

16. CUMULATIVE IMPACTS

This chapter describes potential cumulative impacts of the proposed Port MacKenzie Rail Extension which are the impacts of the proposed rail line when added to the impacts of other past, present, and reasonably foreseeable future projects and actions. The Surface Transportation Board's (STB or the Board) Office of Environmental Analysis (OEA) based this cumulative impacts analysis on the results of the environmental and community resources analyses reported in Chapters 3 through 15 of this Final Environmental Impact Statement (EIS) and information OEA collected and reviewed about relevant past, present, and reasonably foreseeable future projects and actions that could result in impacts in the same area as the proposed rail line. This chapter also incorporates changes made in response to agency and public comments and the availability of new and updated information.

16.1 Applicable Regulations

Council on Environmental Quality (CEQ) regulations that implement the National Environmental Policy Act (NEPA) define a cumulative impact as “the impact on the environment which results from the incremental consequences of an action when added to past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions” (40 Code of Federal Regulations [C.F.R.] § 1508.7). To help Federal agencies assess cumulative impacts under NEPA, CEQ developed a handbook entitled *Considering Cumulative Effects under the National Environmental Policy Act*. OEA followed these guidelines in its evaluation of whether past, present, and reasonably foreseeable future projects and actions in the area of the proposed rail line could, when combined with potential impacts of constructing and operating the proposed rail line, cumulatively result in environmental impacts.

16.2 Affected Environment

The project area is generally located north of Anchorage, Alaska, on the opposite side of the Knik Arm of the Cook Inlet. The proposed rail line would connect the Port MacKenzie District in the Matanuska-Susitna Borough (MSB or Borough) to a point on the existing Alaska Railroad (ARRC) main line between Wasilla and north of Willow, Alaska. The area is relatively rural, with a few recreational areas managed by the Alaska and the MSB located nearby. The area is within the MSB Susitna River valley, bounded by the Susitna River on the west, Knik Arm of Cook Inlet on the south and east, and Parks Highway and the existing ARRC main line on the north. The project area would lie within the Susitna Lowland, which is the landward extension of the Cook Inlet Depression. The depression is a structural basin that contains the lowland basins of the Susitna River, its tributaries, and several other rivers that flow directly into the head of Cook Inlet.

The project area is located in the Cook Inlet Basin Ecoregion, a gently sloping lowland basin characterized by a variety of wetland and woodland habitats including evergreen, deciduous, and mixed forest stands. The area provides habitat for wildlife including bear, moose, wolf, furbearers, fish, and birds. Cultural and historic resources are found within the project area, including cabins and trails. The study area includes several designated recreation areas,

including the Willow Creek State Recreation Area, Nancy Lake State Recreation Area, Little Susitna State Recreation River, and 2 state recreation sites on the northern and southern shores of Big Lake. The study area also includes the Susitna Flats and Goose Bay state game refuges.

16.3 Methodology

An agency should evaluate cumulative impacts along with the analysis of the overall impacts of each alternative. The CEQ recommends that an agency's analysis accomplish the following:

- Focus on the effects and resources in the context of the proposed action.
- Present a concise list of issues relevant to the anticipated effects of the proposed action or eventual decision.
- Reach conclusions based on the best available data at the time of the analysis.
- Rely on information from other agencies and organizations about reasonably foreseeable projects and actions that are beyond the scope of the analyzing agency's purview.
- Relate to the geographic scope of the proposed project.
- Relate to the temporal period of the proposed project.

16.3.1 Establish Boundaries

Based on the geographic scope encompassing the various proposed rail line segments and the varied resource characteristics, OEA determined that appropriate geographic boundaries for this cumulative impacts analysis are Parks Highway on the north, Cook Inlet on the south, Knik Arm on the east, and the Susitna River on the west.

OEA determined that appropriate timeframes for this cumulative impacts analysis are the 2-year construction period and indefinite operation.

16.3.2 Collect and Screen Project and Action Data

OEA researched and collected information about other future projects and actions that could have impacts that would coincide in time and space with the potential impacts of the proposed rail line. This chapter also incorporates changes made in response to agency and public comments and the availability of new and updated information. OEA interviewed appropriate key personnel from project proponent and/or permitting offices and agencies to identify various past, present, and reasonably foreseeable future projects and actions, and reviewed analyses and information about those projects and actions to identify which to include in the cumulative impacts analysis and/or as part of each resource area analysis. OEA then applied a screening process to determine if projects and actions were reasonable, foreseeable, and could be associated with potential cumulative impacts. Section 16.4 describes the projects OEA selected for inclusion in the cumulative impacts analysis; Figures 16-1 through 16-3 show the locations of those projects.

