resources	327.74	399.94	384.17
Development	691.42	707.67	595.36
Transportation	1,474.68	1,277.20	1,146.77
Intergovernmental Revenue Sharing	263.41	288.28	254.53
Debt Service	0.00	0.00	0.00
Principal	31.05	97.96	134.83
Interest and Other Charges	18.50	64.89	77.82
Total State General Fund Expenditures	10,122.04	10,385.86	9,820.70

Source: Alaska Department of Administration (2012); Alaska Department of Administration (2013); Alaska Department of Administration (2014)

5.3.6.2 Local Government

TABLE 5.3.6-3 identifies sources and levels of revenues collected by the local governments of incorporated cities and organized boroughs within the AOI. A substantial percentage of local government revenues come in the form of transfers from the State, primarily as direct State funding of local education programs, and from the federal government. Section 5.3.2.2.6 noted that much of this funding is derived from State oil revenues. Local taxes also are an important source of revenue for some boroughs. As described in Section 5.3.2.2.1, revenues from oil and gas property taxes play an especially large role in generating tax revenues for the NSB and are the borough's main source of capital and operating revenue. Other property taxes constitute a large share of total revenues in the FNSB, MSB, Municipality of Anchorage, and KPB. In addition, some boroughs receive substantial funds from various non-property revenue sources. In FY2013, about 60 percent of the Denali Borough's revenue came from a tax on room rental transactions, commonly referred to as a hotel or bed tax. Enterprise fund earnings account for a large proportion of the KPB's revenues because two hospitals (South Peninsula Hospital and Central Peninsula Hospital) organized under the authority of the borough are reported as enterprise funds. The two hospitals are owned by the borough and operated by non-profit corporations.

TABLE 5.3.6-3

Local Government Revenues by Source in the Area of Interest, FY2013

	Property Tax	Oil & Gas Property Tax[a]	Other Taxes	Other Fees and Charges	Inter-governmental Transfers	Other Non-Tax Revenues	Capital/ Special Projects Revenue Sources	Enterprise/ Business Funds	Total
	$ Thousands								
North Slope Borough	2,553	329,064	—	7,674	52,131	23,313	55,202	34,649	504,586
Yukon-Koyukuk Census Area	—	—	—	—	—	—	—	—	—
Bettles	—	—	4	—	140	0	—	—	145
Nenana	251	—	147	—	135	288	—	456	1,277
Fairbanks North Star Borough	80,648	8,370	5,324	2,317	—	17,575	44,410	14,141	172,785
Fairbanks	14,226	107	5,711	7,336	21,239	11,751	1,121	2,376	63,867
Denali Borough	—	—	2,825	—	—	1,140	902	400	5,268
Anderson	—	—	24	0	177	186	—	160	548
Matanuska-Susitna Borough	74,855	54	9,854	4,725	—	30,553	79,314	16,106	215,461
Houston	342	—	179	126	668	—	—	—	1,314
Palmer	1,164	—	6,121	2,608	1,226	185	870	3,437	15,611
Wasilla	121	—	12,346	1,861	2,733	315	849	3,760	21,985
Kenai Peninsula Borough	24,670	7,253	22,274	—	10,392	2,276	46,695	11,450	125,009
Homer	3,209	—	4,960	—	10,459	5,697	484	6,929	31,739
Kenai	2,805	98	5,999	2,426	3,814	4,288	5,300	693	25,424
Seward	1,277	—	2,741	2,829	2,101	249	1,006	40,868	51,071
Soldotna	347	—	6,499	—	4,425	236	3,603	628	15,738
Municipality of Anchorage	485,008	5,342	52,215	46,562	—	77,309	140,136	379,680	1,186,253
Southeast Fairbanks Census Area	—	—	—	—	—	—	—	—	—
Delta Junction	—	—	—	287	1,294	365	144	—	2,090
Municipality of Skagway Borough	1,713	—	9,612	366	9,982	948	100	2,681	25,402

TABLE 5.3.6-3

Local Government Revenues by Source in the Area of Interest, FY2013

	Property Tax	Oil & Gas Property Tax[a]	Other Taxes	Other Fees and Charges	Inter-governmental Transfers	Other Non-Tax Revenues	Capital/ Special Projects Revenue Sources	Enterprise/ Business Funds	Total
	$ Thousands								
Valdez-Cordova Census Area	—	—	—	—	—	—	—	—	—
Valdez	6,878	52,186	—	17,049	7,628	24,520	3,537	—	111,797
Whittier	596	8	894	224	1,804	68	146	1,858	5,596
Other	—	—	—	—	—	—	—	—	—
Adak	—	—	1,137	—	237	364	611	166	2,515
Nome	2,610	—	5,572	1,120	1,280	720	1,541	1,562	14,405
Unalaska	5,033	—	17,970	—	11,519	2,509	189	30,818	68,036

Source: ADCCED (2014b); ADCCED (2014a)
Notes:
A “—” indicates that the measure is unavailable.
[a] Oil and gas property tax estimated based on information in ADCCED (2014b).

TABLE 5.3.6-3 also identifies sources and levels of revenues collected by city governments within the AOI. Many, but not all, of the PACs have city governments that typically collect some local taxes, most often sales taxes. In addition, a few communities have enacted special taxes, such as a hotel/motel "bed" tax or alcohol and tobacco tax. Some city governments impose household user fees to operate services such as water, sewer, and washeterias, and have established enterprise funds for that purpose. In addition, a number of city governments use gaming activities, such as bingo and pull tabs, to raise revenue without imposing additional taxes on residents or increasing the charges for public services. In some communities, tribal governments provide various public services using grant funds, as well as revenues derived from operating community retail stores and fuel sales.

The variability of local government operating expenditures across borough and city governments in the AOI is shown in TABLE 5.3.6-4. In the NSB, for example, expenditures on transportation and public works and general government account for a comparatively large component of total expenditures, which reflects the relative isolation of the borough's communities and their heavy reliance on air transportation as the primary mode of travel.

TABLE 5.3.6-4

Local Government Operating Expenditures by Category in the Area of Interest, FY2013

	Operating Expenses	**Other Expenditures**	**Capital/Special Project Expenditures**	**Business Type Activities/ Enterprises**	**Total**
	$ Thousands				
North Slope Borough	235,892	151,390	103,951	49,217	540,449
Yukon-Koyukuk Census Area	—	—	—	—	—
Bettles	105	—	—	—	105
Nenana	624	99	—	445	1,169
Fairbanks North Star Borough	88,585	—	86,514	19,182	194,281
Fairbanks	39,038	883	13,492	2,243	55,656
Denali Borough	3,458	9	945	851	5,264
Anderson	444	—	18	—	462
Matanuska-Susitna Borough	80,182	27,870	117,137	14,736	239,926
Houston	1,078	—	—	—	1,078
Palmer	10,107	263	1,148	5,214	16,733
Wasilla	13,314	423	2,049	5,572	21,357
Kenai Peninsula Borough	65,572	—	58,464	12,153	136,190
Homer	22,174	959	5,386	7,744	36,262
Kenai	16,772	—	6,940	645	24,357
Seward	9,523	996	1,231	39,345	51,095
Soldotna	6,596	—	10,936	610	18,141
Municipality of Anchorage	615,984	50,832	166,487	325,508	1,158,812
Southeast Fairbanks Census Area	—	—	—	—	—
Delta Junction	1,174	67	152	241	1,634
Municipality of Skagway Borough	7,831	596	14,996	4,652	28,075

TABLE 5.3.6-4

Local Government Operating Expenditures by Category in the Area of Interest, FY2013

	Operating Expenses	Other Expenditures	Capital/Special Project Expenditures	Business Type Activities/ Enterprises	Total
	$ Thousands				
Valdez-Cordova Census Area	—	—	—	—	—
Valdez	47,615	18,492	32,947	3,999	103,053
Whittier	1,972	—	669	2,742	5,383
Other	—	—	—	—	—
Adak	1,401	—	172	92	1,664
Nome	10,070	160	1,925	976	13,131
Unalaska	21,602	885	5,885	30,265	58,636

Source: ADCCED (2014c); ADCCED (2014a); ADCCED (2014a)
Notes:
A "—" indicates that the measure is unavailable

5.3.7 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directs federal agencies to identify and address, as appropriate, disproportionately high and adverse health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. Environmental justice refers to the "fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (U.S. Environmental Protection Agency 2016).

As described in Section 5.2, the proposed Project facilities would be located in five boroughs and one census area (NSB, FNSB, Denali Borough, MSB, KPB, and Yukon-Koyukuk Census Area). Within these five boroughs and one census area, a total of 13 separate block groups would be intersected by Project facilities. Total populations of the block groups range from 308 to 4,415. Information on race, ethnicity, income levels, and poverty rates within these areas was used to determine if disproportionate effects of the Project facilities would occur to minority or low-income populations. A disproportionate effect is an incidence (or prevalence) of an effect, a risk of an effect, or likely exposure to environmental hazards potentially causing such adverse health effects on a minority and or low-income population, or subpopulation, that significantly exceeds those experienced by a comparable reference population (U.S. Environmental Protection Agency 2016). This analysis uses methodologies established by Executive Order 12898 (59 FR 7629, 1994) and guidance published by the Council for Environmental Quality (1997) and U.S. Environmental Protection Agency (1998).

5.3.7.1 Evaluation Criteria

To assess potential environmental justice concerns related to the proposed Project in accordance with Council for Environmental Quality guidance, two separate analyses were performed:

- *A 50 percent criterion* population analysis to determine the census block groups that intersect Project facilities where minority and/or low-income individuals were equal to or exceeded 50 percent of the population; and

- *A meaningfully greater criterion* population analysis in which minority and/or low-income population percentages within the census block groups were compared to statewide reference populations. Neither the Council for Environmental Quality (1997) nor U.S. Environmental Protection Agency (1998) have defined any exact percentage of the population that can be characterized as "meaningfully greater." The meaningfully greater criterion for minority populations was assumed to be equal to or greater than 120 percent (1.2 times) the statewide reference population, while the low-income criterion was defined as the state poverty level (U.S. Environmental Protection Agency 1998). Low-income populations were identified using the U.S. Census Bureau's ratio of income to poverty level.

A census block group is the smallest geographic area for which the U.S. Census Bureau provides consistent sample data, and it generally contains a population between 600 and 3,000 individuals. A census tract (generally 1,200–8,000 people) is a group of block groups used for census purposes, the boundaries of which generally coincide with town and city limits. A borough usually consists of multiple census tracts.

Minority individuals were characterized as belonging to one or more of the following races: African-American, American Indian, Alaska Native, Asian, Native Hawaiian, Other Pacific Islander, or Other race (Council on Environmental Quality 1997). These data were acquired from *2010 Census Redistricting Data (Public Law 94-171) Summary File Table P1: Race*. The Alaska exceedance criteria for minority race population percentage is 40 percent.

Low-income populations were identified using data from the U.S. Census Bureau's ACS. *Table S1701: Poverty Status in the Past 12 Months* provided 5-year estimates (2010–2014) from the ACS for census tracts. The ACS defines an individual as *below poverty level* if that individual's income, or family's total income, is below a predefined threshold. The Alaska exceedance criteria for low-income population percentage is 10.1 percent.

5.3.7.2 Minority Populations

5.3.7.2.1 50 Percent Criterion

Of the 13 block groups that intersect Project facilities, two have aggregate minority racial populations that meet the 50 percent criterion: NSB, Census Tract 2, Block Group 3 (86.2 percent) and Yukon-Koyukuk Census Area, Census Tract 2, Block Group 1 (83.9 percent) (see Figure 5.3.7-1). The GTP and pipeline facilities are sited in the NSB within both the PBU, a designated oil and gas development unit, and the utility corridor along the Denali Highway.

5.3.7.2.2 Meaningfully Greater Criterion

NSB, Census Tract 2, Block Group 3 and Yukon-Koyukuk Census Area, Census Tract 2, Block Group 1, which exceed the 50 percent criterion, also exceed the meaningfully greater criterion for the State of Alaska of 40 percent. In addition, KPB Census Tract 1, Block Group 1 also exceeds the meaningfully greater criterion with a 48.8 percent aggregate minority population.

TABLE 5.3.7-1

Race and Ethnic Population for Block Groups that Intersect Project Facilities, 2010

	Total Population	Aggregate Total of Racial Minorities
North Slope Borough		
Block Group 3, Census Tract 2	1,030	888
	100%	86.2%[a]
Block Group 1, Census Tract 3	2,527	359
	100%	14.2%
Yukon-Koyukuk Census Area		
Block Group 1, Census Tract 2	641	538
	100%	83.9%[a]
Block Group 2, Census Tract 2	820	283
	100%	34.5%
Fairbanks North Star Borough		
Block Group 4, Census Tract 19	4,415	507
	100%	11.5%
Denali Borough		
Block Group 1, Census Tract 1	308	38
	100%	12.3%
Block Group 2, Census Tract 1	1,518	151
	100%	9.9%
Matanuska-Susitna Borough		
Block Group 1, Census Tract 1.01	620	70
	100%	11.3%
Block Group 1, Census Tract 1.02	940	97
	100%	10.3%
Kenai Peninsula Borough		
Block Group 1, Census Tract 1	373	182
	100%	48.8%[a]
Block Group 1, Census Tract 2	1,600	277
	100%	17.3%
Block Group 2, Census Tract 2	916	133
	100%	14.5%
Block Group 3, Census Tract 2	1,998	238
	100%	11.9%
Alaska Exceedance Criteria		40.0%

Source: U.S. Census Bureau (2016a)
Notes:.
[a] Denotes minority populations that exceed 50 percent or the meaningfully greater criterion threshold.

Using the same criteria, and information from TABLE 5.3.1-4, the following PACs exceed the meaningfully greater criterion for minority populations (see TABLE 5.3.7-2).

TABLE 5.3.7-2

PACs in the Socioeconomic Study Area that Exceed the State 40 Percent Meaningfully Greater Criterion for Minority Populations

	Minority	
	(%)	**MOE (+/-)**
Yukon-Koyukuk Census Area		
Evansville	89.5	17.7
Evansville ANVSA	44.7	23.0
Manley Hot Springs	58.2	18.0
Minto	96.8	2.6
Nenana	43.5	7.1
Kenai Peninsula Borough		
Kasilof	43.1	23.5
Tyonek	93.4	6.0
Municipality of Anchorage		
Eklutna ANVSA	74.6	20.4
Southeast Fairbanks Census Area	22.1	0.1
Dot Lake ANVSA	76.0	16.4
Tanacross	87.9	15.2
Tetlin	88.3	13.6
Tetlin ANVSA	88.3	13.6
Northway Junction	85.7	16.7
Northway	65.5	26.9
Northway ANVSA	79.0	14.4
Valdez-Cordova Census Area		
Chistochina	49.6	32.6
Copper Center	53.6	13.1
Copper Center ANVSA	43.1	10.8
Gulkana	81.4	17.4
Gulkana ANVSA	66.7	17.2
Mentasta Lake	93.2	7.4
Mentasta Lake ANVSA	97.8	3.3
Tonsina	55.4	32.0
Other		
Adak	60.2	21.1
Nome	63.8	2.1
Nome ANVSA	65.8	2.7
Unalaska	68.2	1.6

Source: U.S. Census Bureau (2016b)

5.3.7.3 Low-Income Populations

5.3.7.3.1 50 Percent Criterion

None of the 13 block groups that intersect Project facilities exceeds the 50 percent criterion for low-income populations (TABLE 5.3.7-3 and Figure 3.7.1-2).

5.3.7.3.2 Meaningfully Greater Criterion

Five out of the 13 block groups exceed the state 10.1 percent meaningfully greater criterion for low-income populations (see Figure 3.7.1-2). Both Yukon-Koyukuk Census Area block groups exceed the meaningfully greater criterion: the low-income percentage of Block Group 1 is 25.8 percent and is 22.7 percent in Block Group 2. In addition, Denali Borough, Census Tract 1, Block Group 2 (13.9 percent), MSB Census Tract 1.01, Block Group 1 (33.2 percent), and KPB Census Tract 1, Block Group 1 (12.8 percent) exceed the State meaningfully greater criterion for low-income populations (TABLE 5.3.7-3).

TABLE 5.3.7-3

Low-Income Population for Block Groups that Intersect Project Facilities, Average 2010–2014

	Population for Whom Poverty Status is Determined	Low-Income Population (number)	Low-Income Population (percent)
North Slope Borough			
Block Group 3, Census Tract 2	826	80	9.7%
Block Group 1, Census Tract 3	2,881	111	3.9%
Yukon-Koyukuk Census Area			
Block Group 1, Census Tract 2	628	162	25.8% [a]
Block Group 2, Census Tract 2	895	203	22.7% [a]
Fairbanks North Star Borough			
Block Group 4, Census Tract 19	4,391	185	4.2%
Denali Borough			
Block Group 1, Census Tract 1	204	6	2.9%
Block Group 2, Census Tract 1	1,779	247	13.9% [a]
Matanuska-Susitna Borough			
Block Group 1, Census Tract 1.01	735	244	33.2% [a]
Block Group 1, Census Tract 1.02	835	61	7.3%
Kenai Peninsula Borough			
Block Group 1, Census Tract 1	397	51	12.8% [a]
Block Group 1, Census Tract 2	1,293	74	5.7%
Block Group 2, Census Tract 2	735	22	3.0%
Block Group 3, Census Tract 2	2,482	172	6.9%
Alaska Exceedance Criteria			10.1%

Source: US Census Bureau (2016b)
Notes:
[a] Denotes low-income populations that exceed 50 percent or the meaningfully greater criterion threshold

Using the same criteria, and information from TABLE 5.3.2-16, the following PACs exceed the state 10.1 percent meaningfully greater criterion for low-income populations (see TABLE 5.3.7-4).

TABLE 5.3.7-4

PACs in the Socioeconomic Study Area that Exceed the State 10.1 Percent Meaningfully Greater Criterion for Low-income Populations

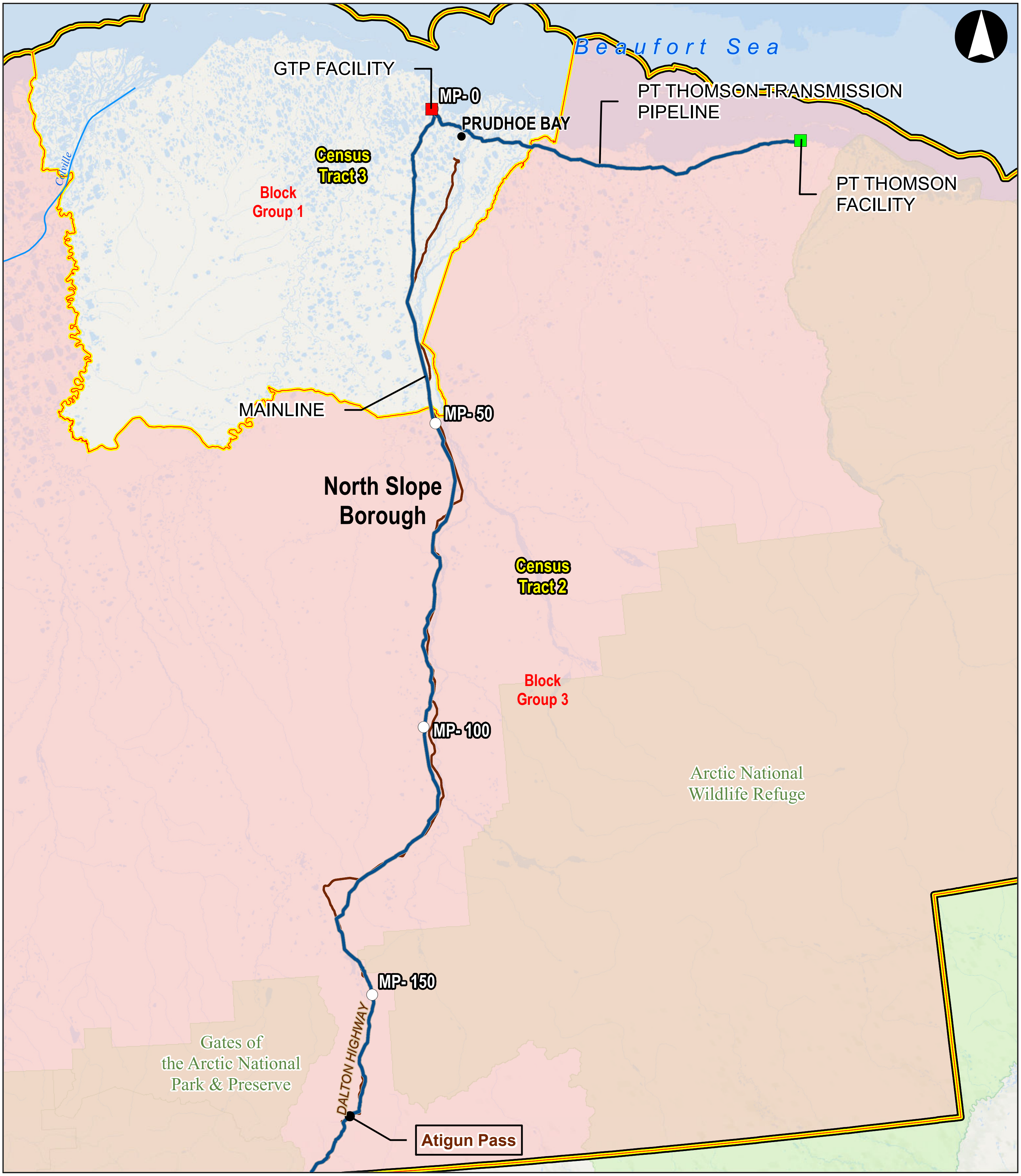
	Individuals Living in Poverty (Percent)	Margin of Error (±)
Yukon-Koyukuk Census Area		
Manley Hot Springs	19.0	18.6
Minto	28.6	13.5
Nenana	15.5	6.2
Fairbanks North Star Borough		
Fairbanks	12.8	2.0
Denali Borough		
Cantwell	10.3	9.5
McKinley Park	23.0	22.3
Matanuska-Susitna Borough		
Big Lake	11.4	3.8
Houston	16.8	5.3
Palmer	11.0	2.7
Talkeetna	12.7	8.3
Trapper Creek	26.0	16.9
Wasilla	12.9	3.7
Willow	13.7	5.9
Kenai Peninsula Borough		
Anchor Point	11.0	3.6
Beluga	42.9	55.7
Clam Gulch	11.1	12.7
Cohoe	14.8	5.0
Happy Valley	12.3	5.8
Homer	10.2	2.7
Moose Pass	11.1	14.6
Ninilchik	23.0	9.8
Ninilchik ANVSA	12.5	1.6
Salamatof	14.4	10.8
Tyonek	32.8	17.3
Municipality of Anchorage		
Eklutna ANVSA	50.7	31.5
Southeast Fairbanks Census Area		
Big Delta	13.0	10.2
Dot Lake ANVSA	52.0	36.7
Dry Creek	20.0	20.2
Tok	14.9	6.9
Tetlin	23.4	16.1
Tetlin ANVSA	23.4	16.1

TABLE 5.3.7-4

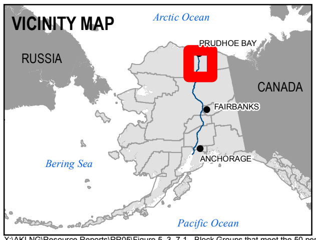
PACs in the Socioeconomic Study Area that Exceed the State 10.1 Percent Meaningfully Greater Criterion for Low-income Populations

	Individuals Living in Poverty (Percent)	Margin of Error (±)
Northway Junction	34.7	32.0
Northway ANVSA	23.9	13.2
Valdez-Cordova Census Area		
Chistochina	15.9	22.4
Copper Center	17.9	10.4
Copper Center ANVSA	14.1	7.9
Gakona ANVSA	11.1	10.3
Mentasta Lake	51.3	18.4
Mentasta Lake ANVSA	48.9	19.5
Slana	39.2	32.8
Whittier	18.0	9.5
Other		
Adak	15.7	14.6
Nome	10.3	3.6
Nome ANVSA	10.8	3.6

Source: U.S. Census Bureau (2016b); U.S. Census Bureau (2015)



VICINITY MAP



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LEGEND

- Project Facility
- Existing Facility
- Alaska LNG Rev C2 Milepost
- Alaska LNG Rev C2 Route
- State and Federal Conservation Lands
- Borough and Census Areas
- Census Tracts
- Block Groups
- Block Groups That Meet The 50% Criterion For Minority Populations

0 5 10 20 Miles

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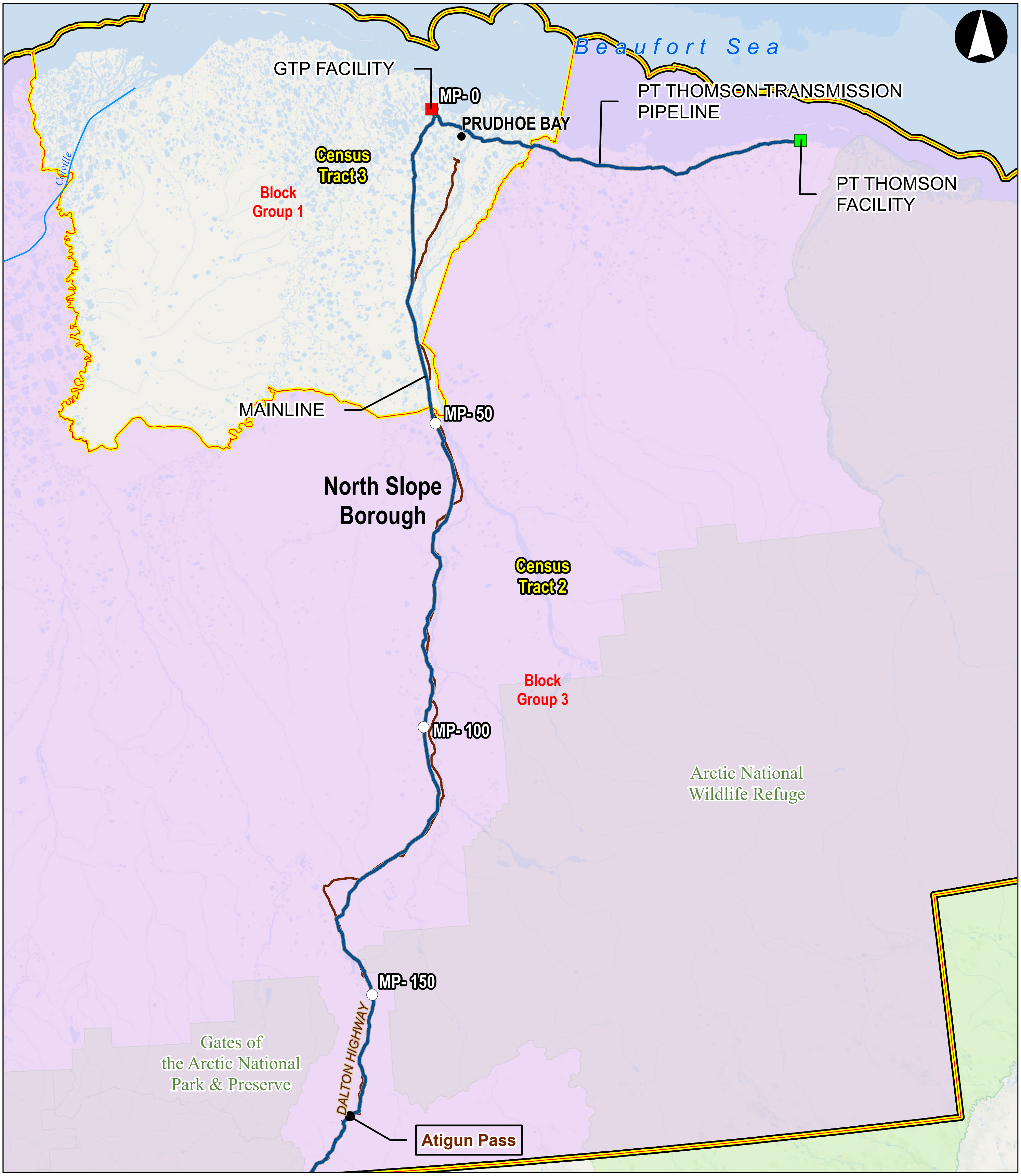
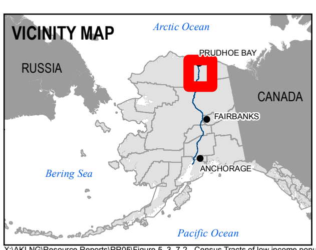
DATE:	2017-03-15	SHEET:	A1

BLOCK GROUPS THAT MEET THE 50% CRITERION FOR MINORITY POPULATIONS

A1 FIGURE 5.3.7-1

ALASKA LNG





LEGEND

- Project Facility
- Existing Facility
- Alaska LNG Rev C2 Milepost
- Alaska LNG Rev C2 Route
- State and Federal Conservation Lands
- Borough and Census Areas
- Census Tracts
- Census Tracts of Low-Income Populations that Meet the Meaningful Greater Criterion
- Block Groups

0 5 10 20 Miles

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SCALE:	1:1,250,000		
DATE:	2017-03-15	SHEET:	A1

CENSUS TRACTS OF LOW-INCOME POPULATIONS THAT MEET THE MEANINGFUL GREATER CRITERION

A1 FIGURE 5.3.7-2

ALASKA LNG

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5.4 POTENTIAL PROJECT SOCIOECONOMIC IMPACTS AND MITIGATION MEASURES

5.4.1 Introduction

This section describes the potential direct and indirect socioeconomic impacts of the Project. These impacts are measured in terms of changes in demographic, economic, and fiscal indicators in the socioeconomic study area caused by construction and operation of the Project. TABLE 5.4.1-1 summarizes the indicators by which direct and indirect impacts are measured.

TABLE 5.4.1-1

Direct and Indirect Socioeconomic Impact Indicators

Socioeconomic Resource	Indicators
Demographics	Change in population size and characteristics as a result of Project-related economic activities
Economy	Number of persons directly and indirectly employed by the Project, including the number who currently reside within the socioeconomic study area or would relocate temporarily/permanently within the area
	Effect of direct and indirect Project employment on unemployment rate
	Effect of direct and indirect Project employment on income levels
	Dollar value of direct Project payroll and equipment/materials purchases
	Economic value of agricultural/pasture/timber land removed during construction and operation of Project facilities
	Effect of direct and indirect Project employment, income and expenditures on cost of living
	Project impacts on employment, income, and output in selected industrial sectors
Housing	Effect of Project-related immigration on availability and cost of housing
Public Infrastructure and Services	Effect of Project on State and municipal infrastructure and services, including Project-related immigration
Government Revenues and Expenditures	Revenues generated by State and municipalities as a result of Project
	Costs incurred by State and municipalities as a result of Project
Transportation	Effect of Project on roads, railroad system, ports and harbors, and airports
	Effect of Project on other transportation users

The direct and indirect socioeconomic effects of the construction, operation, and abandonment phases of the Project would span a period of over 40 years. The construction activity is planned to last from 2019 to 2027 with the first phase extending from 2019 to 2025 and would include construction and completion related to the first LNG and three GTP trains, marine facilities, Mainline, PBTL, and PTTL, resulting in first production of LNG in 2025. After 2025, construction of the remaining Project facilities needed for full production (Phase 2) would take place. The operation phase would start in 2025 with first LNG production, and the Project would be fully operational by 2028. The Project would last for at least 30 years as currently authorized by the U.S. Department of Energy. The abandonment phase, which includes decommissioning of the facilities, may extend over several years. However, this phase could be postponed if additional gas resources are found to exist, markets continue to support the Project, and authorizations are received to continue operations. The current economic model has the ability to project to 2060, which includes the time period through the current authorizations.

While Project construction would continue through 2027, various facility start-up activities associated with initial production would begin as early as 2023. Moreover, the initial economic stimulus effects of construction spending would continue during the first years of full Project operation. Unless otherwise noted, the socioeconomic impacts of the construction phase (2019 through 2027) described in this analysis include the impacts of operation start-up activities, and the socioeconomic impacts of the operation phase (2028 and beyond) include the residual effects of construction spending.

5.4.1.1 Socioeconomic Modeling Approaches

The socioeconomic impact analysis uses various modeling approaches to estimate potential Project impacts, including regional economic impacts, community impacts, and fiscal impacts. An overview of these modeling approaches is provided below, together with a discussion of how the approaches are interrelated. More detailed information about each modeling approach can be found in Appendix B of Resource Report No. 5.

5.4.1.1.1 Regional Economic Impact Model

The analysis of the socioeconomic effects of the Project requires a dynamic modeling framework because of the long time frame required to analyze the impacts of the various phases of the Project and the structural changes in the economy anticipated to occur over that time frame. Unlike a static model which assumes that existing demographic conditions, economic activities, and linkages among industrial sectors would remain constant in the future, a dynamic model allows the incorporation of changes in population due to economic migration; substitution effects among inputs to production due to changes in wages, fuel costs, and other input prices; and subsequent effects on regional trade flows in the estimates of future economic effects.

A dynamic economic forecasting and policy analysis model developed by REMI was selected for this socioeconomic impact analysis. The REMI model incorporates economic responses to changes in wages, employment opportunities, prices, and other economic and demographic factors. Model outputs include annual projections of various socioeconomic variables, such as employment, income, output, unemployment rate, average annual wage rate, net economic migration, and population by age cohort.

The REMI model can be custom-built to address the analytical requirements of a particular application. The model developed for the socioeconomic impact analysis of the Project is a 17-region model with 70 industrial sectors. Project impacts on employment, income, and output are summarized for those industrial sectors that would be most affected by Project construction and operation, including the following:

- Oil and gas;
- Mining support services;
- Construction;
- Transportation (air, water, truck, rail);
- Professional, scientific, and technical services;

- Tourism (scenic and sightseeing transportation sector; museums, historical sites, and similar institutions sector; amusement, gambling, and recreation sector; food services and drinking places sector; and accommodation sector); and

- State and local government.

The customized model provides estimates of various socioeconomic variables for each of the boroughs and census areas in the AOI. For the purposes of the socioeconomic impact analysis, the out-of-state area is considered outside the socioeconomic study area.

Using projected Project employment and expenditure data, the REMI model estimates the socioeconomic effects of in-state activities that would result from Project construction and operation, including the multiplier effect generated by the infusion of money into the Alaska economy from Project payments to businesses and workers. The multiplier effect of this spending would be of two types: indirect and induced. Indirect effects would occur when contractors, vendors, and manufacturers receiving payment for goods or services required by the Project are, in turn, able to pay others who support their businesses. Examples of these types of activities related to Project construction include the goods and services that would be purchased to support ice road construction, camp fabrication and installation, site development, and logistics activities. Induced effects would occur when persons employed by the Project or by linked businesses make purchases from retailers and service establishments in the normal course of household consumption. To the extent that additional revenues accrue to the State of Alaska and local governments as a result of the Project, these revenues would also be anticipated to create a multiplier effect.

The REMI model takes into account both the industrial sector-based interactions that exist in regional economies and the outflow of money from these economies in the form of purchases of goods and services from outside Alaska or individual boroughs and census areas. Additional detail on the REMI model and the modeling approach is presented in Appendix B.

5.4.1.1.2 Community Impact Models

As described in Appendix B, a radiation model was used to estimate potential changes in population in communities in the KPB, where the construction and operation of the Liquefaction Facility is anticipated to result in a larger percent population change than in other boroughs and census areas within the AOI. The radiation model allocates borough-level population projections generated by the REMI model to communities in the KPB based on factors such as community employment, travel time and travel costs between communities, and the geographic distribution of communities.

For other boroughs and census areas within the AOI, borough/census area population projections generated by the REMI model are allocated among individual communities according to the historic population trend for each community in relationship to all other communities in a given borough or census area within the AOI. Past trends are based on 10-year population estimates provided by ADOLWD (2016b).

5.4.1.1.3 Fiscal Impact Models

As described in Appendix B, the fiscal impact models are spreadsheet models developed to evaluate incremental government expenditures in relation to incremental government revenues that would result from construction and operation of the Project over the forecasted life of the Project. There is a model for the State of Alaska and separate models for each municipality in the AOI. The fiscal impact models contain information on operating revenues and expenditures of potentially affected State and local government entities, including Regional Education Attendance Areas that function as school districts in the unorganized borough. The fiscal impact models are not used to estimate impacts to tribal governments because requests to these governments for the required revenue and expenditure information were largely unsuccessful. Fiscal impacts in the unorganized borough are captured in the State fiscal impact model, and impacts to unincorporated communities are included in the State fiscal impact model or municipal fiscal impact models, depending on the powers authorized in a particular borough.

5.4.1.1.4 Integration of Models

Figure 5.4.1-1 provides an overview of the linkages between the major inputs and outputs for each model used in the socioeconomic impact analysis. The REMI model generates projections of employment, population, income, economic output, and other economic indicators resulting from the Project at the regional level. Based on the regional-level results from the REMI model, the community impact models generate community-level estimates of changes in population. The State fiscal impact model also requires inputs from the REMI model. The State and municipal fiscal impact models provide estimates of government expenditures and revenues potentially generated by the Project.

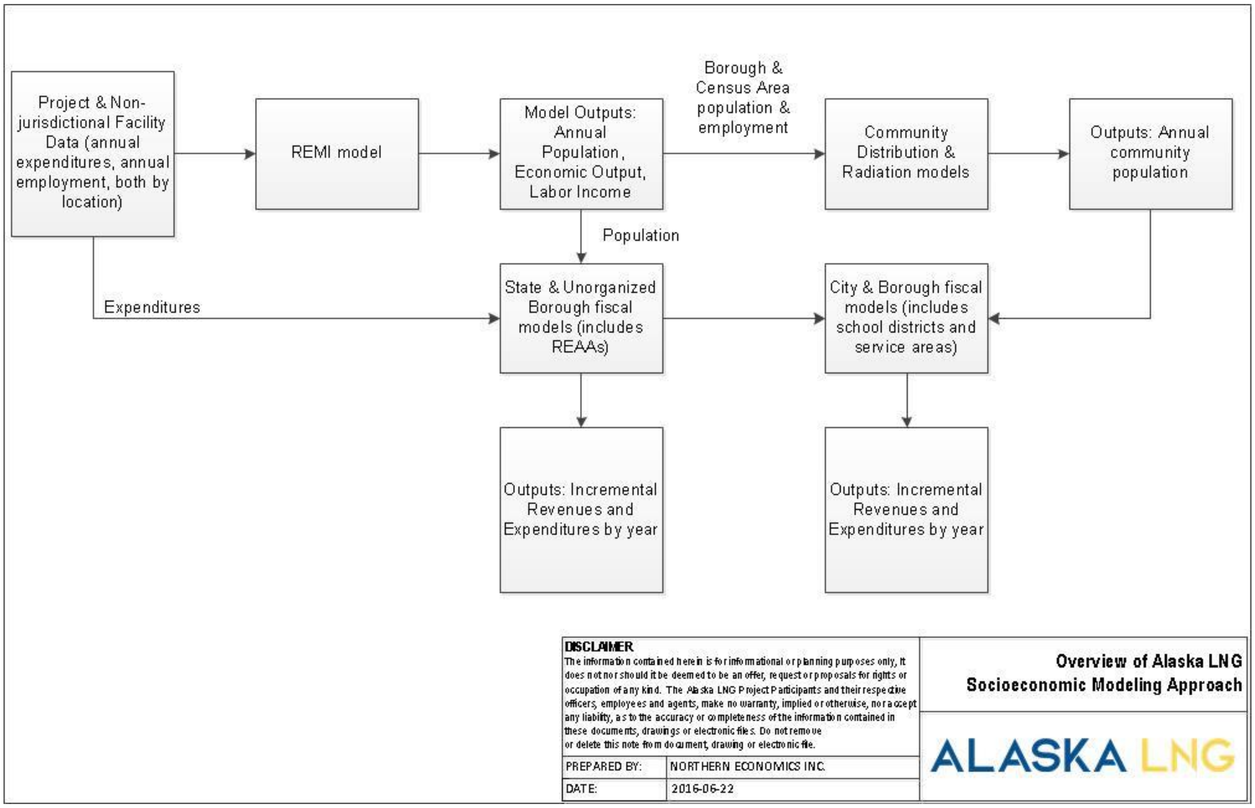


Figure 5.4.1-1. Socioeconomic Impact Analysis Models: Inputs and Outputs

Note: REAA = Regional Educational Attendance Area

5.4.1.2 Analytical Approach

The baseline of the socioeconomic impact analysis is a reference point that reflects the world without the proposed Project. For the purpose of this analysis, the REMI model's baseline data were calibrated to conform to population and employment projections provided by ADOLWD and Martz (2016). The analysis compares this baseline ("without Project" scenario) to the expected state of the world with the proposed Project ("with Project" scenario). Socioeconomic impacts of the Project are measured as the differences between these two scenarios or the incremental effects. The differences for a given socioeconomic variable are presented as both an absolute change and percentage change.

Unless otherwise noted, all estimated monetary effects of Project construction and operation are expressed in nominal dollars.

5.4.1.3 Effect Determination Terminology

The following definitions were used when assessing the duration, significance, and outcome of potential effects related to the Project:

Duration: Temporary effects are those that may occur only during a specific phase of the Project, such as during construction or installation activities. Short-term effects could continue up to five years. Long-term effects are those that would take more than five years to recover. Permanent effects could occur as a result of any activity that modified a resource to the extent that it would not return to pre-construction conditions during the 30-year life of the Project.