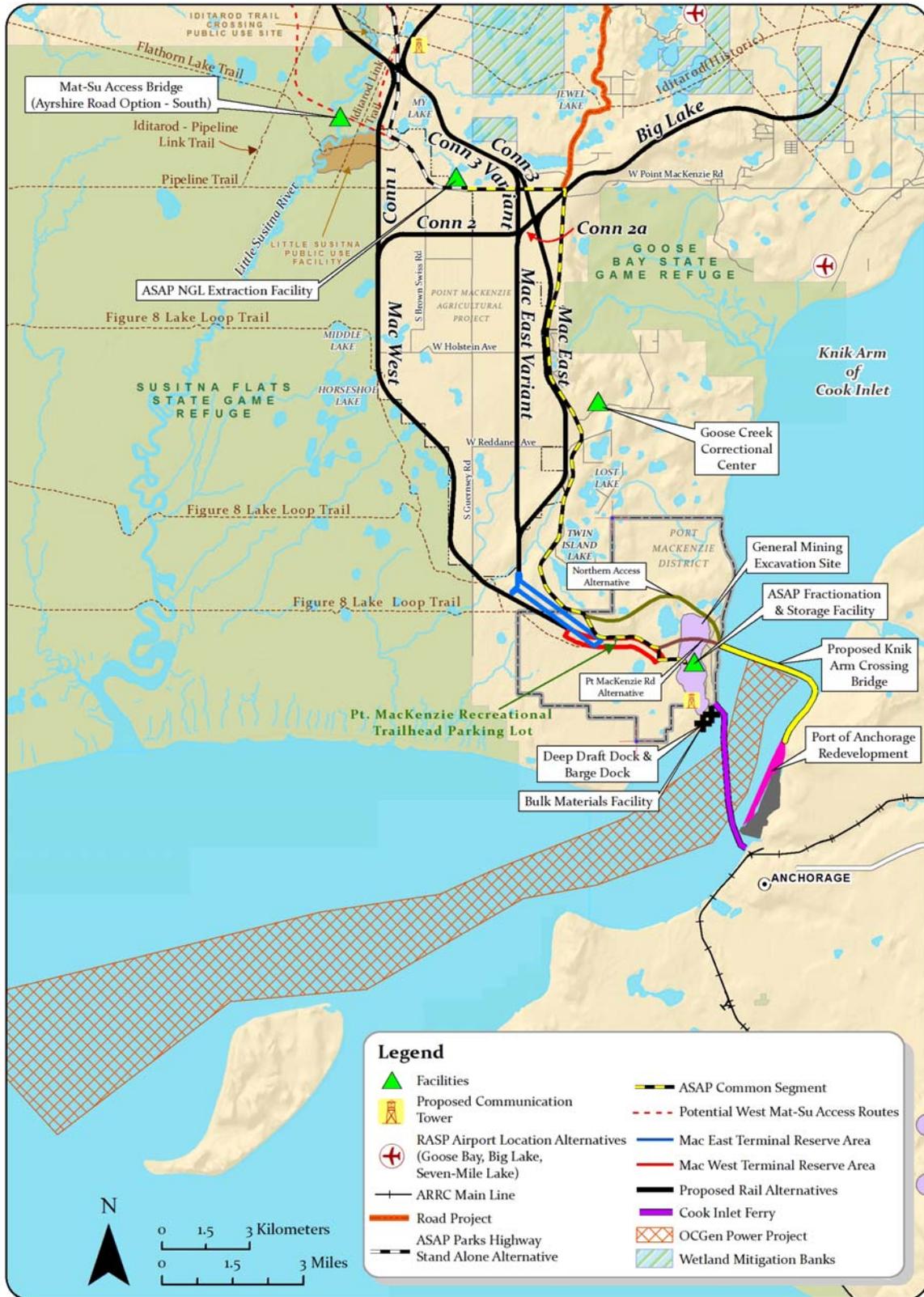


Figure 16-1. Other Projects Located Near the Mac East, Mac West, Mac East Variant, and Connector Segments

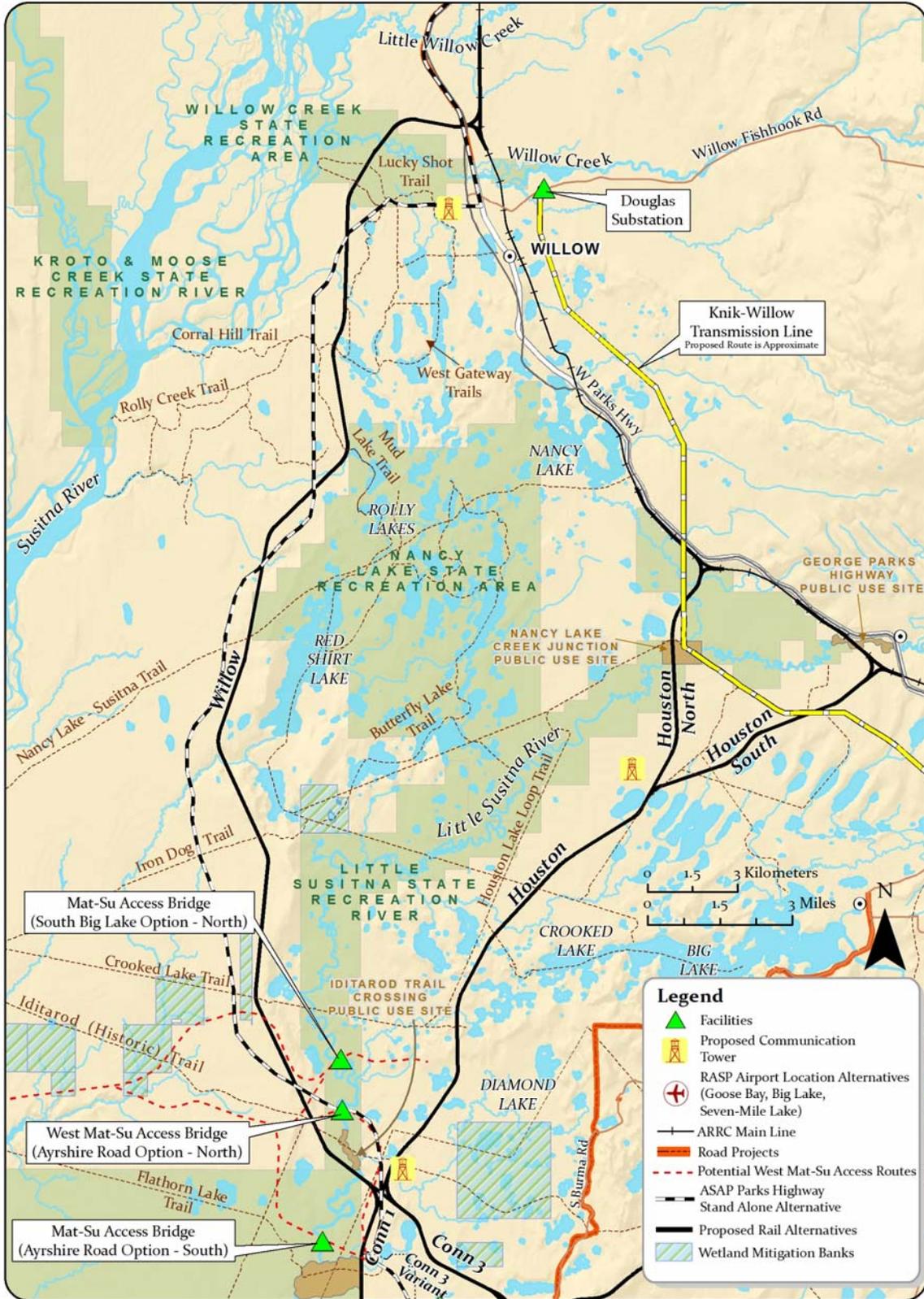


Figure 16-2. Other Projects Located Near the Willow and Houston Segments

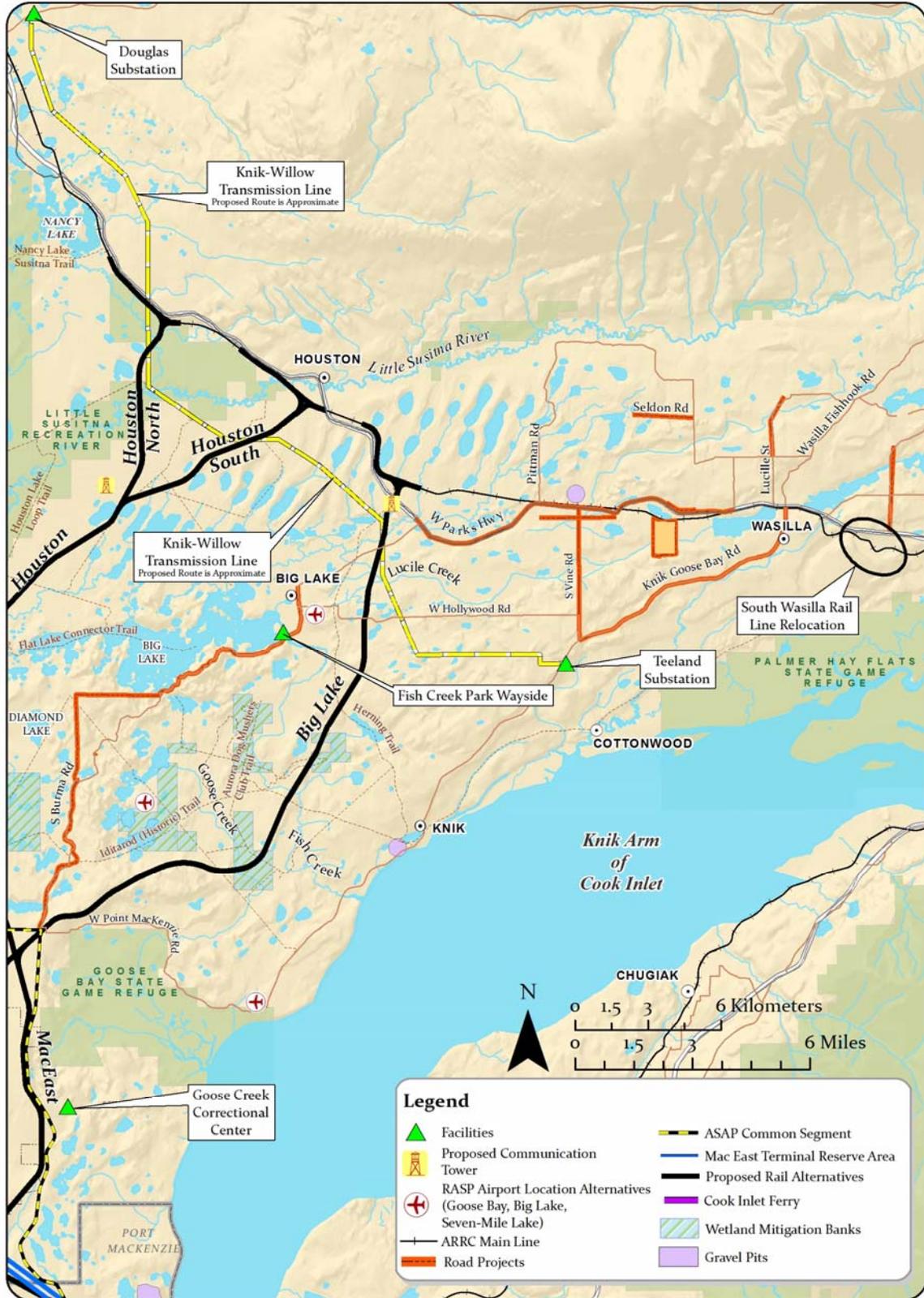


Figure 16-3. Other Projects Located Near the Big Lake Segment

Where available, OEA used existing relevant project data to analyze specific impacts resulting from other projects or actions; however, complete impact analyses were not always available for the relevant projects and actions identified in this cumulative impacts analysis. Where quantitative project data was absent, OEA based the cumulative impacts analysis on the best available qualitative data and information. Section 16.4 summarizes potential cumulative impacts by resource area, and Appendix O provides a more detailed discussion. Chapter 20 includes references for both quantitative and qualitative data and additional information sources relied upon.

16.4 Other Relevant Projects and Actions

This section describes the projects OEA included in the cumulative impacts analysis. Appendix O identifies all projects and actions OEA considered for inclusion and provides a rationale for each project or action not included in the cumulative impacts analysis.

16.4.1 Brief History of the Project Area

It is also important to understand the general history of the area as it pertains to characteristics of the resources potentially affected by the proposed action. OEA considered the history of the project area to understand past and present projects and actions within the area as they are reflected in current conditions. The area around the proposed rail line has developed increasingly over the past decades.

In 1867, the United States purchased Alaska from Russia, performed a territory Census, and summarized resources in 1879 (Bancroft, 1886; Petroff, 1881, 1884). Gold prospecting created the next great influx of Euro-Americans into Upper Cook Inlet, beginning with discoveries on the Kenai Peninsula and Turnagain areas in 1891 (Buzzell, 1986). Communities began to spring up and towns such as Knik and Susitna Station grew up along Cook Inlet. The community of Knik was the largest settlement in the Matanuska-Susitna Valley in the 1890s and served as a transfer point for passengers and freight from ocean-going steamers to smaller vessels or for overland travel. However, the establishment of Anchorage in 1915 as the Alaska Railroad construction headquarters and ship anchorage spelled the end of Knik's prosperity.

After the 1918 Spanish influenza devastated the remaining Native population of Upper Cook Inlet, the survivors resettled at what is today Tyonek. Increasing populations of European Americans in the Upper Cook Inlet area made it correspondingly difficult for Dena'ina people to maintain their traditional land use patterns as promising lands of the Susitna and Matanuska valleys became colonized. After realizing the strategic importance of the Alaska Territory during World War II, the Federal government spent billions of dollars on civilian and military projects (Bush, 1984). Urbanization in Anchorage progressed slowly, with Dena'ina people being pushed away from their former home sites by development pressure, lack of property rights, and race-based discrimination. The Alaska Native Claims Settlement Act of 1971, 33 U.S.C. §1601, was designed to transfer rights to lands taken by the Federal government to Native people, to organize Alaska Natives into a suite of corporate entities instead of dependent but sovereign tribal entities, and to extinguish their aboriginal land rights with the Federal government.

Alaska officially became the 49th state on January 3, 1959 and voters created the Matanuska-Susitna Borough in 1964. With major improvements in transportation (the new Knik River Bridge, now Glenn Highway) completed in 1965, Houston was incorporated as a Third Class City in 1966. The Anchorage to Fairbanks Road (now named Parks Highway) was completed in 1971, and because of the large tracts of land available for subdivision, the Matanuska-Susitna Valley began to grow into a major population center, increasing from 6,509 people in 1970 to 59,322 in 2000 (ADOLWD, undated). The MSB continues to be the fastest growing area in the state with an average annual growth rate of 4.1 percent (ADOLWD, 2008).

Existing conditions reflect past and present projects and actions. The area around the proposed rail line has developed increasingly over the past decades. Activities such as resource extraction, transportation improvements and growth, population growth, supporting infrastructure development, and major recreational development such as state recreation areas and wildlife refuges, have all contributed to current environmental conditions.

16.4.2 Projects and Actions Analyzed in this EIS

The projects described below and presented in Figures 16-1 through 16-3 could have potential impacts occurring within or near the proposed rail line. Many of the projects that have potential to contribute to cumulative impacts are concentrated towards the southern end of the project area near the Mac East, Mac West, Mac East Variant, and Connector segments.

Alaska Stand Alone Pipeline Project. The state has proposed to construct a 24-inch diameter, high pressure pipeline to transport natural gas and possibly additional natural gas liquids (NGL) from Alaska's North Slope to markets in the Anchorage Bowl and to other customers along the pipeline route. The Alaska District U.S. Army Corps of Engineers (USACE) has been designated the lead Federal agency under NEPA for the Alaska Stand Alone Gas Pipeline (ASAP) Project. The USACE has conducted scoping, analyzed preliminary alternatives, and are in the process of developing a Draft EIS, which is anticipated for release in the spring of 2011 (Sweet, 2010). Project construction is anticipated to begin in 2012 and finish by the end of 2015 (State of Alaska, 2009). Under the Parks Highway Stand Alone Alternative, the pipeline would route from the North Slope to Livengood, Alaska along existing roadway and pipeline corridors to Willow, where it would then deviate from Parks Highway and follow the Susitna River and Little Susitna River valleys. In addition to the pipeline, the project would include a 35-acre NGL facility at the corner of Guernsey and Ayrshire Road and fractionation and storage facilities located approximately one mile northwest of the Port MacKenzie pier.

Cook Inlet Areawide Oil and Gas Lease Sale. The Alaska Department of Natural Resources (ADNR) made a final best interest finding for the Cook Inlet areawide oil and gas lease sale (applicable to sales from 2009 through 2018) and sold 35 tracts (totaling 138,880 acres) at the May 26, 2010 sale. None of the tracts that were sold are in the project area; however, most of the project area could be included in future lease sales.