Significance: Minor effects are those that may be perceptible but are of very low intensity and may be too small to measure. A socioeconomic impact is considered minor if Project construction or operation would:

- Cause a population change in a community affected by the Project that is not outside the range of annual percent population changes in the community during the 2010 to 2014 period. The low end of the range is either the largest negative percent change or smallest positive percent change, while the high end is either the largest positive percent change or smallest negative percent change; or

- Cause a change in employment, income, purchases, wage rate, unemployment rate, housing demand and prices, or fiscal conditions in a borough or census area affected by the Project that is less than three percent. To provide a statewide perspective of predicted changes in these socioeconomic variables, effects in Alaska as a whole are also shown even if the change is less than the three percent threshold.

Significant effects are those that, in their context, and due to their intensity, have the potential to result in a substantial adverse or beneficial change in the human environment.

Outcome: A positive effect may cause positive outcomes to the natural or human environment. In turn, an adverse effect may cause unfavorable or undesirable outcomes to the natural or human environment. Direct effects are "caused by the action and occur at the same time and place" (40 CFR 1508.8). Indirect effects are "caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect impacts may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 CFR 1508.8). For the purpose of this socioeconomic impact analysis, indirect effects include the multiplier effect (i.e., indirect and induced effect) on employment, income, and other indicators of the State economy during Project construction and operation.

5.4.2 Potential Construction Impacts and Mitigation Measures

5.4.2.1 Population

Project-related changes in population and demographics in the AOI directly follow from the changes in job opportunities resulting from the Project (Section 5.4.2.2.1). While a change in population is not considered an impact itself, population change has the potential to drive beneficial or adverse impacts to other socioeconomic variables, such as availability of housing (Section 5.4.2.3), demand for public infrastructure and services (Section 5.4.2.6), and local government expenditures (Section 5.4.2.8).

As the Project moves into full construction phase, the temporary beneficial effect on job growth in some areas of the State would be followed by a temporary population increase in those areas as people migrate to accept or seek employment opportunities. To mitigate population increases in Alaska communities, with its attendant demand for housing and community services and facilities, Alaska residents with relevant skills, training, experience and performance would, within the constraints of law, be employed by the Project.

However, because the number of workers required for Project construction would be greater than what the Alaska workforce can provide, some of the jobs would be filled by out-of-state workers. Moreover, some Alaska residents are expected to migrate to those areas of the State where the Project creates new employment opportunities. To further mitigate population effects on Alaska communities, all workers (both Alaska residents and nonresidents) filling direct, onsite Project construction jobs would be required to reside in construction camps, and these camps would be closed (i.e., workers would be confined to the camps while off duty). One possible exception would be KPB residents engaged in the construction of the Liquefaction Facility; these workers may be allowed to commute between their homes and the worksite each day. In addition, Project management and other Project workers at locations other than the actual construction sites would not be required to reside in construction camps.

Accommodation planning assumes that workers building the Liquefaction Facility would make the onsite construction camp their residence for the duration of their construction employment. Workers building the GTP would commute on a rotational basis from designated pickup locations to construction worksites and then be returned to the starting pickup locations at the conclusion of a work rotation. Construction crews for the Project pipelines (Mainline/PBTL/PTTL) and aboveground facilities would stay at a worksite for an entire spread season, and then be returned to starting pickup locations. Pickup locations for Project construction workers would include Lower 48 locations such as Seattle for nonresident workers, and in-state locations such as the Municipality of Anchorage and Fairbanks for resident workers. The provision of transportation to and from designated locations, including payment for such transportation to and from those locations, should further mitigate potential impacts on communities close to the construction sites.

Additionally, Alaska law may mitigate the risk that construction workers hired outside of the State and then transported to the State to work on the Project would be stranded in the State at the conclusion of the Project or upon termination of employment. Alaska Statute 23.10.380 requires that:

> …an employer who furnishes, finances, agrees to furnish or finance, or in any way provides transportation for a person from the place of hire to a point inside or outside of the state to employ the person shall provide the person with return transportation to the place of hire from which transportation was furnished or financed, or to a destination agreed upon by the parties with transportation to be furnished or financed: 1) On or after the termination of employment for a cause considered good and sufficient by the department, beyond the control of the person, or on or after the termination of the contract of employment or a renewal of the contract; and 2) upon the request of the person or the department made within 45 days after the termination of employment.

Due to the requirement that workers reside in closed construction camps, the temporary nature of the jobs, and the high cost of living in Alaska compared to the Lower 48, it is expected that relatively few out-of-state Project construction workers would bring their families to Alaska. Consequently, the population effects of in-migrating nonresident dependents would be minor. Some Alaska workers living in more remote areas of the State may move their families to in-state pickup locations such as Anchorage or Fairbanks to avoid out-of-pocket commuting costs, but the population increase would be small relative to the current populations of these cities.

The above hiring and employment policies would mitigate the adverse effects that the direct Project workforce, including contracted and sub-contracted workers, could potentially have on the populations of Alaska communities in close proximity to Project facilities. However, once a decision has been made to construct the Project there also could be a large temporary influx of people whose only reason to come to Alaska would be a speculative job search (Information Insights 2004). Job seekers from within Alaska would also be drawn to areas of the State where jobs may be indirectly created during the construction period due to multiplier effects. This temporary economic in-migration for non-specific employment opportunities could be substantial. Mellor and Paulson (1979) and Frank Orth & Associates (1984) identified characteristics of large construction projects that are conducive to a high level of in-migration of people seeking employment. The Project would possess many of these characteristics, including a large scale of construction activities; an anticipated high degree of media exposure; a large peak construction work force; a long construction phase; unskilled as well as skilled labor requirements; and a stationary worksite or employment center that is easily accessible (e.g., the Liquefaction Facility located in Nikiski). The level of economic in-migration during construction of the Project could also be influenced by external factors such as the condition of the U.S. economy. For example, migration to Alaska was considerable during the construction of TAPS, which came at the peak of a national recession (Information Insights 2004), and the more recent large population increase in North Dakota that accompanied rapidly expanding oil drilling in the Bakken formation of the Williston Basin occurred during a period of deep recession and early recovery in the national economy (North Dakota Census Office 2014). While the inherently uncertain nature of potential economic in-migration makes it difficult to accurately project regional population changes, the REMI model is designed to incorporate economic migration into population forecasts by considering factors such as the relative wage rate, employment opportunities, and access to amenities.

TABLE 5.4.2-1 shows the estimated change in the size of the resident population during the Project construction phase, which is expected to begin in 2019 and end in 2027. Included in the table are those communities within the AOI expected to experience a percent population change that exceeds the significance threshold described in Section 5.4.1.3. As discussed above, most workers filling direct, onsite Project construction jobs would be required to reside in closed construction camps for the duration of their employment, and then be returned to designated pick up locations. Consequently, these workers would not directly contribute to an increase in new resident population in Alaska. Only non-local Project management staff relocating to different regions in Alaska and in-migrating workers seeking jobs indirectly generated by Project construction would result in resident population increases. The REMI model used to estimate population change assumes that some non-local Project management staff and in-migrating workers would bring their families to Alaska.

The new local resident population increases during the 2019–2027 period would likely be highest in the Municipality of Anchorage, KPB, and MSB. The Project management headquarters would be located in Anchorage, and management staff would likely reside in Anchorage or the MSB. Anchorage would be where most in-state goods and services for the Project would be purchased during the construction phase. The additional temporary economic activity and indirect jobs these purchases would generate are expected to result in an increase in the population of the municipality. In addition, Anchorage, together with the KPB and MSB, would be where many of the persons directly employed by the Project would spend a portion of their incomes on consumer goods and services. The induced jobs this spending would generate are expected to result in temporary, but significant, population increases in a number of communities within these affected areas. Some small, rural communities, such as Talkeetna and Trapper Creek, have a small initial population and thus the addition of relatively few people would have a significant effect. Population changes in other areas of the State would likely be temporary and minor because of the remoteness of the construction sites for the Mainline, GTP, and PTTL/PBTL.

TABLE 5.4.2-1

Estimated Change in Resident Population During Project Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
Alaska	Number of Persons	900	4,000	8,200	11,400	14,800	16,900	18,700	19,200	18,700
	Percent Change	0%	0%	1%	1%	1%	2%	2%	2%	2%
Matanuska-Susitna Borough	Number of Persons	270	1,030	2,100	3,030	3,970	4,660	5,330	5,660	5,760
	Percent Change	0%	0%	1%	2%	3%	3%	4%	4%	4%
Big Lake	Number of Persons	10	40	80	110	150	170	200	210	210
	Percent Change	0%	0%	1%	2%	3%	3%	4%	4%	4%
Houston	Number of Persons	10	20	40	60	80	100	110	120	120
	Percent Change	0%	0%	1%	2%	3%	3%	4%	4%	4%
Palmer	Number of Persons	20	70	130	190	250	290	330	350	360
	Percent Change	0%	0%	1%	2%	3%	3%	4%	4%	4%
Talkeetna	Number of Persons	0	10	20	30	30	40	50	50	50
	Percent Change	0%	0%	1%	2%	2%	3%	4%	4%	4%
Trapper Creek	Number of Persons	0	10	10	10	20	20	30	30	30
	Percent Change	0%	1%	1%	1%	3%	3%	4%	4%	4%
Wasilla	Number of Persons	20	90	180	260	340	400	450	480	490
	Percent Change	0%	0%	1%	2%	3%	3%	4%	4%	4%
Willow	Number of Persons	10	20	50	70	90	100	110	120	120
	Percent Change	0%	0%	1%	2%	3%	3%	4%	4%	4%
Kenai Peninsula Borough										
Kalifornsky	Number of Persons	10	90	190	250	330	390	450	500	520
	Percent Change	0%	0%	2%	2%	3%	4%	4%	5%	5%
Kenai	Number of Persons	0	50	120	150	200	240	270	300	320
	Percent Change	0%	0%	1%	1%	2%	3%	3%	3%	4%
Nikiski	Number of Persons	0	50	110	140	190	220	260	290	300
	Percent Change	0%	1%	2%	2%	3%	4%	5%	5%	5%
Soldotna	Number of Persons	0	50	110	150	190	230	260	290	310
	Percent Change	0%	1%	2%	3%	4%	4%	5%	6%	6%
Municipality of Anchorage	Number of Persons	550	2,260	4,520	6,200	7,990	8,940	9,810	9,820	9,260
	Percent Change	0%	0%	1%	1%	2%	2%	3%	3%	2%

The REMI model accounts for out-migration as well as in-migration at the borough and census area level. The REMI population changes were allocated to the communities using the community distribution model and radiation models, but no communities in the AOI were identified as having population declines during construction that exceeded the percentage threshold for significance. (See Appendix B for additional detail on the modeling approach.)

TABLE 5.4.2-2 shows the estimated change in population of selected age cohorts during Project construction in those areas in which a significant change is expected. The REMI model used to estimate population change assumes that the age distribution of in-migrating workers seeking jobs indirectly generated by Project construction effectively peaks with ages in the mid-twenties to early thirties, and then tails off as people get older. Since most of the persons in the "over 64 years" age group are not in the labor force, the employment opportunities created during the Project's construction phase would have limited effect on the population size of that group. No area of the AOI is expected to experience a significant increase in seniors as a result of Project construction. However, some in-migrating job seekers would be accompanied by their families, or may be joined by their families upon successful completion of their job search and location of suitable accommodations. Because a portion of these families would include children, the under 18 years age cohort population would temporarily increase. There is a spike for children less than school-age (five to 17 years old), and a smaller spike for individuals of that age, reflecting how fewer people tend to move when they have school-age children. Most of the Project-related growth in the number of children would occur in areas where there would be increases in employment opportunities as a result of purchases by the Project and payroll spending by Project employees and third-party contractors. As discussed above, these areas include the Municipality of Anchorage, KPB, and MSB.

TABLE 5.4.2-2

Estimated Change in Population of Selected Age Cohorts During Project Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
Less Than 5 Years Old										
State of Alaska	Number of Persons	100	430	900	1,290	1,710	2,010	2,250	2,300	2,230
	Percent Change	0%	0%	1%	1%	2%	3%	3%	3%	3%
Matanuska-Susitna Borough	Number of Persons	30	110	230	340	460	550	640	670	680
	Percent Change	0%	1%	2%	3%	4%	5%	6%	6%	6%
Kenai Peninsula Borough	Number of Persons	0	30	70	100	130	160	190	210	220
	Percent Change	0%	0%	1%	2%	2%	3%	3%	4%	4%
Municipality of Anchorage	Number of Persons	60	250	500	700	930	1,070	1,180	1,180	1,100
	Percent Change	0%	0%	1%	2%	3%	3%	4%	4%	4%
5-17 Years Old										
State of Alaska	Number of Persons	160	680	1,400	1,980	2,600	3,020	3,440	3,670	3,740
	Percent Change	0%	0%	1%	1%	1%	2%	2%	2%	2%
Matanuska-Susitna Borough	Number of Persons	50	180	360	530	700	830	970	1,070	1,130
	Percent Change	0%	0%	1%	2%	3%	3%	4%	4%	4%
Kenai Peninsula Borough	Number of Persons	10	50	120	150	200	250	290	330	360
	Percent Change	0%	0%	1%	1%	1%	2%	2%	2%	3%
Municipality of Anchorage	Number of Persons	100	390	780	1,080	1,410	1,600	1,810	1,890	1,870
	Percent Change	0%	0%	1%	1%	2%	2%	2%	3%	3%

TABLE 5.4.2-2

Estimated Change in Population of Selected Age Cohorts During Project Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
18-64 Years Old										
State of Alaska	Number of Persons	640	2,860	5,830	8,060	10,370	11,670	12,820	12,940	12,370
	Percent Change	0%	0%	1%	1%	2%	2%	2%	2%	2%
Matanuska-Susitna Borough	Number of Persons	200	740	1,500	2,150	2,790	3,230	3,660	3,840	3,840
	Percent Change	0%	1%	2%	2%	3%	4%	4%	4%	4%
Kenai Peninsula Borough	Number of Persons	20	230	490	630	820	960	1,100	1,190	1,240
	Percent Change	0%	0%	1%	1%	2%	2%	2%	3%	3%
Municipality of Anchorage	Number of Persons	390	1,620	3,230	4,390	5,590	6,180	6,690	6,580	6,070
	Percent Change	0%	0%	1%	2%	3%	3%	3%	3%	3%

Those areas of the State expected to experience a temporary increase in population as a result of an influx of out-of-state job seekers may also experience a temporary increase in racial and ethnic diversity because some economic in-migrants are likely to be members of minority populations. Such increases in racial diversification were seen in areas of North Dakota that incurred high rates of in-migration as result of expanding oil exploration from 2008 to 2014 (North Dakota Census Office 2015a). By 2013, for example, North Dakota had the highest Hispanic/Latino growth of any state, and at least one factor in this growth was the opportunity for jobs (North Dakota Census Office 2015b). Of those areas in Alaska predicted to have the greatest population increases during the Project construction phase, the KPB would likely experience the largest percent increase in minority population because of its current, predominantly white population and the relatively large projected percent increase in the population during construction. The MSB would have a large percent increase in its minority population for similar reasons.

5.4.2.1.1 Liquefaction Facility

TABLE 5.4.2-3 shows the estimated change in the resident population during construction of the Liquefaction Facility in those areas where the change would be significant, and TABLE 5.4.2-4 presents changes in age cohort populations. Except for individuals less than five years old, the effect of Liquefaction Facility construction on the populations of age cohorts would be minor.

TABLE 5.4.2-3

Estimated Change in Resident Population During Liquefaction Facility Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
Alaska	Number of Persons	300	2,200	4,500	5,800	7,200	8,200	9,000	8,900	8,200
	Percent Change	0%	0%	0%	0%	0%	1%	1%	1%	1%
Kenai Peninsula Borough										
Kalifornsky	Number of Persons	10	80	180	230	290	360	410	450	480
	Percent Change	0%	0%	1%	2%	3%	3%	4%	4%	4%
Kenai	Number of Persons	0	50	100	130	170	210	240	260	280
	Percent Change	0%	0%	1%	1%	2%	2%	3%	3%	3%
Nikiski	Number of Persons	0	50	100	130	170	210	240	260	280

TABLE 5.4.2-3

Estimated Change in Resident Population During Liquefaction Facility Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
	Percent Change	0%	1%	2%	2%	3%	4%	4%	5%	5%
Soldotna	Number of Persons	0	50	110	130	180	210	240	270	280
	Percent Change	0%	1%	2%	2%	3%	4%	5%	5%	5%

TABLE 5.4.2-4

Estimated Change in Population of Selected Age Cohorts During Liquefaction Facility Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
Less Than 5 Years Old										
State of Alaska	Number of Persons	40	240	500	660	850	990	1,090	1,060	980
	Percent Change	0%	0%	0%	1%	1%	1%	1%	1%	1%
Kenai Peninsula Borough	Number of Persons	0	30	60	80	110	140	160	170	180
	Percent Change	0%	0%	1%	1%	2%	2%	3%	3%	3%

5.4.2.1.2 Mainline and PTTL

The effect of Mainline and PTTL construction on the populations of selected age cohorts and the resident population as a whole would be temporary and minor in all areas of the AOI.

5.4.2.1.3 GTP and PBTL

The effect of GTP and PBTL construction on the populations of selected age cohorts and the population as a whole would be temporary and minor in all areas of the AOI.

5.4.2.1.4 Non-Jurisdictional Facilities

During each year of KSH Relocation project, PTU Expansion project, and PBU MGS project construction, the effect on the size of the resident population in all AOI municipalities and census areas, as well as the State as a whole, would be temporary and minor.

5.4.2.2 Economy

5.4.2.2.1 Employment and Income

5.4.2.2.1.1 Direct Employment and Income

Project construction would result in temporary and seasonal increases in jobs in Alaska. As described in Resource Report No. 1, construction activity would be divided into phases. The first phase is planned to last from 2019 to 2025, and would include construction related to the initial LNG and GTP trains, Mainline, PBTL, and PTTL, resulting in first production. After 2025, the installation of the remaining Project facilities needed for full production would take place.

TABLE 5.4.2-5 shows the predicted direct impacts of Project construction on average employment over a calendar year in those areas where the change in employment would be significant. The employment effects of construction would be felt primarily from 2020 through 2026. Summer and winter peaks in construction employment could be higher than the average annual employment estimates shown here. The geographical distribution of construction employment is based on the place of work rather than place of residence. The construction workforce would be concentrated in the NSB and KPB. The NSB would be the location of the GTP, PBTL, PTTL, and a section of the Mainline, while the KPB would be the location of the Liquefaction Facility and a section of the Mainline. In addition to being located in the NSB and KPB, the Mainline would traverse the Yukon-Koyukuk Census Area, FNSB, Denali Borough, and MSB. The Municipality of Anchorage is where the Project headquarters team and clerical jobs would likely be located, but the number of such jobs would be minor relative to the total number of jobs in the municipality. Similarly, the number of Project construction jobs in the MSB and FNSB would be minor in comparison to the current job totals in these boroughs. In contrast, the number of construction jobs in the Denali Borough and Yukon-Koyukuk Census Area would be small in comparison to other areas, but the increase would represent a significant change in the number of jobs in the borough and census area.

Excluded from TABLE 5.4.2-5 is the Project operation employment that would begin as early as 2023 with various facility start-up activities. The estimated number of persons employed by these start-up activities would be 270 in 2023 and increase to 895 by 2027, the final year of Project construction, with 2028 being the first full year of operation (Section 5.4.3.2.1.1).

TABLE 5.4.2-5

Estimated Direct Change in Employment During Project Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Number of Jobs	500	2,270	3,730	5,620	7,620	4,880	2,950	1,480	550
	Number of Persons	530	2,540	4,260	6,190	8,420	5,930	4,030	2,220	910
	Percent Change	0%	0%	0%	1%	1%	1%	0%	0%	0%
North Slope Borough	Number of Jobs	60	260	530	590	1,070	1,140	1,080	940	480
	Number of Persons	100	430	890	880	1,440	1,880	1,970	1,610	830
	Percent Change	0%	2%	5%	5%	9%	11%	12%	10%	5%
Yukon-Koyukuk Census Area	Number of Jobs	0	250	410	660	990	690	180	50	0
	Number of Persons	0	260	440	700	1,080	820	250	80	0
	Percent Change	0%	5%	9%	15%	23%	18%	5%	1%	0%
Denali Borough	Number of Jobs	0	50	110	420	470	40	0	0	0
	Number of Persons	0	50	120	440	520	40	0	0	0
	Percent Change	0%	2%	4%	18%	21%	1%	0%	0%	0%
Kenai Peninsula Borough	Number of Jobs	90	1,400	2,290	3,020	4,370	2,710	1,380	320	0
	Number of Persons	90	1,470	2,420	3,190	4,610	2,860	1,450	340	0
	Percent Change	0%	4%	6%	8%	12%	7%	3%	0%	0%

Notes:
The number of workers may be larger than the number of jobs due to rotation schedules and adjustments for vacations and absenteeism. Column totals may not sum to State totals due to rounding.

As shown in TABLE 5.4.2-5, the peak annual average employment during Project construction would occur in 2023, with around 7,600 jobs created and 8,400 people hired. The number of jobs differs from the number of persons because the latter is a function of the possible rotation schedule of a particular job and accounts for vacations and absenteeism. For example, if construction craft workers for the GTP work two weeks on and two weeks off, the number of persons required is twice the number of jobs generated, plus adjustments to account for vacations and absenteeism. The work schedule of the construction workforce by facility is summarized in TABLE 5.4.2-6. In addition to the onsite construction craft workforce provided by third party contracts, it is expected that there would be both a Project headquarters team and onsite Project management at the construction sites. Current estimates show about 80 to 100 headquarters personnel during most of the construction phase, with slight variation by year. As shown in TABLE 5.4.2-6, they are expected to work traditional workweeks and, as noted above, work in Anchorage. Onsite Project management staff is expected to start at about 210 persons, peaking at about 850 in 2023, and declining to about 190 in 2027. These personnel may be working rotational schedules, and if so, their off duty residences could be anywhere in Alaska or the Lower 48.

TABLE 5.4.2-6

Work Schedules During Project Construction

Project Management Team (headquarters)	Standard work week; no rotation
Liquefaction Facility	6 days per week; no rotation
Pipelines (Mainline/PBTL/PTTL)	Onsite for the duration of each spread (approximately 4 months)
Pipelines (aboveground facilities)	Construction crews on a 4-week on/2-week off rotation; construction and onsite project management staff on a 3-week on/3-week off rotation
GTP	Construction crews on a 2-week on/2-week off rotation; construction and onsite project management staff on a 3-week on/3-week off rotation
GTP (construction camp fabrication)	6 days per week; no rotation

TABLE 5.4.2-7 provides an overview of the types of occupations that would be in demand during Project construction. Most of the direct, onsite jobs would be in the heavy civil construction trades, including heavy equipment operators, carpenters, truck drivers, construction managers, construction laborers and iron/steel workers; however, a wide range of occupations are needed for Project construction. As discussed in Section 5.3.2, the largest concentration of workers with occupational skills important to the oil and gas industry is in highly populated southcentral Alaska. Additionally, the construction industry in Alaska is mostly unionized, and the union hiring halls are located in the Municipality of Anchorage and Fairbanks.

However, many areas of the State have workers with relevant skills, including rural areas outside the AOI. Although the number of qualified workers in rural communities is small in comparison to urban areas, the proportion relative to the total number of working-age adults in these communities may be large, and therefore, the employment effects of the Project may be substantial. Construction firms based in Fairbanks and southcentral Alaska would receive most of the Alaska-based construction contracts since most of Alaska's construction companies are located in these areas. However, construction firms throughout the State may capture subcontracts for the Project, and workers employed by these firms would likely come from all regions of the State. In addition, some requirements for Project construction inputs such as gravel and fuel may be filled by in-state businesses.

TABLE 5.4.2-7

Estimated Direct Employment During Project Construction by Occupation and Percent Resident

		2019	2020	2021	2022	2023	2024	2025	2026	2027
Boilermakers	Number of Persons	0	0	0	10	30	40	30	30	10
	Percent Residents	0%	0%	0%	74%	18%	9%	9%	20%	37%
Carpenters	Number of Persons	80	270	400	750	1,390	430	190	80	30
	Percent Residents	100%	100%	99%	52%	27%	83%	100%	100%	100%
Culinary Workers	Number of Persons	0	50	130	240	310	260	210	130	40
	Percent Residents	100%	100%	100%	100%	100%	100%	100%	100%	100%
Divers & Vessels	Number of Persons	0	0	0	0	30	0	0	0	0
	Percent Residents	0%	0%	0%	0%	15%	0%	0%	0%	0%
Electricians	Number of Persons	0	50	110	160	240	290	220	90	50
	Percent Residents	0%	100%	100%	100%	79%	56%	69%	100%	100%
Instrument Fitters	Number of Persons	0	30	70	110	150	170	220	100	60
	Percent Residents	0%	14%	6%	4%	3%	2%	2%	4%	7%
Insulators	Number of Persons	0	0	0	0	60	180	70	10	0
	Percent Residents	0%	0%	0%	0%	21%	7%	17%	100%	100%
Ironworkers	Number of Persons	0	20	70	240	470	310	230	160	80
	Percent Residents	0%	100%	90%	25%	13%	14%	15%	39%	75%
Laborers	Number of Persons	80	780	1,330	1,410	1,740	1,230	760	360	110
	Percent Residents	100%	81%	47%	43%	35%	47%	69%	100%	100%
Marine	Number of Persons	0	0	0	0	40	0	0	0	0
	Percent Residents	0%	0%	0%	0%	0%	0%	0%	0%	0%
Millwrights	Number of Persons	0	10	20	30	50	70	70	40	20
	Percent Residents	0%	100%	86%	50%	32%	17%	15%	41%	66%
Operating Engineers	Number of Persons	30	420	750	930	1,150	620	360	210	90
	Percent Residents	100%	82%	45%	36%	29%	47%	70%	100%	100%
Painters	Number of Persons	0	0	0	0	10	30	20	10	0
	Percent Residents	0%	0%	0%	0%	100%	100%	100%	100%	0%
Pipefitters	Number of Persons	0	40	90	100	180	320	300	120	50
	Percent Residents	0%	100%	96%	85%	47%	23%	24%	68%	100%
Surveyors	Number of Persons	0	30	50	60	40	10	0	0	0
	Percent Residents	0%	100%	66%	53%	70%	100%	0%	0%	0%
Teamsters	Number of Persons	30	410	610	1,050	1,080	800	510	280	110
	Percent Residents	100%	100%	84%	49%	47%	55%	76%	100%	100%
Pipeliners/Welders	Number of Persons	10	50	150	350	510	260	130	50	10
	Percent Residents	100%	100%	39%	17%	11%	21%	39%	100%	100%
Other	Number of Persons	340	400	500	780	950	920	720	560	230
	Percent Residents	37%	19%	16%	12%	10%	11%	14%	14%	20%
Total[a]	**Number of Persons**	**570**	**2,560**	**4,280**	**6,220**	**8,430**	**5,940**	**4,040**	**2,230**	**890**
	Percent Residents	**63%**	**78%**	**57%**	**42%**	**32%**	**40%**	**50%**	**66%**	**69%**

Notes:
[a] Column totals may not equal those in TABLE 5.4.2-5 due to rounding.

In addition to showing the types of occupations that would be in demand during Project construction, TABLE 5.4.2-7 presents the estimated percentage of workers who would be Alaska residents. Appendix B describes the methodology used to estimate the percentage of Alaska resident hire. As previously discussed, Alaska residents with relevant skills, training, experience and performance would, within the constraints of law, be employed by the Project. Section 5.3.2.1 noted that recognition that construction of a major natural gas pipeline in Alaska would require the development of a skilled workforce has led to increased efforts to address workforce development in the State. Moreover, it may cost more for a contractor to import labor from outside the State than to hire an Alaska resident. However, due to the magnitude of Project construction labor requirements with respect to the size of Alaska's active workforce, some jobs would be filled by temporary workers coming from locations outside Alaska. The U.S. Gulf Coast is a global center for a broad range of activities relating to the oil and gas industry, and, therefore, would likely provide a substantial amount of the out-of-state construction labor.

As shown in TABLE 5.4.2-7, the percentage of resident hire would vary depending on occupation. For some occupations, such as culinary workers, the supply of residents is expected to be sufficient to meet demand throughout the construction phase. However, for most job types, the demand would surpass the number of available residents with the requisite skills at some point during Project construction. In total, it is estimated that about 16,600 of the workers filling direct, onsite jobs during the nine year construction period, or about 47 percent of the workforce, would be Alaska residents.

TABLE 5.4.2-8 shows the predicted direct impacts of Project construction on wages and salaries in those areas where the change in income would be significant, with the 2023 peak corresponding to the year when the highest number of jobs would be created. While Project wages and salaries would account for a large portion of total wages and salaries in areas such as the Yukon-Koyukuk Census Area and Denali Borough during peak construction years, the impact of this additional income on economic activity in these areas would be limited since most of the construction workforce would be housed in closed construction camps and have limited interaction with local economies.

TABLE 5.4.2-8

Estimated Direct Change in Wages and Salaries During Project Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Amount ($ Millions)	117	511	1,070	1,452	1,948	1,305	814	424	141
	Percent Change	0%	2%	5%	6%	8%	5%	3%	1%	0%
North Slope Borough	Amount ($ Millions)	16	82	245	215	348	372	343	283	125
	Percent Change	1%	6%	19%	16%	26%	27%	24%	19%	8%
Yukon-Koyukuk Census Area	Amount ($ Millions)	0	71	188	177	274	181	41	11	0
	Percent Change	0%	56%	138%	122%	178%	111%	23%	5%	0%
Denali Borough	Amount ($ Millions)	0	15	53	111	131	10	0	0	0
	Percent Change	0%	18%	61%	122%	136%	10%	0%	0%	0%
Matanuska-Susitna Borough	Amount ($ Millions)	45	44	96	187	129	18	23	6	0
	Percent Change	4%	4%	8%	16%	10%	1%	1%	0%	0%
Kenai Peninsula Borough	Amount ($ Millions)	25	265	445	706	1,006	666	358	90	0
	Percent Change	2%	22%	35%	53%	72%	45%	23%	5%	0%

Liquefaction Facility

TABLE 5.4.2-9 shows the estimated direct change in employment during Liquefaction Facility construction in those areas where the change in employment would be significant. The peak annual average employment during Liquefaction Facility construction would occur in 2023, with around 3,900 jobs created and 4,100 people hired statewide.

There is uncertainty around estimates of the number of KPB residents that may be employed on the Liquefaction Facility. While there are a large number of jobs, many of them are highly specialized and specialty contractors may bring in their own experienced crews. The civil earthwork and utility work in the early stages of the construction effort, along with camp operations may offer the best opportunity for maximizing the employment of local residents. It is estimated that from 200 to 500 persons hired to construct the Liquefaction Facility (five to 12 percent of peak employment) could be KPB workers, defined as those who are borough residents and live close enough to commute to and from their homes each day.

TABLE 5.4.2-9

Estimated Direct Change in Employment During Liquefaction Facility Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Number of Jobs	60	1,240	2,080	2,640	3,860	2,290	1,110	230	0
	Number of Persons	60	1,310	2,210	2,810	4,100	2,440	1,180	250	0
	Percent Change	0%	0%	0%	0%	0%	0%	0%	0%	0%
Kenai Peninsula Borough	Number of Jobs	40	1,190	2,020	2,580	3,800	2,240	1,070	210	0
	Number of Persons	40	1,260	2,150	2,750	4,040	2,390	1,140	230	0
	Percent Change	0%	3%	5%	7%	10%	6%	3%	0%	0%

Notes:
The number of workers may be larger than the number of jobs due to rotation schedules and adjustments for vacations and absenteeism. Column totals may not sum to State totals due to rounding.

TABLE 5.4.2-10 shows the predicted direct impacts of Liquefaction Facility construction on wages and salaries, with the 2023 peak in income corresponding to the year when the highest number of jobs would be created.

TABLE 5.4.2-10

Estimated Direct Change in Wages and Salaries During Liquefaction Facility Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Amount ($ Millions)	13	220	377	598	865	556	296	73	0
	Percent Change	0%	1%	1%	2%	3%	2%	1%	0%	0%
Kenai Peninsula Borough	Amount ($ Millions)	8	210	366	584	851	543	284	65	0
	Percent Change	18%	29%	44%	61%	37%	18%	4%	0%	18%

Mainline and PTTL

TABLE 5.4.2-11 shows the estimated direct change in employment during Mainline and PTTL construction in those areas where the change in employment would be significant. The peak employment would occur in 2023, with around 2,600 jobs created and 2,900 people hired over several summer and winter construction seasons. The proposed design anticipates that an individual compressor station would be built in approximately one year and require approximately 160 personnel (on average) to construct, inspect, and precommission the station. It is anticipated that an individual meter station would be constructed in approximately three to four months and would require approximately 100 personnel to construct, inspect, and precommission the station. An individual heater station is estimated to be built in approximately one year using a workforce of 110 personnel.

TABLE 5.4.2-11

Estimated Direct Change in Employment During Mainline and PTTL Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Number of Jobs	0	390	850	1,960	2,580	1,090	420	110	0
	Number of Persons	0	410	910	2,080	2,850	1,330	630	170	0
	Percent Change	0%	0%	0%	0%	0%	0%	0%	0%	0%
North Slope Borough	Number of Jobs	0	50	190	280	720	380	170	50	0
	Number of Persons	0	50	210	290	800	460	260	70	0
	Percent Change	0%	0%	1%	1%	5%	2%	1%	0%	0%
Yukon-Koyukuk Census Area	Number of Jobs	0	210	360	580	880	570	140	30	0
	Number of Persons	0	220	390	620	970	700	210	60	0
	Percent Change	0%	4%	8%	13%	21%	15%	4%	1%	0%
Denali Borough	Number of Jobs	0	40	100	370	420	30	0	0	0
	Number of Persons	0	40	110	390	470	30	0	0	0
	Percent Change	0%	1%	4%	16%	19%	1%	0%	0%	0%

Notes:
The number of workers may be larger than the number of jobs due to rotation schedules and adjustments for vacations and absenteeism. Column totals may not sum to State totals due to rounding.

TABLE 5.4.2-12 shows the predicted direct impacts of Mainline and PTTL construction on wages and salaries, with the 2023 peak in income corresponding to the year when the highest number of jobs would be created.

TABLE 5.4.2-12

Estimated Direct Change in Wages and Salaries During Mainline and PTTL Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Amount ($ Millions)	0	111	410	519	716	288	97	19	0
	Percent Change	0%	0%	1%	2%	3%	1%	0%	0%	0%
North Slope Borough	Amount ($ Millions)	0	14	93	73	201	99	39	8	0
	Percent Change	0%	1%	7%	5%	15%	7%	2%	0%	0%

TABLE 5.4.2-12

Estimated Direct Change in Wages and Salaries During Mainline and PTTL Construction

Yukon-Koyukuk Census Area	Amount ($ Millions)	0	60	174	155	244	150	31	6	0
	Percent Change	0%	47%	128%	106%	158%	91%	18%	3%	0%
Denali Borough	Amount ($ Millions)	0	12	50	97	117	8	0	0	0
	Percent Change	0%	14%	58%	107%	122%	7%	0%	0%	0%
Matanuska-Susitna Borough	Amount ($ Millions)	0	20	81	161	115	16	19	4	0
	Percent Change	0%	1%	7%	13%	9%	1%	1%	0%	0%

GTP and PBTL

TABLE 5.4.2-13 shows the estimated direct change in employment during construction of the GTP and PBTL, including GTP infrastructure and dock modifications. The GTP construction camp is assumed to be fabricated in the MSB since there is some capacity for camp manufacturing in the area. However, the effect on employment in the MSB would be temporary and minor. All other construction camps would be built outside of Alaska and transported to the worksites. The peak employment during GTP and PBTL construction would occur in 2025, with around 710 jobs created and 1,500 people hired.

TABLE 5.4.2-13

Estimated Direct Change in Employment During GTP and PBTL Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Number of Jobs	140	240	320	260	250	590	710	590	310
	Number of Persons	170	420	660	540	540	1,250	1,510	1,250	670
	Percent Change	0%	0%	0%	0%	0%	0%	0%	0%	0%
North Slope Borough	Number of Jobs	30	170	280	240	230	560	670	560	290
	Number of Persons	70	340	620	520	520	1,220	1,470	1,210	640
	Percent Change	0%	2%	3%	3%	3%	7%	9%	7%	4%

Notes:
The number of workers may be larger than the number of jobs due to rotation schedules and adjustments for vacations and absenteeism. Column totals may not sum to State totals due to rounding.

TABLE 5.4.2-14 shows the predicted direct impacts of GTP and PBTL construction on wages and salaries, with the 2025 peak in income corresponding to the year when the highest number of jobs would be created.

TABLE 5.4.2-14

Estimated Direct Change in Wages and Salaries During GTP and PBTL Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Amount ($ Millions)	24	84	155	134	124	233	259	212	96
	Percent Change	0%	0%	0%	0%	0%	0%	1%	0%	0%
North Slope Borough	Amount ($ Millions)	6	58	135	123	114	220	246	200	88
	Percent Change	0%	4%	10%	9%	8%	16%	17%	13%	5%

Non-Jurisdictional Facilities

KSH Relocation project

The KSH Relocation project is anticipated to be built in a single year immediately prior to the start of construction activities for the Liquefaction Facility. Peak employment in the KPB is estimated at about 80 people. Payroll data for this project are not available .

PTU Gas Expansion project

The PTU Gas Expansion project is anticipated to be built over a five-year construction period, 2021 through 2025. The PTU Gas Expansion project employees would be supported by the operations crew of the existing Point Thomson development, so direct employment levels would be 8 positions in 2021, about 45 in 2022, and 85 in 2023. In 2024, the number of positions increases to 375 and in 2025 employment increases to about 480 positions. The rotation schedule for the project is unknown, but if the rotation schedule is similar to typical North Slope operations with two weeks on and two weeks off, the number of persons required would be twice the number of positions noted above. Construction payroll for the project is estimated at roughly $400 million for the construction period, excluding the payroll for camp fabrication, which is assumed to be built outside of Alaska and transported to the site.

PBU MGS project

The PBU MGS project is anticipated to be constructed during the 2019 through 2024 time period, with peak construction activity in years 2022 through 2024. Peak on-site construction employment would be about 90 persons during this time period. Payroll data for this project are not available.

5.4.2.2.1.2 Direct, Indirect, and Induced Employment and Income

As described in Section 5.4.1.1.1, local spending has a stimulus effect on the State’s economy, thereby increasing the number of jobs and amount of labor income. Construction of the Project would temporarily create indirect and induced part-time and full-time jobs via this multiplier effect.

The requirement that all workers filling direct, onsite Project construction jobs (both Alaska residents and nonresidents with the potential exception of KPB residents engaged in the construction of the Liquefaction Facility) reside in self-contained construction camps would significantly decrease the level of induced employment in communities near construction sites. As a result of this requirement, only a limited amount of worker payroll would be spent in communities near the Project facilities. Furthermore, the requirement that construction crews building the GTP and Project pipelines be transported to designated pickup locations at the conclusion of a work rotation or spread season would also decrease in-state spending of wages by nonresidents. If a smaller amount of the Project's construction payroll enters the local economy, there is reduced potential for induced employment creation. This has the genera1 disadvantage of reducing total Project-related income and employment benefits to Alaska. Nevertheless, Project wages paid to Alaska residents would contribute to the local economies of the communities in which these workers permanently reside.

The majority of those working in indirect and induced jobs would be hired in accordance with the normal patterns of those businesses that would experience job growth. Unlike individuals who obtain direct Project employment, they would not reside in construction camps, nor would they be hired seasonally for the duration of a specific construction period. Indirect and induced employment would attract a diverse population, reflecting the variety of job opportunities represented in the indirect and induced employment category. Lower-paying service sector occupations, such as retail clerks and food workers, would attract relatively unskilled individuals. Although they would have to compete with economic in-migrants for these positions, Alaska residents who do not have the skills needed for the more formalized and specialized direct jobs created by Project construction would benefit from the jobs created by the increased demand for services. The additional public service employment created by expanded demand for governmental services during Project construction would require a mixture of skilled and unskilled labor, while construction work associated with Project-related public infrastructure projects would attract a certain amount of skilled, but a larger amount of unskilled manual labor.

For those areas that would be significantly affected, TABLE 5.4.2-15 shows the estimated total (direct, indirect, and induced) change in employment during Project construction, and TABLE 5.4.2-16 shows the total change in income. The tables in this section include employment associated with start-up activities for operation which would begin as early as 2023. The Municipality of Anchorage and FNSB would be the primary location in Alaska where goods and services from local businesses would be purchased during the construction phase, although suppliers in other areas of the State could also benefit from Project purchases. In addition, Anchorage, together with the KPB and MSB, would be where many of the persons directly and indirectly employed by the Project would spend a portion of their incomes on consumer goods and services. The MSB would also experience construction spending for construction camp fabrication, while most of the jobs associated with an expansion of public infrastructure and services would occur in the KPB. The estimated total change in employment and wages and salaries includes Alaska residents directly employed by Project, but excludes nonresidents in the direct Project workforce since those individuals are anticipated to return to their place of residence when off rotation and to spend their income outside of Alaska.