Cook Inlet Ferry. The MSB is proposing construction of a dock at Port MacKenzie as part of the Borough's proposed year-round commuter ferry system that would provide transportation across the 2 miles of Knik Arm that separate the MSB and Anchorage. The project would also include parking and terminal structures (already constructed) and could lead to increased road

development in the Point MacKenzie area. As of December 2010, funding had not been secured for the construction of the dock facilities. The MSB anticipates that the dock facilities will be constructed in 2011 or 2012 (Weller, 2010).

Cook Inlet OCGen™ Power Project. Ocean Renewable Power Company Alaska plans to install its proprietary ocean current electrical generation technology, OCGen™, to generate renewable electricity from open-ocean and tidal currents beginning with the installation of phase 1 in July 2011 for a 1-year environmental testing and monitoring period. The impacts of the project would be focused on the location where the project is sited in Cook Inlet and to-be-determined onshore locations where transmission lines would be constructed.

Knik Arm Crossing. Knik Arm Bridge and Toll Authority has proposed to construct the Knik Arm Crossing, a bridge that would cross Knik Arm of Upper Cook Inlet. The bridge would be approximately 2.5 miles long and would connect the Municipality of Anchorage to the MSB via Point MacKenzie Road. The crossing landfall would be approximately 1 mile from the Mac West Terminal Reserve and approximately 3 miles from the Mac East Terminal Reserve. Impacts resulting from the crossing would be focused at the southern end of the project area.

Knik-Willow Transmission Line Upgrade. The Alaska Energy Authority's (AEA) Knik-Willow (Teeland-Douglas) transmission line upgrade project would replace an older segment of the Anchorage-Fairbanks Intertie with a new 25-mile, 230-kilovolt transmission line between the Teeland (Knik) and Willow (Douglas) substations in Alaska. The transmission line route would be located in the northern part of the rail line project area and likely would cross the Houston North, Houston South, and Big Lake segments. The AEA published a Draft Alaska Railbelt Regional Integrated Resource Plan (RIRP) Study in December 2009. The Draft RIRP includes a Lake Lorraine to Douglas route for a possible new transmission line. OEA did not include the possible Lake Lorraine to Douglas route area in this analysis as there are no specific routes or alternative routes defined. The Draft RIRP indicates that detailed engineering and permitting activity plans are not finalized or funded and, if finalized and funded, would begin in the 2011 through 2016 timeframe (Black & Veatch, 2009).

Goose Greek Correctional Center. The 450,000-square-foot medium-security Goose Greek Correctional Center is an MSB and state joint project under construction at the corner of Alsop Road and Point MacKenzie Road (DOWL Engineers, 2008). Impacts from the correctional center would be focused in the area of the Mac East Segment of the proposed rail line.

The MSB Regional Aviation System Plan. The Regional Aviation System Plan (RASP) addresses aviation issues, needs, and growth with a geographic focus on the airports connected to the road system in the MSB. The RASP includes a basic inventory of airports and improvements needed at public airports, a forecast of aviation growth, locations for new public airports and/or floatplane bases, preliminary plans for the layout of the highest priority new airports and floatplane bases, operations to improve aviation safety, and MSB roles in airport development and management. New or upgraded airport facilities identified in the RASP include locations at Big Lake, Goose Bay, and Seven-Mile Lake. The closest rail line alternative would be those including the Big Lake Segment.

Port MacKenzie Development Projects: Bulk Materials Facility, Gravel Mining, Deep Draft Dock Expansion, Barge Dock Expansion. The following 4 projects at Port MacKenzie are planned or already operating. Impacts from the projects would be focused at the southern end of the rail line project area and would be located closest to the Mac East and Mac West terminal reserves.

- The MSB plans to upgrade roads, storage, and storage areas to develop a bi-modal bulk materials facility at Port MacKenzie to handle bulk materials cargo.
- The MSB and Quality Asphalt and Paving are moving gravel from an excavation site in Port MacKenzie to the Port of Anchorage to provide the foundation for the marine terminal development north expansion (White, 2008).
- The USACE has permitted expansion plans for the 2004 Deep Draft Dock at Port MacKenzie and preliminary designs are complete; however, project funding is not yet in place (Zartman, 2009).
- In January 2007, Port MacKenzie received a permit to expand an existing barge dock by nearly 8 acres; funding was received in 2009 (Zartman, 2009). As of August 2010, the project was nearing completion of the initial phase, which includes construction of the new borrow dike, filter rock, and armor rock. Interior fill is being embanked with an estimated quantity of 250,000 tons of material to be placed. Drainage improvements are being constructed adjacent to Don Young Road (MSB, 2010).

Port of Anchorage Marine Terminal Redevelopment Project. The Port of Anchorage Marine Terminal Redevelopment Project began in 2005 and will expand, reorganize, and improve the Port of Anchorage by adding an additional 135 acres of land and by providing approximately 8,880 linear feet of additional waterfront structures under a phased construction schedule through 2014. The project is located across the Cook Inlet from the southern end of the rail line project area.

Road Projects. Road projects include:

- Parks Highway: Lucas Road (Wasilla) to Big Lake Cutoff Improvements (State Transportation Improvement Program [STIP] #11961);
- Parks Highway: Willow Creek Bridge to Kashwitna River Bridge Rehabilitation, Mile Post 72 to 83;
- Point MacKenzie Road Upgrades and Paving (STIP #20254);
- Point MacKenzie Road Improvements: Don Young Road Upgrades (STIP #18755);
- South Big Lake/Burma Road Upgrades (previously STIP #21355);
- Knik Goose Bay Road Improvements;
- Knik Goose Bay Road Widening: Centaur Avenue to Vine Road (STIP #24596);
- Museum Drive Extension (MSB Project 30090);
- Machen Drive Extension (MSB Project 30090);

- South Mack Drive Extension (City of Wasilla Project No. 54987);
- Lucille Street Rehabilitation Study;
- Seward Meridian Parkway (STIP # 2481);
- Vine Road Upgrade;
- Seldon Road Extension; and
- Fish Creek Park Wayside (STIP #6216).

These road projects would be located throughout the rail line project area, including areas near the Big Lake, Willow, Mac East, Mac West, and Mac East Variant segments.

South Wasilla Rail Line Relocation. ARRC plans to straighten curves along main line track in South Wasilla between ARRC Mile Posts 154 and 158. The relocation would take place to the east of the Big Lake Segment.

Su-Knik Mitigation Bank – Umbrella Mitigation Bank Instrument – Big Lake South Individual Bank Plan. The MSB and Sustainable Environments, LLC, propose to establish an umbrella preservation mitigation bank. The Big Lake South Bank in the MSB, just south of the Houston, Wasilla, and Palmer growth corridor, would be a part of this umbrella. Fish Creek, Threemile Creek, and Goose Creek would flow through the project area and connect an extensive complex of existing wetlands. The mitigation banks would be located near the area of the Connector 1 Segment and the Houston Segment, and would be crossed by the Big Lake Segment of the proposed rail line.

West Mat-Su Access Project. The MSB has proposed to build a bridge across the Little Susitna River into the southern part of the Fish Creek Management Area and is studying 4 access road options including 3 locations for the bridge – the extension of Susitna Parkway in the Big Lake area; a location approximately 0.8 miles north of where the Iditarod National Historic Trail crosses the river; and near the existing Little Susitna River access at the end of Ayrshire Road. Potential road options associated with the access project could intersect the Connector 1 Segment and the Big Lake Segment of the proposed rail line.

16.5 Environmental Consequences

This section summarizes the results of resource-specific cumulative impacts analyses detailed in Appendix O. It is a compilation of potential impacts, that is, the cumulative result of impacts of the proposed action and alternatives when added to the potential impacts of other actions. OEA analyzed cumulative impacts for situations in which planned or reasonably foreseeable projects and actions would overlap the proposed rail line in relation to geographic area and project timeframe.

OEA identified the combined interaction of the proposed rail line and other planned or reasonably foreseeable future projects and identified potential cumulative impacts for all of the environmental resource areas described in Chapters 3 through 15 of the EIS. Sections 16.5.1 through 16.5.13 summarize potential impacts of the proposed rail line and focus on how those

impacts could contribute to cumulative impacts when combined with potential impacts of other relevant projects.

16.5.1 Geology and Soils

Potential impacts to geology and soils from the proposed rail line include modifications of topography through excavation and fill associated with construction of the rail line and associated facilities; removal and replacement of soils classified as unsuitable for construction of rail line embankments and service roads; exposure of highly erodible soils to the erosive forces of wind and water; conversion of land in the proposed rail line footprint that contains soils the MSB considers to be of local importance for agricultural purposes; and potential damage to infrastructure from seismic events.

Construction and operation activities associated with the oil and gas lease sale, the bridge crossing of Cook Inlet, the transmission line and pipeline, and certain road projects would overlap with certain segments of the proposed rail line and minor cumulative impacts are expected to result. Most notably, these activities could, to some extent, result in minor impacts in relation to topographic modification through removal and replacement of the existing soil profile. In some cases, these activities also could lead to the exposure of highly erodible soils or conversion of agricultural lands. Furthermore, infrastructure related to these projects would have some degree of vulnerability to damage resulting from seismic events. Potential impacts from the proposed rail line, when added to potential impacts of the relevant projects, could result in minor cumulative impacts to geology and soils in the Matanuska-Susitna area.

16.5.2 Water Resources

There could be potential impacts to certain water resources from proposed rail line construction and operation, including impacts from clearing and grading; construction of unpaved access roads, bridges, staging areas, and culverts; water-supply withdrawals; and rail line operation. Impacts could include changes to natural drainage and altered flood hydraulics; increased potential for debris jams and overbank flooding upstream of water crossings; reduced floodplain area; increased scour and bank erosion at rail line crossings; increased turbidity, sediment loads, and concentrations of pollutants; changes to recharge potential and aquifer dewatering due to increased ground compaction within the rail line footprint and an increased risk of groundwater contamination from the rail line providing additional sources or pathways for pollutants; impacts to the Su-Knik Mitigation Bank; and impacts to the Goose Creek Fen. OEA analyzed impacts to surface waters and wetlands; cumulative impacts to groundwater and floodplains were not analyzed as there are not likely to be adverse impacts to groundwater or floodplains resulting from the proposed rail line.

The proposed rail line could add to existing impacts to surface water and wetland resources in the project area from urban, recreation, transportation, agriculture, and resource-development activities.

Potential impacts to surface water and wetland resources from the proposed rail line could overlap with impacts from several of the projects identified in Section 16.4, including the natural gas pipeline, the oil and gas lease sale, the transmission line, the correctional center, the aviation

plan, development projects at Port MacKenzie, and road projects. Alternatives for the proposed rail line that include the Big Lake Segment could negate some of the beneficial impacts of the Su-Knik Mitigation Bank by reducing the wetland acreage available to compensate for the impacts of development projects elsewhere. There would be no overlap of impacts to the Goose Creek Fen. Therefore, impacts to surface water and wetland resources from the proposed rail line, when added to the impacts of other relevant projects, could result in cumulative impacts to surface water and wetland resources in the Matanuska-Susitna area.

16.5.3 Biological Resources

The primary impacts of proposed rail line construction and operation would be habitat loss and altered suitability; fish, wildlife, and vegetation mortality; and reduced survival and reproductive success of native species. Linear projects that involve significant land clearing across long distances could change fire cycles by leading to the creation of fire breaks along the rail line footprint. These fire breaks could lead to an increase in fuel accumulation along one side of the rail line footprint, thereby increasing the risk of more intense wildland fires. As a result of changes in fire cycles, separated vegetation communities might experience different rates of ecological succession, leading to a decrease in biodiversity in the project area.

All proposed rail line alternatives have the potential to impact biological resources already affected by urban, recreation, transportation, agriculture, and resource-development activities in the project area.

Construction and operation activities associated with the natural gas pipeline, the oil and gas lease sale, the OCGenTM Power Project, the bridge and ferry crossing of Cook Inlet, the transmission line, the correctional center, the aviation plan, development projects at Port MacKenzie and the Port of Anchorage, and road projects could affect wildlife habitat through habitat destruction and altered suitability (including increases in invasive plant populations and changes in fire cycles), increased public access, noise, and potential direct and indirect wildlife mortality. The potentially beneficial impacts of the Su-Knik Mitigation Bank for most wildlife species could be negatively impacted as a result of alternatives for the proposed rail line that include the Big Lake Segment because they would remove wetlands in the bank. The potential impacts of the proposed rail line, when added to the impacts of the noted projects, could result in cumulative impacts to the biological environment in the Matanuska-Susitna area.

16.5.4 Cultural and Historic Resources

Archaeological sites in the proposed rail line footprint that could not be avoided could possibly be damaged during proposed rail line construction. The *Iditarod Dog Sledding Historic District/Historical Vernacular Landscape* (Iditarod Dog Sledding Historic District) could be adversely affected to varying degrees through loss of visual integrity, cultural privacy, potential loss of and changes to access within the right-of-way (ROW), and changes to traditional or culturally notable use of and connection to the property. Officially recognized trails would be grade-separated or relocated, facilitating free passage; however, the integrity of any historic trails would still be adversely affected through the introduction of auditory and visual effects, and access across the study area by dog sledders who travel across unofficial trails could be impeded. For any potential effects to be considered adverse, the introduction of visual, atmospheric, or

audible elements would have to diminish the integrity of the property's major historic features (36 C.F.R. § 800.5(2)(v)). The NHPA section 106 Programmatic Agreement being developed for this project would provide a mechanism to fully evaluate which properties are listed in or eligible for listing in the *National Register of Historic Places*, what their major historic features are, and whether those properties would be adversely affected by the proposed project.

Historic and potentially historic trails could be blocked, rerouted, or diverted if they are not officially recognized trails. Depending on the timing of construction activities and/or locations of installed crossings, some trail routes, such as the Iditarod Dog Sled Race route, could be altered. Trail crossings would diminish the integrity of historic and potentially historic trails. Historic properties within the project area could be adversely affected and lose their context and integrity through visual and audible effects. All alternatives would cross the Iditarod National Historic Trail, thereby affecting the historic integrity of the trail and its ancillary network and potentially affecting the eligibility of the ancillary network as NHPA trails or NHPA historic trail segments.

Many of the historic structures that could experience visual or audible effects are either already associated with the railroad (such as the Houston railroad station) and thus would not be affected by the introduction of railroad-associated visual or audible elements or are located near the existing rail line along Parks Highway and already experience visual and audible effects associated with rail line operation. The remaining historic structures are generally within 0.5 mile of the rail line alternatives and could experience visual and audible effects. For any of these potential effects to be considered adverse, however, the introduction of visual, atmospheric, or audible elements would have to diminish the integrity of the property's significant historic features (36 C.F.R. § 800.5(2)(v)).