TABLE 5.4.2-15

Estimated Total Change in Resident Employment During Project Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Number of Persons	2,490	12,500	19,720	18,770	20,030	16,670	16,300	11,140	6,940
	Percent Change	0%	2%	4%	3%	4%	3%	3%	2%	1%
Matanuska-Susitna Borough	Number of Persons	590	1,770	2,500	2,400	2,330	2,030	2,020	1,630	1,270
	Percent Change	1%	4%	6%	6%	6%	5%	5%	4%	3%
Kenai Peninsula Borough	Number of Persons	90	1,480	2,710	1,970	1,800	1,550	1,380	1,120	910
	Percent Change	0%	4%	7%	5%	4%	4%	3%	2%	2%
Municipality of Anchorage	Number of Persons	1,680	8,120	12,600	12,530	13,920	11,540	11,470	7,250	3,960
	Percent Change	0%	3%	5%	5%	6%	5%	5%	3%	1%

TABLE 5.4.2-16

Estimated Total Change in Resident Wages and Salaries During Project Construction

	2019	2020	2021	2022	2023	2024	2025	2026	2027

TABLE 5.4.2-16

Estimated Total Change in Resident Wages and Salaries During Project Construction

State of Alaska	Amount ($ Millions)	148	908	1,494	1,523	1,760	1,565	1,587	1,188	811
	Percent Change	0%	3%	6%	6%	6%	5%	5%	3%	2%
Fairbanks North Star Borough	Amount ($ Millions)	6	87	143	139	154	127	108	82	50
	Percent Change	0%	3%	5%	4%	5%	3%	3%	2%	1%
Matanuska-Susitna Borough	Amount ($ Millions)	14	56	92	100	104	100	104	92	77
	Percent Change	1%	4%	7%	7%	7%	6%	6%	5%	4%
Kenai Peninsula Borough	Amount ($ Millions)	4	71	124	109	118	110	103	87	73
	Percent Change	0%	5%	8%	7%	7%	6%	5%	4%	3%
Municipality of Anchorage	Amount ($ Millions)	122	681	1,107	1,147	1,352	1,201	1,231	885	570
	Percent Change	1%	5%	9%	9%	10%	8%	8%	5%	3%

Liquefaction Facility

For those areas that would be significantly affected, TABLE 5.4.2-17 shows the estimated total change in employment during construction of the Liquefaction Facility, and TABLE 5.4.2-18 shows the total change in income. The relatively high compensation rate for the construction workforce results in higher percentage changes for wages and salaries compared to the percentage increases in employment.

TABLE 5.4.2-17

Estimated Total Change in Resident Employment During Liquefaction Facility Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Number of Persons	740	7,350	11,070	9,190	9,340	8,410	8,540	4,590	1,880
	Percent Change	0%	1%	2%	1%	1%	1%	1%	0%	0%
Kenai Peninsula Borough	Number of Persons	60	1,340	2,460	1,760	1,550	1,350	1,180	940	750
	Percent Change	0%	3%	6%	4%	4%	3%	3%	2%	1%
Municipality of Anchorage	Number of Persons	570	4,990	7,130	6,000	6,260	5,680	6,070	2,840	670
	Percent Change	0%	2%	3%	2%	2%	2%	2%	1%	0%

TABLE 5.4.2-18

Estimated Total Change in Resident Wages and Salaries During Liquefaction Facility Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Amount ($ Millions)	50	503	762	709	777	733	759	447	211
	Percent Change	0%	2%	3%	3%	3%	3%	3%	1%	0%
Matanuska-Susitna Borough	Amount ($ Millions)	2	19	31	35	41	42	45	35	26
	Percent Change	0%	1%	2%	2%	3%	3%	3%	2%	1%
Kenai Peninsula Borough	Amount ($ Millions)	3	65	113	98	103	98	91	75	63
	Percent Change	0%	5%	8%	7%	7%	6%	6%	4%	4%
Municipality of Anchorage	Amount ($ Millions)	42	378	559	520	570	540	582	316	117
	Percent Change	0%	3%	5%	4%	5%	4%	4%	2%	0%

Mainline and PTTL

For those areas that would be significantly affected, TABLE 5.4.2-19 shows the estimated total change in employment during construction of the Mainline and PTTL, and TABLE 5.4.2-20 shows the total change in income.

TABLE 5.4.2-19

Estimated Total Change in Resident Employment During Mainline and PTTL Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Number of Persons	700	2,700	4,830	6,750	8,740	5,630	4,140	2,660	1,980
	Percent Change	0%	0%	1%	1%	1%	1%	0%	0%	0%
Matanuska-Susitna Borough	Number of Persons	80	740	1,190	1,230	1,130	810	670	530	440
	Percent Change	0%	1%	3%	3%	2%	2%	1%	1%	1%

TABLE 5.4.2-20

Estimated Total Change in Resident Wages and Salaries During Mainline and PTTL Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Amount ($ Millions)	45	235	448	576	791	567	453	326	267
	Percent Change	0%	1%	2%	2%	3%	2%	1%	1%	1%
Fairbanks North Star Borough	Amount ($ Millions)	1	32	61	67	85	54	39	28	23
	Percent Change	0%	1%	2%	2%	3%	2%	1%	1%	0%
Matanuska-Susitna Borough	Amount ($ Millions)	3	24	43	49	49	41	36	31	27
	Percent Change	0%	2%	3%	4%	4%	3%	2%	2%	1%
Municipality of Anchorage	Amount ($ Millions)	40	171	324	440	630	452	362	257	210
	Percent Change	0%	1%	3%	3%	5%	3%	2%	2%	1%

GTP and PBTL

The estimated total change in employment and income resulting from construction of the GTP and PBTL would be temporary and minor in all boroughs and census areas in the AOI.

Non-Jurisdictional Facilities

The estimated total change in employment and income resulting from construction of the non-jurisdictional facilities would be temporary and minor in all boroughs and census areas in the AOI. The KSH Relocation project is anticipated to create about 270 total jobs in the KPB at the peak of construction. The PTU Expansion project is anticipated to create a total of about 2,600 jobs in 2024 and 2025, the peak years of construction, within the State. The PBU MGS project would generate around 1,200 total jobs in 2022 and 2023. Estimates of total wages and salaries for the non-jurisdictional facilities are not available.

5.4.2.2.1.3 Unemployment

The employment opportunities generated by the building of the Project facilities would constitute an economic net benefit to Alaska residents only 1) if the new jobs are taken by current residents who were previously unemployed or under-employed; and/or 2) if the new jobs result in an increase in wage rates within industrial sectors affected by the Project. This section examines effects on unemployment in Alaska, while Section 5.4.2.2.1.4 describes effects on wage rates.

TABLE 5.4.2-21 shows the estimated change in unemployment in those areas where there would be a significant change during Project construction. Table values represent the percent decline or rise in the unemployment rate relative to the “without Project” scenario. As discussed in Section 5.3.2, the largest concentration of Alaska workers with occupational skills important to Project construction activities is in highly populated southcentral Alaska. Thus, the main effect of direct Project work opportunities on unemployment in the State may be to reduce the already fairly low unemployment rates in southcentral Alaska and Fairbanks. Moreover, most of the temporary direct and induced jobs created during Project construction would be located in southcentral Alaska. However, unemployment rates are also expected to decline in some other areas of the State. For example, the unemployment rate in the NSB may decline due to ASRC’s ownership of the Nikiski Fabrication Facility and Rig Tenders Marine Terminal, which could be used during Project construction.

As during construction of TAPS (Information Insights 2004), most of the individuals who come to Alaska in search of the direct, indirect and induced jobs created by the Project are expected to be able to find employment. However, some in-migrants would remain unemployed for the duration of their stay in Alaska. While the unemployment rate may not rise, the number of unemployed may increase in some areas of the State if there is a large, short-term influx of job seekers.

TABLE 5.4.2-21

Estimated Percent Change in Unemployment Rate During Project Construction

	2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	0%	-4%	-5%	-4%	-4%	-3%	-2%	0%	0%
North Slope Borough	0%	-5%	-7%	-5%	-5%	-2%	0%	2%	4%
Fairbanks North Star Borough	0%	-2%	-3%	-3%	-2%	-1%	0%	0%	0%
Matanuska-Susitna Borough	-2%	-8%	-11%	-9%	-9%	-6%	-6%	-2%	0%
Kenai Peninsula Borough	0%	-5%	-8%	-5%	-4%	-2%	-2%	-1%	0%
Municipality of Anchorage	-1%	-5%	-7%	-6%	-6%	-3%	-3%	0%	1%

Liquefaction Facility

TABLE 5.4.2-22 shows the estimated change in unemployment rates during construction of the Liquefaction Facility. The increase in unemployment rates during the last years of the construction phase is associated with the construction effort tapering off as the Liquefaction Facility nears completion.

TABLE 5.4.2-22

Estimated Percent Change in Unemployment Rate During Liquefaction Facility Construction

	2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	0%	-2%	-3%	-2%	-2%	-1%	-1%	0%	0%
Matanuska-Susitna Borough	0%	-4%	-5%	-3%	-4%	-3%	-2%	0%	0%
Kenai Peninsula Borough	0%	-4%	-7%	-4%	-3%	-2%	-1%	0%	0%
Municipality of Anchorage	0%	-3%	-4%	-3%	-2%	-1%	-1%	0%	1%

Mainline and PTTL

Certain municipalities are expected to see significant reductions in their unemployment rates with construction of the Mainline and the PTTL as shown in TABLE 5.4.2-23. The unemployment rates decline as construction employment increases, and then municipalities experience increasing unemployment rates after Mainline and PTTL construction ends in 2025.

TABLE 5.4.2-23

Estimated Percent Change in Unemployment Rate During Mainline and PTTL Construction

	2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	0%	0%	-1%	-1%	-2%	-1%	0%	0%	0%
North Slope Borough	0%	-1%	-2%	-2%	-3%	-1%	0%	0%	1%
Matanuska-Susitna Borough	0%	-2%	-3%	-4%	-4%	-2%	-1%	0%	0%
Municipality of Anchorage	0%	0%	-1%	-2%	-3%	-1%	0%	0%	0%

GTP and PBTL

Construction of the GTP and PBTL would have a temporary and minor effect on unemployment rates in the AOI.

Non-Jurisdictional Facilities

The estimated total change in the unemployment rate due to construction of the KSH Relocation project, PTU Expansion project, and PBU MGS project would be temporary and minor in all boroughs and census areas in the AOI.

5.4.2.2.1.4 Wage Rates

Similar to the construction of TAPS (Carrington 1996), the increased labor demand in some industries during Project construction could temporarily increase effective hourly wages in Alaska. However, differences in wage inflation are expected across industries and geographical areas. Large wage increases are anticipated in industrial sectors that would experience strong employment growth over the Project construction period, including the construction, transportation, and professional, scientific, and technical services sectors. The Municipality of Anchorage has most of the construction firms in the State and is the economic center for the other industry sectors that would be most affected by Project construction. Therefore, wage inflation is expected in the municipality. Wage inflation is also expected in the wholesale and retail trade industries in the KPB and MSB since many of the persons directly and indirectly employed by the Project would spend a portion of their incomes on consumer goods and services in these boroughs. Some wage inflation could also occur in areas that would have little connection to Project construction through local firms being suppliers to the Project or through local spending by direct and indirect employees. For example, given the attraction of high-paying Project construction jobs, the major local employers, such as local government, in the Yukon-Koyukuk Census Area and other remote areas of the State may be compelled to increase wage rates to retain workers. Similarly, retail and service businesses outside the KPB and MSB, such as tourism-related businesses in the Denali Borough, may experience increases in hourly wage rates as they vie to recruit and retain the best workers.

In addition, the inflow of capital and labor to Alaska resulting from Project construction could lead to temporary inflationary pressure and effects on prices of housing and other goods and services for residents in some Alaska communities. The higher prices for goods and services caused by this inflationary pressure would reduce the real income of those whose incomes do not rise as fast as the price level, such as lower and fixed income residents not employed by the Project. For example, construction of TAPS adversely affected the real income of workers in the manufacturing sector, retirees, and others whose nominal income did not keep pace with inflation (Carrington 1996). The same negative effects of price inflation were described for those residents of western North Dakota who did not benefit from the job opportunities created by the rapid expansion of oil production activity from 2008 to 2014 (Bohnenkamp et al. 2011; Holeywell 2011; BBC Research & Consulting 2013).

TABLE 5.4.2-24 shows the estimated percentage change in wage rates expected to occur with Project construction in those areas with significant change. The largest change would occur in the Municipality of Anchorage, with the KPB also experiencing significant wage rate increases.

TABLE 5.4.2-24

Estimated Percent Change in Wage Rates During Project Construction

	2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	0%	1%	2%	2%	2%	2%	2%	1%	1%
Kenai Peninsula Borough	0%	2%	2%	2%	3%	3%	2%	2%	1%
Municipality of Anchorage	0%	2%	4%	3%	4%	3%	3%	2%	1%

Wage rates in industrial sectors besides those experiencing strong employment growth could also be affected. In particular, the wage inflation that occurs during Project construction could potentially have an adverse impact on Alaska manufacturing firms that trade their goods nationally or internationally, such as seafood processors. To the extent that these firms must pay higher wages to compete for local workers, these increased labor costs might cause them to reduce employment and output because their products are sold in large, non-local markets and they cannot compensate for higher wages by increasing output prices. However, Carrington (1996) reported that TAPS construction had little spillover economic effect on the State's manufacturing industries because of their geographical isolation and other factors.

5.4.2.2.2 Purchases

5.4.2.2.2.1 Direct Purchases

Following the final investment decision for the Project, procurement activities would begin to ensure that the equipment, modules, and materials needed for Project construction are available when needed. Alaska businesses would be contracted with, within the constraints of law, to the extent they have the relevant experience and performance. The Project's procurement process would be designed to provide fair and equal opportunity to all eligible contractors and businesses. Contracts could be awarded exclusively based on safety considerations and best total value, but qualified Alaska and Alaska Native-owned businesses would enhance their competitiveness by having equipment and personnel located in Alaska. All Project contractors would be required to develop a plan to provide opportunities to qualified Alaska businesses.

Major material items, such as steel pipe and major sealift modules, would be manufactured out-of-state or globally and shipped via marine transport to Alaska ports. Businesses located in Fairbanks and Anchorage would be the sources of most Alaska-sourced supplies because these two cities are the supply centers for the State's construction and oil and gas industries. In addition, while a large amount of the construction materials needed would be purchased out-of-state, Alaska's water, air, and truck transportation sectors would benefit from these purchases. The Municipality of Anchorage is the center of the State's transportation industry, and Fairbanks serves as Interior Alaska's transportation hub. Every borough and census area traversed by the Mainline is expected to receive some purchases, with the smaller purchases being gravel. Purchases from the Valdez-Cordova Census Area and KPB are anticipated to be mainly diesel fuel and other petroleum products.

While the amount of direct statewide purchases would exceed $1 billion in some construction years, the purchases would be temporary and minor in all boroughs and census areas of the AOI during the construction of each facility and the Project as a whole. Total direct statewide purchases of goods and services (not including direct wages and salaries) are estimated to amount to $7.2 billion (2015 $) over the entire construction period.

To the extent that these Project-related purchases limit the availability of goods and services for local businesses that are dependent on the same suppliers, the Applicant will initiate discussions with appropriate entities to identity way to minimize and mitigate potential impacts to existing businesses in AOI communities during the procurement process.

Non-Jurisdictional Facilities

The estimated direct change in purchases due to construction of the non-jurisdictional facilities would be temporary and minor in all boroughs and census areas in the AOI. Preliminary estimates of statewide direct purchases are $60 million for the KSH Relocation project; $750 million for the PTU Expansion project; and $660 million for the PBU MGS project.

5.4.2.2.2.2 Direct, Indirect, and Induced Purchases

TABLE 5.4.2-25 shows the estimated total (direct, indirect, and induced) change in purchases for construction supplies, equipment, and construction services during Project construction in those areas where the change in purchases would be significant. These purchases do not include construction payroll.

TABLE 5.4.2-25

Estimated Total Change in Purchases During Project Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Amount ($ Millions)	505	2,566	4,259	4,399	5,399	4,919	6,009	4,914	4,085
	Percent Change	0%	1%	3%	3%	3%	3%	3%	2%	2%
North Slope Borough	Amount ($ Millions)	1	11	14	7	3	-8	271	392	491
	Percent Change	0%	0%	0%	0%	0%	0%	2%	2%	3%
Matanuska-Susitna Borough	Amount ($ Millions)	106	286	404	397	394	358	369	311	251
	Percent Change	1%	4%	6%	5%	5%	4%	4%	3%	2%
Kenai Peninsula Borough	Amount ($ Millions)	21	302	573	476	593	582	618	602	530
	Percent Change	0%	3%	5%	4%	5%	4%	4%	4%	3%
Municipality of Anchorage	Amount ($ Millions)	352	1,747	2,869	3,094	3,903	3,572	4,367	3,308	2,604
	Percent Change	0%	2%	4%	4%	5%	5%	5%	4%	3%

Liquefaction Facility

TABLE 5.4.2-26 shows the estimated total change in purchases during Liquefaction Facility construction in those areas where the change in purchases would be significant.

TABLE 5.4.2-26

Estimated Total Change in Purchases During Liquefaction Facility Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Amount ($ Millions)	149	1,496	2,339	2,032	2,310	2,323	2,790	1,781	1,056
	Percent Change	0%	1%	1%	1%	1%	1%	1%	1%	0%
Kenai Peninsula Borough	Amount ($ Millions)	13	254	478	366	439	481	538	542	490
	Percent Change	0%	2%	4%	3%	3%	4%	4%	4%	3%

Mainline and PTTL

TABLE 5.4.2-27 shows the estimated total change in purchases during Mainline and PTTL construction in those areas where the change in purchases would be significant.

TABLE 5.4.2-27

Estimated Total Change in Purchases During Mainline and PTTL Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Amount ($ Millions)	141	538	1,053	1,656	2,509	1,777	1,536	1,097	937
	Percent Change	0%	0%	0%	1%	1%	1%	0%	0%	0%
Matanuska-Susitna Borough	Amount ($ Millions)	12	121	197	207	192	144	124	100	87
	Percent Change	0%	1%	3%	3%	2%	1%	1%	1%	1%

GTP and PBTL

The total purchases during construction of the GTP and PBTL would have a temporary and minor effect in the AOI.

Non-Jurisdictional Facilities

Estimates of total purchases during construction of the non-jurisdictional facilities are not available, but it is anticipated that this spending would have a temporary and minor effect in the AOI.

5.4.2.2.3 Sector Employment, Income, and Output

TABLE 5.4.2-28 shows the estimated change in statewide sector employment, output, and compensation during Project construction. The temporary effects of Project construction on employment, output, and compensation would be concentrated in certain industrial sectors, including the oil and gas, construction, transportation, tourism, and professional, scientific, and technical services industries. The Project is not expected to affect the tourism industry per se, but rather some of the sectors that support the industry, such as the food services and drinking places sector and accommodation sector. These effects would be beneficial, as Project expenditures would support additional jobs in these sectors. The impacts of Project construction to the tourism and recreation economy centered on Denali National Park and Preserve are expected to be minor and temporary. As described in Resource Report 8, the proposed Mainline route would not cross through the Denali National Park and Preserve or any designated wilderness areas outside of the park. Resource Report 8 notes that the Project would coordinate early and regular consultation with tourism and recreation businesses to mitigate any possible adverse impacts to these businesses during the construction phase. The effect of Project construction on employment, compensation, and output in state and local government is expected to be temporary and minor.

TABLE 5.4.2-28

Estimated Change in Sector Average Annual Employment, Output, and Compensation During Project Construction[a]

		Average Annual Employment (Number of Persons)	Average Annual Output ($ Millions)	Average Annual Compensation ($ Millions)
Oil and Gas	Amount	220	540	40
	Percent Change	4%	4%	5%
Mining Support Services	Amount	190	90	30

TABLE 5.4.2-28

Estimated Change in Sector Average Annual Employment, Output, and Compensation During Project Construction[a]

	Percent Change	1%	2%	3%
Construction	Amount	3,150	580	370
	Percent Change	12%	12%	28%
Transportation	Amount	500	180	50
	Percent Change	3%	3%	4%
Professional, Scientific, and Technical Services	Amount	890	170	70
	Percent Change	3%	3%	4%
Tourism	Amount	1,370	130	50
	Percent Change	2%	2%	3%

Note:
[a] Values represent statewide average of employment, income, and economic output over the 2019-2027 period. Income and output values are in 2015 dollars.

5.4.2.2.3.1 Liquefaction Facility

TABLE 5.4.2-29 shows the estimated change in statewide employment, output, and compensation during Liquefaction Facility construction in those sectors where the change would be significant.

TABLE 5.4.2-29

Estimated Change in Sector Average Annual Employment, Output, and Compensation During Liquefaction Facility Construction

		Average Annual Employment (Number of Persons)	Average Annual Output ($ Millions)	Average Annual Compensation ($ Millions)
Construction	Amount	1,640	300	180
	Percent Change	6%	6%	13%

5.4.2.2.3.2 Mainline and PTTL

TABLE 5.4.2-30 shows the estimated change in statewide employment, output, and compensation during Mainline and PTTL construction in those sectors where the change would be significant.

TABLE 5.4.2-30

Estimated Change in Sector Average Annual Employment, Output, and Compensation During Mainline and PTTL Construction

		Average Annual Employment (Number of Persons)	Average Annual Output ($ Millions)	Average Annual Compensation ($ Millions)
Construction	Amount	790	150	110
	Percent Change	3%	3%	8%

5.4.2.2.3.3 GTP and PBTL

TABLE 5.4.2-31 shows the estimated change in statewide employment, output, and compensation during GTP and PBTL construction in those sectors where the change would be significant.

TABLE 5.4.2-31

Estimated Change in Sector Average Annual Employment, Output, and Compensation During GTP and PBTL Construction

		Average Annual Employment (Number of Persons)	Average Annual Output ($ Millions)	Average Annual Compensation ($ Millions)
Construction	Amount	710	140	80
	Percent Change	2%	3%	6%

5.4.2.2.3.4 Non-Jurisdictional Facilities

Estimates of change in sector employment, output, and compensation during construction of the non-jurisdictional facilities are not available, but it is anticipated that this change would be temporary and minor in all areas of the AOI.

5.4.2.3 Housing

5.4.2.3.1 Overview

Prior to construction beginning, a Project headquarters team of about 150 to 250 persons would be established consisting of Alaska residents and persons migrating to the State for the construction phase. The team headquarters would be located in the Municipality of Anchorage, and the team members would likely reside in Anchorage or the MSB. The effect of out-of-state team members on the availability of housing is expected to be minor and temporary since their demand for housing would be small relative to the housing supply in Anchorage and the MSB. Those team members who already permanently reside in Anchorage or the MSB would place no additional demands on local housing.

As the Project moves into full construction phase, the direct effects on housing would be temporary and minor because the majority of construction crews for all Project facilities would be housed in temporary construction camps and on a daily basis would be transported from the camps to Project worksites. The construction camps would be self-contained and would be operated and maintained for most of the Project construction phase. All construction camps are expected to be closed, with workers required to remain within the camp while off duty. The exception would be KPB residents engaged in the construction of the Liquefaction Facility; these workers would potentially commute daily from their homes, and may not require housing at the construction site. Construction management may be another exception if other housing options are readily available. Additional information on the location and operations of the construction camps associated with the Project facilities is provided in Resource Report No. 1.

It is anticipated that some of the Project logistics personnel may temporarily stay in hotels/motels in communities along the transportation routes used to transport construction materials and equipment to Project worksites. Logistics truck drivers are primarily expected to sleep in their trucks or in Project construction camps, although the logistics companies or the drivers may elect to use facilities in the Prudhoe Bay CDP area or elsewhere along the transportation routes. The existing hotels/motels would be able to accommodate the anticipated number of personnel, although during the summer tourist season vacancies could be low.

As described in Section 5.4.2.1, the majority of economic in-migrants seeking indirect and induced jobs created during Project construction would be destined for the Municipality of Anchorage and MSB. Most job search activity would occur in these areas. It is unlikely that a significant number of those employed in indirect and induced jobs would seek to purchase housing because the jobs would be temporary; therefore, the demand for temporary accommodations, such as house and apartment rental units, motel/hotel rooms, emergency shelters, and campgrounds, would be high. The greatest potential for the Project to affect tourism would be during the summer when in-migrants seeking employment would compete with tourists for accommodations. The high rate of occupancy may be good for some tourist accommodations. However, hotels/motels fully occupied by in-migrants don’t necessarily benefit other businesses that depend on tourism. Moreover, there is a concern by tourist accommodation operators who are dependent on repeat business that turning away tourists could result in lost customers when Project construction ends and most economic in-migrants return home.

TABLE 5.4.2-32 shows the estimated demand for housing units during the construction phase of the Project in those areas where the change in demand would be significant. As discussed in Section 5.4.2.1, the REMI model used to estimate population change assumes that some non-local Project management staff and in-migrating workers would bring their families to Alaska. It is further assumed that the average household size of the additional resident population resulting from Project construction would be 2.75, the average household size of occupied housing units in the State during the 2009 to 2013 period (U.S. Census Bureau 2016b).

The additional economic activity and jobs that would be generated by the Project in the Municipality of Anchorage and MSB would temporarily result in a substantial increase in local demand for housing, with the demand for housing during Project construction exceeding the current supply of vacant housing units for sale or rent. Preparing for this excess demand may be challenging. Construction of new housing would be difficult to begin before demand exists due to lack of financing and water, sewer, and power hook-ups not yet developed by local government. If too little additional housing is built, some economic in-migrants may be required to live in hotels, motels, RV parks, campgrounds, or other substandard living arrangements. It is likely that many economic migrants could be accommodated during the winter and shoulder season months in these non-traditional temporary housing arrangements, but competition with visitors during the summer months and seasonal increases in accommodation prices may make it difficult for those persons that were able to find work in lower-paying occupations.

TABLE 5.4.2-32

Estimated Demand by the Project for Housing Units During Project Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Number of Units	330	1,450	2,960	4,140	5,380	6,130	6,810	6,990	6,810
	Percent of Vacant Units for Sale or Rent	3%	15%	30%	42%	55%	63%	70%	72%	70%
North Slope Borough	Number of Units	0	20	30	50	60	60	60	60	50
	Percent of Vacant Units for Sale or Rent	0%	16%	25%	42%	50%	50%	50%	50%	42%
Yukon-Koyukuk Census Area	Number of Units	0	0	10	10	10	10	10	0	0
	Percent of Vacant Units for Sale or Rent	0%	0%	8%	8%	8%	8%	8%	0%	0%
Fairbanks North Star Borough	Number of Units	10	100	230	340	460	520	560	550	520
	Percent of Vacant Units for Sale or Rent	0%	4%	11%	16%	22%	25%	27%	27%	25%
Denali Borough	Number of Units	0	0	0	0	0	10	10	0	0
	Percent of Vacant Units for Sale or Rent	0%	0%	0%	0%	0%	13%	13%	0%	0%
Matanuska-Susitna Borough	Number of Units	100	380	760	1,100	1,440	1,690	1,940	2,060	2,100
	Percent of Vacant Units for Sale or Rent	8%	33%	67%	98%	128%	150%	172%	183%	187%
Kenai Peninsula Borough	Number of Units	10	120	250	320	420	500	580	640	670
	Percent of Vacant Units for Sale or Rent	0%	11%	23%	30%	39%	47%	54%	60%	63%
Municipality of Anchorage	Number of Units	200	820	1,640	2,260	2,900	3,250	3,570	3,570	3,370
	Percent of Vacant Units for Sale or Rent	7%	32%	64%	88%	113%	126%	139%	139%	131%

Percent of Vacant Units is based on the number of available units today and does not incorporate any new development or addition of rental units.

A shortage of housing would not necessarily inhibit the flow of in-migrating job seekers; people are highly adaptable if satisfactory employment opportunities are available. Moreover, given that some economic in-migrants would have incurred heavy travel costs in reaching Alaska, they may be expected to undertake a prolonged period of job search. While it is anticipated that many in-migrant job-seekers would be successful in finding employment, others may remain unemployed for the duration of their stay in Alaska. In addition, many of the indirect and induced jobs would be relatively low-paying jobs in the retail and service industries. The ability of unemployed or low-income individuals to afford adequate housing would be limited. Private charitable institutions in Alaska may choose to involve themselves in providing housing assistance to transients, although current transitional housing facilities in the KPB and Anchorage have little or no excess capacity (Section 5.3.3.3).

In addition, a housing shortage would result in higher prices for existing owner-occupied dwellings and rental units. TABLE 5.4.2-33 shows the estimated percent change in housing prices during Project construction in those areas where the change in prices would be significant. The areas include the NSB, MSB, KPB, and Municipality of Anchorage. A price increase would place a financial strain on residents whose income has not increased at the same pace as the cost of housing, including senior citizens who are living on fixed incomes and people who are working low wage service jobs. Affordability may also be an issue for households who have moderate income levels because they may not qualify for low income subsidized housing or housing vouchers provided by the Alaska Housing Finance Corporation, yet it may be difficult for them to find affordable market-rate housing.

TABLE 5.4.2-33

Estimated Percent Change in Housing Prices During Project Construction

	2019	2020	2021	2022	2023	2024	2025	2026	2027
North Slope Borough	0%	2%	3%	3%	4%	3%	2%	1%	0%
Matanuska-Susitna Borough	0%	2%	4%	5%	6%	6%	6%	5%	5%
Kenai Peninsula Borough	0%	1%	3%	3%	3%	3%	3%	3%	3%
Municipality of Anchorage	0%	2%	3%	3%	4%	4%	4%	3%	2%

On the other hand, if local governments allow too much additional housing to be built, they may be forced to take ownership of excess housing after Project construction ends and most economic in-migrants return home. As seen in past "boom and bust" cycles of oil exploration in North Dakota (Holeywell 2011; Marcil 2016), private residential developers and investors may decide to forfeit their undeveloped land to local political entities if they owe more in property taxes than the value of the land itself. Should bonds be sold to raise the public funds for installation of streets and utilities for subdivisions that are later never developed, remaining residents may bear the brunt of paying off these bonds. At the same time, a borough may see its property tax base decrease if the market value, and therefore the assessed value, of developed and undeveloped land falls.

These potential impacts to housing may be mitigated by impact payments as described in Section 5.4.2.6.1. If municipal impact aid grants are available, they may fund projects that address impacts such as increased need for housing, including affordable housing and related infrastructure and homeless shelters.

5.4.2.3.2 Liquefaction Facility

Before the Liquefaction Facility construction camp is built, construction personnel for the facility would use local commercial accommodations in the KPB, with the number of workers at any time likely fewer than 300. This demand for housing would have a minor and temporary effect on the KPB tourism industry. The effect could be beneficial for owners of commercial accommodations in the KPB, but potentially negative for visitors seeking temporary lodging, particularly during the summer tourist and sport-fishing season.

The Liquefaction Facility construction camp and associated camp facilities would be located adjacent to the Liquefaction Facility. The camp would accommodate the workforce and would include dormitories, cafeteria, recreation rooms, and other amenities. The camp would have a design life of approximately six years, and its installation would be one of the first onsite activities.

The Liquefaction Facility workforce is predicted to peak at about 4,000 persons (Section 5.4.2.2.1.1), and the construction camp design would be modular and expandable with the ability to add accommodations greater than 5,000, but also be able to function efficiently with a reduced number of camp residents. Accommodation planning assumes that workers would not be required to "vacate" their rooms while off duty. This would mitigate the impacts of Liquefaction Facility construction on the availability of housing in the AOI by increasing the likelihood that workers would make the construction camp their residence for the duration of their construction employment. Consequently, construction crews are expected to place temporary and minor additional demands on local housing in the AOI.

The relocation of Project management staff who are State residents but non-local and the in-migration of persons seeking jobs indirectly generated by Liquefaction Facility construction would result in an increased demand for housing. For those areas where the change would be significant, TABLE 5.4.2-34 shows the estimated demand for housing units during construction of the Liquefaction Facility, both in total and as a percentage of vacant units for sale or rent in 2010 for each significantly impacted area. TABLE 5.4.2-35 shows the estimated percent change in housing prices.

TABLE 5.4.2-34

Estimated Demand by the Project for Housing Units During Liquefaction Facility Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Number of Units	130	820	1,630	2,110	2,620	2,970	3,290	3,250	3,010
	Percent of Vacant Units for Sale or Rent	1%	8%	16%	21%	27%	30%	34%	33%	31%
North Slope Borough	Number of Units	0	10	10	20	20	20	20	10	0
	Percent of Vacant Units for Sale or Rent	0%	8%	8%	16%	16%	16%	16%	8%	0%
Fairbanks North Star Borough	Number of Units	0	40	80	110	140	150	160	140	120
	Percent of Vacant Units for Sale or Rent	0%	1%	3%	5%	6%	7%	7%	6%	5%
Matanuska-Susitna Borough	Number of Units	30	160	320	450	590	700	810	840	810
	Percent of Vacant Units for Sale or Rent	2%	14%	28%	40%	52%	62%	72%	74%	72%
Kenai Peninsula Borough	Number of Units	10	90	200	250	330	400	480	530	570
	Percent of Vacant Units for Sale or Rent	0%	8%	18%	23%	31%	37%	45%	49%	53%
Municipality of Anchorage	Number of Units	80	510	990	1,250	1,500	1,650	1,780	1,680	1,460
	Percent of Vacant Units for Sale or Rent	3%	19%	38%	48%	58%	64%	69%	65%	57%

Percent of Vacant Units is based on the number of available units today and does not incorporate any new development or addition of rental units.

TABLE 5.4.2-35

Estimated Percent Change in Housing Prices During Liquefaction Facility Construction

	2019	2020	2021	2022	2023	2024	2025	2026	2027
Kenai Peninsula Borough	0%	1%	2%	2%	2%	2%	3%	2%	2%

5.4.2.3.3 Mainline and PTTL

Temporary construction camps would be used to house personnel during construction of the Mainline and associated aboveground facilities. Each camp would be fully self-sustaining with fuel storage, power generation, water treatment, food preparation, and wastewater treatment facilities. Numerous camps would be needed to house the number of construction and support personnel required for Mainline construction. The general locations of these temporary construction infrastructure facilities are identified on the facility location maps included as Appendix A of Resource Report No. 1. Camp sizes would depend on the construction activity and locations that they are supporting.

As described in Section 5.4.2.1, it is assumed that both Alaska resident and nonresident Mainline construction workers would stay at a worksite for an entire spread season, and then be returned to starting pickup locations. As a result, construction crews would place no additional demands on local housing in the AOI.

Non-local Project management staff relocating to different regions in Alaska and in-migrating workers seeking jobs indirectly generated by Mainline and PTTL construction would result in an increased demand for housing. For those areas where the change would be significant, TABLE 5.4.2-36 shows the estimated demand for housing units during construction of the Mainline and PTTL. The percent change in housing prices would be temporary and minor.

TABLE 5.4.2-36

Estimated Demand by the Project for Housing Units During Mainline and PTTL Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Number of Units	100	320	690	1,210	1,880	2,130	2,250	2,220	2,130
	Percent of Vacant Units for Sale or Rent	1%	3%	7%	12%	19%	22%	23%	23%	22%
North Slope Borough	Number of Units	0	10	10	20	30	30	30	20	20
	Percent of Vacant Units for Sale or Rent	0%	8%	8%	16%	25%	25%	25%	16%	16%
Yukon-Koyukuk Census Area	Number of Units	0	0	0	10	10	10	0	0	0
	Percent of Vacant Units for Sale or Rent	0%	0%	0%	8%	8%	8%	0%	0%	0%
Fairbanks North Star Borough	Number of Units	0	20	60	120	210	240	240	240	220
	Percent of Vacant Units for Sale or Rent	0%	0%	2%	5%	10%	11%	11%	11%	10%
Matanuska-Susitna Borough	Number of Units	30	130	290	460	630	720	780	800	810
	Percent of Vacant Units for Sale or Rent	2%	11%	25%	41%	56%	64%	69%	71%	72%
Kenai Peninsula Borough	Number of Units	0	10	30	40	60	60	60	60	60
	Percent of Vacant Units for Sale or Rent	0%	0%	2%	3%	5%	5%	5%	5%	5%
Municipality of Anchorage	Number of Units	70	140	280	540	920	1,050	1,100	1,060	990
	Percent of Vacant Units for Sale or Rent	2%	5%	10%	21%	35%	41%	42%	41%	38%

Percent of Vacant Units is based on the number of available units today and does not incorporate any new development or addition of rental units.

5.4.2.3.4 GTP and PBTL

Before the GTP pioneer camp is built, construction personnel could require temporary use of one or more of the hotels or workforce camps in the Prudhoe Bay CDP area. Given the anticipated small size of the construction workforce for the pioneer camp, the effects on Prudhoe Bay CDP lodging facilities would be minor and temporary. The preference is to locate the pioneer camp on an existing granular pad in the PBU or in the Prudhoe Bay CDP area. The pioneer camp would be sized to accommodate approximately 600 personnel.

An onsite integrated construction and operations camp would be constructed to support GTP construction. The construction and operations camp would be built near the GTP operation center and would be sized to accommodate up to 1,680 personnel to manage peak staffing loads during construction and turnarounds and 125 personnel under normal circumstances. Once construction, commissioning, and start-up of the GTP are complete, the construction and operations camp would remain as a permanent operations and turnaround facility. The construction of the PBTL would use the camp for the GTP.

As described in Section 5.4.2.1, it is assumed that both Alaska resident and nonresident GTP construction workers would return to their homes during their 2-week off duty periods. As a result, construction crews would place little, if any, additional demands on local housing in the AOI.

Non-local Project management staff relocating to different regions in Alaska and in-migrating workers seeking jobs indirectly generated by GTP and PBTL construction would result in an increased demand for housing. TABLE 5.4.2-37 shows the estimated demand for housing units during construction of the GTP and PBTL in those areas where the change in demand would be significant. The effect of construction of the GTP and PBTL on housing prices in the AOI would be temporary and minor.

TABLE 5.4.2-37

Estimated Demand by the Project for Housing Units During GTP and PBTL Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
State of Alaska	Number of Units	100	320	650	810	870	1,010	1,280	1,540	1,680
	Percent of Vacant Units for Sale or Rent	1%	3%	6%	8%	9%	10%	13%	15%	17%
North Slope Borough	Number of Units	0	0	10	10	10	10	20	20	20
	Percent of Vacant Units for Sale or Rent	0%	0%	8%	8%	8%	8%	16%	16%	16%
Fairbanks North Star Borough	Number of Units	10	40	90	110	120	130	160	180	180
	Percent of Vacant Units for Sale or Rent	0%	1%	4%	5%	5%	6%	7%	8%	8%
Matanuska-Susitna Borough	Number of Units	30	80	150	190	220	270	340	410	460
	Percent of Vacant Units for Sale or Rent	2%	7%	13%	16%	19%	24%	30%	36%	41%
Kenai Peninsula Borough	Number of Units	0	10	10	20	20	20	30	50	50
	Percent of Vacant Units for Sale or Rent	0%	0%	0%	1%	1%	1%	2%	4%	4%

TABLE 5.4.2-37

Estimated Demand by the Project for Housing Units During GTP and PBTL Construction

		2019	2020	2021	2022	2023	2024	2025	2026	2027
Municipality of Anchorage	Number of Units	60	180	380	470	490	560	710	860	940
	Percent of Vacant Units for Sale or Rent	2%	7%	14%	18%	19%	21%	27%	33%	36%

Percent of Vacant Units is based on the number of available units today and does not incorporate any new development or addition of rental units.

5.4.2.3.5 Non-Jurisdictional Facilities

5.4.2.3.5.1 KSH Relocation project

It is anticipated that a large portion of the direct construction workforce for the KSH Relocation project would be KPB residents, and the relatively small number of indirect and induced jobs created by the project in the KPB could be filled by KPB residents who are unemployed or under-employed. Since these workers would already reside in the Borough, they would place no additional demands on local housing. In addition, because the KSH Relocation project would be constructed prior to the Project there would not be an overlapping competition for housing.

5.4.2.3.5.2 PTU Expansion project

The majority of the construction workforce would be billeted in temporary construction camps at Point Thomson as well as existing camps at Badami and in the Prudhoe Bay CDP area. The existing permanent operations camp at Central Pad would also be used. Consequently, the effect of the project on housing is anticipated to be temporary and minor.

5.4.2.3.5.3 PBU MGS project

The PBU MGS project would be completed in the same timeframe as GTP construction, and some construction workers would be housed in the GTP construction camps. However, should the project require additional camp space to accommodate workers, a mobile 200-person camp would be located on existing pads near construction activities. Consequently, the effect of the project on housing is anticipated to be temporary and minor.

5.4.2.4 Property Values

During Project scoping, some commenters raised concerns about the impact of construction and operation of the Liquefaction Facility and Mainline on property values. Estimates of current property values in the AOI based on property tax assessments are shown in TABLE 5.4.2-38 and Figure 5.4.2-1. Property taxes are generally based on the market value of property (corrected for exemptions).

In the boroughs that would be traversed by the Mainline, there are eight cities that collect property taxes. TABLE 5.4.2-38 presents estimated average property values for those cities. Values range from a low of $7,800 per acre in Houston to a high of $289,700 per acre in Fairbanks.

TABLE 5.4.2-38

Estimated Average Property Values in the Area of Interest, 2013

	Total Assessed Property Value[a]	**Approximate Assessed Land Area (Acres)[b]**	**Assessed Property Value Per Acre**
Fairbanks North Star Borough			
Fairbanks	$2,436,231,311	8,409[c]	$289,717
Matanuska-Susitna Borough			
Houston	$117,499,498	15,079	$7,792
Palmer	$387,204,774	3,297	$117,442
Wasilla	$940,460,404	8,369	$112,374
Kenai Peninsula Borough			
Homer	$617,987,712	8,348	$74,027
Kenai	$704,449,852	18,558	$37,959
Seward	$228,195,800	2,550[d]	$89,463
Soldotna	$454,586,635	3,940	$115,352

Source: ADCCED (2014c); Fairbanks North Star Borough (2016); Matanuska-Susitna Borough (2016); Kenai Peninsula Borough (2016); Municipality of Anchorage (2016)

Notes:

[a] Excludes local assessed personal property or state assessed value.

[b] Excludes water areas.

[c] Excludes military property.