There could be increases in residential development and recreation activity in the project area associated with the Knik Arm Crossing, Cook Inlet Ferry, the regional aviation plan, and the West Mat-Su Access Project. There would be construction activities associated with these projects and the correctional center, the transmission line, and the natural gas pipeline, which could result in adverse impacts to cultural and historic resources.

The Knik Arm Crossing in the study area could have a substantial impact on existing cultural resources, particularly for those closest to the Point MacKenzie and Knik areas, including the Iditarod National Historic Trail, due to a potential increase in residential development from people taking advantage of the shortened commute between Point MacKenzie and Anchorage via the bridge. Proposed rail line construction activities, when combined with these other projects, could result in cumulative impacts to cultural and historic resources.

16.5.5 Subsistence

All proposed rail line alternatives are in the state nonsubsistence area and are a considerable distance from areas where state-regulated subsistence activities occur. Therefore, impacts to subsistence uses outside the nonsubsistence area would be similar for all alternatives. Impacts to wildlife from the rail line alternatives could vary. Impacts to subsistence could include adverse impacts to resource availability as a result of train-resource collisions, especially for species that migrate through the project area; changes in resource availability if the disruption from rail line

operation affects species distribution and/or survival rates; and adverse impacts to user access due to ARRC regulations prohibiting access across the rail line except at designated crossing points.

The most substantial past impact on subsistence activities in the study area resulted from the creation of the Anchorage-Matsu-Kenai nonsubsistence area in 1992 under Alaska Administrative Code (Alaska Admin. Code 5 § 99.015). This action removed subsistence hunting and fishing regulations and the subsistence priority from a large continuous area of the Matanuska-Susitna, Anchorage, and Kenai Peninsula areas.

Cumulative impacts to subsistence uses would be minimal because planned or reasonably foreseeable future projects are within the Anchorage-Matsu-Kenai nonsubsistence area. Several of these projects would have a small footprint within the nonsubsistence area and, except for small habitat disturbances in the immediate area, would not be likely to contribute to larger cumulative impacts to subsistence. There are two foreseeable projects that could add to cumulative effects to subsistence uses outside the Anchorage-Matsu-Kenai nonsubsistence area – the Knik Arm Crossing and natural gas pipeline projects. The Knik Arm Crossing could draw more residents to the study area, thereby increasing the number of people who might travel to the closest subsistence managed lands. Depending on the proponents' policy regarding access along the natural gas pipeline ROW, the pipeline could restrict or improve subsistence-user access to subsistence-managed lands. An overall increase in the number of development projects in the study area could lead to cumulative impacts to Knik and Eklutna tribal members' traditional use areas. While these traditional use areas are now within a nonsubsistence area, Eklutna and Knik tribal members could still have a traditional connection to the land, and construction and operation of future projects could add to a sense of loss and intrusion by outsiders into their traditional harvest areas. To the extent that any project affects populations of beluga whales, there could be impacts to Cook Inlet Dena'ina villages' (such as Tyonek, Eklutna, and Knik) subsistence use of beluga whales.

16.5.6 Climate and Air Quality

OEA has concluded that increases in emissions from construction and operation of the proposed rail line would be minimal in the context of existing conditions. Using a conservative approach, OEA determined that construction emissions for the proposed project would be expected to be a small fraction of the Borough's total annual emissions during the assumed construction period of 2 years. Estimated nitrogen oxide, PM₁₀,¹ and PM_{2.5},² construction-related emissions would be well below the *de minimis* conformity thresholds of 100 tons per year for each pollutant. The estimated operation-related emissions would also be a small fraction of the MSB annual off-roadway vehicle emissions and the emission totals for each of the pollutants would be well below the *de minimis* conformity thresholds of 100 tons per year for each pollutant. OEA also has determined that emissions from the proposed terminal reserve at the end of the rail line in the Port MacKenzie District would be a fraction of the rail line operation-related emissions and well below the *de minimis* conformity thresholds of 100 tons per year for each pollutant.

¹ All particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers.

² All particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.

Globally, sources of human-induced emissions of greenhouse gases include mainly burning of fossil fuels, with important contributions from clearing of forests, agricultural practices, and other similar activities. Greenhouse gas emissions associated with the proposed rail line would be mostly carbon-dioxide (CO₂) emissions. Estimated annual average construction-related CO₂ emissions would be 3,141 metric tons per year and operation-related emissions would be 2,606 metric tons per year. Operation-related CO₂ emissions would represent a 2 percent increase in ARRC CO₂ emissions and would be less than 0.01 percent for Alaska as a whole (ADEC, 2008). Also, CO₂ emissions from existing roadway activity would likely decrease as a result of the proposed rail line to the extent that transportation activity by truck would be shifted to rail. Similarly, CO₂ emissions would likely decrease if commodities from Interior Alaska were transported over the proposed rail line to Port MacKenzie rather than to the Port of Anchorage or Seward because of the shorter distance.

Although the emissions generated from construction and operation of the proposed rail line would be very small in comparison to annual global CO₂ emissions, they could contribute to global greenhouse gas emissions and, when added to emissions from the reasonably foreseeable future projects and actions described in this Chapter (see also Appendix O) and similar projects and actions across the globe, they could lead to an adverse cumulative impact. The following paragraphs provide a discussion of the general impacts of climate change with a focus on Alaska and their effects on the proposed rail line.

The Intergovernmental Panel on Climate Change (IPCC) and the U.S. Global Change Research Program (USGCRP) have assessed the potential consequences of global climate change (IPCC, 2007 and USGCRP, 2009). The global average temperature since 1900 has risen by about 1.5 degrees Fahrenheit (°F) and is projected to rise another 2 degrees to 11.5°F by 2100, with the greatest increases expected to occur in the Arctic and in the middle of continents. The U.S. average temperature has risen by a comparable amount and is very likely to rise more than the global average over this century, with some variation from place to place (USGCRP, 2009). Over the past 50 years, Alaska has warmed at more than twice the rate of the rest of the U.S. average, leading to more pronounced climate change impacts in the state than in the rest of the United States. During this time, Alaska's annual average temperature has increased 3.4°F and the winters have warmed by 6.3°F (Fitzpatrick *et. al.*, 2008 in USGCRP, 2009). Average annual temperatures in Alaska are predicted to continue to rise about 3.5°F to 7°F above 2009 levels by the middle of the century (USGCRP, 2009). Sea level, as a result of climate change, also is rising at roughly double the rate observed over the past century, as recorded by satellite data over the last 15 years (Bindoff *et. al.*, 2007 in USGCRP, 2009). Precipitation patterns also are changing with increases and decreases observed across the globe and, in some regions, there have been increases in both droughts and floods (Trenberth *et. al.*, 2007 in USGCRP, 2009). Precipitation is projected to increase overall, but substantial shifts are expected in where and how precipitation occurs so increases in air temperature are expected to lead to drier conditions overall (Meehl *et. al.*, 2007 in USGCRP, 2009).