[d] Excludes Resource Management areas.

[e] Excludes Chugach State Park, Chugach National Forest, and military property.

The left-hand map in Figure 5.4.2-1 shows the assessed property value per acre of land parcels in Nikiski, with the target acquisition area of the Liquefaction Facility outlined in red. Analysis of parcel data shows that approximately eight percent of Nikiski's land is used for industrial purposes, with the remainder used for residential or commercial purposes. Most parcels in the industrial land use category are located along an industrial waterfront and adjacent to an existing LNG terminal. The right-hand map in Figure 5.4.2-1 shows where high/low property values cluster spatially. The "hot spot" analysis tool was used to identify statistically significant spatial clusters of high property values (hot spots—shown in red) and low property values (cold spots—shown in blue) via the Getis-Ord Gi* statistic (Environmental Systems Resource Institute 2015). The average value of parcels in the high value clusters is $12,400 per acre, while the average value of parcels in the low value clusters is $5,000 per acre. The map shows that statistically significant spatial concentrations of high property values occur in residential areas located around lakes and in the city's downtown commercial area. Moreover, the map shows that there are concentrations of high residential and commercial property values in close proximity to industrial areas (shown in yellow). Residential and commercial parcels closer to industrial uses are generally not assessed at lower values per acre than parcels further away.

ASSESED PROPERTY VALUES IN NIKISKI

FIGURE 5.4.2-1

ALASKA LNG

LEGEND

Assesed Land Value (Dollars Per Acre)

- $0.00 - $1,665
- $1,665 - $3,156
- $3,156 - $4,682
- $4,682 - $6,204
- $6,204 - $7,828
- $7,828 - $10,813
- $10,813 - $16,209
- $16,209 - $24,155
- $24,155 - $37,230
- $37,230 - $65,000

Significant Assesed Land Value Clusters

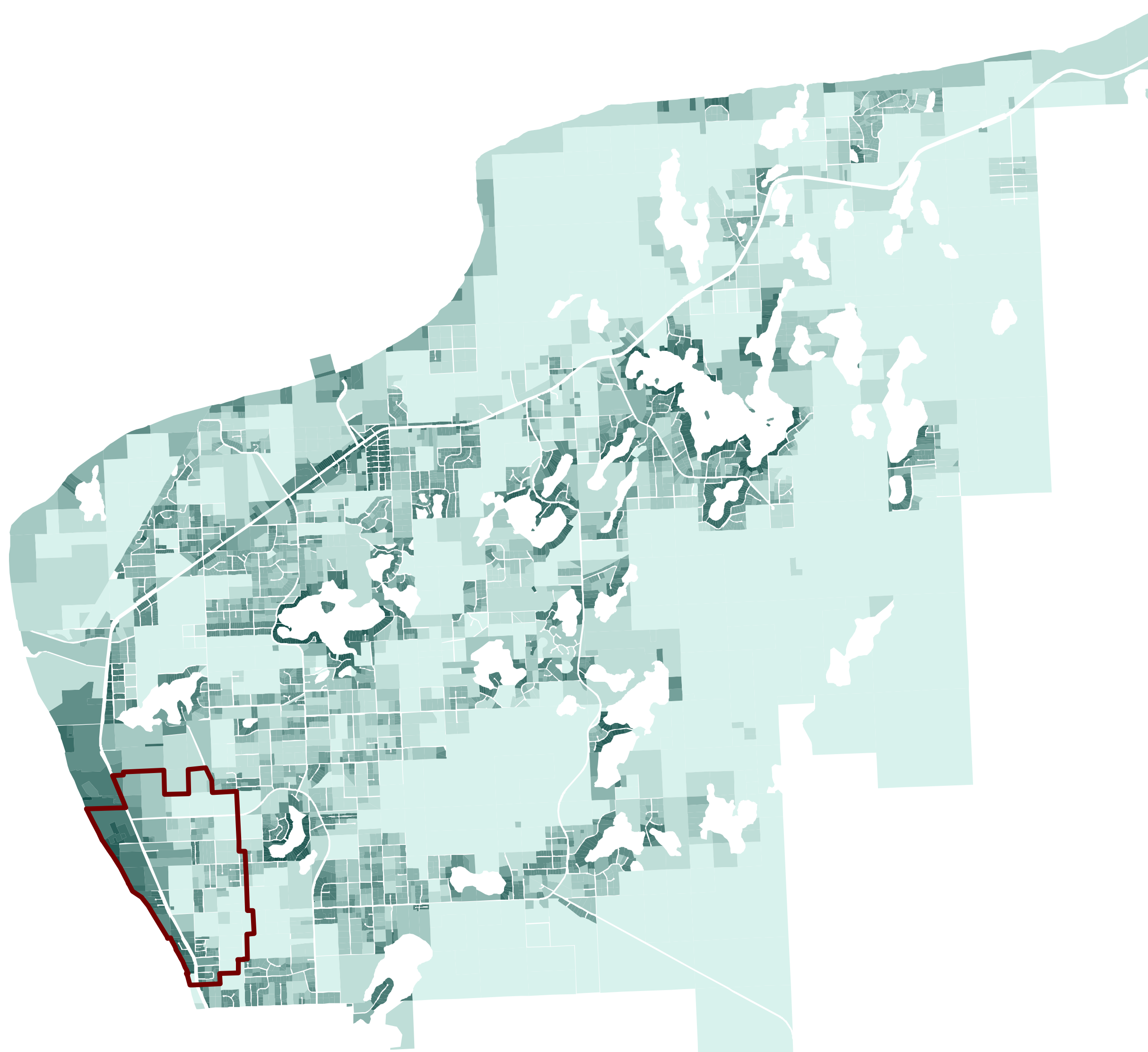
- Low Value Cluster
- Not Significant
- High Value Cluster

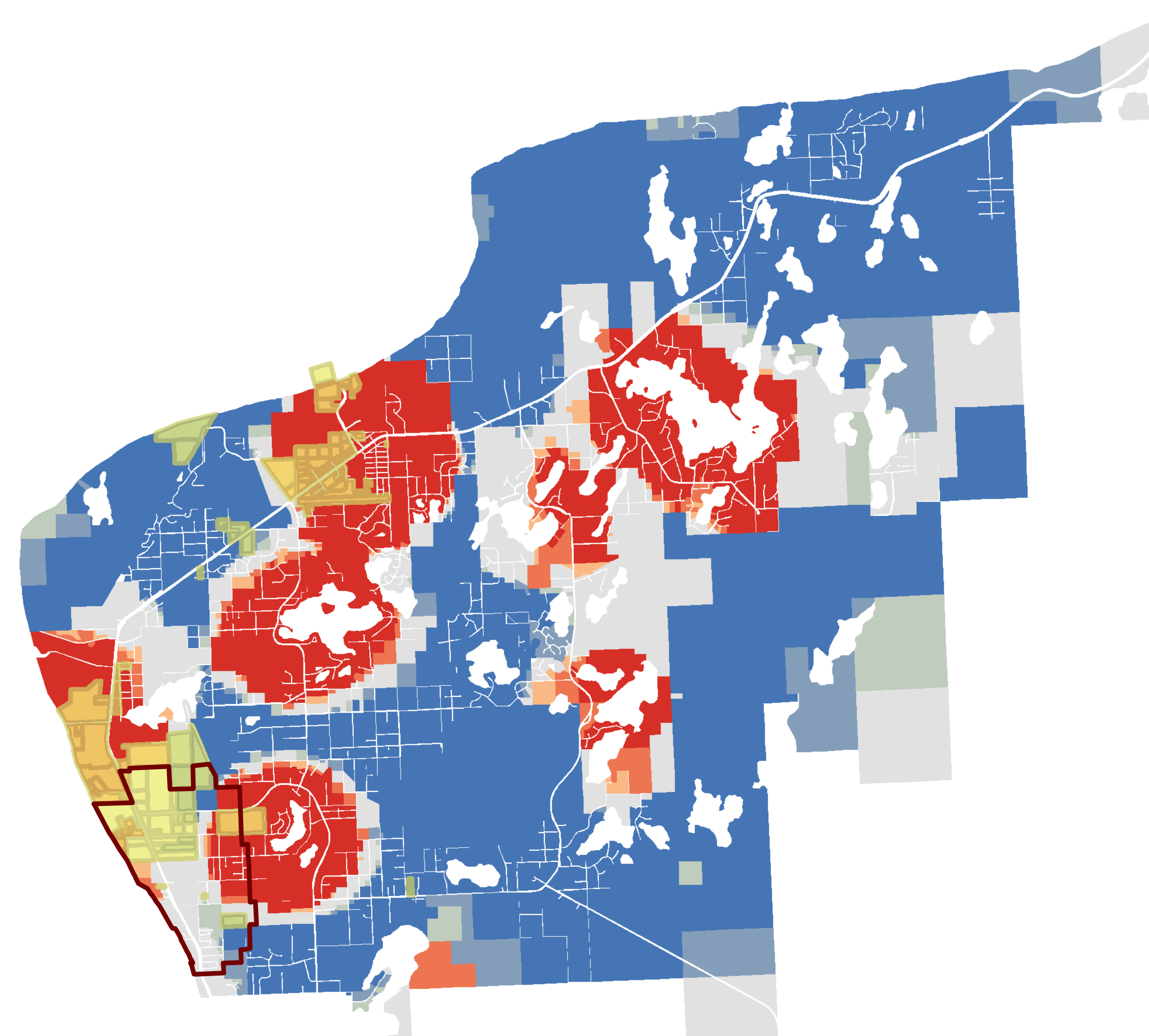
Areas of Interest

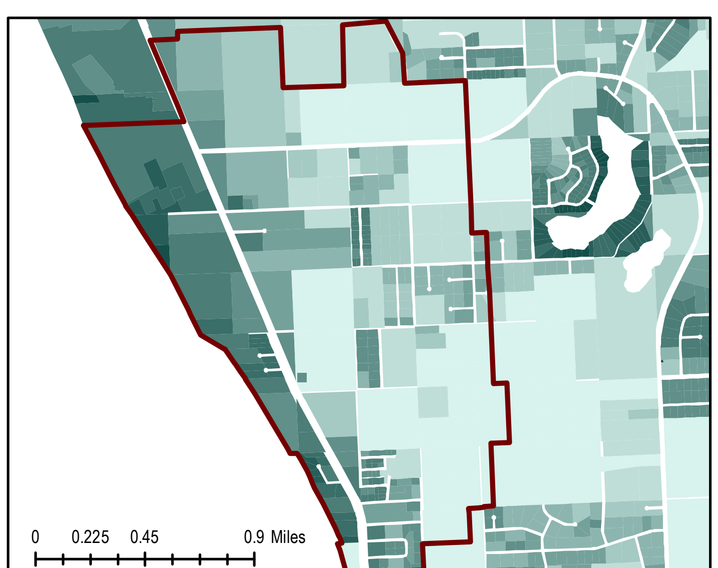
- LNG Target Acquisition Area
- Industrial Areas

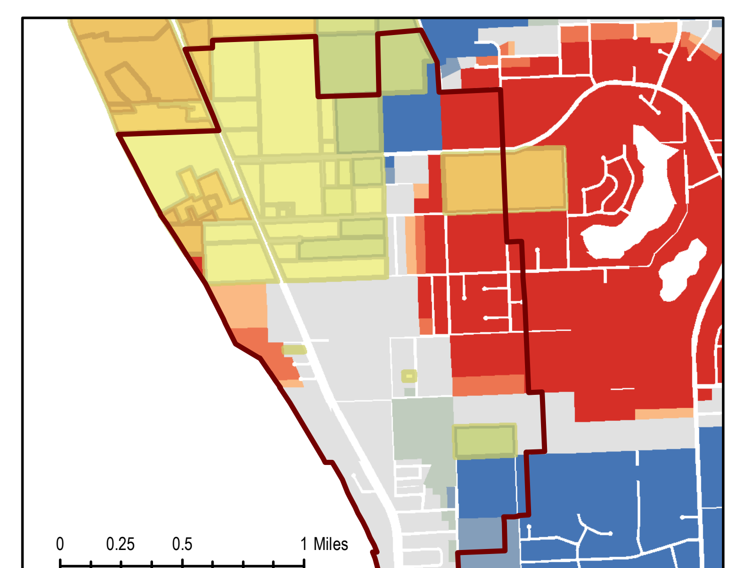
	Dollars Per Acre		
	High Value Cluster	Low Value Cluster	All Parcels
Mean	$12,415	$5,866	$9,168
SD	$9,824	$3,667	$7,879

0 0.75 1.5 3 Miles









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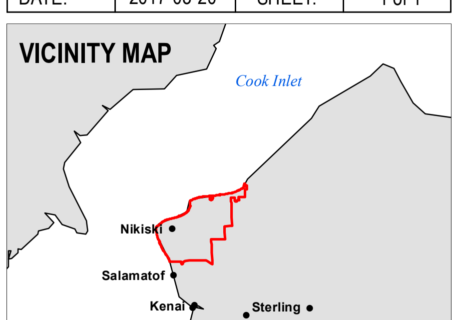
PREPARED BY:	NORTHERN ECONOMICS INC.		
SCALE:	1:120,000		
DATE:	2017-03-20	SHEET:	1 of 1

VICINITY MAP



5.4.2.4.1 Liquefaction Facility

Visual, noise, and dust impacts during construction of the Liquefaction Facility have the potential to affect residential and commercial areas in close proximity to the construction site through a possible reduction of land value. Resource Report Nos. 8 and 9 describes measures to mitigate the visual, noise, and dust impacts of Liquefaction Facility construction. As a result of these mitigation measures, the adverse impacts on property values in neighboring residential and commercial areas are expected to be temporary and minor. The temporary influx of individuals seeking jobs directly or indirectly created during construction of the Liquefaction Facility is expected to increase the demand for housing in the Nikiski and Kenai/Soldotna areas, which, in turn, would likely increase local housing costs and property values in the areas.

5.4.2.4.2 Pipelines and Aboveground Facilities

Visual, noise, and dust impacts during construction of the Mainline have the potential to affect residential and commercial areas in close proximity to the construction site through a possible reduction of land value. Potential damages to private property during proposed Project construction would be concentrated along the Mainline ROW and appurtenant facilities. Resource Report No. 9 states that approximately two percent of the Mainline ROW consists of residential land.

Resource Report Nos. 8 and 9 describes measures to mitigate the visual, noise, and land disturbance impacts of Mainline construction. As a result of these mitigation measures, the negative impacts of construction on property values are expected to be temporary and minor.

Both the PTTL and PBTL would cross public lands managed by the State of Alaska in an area of Prudhoe Bay occupied by oil and gas production facilities and operations. There are no residential or commercial buildings within the construction ROW of the PBTL or PTTL. Therefore, no effects on property values are expected.

5.4.2.4.3 GTP

The GTP would be constructed in an area of extensive industrial development, and no impact on the value of properties or homes is anticipated during construction.

5.4.2.4.4 Non-Jurisdictional Facilities

5.4.2.4.4.1 KSH Relocation project

The impact on property values during construction of the KSH Relocation project will be provided when a proposed route has been selected.

5.4.2.4.4.2 PTU Expansion project

The PTU Expansion project would be constructed in an area of extensive industrial development, and no impact on the value of properties or homes is anticipated during construction.

5.4.2.4.4.3 PBU MGS project

The PBU MGS project would be constructed in an area of extensive industrial development, and no impact on the value of properties or homes is anticipated during construction.

5.4.2.5 Displacement of Residences and Businesses

Resource Report No. 8 describes the number of residential and commercial buildings within 200 feet of the construction work area of the Project facilities and the impacts to these buildings. All residential and commercial land holdings would be acquired or controlled prior to construction. The land would no longer be classified as residential. Additionally, easements would be negotiated for the Mainline ROW. Therefore, no displacement of landowners within the Project facilities footprint would be anticipated as a result of construction.

5.4.2.6 Public Infrastructure and Services

During Project construction, the requirement that most Project workers filling direct, onsite jobs (both Alaska residents and nonresidents) must reside in construction camps while on rotation would mitigate adverse impacts on public infrastructure and services. KPB residents engaged in the construction of the Liquefaction Facility would potentially commute daily from their homes, and, therefore, are not projected to create additional demand for public infrastructure and services.

The temporary construction camps would be self-contained and would be operated and maintained throughout the Project construction phase. Some camps would be relocated as the construction work progresses. In addition to housing facilities, the camps would typically be equipped with appropriate recreation and emergency medical facilities for Project workers, electrical power generation, fuel storage, facilities for sewage gathering and/or treatment, and waste incineration and management facilities. An exception would be the GTP construction camp, which would have first aid capabilities only and would rely on the Fairweather Deadhorse Medical Clinic or Prudhoe Bay Operations Center for emergency medical response. Depending on availability, potable water for the construction camps would be piped or trucked in, or water wells may be drilled at the camp location.

While the direct effects of Project construction on the demand for public infrastructure and services are expected to be minor, the indirect effects could be significant in some areas of the AOI. As discussed in Section 5.4.2.1, a temporary increase in population would occur through hiring by local employers not directly related to the Project or by way of in-migration. This surge of economic in-migrants would boost the demand for borough and community infrastructure and services. At the same time local governments would experience increased staffing requirements to address this higher demand, government workforce retention may become an issue because high-paying Project construction jobs may attract public service employees, including law enforcement officers, fire protection and emergency medical service personnel, and teachers. In particular, lower-paid public service jobs such as clerical positions may go unfilled as workforce assets shift to higher-paying jobs created by the Project. In addition, ambulance services and fire departments that rely on volunteers may find it more difficult to recruit and retain volunteers as workloads increase. This concurrent difficulty in retaining government employees and rising demand for public services could result in a reduction in the quantity and/or quality of government services.

Increases in the cost of living and lack of affordable housing may also make it difficult for local government agencies to hire and retain personnel. During construction of TAPS, turnover in some public sector jobs was made worse when individuals left areas that experienced high population growth, such as Fairbanks, due to their inability to find adequate, affordable housing (Information Insights 2004). Construction of the Project is expected to result in an increase in housing prices that is significant but not excessive in those areas where temporary influxes of economic in-migrants are expected, such as the Municipality of Anchorage, MSB, and KPB (TABLE 5.4.2-33).

5.4.2.6.1 Municipal Impact Aid Grant Program

To some extent, the magnitude of Project construction impacts on public infrastructure and services would depend on when and to what level the requirements of economic in-migrants are addressed. Planning and use of impact funds to relieve the stress on public infrastructure and services in Fairbanks caused by the large, short-term influx of outsiders during construction of TAPS, were generally characterized as "too little, too late" (Information Insights 2004). The impacts to public infrastructure and services realized by Fairbanks and other municipalities during TAPs construction were experienced well before any remuneration of tax receipts from an increased tax base were collected, and there was a lack of support and financial assistance to municipalities prior to construction. The result was overburdened law enforcement, medical, and educational facilities (Information Insights 2004). Appendix A provides further details on TAPS construction and describes subsequent changes in the State's economy that could result in differences between the impacts of TAPs construction and construction of the Project.

The potential economic impacts of this Project are of a lower magnitude to the State of Alaska than TAPS at the time of construction. However, the Applicant recognizes that initial impacts to communities during construction will be realized, and some of them may be in the form of higher burdens on government and community infrastructure and services prior to receipts of economic benefits such as increased local taxes. In light of these strains on public infrastructure and services, an impact fund could be developed. The Municipal Advisory Gas Project Review Board has discussed ways to allocate these potential impact payments among affected communities, including potential impact payments being placed in a non-lapsing capitalized fund that would be divided into two sub funds, one for the purpose of addressing impacts statewide and on unincorporated communities and the other to fund a grant program to distribute funds to affected municipalities (MAGPRB Annual Report 2015). The funds for municipalities would be administered by ADCCED as a municipal impact aid grant program. To be eligible to receive assistance under the program, municipalities would demonstrate that the construction of infrastructure for the Project has a direct impact on the municipality or the municipality's residents. ADCCED would accept applications and award grants on a continuous basis throughout the impact period. Once a project is approved, grant funds would be provided promptly, without requiring the grantee municipality to advance its own funds to initiate the project. As described in MAGPRB Annual Report (2015), examples of impacts that projects eligible for municipal impact aid grants may address might include:

- increased public safety needs: police protection, search and rescue, fire protection, and emergency medical services;
- increased public health and social service needs: hospitals, clinics, emergency medical facilities, alcohol and drug abuse facilities, mental health facilities, homeless shelters, waste disposal systems, and water distribution systems;

- increased burdens on municipally owned utilities: electric generating plants and distribution systems, waste disposal, water supply systems, telephone systems, and any fuel distribution systems;
- increased need for housing, educational and other public services and facilities: educational institutions, recreational facilities, daycare centers, affordable housing and related infrastructure, and local and regional roads and transportation systems; and
- planning, design, and engineering activities related to an eligible project.

Information is not yet available on how a potential fund addressing the Project's impact on the State and on unincorporated communities would be implemented.

The potential effects of Project construction on municipal services, such as schools, medical facilities, police, fire protection, and utilities are discussed below, together with proposed measures to mitigate these impacts, including the municipal impact aid grant program.

5.4.2.6.2 Schools

As discussed in Section 5.4.2.1, it is expected that relatively few incoming Project construction workers would bring their families to Alaska due to the requirement that workers reside in construction camps as well as other factors. However, Section 5.4.2.1 also noted that some in-migrating job seekers would be accompanied by families that include school-age children, and that would increase the population in some schools in the boroughs where the in-migrants reside. In addition, some Alaska residents could choose to move to the Municipality of Anchorage, Fairbanks, or other potential Project logistics hubs in the State. Most of the significant Project-related growth in the number of school-age (five to 17 years old) children would occur in areas where there would be increases in employment opportunities as a result of purchases by the Project and payroll spending by Project employees and third-party contractors (TABLE 5.4.2-2). As described previously, these areas include the Municipality of Anchorage, KPB, and MSB.

It is not anticipated that the temporary increase in the number of school-age children would result in a demand for new schools because the students would be dispersed over several communities and within communities. However, the additional students would require additional funding by the State and local governments, and could potentially result in increased classroom sizes and higher student-teacher ratios. If necessary, portable classrooms may need to be added to existing schools.

In addition, the change in racial and ethnic diversity that may accompany the temporary influx of in-migrants described in Section 5.4.2.1 could lead to a higher percentage of students whose primary language or language of influence is not English and who are learning the English language. In all Alaska school districts, students with limited English proficiency qualify for English language development services and academic support to assist them in meeting the same academic standards and content that all students are expected to meet. As a result, these students typically require additional funding. As noted in Section 5.4.2.1, the KPB would likely experience the largest percent increase in minority population because of its current, predominantly white population and the relatively large projected percent increase in the population during Project construction. While the Kenai Peninsula Borough School District has a well-established English Language Learner program, the number of participating students is small in comparison to most other school districts in the State, and there may be insufficient resources to meet an increased demand for English language teaching.

Moreover, children of economic in-migrants who don't have stable housing may qualify for special assistance through the Students in Transition Program (Alaska Department of Education and Early Development 2013a). This program relies heavily on public donations, and the staff member is funded out of a separate federal grant (Vlasak 2015). Current funding may be inadequate to provide assistance to the additional qualifying children during the Project construction phase.

These impacts to educational facilities and services may be mitigated by impact payments as described in Section 5.4.2.6.1. If municipal impact aid grants are available, they may fund projects that address impacts to educational institutions. For example, potential grant funds could be used for hiring additional teachers and other educational staff during the period of construction. The Applicant will initiate discussions with the Alaska State Board of Education and the Alaska Department of Education and Early Development to identify ways to minimize impacts.

5.4.2.6.3 Health Care

The temporary construction camps built by the Project would provide onsite healthcare to respond to minor medical needs for the construction workforce. Most construction camps would have trained medical staff and dedicated transportation (i.e., ambulances or helicopters) to handle routine and emergency response. An exception would be the GTP construction camp, which would have first aid capabilities only and would rely on the Fairweather Deadhorse Medical Clinic and Prudhoe Bay Operations Center in the Prudhoe Bay CDP for emergency medical response. Both medical facilities currently have excess capacity due to the decline in the oil and gas industry workforce on the North Slope. At times, the Fairweather Deadhorse Medical Clinic has been temporarily closed because of low patient volume (Stephens 2017). Moreover, additional medical clinics on the North Slope could be available for use by the Project, such as the clinics operated by ConocoPhillips Alaska at the Alpine and Kuparuk oil fields. Therefore, it is anticipated that any increase in demand for emergency medical services on the North Slope resulting from Project construction would readily be accommodated by existing clinics. The Project would implement "fit-for-duty" screenings of incoming construction workers to decrease the number of Project non-related injuries/illnesses requiring medical treatment at worksite facilities or community medical facilities.

Illness or injuries requiring advanced medical care would be treated in existing hospitals, including those located in Barrow, Fairbanks, Anchorage, and Soldotna. In the event of an accident at a Project construction site, and if local hospitals are at capacity, medical evacuation to another hospital would be provided. Existing larger medical facilities, such as those in Fairbanks and Anchorage, are adequate to handle the increase in the demand for medical services during Project construction, including the increase resulting from the influx of in-migrants seeking work, and the additional families that may move to areas of the State. However, some smaller health care facilities are currently sometimes operating at full capacity. As described in Section 5.3.4.2, the medical/surgical floor at Central Peninsula Hospital in Soldotna has been at capacity in recent years. An unplanned increase in demand would necessitate either expensive transfers to Anchorage or building more bed capacity. Moreover, the hospital's emergency department could handle a moderate increase in volume, but anything substantial would require expansion of the department.

Another concern is that some economic in-migrants would have no regular health care provider and would use hospital emergency rooms as primary care access points (Information Insights 2004). In addition to experiencing overburdened emergency rooms, healthcare facilities may encounter an increase in uncollectable debt as the number of uninsured patients increases. Moreover, given that many in-migrants would have transient living situations, an increase in unreimbursed care could result due to an inability to bill patients because of inaccurate billing information.

These impacts to medical facilities and services may be mitigated by impact payments as described in Section 5.4.2.6.1. If municipal impact aid grants are available, they may fund projects that address impacts to hospitals, clinics, emergency medical facilities, alcohol and drug abuse facilities, and mental health facilities. For example, potential grant funds could be used for expanding the capacity of medical facilities or hiring additional medical personnel during the period of Project construction. The Applicant will initiate discussions with the Alaska State Hospital and Nursing Home Association and the Alaska Native Tribal Health Consortium to identify ways to minimize impacts.

5.4.2.6.4 Emergency Services

The Liquefaction Facility worksite would be largely self-sufficient with respect to emergency response services, including medical facilities and small-scale fire response. Resource Report No. 11 provides additional information on Project impacts on local fire departments and emergency response agencies and mitigation measures addressing those impacts.

A rise in emergency ambulance and fire calls is possible as a result of an increase in auto accidents and injuries that result from Project-related traffic on area roads, and from Project-related population change. As shown in TABLE 5.4.2-1, the Municipality of Anchorage, MSB and KPB are expected to experience significant population increases during Project construction.

As discussed in Section 5.3.4.3, during many days, EMS services in Nikiski, Kenai, and Soldotna are currently understaffed relative to the number of calls received, and the KPB’s multi-agency 911 dispatch center is shorthanded. Any increase in call volume during Project construction would exacerbate these understaffing problems. Moreover, as discussed above, ambulance services and fire departments may find it more difficult to retain and recruit volunteers as a result of the high-paying jobs created during Project construction. The Nikiski Fire Department, which provides fire protection and emergency medical services for the community, has a high percentage of volunteer personnel. Central MatSu Emergency Services, which provides EMS services in the MSB outside of Palmer and Wasilla, also relies heavily on volunteers. Should the workload of EMS service providers increase as a result of emergencies related to Project construction, they may be compelled to hire full-time paid professionals, rather than continuing to rely on volunteers.

Consultations would be held with local emergency response services. Any adverse impacts to these services may be mitigated by impact payments as described in Section 5.4.2.6.1. The impacts might be eligible if there are municipal impact aid grants and they include impacts to search and rescue, fire protection, and emergency medical services. Potential grant funds could be used for hiring additional fire fighters and emergency medical service personnel during the period of construction. The Applicant will also initiate discussions with the State Emergency Response Commission to identify ways to minimize impacts.

5.4.2.6.5 Law Enforcement

As discussed above, the construction camps for Project facilities are expected to be closed camps, with workers required to remain within the camps while off duty. Activities of camp security staff would include tracking, sorting, and implementing daily transits to and from the camps during rotations, demobilizations, and mobilizations, and securing the camp perimeter from unauthorized entry or exit. In addition, hiring procedures, training, screening, and camp rules would be implemented to reduce issues of workplace and community illegal activities. Because of the use of their own security personnel, the camps would place minor requirements on local law enforcement agencies.

While the direct effects of Project construction on the demand for law enforcement services are expected to be minor, the indirect effects could be significant in some areas of the AOI. As noted in Section 5.4.2.1, it is anticipated that during Project construction a temporary increase in population would occur due to in-migration expected to occur through hiring by local employers not directly related to the Project. As shown in TABLE 5.4.2-1, the Municipality of Anchorage, MSB and KPB are expected to experience significant population increases during Project construction. As with any major construction project in Alaska that brings in workers from large metropolitan areas or from outside of the State, some communities in the AOI may experience an increase in anti-social behavior, including crimes against persons and property. Further, economic boom situations may attract illegal activities, such as prostitution and drugs (U.S. Department of Energy 2007).

While law enforcement staffing is quite high in areas of concentrated population, such as the Municipality of Anchorage, the same cannot be said for smaller communities in the AOI (U.S. Department of Energy 2007). These small communities might have a more difficult time coping with the potential increased crime resulting from short-term residency of economic in-migrants. For example, while Kenai and Soldotna have their own police forces, public safety resources, such as police officers and patrol cars, are limited. Nikiski has no police department since it is an unincorporated city; it relies on Alaska State Troopers at the Soldotna Post for law enforcement services. Much of the MSB is in a similar situation, with the Alaska State Trooper Post in Palmer providing law enforcement services over a large portion of the borough. As discussed in Section 5.3.4.3, recent State budget cuts have led to the loss of positions in the Division of Alaska State Troopers and the closure of some Alaska State Trooper posts. Local and State law enforcement departments that are already short-staffed would find it particularly difficult to deal with higher crime rates if they lose many employees to Project contractors/subcontractors, who hire them on for higher wages as security personnel.

These impacts to law enforcement services may be mitigated by impact payments as described in Section 5.4.2.6.1. If municipal impact aid grants are available, they may fund projects that address impacts to police protection. For example, potential grant funds could be used for hiring additional police officers and acquiring additional law enforcement resources during the period of construction. The Applicant will initiate discussions with the Alaska Peace Officers Association to identify ways to minimize and mitigate impacts.

5.4.2.6.6 Utilities

5.4.2.6.6.1 Water and Sewage

During construction of the Liquefaction Facility, two to three wastewater treatment systems would be constructed. One would be located near the construction camp, the second near the concrete batch plant, and a third potential system may be built to support hydrotesting. Water would be sourced from water wells, with the exception that hydrotest water would come from Cook Inlet. These wells would provide approximately 1.4 million gallons per day and be used for construction. They are not currently planned to support operations. Groundwater wells would also be used for the temporary potable water plant.

Each Mainline construction camp would be fully self-sustaining with water treatment and wastewater treatment facilities. Water would be sourced from various nearby sources if possible or trucked into the camp from more distant locations and treated for use within the camp. Liquids from the wastewater treatment plant would be disposed of in accordance with permits, and solids would be incinerated or disposed of at an appropriate disposal facility.

The GTP pioneer camp would not have onsite water/wastewater treatment. The camp would use existing water sources and wastewater treatment facilities within NSB's Service Area Ten, which provides utilities to industrial clients in the Prudhoe Bay area. These existing water and sewage treatment facilities are adequate to handle the increased demand. The GTP would develop a reservoir filled with water from the Putuligayuk River during spring break-up. The reservoir would supply water to the integrated construction and operations camp as well as process water and other uses during operation of the GTP. The GTP would also have two Class I industrial injection wells to dispose of the water from the water treatment plant and other liquid waste streams. Solids from the water treatment plant would be disposed of at appropriate disposal sites in accordance with permits.

Existing water and sewage treatment facilities in urban centers, such as Fairbanks and the Municipality of Anchorage, are adequate to handle the increased demand that would result from the temporary influx of economic in-migrants during Project construction. Kenai and Soldotna also have enough spare water and sewage treatment system capacity to handle a significant demand growth as a result of the arrival of economic in-migrants, although Soldotna's water distribution and sewage collection system would need to be expanded and extended to accommodate the additional service hookups. In addition, any service expansion into the Nikiski area would require extension of the Kenai distribution and collection system (Persily 2015). The current capacities of utility systems in some small, rural communities expected to experience significant population increases during Project construction may be unable to accommodate the with the increased demand. For example, Talkeetna's central sewer and water system, which is owned and operated by the MSB, is currently in need of improvements, but the community itself has insufficient financial resources to upgrade the system (CRW Engineering Group 2014). Because Talkeetna is currently unincorporated and, therefore, cannot collect taxes to plan for and provide the additional utility capacity required to accommodate a rapid increase in population, the MSB would likely be responsible for these tasks.

Additional information on water and wastewater treatment facilities that would be provided for construction of Project facilities is presented in Resource Report No. 1. Additional information on impacts to water resources is provided in Resource Report No. 2.

Impacts to community water and sewage systems may be mitigated by impact payments as described in Section 5.4.2.6.1. If municipal impact aid grants are available, they may fund projects that address impacts to waste disposal and water supply systems. For example, potential grant funds could be used to expand these facilities to meet the increased demand during the period of construction. The Applicant will initiate discussions with the appropriate entities in the affected areas to identify and discuss options to minimize and mitigate impacts to community water and sewage systems.

5.4.2.6.6.2 Solid Waste

Waste material generated during construction of all Project facilities would be disposed of as required by federal, State, and local regulations. A detailed description of the proposed waste characterization procedures, estimated waste quantities, and waste handling/disposal procedures during Project construction is provided in the Project's *Waste Management Plan*. This plan addresses hazardous and non-hazardous waste materials in detail and is provided as an appendix of Resource Report No. 8. The *Waste Management Plan* includes procedures to reduce the impacts on local solid waste utilities. Impacts to these utilities would be temporary and minor relative to the volume of waste currently disposed of in existing landfill facilities.

Construction of the Liquefaction Facility would rely on available landfill and waste handling capabilities in the KPB, primarily the Central Peninsula Landfill. The Central Peninsula Landfill is a State-permitted solid waste disposal facility maintained by the KPB. It is located south of Soldotna, about 22 miles from the proposed Liquefaction Facility. About 98 percent of the borough's population of 55,000 is served by this landfill. For the last decade, the landfill has disposed of 53,000 tons per year of solid waste. The Central Peninsula Landfill design capacity covers projected needs through 2035 (Persily 2015). During peak construction years, the Liquefaction Facility would generate about 4,100 tons per year of solid waste from construction camp operations and construction debris that would be transported off site, less than 8 percent of current landfill use. Also, wastes that cannot be managed onsite would be transported offsite to approved treatment, disposal, or recycling facilities at other sites in Alaska or the Lower 48. Non-exempt hazardous waste would be sent to disposal facilities outside of Alaska.

Existing waste storage and processing facilities at Point Thomson would be used to support the PTTL construction and operation in accordance with regulatory requirements. Additional incinerators may be mobilized temporarily if needed to provide increased capacity to support construction and operation. Wastes that cannot be managed onsite would be transported offsite to approved treatment, disposal, or recycling facilities at other Alaska North Slope locations (such as the Deadhorse Oxbow landfill operated by the NSB) or other sites in Alaska or the Lower 48. Non-exempt hazardous waste would be sent to disposal facilities outside of Alaska.

Construction of the GTP would plan to use the Deadhorse Oxbow landfill for most solid waste disposal. The annual amount of solid waste delivered to the landfill increased from about 80,000 cubic yards in 2006 to 141,000 cubic yards in 2015 (Ice Services 2016). Recently, the Deadhorse Oxbow landfill added one additional waste cell because the existing disposal cell was nearing capacity. The estimated life of the expanded facility is 30-40 years (Olson 2016).

PTU Expansion project waste would be managed on site to the extent practicable using an incinerator and disposal wells; waste would be hauled offsite to an approved disposal facility when required. The PBU

MGS project waste would use the Deadhorse Oxbow landfill for most solid waste disposal. The KSH Relocation project would use the Central Peninsula landfill for solid waste disposal.

5.4.2.6.6.3 Energy

Electricity

The initial power demand during construction of the Liquefaction Facility would be approximately 17 to 28 megawatts with a demand of 7 to 10 megawatts for the site and 10 to 17.5 megawatts for the construction camp. Actual power requirements would vary as the construction manpower loading changes during the summer and winter months. Portable generators would be onsite for both back-up and active work (e.g., welding). In addition, the potential use of Homer Electric Association's power during construction of the Liquefaction Facility is under consideration. The amount of power that would be obtained from Homer Electric Association during construction would likely be small in relation to Homer Electric Association's current generating capacity, which totals more than 200 megawatts (Homer Electric Association 2014), and the sale of electricity by Homer Electric Association to the Project is not expected to decrease the service to other customers of the utility. The utility would benefit from the additional revenue generated by these sales, and, in turn, this increased revenue could result in lower electrical rates for customers.

Other Project facilities would have independent power generation units and would have no effect on local electric utilities during the construction phase. Additional information on electricity use during construction of Project facilities is presented in Resource Report No. 1. The PTU Expansion project and the PBU MGS project would also have independent power generation units and would have no effect on local electric utilities. Electricity use by the KSH Relocation project is unknown but anticipated to be minor compared to the generation capacity of HEA.

Fuel

The demand for Ultra-low Sulphur Diesel (ULSD) during construction of Project facilities is expected to be supplied primarily by in-state sources. Two refineries, Petro Star in Valdez and Tesoro in Kenai, are available in Alaska to source ULSD, and together they have excess idle capacity of about 11 million gallons per month. The Project's peak demand during construction of 7 million gallons of ULSD per month could be met by the in-state refiners, although some fuel may need to be imported during the summer months when in-state demand for refined product is at its peak. This demand estimate includes fuel needs for the PTU Expansion and the PBU MGS projects. However, current internal distribution resources and infrastructure for storage is not geared for the peak demand for ULSD during Project construction.

The prime construction contractor may be required to build and operate a fuel depot to be used during the construction period for the Liquefaction Facility. Prior to the fuel depot being installed, subcontractors would provide their own fuel resources. Each Mainline construction camp would have fuel tankage, and fuel depots along the Dalton Highway would provide additional fuel storage in the event of disruption in fuel delivery to the construction camps. The GTP construction camp would also have fuel tankage and would develop separate fuel storage facilities on the GTP pad. Fuel for construction would be trucked to the site and stored for use as needed.

To mitigate potential impacts on existing users, new ULSD supplies, delivery supply chains, and storage facilities would be developed to support Project construction. The expectation is that most fuel used during Project construction would be provided by in-state refiners but fuel could be shipped from the Lower 48 as needed.

Additional information on fuel use during construction of Project facilities is presented in Resource Report No. 1. The KSH Relocation project fuel requirements are unknown but are anticipated to be insignificant compared to the refining capacity of the nearby Tesoro refinery.

5.4.2.7 Transportation

A complex multimodal network of highway, rail, ocean, and air transportation would be required for the construction of the Project. Construction of the separate Project facilities would require the simultaneous use of many of the same roads, railways, ports, and airports. A discussion of the impacts on these modes of transport and the routes during Project construction is presented in the following sections. Additional information on transportation logistics can be found in Resource Report No. 1. Section 8.9 and Appendix F of Resource Report No. 8 also provide more information regarding the potential effects of the Project footprint on roads and other transportation infrastructure.

It is anticipated that mobilization of construction equipment and materials would begin in 2019, with a target date for actual Project construction beginning in late 2019 (See Table 1.5.1-1 in Resource Report No. 1 for additional schedule detail). The majority of construction equipment and materials would be shipped from foreign ports and ports in the Lower 48 to designated Alaska ports via commercially available barging and ship transport. Once the materials and equipment arrive in Alaska, they would be distributed by rail, truck, and air to predetermined construction sites. Many of the construction personnel would also originate from outside Alaska. These workers would arrive at various regional airport hubs in the State and then be transported to construction sites by air or bus.

In the following subsections, the description of the transportation impacts of Project facilities located on the North Slope (GTP/PBTL/PTTL) include all the facilities in combination, plus the non-jurisdictional facilities located on the North Slope (PBU MGS project and PTU Expansion project). These facilities would be constructed during the same general time period, and the effects of their construction on the transportation system would be understated if the facilities were evaluated separately. Any mention of Project-related traffic for North Slope destinations includes the non-jurisdictional facility traffic even if non-jurisdictional facilities are not directly specified.

There would be indirect effects on the transportation system due to the population changes that would occur as a result of the Project, including people that migrate into a region seeking Project employment, or seeking work in other sectors of the economy. These transportation effects would be concentrated in those areas where the most employment opportunities as a result of purchases by the Project and payroll spending by Project employees and third-party contractors would occur. As described previously, these areas include the Municipality of Anchorage, KPB, and MSB.

5.4.2.7.1 Ports, Harbors, and Marine Shipping Channels

5.4.2.7.1.1 Ports and Harbors

The majority of equipment and materials used in construction would be shipped to Alaska using ships and oceangoing tugs pulling barges. Southcentral Alaska ports accessible through the Gulf of Alaska, such as those in Anchorage, Seward, and Nikiski would be the likely points of entry for offloading equipment and materials. Additionally, improved docking facilities in Prudhoe Bay would be used to receive modules, equipment, and material during the ice-free shipping season.