In Alaska, higher temperatures are already contributing to earlier spring snowmelt, reduced sea ice, widespread glacier retreat, and permafrost warming (ACIA, 2004; Fitzpatrick *et. al.*, 2008 in USGCRP, 2009). Reduced sea ice provides opportunities for increased shipping and resource extraction, however, at the same time, also increases coastal erosion (Jones *et al.*, 2009 in USGCRP, 2009) and flooding associated with coastal storms. Climate models project that the

Bering Sea will experience the largest decreases in atmospheric pressure in the Northern Hemisphere, suggesting an increase in storm activity in the region (Meehl *et al.*, 2007 in USGCRP, 2009). Reduced sea ice also alters the timing and location of plankton blooms, which is expected to drive major shifts of marine species such as pollock and other commercial fish stocks (Grebmeier *et al.*, 2006 in USGCRP, 2009). The Bering Sea pollock fishery off Alaska's west coast is the world's largest single fishery and has undergone major declines in recent years (USGCRP, 2009).

Insect outbreaks and wildfires are increasing with warming temperatures and Southcentral Alaska experienced the largest outbreak of spruce beetles in the world in the 1990s, destroying over 5 million acres of Alaska spruce forest (Ryan *et al.*, 2008 in USGCRP, 2009; Juday *et al.*, 2005 in USGCRP, 2009). The average area burned per year in wildfires in Alaska is projected to double from 2009 levels by the middle of this century (Balshi *et al.*, 2008 in USGCRP, 2009). Permafrost temperatures have increased throughout Alaska since the 1970s (Lettenmaier *et al.*, 2008, in USGCRP, 2009), with the largest increases measured in the northern part of the state (Osterkamp, 2007 in USGCRP, 2009). Greater evaporation and permafrost thawing due to warming temperatures is the likely cause for a reduction of closed basin lake areas in Alaska over the last 50 years. This threatens wetlands and the traditional lifestyle of Native peoples that depend on them. Degradation of permafrost could connect surface waters to groundwater, which has the potential to dry out shallow streams, ponds, and wetlands if re-supply by snowmelt and precipitation are less than losses from evaporation and percolation (ACIA, 2004). In areas with heavy concentrations of ground ice, permafrost thaw and associated ground surface collapse could increase the formation of wetlands, ponds, and drainage networks (ACIA, 2004). Because water extraction would only occur during construction, long-term, climate change induced changes in water availability would not be expected to affect the proposed rail line.

Climate change induced permafrost thaw could lead to embankment deformation through the process of thaw settlement, which occurs when ice-rich permafrost thaws and causes the ground surface to subside (Lemke *et al.*, 2007). Ground subsidence could damage public infrastructure including roads, runways, water and sewer systems, and rail embankments. It has been estimated that thawing permafrost could add \$3.6 billion and \$6.1 billion to future costs for publicly owned infrastructure in Alaska by 2030 (Larsen *et al.*, 2008 in USGCRP, 2009).

16.5.7 Noise and Vibration

Proposed Port MacKenzie construction activities, such as the use of heavy equipment and pile driving for bridges along certain segments, would generate noise. Rail line operation would generate wayside noise and noise from sounding locomotive warning horns at at-grade rail-roadway crossings. Because of the relatively low ambient noise level and proximity of receptors, the 3 dBA [A-weighted decibel] noise increase contour associated with the Big Lake Segment would include 18 receptors, the Connector 3 Segment would include 15 receptors, the Willow Segment would include 13 receptors, the Houston South Segment would include 9 receptors, the Mac West Segment would include 2 receptors, the Mac East Variant Segment would include 2 receptors, and the Connector 3 Variant Segment would include 2 receptors. Also, because of relatively low ambient noise levels in these areas, train noise would be more noticeable than in other areas with higher ambient noise levels. The Mac East Variant and Connector 3 segments would also experience noise levels above the 65 decibel DNL [day-night average noise level];

rail line alternatives that include either of those segments would result in noise impacts for those receptors. Although some of the other projects and actions could increase noise levels, there is no overlap of the areas of noise impact from these projects and actions with the areas of potential noise impact from the proposed rail line. Thus, no cumulative impacts are expected to result.

16.5.8 Energy

All segments of the proposed rail line would cross a 230-kilovolt transmission line that links the Beluga Power Plant near Tyonek to a bulk substation just south of the Port MacKenzie District. The Big Lake, Houston South, and Houston North segments also would cross a 138-kilovolt transmission line parallel to the ARRC main line between Knik-Fairview and Willow. The Connector 1, Connector 3, Connector 3 Variant, and Big Lake segments would cross an existing natural gas pipeline that runs along Ayrshire Road and just north of Port MacKenzie Road. ARRC would have to employ appropriate construction industry standards to minimize any potential to disrupt the provision of energy resources. Increases in energy consumption during proposed rail line construction would be negligible. Train operation would consume less than 0.5 percent of the annual statewide consumption of distillate fuel.

Cumulative impacts to energy resources would be limited to proposed rail line crossings of proposed transmission lines. This would require coordination between ARRC and the proponents responsible for the other proposed projects to ensure appropriate planning for location of transmission pylons.

16.5.9 Transportation Safety and Delay

The proposed rail line would have the potential to impact traffic safety and delay on the network of local, arterial, and collector roads that comprise much of the existing transportation system in the project area. Where new crossings along the proposed rail line would be grade-separated, there would be no increase in the number of potential future train-vehicle accidents and no change in vehicle delay. Where crossings would not be grade-separated (at-grade crossings), there could be an increase in accidents and vehicle delay.

There could be temporary vehicle delays during rail line construction at new at-grade crossings and where roads would be improved or relocated. Although rail line operation could affect delay at at-grade crossings, this impact would be minimal.

The proposed rail line is expected to result in a small increase in future accident frequencies as a result of at-grade crossings. The proposed rail line should not result in a considerable increase in vehicle delay. There could be an increase in future accident frequency and vehicle delay from the proposed rail line when added to the Port MacKenzie development projects, the Knik Arm Crossing, the Cook Inlet Ferry, the West Mat-Su Access Project, and other road improvements.

16.5.10 Navigation

The proposed rail line includes bridges and structures that would cross inland rivers and streams in the project area, which could have a negligible impact on navigation. Of the reasonably foreseeable future projects analyzed for cumulative impacts, only the West Mat-Su Access

Project, which would include a new bridge across the Little Susitna River, could create the potential for cumulative impacts to navigation along this waterbody. Alternative access routes, including three potential bridge locations, are under consideration for the West Mat-Su Access project. The Willow, Houston North, and Houston South segments also include a bridge crossing of the Little Susitna River. Construction of any of these segments, combined with the West Mat-Su Access project, could result in cumulative impacts to navigation along the Little Susitna River due to the construction of bridges over this waterbody. However, the cumulative impacts to navigation would be negligible if the bridges are constructed with vertical and horizontal clearances equal or greater than those found in existing bridges on the waterway.

16.5.11 Land Use

Land owners in the study area include the Federal government, State of Alaska, the MSB, Alaska Mental Health Trust, University of Alaska, private citizens, Alaska Native Regional Corporation (Cook Inlet Regional Incorporated) and Alaska Native Village Corporation (Knikatu Inc.) established under the Alaska Native Claims Settlement Act of 1971, 43 U.S.C. § 1601, and land given to an authorized individual Indian, Aleut, or Eskimo in Alaska under the Native Allotment Act of 1906, 43 U.S.C. § 270. Impacts to land use from proposed rail line construction and operation would vary depending on alternative. Existing land uses within the ROW would be permanently changed, and any activities within the ROW not associated with the rail line would require an ARRC entry permit. In the area of the Big Lake Segment, the proposed rail line would require taking 10 structures, 5 residences, and 1 business. Structures also would be taken along the Connector 3 Segment ROW (2 structures) and in the Mac East Variant Segment ROW (1 structure).