No single southcentral Alaska port has the current capacity to receive the volume of cargo required for construction of the Project and the non-jurisdictional facilities. Moreover, each port has unique qualities that lend it better to certain types of cargo and modes of transport off the dock and to the existing road and rail system. Therefore, multiple existing ports, together with the proposed Project MOF at Nikiski, would be used. TABLE 5.4.2-39 lists the primary ports during Project construction and summarizes their principal uses. The location of these primary ports is shown in Figure 5.3.5-1.

TABLE 5.4.2-39

Purpose of Primary Ports in the Area of Interest During Project Construction

Port of Anchorage	Municipality of Anchorage	Primary port of entry for receipt of food and other construction camp supplies, breakbulk materials, truckable modules, pipe, and fuel.
Beluga Landing (Mainline MOF)	Kenai Peninsula Borough	Used for receipt of pipe and other materials for the construction of the southernmost spreads of the Mainline and for construction of the offshore pipeline.
Port of Nikiski (Pioneer MOF and Project MOF)	Kenai Peninsula Borough	Existing dock facilities located north of the Liquefaction Facility would be used as an offloading facility for construction materials and equipment for the Liquefaction Facility until Project MOF is built.
Port of Seward	Kenai Peninsula Borough	Entry point for pipe, truckable modules, and other construction materials.
Port of Dutch Harbor	Aleutians West Census Area	Used by GTP and non-jurisdictional facilities (PBU MGS project and PTU Expansion project) for customs importation of the major sealift modules.
Prudhoe Bay West Dock	North Slope Borough	Entry point for GTP and PBU MGS project. It could also be used by the PTU Expansion project for delivery of materials via coastal barge to the Point Thomson Marine Facilities.

As described in Section 5.3.5.1, there are a number of secondary ports that under certain circumstances could be considered for use during Project construction. The Port of Whittier has on-dock rail and road access and is a key alternate port for breakbulk and containerized materials that need to be delivered to locations north of Fairbanks. The Port of Homer could be used as an alternate port for receipt of Liquefaction Facility construction materials. Port MacKenzie has highway access and plans for a rail spur to connect to the ARRC mainline and could be used for receipt of Mainline or offshore pipe. The Ports of Valdez and Skagway offer highway access to Interior Alaska. In addition, Skagway is able to receive materials from Canada by road, and these materials can be loaded onto common carriage barges heading north to other southcentral Alaska ports. The Ports of Adak and Nome could potentially be used as safe havens for barges and ships traveling to other ports in the North Slope. Point Thomson Service Pier is a possible receiving point for major sealift modules and heavy equipment for the PTU Expansion project. While these ports could be used to support Project construction, their level of use is uncertain, and an evaluation of the potential impacts of using these ports is speculative since they are not in current Project execution plans. As a result, the secondary ports are not considered alternatives to the primary ports listed above.

The following sections further describe how each primary port may be used for the delivery of Project construction materials and equipment, including the number and frequency, as well as seasonality, of trips by ships and tug and barge sets during construction and what port upgrades may be necessary.

Port of Anchorage

The Port of Anchorage is the most developed point of entry for Alaska and is the best suited for receiving Project construction materials in either containerized or Ro/Ro from the Ports of Seattle and Tacoma. It would be the likely point of entry for breakbulk materials, truckable modules, and various materials of standard load size.

Table 5.4.2-40 summarizes the estimated use of the Port of Anchorage during Project construction. Cargo quantities are indicated in forty-foot equivalent units (FEUs) because the transportation would be via commercial ship service providers which allocate space based on FEUs. The peak year requirements would represent a more than 30 percent increase in the amount of containerized freight received by the port in comparison to the annual average amount recorded at the port during the 2005–2014 period (Section 5.3.5.1).

All support through the Port of Anchorage during Project construction is expected to be provided via commercial service rather than chartered vessel. As described in Section 5.3.5.1, there are only two operators that provide commercial ship transportation service on the Anchorage-Seattle/Tacoma route: Matson, which provides container service, and TOTE Maritime, which provides Ro/Ro service. There are 208 scheduled commercial sailings per year by the two marine transport service providers. It is assumed there would be at least one piece of Project-related freight item on every sailing. The two marine service providers have a seasonally weighted annual utilization rate of approximately 82.5 percent. If the current utilization by other shippers stays the same, additional sailings would be required to meet the increased demands from the project in 2022, 2023, and 2024. One of the service providers has existing marine vessels that could be shifted to the Alaska service to meet this increased demand.

TABLE 5.4.2-40

Estimated Use of the Port of Anchorage During Project Construction

	2020	2021	2022	2023	2024	2025	2026
Materials (short tons)	161,722	245,864	304,740	486,754	377,678	351,170	71,284
Number of FEUs[c]	12,226	18,587	23,038	36,798	28,552	26,548	5,389
Vessel Calls	208(a)	208[a]	230[b]	217[b]	214[b]	208[a]	208[a]
Days of Dock Time Unloading Ships	17	26	32	51	40	37	7
Dock & Crane Utilization	5%	7%	9%	14%	11%	10%	2%

Source: Alaska LNG (2016)
Notes:
[a] Matson and TOTE each have 104 scheduled sailings to the Port of Anchorage, making a combined total of 208 vessel calls each year.
[b] Includes additional sailings required to meet project demands using the assumption the current utilization rate for TOTE and Matson stays the same.

There are no clear infrastructure limitations identified with activities associated with the Project's use of the Port of Anchorage during construction. With the current utilization of the port estimated to be approximately 40 percent, in conjunction with peak utilization by the Project of 16 percent (Table 5.4.2-40), the total port utilization would be at 56 percent. However, the port has a shortage of available land for storage, and increased shipping activity would exacerbate existing traffic congestion on the roads in the port area. In addition, the Port of Anchorage has a modernization program over the next seven to nine years that may limit the use of Anchorage as a primary port other than general cargo via the two regular ship lines that currently lease the port's docks. At times, the program could limit the cargo staging capacity and impact the ability to offload ships. If this event should occur during Project construction, the planned port of entry could be shifted to another location temporarily. The Ports of Valdez and Seward are two alternative ports of entry to Anchorage that could be utilized should the Port of Anchorage become overwhelmed with the combination of general traffic and project traffic. Neither port could function effectively as a full replacement of the Port of Anchorage. The Ports of Valdez and Seward are suitable for a partial shift for specific types of freight destined for project locations accessible by specific over the road routes. The Port of Valdez is well suited for receiving containerized and roll-on/roll-off breakbulk cargo destined for delivery via truck to Fairbanks and sites further north. The Port of Seward is well suited for receiving containerized cargo and breakbulk materials. Approximately 750 FEUs per year that could be shifted from the Port of Anchorage to the Port of Seward without impacting other consumers or adding additional voyages, carriers or barge charters. Approximately 4,608 FEUs could be shifted from the Port of Anchorage to the Port of Valdez without impacting other consumers or adding additional voyages, carriers or barge charters.

Port of Seward

Due to the Port of Seward's rail-on-dock service and direct linkage to the ARRC rail system (Section 5.3.5.1), it would be used primarily for receiving the line pipe, pipelining equipment, block valves, fittings, compressor, heater, and metering station components, supplies, and other materials required for construction of the Mainline, PTTL, and PBTL. The size of equipment and other materials would be constrained by the three tunnels that are on the rail line between Seward and Anchorage. The construction materials and equipment would be transported by rail to the initial spread storage/lay down yards in Fairbanks or along the Parks Highway corridor. The materials and equipment would then be distributed by truck or rail to the various spread sections. Pipeline construction materials and equipment could also be transported via barge from the Port of Seward to the Mainline MOF at Beluga for the southernmost spreads of the Mainline.

TABLE 5.4.2-41 shows the infrastructure demands placed on the Port of Seward during Project construction. Peak Project utilization of dock space would be 13 percent, which is less than the excess amount currently available. However, a limitation exists when considering the staging space required to place the pipe to ground for inspection since unloading an entire Handymax-sized vessel (18,000 metric ton (mt) cargo capacity) and stacking the pipe two levels high would require an estimated 5.18 acres of staging space. This is more than the five acres of laydown space currently available. In addition, port congestion could be a concern if larger ships are selected for pipe shipments. Large ships take significantly longer to unload than smaller ships, which means that port facilities would be unavailable for other shipping activities. However, smaller vessels (e.g., 7,900 mt cargo capacity) could be efficiently accommodated by the Port of Seward facilities, equipment, and laydown areas. Moreover, smaller ships have the added benefit of taking less time to unload, thus reducing turn times and avoiding bottlenecks during the unloading operations. For the Port of Seward it was assumed the vessels would be project charters with an average vessel carrying capacity of approximately 18,000 short tons.

TABLE 5.4.2-41

Estimated Use of the Port of Seward During Project Construction

	2020	2021	2022
Materials (short tons)	89,140.31	124,796.44	142,642.50
Number of FEUs	8,198	11,476	13,116
Sticks of Pipe	28,904	40,461	46,243
Vessel Calls	11	16	18
Days of Dock Time Unloading Ships	30	42	48
Dock Utilization (%)	8	12	13

Source: Alaska LNG (2016)

Port of Nikiski

Construction of the Liquefaction Facility would be supported by construction of a temporary Project MOF and onsite haul road in the Nikiski area to directly transfer construction materials, including major sealift modules, breakbulk materials, and construction equipment, to the Liquefaction Facility site. The Project MOF at Nikiski would most likely be designed for 10 years of use through the construction time period, and would be removed or re-purposed following completion of construction.

Prior to the completion of the Project MOF, existing dock facilities in the area such as the Nikiski Fabrication Facility and Rig Tenders Marine Terminal would be used as a Pioneer MOF to receive shipments during the early Liquefaction Facility site development; however, both the existing dock facilities and the Project MOF would be used during peak construction periods to facilitate scheduling demands.

The Pioneer MOF is anticipated to receive approximately 50 barge shipments of steel products and about 100 barge shipments of bulk materials over the Marine Terminal construction period. In addition, there would be approximately 45 marine shipments of quadropods and Product Loading Facility modules.

The Project MOF is estimated to receive approximately 60 shipments of modules from the fabrication yards during Liquefaction Facility construction. Approximately 10 barges would be circulating between Nikiski and Anchorage or Seward on a weekly basis for three years. Shipments of construction equipment and materials would primarily be made during the eight-month primary shipping season. Total Project-related deep-draft vessel calls at the Project MOF would be as many as three per week, which would correspond to an estimated 10 percent increase in vessel calls in comparison to the annual average per week recorded at the Port of Nikiski in 2014 (TABLE 5.3.5-2). This increase would be temporary and would not likely have a significant effect on existing port users or port operations. Further, when the Project MOF is constructed, it would relieve demands on the Pioneer MOF.

In addition to the vessels bringing materials, equipment, and modules for the Project, there would be additional vessel activity in the vicinity associated with construction of the Marine Terminal and dredging for the Project MOF. Construction of the offshore pipeline would also result in additional vessel activity in the vicinity of the Mainline MOF at Beluga on the west side of Cook Inlet.

Beluga Landing (Mainline MOF)

A new temporary or permanent material offloading facility independent of the existing Beluga Landing would be built to support Project construction activities. The new facility would be located close to, but at a reasonable distance from, the current Beluga Landing such that the new facility construction and operation does not interfere with the current Beluga Landing operations. The new Mainline MOF would be used to receive barges transporting onshore pipeline construction materials and equipment. These materials would then be trucked to the southernmost spreads of the Mainline corridor. Additionally, Beluga Landing could be used for the delivery of concrete coated pipe and construction equipment for the offshore pipeline spread. TABLE 5.4.2-42 shows the estimated use of the Mainline MOF or Beluga Landing during Project construction. The peak in Project-related vessel calls would occur in 2021, and this peak would correspond to an estimated 108 percent increase in comparison to the number of vessel calls recorded at Beluga Landing in 2014 (Table 5.3.6-5).

TABLE 5.4.2-42

Estimated Use of Mainline MOF or Beluga Landing During Project Construction

	2020	2021	2022	2023	2024	2025
Number of Barge Loads	88	147	41	41	50	36

Port of Dutch Harbor

Over the years, the Port of Dutch Harbor has often provided customs clearance for modules and materials traveling to the North Slope by barge, and it is expected that the major sealift modules and pipe imported for the Project would go through the well-established customs entry process in the port. In addition, the Port of Dutch Harbor is one of the most productive ports for transshipment of cargo in Alaska and would be used as a staging area for imported Project construction materials that would be transported onwards to the North Slope by oceangoing tugs pulling barges.

The Port of Dutch Harbor is the home port for a large commercial fishing fleet, and it is the top fishery export port of record for the United States. Due to the number of vessels in operation in the port area, adequate anchorage may be limited. Ship’s agent planning and early coordination would be key to developing a sealift entry and exit strategy to mitigate interference with services supporting the fishing industry at the Port of Dutch Harbor. A project-wide Importation Guide that provides standardization of imports and increases customs clearance efficiencies would be developed with U.S. Customs and Border Protection.

Prudhoe Bay West Dock

It is anticipated that the GTP modules would be built outside Alaska, transported to the West Dock at Prudhoe Bay aboard barges pulled by oceangoing tugs during four summer sealifts. TABLE 5.4.2-43 shows the estimated use of West Dock during construction of the GTP. A new dock adjacent to the seawater treatment plant, to be named Dock Head 4, would be constructed and used to offload modules arriving by sealift. Other improvements include widening of the access road and development of a new staging area south of the existing West Dock staging area. A barge bridge would be used to span the 650-foot channel/breach located between Dock Head 2 and Dock Head 3. The peak in Project-related vessel calls would occur in 2023, and this peak would correspond to an estimated 80 percent increase in comparison to the number of vessel calls recorded at West Dock in 2014 (Table 5.3.6-5). The months of barge operations would likely be limited to July through August. As described in Section 5.3.5.1, there is considerable vehicular and pedestrian traffic at the West Dock causeway during each summer sealift season. Project construction would significantly increase that traffic, thereby intensifying the congestion and risk of accidents. A Journey Management Plan would be established with other user groups to ensure a safe and functional traffic management and risk mitigation plan during Project construction offloading and transportation operations.

TABLE 5.4.2-43

Estimated Use of Prudhoe Bay West Dock During Project Construction

	2023	2024	2025	2026
Number of Modules	51	32	17	17
Number of Barges	23	18	10	10
Sealift Weight (Metric Tons)	83,369	90,861	58,479	58,479

Most of the construction materials for the PBU MGS project would be delivered to the construction site via truck transportation. Some limited volume of materials and equipment may be oversize or overweight for the highway system and would need to be moved by barge to West Dock.

5.4.2.7.1.2 Marine Shipping Channels and Adjacent Shorelines

Many of the ports that would receive Project construction materials and equipment are shared with the commercial fishing industry and other maritime industry users, so simultaneous operations and seasonal congestion must be considered and managed. For example, during the fishing season, the entrances to Iliuliuk Harbor (East Channel from Iliuliuk Bay and South Channel from Captains Bay) become highly congested with fishing vessels. On the other hand, as described in Section 5.3.5.1, commercial fishermen are already accustomed to the presence of large vessels in the navigation channels. In addition, the offshore portion of the Mainline across Cook Inlet would be laid in the ice-free season and coordination efforts would be made with other waterway and nearshore users, including commercial fishing vessels to reduce potential impacts.

During construction of the Marine Terminal, it is anticipated there would be temporary but significant adverse effects on some set gillnet permit holders participating in the Cook Inlet commercial salmon fishery due to loss of access to fishing areas for the period of construction. It is estimated that 12 permit holders with Alaska Department of Natural Resources shore fishery leases in the Salamatof (244-41) management area would be affected. Marine Terminal construction is scheduled to start in late 2019 after the salmon fishing season has ended and would continue through 2024. Therefore, the duration of the effects to the set gillnet permit holders would be five years. The magnitude of these effects would depend on the location, number, and size of offshore structures and safety requirements, and the timing of closures due to construction. However, it is possible that Marine Terminal construction would prevent affected permit holders from harvesting any salmon in their lease areas during the five-year period because they would be unable to access their lease areas and/or a suitable staging area for fishing gear during the commercial fishing season.

In addition, there are four shore fishery leases within the construction ROW of the Mainline and the offshore pipeline on the west side of Cook Inlet. These leases are located in the Tyonek (247-20) management area. It is anticipated there would be temporary adverse effects on the set gillnet permit holders owning these leases due to nearshore trenching and anchoring, scheduling conflicts, safety setbacks, and exclusion areas during construction. The duration of the effects to the permit holders would be one year.

Assuming past fish landings are representative of the future, the losses in set gillnet ex-vessel revenue that could result from reduced beach access were estimated based on 2006–2015 data obtained from the Alaska Commercial Fisheries Entry Commission on inflation-adjusted ex-vessel prices, and fish landings and the number of active set gillnet fishery participants in the Salamatof (244-41) and Tyonek (247-20) management areas (Gho 2016). The estimated average annual gross earnings lost by each of the set gillnet permit holders displaced by Marine Terminal construction is $50,900. The estimated total gross earnings lost by all affected permit holders over the five-year construction period is about $3.05 million. This loss represents about 20 percent of the gross revenues expected to accrue to set gillnet permit holders fishing in the Salamatof (244-41) management area over the 2020–2024 period in the absence of Marine Terminal construction. The estimated average annual gross earnings lost by each of the set gillnet permit holders displaced by Mainline construction is $8,600. The estimated total gross earnings lost by all affected permit holders over the one-year construction period is about $1.23 million. This loss represents about 28 percent of the gross revenues expected to accrue to set gillnet permit holders fishing in the Tyonek (247-20) management area period in the absence of Mainline construction.

Displaced set gillnet permit holders could elect to fish other locations in Cook Inlet that are not under existing leases. However, the harvest levels in unleased areas may be substantially lower than historic catches in their lease areas. The lower catches and consequent reduction in revenue would not only have a significant adverse impact on affected permit holders, but also on crew members hired each year to harvest with each permit holder. Consultations would be held with affected set gillnet operators to mitigate potential economic losses during Project construction. It is possible that construction activities would have a beneficial effect on some set gillnet permit operations. A portion of the salmon not harvested by set gillnet permit holders displaced by Marine Terminal and Mainline construction would likely be harvested by nearby set gillnet operations, thereby increasing the revenues of those operations.

Aside from loss of fishing revenue, commercial set gillnet permit holders displaced by Marine Terminal construction could also face uncertainty about their ownership of shore fishery leases at the end of the construction phase. Under State law (Alaska Statute 38.05.082), a site can be leased for up to ten years; however, a lessee must personally fish their leased site at least every other year, for at least four legal fishing periods during the commercial fishing season. Failure to do so is grounds for lease termination (Alaska Department of Natural Resources 2010). However, the Alaska Department of Natural Resources has discretion to waive this requirement, and it is possible that affected set gillnet permit holders would be allowed to retain their leases and resume fishing their respective sites after Marine Terminal construction is completed.

See Resource Report No. 8 for additional information on potential Project effects on beach access by set gillnet permit holders and proposed measures to mitigate those impacts. Resource Report No. 2 and

Resource Report No. 3 provide information on potential water quality impacts, including the effects of offshore dredging, on Cook Inlet fishery resources and proposed mitigation measures.

5.4.2.7.2 Highways

Truck transportation would be used for final delivery of most construction materials and equipment to Project construction sites (an exception would be major modules, which are defined as any module that exceeds the dimensional and weight limits for over-the-road transportation in Alaska). Highways and access roads would be used to transport construction equipment, materials, and personnel to the Liquefaction Facility site, Mainline ROW, compressor stations, borrow sites, GTP site, and other locations. Large trucks, such as on- and off-road dump trucks, dry van trucks, dry van trailer trucks, flatbed trucks, and oversize transport trailers, would transport modules and materials over the course of construction. In addition, buses would be used to transport construction personnel from regional airport hubs to road-accessible construction camps, and from the camps to construction sites.

During construction, Alaska trucking companies and contractors would be used to the extent they are available, qualified, and competitive. In-state truck demand would peak at around 250 to 270 trucks in the peak construction years. A survey of trucking companies in Alaska revealed that the stated capacity above the current utilization of semi-tractor trucks in the State is slightly under the estimated peak demand during Project construction. The providers accounted for 250 equivalent truck capacity available above their current business load. This leaves a shortage of up to about 20 semi-tractor trucks assuming the base business load remains equivalent to current market conditions. Should construction result in a shortage of semi-tractor trucks, existing users of in-state trucking services could experience substantial transport bottlenecks and an increase in truck freight costs. However, it is likely that trucking companies would prefer to serve and maintain their existing customer base, as the Project demand for trucking services during construction would be temporary.

In addition, trucking companies in Alaska expressed concern for the forecasted shortage of qualified truck drivers during Project construction. Over the past few years, the trucking industry nationwide has struggled with a shortage of truck drivers. There are many reasons for the driver shortage, but one of the largest factors is the relatively high average age of the existing workforce (Costello 2015). The driver shortage experienced in Alaska in 2014 and 2015 is recent evidence of the difficulty in acquiring drivers with sufficient training to safely engage in trucking on the Dalton Highway and in ice road trucking. As with a shortage of semi-tractor trucks, a lack of qualified commercial truck drivers could result in transport bottlenecks and higher costs for existing users of in-state trucking services. Consultations would be held with the Alaska Truckers Association to address this situation, and Project representatives are evaluating the current training programs available in Alaska to determine if additional resources may be required to mitigate the shortage of qualified individuals.

ADOT&PF anticipates that some roads, highways, and bridges would need improvements to bear the heavier and more frequent truckloads during Project construction, and that portions of the Parks, Dalton, Elliott, Seward, Sterling, and Glenn Highways may need to be refurbished after 2027 to repair Project-related construction effects. A potential highway use agreement may provide mitigation for construction-related impacts to roads, highways, and bridges. Even if improvements or refurbishments are not needed, the additional truck traffic would reduce the time interval between major reconstruction activities on each highway.

For public roads that would be used during construction of the Project, the potential need for roadway improvements to mitigate traffic congestion would be evaluated. As noted in Resource Report No. 1, all highway movements of Project-related equipment and materials would be within the current load and size limits of the existing highway system. Many of the existing non-public roads (e.g., PBU and TAPS access roads), including those that may not currently be used, may require modifications to accommodate large and heavy construction equipment and material. Modifications may include adding granular material and/or ice and snow to increase the road's load-bearing capacity, grading rough areas, filling in low spots and potholes, widening roadbeds and curves, brushing/grading of shoulders, and installing culverts or bridges.

Given the location of proposed Project and non-jurisdictional facilities, the movement of construction materials, equipment, and personnel would largely take place over the existing, limited surface transportation network in Alaska. TABLE 5.4.2-44 lists the primary Alaska highways that would be used during Project construction and summarizes their principal uses.

TABLE 5.4.2-44

Purpose of Primary Highways in the Area of Interest During Project Construction

Steese Highway/ Elliott Highway/ Dalton Highway	Fairbanks North Star Borough/North Slope Borough	The Steese, Elliott, and Dalton Highways would support the construction of the Mainline, GTP, PTTL/PBTL, and PBU MGS and PTU Expansion projects.
Glenn Highway/ Parks Highway	Municipality of Anchorage, Matanuska-Susitna Borough/Denali Borough/ Fairbanks North Star Borough	Vehicles transporting Project construction materials, equipment, and personnel from southcentral Alaska to the North Slope would use the Glenn and Parks Highways.
Seward Highway/ Sterling Highway/ Kenai Spur Highway	Municipality of Anchorage/ Kenai Peninsula Borough	The Seward Highway would support the construction of all Project facilities. It would also be a commonly used route for truckable loads between Seward and Anchorage. In Anchorage, the Seward Highway connects with the Glenn Highway for further conveyance north to Project construction sites. The Kenai Spur Highway and Sterling Highway would support the construction of the Liquefaction Facility and Mainline.

TABLE 5.4.2-45 identifies the calculated annual full truck loads transported across a series of route segments based on the compiled demands. The volume of construction-related traffic generally peaks on all Alaska Highway routes from 2022 through 2025, with lesser volumes in 2021 and 2026, and minor volumes in 2019 and 2027. Data are not yet available to estimate seasonal differences in traffic volumes, but peak construction activities for the Mainline would be in the winter (December through April) and summer (June through September). Transportation and pre-staging of camps, materials, equipment, and supplies for the Mainline would precede these peak work months. Peak construction activities for other Project and non-jurisdictional facilities would generally occur in the summer, with equipment, materials, and supplies arriving throughout the year but larger truck volumes preceding the summer peak.

TABLE 5.4.2-45

Estimated Use of Highway Transportation in the Area of Interest During Construction

	2020	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
	Average Annual Full Truck Loads						
Steese/Elliott/Dalton Highways	9,100	12,500	15,000	15,000	15,000	14,400	3,400
Glenn/Parks Highways	15,200	22,200	25,500	22,900	22,900	26,300	5,400

TABLE 5.4.2-45

Estimated Use of Highway Transportation in the Area of Interest During Construction

	2020	2021	2022	2023	2024	2025	2026
	Average Annual Full Truck Loads						
Sterling/Kenai Spur Highways	22,500	22,500	33,800	45,000	45,000	45,000	11,300
Seward Highway	15,500	17,300	24,000	29,000	29,000	30,100	7,200

The trips shown in TABLE 5.4.2-45 were assigned to the individual road segments by determining the port of entry and road route that would be used transport the breakbulk and containerized materials to project sites in each construction year. Materials that were identified as destined to go to the Liquefaction Facility and not identified as needing special transport (i.e., sealift or special barge) were assigned to the Seward, Sterling, and Kenai Spur Highways. Materials that were identified as being destined to go to the Mainline were assigned to the route that connects Anchorage to the pipeline corridor via the Glenn and Parks Highways, and then 50 percent of that volume was also assigned to the Steese, Elliot and Dalton Highways) to account for material deliveries to the portion of the pipeline north of Fairbanks. Materials identified as destined to go to GTP and PTU GE and not identified as needing special transport (i.e., sealift or special barge) were routed on the Glenn, Parks, Steese, Elliott, and Dalton Highways, as they are the only available roads to connect Anchorage to the North Slope. For each truckload of material transported to a project site, it was assumed the truck would return via the same route to its point of origin.

The estimated project related average daily traffic segment is calculated using the estimated FEU/FTL equivalent materials transported across route segments for the integrated material and equipment logistics demands of the Project. The baseline planning assumption is that one trip is required for every FEU/FTL transported. The number of FEUs/FTLs is doubled to account for backhaul, and divided by 365 days. TABLE 5.4.2-46 provides the time-sequenced total average daily traffic for project materials required by route and sub-project and the total integrated Project.

TABLE 5.4.2-46

Estimated Project Related Average Daily Traffic in the Area of Interest by Route Segment During Project Construction

	Project Facility	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
Glenn/Parks Highways (Anchorage-Fairbanks)	PBU	2	2	3	5	5	5	1
	GTP	15	15	22	30	30	30	7
	PTU GE	3	6	6	19	19	6	3
	Mainline	46	72	79	50	50	76	13
	Project Total	67	96	111	104	104	116	24
Steese/Elliott/Dalton Highways (Fairbanks-Deadhorse)	PBU	2	2	3	5	5	5	1
	GTP	16	16	23	31	31	31	8
	PTU GE	4	8	8	23	23	8	4
	Mainline	28	43	48	24	24	36	6
	Project Total	50	69	82	82	82	79	19
Seward/Sterling/Kenai Spur Highways (Anchorage-Nikiski)	Liquefaction Facility	29	43	58	76	31	1	N/A

Source: Alaska LNG (2016)

TABLE 5.4.2-47 converts the annual truck loads presented above into AADT associated with Project construction and presents the percent change in traffic volumes compared to estimated future AADTs on each of the major route segments. The future AADT estimates for other (non-Project) traffic on the Steese/Elliott Highways, the Glenn/Parks Highways, and the Seward/Sterling/Kenai Spur Highways are based on a linear trend of AADTs using the observations from the 2003–2013 period (TABLE 5.3.5-6). Non-Project related traffic was estimated using a regression with a 95 percent confidence level, and using the calculated variable and intercept to project AADT during construction years, rounding to the nearest 10. For the Dalton highway, the Alaska DOT only has three years of recorded data for the annual average daily traffic at MP 339. For 2015, the AADT is 147 vehicles. The planning assumption to project future volumes is to round to the nearest 10 vehicles and add 10 vehicles per year. The MP or location where the AADTs are measured is presented in the table. The traffic recorder locations were selected to minimize local traffic from nearby communities, thereby making the traffic counts more representative of long-haul truck and vehicle traffic.

TABLE 5.4.2-47

Estimated Project-Related Annual Average Daily Truck Traffic and Percent Change in Total Vehicular Traffic in the Area of Interest by Route Segment During Project Construction

	2020	2021	2022	2023	2024	2025	2026
Steese/Elliott/Dalton Highways							
Dalton Highway (MP 335)	50/26%	69/34%	82/39%	82/37%	82/36%	79/33%	19/7%
Elliott Highway North of Fox	50/4%	69/5%	82/6%	82/6%	82/6%	79/6%	19/1%
Steese Highway North of Fox	50/2%	69/3%	82/4%	82/4%	82/4%	79/3%	19/1%
Glenn/Parks Highways							
Parks Highway (MP 245)	67/4%	96/5%	111/6%	104/6%	104/5%	116/6%	24/1%
Glenn Highway at Eklutna Flats	67/<1%	96/<1%	111/<1%	104/<1%	104/<1%	116/<1%	24/<1%
Seward/Sterling/Kenai Spur Highways							
Sterling Highway (Skilak Lake Road intersection)	29/1%	43/1%	58/2%	76/3%	31/1%	1/<1%	N/A
Seward Highway south of Sterling Highway (Moose Pass)	29/2%	43/3%	58/4%	76/6%	31/2%	1/<1%	N/A
Seward Highway north of Sterling Highway at Placer River	29/1%	43/1%	58/1%	76/2%	31/1%	1/<1%	N/A

Sources: Based on data from ADOT&PF (2016)

Two threshold impact criteria were used to determine if the traffic volume on a highway route segment would be significantly adversely affected during Project construction. First, is whether the projected percent change in annual traffic volume due to Project construction is greater than the maximum percent change experienced during the 2004–2013 period; second is whether the projected annual traffic volume due to Project construction is greater than the peak traffic volume during the 2004–2013 period (TABLE 5.3.5-6). The second criterion was added when it became evident that for some route segments, the projected percent change could be larger than historic change levels, but the projected combined traffic volumes were below historic volumes. In this case, the highway should be able to accommodate the projected traffic volumes. Based on both threshold impact criteria, it is estimated that only the traffic volume on the Dalton Highway (MP 335) would be significantly affected. The significant Project-related traffic impacts to the Dalton

Highway would be temporary, occurring during all years of Project construction. While several highway segments would experience large percent changes (e.g., Seward Highway south of Sterling Highway intersection [Moose Pass]; and Sterling Highway west of Seward Highway intersection [Skilak Lake Road]), the combined traffic volumes are below historic peaks.

TABLE 5.4.2-45 provides the estimated full truck loads for transporting materials to project sites. TABLE 5.4.2-45 does not include the number of buses required to transport Project construction personnel from regional hubs to construction camps or from construction camps to Project worksites, as the number of buses will not have any significant impact on traffic volumes over the segments of highway. As described in Section 5.4.2.7.4, the types of airplanes anticipated for use at the regional hub airports are Boeing 737-400, de Havilland Dash 8-100, and a Bombardier Q400. A 737-400 airplane transports up to 144 passengers. A Dash 8-100 transports up to 37 passengers. A Q400 transports up to 74 passengers. The 737-400 aircraft would be used between Seattle and Anchorage, Anchorage and Fairbanks, Fairbanks and Deadhorse, and Anchorage and Deadhorse. The buses selected for the project will be sized to transport up to 40 passengers with baggage. TABLE 5.4.2-48 provides the anticipated number of buses that would be used to transport passengers each day.

TABLE 5.4.2-48

Estimated Number of Buses Required to Transport Project Construction Personnel

	Airport/Airstrip Interface	Aircraft Size (number of passengers)	Buses per Aircraft	Max. Flights Received per Day	Recommended Bus Count for Shuttling[a]
PTU GE	Point Thomson	29	1	2	1 - 2
GTP	SCC	74 - 146	2 - 4	1	2 - 4
LNG Plant & Marine Terminal Facilities	ENA	37	1	8	2 - 3
Project Total[b]					5 - 9

Source: **Alaska LNG (2015)**
Notes:
[a] Assumes 40-passenger bus
[b] Mainline buses are estimated in TABLE 5.4.2-49

The Mainline execution base assumption is that Project construction personnel would be transported from regional hub airports to project camps via bus at the beginning and end of a construction season for each spread. Therefore, the buses required for each camp would not have a continuous impact on the estimated daily traffic counts along the entire highway. TABLE 5.4.2-49 provides the estimated number of buses needed to transport personnel. A range is provided in the following table of the required buses to travel from each camp to regional airport hub, by construction season, where the lower number is the number of buses needed if personnel arrive at the regional hub on a Q400 aircraft and the higher number is the number of buses needed if personnel arrive at the regional hub via a Boeing 737 aircraft.

TABLE 5.4.2-49

Estimated Number of Buses Required to Support Mainline Construction Camps by Season

<table>
<tr><th rowspan="2">Camp Name</th><th rowspan="2">Camp Pipeline Mp</th><th rowspan="2">Hub Airport Interface</th><th rowspan="2">Bussing Only Transit Time[a]</th><th colspan="9">Number of Buses Required by Season</th></tr>
<tr><th>S (-1.5)</th><th>W (-1)</th><th>S (-0.5)</th><th>W 0</th><th>S 0.5</th><th>W1</th><th>S1.5</th><th>W2</th><th>S2.5</th></tr>
<tr><td>Prudhoe Bay</td><td>0.7</td><td rowspan="7">Deadhorse (SCC)</td><td>0.4</td><td></td><td></td><td></td><td></td><td></td><td>2-4</td><td></td><td></td><td></td></tr>
<tr><td>Franklin Bluffs</td><td>43.8</td><td>0.85</td><td colspan="2">2-4</td><td></td><td colspan="4">2-4</td><td></td><td></td></tr>
<tr><td>Compressor Stn. 2 Camp</td><td>76</td><td>1.58</td><td></td><td></td><td></td><td></td><td></td><td colspan="3">2-4</td><td></td></tr>
<tr><td>Happy Valley</td><td>85.8</td><td>1.81</td><td></td><td></td><td></td><td colspan="2">2-4</td><td></td><td colspan="3">2-4</td></tr>
<tr><td>Galbraith Lake</td><td>142.7</td><td>3.15</td><td></td><td colspan="3">2-4</td><td></td><td></td><td>2-4</td><td></td><td></td></tr>
<tr><td>Compressor Stn. 4 Camp</td><td>147.1</td><td>3.25</td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="3">2-4</td></tr>
<tr><td>Dietrich Camp</td><td>206.3</td><td>4.57</td><td colspan="5">2-4</td><td></td><td colspan="3">2-4</td></tr>
<tr><td>Compressor Stn. 6 Camp</td><td>240.5</td><td rowspan="14">Fairbanks (FAI)</td><td>5.77</td><td></td><td></td><td></td><td></td><td></td><td colspan="3">2-4</td><td></td></tr>
<tr><td>Coldfoot</td><td>242</td><td>5.74</td><td colspan="2">2-4</td><td></td><td colspan="3">2-4</td><td></td><td></td><td></td></tr>
<tr><td>Prospect</td><td>279.4</td><td>4.92</td><td>2-4</td><td></td><td>2-4</td><td></td><td></td><td colspan="3">2-4</td><td></td></tr>
<tr><td>Old Man</td><td>306.2</td><td>4.23</td><td></td><td></td><td colspan="3">2-4</td><td></td><td></td><td colspan="2">2-4</td></tr>
<tr><td>Compressor Stn. 8 Camp</td><td>332.9</td><td>3.66</td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="3">2-4</td></tr>
<tr><td>Five Mile</td><td>353.7</td><td>3.19</td><td></td><td></td><td colspan="7">2-4</td></tr>
<tr><td>Livengood</td><td>401.5</td><td>1.9</td><td colspan="9">2-4</td></tr>
<tr><td>Compressor Stn. 10 Camp</td><td>421.7</td><td>2.5</td><td></td><td></td><td></td><td></td><td></td><td colspan="3">2-4</td><td></td></tr>
<tr><td>Dunbar</td><td>456.4</td><td>1.26</td><td>2-4</td><td></td><td colspan="4">2-4</td><td></td><td></td><td></td></tr>
<tr><td>Rex</td><td>499.1</td><td>0.82</td><td></td><td colspan="7">2-4</td><td></td></tr>
<tr><td>Compressor Stn. 12 Camp</td><td>518.2</td><td>2.24</td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="3">2-4</td></tr>
<tr><td>Healy</td><td>527</td><td>2.38</td><td></td><td></td><td></td><td></td><td></td><td colspan="2">2-4</td><td></td><td></td></tr>
<tr><td>Heater Stn. 1 Camp[3]</td><td>561.6</td><td>3.14</td><td></td><td></td><td></td><td></td><td>2-4</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Cantwell</td><td>568.5</td><td>3.29</td><td colspan="5">2-4</td><td></td><td></td><td></td><td>2-4</td></tr>
<tr><td>Compressor Stn. 14 Camp</td><td>596.9</td><td rowspan="6">Anchorage (ANC)</td><td>4.26</td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="3">2-4</td></tr>
<tr><td>Hurricane</td><td>607.3</td><td>4.03</td><td colspan="3">2-4</td><td></td><td>2-4</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Chulitna</td><td>647.5</td><td>2.10</td><td colspan="7">2-4</td><td></td><td></td></tr>
<tr><td>Compressor Stn. 16</td><td>674.7</td><td>2.59</td><td></td><td></td><td></td><td></td><td></td><td colspan="4">2-4</td></tr>
<tr><td>Susitna</td><td>693.3</td><td>3.12</td><td></td><td colspan="4">2-4</td><td></td><td></td><td colspan="2">2-4</td></tr>
<tr><td>Sleeping Lady</td><td>744.1</td><td>N/A</td><td></td><td></td><td></td><td colspan="6">2-4</td></tr>
</table>

TABLE 5.4.2-49

Estimated Number of Buses Required to Support Mainline Construction Camps by Season

Camp Name	Camp Pipeline Mp	Hub Airport Interface	Bussing Only Transit Time[a]	Number of Buses Required by Season								
				S (-1.5)	W (-1)	S (-0.5)	W 0	S 0.5	W1	S1.5	W2	S2.5
Beluga Marine Camp	764.2		N/A	2-4								
Kenai	799.1	Kenai (ENA)	0.33	2-4								
Range of Total Number of Buses				22 to 44	24 to 48	28 to 56	32 to 64	34 to 68	34 to 68	42 to 84	36 to 72	30 to 60

Source: Alaska LNG (2015)
Notes:
[a] Transit times based on assumed average bus speed of 45 mph.

There are no highway crossings or pipeline collocation within highway right of ways within "safety corridors". The Dalton, Elliot and Parks Highway crossings will be performed using horizontal bores. Access for equipment crossings will be via short access road connections to the highway on either side of the bore. There are two locations where the pipeline will be in close proximity to the highway along the Dalton and Parks Highways. These areas (Atigun Pass, Nenana River Gorge) will have detailed traffic management plans which are described in Sections 5.4.2.7.1.2 and 5.4.2.7.1.3.

Additional information on traffic impacts on the primary highways in the AOI during Project construction is discussed in the sections below.

5.4.2.7.2.1 Steese Highway/Elliott Highway/Dalton Highway

As described in Section 5.3.5.2, the Dalton Highway is the only established road that provides year-round access to the Prudhoe Bay area from Fairbanks. The proposed plan is to use the railway to transport pipeline construction materials and equipment for the northern spreads of the Mainline and for the PTTL and PBTL from southcentral Alaska ports to a storage area in the greater Fairbanks area that would function as a centralized stockpile prior to the beginning of construction. From Fairbanks, the materials and equipment would be transported by truck north along the Steese/Elliott/Dalton Highways to specific intermediate stockpiles or pipe storage areas along the Mainline route. Approximately 400 miles of the Mainline would be located adjacent to the Dalton Highway paralleling the TAPS oil pipeline from Prudhoe Bay to Livengood. Similarly, certain bulk items, equipment, supplies, and structures for construction of the GTP and non-jurisdictional facilities on the North Slope would be shipped via rail from southcentral Alaska ports to Fairbanks, and then loaded onto trucks for transport along the highways to Prudhoe Bay.

Construction crews for the Project pipelines, GTP, and North Slope non-jurisdictional facilities would be flown to airport hubs in Fairbanks or the Prudhoe Bay CDP. The crews would then be transported from these hubs to road-accessible construction camps by bus. Some of the bus journeys may exceed five hours each way; crews would be transported to more remote Mainline construction sites by airplane. North of

Livengood, construction crews would use the gravel access roads that were built for TAPS and for the Dalton Highway, where appropriate. Additional access roads or upgrades may also be required north of Livengood. South of Livengood, the proposed design considers access approximately every 2 to 10 miles of pipeline from the nearest existing public or private road to the construction ROW for the Mainline where possible. This access may include improvements to existing roads (e.g., widening, granular material fill, culverts, reducing curvature of the road) or construction of new roads.

Periodic lane closures on the Dalton Highway would occur where construction of the pipeline is within close proximity. Specific locations are within Atigun Pass. At least one lane of traffic would be maintained. Traffic control plans would be prepared and sealed by a professional engineer registered in Alaska and will follow the Alaska Traffic Manual and Manual of Uniform Traffic Control Devices. A site-specific preliminary traffic control plan for the Dalton Highway is as follows. The Dalton highway provides access and is used as a travel lane to provide equipment access. Lane closures along the Dalton Highway are for north bound traffic from near the top of the Atigun Pass to just before the downhill section on the north side of the Pass (Hwy MP 244.3 to 244.9). From the top of the Pass heading south there would be a lane closure for southbound traffic at the bottom of the Pass in a relatively flat area (Hwy MP 242.2 to 242.4). The southernmost lane closure is in the Dietrich valley (Hwy MP 235.0 to 235.6). There is a pull out on the northbound side about midway into the lane closure that can be used as a turn around.

As shown in TABLE 5.4.2-47, the additional traffic during Project construction is expected to increase the AADT on the highway by about 80 vehicle trips from 2022 through 2025. Given that the Dalton Highway is a two-lane, mostly gravel highway, one of the most isolated roads in the United States, and predominately used by large commercial haulers, the amount of traffic on the highway is an especially important safety consideration. Construction-related traffic volumes in the peak years would increase total vehicular traffic on the Dalton Highway by almost 40 percent of what it would be under the “without Project” scenario, with total traffic volumes reaching about 320 AADT. About 75 percent of the traffic on the Dalton Highway north of Happy Valley are trucks (TABLE 5.3.5-8), or about 120 truck trips per day. It is estimated that the amount of truck traffic on the highway would increase by about 75 percent over projected levels on an AADT basis.

The majority of truck drivers traveling to the North Slope area would reach their requirement for a duty rest between Livengood and Coldfoot regardless of which southcentral Alaska port trucks originate from. Pullouts and rest stops along the Elliott and Dalton Highways would accommodate most statutory rest periods when drivers run out of drive time. Sleeper cabs on truck tractors are the norm, and would be used in most instances when on a rural or undeveloped stretch of road. Where there are some accommodations, such as is in the Prudhoe Bay CDP or along the Mainline route where there are already camps set up, the drivers and their companies may opt to have the driver stay overnight in the camp/hotel if there is room. To mitigate the duty rest requirements, the need to truck Project cargo from southcentral Alaska ports to the Prudhoe Bay CDP would be reduced by maximizing the use of ARRC rail system capacity. This would allow trucks to run from Fairbanks to the Prudhoe Bay CDP without duty rest unless unexpected delays occur. If additional pullouts, weigh station enhancements, and truck staging and waiting areas are needed by the Project, they would be identified when a more precise schedule of deliveries along these routes is defined.

5.4.2.7.2.2 Glenn Highway/Parks Highway

Construction-related truck traffic from the Ports of Anchorage or Seward destined to a centralized storage facility in Fairbanks, the North Slope, or southern portions of the Mainline near the Parks Highway would use the Glenn and Parks Highways. In addition, Mainline construction crews would be transported by bus from the airport hubs of Anchorage and Fairbanks to the road-accessible construction camps along the Parks Highway.

There are no alternative routes for construction-related traffic to avoid the Glenn and Parks Highways. As described in Section 5.3.5.2, the Parks Highway is the main route between Anchorage and Fairbanks, the principal access to Denali National Park and Preserve, and the main highway in the MSB. As discussed above, in comparison to recent ADDT counts on the Parks Highway (Section 5.3.5.2), the volume of traffic during construction would not be significant. Nevertheless, this additional truck traffic would contribute to the current congestion on the two highways. Section 5.3.5.2 notes that the section of the Parks Highway between Wasilla and Houston is designated by ADOT&PF as a safety corridor due to the high level of commuter traffic. In addition, tourist vehicle traffic has the potential to increase traffic congestion on all sections of the Glenn and Parks Highways during the summer months. Additional pullout areas of a size to accommodate trucks, together with additional passing lanes, may be needed to accommodate construction-related traffic. The Project would maximize the use of ARRC rail system capacity to reduce pullout requirements.

In addition, as with the Elliott Highway, the Glenn and Parks Highways have weigh stations that are limited in capacity. Particularly during peak tourism periods, a backlog of trucks waiting to be processed could impede traffic flow and create traffic jams that would have an adverse effect on neighboring communities and commuters. Expansion of weigh stations, or interim staging, may be required to avoid traffic congestion since adequate areas for mandatory rest stops are limited on the Parks Highway. If additional pullouts, passing lanes, weigh station enhancements, and truck staging and waiting areas are needed by the Project and non-jurisdictional facilities, they would be identified when a more precise schedule of deliveries along these routes is defined.

The primary mitigation method for limiting additional traffic on the Glenn and Parks Highways would be to use the ARRC rail system as much as possible to transport Project construction equipment and materials. Authorities that have jurisdiction over roads and highways affected by construction of Project and non-jurisdictional facilities, including ADOT&PF, would be consulted to develop traffic management plans prior to construction.

Periodic lane closures on the Parks Highway would occur where construction of the pipeline is within close proximity. Specific locations are within the Nenana River Gorge north of Denali National Park. At least one lane of traffic would be maintained. Traffic control plans would be prepared and sealed by a professional engineer registered in Alaska and would follow the Alaska Traffic Manual and Manual of Uniform Traffic Control Devices. Site specific preliminary traffic control plan for the Parks Highway is as follows. Near the Moody Bridge across the Nenana River (Mainline MP 532, Parks Hwy MP 243), full road or lane closures are not anticipated, although it may become necessary for high picks or crane work adjacent to the highway. Normal construction zone speed restrictions and traffic control practices should be anticipated with minimal impacts to regular traffic. Construction zone traffic control would be required for the railroad when work is taking place within the railroad ROW.

Within the Nenana River Gorge area, Mainline MP 532 to MP 536, Hwy MP 239 to 243, there would be periodic lane closures with pilot car operations. The preferred pipeline alignment is along the ditch line east of the Parks Highway approximately between Parks Hwy MP 240 and 241. There is an unstable rock bluff within this area alongside the highway. A rock fall barrier was constructed alongside the highway to provide protection from falling rock debris. The rock fall barrier would need to be temporarily moved away from the rock bluff during construction to accommodate pipe laying operations. After relocating the rock fall barrier, the area between it and the bluff would still be too narrow to accommodate a work pad for pipe laying equipment. This would require establishing an 18 foot wide work area along the east side of the existing roadway surface. The work area would include a temporary construction barrier placed along the edge of the proposed work area to separate and shield highway traffic from construction operations. Highway traffic would utilize the remaining six feet of the west travel lane plus the paved shoulder for single lane traffic. Flaggers and pilot cars would be required to control the movement of northbound and southbound traffic through the construction zone. Full closures are not anticipated unless additional rock scaling is necessary. If required, closures would be scheduled for night time and advertised well in advance similar to the work flow that occurred during the ADOT&PF rock scaling work within this section of highway during summer 2016. The traffic management plan would make use of the existing pull outs along this stretch of the highway. Work within this area is scheduled to begin after Labor Day to minimize traffic impacts.

5.4.2.7.2.3 Seward Highway/Sterling Highway/Kenai Spur Highway

Rail would provide the best option for transporting large quantities of construction materials and equipment from the Port of Seward, and construction materials for the Liquefaction Facility, such as concrete piles, equipment, structural steel, pipe spools, and modules, could be transported to the facility site at Nikiski via barge and other marine vessels. However, during the three years of peak Liquefaction Facility construction, some general cargo and materials for construction would likely be trucked along the Seward, Sterling, and Kenai Spur Highways from the Ports of Seward and Anchorage to Nikiski. Over the three-year period, assuming that every truck taking materials to Nikiski returns to its point of origin, the number of truck trips could range up to about 10,500 between Seward and Nikiski, and 27,800 between Anchorage and Nikiski.

The construction camp for the Liquefaction Facility would be located onsite to reduce the need for off-site traffic and road crossings during shift changes. This would decrease congestion on local public roads and the risk of potential traffic accidents for workers and the general public. However, construction workers would be transported in and out of the Liquefaction Facility construction site on a daily basis as a result of mobilizations and demobilizations. Buses carrying 40 passengers would be used to transport personnel along the Kenai Spur Highway between the Kenai Municipal Airport and the construction camp. In addition, the daily commuting of KPB residents employed in the construction of the Liquefaction Facility could result in temporary impacts on traffic in the KPB. From 200 to 500 KPB residents could be working on the facility at any one time (Section 5.4.2.2.1.1). These workers would commute typically six days a week to and from the construction site, resulting in increased traffic in the Nikiski and Kenai/Soldotna areas at specific times. To minimize traffic congestion, the Applicant would encourage KPB resident construction workers to share rides to the construction site. Contractors may also provide buses to move workers from common parking areas to the construction work area. The Applicant would also schedule construction-related traffic within roadways and specific crossings in the Nikiski and Kenai/Soldotna areas to avoid commuter traffic and school buses to the greatest extent practical.

Fuel for construction of the Liquefaction Facility could be delivered by barge or by tanker truck from the adjacent Tesoro Alaska oil refinery, an option that would require no use of public roads (the possibility also exists to build a pipeline from the refinery to the construction site). Further, aggregate material would be transported to the construction site in dump trucks originating from quarries within an approximate 20-mile radius of the site. Off-highway trucks (i.e., trucks designed to transport material over narrow haul roads) with 30 to 40 cubic yard capacities would be used for transporting aggregate from quarries within the site. This latter dump truck traffic would not be on the road system, minimizing traffic impact and reducing road safety risk.

As described in Section 5.3.5.2, the Seward, Sterling, and Kenai Spur Highways provide regional mobility for movement of people and goods along the Kenai Peninsula. As discussed above, in comparison to recent AADT counts on these three highways (Section 5.3.5.2), the volume of traffic related to Project and NJF construction would not be significant. Nevertheless, this additional traffic would contribute to the congestion that already exists along sections of the Seward, Sterling, and Kenai Spur Highways. Section 5.3.5.2 notes that sections of the Seward and Sterling Highways are designated by ADOT&PF as safety corridors. The additional traffic associated with Project construction would further overload these sections and exacerbate the safety risk (Persily 2015). In addition, south of its intersection with the Sterling Highway, the Seward Highway runs through the community of Moose Pass, which in conjunction with high summer traffic associated with tourism, may be an impedance to high truck traffic volumes should large quantities of general cargo be transported from the Port of Seward to Nikiski during Project construction. With respect to the Kenai Spur Highway, Section 5.3.5.2 notes that traffic congestion regularly occurs at places along the highway, especially during morning and afternoon commute times. Traffic related to Project construction could result in even slower travel times along the Kenai Spur Highway and a higher traffic safety risk.

The primary mitigation method for reducing additional traffic on the Seward, Sterling, and Kenai Spur Highways would be to use barges and other vessels as much as possible to transport Project construction equipment and materials to worksites. In addition, authorities that have jurisdiction over roads and highways affected by construction of Project facilities, including ADOT&PF, would be consulted to develop traffic management plans prior to construction. The traffic management plans would ensure that responsible parties plan, coordinate, and track the implementation of Project-related road maintenance and rehabilitation, bridge and major culvert maintenance, road infrastructure monitoring and inspection, and traffic management.

5.4.2.7.3 Railroads

During construction, ARRC's central line and branch lines would be used to move fuel, pipe, construction equipment, and other cargo from southcentral Alaska ports to predetermined storage areas in the greater Fairbanks area, with some materials delivered to newly built rail spurs that are in close proximity to the Mainline ROW and pipe storage or contractor yards. The Ports of Whittier and Seward are linked directly with rail, although tunnel dimensions limit the size of the rail cargo that can be moved from the two ports. The Port of Anchorage does not have direct rail access, but containers are currently loaded on chassis and transported off port to a nearby existing ARRC rail yard. Where possible, rail lines would also be used to transport materials and equipment to construction sites; however, it is likely that most materials and equipment would be transported to worksites via truck.

The estimated construction-related demand for railcars during the construction phase ranges from about 60 to 100 dedicated railcars during the 2020–2025 period. Peak demand of approximately 100 dedicated railcars would occur in 2022. The demand exceeds current excess railway system capacity in each year of construction. Should Project construction result in a shortage of railcars, existing users of ARRC freight services may experience transport bottlenecks and higher rail freight costs. To enable ARRC to adequately support its current business customers, ARRC has requested that a two-year notice be provided to allow sufficient lead time to obtain additional railcars. In addition, a decision to transport fuel required for construction via rail would require the acquisition of additional tanker railcars. Fuel tanker railcars are privately owned by bulk petroleum shippers and are not managed by ARRC.

There is also a risk that the increased freight during construction could cause congestion in the rail system, particularly during the summer tourist season when the number of passenger trains increases substantially. To manage the load on the system due to construction freight, the Project contractors/subcontractors would coordinate with ARRC to move freight trains to a night shift as much as possible, keeping the day shift for passenger trains during the summer.

While additional railcars would be required to meet Project demand, no modifications of the Alaska railroad system infrastructure would be necessary to accommodate the additional freight, nor would additional locomotives or railway operating crews be needed. Rail spurs would be constructed by the Project to facilitate the delivery of the pipe and other materials to near where construction activities take place. Since the offloading of pipe can be time consuming, rail spurs are necessary to keep the primary rail lines open during the time it takes to offload pipe or other materials.

5.4.2.7.4 Air Transportation

Personnel transportation for Project construction would include interstate and Alaska regional aviation transportation between areas with available labor pools and regional airport hubs. Final transportation from the regional hub airports to the construction camps would be performed via air or bus. Air transport would also be used to move materials and equipment to remote worksites during Project construction.

TABLE 5.4.2-50 lists the four key airport hubs in the AOI during Project construction and summarizes their principal uses.

TABLE 5.4.2-50

Purpose of Key Airport Hubs in the Area of Interest During Project Construction

Ted Stevens Anchorage International Airport	Municipality of Anchorage	Key interstate transportation hub for construction personnel rotating to and from out-of-state locations Regional hub for access to other regional hubs within Alaska (Kenai Municipal Airport and Fairbanks International Airport) as well as for tactical airports supporting remote Mainline construction sites in southern Alaska
Fairbanks International Airport	Fairbanks North Star Borough	Entry point for some Mainline construction personnel originating from outside of Alaska Regional hub for access to other regional hubs within Alaska (Deadhorse Airstrip) as well as for tactical airports supporting remote Mainline construction sites in northern Alaska
Deadhorse Airstrip	North Slope Borough	Destination and departure point for GTP and PBTL construction personnel Destination and departure point for PTTL construction personnel (between Prudhoe Bay and the PTU)

Kenai Municipal Airport	Kenai Peninsula Borough	Destination and departure point for personnel supporting the construction of the Liquefaction Facility as well as a smaller number of Mainline construction workers

Project-related air passenger traffic would flow between the Anchorage and Fairbanks airports and the Seattle-Tacoma International Airport and the two key airport hubs at Kenai and the Prudhoe Bay CDP. This additional passenger traffic at the Anchorage and Fairbanks airports would be small in comparison to recent passenger numbers at the two major airports in Alaska (Section 5.3.5.4). The peak in Project-related passenger traffic at both Ted Stevens Anchorage International Airport and Fairbanks International Airport would occur in 2023. It is unlikely that this movement of Project construction workers would place undue logistical stress on the Anchorage and Fairbanks airports, particularly since most of the flights would be on Project-chartered aircraft so workers would not be competing for airline seats, and one of the two annual construction peaks for air travel would be during the winter when the airports are under-utilized.

The majority of Project construction personnel would be transported from the regional hub airports to the project sites via bus; however, there may be some use of tactical airstrips such as Point Thomson, Galbraith Lake, Chandalar, Coldfoot, Livengood Camp, Prospect Creek, Nenana, Cantwell, Summit, Talkeetna, Willow, and Beluga. If tactical airstrips are used, the airstrips would be used within the constraints of their design and current conditions, so the aircraft selected for use at a tactical airstrip would be able to land and take off on the airstrip without additional airstrip improvements. All these airstrips are for public use except for the airstrip at Beluga, which is privately owned. It is uncertain how many construction workers would be transported to these airstrips, but the increase in passengers and flights is not expected to adversely affect operations at the Anchorage and Fairbanks airports or disrupt air service at the airstrips. Some of the airstrips are not jet-capable, and smaller planes, such as Dash 8-100 series, Twin Otter, and similar-sized aircraft, would be needed to transport construction crews. Consultations would be held with ADOT&PF to discuss potential improvements for public airstrips and with the Beluga airstrip owner. If the planning assumption that pipeline constructions crews would mobilize and work an entire spread season before demobilizing is changed in the next project phase, the tactical airstrips will be further evaluated to determine if their use is justified. ~~Since the baseline plan is not to utilize the tactical airstrips, the projected volumes of usage by project workers is zero.~~ Project execution plans do not envision use of the tactical airstrips at this time.

The large workforce involved in the construction of the Liquefaction Facility in Nikiski would require considerable air transportation, with a peak demand for flights between Anchorage and Kenai coinciding with the peak workforce in 2023. While there would be a major increase in enplanements at Kenai Municipal Airport during Project construction, the airport is currently underutilized, and the planes that would be turned at the airport during construction are relatively small. Therefore, this airport is expected to be capable of supporting the increased demands from the Project without any infrastructure improvements. However, the increase in passenger traffic could have a temporary but significant adverse impact on the public's use of the airport by creating crowded conditions at the passenger terminal, which, in turn, would create delays at ticket counters and security checkpoints. When passengers anticipate these delays, they arrive at the airport earlier and increase their travel time. Moreover, additional passengers results in increased delays at the baggage claim carousel at the end of a trip (Cohen and Coughlin 2003). Consultations would be held with the Kenai Municipal Airport to identify potential solutions to handle the increased passengers and baggage.

At the Deadhorse Airstrip, the peak in Project-related passenger traffic would occur in 2023 when the construction workforce for the GTP and Mainline would reach its peak. The large increase in passenger traffic at the airport would not have an adverse impact on the general public because the Deadhorse Airstrip is primarily used by existing oil and gas industry employees working in the greater Prudhoe Bay area. Nevertheless, these workers would be adversely affected by the increased congestion at the passenger terminal during Project construction. The workers frequently use the airport because of their fly-in/fly-out rotational work schedule. Consultations would be held with ADOT&PF and air carriers providing service to the Deadhorse Airstrip to determine if upgrades are needed to account for additional passengers, such as a larger lobby area, expanded baggage and cargo handling facilities, and gate and security improvements.

Due to the large variation in the locations of Project construction sites and the aviation infrastructure available, the Project would need access to a variety of aircraft types and aviation pilots and crews with a variety of experiences. Interstate air service between Seattle and Anchorage from 2020 through 2025 could be supported by large jet aircraft (e.g., Boeing 737-400). Regional hub service within Alaska could be supported by a large jet airplane with a smaller turboprop (e.g., de Havilland Dash 8-100) or two medium-sized turboprop planes (e.g., Bombardier Q400). Other aircraft options are also under evaluation.

Rotations, mobilizations, and demobilizations of Project construction personnel would cause large spikes in demand for aircraft. When these spikes coincide with spikes in demand for commercial air travel tickets during the peak tourism season, there would be a risk that Project competition for aviation resources would overburden the commercial aviation service providers in Alaska and along the Lower 48 to Alaska routes. For example, within Alaska, there is currently insufficient aircraft capacity to support the Project intrastate personnel rotation requirements (e.g., transporting staff from the major hub of Anchorage to smaller hubs, such as Fairbanks, the Prudhoe Bay CDP, and Kenai). At its peak rotation, there is expected to be approximately 8,400 Project construction workers in Alaska. Assuming possible rotation schedules, during peak periods there could be as many as 700 to 800 seats required daily to support rotations, mobilizations and demobilizations. The cumulative capacity after current business load for transportation through this corridor is expected to be approximately 300 to 400 seats per day. Block seating purchases on commercial flights by the Project would result in fewer seats available for tourists and therefore have an adverse impact on Alaska’s tourist industry.

Procuring and managing air charter service to support the transportation of Project construction personnel between the Lower 48 and Alaska and within Alaska, together with a coordinated focus to upgrade capacities of key airport terminal facilities if needed, would help avoid the risk of disrupting commercial air service on interstate and intrastate routes. In addition, air charters would enable contractors to screen personnel prior to the travel to Alaska, which would reduce the number of return flights for people released from the Project for noncompliance with drug, alcohol, and weapons policies. Air charters or scheduled commercial flights for Project construction workers would also be a key element in arranging for workers to return to their place of hire during rotations, mobilizations, and demobilizations, thereby reducing the adverse socioeconomic impacts on local communities that would otherwise be caused by temporary population increases.

5.4.2.8 Government Revenues and Expenditures

Construction of the Project could potentially generate significant revenues for local governments and the State of Alaska. Revenues received by the State and municipalities could be associated with the proposed impact payments to be paid in lieu of oil and gas property taxes during the construction phase (Section 5.4.2.6.1). In addition, revenues from sales taxes, property taxes, excise taxes, and corporate income taxes would be generated due to the higher level of economic activity associated with construction of the Project. Certain communities could also experience increased revenues from special taxes, including alcohol, tobacco, car rental, motor fuel, utility, and bed taxes, generated by in-migrating job seekers and Project logistics personnel (e.g., persons working at ports receiving construction materials and equipment).

Construction of the Project could also potentially increase the expenditures of local governments and the State of Alaska. As discussed in Section 5.4.2.6, the additional people expected to move into the State because of the increased employment opportunities created by the Project during construction would increase the demand for some types of public infrastructure and services. State and local governments affected by immediate and costly impacts to public infrastructure and services could subsequently be affected by strained budgets. Even if government revenues per capita are eventually sufficient to cover the added costs, the revenues would be collected only after expenditures for the increased population are required. State financial assistance to local governments would be limited by law and may not exist. On the other hand, the fiscal impact of any substantial immigration of people during Project construction may be mitigated by impact payments as described in Section 5.4.2.6.1.

There is currently insufficient information to conduct a comprehensive fiscal impact analysis evaluating incremental State and local government expenditures in relation to incremental State and local government revenues that would result during construction of the Project. In particular, the impact payments to be paid in lieu of property taxes during the construction phase have not been determined, and an estimate of the construction costs that would be incurred by the State as an equity owner of the Project is unavailable. In this socioeconomic impact analysis, potential fiscal effects at the state level are described in qualitative terms. Quantitative estimates of fiscal effects at the local government level are presented, but are restricted to changes in government tax receipts and spending that would result from Project-related changes in population. These population-based revenues and expenditures and other details about the fiscal impacts model are discussed in Section 2.4 of Appendix B.

The majority of population-based expenditures for the State of Alaska are related to the cost of education and health and human services. The change in State government revenues and expenditures during construction would be temporary and minor.

For those municipalities in the AOI that would be significantly affected, TABLE 5.4.2-51 through TABLE 5.4.2-56 show the change in population-based local government revenues and expenditures as a result of Project construction. The annual net change in fiscal position, in terms of amount, represents revenues less expenditures in a given year. If the number is negative, the municipality is in a deficit situation (i.e., expenditures exceed revenues). If the amount is positive, the local government is in a surplus situation. The percent change in fiscal position represents the annual difference between revenues and expenditures as a percentage of the difference from the 2013 baseline year. Local governments would incur costs due to Project-related population growth in the first few years of construction before revenues become available to cover those costs. This situation can stress municipal budgets, although the model results indicate that any temporary deficits would be minor in comparison to the projected municipal budgets under the “without Project” scenario.

TABLE 5.4.2-51

Estimated Net Difference Between Matanuska-Susitna Borough Population-Based Expenditures and Revenues During Project Construction

	2019	2020	2021	2022	2023	2024	2025	2026	2027
Net Change in Fiscal Position[a]									
Amount ($ Thousands)	28	-160	-430	346	1,569	2,652	3,672	4,388	5,186
Percent Change	0	0	0	0	2	4	5	6	7
Expenditures (1,000s)									
Total Expenditures	258	989	2,040	2,990	4,010	4,812	5,685	6,248	6,613
Operating Expenses	235	900	1,859	2,730	3,669	4,412	5,227	5,762	6,118
General Government	42	157	318	460	602	706	809	859	874
Public Safety	22	85	172	248	325	381	436	464	472
Public Works	14	51	104	150	197	231	264	281	286
Health and Human Services	0	0	0	0	0	0	0	0	0
Education	146	565	1,179	1,749	2,383	2,904	3,501	3,928	4,253
Other Operating Expenses	11	42	85	123	162	190	217	231	235
Business Type Activities/Enterprises	24	89	180	260	341	399	457	486	494
Water and Wastewater	0	0	0	0	0	0	0	0	0
Electric	0	0	0	0	0	0	0	0	0
Other	24	89	180	260	341	399	457	486	494
Revenues (1,000s)									
Total Revenue	286	829	1,609	3,336	5,579	7,464	9,357	10,635	11,798
Property Tax (excludes O&G property tax)	133	246	443	1,676	3,414	4,942	6,474	7,585	8,704
Sales Tax	0	0	0	0	0	0	0	0	0
Special Taxes	33	128	242	326	416	473	537	557	559
Charges for Services and Other Fees	13	51	103	149	195	229	262	278	283
Other Non-tax Revenues	87	329	667	963	1,262	1,479	1,694	1,799	1,831
Business Type Activities/Enterprises	20	76	154	222	291	341	391	415	422
Water and Wastewater	0	0	0	0	0	0	0	0	0
Electric	0	0	0	0	0	0	0	0	0
Other	20	76	154	222	291	341	391	415	422

Notes:
[a] Includes impacts of Project operation start-up activities.

TABLE 5.4.2-52

Estimated Net Difference Between City of Wasilla Population-Based Expenditures and Revenues During Project Construction

	2019	2020	2021	2022	2023	2024	2025	2026	2027
Net Change in Fiscal Position[a]									
Amount ($ Thousands)	4	14	29	45	63	77	90	98	103

TABLE 5.4.2-52

Estimated Net Difference Between City of Wasilla Population-Based Expenditures and Revenues During Project Construction

Percent Change	0	1	1	3	4	4	5	5	5
Expenditures (1,000s)									
Total Expenditures	53	204	413	594	778	913	1,044	1,108	1,126
Operating Expenses	36	141	285	410	536	630	720	764	777
General Government	8	30	60	87	113	133	152	162	164
Public Safety	17	67	135	194	253	298	340	361	367
Public Works	6	23	46	66	87	102	116	123	125
Health and Human Services	0	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0
Other Operating Expenses	6	22	44	63	83	97	111	118	120
Business Type Activities/Enterprises	15	59	119	171	224	263	301	320	325
Water and Wastewater	8	32	64	93	121	142	163	173	176
Electric	0	0	0	0	0	0	0	0	0
Other	7	27	55	79	103	121	138	147	149
Revenues (1,000s)									
Total Revenue	57	219	442	639	840	990	1,134	1,206	1,229
Property Tax (excludes O&G property tax)	0	1	1	5	11	16	21	24	28
Sales Tax	34	131	264	380	497	584	667	708	720
Special Taxes	0	0	0	0	0	0	0	0	0
Charges for Services and Other Fees	5	20	40	57	75	88	101	107	109
Other Non-tax Revenues	7	28	56	81	106	124	142	151	153
Business Type Activities/Enterprises	10	40	80	116	151	178	203	216	219
Water and Wastewater	8	31	63	91	119	140	160	170	173
Electric	0	0	0	0	0	0	0	0	0
Other	2	8	17	25	32	38	43	46	47

Notes:
[a] Includes impacts of Project operation start-up activities.

TABLE 5.4.2-53

Estimated Net Difference Between City of Homer Population-Based Expenditures and Revenues During Project Construction

	2019	2020	2021	2022	2023	2024	2025	2026	2027
Net Change in Fiscal Position[a]									
Amount ($ Thousands)	0	-17	-34	40	133	182	255	314	372
Percent Change	0	0	0	0	3	4	5	6	8
Expenditures (1,000s)									
Total Expenditures	9	81	167	220	291	347	397	437	462

TABLE 5.4.2-53

Estimated Net Difference Between City of Homer Population-Based Expenditures and Revenues During Project Construction

	2019	2020	2021	2022	2023	2024	2025	2026	2027
Operating Expenses	6	55	114	150	198	236	270	298	315
General Government	2	16	33	43	57	68	78	86	91
Public Safety	2	22	45	59	78	93	106	117	124
Public Works	1	10	20	27	35	42	48	53	56
Health and Human Services	0	1	2	3	4	5	6	6	7
Education	0	0	0	0	0	0	0	0	0
Other Operating Expenses	1	7	14	18	24	29	33	36	38
Business Type Activities/Enterprises	3	25	52	69	91	109	124	137	144
Water and Wastewater	0	0	0	0	0	0	0	0	0
Electric	0	0	0	0	0	0	0	0	0
Other	3	25	52	69	91	109	124	137	144
Revenues (1,000s)									
Total Revenue	9	63	134	260	424	529	652	751	834
Property Tax (excludes O&G property tax)	2	4	10	98	209	273	360	429	494
Sales Tax	2	17	35	46	61	73	83	91	97
Special Taxes	0	0	0	0	0	0	0	0	0
Charges for Services and Other Fees	0	0	0	0	0	0	0	0	0
Other Non-tax Revenues	2	19	40	52	69	82	94	104	110
Business Type Activities/Enterprises	3	23	49	64	85	101	116	127	134
Water and Wastewater	0	0	0	0	0	0	0	0	0
Electric	0	0	0	0	0	0	0	0	0
Other	3	23	49	64	85	101	116	127	134

Notes:
[a] Includes impacts of Project operation start-up activities.

TABLE 5.4.2-54

Estimated Net Difference Between City of Kenai Population-Based Expenditures and Revenues During Project Construction

	2019	2020	2021	2022	2023	2024	2025	2026	2027
Net Change in Fiscal Position[a]									
Amount ($ Thousands)	0	-21	-42	64	193	259	358	441	522
Percent Change	0	0	-1	1	5	7	10	12	14
Expenditures (1,000s)									
Total Expenditures	10	108	232	300	394	472	544	596	630
Operating Expenses	10	105	225	291	383	458	528	579	612

TABLE 5.4.2-54

Estimated Net Difference Between City of Kenai Population-Based Expenditures and Revenues During Project Construction

	2019	2020	2021	2022	2023	2024	2025	2026	2027
General Government	2	23	50	65	85	102	118	129	137
Public Safety	4	48	104	135	177	212	244	267	283
Public Works	2	17	37	48	63	75	86	95	100
Health and Human Services	0	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0
Other Operating Expenses	1	16	34	44	58	69	80	88	93
Business Type Activities/Enterprises	0	3	7	9	11	14	16	17	18
Water and Wastewater	0	0	0	0	0	0	0	0	0
Electric	0	0	0	0	0	0	0	0	0
Other	0	3	7	9	11	14	16	17	18
Revenues (1,000s)									
Total Revenue	10	87	190	364	587	731	902	1,037	1,152
Property Tax (excludes O&G property tax)	100	103	110	232	383	467	583	678	767
Sales Tax	4	44	96	124	162	194	224	245	259
Special Taxes	0	0	0	0	0	0	0	0	0
Charges for Services and Other Fees	1	16	34	44	57	69	79	87	92
Other Non-tax Revenues	2	20	43	56	74	88	102	112	118
Business Type Activities/Enterprises	0	2	5	7	9	11	13	14	14
Water and Wastewater	0	0	0	0	0	0	0	0	0
Electric	0	0	0	0	0	0	0	0	0
Other	0	2	5	7	9	11	13	14	14

Notes:
[a] Includes impacts of Project operation start-up activities.

TABLE 5.4.2-55

Estimated Net Difference Between City of Soldotna Population-Based Expenditures and Revenues During Project Construction

	2019	2020	2021	2022	2023	2024	2025	2026	2027
Net Change in Fiscal Position[a]									
Amount ($ Thousands)	1	13	28	51	81	100	123	141	156
Percent Change	0	1	2	5	7	9	11	12	14
Expenditures (1,000s)									
Total Expenditures	6	81	174	225	294	352	407	447	474
Operating Expenses	6	81	174	225	294	352	407	447	474

TABLE 5.4.2-55

Estimated Net Difference Between City of Soldotna Population-Based Expenditures and Revenues During Project Construction

	2019	2020	2021	2022	2023	2024	2025	2026	2027
General Government	1	17	36	46	61	73	84	92	98
Public Safety	2	26	56	72	94	113	131	144	152
Public Works	2	27	58	75	98	117	136	149	158
Health and Human Services	0	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0
Other Operating Expenses	1	11	24	31	41	49	57	62	66
Business Type Activities/Enterprises	0	0	0	0	0	0	0	0	0
Water and Wastewater	0	0	0	0	0	0	0	0	0
Electric	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0
Revenues (1,000s)									
Total Revenue	7	94	202	276	375	452	530	589	630
Property Tax (excludes O&G property tax)	0	0	1	17	36	46	61	73	84
Sales Tax	6	80	171	221	289	347	402	441	467
Special Taxes	0	0	0	0	0	0	0	0	0
Charges for Services and Other Fees	0	0	0	0	0	0	0	0	0
Other Non-tax Revenues	1	14	29	38	49	59	68	75	79
Business Type Activities/Enterprises	0	0	0	0	0	0	0	0	0
Water and Wastewater	0	0	0	0	0	0	0	0	0
Electric	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0

Notes:
[a] Includes impacts of Project operation start-up activities.

TABLE 5.4.2-56

Estimated Net Difference Between Municipality of Anchorage Population-Based Expenditures and Revenues During Project Construction

	2019	2020	2021	2022	2023	2024	2025	2026	2027
Net Change in Fiscal Position[a]									
Amount ($ Thousands)	4	-1,936	-4,579	-395	5,909	10,948	15,887	18,349	21,842
Percent Change	0	0	0	0	1	1	2	3	3
Expenditures (1,000s)									
Total Expenditures	1,673	6,887	13,850	19,205	25,004	28,324	31,577	32,289	31,248
Operating Expenses	1,154	4,755	9,594	13,363	17,482	19,908	22,343	23,046	22,532

TABLE 5.4.2-56

Estimated Net Difference Between Municipality of Anchorage Population-Based Expenditures and Revenues During Project Construction

	2019	2020	2021	2022	2023	2024	2025	2026	2027
General Government	36	149	298	408	526	588	645	646	609
Public Safety	416	1,707	3,407	4,677	6,021	6,737	7,392	7,399	6,977
Public Works	154	631	1,260	1,729	2,226	2,491	2,733	2,736	2,580
Health and Human Services	22	89	179	245	316	353	387	388	366
Education	454	1,885	3,865	5,499	7,359	8,581	9,914	10,606	10,802
Other Operating Expenses	71	293	585	803	1,034	1,157	1,270	1,271	1,199
Business Type Activities/Enterprises	426	1,746	3,487	4,786	6,161	6,894	7,564	7,571	7,139
Water and Wastewater	142	581	1,160	1,592	2,050	2,293	2,516	2,519	2,375
Electric	204	837	1,672	2,295	2,954	3,306	3,627	3,630	3,423
Other	80	328	655	899	1,157	1,295	1,421	1,422	1,341
Revenues (1,000s)									
Total Revenue	1,678	4,951	9,272	18,810	30,913	39,273	47,464	50,638	53,090
Property Tax (excludes O&G property tax)	6,206	6,775	7,583	14,540	23,764	30,710	37,968	41,812	45,422
Sales Tax	0	0	0	0	0	0	0	0	0
Special Taxes	113	646	1,297	1,742	2,360	2,568	2,399	1,717	1,269
Charges for Services and Other Fees	86	353	705	968	1,246	1,395	1,530	1,532	1,444
Other Non-tax Revenues	102	419	837	1,149	1,480	1,656	1,817	1,818	1,715
Business Type Activities/Enterprises	512	2,099	4,191	5,753	7,406	8,287	9,093	9,101	8,582
Water and Wastewater	204	835	1,667	2,289	2,946	3,297	3,617	3,621	3,414
Electric	226	926	1,848	2,536	3,265	3,653	4,009	4,012	3,784
Other	83	339	676	928	1,195	1,337	1,467	1,468	1,384

Notes:

[a] Includes impacts of Project operation start-up activities.

5.4.2.9 Economic Value of Removal of Agricultural/Pasture Land or Timberland from Production

This section estimates the economic impacts of losses of production in agricultural/pasture land or timberland resulting from the Project. Due to the closely related effects of Project construction and operation on these land resources, the effects during the construction and operation phases of the Project are described concurrently. The acreage that would be temporarily or permanently removed from production during construction and operation of each of the Project facilities is identified, and the effect on the local or regional economy is discussed. The methodology used for this analysis is described in Section 2.8 of Appendix B.

TABLE 5.4.2-57 summarizes impacts to timberland during Project construction and operation. In total, about 12,000 acres would be removed from production statewide, with an estimated loss of around one million dollars. This impact would be minor, as the total amount of forest land cleared as a result of the Project would represent a small fraction of the forested acres in Alaska.

TABLE 5.4.2-57

Total Impacts of Project Construction and Operation on Timberland

	Forested Land Affected (Acres)		Estimated Economic Value	
	Construction[a]	Operation[a]	Construction	Operation
State of Alaska	8,899	3,253	$646,302	$385,346
North Slope Borough	22	5	$1,054	$250
Yukon-Koyukuk Census Area	4,215	1,109	$179,600	$50,097
Fairbanks North Star Borough	108	127	$44,698	$57,572
Denali Borough	1,230	302	$56,616	$14,109
Matanuska-Susitna Borough	3007	1,126	$318,227	$131,584
Kenai Peninsula Borough	317	585	$46,107	$131,770

Notes:
[a]Construction acreage excludes operational areas.
[b] Acreage used for operation would be affected during construction but is reported separately to avoid double counting economic values.

5.4.2.9.1 Liquefaction Facility

Construction and operation of the Liquefaction Facility is expected to have no impact on agricultural/pasture land, as the construction will occur on an industrial waterfront in a previously heavily-developed area.

The estimated impact of construction and operation of the Liquefaction Facility on timberland in terms of acres cleared and the value of timber foregone is shown in TABLE 5.4.2-58. This impact, which would occur entirely within the KPB, would be permanent but minor, as the total amount of forest land cleared during Project construction and operation would represent less than one percent of the forested acres in the borough.

TABLE 5.4.2-58

Impacts of Construction and Operation of the Liquefaction Facility on Timberland

Forested Land Affected (Acres)		**Estimated Economic Value**	
Construction[a]	**Operation[b]**	**Construction**	**Operation**
35	477	$8,040	$117,291

Notes:
[a]Construction acreage excludes operational areas.
[b] Acreage used for operation would be affected during construction but is reported separately to avoid double counting economic values.

5.4.2.9.2 Pipelines and Aboveground Facilities

Construction and operation of the PTTL, PBTL, and that portion of the Mainline located north of the Brooks Range are expected to have no impact on agricultural/pasture land or timberland production, as there are no agricultural or timberlands north of the Brooks Range.

With respect to construction and operation of that portion of the Mainline located south of the Brooks Range, Resource Report 8 reports 2.2 acres of potentially affected agricultural land, either pasture (hay) or crops, in the KPB and MSB. Upon further examination, however, these acres were determined to be woody wetlands and herbaceous sedge meadows (muskegs) or coded incorrectly by the National Land Cover Database. Therefore, no impacts to agricultural/pasture land are expected during construction and operation of the Mainline.

In terms of potential effects of Mainline construction and operation on timberland, Resource Report No. 8 notes that timber would be cleared along the Mainline construction ROW, storage yards, camps, workspaces, and access roads. The estimated impact of construction and operation of the Mainline on timberland by borough and census area is shown in TABLE 5.4.2-59. It is estimated that approximately 12,000 acres of forest would be cleared for Mainline construction and operation, with an estimated value of $1.03 million. This impact would be permanent but minor, as the total amount of forest land cleared for Project construction and operation would represent less than one percent of the forested acres in each affected borough or census area.

TABLE 5.4.2-59

Impacts of Construction and Operation of the Mainline on Timberland

	Forested Land Affected (Acres)		**Estimated Economic Value**	
	Construction[a]	**Operation[a]**	**Construction**	**Operation**
State of Alaska	8,864	2,776	$638,263	$268,055
North Slope Borough	22	5	$1,054	$250
Yukon-Koyukuk Census Area	4,215	1,109	$179,600	$50,097
Fairbanks North Star Borough	108	127	$44,698	$57,572
Denali Borough	1,230	302	$56,616	$14,109
Matanuska-Susitna Borough	3007	1,126	$318,227	$131,584
Kenai Peninsula Borough	282	108	$38,067	$14,479

Notes:
[a]Construction acreage excludes operational areas.
[b] Acreage used for operation would be affected during construction but is reported separately to avoid double counting economic values.

The effects on the local or regional economy of this timber clearing would depend on where the clearing occurs and the level of management that exists at that location. Most of the Mainline corridor timberland is managed under a custodial approach, with primary economic value tied to timber as a fuel resource. In areas of custodial management, the roads that would be built to obtain access to the construction and permanent ROW for the Mainline may have a beneficial impact on wood supply by increasing access to timberland. In addition, the access roads would facilitate vehicle entry in certain areas for wildland fire suppression and would facilitate hunting, fishing, and other recreational activities.

In those areas with extensive management regimes, access would also be provided that may not otherwise be available, thereby further increasing wood supply. Certain areas, such as the corridor across the western portion of the Tanana Valley State Forest or areas west of MSB-managed forest units, may experience a permanent loss of timberland due to the Mainline, but these losses would be minor relative to the amount of timberland available. Any adverse economic impacts due to these losses could be offset by the beneficial economic impacts of Project-related access roads (Eleazer 2016).

Intensively managed timberland is limited to the Tanana Valley State Forest within the FNSB. The Mainline corridor passes through a limited amount of the forest and is projected to have a limited impact on timberland within the Tanana Valley State Forest. Alaska's Constitution requires sustained yield management on its lands and the State has quantified a sustained yield harvest level for the Tanana Valley State Forest. The Alaska Division of Forestry noted in a Five-Year Schedule of Timber Sales the following:

> In each of the years covered in this schedule, the total volume of wood proposed for harvest is far below the potential sustained harvest level determined in the Timber Inventory of State Forest Lands in the Tanana Valley…the proposed average yearly harvest…constitutes less than 14% of the potential sustained harvest by area and 20% by volume (Meaney 2015).