Public lands in the project area are used primarily for recreation, hunting, and fishing. Figures 16-1 through 16-3 show the recreational resources associated with the proposed rail line segments. Construction activities could temporarily impede access to trails and waterways, including the Iditarod National Historic Trail. Operation activities could impact the experience of users engaged in activities such as recreation, hunting, fishing, and wildlife viewing. Officially recognized trails would be grade-separated or relocated. There would be a loss of connectivity of trails for which grade-separated crossings would not be provided. These trails would be blocked, and ARRC's trespassing regulations would prohibit the public from crossing the ROW without first obtaining approval from ARRC.

Mining and timber harvesting also are allowed by permit. Private lands in the project area are primarily forested or in agricultural and residential use. Lands outside the ROW would maintain their existing ownership and uses, but landowners could change the way they use the land as allowed by the MSB building or zoning rules. The proposed rail line is expected to handle 2 freight-only trains per day, with no passenger service or whistle stops. Except for the rail line and associated facilities within the ROW, the presence and operation of the rail line would not be likely to result in substantial changes in land use patterns in the project area.

Impacts of the proposed rail line could combine with impacts of the Cook Inlet areawide oil and gas lease sale and the Knik Arm Crossing to produce potentially significant land use changes; however, the rail line contribution to those cumulative impacts would be minimal. The primary potential impacts to visual resources from construction and operation of the proposed rail line

would be vegetation removal along the ROW, construction of a linear rail line, construction of at-grade and grade-separated road and trail crossings, blocking of trails without crossings, and construction of bridges over waterways. These changes could alter the existing visual character for most segments, affecting sensitive viewer groups. All proposed rail line alternatives could contribute to cumulative impacts to visual resources in the project area when combined with other projects occurring in the project area, many of which have similar visual impacts.

16.5.12 Socioeconomics

Potential socioeconomic impacts from the proposed rail line could include a temporary increase in direct employment during project-related construction. This temporary increase in direct employment could be complemented by additional indirect employment generated through suppliers and service providers. Induced employment through multiple rounds of expenditures and consumption along production and consumption chains also could occur. The local labor force would partly meet the increased labor demand, and any increased pressures on housing and public services from the migration of laborers to the project area would be minor, as discussed below.

Cumulative impacts to socioeconomic resources would include increased demand for labor, which would likely lead to increased demand for local housing and public services to the extent that labor migrates to the MSB from outside the area. Labor for some of the construction projects might come from the Municipality of Anchorage and reside in that area, which would reduce pressure on the MSB housing market and public services from migration to the area. To the extent that some of the foreseeable projects would shorten the commute time between the MSB and Anchorage, there could be incentives for workers to permanently relocate to the MSB. However, because this permanent stimulus for relocation would occur only after construction work is completed, the MSB housing market and its public services would have time to adjust to expected increases in demand.

There could be long-term negative impacts to recreational activities because the proposed rail line would cross land used for recreational purposes. Crossings of officially recognized trails would be grade-separated or relocated. Recreation and tourism activities that use other trails, however, could be blocked by the rail line. Those that are blocked possibly could be diverted to nearby trails with crossings. This could have a potentially adverse effect on economic activities directly or indirectly related to the use of such trails. Cumulative impacts to recreation activities are expected to be minor if the Board imposes OEA's recommended mitigation measures for grade-separated crossings at select trails in any decision granting ARRC the authority to construct and operate the proposed rail line.

16.5.13 Environmental Justice

Because proposed rail line construction and operation would not result in high and adverse impacts to human health or the environment, minority and low-income groups would not experience disproportionately high and adverse impacts.

Based on the analysis of cumulative impacts reported in Sections 16.4.1 through 16.4.12, impacts of the proposed rail line, when added to the impacts of other past, present, or reasonably

foreseeable future projects and actions, would not result in high and adverse cumulative impacts to human health or the environment. In the absence of high and adverse human health and environmental effects, even considering the impacts of other relevant projects, there would be no disproportionately high and adverse cumulative impacts to minority and low-income groups.

16.5.14 Conclusions

The construction and operation of the proposed rail line could contribute to potential cumulative impacts on the following resources: surface water and wetland resources, biological resources, cultural and historic resources, climate and air quality, and land use. These impacts are summarized below.

Potential cumulative impacts from the proposed rail line when combined with potential surface water and wetland impacts from the projects identified in Section 16.5.2 could result in altered drainage and flood hydraulics; increased debris jams and overbank flooding upstream of proposed rail line crossings; reduced floodplain area; increased scour and bank erosion; decreased water quality; changes to recharge potential; and impacts to the Su-Knik Mitigation Bank. Potential cumulative impacts to surface waters and wetlands are expected to be greater along the Big Lake Segment because this segment would impact the Su-Knik Mitigation Bank, reducing the wetland acreage available to compensate for the impacts of development projects elsewhere.

Potential cumulative impacts from the proposed rail line when combined with potential biological resource impacts from the projects identified in Section 16.5.3 include habitat loss and altered suitability; direct and indirect fish, wildlife, and vegetation mortality; reduced survival and reproductive success of native species; changes in fire cycles; and altered ecological succession. Potential cumulative impacts to biological resources are expected to be greater along the Big Lake Segment because this segment would impact the Su-Knik Mitigation Bank, reducing the wetland acreage and wildlife habitat available to compensate for the impacts of development projects elsewhere.

Potential cumulative impacts from the proposed rail line when combined with potential cultural and historic resource impacts due to increased development, recreation activity, and construction from the projects identified in Section 16.5.4 include possible damage to archaeological sites and the loss of visual integrity, potential loss of and changes to access within the ROW, and changes to traditional or culturally notable use of and connection to the property within the Iditarod Dog Sledding Historic District. All build alternatives for the proposed rail line would cross the Iditarod National Historic Trail, thereby affecting its historic integrity, and other historic structures could be affected through potential visual or audible impacts.

Potential cumulative impacts from the proposed rail line when combined with potential greenhouse gas emissions from the projects identified in Section 16.4.2 and other projects and actions across the globe include an increase in greenhouse gas emissions, which can lead to changes in precipitation patterns, earlier spring snowmelt, reduced sea ice, glacier retreat, permafrost warming, increased insect outbreaks and wildfires, and increased evaporation. Emission contributions from the proposed rail line, however, would be very small in comparison to annual global CO₂ emissions.

Potential cumulative impacts from the proposed rail line when combined with potential land use impacts from the Cook Inlet areawide oil and gas lease sale and the Knik Arm Crossing include permanent changes in land use, although the rail line contribution to those cumulative impacts would be minimal. Potential cumulative impacts from the proposed rail line when combined with potential land use impacts from the projects identified in Section 16.4.2 include impacts to recreational users, loss of trail connectivity, and alteration of the area's visual character through vegetation removal, construction, trail blockages, and the construction of bridges.

OEA also expects potential minor cumulative impacts on geology and soils, subsistence use, transportation safety and delay, and socioeconomics. There would be negligible cumulative impacts to energy use and navigation and no cumulative impacts to groundwater and floodplain resources, noise and vibration, and environmental justice.