Any adverse economic impacts due to the slight potential reduction of timberland during construction of the Mainline would likely be offset by the beneficial economic impacts of Project road access to timberland located elsewhere in the Tanana Valley State Forest, especially as current timber supply exceeds proposed harvest levels by 80 percent (volume basis).

5.4.2.9.3 GTP

Construction and operation of the GTP is expected to have no impact on agricultural/pasture land or timberland production, as there are no agricultural or timberlands north of the Brooks Range.

5.4.2.9.4 Non-Jurisdictional Facilities

The impact on agricultural/pasture land or timberland during construction and operation of the KSH Relocation project will be provided when a proposed route has been selected. Construction and operation of the PTU Expansion project and PBU MGS project is expected to have no impact on agricultural/pasture land or timberland production, as there are no agricultural or timberlands north of the Brooks Range.

5.4.2.10 Environmental Justice

Project facilities have been sited primarily within industrial areas and designated utility corridors to avoid areas where people live. Interdependent Project Facilities are in the PBU and within designated utility corridors; the Liquefaction Facility was sited within an existing industrial area near Nikiski to the extent practicable, and agreements have been made or will be made with land owners to acquire the remaining property. Mitigation measures for potential environmental justice impacts could include the following and would be developed prior to construction:

- Coordinate construction activities with state and local authorities and communicate construction schedules to local users to reduce impacts to subsistence activities where possible;
- Coordinate construction activities with state and local authorities to reduce impacts to high-use tourist and local recreation seasons (i.e., wildlife viewing, hunting, snow machining);
- Develop and implement traffic control plans to reduce negative impacts to local businesses by blocking access during construction;
- Locate Project construction sites and aboveground permanent facilities in areas separated from residential homes to reduce impacts on housing value or quality of life of adjacent residents; and
- Mitigate visual impacts by using vegetative cover in front of construction areas as possible and practicable, as well as repositioning access roads away from public areas. Limit the use of lights during the night to reduce visual impacts.

5.4.2.10.1 Environmental Justice and Public Health

The State of Alaska developed *Technical Guidance for Health Impact Assessment in Alaska*, also known as the Alaska HIA Toolkit (Alaska Department of Health and Social Services [ADHSS] 2015). This public health analysis focuses on minority populations and low-income populations and is informed by both the Toolkit as well as the Human Health section of the Alaska Stand Alone Gas Pipeline Final EIS (USACE 2012).

This section examines potential human health impacts from construction and operations of the Project. The impacts considered include health effect categories (HECs), identified in the Alaska Toolkit (see above).

Project impacts (both positive and negative) would occur during both the construction and operations phases but the negative impacts are likely to be greater during the construction period than the operations period, mainly with respect to accidents and injuries. This is because of the disruptions that are associated with construction and existing infrastructure and the influx of a relatively large number of workers during this period. Impacts during operations will be related to health services infrastructure and capacity as a result of population increases during Project operation (see TABLE 5.4.3-1 and Section 5.4.3.5.3 for more detail).

During the operations phase, most of the impacts are likely to be positive (e.g., improved air quality in certain areas resulting from the substitution of natural gas for other fossil fuels and resulting health benefits to residents of Fairbanks), substantial, enduring, and of direct benefit to the health of Alaska residents.

The potential impacts described below arise from the direct physical effects of construction activities and those associated with the presence of construction personnel necessary to complete the job over the construction period.

5.4.2.10.1.1 HEC 1: Social Determinants of Health

The proposed Project would have the potential to impact the social determinants of health if it caused the following to occur:

- Change in maternal and child health status (e.g., infant mortality, initiation of prenatal care, low birth weight, smoking during pregnancy, child abuse, or alcohol use during pregnancy);
- Change in depression/anxiety prevalence;
- Change in the substance abuse rate;
- Change in the suicide rate;
- Change in teen pregnancy rates;
- Change in domestic violence and family stress; and
- Change in economy and employment.

Of these changes, the Applicant anticipates a change in economy and employment for the PACs that exceed the meaningfully greater criteria for low-income and minority populations.

5.4.2.10.1.2 HEC 2: Accidents and Injuries

The proposed Project may have the potential to change the rate of accidents and injuries, for example, if it caused the following to occur::

- Change in unintentional injury (e.g., drowning, falls, snow machine, ATV injury) rates by changing access locations and distances to recreational facilities;
- Change in roadway incidents and injuries with increased traffic; and
- Changes to safety during subsistence activities as a result of changes to harvest trip distance.

Construction of the Project may result in increased accidents and injuries to those who participate in construction activities as well as the general population from increased presence of construction workforce and the transportation of materials on the existing infrastructure. Impacts from the Project on accidents and injuries are estimated to be moderate and temporary.

5.4.2.10.1.3 HEC 3: Exposure to Hazardous Materials

The proposed Project would have the potential to result in an increase to exposure to hazardous materials from:

- Changes in physiologic contaminant levels such as fugitive dust, criteria air pollutants, persistent organic pollutants, and volatile organic compounds, and
- Changed levels of the same substances in subsistence resources.

Emissions from construction equipment combustion, fugitive dust, and open burning would be controlled to the extent required by the ADEC. Therefore, the proposed Project construction-related activities would not significantly affect local or regional air quality. Therefore, construction of the proposed Project should not significantly increase exposure of the PACs to these substances.

In addition to complying with all applicable regulations, the proposed Project would also follow the requirements of the FERC Order and the Applicant's plans intended to ensure the proper handling and disposal of hazardous and nonhazardous wastes. These plans include a waste management plan and spill prevention and response plan. Therefore, construction of the proposed Project should not lead to significant exposure of the PACs to these substances.

Impacts from the Project on exposure to hazardous materials are estimated to be minor and temporary.

5.4.2.10.1.4 HEC 4: Food, Nutrition, and Subsistence

The Project would have the potential to affect the food, nutrition, and subsistence of PACs if it caused the following to occur:

- Change in amount of dietary consumption of subsistence resources;
- Change in composition of diet; and
- Change in food security.

The timing of construction activities could impact subsistence activities. User access to subsistence areas could be temporarily reduced due to both physical and regulatory barriers related to water extraction efforts, pipe laydown, noise, traffic, and other construction activities. Short-term decreased user access and increased competition for subsistence resources would have the greatest effect in the undeveloped Minto Flats vicinity and for subsistence users in communities that lie directly along the proposed Project, in particular the communities of Anderson, Beluga, Cantwell, Coldfoot, Healy, McKinley Park, Minto, Nenana, Trapper Creek, Tyonek, Willow, and Wiseman.

Subsistence is discussed in detail in Section 5.5 and in Appendix D. In summary, PACs that may experience moderate to major impacts to subsistence resources for those residents in areas that exceed the meaningfully greater criteria for low-income and minority populations (Minto, Nenana, McKinley Park, Cantwell, Talkeetna, Trapper Creek, Willow, Beluga, and Tyonek).

The impact of the proposed Project on food, nutrition, and subsistence is anticipated to be moderate and temporary.

5.4.2.10.1.5 HEC 5: Infectious Diseases

The proposed Project would have the potential to affect infectious diseases, for example, if it caused the following to occur:

- Change in transmission of pediatric acute respiratory disease rates;
- Change in acute adult respiratory disease rates (TB, bronchitis, influenza);
- Change in STD rates (e.g., Chlamydia, gonorrhea, HIV);
- Change in gastro intestinal outbreaks; and
- Change in antibiotic-resistant staph skin infections.

The public health concern with respect to evaluating proposed development Projects is that these diseases can be transmitted by infected construction workers (potentially from workers that come from outside the area). In the Alaska context, the diseases of particular concern include infectious respiratory diseases (e.g., pneumonia, influenza) and STDs (AIDS, syphilis, gonorrhea, and Chlamydia).

The construction camps will be closed, that is, the workers will be required to stay within the camp during their work rotation and then transported to their entry city for their trip home. Each camp would have a medical technician on-staff. Camp facilities would include a private examination room and a reception and service area. Equipment would include refrigeration facilities for storage of perishable medicines, sterilization equipment, and storage for medical supplies. Workers who contract other infectious diseases would be evacuated to treatment facilities away from the camps in much the same say as occupational injuries would be treated.

Potential impacts on infectious diseases are anticipated to be moderate.

5.4.2.10.1.6 HEC 6: Water and Sanitation

Water and sanitation were considered for construction camps. Potentially relevant impacts include:

- Change in potable water access;
- Change in water quantity;
- Change in water quality; and
- Change in demand on water and sanitation infrastructure due to the influx of non-resident workers.

Construction of the proposed Project should not materially increase exposure of the PACs to toxic and hazardous substances. Therefore, effects on water quality due to the use of hazardous materials in the proposed Project are not anticipated. The SPCC and waste management plan, which would be developed for the proposed Project, would address hazardous and non-hazardous wastes and solid waste to be reused, recycled, burned, or disposed of in accordance with applicable regulations. In addition, domestic wastewater produced from work camps would be treated and discharged in accordance with applicable permits. Construction of the proposed Project would therefore have negligible effects on water quality.

The Applicant has not yet determined from which surface water bodies it would obtain the necessary water supplies so it is not possible to examine impacts in detail. However, the Applicant would need to obtain (and comply with provisions of) the necessary permits prior to water withdrawal, including conditions to honor existing water rights, thereby minimizing any potential adverse effects to potable water supplies.

Construction camps would require food service, drinking water, wastewater treatment, and solid waste management. The Applicant would obtain the necessary permits and comply with relevant regulations, and would manage waste according to permits required to run camp operations. Therefore, an increased demand on water and sanitation infrastructure due to construction camps would be managed and mitigated through permits obtained from ADEC and contracts with local service providers. Potential impacts on water and sanitation are anticipated to be minor and temporary.

5.4.2.10.1.7 HEC 7: Non-communicable and Chronic Disease

Construction of the proposed Project would have the potential to affect non-communicable and chronic diseases, for example, if it caused the following to occur:

- Change in cardiovascular disease rates;
- Change in type 2 Diabetes Mellitus (DM) rates;
- Change in chronic lower respiratory disease rates; and
- Change in cancer rates.

Exposure to criteria pollutants may impact important chronic diseases, including asthma, chronic obstructive pulmonary disease (COPD), and cardiovascular diseases. Thus, if the concentrations of criteria pollutants, particularly fine particulates (PM 2.5), were to exceed the national ambient air quality standards (NAAQS), adverse health effects may result. As noted in sections above, the proposed Project construction activity has the potential to emit particulate matter. However, these emission levels are unlikely to lead to exceedances of NAAQS. Although the potential exists for a negative effect, it would be limited to the area directly around the activity and be ephemeral in duration as construction activities are temporary. Long-term emissions will be regulated and permitted by ADEC to ensure there would be no increase in health impacts to nearby populations to permanent emission sources. Changes in diet that might result from loss of subsistence resources have the potential to increase obesity, one of the risk factors for diabetes (see Section 5.4.2.10.1.4 as well as 5.5 for information on impacts from changes in subsistence resources).

The analysis of construction projects in the State of Alaska determined that there is no indication that Project construction and operations would lead to increases in prevalence of chronic diseases.

5.4.2.10.1.8 HEC 8: Health Services Infrastructure and Capacity

There are no PACs that are in medically underserved areas (MUAs) that exceed the meaningfully greater criteria for low-income and minority populations.

Impacts to human health related to health services infrastructure and capacity may result from:

- Change in number or quality of clinics and staff: Medical technicians would be available at each construction camp, but their purpose would be to attend those engaged in proposed Project construction activities;

- Change in services offered (e.g. prenatal checks, x-ray, and laboratory services): The proposed Project would not be intended to provide these services;

- Change in accessibility of health care: No change is envisioned; and

- Change in utilization/clinic burden from non-resident influx.

Project construction may result in an increase in accidents and injuries (see Section 5.4.2.10.1.2). The existing medical services facilities are provided in TABLE 5.3.4-3. There are medically underserved areas (MUAs) that the Project intersects, however, seriously sick or injured workers would likely be flown to either Fairbanks or Anchorage and would not materially impact local medical facilities. Routine care for construction workers would likely be addressed while in the construction camp, when they are home, and for in-state workers through their existing service provider. See impacts to health services infrastructure and capacity in Sections 5.4.2.6.3 and 5.4.3.5.3 and to emergency services in Sections 5.4.2.6.4 and 5.4.3.5.4.

The impact of the Project on health services infrastructure and delivery is anticipated to be minor and temporary.

5.4.3 Potential Operation Impacts and Mitigation Measures

This section partially describes the impacts of Project operation during the first three years of full production. The analysis represents the immediate socioeconomic operation impacts of the Project. Additional State and municipal revenue can be expected over the 30-year life of the Project from production taxes, royalties paid in kind, and income taxes. It is anticipated that the beneficial effect of the state and local government revenue generated by the Project on Alaska's economy would be significant and permanent. The additional revenue would allow for increased government spending, which would stimulate the State's economy through increased business revenues, production, capital expenditures, and employment. In addition, the effect of this increased spending would be multiplied by producing increases in private spending that additionally stimulate the economy. Job creation in Alaska would, in turn, result in population growth, with its attendant demand for housing and public services and facilities.

During the first three years of full production the transition from the construction phase to the operation phase would be completed. The amount of direct employment and income annually generated by Project operation is expected to reach its permanent level. However, not all residual socioeconomic effects of Project construction would dissipate during this period.

5.4.3.1 Population

Alaska resident and nonresident Project construction workers would likely return to their home communities when their construction services are no longer required. Information Insights (2006) suggested that some Alaska residents who received training for Project construction jobs might opt to leave the State once construction was completed because job skills appropriate to and learned for the construction phase would become less in demand. Moreover, up-skilling of the population during Project construction may make it easier for residents of rural areas of Alaska to migrate to jobs in the outside economy once construction ends, thereby reducing the populations of some rural communities.

However, the population increase that would result from the beneficial effect of Project operation on job growth in Alaska is expected to outweigh the departure of construction workers from the State. TABLE 5.4.3-1 shows the estimated change in the size of resident population during the first years of full Project operation in those areas where the change in population would be significant. The areas most likely to experience significant population increases are the KPB and MSB. Most of the jobs associated with operation of the Liquefaction Facility would be located in the KPB. The Municipality of Anchorage is where the Project headquarters team and clerical jobs would be located, and many of the Liquefaction Facility support staff jobs and jobs related to the operation and maintenance of the Mainline, GTP, and PTTL/PBTL would also be based in the Municipality, with personnel traveling to worksites as needed. The effect of these direct Project jobs on the population of the KPB and Municipality of Anchorage would be permanent but minor since it is anticipated that most of the persons filling these jobs would be drawn from existing labor pools in the areas. The indirect jobs generated by Project operation would be concentrated in southcentral Alaska, and many of the persons migrating to fill these jobs would likely reside in the MSB and KPB due to the lower housing costs in these areas in comparison to the Municipality of Anchorage.

Beyond the initial years of Project operation, it is anticipated that the beneficial effect of the state and local government revenue generated by the Project on employment opportunities would accelerate the expansion in Alaska's population. As during the initial years of operation, the area that would likely be affected the most would be southcentral Alaska, as this area is expected to continue to be the center of State population growth. The increase in population in this area of the AOI is expected to be permanent and significant.

TABLE 5.4.3-1

Estimated Change in Resident Population During Project Operation

		2028	**2029**	**2030**
Alaska	Number of Persons	17,900	17,000	16,300
	Percent Change	2%	2%	1%
Matanuska-Susitna Borough	Number of Persons	5,770	5,740	5,710
	Percent Change	4%	4%	4%
Big Lake	Number of Persons	210	210	210
	Percent Change	4%	4%	4%
Houston	Number of Persons	120	120	120
	Percent Change	4%	4%	3%
Palmer	Number of Persons	360	360	350
	Percent Change	4%	4%	4%
Talkeetna	Number of Persons	50	50	50
	Percent Change	4%	4%	4%
Trapper Creek	Number of Persons	30	30	30
	Percent Change	4%	4%	4%
Wasilla	Number of Persons	490	490	490
	Percent Change	4%	4%	4%
Willow	Number of Persons	120	120	120
	Percent Change	4%	4%	3%
Kenai Peninsula Borough	Number of Persons	1,920	1,980	2,020
	Percent Change	3%	3%	3%
Kalifornsky	Number of Persons	550	560	570
	Percent Change	5%	5%	5%
Kenai	Number of Persons	330	340	340
	Percent Change	4%	4%	4%
Nikiski	Number of Persons	310	320	330
	Percent Change	6%	6%	6%

TABLE 5.4.3-1

Estimated Change in Resident Population During Project Operation

		2028	2029	2030
Soldotna	Number of Persons	320	330	340
	Percent Change	6%	6%	6%

TABLE 5.4.3-2 shows the estimated change in population of selected age cohorts during Project operation in those areas in which a significant change is expected. The additional employment opportunities created by Project operation would increase the number of working-age residents, which, in turn, would result in a higher number of children. The largest percentage increases in the number of children would occur in those areas where there would be large increases in employment opportunities. As discussed above, these areas include the Municipality of Anchorage, KPB, and MSB. Since many of the persons in the over 64 years of age cohort population are not in the labor force, the additional employment opportunities during the operation phase would have a limited immediate effect on the number of these individuals. However, as the individuals who filled the additional jobs created during the operation phase grow old, the number of elderly residents would increase, even though some elderly would move to other states (Howell 2014). Similar to the construction phase effects, the ethnic and racial composition of the in-migrants who fill some operation phase jobs may vary from the existing compositions of the Alaska communities in which they relocate.

TABLE 5.4.3-2

Estimated Change in Population of Selected Age Cohorts During Project Operation

		2028	2029	2030
Less Than 5 Years Old				
Alaska	Number of Persons	2,070	1,890	1,690
	Percent Change	3%	2%	2%
Matanuska-Susitna Borough	Number of Persons	670	650	610
	Percent Change	6%	6%	5%
Kenai Peninsula Borough	Number of Persons	220	220	220
	Percent Change	4%	4%	4%
Municipality of Anchorage	Number of Persons	980	860	720
	Percent Change	3%	3%	2%
5-17 Years Old				
Alaska	Number of Persons	3,770	3,790	3,820
	Percent Change	2%	2%	2%
Matanuska-Susitna Borough	Number of Persons	1,180	1,230	1,270
	Percent Change	4%	4%	4%
Kenai Peninsula Borough	Number of Persons	390	410	430
	Percent Change	3%	3%	3%
18-64 Years Old				
Alaska	Number of Persons	11,560	10,810	10,160
	Percent Change	2%	2%	2%
Matanuska-Susitna Borough	Number of Persons	3,790	3,720	3,650

TABLE 5.4.3-2

Estimated Change in Population of Selected Age Cohorts During Project Operation

	Percent Change	4%	4%	4%
Kenai Peninsula Borough	Number of Persons	1,280	1,300	1,310
	Percent Change	3.0%	3.0%	3.0%
Municipality of Anchorage	Number of Persons	5,440	4,880	4,400
	Percent Change	3.0%	2.0%	2.0%

5.4.3.1.1 Liquefaction Facility

TABLE 5.4.3-3 shows the estimated change in the resident population during operation of the Liquefaction Facility in those communities where the change would be significant, and TABLE 5.4.3-4 presents changes in age cohort populations.

TABLE 5.4.3-3

Estimated Change in Resident Population During Liquefaction Facility Operation

		2028	2029	2030
Alaska	Number of Persons	7,600	7,000	6,400
	Percent Change	0%	0%	0%
Kenai Peninsula Borough				
Kalifornsky	Number of Persons	500	510	530
	Percent Change	5%	5%	5%
Kenai	Number of Persons	290	300	310
	Percent Change	3%	3%	3%
Nikiski	Number of Persons	290	300	310
	Percent Change	5%	5%	6%
Soldotna	Number of Persons	300	310	310
	Percent Change	6%	6%	6%

TABLE 5.4.3-4

Estimated Change in Population of Selected Age Cohorts During Liquefaction Facility Operation

		2028	2029	2030
Less Than 5 Years Old				
Alaska	Number of Persons	870	760	630
	Percent Change	1%	1%	1%
Kenai Peninsula Borough	Number of Persons	190	190	190
	Percent Change	3%	3%	3%
5-17 Years Old				
Alaska	Number of Persons	1,650	1,620	1,600
	Percent Change	1%	1%	1%
Kenai Peninsula Borough	Number of Persons	320	350	370

TABLE 5.4.3-4

Estimated Change in Population of Selected Age Cohorts During Liquefaction Facility Operation

	Percent Change	2%	2%	3%

5.4.3.1.2 Mainline and PTTL

The estimated change in age cohort populations during operation of the Mainline and PTTL would be minor in all areas of the AOI.

5.4.3.1.3 GTP and PBTL

The effect of GTP and PBTL operation on the populations of selected age cohorts and the resident population as a whole would be minor in all areas of the AOI.

5.4.3.1.4 Non-jurisdictional Facilities

The estimated change in age cohort populations during operation of these facilities would be minor in all areas of the AOI.

5.4.3.2 Economy

5.4.3.2.1 Employment and Income

5.4.3.2.1.1 Direct Employment and Income

As described in Section 5.4.2.2.1.1 and shown in TABLE 5.4.2-5, Project construction employment would continue through 2027. However, Project operation employment would begin as early as 2023 with various facility start-up activities associated with initial production; start-up for the Mainline and Liquefaction Facility is scheduled for 2023, while start-up for the GTP would initiate in 2025. As Project facilities become fully operational, operation employment would increase until stabilizing in 2027.

The direct jobs created during full Project operation would be permanent, lasting the entire 30-year expected life of the Project. However, the number of direct jobs would be minor in all areas of the AOI. The total number of jobs generated statewide would stabilize at around 1,000. The operation workforce would be concentrated in the KPB, Municipality of Anchorage, and NSB. The Municipality of Anchorage is where the Project headquarters team and clerical jobs would likely be located. The KPB would be the location of the Liquefaction Facility, which would require approximately 310 personnel, 240 of whom would be located at the Liquefaction Facility, with 70 support staff personnel based in Anchorage. In addition, approximately every four years, personnel would be brought in to perform turn-around maintenance at the LNG Plant. The NSB would be the location of the GTP and PBTL, which would require approximately 170 support staff based in Anchorage, and about 85 operation and maintenance personnel located on site at any given time. Operation and maintenance of the Mainline and PTTL, meter stations, and compressor stations are expected to require approximately 330 full-time workers, consisting of trade technicians, technical specialists, safety personnel, support staff, and management. While the employment effects of Project operation would be permanent, the number of direct jobs created by each Project facility or the Project as a whole would be insignificant during the operation phase in all areas of the AOI.

In contrast to the number of direct jobs generated by Project operation, the direct change in income due to the Project would be significant in some areas of the AOI. For those areas where the change would be significant, TABLE 5.4.3-5 shows the predicted direct impacts of Project operation on income. Because the allocation of wages and salaries by area is based on the job location, the large number of miles of the Mainline within the Yukon-Koyukuk Census Area result in a large portion of the Mainline field crew costs being allocated to that area. A relatively low income for the Yukon-Koyukuk Census Area and Denali Borough under the "without Project" scenario also contributes to the large percent increases. Wages and salaries are assumed to increase at a rate of about 2.5 percent per annum.

TABLE 5.4.3-5

Estimated Direct Change in Wages and Salaries During Project Operation

		2028	2029	2030
State of Alaska	Amount ($ Millions)	395	406	418
	Percent Change	1%	1%	1%
North Slope Borough	Amount ($ Millions)	78	81	83
	Percent Change	4%	4%	4%
Yukon Koyukuk Census Area	Amount ($ Millions)	28	29	30
	Percent Change	14%	13%	13%
Denali Borough	Amount ($ Millions)	8	8	9
	Percent Change	6%	6%	6%
Kenai Peninsula Borough	Amount ($ Millions)	89	91	93
	Percent Change	4%	4%	4%

Liquefaction Facility

For those areas where the change would be significant, TABLE 5.4.3-6 shows the predicted direct impacts of Liquefaction Facility operation on income.

TABLE 5.4.3-6

Estimated Direct Change in Wages and Salaries During Liquefaction Facility Operation

		2028	2029	2030
State of Alaska	Amount ($ Millions)	116	119	122
	Percent Change	0%	0%	0%
Kenai Peninsula Borough	Amount ($ Millions)	84	86	88
	Percent Change	4%	4%	4%

Mainline and PTTL

For those areas where the change would be significant, TABLE 5.4.3-7 shows the predicted direct impacts of Mainline and PTTL operation on income.

TABLE 5.4.3-7

Estimated Direct Change in Wages and Salaries During Mainline and PTTL Operation

		2028	**2029**	**2030**
State of Alaska	Amount ($ Millions)	140	144	148
	Percent Change	0%	0%	0%
Yukon Koyukuk Census Area	Amount ($ Millions)	28	29	30
	Percent Change	14%	13%	13%
Denali Borough	Amount ($ Millions)	8	8	9
	Percent Change	6%	6%	6%

GTP and PBTL

For those areas where the change would be significant, TABLE 5.4.3-8 shows the predicted direct impacts of GTP and PBTL operation on income.

TABLE 5.4.3-8

Estimated Direct Change in Wages and Salaries During GTP and PBTL Operation

		2028	**2029**	**2030**
State of Alaska	Amount ($ Millions)	140	144	148
	Percent Change	0%	0%	0%
North Slope Borough	Amount ($ Millions)	62	64	66
	Percent Change	3%	3%	3%

Non-Jurisdictional Facilities

The direct jobs and income resulting from operation of the non-jurisdictional facilities would be permanent but minor in all areas of the AOI.

5.4.3.2.1.2 Direct, Indirect, and Induced Employment and Income

As the economic stimulus from Project construction dissipates, the number of jobs indirectly created by the construction activity would decline. The economic activity during the initial years of Project operation would partially offset the decline from construction with modest increases in statewide employment. However, the additional employment is not significant in any region of the AOI. The impact of operation on total (direct, indirect, and induced) employment and income during these initial years would be minor.

Beyond the initial years of operation it is anticipated that the beneficial effect of the state and local government revenue generated by the Project on economic activity in Alaska would accelerate the expansion of employment opportunities in the State. These employment opportunities would likely be concentrated in southcentral Alaska, as this area is expected to continue to be the center of State economic growth. The increase in employment and income in this area of the AOI is expected to be permanent and significant.

5.4.3.2.1.3 Unemployment

Project operation would reduce the unemployment rate in the regions where the operation workforce works and resides. This effect would be permanent but minor. However, in most regions this reduction would be offset by the loss of jobs due to the dissipation of the economic stimulus from Project construction. Consequently, the overall unemployment rate would trend higher for a few years before returning to equilibrium with the unemployment rate in the "without Project" scenario. The overall effect would be short-term and minor.

5.4.3.2.1.4 Wage Rates

As noted in Section 5.3.2.2, the oil and gas industry has the highest wages of any industry sector in the State, and the pipeline transportation sector and mining support services sector also have high wages relative to most other Alaska industries. As a result, the direct jobs created by Project operation would result in higher average wages for the areas where the Project workforce works and resides. However, the number of operation workers is small in relationship to the labor force in the boroughs and census areas in the AOI. Therefore, the effect on wage rates would be permanent but minor.

5.4.3.2.1.5 Purchases

While the direct expenditures during Project operation would be permanent, the purchases would be minor in all boroughs and census areas of the AOI during the operation of each facility and the Project as a whole. Total statewide direct purchases for operations and maintenance of all the Project facilities are estimated to amount to about $1 billion (2015 $) annually during the operations phase.

5.4.3.2.2 Sector Employment, Wages, and Output

The industry sectors most affected during Project operation would differ from those most affected by construction. The effects would be widespread throughout the economy, and would include service-oriented sectors, such as retail and wholesale trade, real estate, health care, and food service and drinking places. The effects are anticipated to be permanent but minor in all areas of the AOI.

5.4.3.3 Housing

Early staffing plans assume that the 335 Liquefaction Facility personnel would reside off-site in local housing, with about 160 in the KPB and 175 in other southcentral Alaska locations. In addition, all personnel brought in for the turn-around maintenance at the LNG Plant would be housed in local commercial accommodations. Because the onsite LNG Plant workers would not be on a fly-in and fly-out rotation and live in onsite camps, the residency pattern of those workers would be dissimilar to the current residency pattern for oil and gas industry workers on the North Slope. Most onsite Liquefaction Facility personnel would likely reside in the Nikiski and Kenai/Soldotna areas and would commute daily to the site.

Estimates are not yet available on the number of persons that may be hired from communities beyond the daily commuting distance and may need housing in the area. However, there is a concentration of people with oil and gas industry experience in the Nikiski and Kenai/Soldotna areas. Hiring of these local residents with experience would reduce the potential impacts on housing demand.

Approximately 330 full-time employees would be required to manage, operate, inspect, and conduct routine maintenance on the Project pipelines and aboveground facilities, and it is likely that these personnel would be based in Anchorage and Fairbanks. The effect on housing demand in the two cities would be permanent but minor since it is anticipated that most of these workers would be drawn from the existing labor pool in Anchorage and Fairbanks.

Operation of the GTP is not projected to create additional direct demand for housing in the NSB because the onsite GTP operation workforce would be housed in a camp during their rotation shifts. The onsite construction camp for the GTP would remain as a permanent operations and turnaround accommodation facility. During normal operations occupancy would be approximately 125 personnel and would have sufficient capacity to support periods of high activity, such as facility turnarounds. Opportunities for sharing GTP camp space with existing Prudhoe Bay operators would be explored as the Project progresses. The permanent camp would include offices, dormitories, kitchen, dining, and recreation and first-aid facilities. Most onsite GTP staff who are off-rotation are anticipated to reside in southcentral Alaska or the Lower 48, with a minor percentage in Fairbanks and other areas of the state, similar to the existing residency patterns of North Slope oil and gas industry workers who are Alaska residents (McDowell Group 2012b).

Of the approximately 1,000 operations personnel required for the Project, approximately 350 to 400 are anticipated to be located in the Municipality of Anchorage. The increased demand for housing in Anchorage would be permanent but minor relative to the number of vacant housing units in the municipality. The added demand would represent about six percent of the number of vacant housing units (Section 5.3.3.1).

For those areas where the change would be significant, TABLE 5.4.3-9 shows the estimated demand for housing units during Project operation, and TABLE 5.4.3-10 shows the estimated percent change in housing prices. While the direct effects of Project operation on the demand for housing are expected to be minor, the indirect effects during the initial years of operation would be significant in some areas of the AOI, due primarily to the lingering economic stimulus of Project construction. All areas with the exception of the KPB would have significant but declining demand for housing in the first three years of full operation.

As discussed in Section 5.4.3.1, further in the future, it is anticipated that the beneficial effect of the State and local government revenue generated by the Project on employment opportunities would accelerate the expansion in Alaska's population, with southcentral Alaska being affected the most. This population growth is expected to result in a permanent and significant increase in the demand for housing in this area of the AOI.

TABLE 5.4.3-9

Estimated Demand by the Project for Housing Units During Project Operation

		2028	**2029**	**2030**
State of Alaska	Number of Units	6,490	6,190	5,910
	Percent of Vacant Units for Sale or Rent	67%	64%	61%

TABLE 5.4.3-9

Estimated Demand by the Project for Housing Units During Project Operation

North Slope Borough	Number of Units	40	40	30
	Percent of Vacant Units for Sale or Rent	33%	33%	25%
Fairbanks North Star Borough	Number of Units	460	410	370
	Percent of Vacant Units for Sale or Rent	22%	20%	18%
Matanuska-Susitna Borough	Number of Units	2,100	2,090	2,080
	Percent of Vacant Units for Sale or Rent	187%	186%	185%
Kenai Peninsula Borough	Number of Units	700	720	730
	Percent of Vacant Units for Sale or Rent	66%	67%	68%
Municipality of Anchorage	Number of Units	3,090	2,840	2,620
	Percent of Vacant Units for Sale or Rent	120%	110%	102%

TABLE 5.4.3-10

Estimated Percent Change in Housing Prices During Project Operation

	2028	**2029**	**2030**
Matanuska-Susitna Borough	4%	4%	4%
Kenai Peninsula Borough	3%	3%	3%

5.4.3.3.1 Liquefaction Facility

For those areas where the change would be significant, TABLE 5.4.3-11 shows the estimated demand for housing units during operation of the Liquefaction Facility. The percent change in housing prices would be minor.

TABLE 5.4.3-11

Estimated Demand for Housing Units During Liquefaction Facility Operation

		2028	**2029**	**2030**
State of Alaska	Number of Units	2,780	2,560	2,350
	Percent of Vacant Units for Sale or Rent	28%	26%	24%
Fairbanks North Star Borough	Number of Units	100	90	70
	Percent of Vacant Units for Sale or Rent	4%	4%	3%
Matanuska-Susitna Borough	Number of Units	790	760	720
	Percent of Vacant Units for Sale or Rent	70%	67%	64%
Kenai Peninsula Borough	Number of Units	590	610	630
	Percent of Vacant Units for Sale or Rent	55%	57%	59%
Municipality of Anchorage	Number of Units	1,260	1,070	910
	Percent of Vacant Units for Sale or Rent	49%	41%	35%

5.4.3.3.2 Mainline and PTTL

For those areas where the change would be significant, TABLE 5.4.3-12 shows the estimated demand for housing units during operation of the Mainline and PTTL. The percent change in housing prices would be minor.

TABLE 5.4.3-12

Estimated Demand by the Project for Housing Units During Mainline and PTTL Operation

		2028	2029	2030
State of Alaska	Number of Units	2,050	1,960	1,890
	Percent of Vacant Units for Sale or Rent	21%	20%	19%
North Slope Borough	Number of Units	20	20	20
	Percent of Vacant Units for Sale or Rent	16%	16%	16%
Fairbanks North Star Borough	Number of Units	210	190	180
	Percent of Vacant Units for Sale or Rent	10%	9%	8%
Matanuska-Susitna Borough	Number of Units	820	820	820
	Percent of Vacant Units for Sale or Rent	73%	73%	73%
Kenai Peninsula Borough	Number of Units	50	50	50
	Percent of Vacant Units for Sale or Rent	4%	4%	4%
Municipality of Anchorage	Number of Units	920	860	800
	Percent of Vacant Units for Sale or Rent	35%	33%	31%

5.4.3.3.3 GTP and PBTL

For those areas where the change would be significant, TABLE 5.4.3-13 shows the estimated demand for housing units during operation of the GTP and PBTL. The effect of GTP and PBTL operation on housing prices would be minor.

TABLE 5.4.3-13

Estimated Demand by the Project for Housing Units During GTP and PBTL Operation

		2028	2029	2030
State of Alaska	Number of Units	1,680	1,680	1,680
	Percent of Vacant Units for Sale or Rent	17%	17%	17%
North Slope Borough	Number of Units	20	30	30
	Percent of Vacant Units for Sale or Rent	16%	25%	25%
Fairbanks North Star Borough	Number of Units	150	130	110
	Percent of Vacant Units for Sale or Rent	7%	6%	5%
Matanuska-Susitna Borough	Number of Units	480	500	520
	Percent of Vacant Units for Sale or Rent	42%	44%	46%
Kenai Peninsula Borough	Number of Units	60	60	70
	Percent of Vacant Units for Sale or Rent	5%	5%	6%
Municipality of Anchorage	Number of Units	940	930	920
	Percent of Vacant Units for Sale or Rent	36%	36%	35%

5.4.3.4 Property Values

5.4.3.4.1 Liquefaction Facility

As discussed in Section 5.4.2.4, during Project scoping, some commenters raised concerns about potential impacts of Liquefaction Facility operation on property values. These commenters noted that visual and noise impacts during operation of the Liquefaction Facility, together with the public safety concerns posed by large-scale LNG facilities, have the potential to adversely affect residential and commercial areas in close proximity to the Liquefaction Facility through a possible reduction of land and building values.

A number of past studies have been conducted to estimate the effect, if any, of LNG facilities on property values. These studies, as summarized in recent environmental impact statements on LNG facilities, have generally concluded that LNG facilities do not have a significant effect, beneficial or adverse, on property values. Studies addressing property value effects of LNG facilities include:

- Argonne National Laboratory — economic impacts of “noxious” facilities on local wages and property values. Concluded some facilities have a significant impact on property values, but that LNG facilities did not have a significant beneficial or adverse effect on property values (Clark and Nieves 1994);
- Real Estate Consulting Group of Connecticut — survey of tax assessors in communities where LNG facilities exist or were being developed. The authors concluded that the LNG facilities did not affect assessments, and property owners in the vicinity of LNG facilities did not request lower valuations (Real Estate Counseling Group of Connecticut 1995);
- AES Sparrows Point LNG, LLC — review of real estate values near the Cove Point LNG terminal located in Calvert County, Maryland included comparative property sales values within one mile of the Cove Point facility for the years 2000 to 2006, and included similar property value information for areas 5 to 12 miles from the Cove Point facility. The review concluded the presence of the facility had “no depressing effect" on property values (Carson 2006);
- KTR Newmark LLC — market analysis commissioned by KeySpan LNG reviewed 1985–2004 single-family home sales within a two-mile radius of the Distrigas LNG terminal in Everett, Massachusetts. The average annual price increases in the study area from 1995–2004 exceeded those for Massachusetts, Boston area, and Middlesex County (Federal Energy Regulatory Commission 2005); and
- ECONorthwest — study of the effects the siting of peak shaving LNG storage plants at Newport and Portland, Oregon had on local residential and commercial property values. Using data from the Lincoln County Tax Assessors Office, the study found that property values around the Newport LNG facility were not depressed, and 25 homes within 0.5 mile and overlooking the facility had above average market values. The study also argued that the presence of many other industrial and commercial properties around the Portland LNG facility, including the second-largest industrial employer in the city, suggests that the presence of this facility has not discouraged other businesses from locating in the area (ECONorthwest 2006).

The potential impacts of a LNG facility on the value of a tract of adjacent land depends on many factors, including the values of neighboring properties, presence of other industrial facilities, and the extent of development and other aspects of current land use. The proposed location of the Liquefaction Facility is on an industrial waterfront and adjacent to an existing LNG terminal and other industrial facilities. It is also adjacent to a sparsely populated rural residential area where some residences have existed throughout the operational period of the existing LNG terminal, and some have been constructed since the terminal has been in operation. As described in Section 5.4.2.4.1, these current industrial uses have had no discernable adverse impact on the value of adjacent residential and commercial properties. In addition, Resource Report Nos. 8 and 9 describe measures to mitigate any visual and noise impacts that could result from operation of the Liquefaction Facility. Therefore, it is unlikely that Liquefaction Facility operation would have an adverse effect on property values of nearby residences or businesses. On the contrary, by increasing the number of permanent high paying jobs in the Nikiski and Kenai/Soldotna areas, operation of the Liquefaction Facility could increase the demand for local housing and potentially increase property values in these areas.

Another concern voiced by residents and property owners in public scoping for a number of environmental impact statements on LNG facilities is the effect of these facilities on homeowner insurance rates and the availability of insurance coverage. FERC reviewed this topic in the *Final Environmental Impact Statement on the Weaver's Cove LNG Project* (Docket Nos. CP04-36-000 and CP04-41-000, issued May 2005) and reported that:

> In response to these expressed concerns, Weaver's Cove Energy consulted with insurance advisors who have indicated that the LNG terminal would not have an impact on homeowner insurance rates. Homeowner insurance rates are generally set on a county-wide basis, with individual rate adjustments made to reflect the age and value of the property and the claims record of the owner; insurance rates are not based on the surrounding landscape or structures at the local level.

Based on this finding, it was concluded that the presence of the Liquefaction Facility would not affect the insurance rates of nearby residences.

5.4.3.4.2 Pipelines and Aboveground Facilities

As discussed in Section 5.4.2.4, during Project scoping, comments were received regarding the potential effect of the installation of the Mainline and/or the Mainline ROW on property values. A number of studies have been conducted to estimate the effect, if any, of natural gas pipelines on property values. These studies have generally concluded that that there is no discernable impact on the sales price or demand for properties along natural gas pipelines. Studies addressing property value effects of pipelines include:

- Interstate Natural Gas Association of America — national case study to determine if the presence of a pipeline on a piece of property affected the property value or sales price of the property. Four separate geographically diverse areas were selected for the case study: 1) a suburban area crossed by one natural gas pipeline; 2) a suburban area crossed by multiple natural gas and products pipelines; 3) a rural area crossed by one natural gas pipeline; and 4) a rural area crossed by multiple gas pipelines and one products pipeline. The results of the study revealed that there was no discernable impact on the sales price or demand for properties along natural gas pipelines. It was further determined that neither the size of the pipeline (diameter) nor the product carried via a pipeline has any significant impact on property sale prices (Allen 2001);

- Integra Realty Resources — updated national case study contracted by the Interstate Natural Gas Association of America to determine the effect of natural gas transmission pipelines on property values. The analysis showed that the presence of pipelines does not affect the value of a property, its insurability, its desirability, or the ability to obtain a mortgage (Integra Realty Resources 2016);
- ECONorthwest — study on NW Natural's South Mist Pipeline Extension to determine if the presence of the pipeline on properties in Washington, Marian, and Clackamas County, Oregon affected the property value or sale price. Information from more than 10,000 property transactions within one mile of the pipeline was used to test for statistical or economical significance on residential property values. The study found there was not a statistically significant impact on the sale price of properties along the South Mist Pipeline Extension; therefore, the pipeline had no discernible impact on property values (Fruits 2008);
- Gnarus Advisors LLC — a literature review specific to pipelines and property values, with a focus on actual sales data. The authors concluded that there is no credible evidence that proximity to pipelines reduces property values. Further, they found that hypothetical surveys of actual or potential market participants should not be used as a substitute for the systematic analysis of market data, as they may overstate the effects, if any, of proximity to disamenities, including pipelines, on property values (Wilde et al. 2008);
- Diskin et al. — study on the impacts of natural gas pipelines on residential property values in Arizona. The study found no systematic relationship between proximity to a pipeline and sale price or value of property (Diskin et al. 2011); and
- Hansen et al. — analysis of property sales near two pipelines in Washington, using methodologies that considered proximity and persistence over time. One of the two pipelines had an incident. A comparison of property values near the pipeline before and after the incident noted a decline in property values following the incident, but the decline was most pronounced for properties within 50 feet of the affected pipeline. The properties regained their expected value over time (Hansen et al. 2006).

The impact a natural gas pipeline may have on the value of a tract of land depends on many factors, including pipeline size, the values of adjacent properties, the presence of adjacent rights-of-way, the presence of other industrial facilities or pipelines, the current value of the land, and the extent of development and other aspects of current land use. Currently available information does not support any firm conclusion with respect to the potential effects of the operation of the Mainline on property values. The Mainline would be a large-diameter pipeline, but as noted in Resource Report No. 9, it would be buried along the majority of the route, and permanent visual and noise-related impacts to residential areas would be expected to be long-term but minor. According to Resource Report No. 1, approximately 36 percent of the Mainline route is collocated within 500 feet of an existing ROW, either the TAPS ROW or a highway ROW. Resource Report No. 9 states that only approximately two percent of the Mainline ROW consists of residential land. Residential land use would be converted to utility use for the life of the proposed Project. The permanent conversion would put constraints on further development of previously residential land.

Regarding the potential for insurance premium adjustments associated with pipeline proximity, FERC has reviewed this topic in several final environmental impact statements for gas pipelines and concluded that pipeline infrastructure does not affect homeowner insurance rates. For example, the *Final Environmental Impact Statement on the New Jersey-New York Expansion Project* (Docket No. CP11-56-000, issued March

2012) reported that homeowners' insurance rates are unlikely to change due to construction and operation of the proposed project. Based on this finding, it is not anticipated that the presence of the Mainline would affect the insurance rates of nearby residences.

Both the PTTL and PBTL would cross public lands managed by the State of Alaska in an area of the North Slope and Prudhoe Bay primarily used and occupied by oil and gas production facilities and operations. There are no residential or commercial buildings within the permanent ROW of the PBTL or PTTL. Therefore, no effects on property values are expected.

5.4.3.4.3 GTP

The main operational footprint of the GTP is located in an area of extensive industrial development, and no impact on the value of properties or homes is anticipated.

5.4.3.4.4 Non-Jurisdictional Facilities

The impact on property values during operation of the KSH Relocation project will be provided when a proposed route has been selected. The PTU Expansion project and PBU MGS project would operate in an area of extensive industrial development, and no impact on the value of properties or homes is anticipated during operation.

5.4.3.5 Public Infrastructure and Services

Increases in the population during the operation phase would place additional demands on public infrastructure and services. While the direct effects of Project operation on the demand for public infrastructure and services are expected to be minor, the indirect effects could be significant in some areas of the AOI. As discussed in the description of population effects of Project operation (Section 5.4.3.1), additional people are expected to move into the State on a permanent basis as a result of the increased employment opportunities. In particular, it is anticipated that the beneficial effect of the State and local government revenue generated by the Project on employment opportunities would accelerate the expansion in Alaska's population. The nature of this effect would, in turn, influence the demand for public infrastructure and services provided by the State, boroughs, and communities. The increased demand would likely be concentrated in southcentral Alaska, as this area is expected to continue to be the center of State economic and population growth.

5.4.3.5.1 Payment in Lieu of Property Tax

It has been proposed that the Project make payments in lieu of the property taxes that the Project might otherwise pay to the State and municipalities during Project operation. These payments are tentative and subject to required changes under existing property tax laws. The Municipal Advisory Gas Project Review Board has discussed ways to allocate these potential payments among affected communities. To the extent these payments are available in the future, they could be used to mitigate costs incurred by municipalities and communities during Project operation.

The potential effects of Project operation on municipal services, such as schools, medical facilities, police, fire protection, and utilities are discussed below, together with proposed measures to mitigate these impacts, including the payment in lieu of property tax.

5.4.3.5.2 Schools

The effect of Project operation on schools would depend on the number of families with children of school age that migrate into the affected communities during operation. Estimates of the number of school age (5-17 years old) children in the areas with significant percentage changes in student populations during operation are shown in TABLE 5.4.3-2. These areas include the MSB and KPB. It is not expected that the increases will result in the need for more schools since the students will be dispersed over a number of grades and in a number of communities. However, the increases could result in larger classroom sizes, the addition of modular classrooms to some schools, and the need to hire additional teachers. Operation of the Liquefaction Facility would result in a significant change in the KPB student population. Operation of the other Project facilities individually would not result in significant changes in student populations, nor would operation of the non-jurisdictional facilities.

These impacts to educational facilities and services may be mitigated by payments in lieu of property tax as described in Section 5.4.3.5.1. If payments are available, they may fund projects that address impacts to educational institutions. For example, potential payments could be used for hiring additional teachers and other educational staff during the period of operation.

5.4.3.5.3 Health Care

The effect of Project operation on health care services and facilities would depend on the number of persons that migrate into affected communities during operation. As shown in TABLE 5.4.3-1, the MSB and the KPB are expected to experience significant population increases during Project operation. As discussed in Section 5.4.2.6.3, Central Peninsula Hospital in Soldotna is sometimes at capacity for certain services, and a larger population in the KPB would further increase the number of times when the hospital is at capacity. The Mat-Su Regional Medical Center in Palmer would also experience an increase in patients with the significant population growth in the MSB.

These impacts to medical facilities and services may be mitigated by payments in lieu of property tax as described in Section 5.4.3.5.1. If payments are available, they may fund projects that address impacts to hospitals, clinics, emergency medical facilities, alcohol and drug abuse facilities, and mental health facilities. For example, potential payments could be used for expanding the capacity of medical facilities or hiring additional medical personnel during the period of Project operation.

5.4.3.5.4 Emergency Services

The effect of Project operation on emergency services, including EMS and fire response, would depend on the number of households that migrate into the affected communities during operation, and the additional traffic generated by the Project. As shown in TABLE 5.4.3-1, the MSB and the KPB are expected to experience significant population increases during Project operation.

As discussed in Section 5.3.4.3, during many days, EMS services in Nikiski, Kenai, and Soldotna are understaffed relative to the number of calls received. Any increase in call volume would exacerbate these understaffing problems. In addition, should the workload of EMS service providers increase as a result of population increases related to Project operation, they may be compelled to hire full-time paid professionals, rather than continuing to rely on volunteers.

Any adverse impacts to emergency services may be mitigated by payments in lieu of property tax as described in Section 5.4.3.5.1. For example, potential payments could be used for hiring additional fire fighters and emergency medical service personnel during the period of Project operation.

5.4.3.5.5 Law Enforcement

The effect of Project operation on law enforcement would depend on the number of persons that migrate into the affected communities during operation, and the additional traffic generated by the Project. As shown in TABLE 5.4.3-1, the MSB and the KPB are expected to experience significant population increases during Project operation. As noted in Section 5.4.2.6.5, public safety resources in the KPB and MSB are limited. An increase in population would result in additional calls for police services, which would stretch the available resources even further.

These impacts to law enforcement services may be mitigated by payments in lieu of property tax as described in Section 5.4.3.5.1. For example, potential payments could be used for hiring additional police officers and acquiring additional law enforcement resources during the period of Project operation.

5.4.3.5.6 Utilities

5.4.3.5.6.1 Water and Sewage

Liquefaction Facility operation would not use local water and sewer utilities, and therefore would have no impact on those utilities. Freshwater for the Liquefaction Facility would be supplied by two groundwater wells located near the temporary camp. A wastewater treatment system would be located onsite. Employees working at the Liquefaction Facility and residing in the nearby KPB communities could place additional demands on local water and sewer systems depending on the number of households that migrate into the communities to take Liquefaction Facility operation jobs.

Operation of the Mainline would not require hookups to local water and sewer utilities. The small number of people employed by Mainline operation would not have an appreciable effect on local water and sewer utility systems in southcentral Alaska, Fairbanks, or elsewhere in the State where these employees and their families are expected to reside since the additional demand would be minor in comparison to the existing utility service volumes and current capacity.

Operation of the GTP would not affect any local water and sewer utilities. The GTP water systems would provide water of varying quality, as required, to various users in the GTP and operations camp, including process makeup requirements, firefighting, and potable water. Water supply to the GTP and associated camp would originate from the Putuligayuk River. Due to the low flow in the winter and fish use of the river, year-round withdrawal of sufficiently large quantities is unlikely. To ensure year round water supply, water from the river would be used to fill a reservoir during spring breakup when there is sufficient water runoff. The small number of off-site personnel employed by GTP operation would not have an appreciable effect on local water and sewer utility systems in southcentral Alaska, Fairbanks, or elsewhere in the State where these employees and their families are expected to reside since the additional demand would be minor in comparison to the existing utility service volumes and current capacity.

The PTTL and PBTL are not anticipated to have any effect on local water and sewer utility systems. The small number of people employed by PTTL and PBTL operation would not have an appreciable effect on local water and sewer utility systems in southcentral Alaska, Fairbanks, or elsewhere in the State where these employees and their families are expected to reside since the additional demand would be minor in comparison to the existing utility service volumes and current capacity.

Additional information on the impacts of Project operation on water resources is provided in Resource Report No. 2.

An increase in water use is not anticipated in support of operation of the PBU MGS project. Water would be sourced from permitted sources and remain within permitted volumes, and water withdrawal would be completed under the associated permitting stipulations as outlined by the Alaska Department of Natural Resources (ADNR) and ADF&G. The PTU Expansion project would not affect any local water and sewer utilities. The KSH Relocation project would not require services from local water and sewer utilities.

5.4.3.5.6.2 Solid Waste

Impacts to local solid waste utilities would be permanent but minor relative to the volume of waste currently disposed of in existing landfill facilities. The estimated waste quantities generated during operation would not significantly reduce the life of current landfills. A detailed description of the proposed waste characterization procedures, estimated quantities, and handling/disposal procedures during operation of facilities is provided in the Project's *Waste Management Plan* provided as an appendix of Resource Report No. 8.

The volume of solid waste generated by the PTU Expansion project and the PBU MGS during operation would be small in comparison to the volume generated during construction of these facilities and the capacity of the Deadhorse Oxbow landfill. The disposal methods for these facilities is described in Section 5.4.2.6.6.2. The KSH Relocation project would generate very little solid waste during operation. The effect of these projects on solid waste landfills during operation is permanent but minor.

5.4.3.5.6.3 Energy

Electricity

The availability and capacity of Homer Electric Association (HEA) to meet the Liquefaction Facility's power needs during operation has been investigated; however, HEA does not have sufficient capacity to provide for these needs. The sufficiency of capacity available at HEA to support individual operational processes (e.g., black start, firewater system) will continue to be evaluated.

Power generation for the Liquefaction Facility is described in Resource Report No. 1. The power plant size requirement during normal operations would be nominally 150 megawatts. The plant is not designed to export power to the grid. Natural gas would be the primary fuel for power generation, with HEA available for emergency power generation. If the Liquefaction Facility operation uses HEA for emergency power supply, the impact on the electric utility would be temporary and minor. While Liquefaction Facility operation is not anticipated to have a significant effect on HEA's service, households that migrate into the KPB for employment during Liquefaction Facility operation would place demands on the electric utility. This demand is anticipated to be small in relation to HEA's current generating capacity, which totals more than 200 megawatts (Homer Electric Association 2014). The utility would benefit from the additional revenue generated by the increased demand, and, in turn, this increased revenue could result in lower electrical rates for customers.

Operation of the Mainline would most likely not require hookups to local electrical utilities. The small number of people employed by Mainline operation would not have an appreciable effect on local electrical utilities in southcentral Alaska, Fairbanks, or elsewhere in the State where these employees and their families are expected to reside since the additional demand would be minor in comparison to the existing utility service volumes and current capacity.

Operation of the GTP would not affect any local electrical utilities. GTP and GTP camp electrical power would be supplied by the electrical power generation system, which would consist of gas turbines for main power generation and diesel generators for essential and emergency power generation. The small number of off-site personnel employed by GTP operation would not have an appreciable effect on local electrical utilities in southcentral Alaska, Fairbanks, or elsewhere in the State where these employees and their families are expected to reside since the additional demand would be minor in comparison to the existing utility service volumes and current capacity.

The PTTL and PBTL would also not have hookups to local electric utilities. The small number of people employed by PTTL and PBTL operation would not have an appreciable effect on local electrical utilities in southcentral Alaska, Fairbanks, or elsewhere in the State where these employees and their families are expected to reside since the additional demand would be minor in comparison to the existing utility service volumes and current capacity.

The PTU Expansion project and the PBU MGS would not affect any local electric utilities. It is unknown if the KSH Relocation project would require service from HEA but electric utility lines may need to be moved as part of the relocation process. This effect is considered permanent and minor.

Fuel

Natural gas would be the primary fuel for power generation and heating of Project facilities during operation, with diesel fuel used for emergency purposes only. Diesel fuel would also be needed for transportation of supplies and materials to Project facilities and for use in light trucks and other service vehicles used in operations.

Natural gas or heating fuel would also be consumed by the additional people that migrate to the State as a result of the employment opportunities directly and indirectly created by Project operation. The volumes of diesel or heating fuel required for this increased population are expected to be minor in comparison to the in-state refinery capacity and current demand. Opportunities for additional natural gas supplies to utilities and consumers in the state would be provided.

The non-jurisdictional facilities located on the North Slope would also use natural gas as the primary fuel for power generation and heating. Diesel fuel would be needed for transportation equipment at all non-jurisdictional facilities and for back-up power in the North Slope facilities.

5.4.3.6 Transportation

The most visible transportation mode during operations would be the LNG carriers transiting to and from the Liquefaction Facility and the pilot station in Homer. These transits would increase the number of vessel calls in both locations and in the shipping channel but are considered moderate in relation to the current deep draft vessel counts in the area, and would extend for the life of the Project.

Other transportation requirements during Project operation are anticipated to be permanent but minor in comparison to the current level of transportation activity in Alaska and the capacity of the State's different transportation modes. Transportation requirements for the non-jurisdictional facilities are also anticipated to be permanent and minor.

5.4.3.7 Government Revenues and Expenditures

Project operation would result in economic benefits through increased revenues for local governments and the State of Alaska. Some of these revenues would be associated with the production and sale of natural gas, while other revenues would be generated due to the population increase and higher level of economic activity expected to result from Project operation.

As discussed previously, the level of production taxes, royalties paid in kind, and income taxes that would result from operation of the Project could not be estimated because the commercial and fiscal terms to commercially develop North Slope natural gas reserves have not been finalized. In this socioeconomic impact analysis, potential fiscal effects at the state level are described in qualitative terms. Quantitative estimates of fiscal effects at the local government level are presented but are restricted to changes in population-based revenues and expenditures during the first years of full Project operation. These revenues and expenditures and other details about the fiscal impact models are discussed in Section 2.4 of Appendix B.

The majority of population-based expenditures for the State of Alaska are related to the cost of education and health and human services. The change in population-based government revenues and expenditures during the initial years of operation would be minor. As discussed in Section 5.4.3.5.1, payments in lieu of taxes have been proposed to offset costs borne by the State government during Project operation.

For those municipalities in the AOI that would be significantly affected, TABLE 5.4.3-14 through TABLE 5.4.3-20 show the change in population-based local government revenues and expenditures as a result of Project operation. The amount shown represents annual revenues less annual expenditures, or net fiscal position. The percent change in fiscal position represents the annual difference between revenues and expenditures as a percentage of the difference in the 2013 baseline year. The net fiscal position of the KPB, MSB, and Municipality of Anchorage is expected to be positive during the first years of full Project operation, as the economic stimulus from Project construction would continue during these years. As discussed in Section 5.4.3.5.1, payments in lieu of taxes have been proposed to offset costs borne by local governments during Project operation. In particular, jurisdictions with Project-related property within their boundaries stand to benefit from their share of these payments. As discussed in Section 5.2.2, the Liquefaction Facility would be located in the KPB; the Mainline would traverse the KPB, MSB, Denali Borough, FNSB, Yukon-Koyukuk Census Area, and NSB; and the GTP, PBTL, and PTTL would be located in the NSB. A share of the payments also may be distributed to other municipalities and communities in the State, regardless of whether there is any taxable property of the Project within the municipalities or communities.

TABLE 5.4.3-14

Estimated Change in Matanuska-Susitna Borough Population-Based Expenditures and Revenues During Project Operation

	2028	2029	2030
Net Change in Fiscal Position			
Amount ($ Thousands)	5,419	5,287	4,966
Percent Change	6	6	5
Expenditures (1,000s)			
Total Expenditures	6,929	7,212	7,503
Operating Expenses	6,434	6,719	7,013
General Government	875	871	866
Public Safety	472	470	468
Public Works	286	285	283
Health and Human Services	0	0	0
Education	4,566	4,859	5,164
Other Operating Expenses	235	234	233
Business Type Activities/Enterprises	495	493	490
Water and Wastewater	0	0	0
Electric	0	0	0
Other	495	493	490
Revenues (1,000s)			
Total Revenue	12,348	12,498	12,469
Property Tax (excludes O&G property tax)	9,254	9,419	9,407
Sales Tax	0	0	0
Special Taxes	555	552	548
Charges for Services and Other Fees	283	282	281
Other Non-tax Revenues	1,832	1,825	1,815
Business Type Activities/Enterprises	422	421	418
Water and Wastewater	0	0	0
Electric	0	0	0
Other	422	421	418

TABLE 5.4.3-15

Estimated Change in City of Houston Population-Based Expenditures and Revenues During Project Operation

	2028	2029	2030
Net Change in Fiscal Position			
Amount ($ Thousands)	11	12	12
Percent Change	4	3	3
Expenditures (1,000s)			
Total Expenditures	65	65	65
Operating Expenses	65	65	65
General Government	23	23	23
Public Safety	21	20	20
Public Works	19	19	19
Health and Human Services	0	0	0
Education	0	0	0
Other Operating Expenses	2	2	2
Business Type Activities/Enterprises	0	0	0
Water and Wastewater	0	0	0
Electric	0	0	0
Other	0	0	0
Revenues (1,000s)			
Total Revenue	76	76	76
Property Tax (excludes O&G property tax)	26	27	27
Sales Tax	9	9	9
Special Taxes	2	2	2
Charges for Services and Other Fees	8	8	8
Other Non-tax Revenues	32	31	31
Business Type Activities/Enterprises	0	0	0
Water and Wastewater	0	0	0
Electric	0	0	0
Other	0	0	0

TABLE 5.4.3-16

Estimated Change in City of Wasilla Population-Based Expenditures and Revenues During Project Operation

	2028	2029	2030
Net Change in Fiscal Position			
Amount ($ Thousands)	104	105	104
Percent Change	6	5	5
Expenditures (1,000s)			
Total Expenditures	1,126	1,122	1,115
Operating Expenses	777	774	769

TABLE 5.4.3-16

Estimated Change in City of Wasilla Population-Based Expenditures and Revenues During Project Operation

	2028	2029	2030
General Government	164	164	163
Public Safety	367	366	363
Public Works	125	125	124
Health and Human Services	0	0	0
Education	0	0	0
Other Operating Expenses	120	120	119
Business Type Activities/Enterprises	325	324	322
Water and Wastewater	176	175	174
Electric	0	0	0
Other	149	149	148
Revenues (1,000s)			
Total Revenue	1,231	1,226	1,219
Property Tax (excludes O&G property tax)	30	30	30
Sales Tax	720	717	713
Special Taxes	0	0	0
Charges for Services and Other Fees	109	108	107
Other Non-tax Revenues	153	152	151
Business Type Activities/Enterprises	219	218	217
Water and Wastewater	173	172	171
Electric	0	0	0
Other	47	46	46

TABLE 5.4.3-17

Estimated Change in City of Homer Population-Based Expenditures and Revenues During Project Operation

	2028	2029	2030
Net Change in Fiscal Position			
Amount ($ Thousands)	417	443	461
Percent Change	9	9	9
Expenditures (1,000s)			
Total Expenditures	477	493	502
Operating Expenses	325	336	342
General Government	94	97	99
Public Safety	128	132	134
Public Works	57	59	60
Health and Human Services	7	7	7
Education	0	0	0
Other Operating Expenses	40	41	42
Business Type Activities/Enterprises	149	154	157

TABLE 5.4.3-16

Estimated Change in City of Wasilla Population-Based Expenditures and Revenues During Project Operation

	2028	2029	2030
Water and Wastewater	0	0	0
Electric	0	0	0
Other	149	154	157
Revenues (1,000s)			
Total Revenue	894	935	963
Property Tax (excludes O&G property tax)	542	572	593
Sales Tax	100	103	105
Special Taxes	0	0	0
Charges for Services and Other Fees	0	0	0
Other Non-tax Revenues	113	117	119
Business Type Activities/Enterprises	139	144	146
Water and Wastewater	0	0	0
Electric	0	0	0
Other	139	144	146

TABLE 5.4.3-18

Estimated Change in City of Kenai Population-Based Expenditures and Revenues During Project Operation

	2028	2029	2030
Net Change in Fiscal Position			
Amount ($ Thousands)	583	619	645
Percent Change	16	16	17
Expenditures (1,000s)			
Total Expenditures	654	674	688
Operating Expenses	635	655	668
General Government	142	146	149
Public Safety	293	302	309
Public Works	104	107	109
Health and Human Services	0	0	0
Education	0	0	0
Other Operating Expenses	96	99	101
Business Type Activities/Enterprises	19	19	20
Water and Wastewater	0	0	0
Electric	0	0	0
Other	19	19	20
Revenues (1,000s)			
Total Revenue	1,237	1,293	1,333

TABLE 5.4.3-18

Estimated Change in City of Kenai Population-Based Expenditures and Revenues During Project Operation

	2028	2029	2030
Property Tax (excludes O&G property tax)	833	874	904
Sales Tax	269	277	283
Special Taxes	0	0	0
Charges for Services and Other Fees	95	98	100
Other Non-tax Revenues	123	126	129
Business Type Activities/Enterprises	15	15	16
Water and Wastewater	0	0	0
Electric	0	0	0
Other	15	15	16

TABLE 5.4.3-19

Estimated Change in City of Soldotna Population-Based Expenditures and Revenues During Project Operation

	2028	2029	2030
Net Change in Fiscal Position			
Amount ($ Thousands)	168	175	181
Percent Change	14	15	15
Expenditures (1,000s)			
Total Expenditures	492	506	518
Operating Expenses	492	506	518
General Government	101	104	107
Public Safety	158	163	167
Public Works	164	168	173
Health and Human Services	0	0	0
Education	0	0	0
Other Operating Expenses	69	70	72
Business Type Activities/Enterprises	0	0	0
Water and Wastewater	0	0	0
Electric	0	0	0
Other	0	0	0
Revenues (1,000s)			
Total Revenue	660	681	699
Property Tax (excludes O&G property tax)	93	98	102
Sales Tax	485	498	511
Special Taxes	0	0	0
Charges for Services and Other Fees	0	0	0
Other Non-tax Revenues	82	85	87
Business Type Activities/Enterprises	0	0	0

TABLE 5.4.3-19

Estimated Change in City of Soldotna Population-Based Expenditures and Revenues During Project Operation

	2028	2029	2030
Water and Wastewater	0	0	0
Electric	0	0	0
Other	0	0	0

TABLE 5.4.3-20

Estimated Change in Municipality of Anchorage Population-Based Expenditures and Revenues During Project Operation

	2028	2029	2030
Net Change in Fiscal Position			
Amount ($ Thousands)	22,442	20,640	17,905
Percent Change	3	3	2
Expenditures (1,000s)			
Total Expenditures	29,660	28,195	26,935
Operating Expenses	21,646	20,833	20,155
General Government	560	515	474
Public Safety	6,415	5,893	5,427
Public Works	2,372	2,179	2,007
Health and Human Services	336	309	284
Education	10,860	10,925	11,031
Other Operating Expenses	1,102	1,012	932
Business Type Activities/Enterprises	6,564	6,030	5,553
Water and Wastewater	2,184	2,006	1,847
Electric	3,148	2,891	2,663
Other	1,233	1,132	1,043
Revenues (1,000s)			
Total Revenue	52,102	48,835	44,840
Property Tax (excludes O&G property tax)	45,495	43,196	40,063
Sales Tax	0	0	0
Special Taxes	1,154	1,064	987
Charges for Services and Other Fees	1,328	1,220	1,123
Other Non-tax Revenues	1,576	1,448	1,334
Business Type Activities/Enterprises	7,891	7,248	6,675
Water and Wastewater	3,139	2,884	2,656
Electric	3,479	3,196	2,943
Other	1,273	1,169	1,077

5.4.3.8 Environmental Justice

Environmental justice impacts and mitigation are still being evaluated. However, Project facilities have been sited primarily within industrial areas and to avoid areas where people live. Interdependent Project Facilities are located in the PBU and within designated utility corridors; the Liquefaction Facility was sited within an existing industrial area to the extent practicable, and agreements have been made or will be made with land owners to acquire residences. Refer to section 5.4.2.10.1.1 for public health impacts to minority and low-income populations.

Mitigation measures for potential environmental justice impacts could include the following:

- Develop and implement traffic control plans to reduce negative impacts to local businesses and residents from truck and vehicle traffic during operation;
- Locate Project aboveground permanent facilities in areas separated from residential homes to reduce impacts on housing value or quality of life of adjacent residents;
- Mitigate visual impacts by using vegetative cover in front of aboveground permanent facilities as possible and practicable;
- Limit the use of lights during the night to reduce visual impacts; and

  Implement noise control programs during operation to reduce potential impacts on residential homes and quality of life of adjacent residents.

5.5 SUBSISTENCE AND TRADITIONAL KNOWLEDGE OVERVIEW

5.5.1 Subsistence

The Project subsistence studies detailed in the Subsistence and Traditional Knowledge Updated Studies Report (Appendix D) provide subsistence information to FERC and other State and federal agencies about potential impacts to subsistence activities from the Project. The subsistence study methodology is as follows:

1. Identify Study Communities;
2. Compile Existing Data and Conduct Data Gap Analysis;
3. Develop Criteria for and Perform Updated Studies;
4. Impact Analysis;
   A. Identify Potential Impact Categories and Sources;
   B. Differentiate Subsistence Impacts on Both State and Federal Land;
   C. Identify Key Subsistence Resources by Measures of Material and Cultural Importance;
   D. Analyze Potential Impacts of the Project on Subsistence Uses; and
   E. Apply Impact Criteria.

5.5.1.1 Identify Study Communities

Subsistence studies were initiated with an analysis of available use area data, harvest data, and geographic data (i.e., proximity of communities to the Project) to identify communities (including incorporated places, census designated places, and non-subsistence areas) that could experience direct or indirect Project-related impacts. In accordance with FERC's February 17, 2011 Guidance on Subsistence Data Requirements, as well as ADF&G study community selection criteria (e.g., communities within 50 miles) for household harvest surveys, the following criteria were used to identify study communities within the subsistence affected environment:

- Any community located within 50 miles of the proposed pipeline route, or
- Any community located more than 50 miles from the proposed pipeline route, but with subsistence use areas within 30 miles of the proposed pipeline route.

These community selection criteria are explained in detail in the Subsistence and Traditional Knowledge Existing Data Compilation Report (Appendix C). In summary, the Applicant identified 62 study communities that represent 94 U.S. Census areas (e.g., city, municipality, or CDP) located along the proposed corridor.

5.5.1.2 Compile Existing Subsistence Data and Conduct Data Gap Analysis

Subsistence studies proceeded with a data gap analysis related to communities potentially affected by the proposed Project. As part of a data gap analysis, the study inventoried available subsistence information for all potentially affected study communities.

Appendix C provides existing subsistence data for 62 communities (representing 94 U.S. Census areas) in the following seven geographic Regions crossed by the Project corridor:

1. North Slope;
2. Yukon River;
3. Tanana River;
4. Copper River;
5. Southcentral;
6. Prince William Sound; and
7. Kenai Peninsula.

Appendix C provides regional overviews for each of the seven geographical regions and identifies subsistence information available for each potentially affected community, including subsistence use areas, harvest data, timing of subsistence activities, and spatial and temporal trends in subsistence. Appendix C provides existing information on the following:

- Definition of Subsistence;
- Defining Study Communities;
- Subsistence Baseline Indicators;

- Methods for Compilation of Existing Data;
- Subsistence Existing Data Compilation for Seven Study Regions;
- Regional Overviews;
- Subsistence Use Areas;
- Existing Harvest Data;
- Timing of Subsistence Activities;
- Existing Traditional Knowledge Compilation for Seven Study Regions; and
- Potential Impacts of Proposed Project.

Based on a systematic review of existing data to address key subsistence baseline indicators as well as study-specific criteria based on previous guidance from FERC, ADF&G, and Alaska Pipeline Project, the data gap analysis resulted in recommendations for: (1) updated long-term subsistence mapping studies in select communities; and (2) updated household harvest surveys.

5.5.1.3 Updated Subsistence Studies

To address subsistence information data gaps, the study developed the following criteria for updated studies:

1. Long-term Subsistence Mapping Criteria:
    - community located outside of federally designated non-rural areas and/or communities that border or are located outside of State-designated non-subsistence areas (i.e., communities in rural areas);
    - community within 50 miles of proposed route; and
    - long-term subsistence mapping data older than 10 years.
2. Household Harvest Survey Criteria:
    - located outside of federally designated non-rural areas and/or communities that border or are located outside of State-designated non-subsistence areas (i.e., communities in rural areas); and
    - harvest data older than three years.

Updated long-term subsistence mapping studies consisting of community visits and interviews with active subsistence harvesters were initiated by Project subsistence contractors in fall 2014. Results are presented in the Updated Subsistence and Traditional Knowledge Study Report found in Appendix D, which presents subsistence mapping and harvest information, including subsistence use areas, harvest data, timing of subsistence activities, and spatial and temporal trends in subsistence for each of the seven geographical regions crossed by the Project.

ADF&G is currently developing household subsistence harvest information and this information will be provided to FERC by July 1, 2017.

For all remaining study communities that did not meet criteria for updated studies, the Project's subsistence analysis relies on existing data (e.g., previously documented subsistence use areas and household harvest surveys) presented in Appendix C, ADF&G wildlife harvest ticket database, and the Alaska Subsistence Fisheries Database to identify communities and their subsistence users that may be potentially impacted from the Project.

5.5.1.4 Impact Analysis

Subsistence impacts analysis methods are detailed in Appendix E. In summary, subsistence impacts analysis methodology is as follows:

(1) ***Identify Potential Impact Categories and Sources:*** the approach to subsistence impacts analysis organizes potential subsistence impacts from the Project around six primary subsistence impact categories that could be directly or indirectly affected by Project activities. These subsistence impact categories include the following:

- Subsistence Use Areas
- User Access to Subsistence Areas (User Access)
- Resource Availability (note: this category will rely in part upon analyses in Resource Report No. 3 as to potential impacts to specific subsistence resources)
- Harvest Competition for Subsistence Resources (Competition)
- Costs and Time Associated with Subsistence Activities (Costs and Time)
- Importance to Culture and Identity of a Community (Culture)

(2) ***Differentiate Subsistence Impacts on Both State and Federal Land:*** The impacts analysis does not address any potential impacts to resource uses that occur within State-designated non-subsistence areas as those uses are regulated under general hunting and personal use, sport, guided sport, and commercial fishing regulations. A non-subsistence area is defined in 5 AAC 99.016 as "an area or community where dependence upon subsistence is not a principal characteristic of the economy, culture, and way of life of the area or community." It also does not address any potential impacts to resource uses that occur within federal lands by federally designated nonrural communities because non-rural residents do not qualify for subsistence harvesting on federal lands under federal subsistence regulations (36 CFR §242).

(3) ***Identify Key Subsistence Resources by Measures of Material and Cultural Importance:*** The study establishes measures of material and cultural importance for each subsistence resource by study community to inform the magnitude of potential impacts, with quantitative measure for individual resource in terms of three parameters: 1. Material importance; 2. Cultural importance; and 3. Harvester-reported importance. Details of key subsistence resources by measures of material and cultural importance are found in Appendix D, Section 6.1.3.

(4) ***Analyze Potential Impacts of the Project on Subsistence Uses:*** After identifying subsistence impact categories, potential impact sources, impact likelihood by community, and key subsistence resources and measures of material and cultural importance, the study analyzed the potential subsistence impacts of Project construction and operation on each resource/community by subsistence impact category: subsistence use areas, resource availability, user access, costs and time, competition, and culture. Details are found in Appendix D, Section 6.1.4.

(5) ***Apply Impact Criteria:*** Criteria used to guide the impact assessment to differentiate between minor, moderate, and major effects from the Project are found in Appendix D, Section 6.1.5. These impact components are based on NEPA guidance, which requires consideration of both context and intensity when assessing significant impacts (40 CFR 1508.27). The three criteria analyzed are: (1) magnitude (i.e., resource importance and rural/nonrural status); (2) duration; and (3) geographic extent of impacts to study communities' subsistence activities based on guidelines provided in Appendix D, Section 6.1.5.

5.5.1.5 Summary of Impacts

Results of the subsistence impacts analysis are detailed in Appendix D, Section 6.4. In summary, of the 62 study communities, impacts to subsistence for five communities (Minto, Nenana, Four-Mile Road, Alexander Creek, and Beluga) have a summary impact rating of major based on the criteria of magnitude, duration, and extent. This impact rating of major is primarily based on the long-term effect of increased access and competition from a cleared ROW and access roads to areas previous undeveloped or with limited access options. An additional 22 communities have a summary impact rating of moderate, which is primarily a result of their proximity to the Project and high likelihood for effects to subsistence activities from construction. Nineteen communities have a summary impact rating of minor due to the lower potential for impacts during construction and operation. Lastly, 16 study communities have a summary impact rating of negligible as these communities are generally located farthest from the Project, are in nonsubsistence areas and/or nonrural, and any potential effects would be unlikely and temporary.

Recommended measures to mitigate potential Project impacts to subsistence activities are found in Appendix D, Section 6.5.

5.5.2 Traditional Knowledge

Traditional knowledge has been referred to under a variety of names, including traditional ecological knowledge and/or traditional environmental knowledge, local knowledge, community knowledge, and indigenous knowledge. Generally, discussions of traditional knowledge are based on the acknowledgement that indigenous peoples who live on the land and harvest its resources have an intimate understanding of their environment grounded in a long-term relationship with the surrounding land, ocean, rivers, ice, and resources. This understanding includes knowledge of the anatomy and biology of resources based on centuries of harvest and processing, observations about distribution of resources, animal behavior, seasons, weather and climate, hydrology, sea ice, currents, how ecosystems function, and the relationship between the environment and the local culture. This knowledge is based on the multi-generational sharing and building on direct observations made on the daily processes of safely and successfully obtaining food and satisfying material needs. Many of the practices that are informed by traditional knowledge are reflected in the documentation of subsistence use areas, timing of subsistence activities, and harvest data and are reported in Appendices C and D.

Project traditional knowledge studies detailed in Appendix D provide traditional knowledge information to FERC and other State and federal agencies regarding potential impacts from the proposed Project. The traditional knowledge study methodology is as follows:

1. Identify Study Communities;
2. Compile Existing Data and Conduct Data Gap Analysis;
3. Perform Updated Studies; and
4. Use traditional knowledge to inform subsistence and land use patterns and trends.

5.5.2.1 Identify Study Communities

To initiate traditional knowledge studies the study team developed criteria for selecting potential communities that would be appropriate for providing such information. The following criteria were used to identify study communities within the traditional knowledge affected environment:

- At least 50 percent of the community is Alaska Native; or
- A federally recognized tribe is affiliated with the community, and
- The community is within 50 miles of the pipeline route; or
- The community's documented subsistence use areas overlap with the pipeline route.

5.5.2.2 Compile Existing Traditional Knowledge and Conduct Data Gap Analysis

Traditional knowledge studies proceeded with a data gap analysis related to communities potentially affected by the proposed Project. As part of a data gap analysis, the study inventoried available traditional knowledge information for all potentially affected study communities.

Documented, available sources of traditional knowledge from seven geographic regions are inventoried in the Subsistence and Traditional Knowledge Existing Data Compilation Report (Appendix C), which describes the 232 traditional knowledge sources used, organized by region including the North Slope Region, Yukon River Region, Tanana River Region, Copper River Region, Southcentral Region, Prince William Sound Region, and Kenai Peninsula Region. The traditional knowledge identified in these sources is supplemented by data collected as part of the traditional knowledge workshops conducted for the Project. Appendix C also provides an overview of the role of traditional knowledge in the subsistence lifestyle of each region.

5.5.2.3 Perform Updated Studies

The Applicant conducted traditional knowledge interviews in study communities with no existing available traditional knowledge data. These consist of traditional workshop interviews in study communities and interviews with Tribal elders, subsistence harvesters and others community members with such knowledge. Updated studies, the results of which are detailed in Appendix D, were initiated in 2014 and completed in the spring of 2016.

Appendix D presents the results of the Applicant's updated traditional knowledge studies. The data are Appendix D also includes recommendations for the Project for each of these subjects derived from traditional knowledge, Project-related traditional concerns, and the role of traditional knowledge in subsistence impacts analysis.

5.5.2.4 Use Traditional Knowledge, Subsistence and Land Use Patterns and Trends

The Traditional Knowledge gathered from Alaska LNG study communities detailed in Appendix D is used to analyze long-term and recent trends and patterns in subsistence and land use, and inform subsistence impacts analysis. Traditional knowledge, which is learned through experience and passed on through generations, is a key component of the subsistence lifestyle. In many ways, traditional knowledge is what makes subsistence possible. Without such knowledge, subsistence users would be unable to make informed choices to ensure a safe and successful harvest, to safely prepare and store subsistence foods, and to adequately provide for the community. Traditional knowledge provides subsistence users with the means to answer the following questions:

- Where do you go? (*Subsistence Use Areas*);
- When do you go? (*Timing of Subsistence Activities*);
- How do you harvest? (*Harvest Methods*);
- How do you process? (*Processing Methods*);
- How much and with whom do you share? (*Methods of Distribution*) ;
- Who participates? (*Social Roles: Teacher, Processor, Hunter, Distributor*); and
- Have the above activities changed? (Changes over Time).

Subsistence Use Areas: Where subsistence users hunt and harvest subsistence resources is based on traditional knowledge about the seasonal distribution and habitat of subsistence resources; environmental factors that may affect access, safety, and resource availability; use of an area by previous generations or family ties to an area; suitability of an area for access and camping; proximity of the area to multiple resource bases; and additional factors that have been learned and passed down between generations.

Timing of Subsistence Activities. The timing of subsistence activities is guided by traditional knowledge about the seasonal availability of subsistence resources in accessible locations; the quality of subsistence resources at different times of the year and the ability to retrieve these resources without risk of spoilage due to heat or insects; seasonal weather or environmental conditions that may hinder resource availability or safe access to hunting and harvesting locations; and traditional ceremonies and celebrations centered around harvests and sharing of subsistence resources (e.g., *Nalukataq*, *Kivgik*, First Salmon ceremony).

Harvest Methods: Traditional knowledge about subsistence harvest methods include techniques for locating and stalking subsistence resources in traditionally used areas; techniques for efficient harvests of game that maximize harvest numbers or reduce the waste of edible parts; and adhering to Alaska Native ethics and values associated with harvest amounts and treatment of subsistence resources that will ensure successful harvests in the future.

Processing Methods: Methods of butchering and processing subsistence resources are often complex processes with specific rules that are based on generations of traditional knowledge. Subsistence harvesters use numerous ways to process and prepare each subsistence resource for consumption, including drying, smoking, aging, fermenting, freezing, boiling, and storing in oil. Use of traditional knowledge about processing subsistence foods is particularly important in avoiding food-borne illnesses. In addition, specific butchering techniques are used to avoid spoilage of the meat and reduce damage or loss of edible parts. Knowledge about processing methods includes traditional knowledge about the appropriate celebrations, ceremonies, or venues for serving different types of subsistence foods.

Methods of Distribution: Sharing is a central subsistence value and the methods for sharing are in many ways based upon traditional knowledge about the appropriate ways to distribute subsistence foods throughout the community. Adhering to prescribed methods of distributing subsistence foods ensures that social and family ties are maintained and supports overall community well-being.

Social Roles: Subsistence activities, including hunting, harvesting, processing, and distribution, are in many ways organized around social roles. Traditional knowledge informs the expected behaviors and actions of individuals in a subsistence society, including those with particular subsistence roles. Subsistence roles include boat captains, boat captains' wives, crew members, active harvesters of particular resources (e.g., wolf and wolverine hunters, fishermen), sewers, and processers. Social roles are often determined based on kinship relationships but may also develop through friendships, partnerships (i.e., hunting partners), or adopted kin.

Changes over Time: Traditional knowledge passed on through generations of subsistence users, in addition to personal experiences and time on the land, informs a harvester's understanding of the physical and biological environment. This understanding guides an individual's methods of hunting, harvesting, and processing subsistence resources. Thus, subsistence harvesters are keenly aware of changes that affect their subsistence activities. These include changes in temperatures; ocean currents; the frequency and severity of storms; water levels in local rivers and lakes; precipitation levels; ice conditions; river channels and shore lines; and subsistence resource distribution, migration, quality, and habitat.

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