2. PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Alaska Railroad Corporation (ARRC or the Applicant) proposed action for the Port MacKenzie Rail Extension; the development of potential rail line alignments by the applicant; the Surface Transportation Board's (STB or the Board) Office of Environmental Analysis's (OEA) selection of a reasonable range of alternatives for analysis in this Final Environmental Impact Statement (EIS), including the No-Action Alternative (no new rail construction); and alternatives considered but not included for detailed study.

2.1 Proposed Action

Under the proposed action, ARRC would construct and operate a single-track rail line from Port MacKenzie to a point on the existing ARRC main line between Wasilla and just north of Willow, Alaska. The Federal Railroad Administration (FRA) establishes the standards for class of track and maximum operating speed for passenger and freight on each class of track (49 Code of Federal Regulations [C.F.R.] part 213). ARRC proposes to transport commercial freight on the rail line, and would construct and maintain the rail line to FRA Class 4 standards[1], because of its anticipated average operating speed for freight service (51 mph). ARRC proposes a right-of-way (ROW) of approximately 200 feet for the rail line. Unless otherwise noted, this Final EIS assumes that all construction activities would occur within this 200-foot ROW. ARRC might reduce the width of the ROW, as necessary, to minimize potential impacts to sensitive resources or accommodate the terrain. The area that would be permanently impacted by the rail line generally lies within the 200-foot ROW and is referred to as the rail line footprint. This area includes the rail bed, terminal reserve area, access road, and associated facilities. The associated facilities could include a power line, buried utility lines, construction staging areas, communication towers, and supplemental access roads to these facilities (see Figure 2-1). In addition, ARRC would construct 1 rail line siding within the existing main line ROW where ARRC's existing main line and the proposed rail line would connect. As part of ARRC's proposed action, the area in the ROW outside of the rail line footprint that would be cleared of vegetation for construction, but not needed for permanent structures, would be restored to natural conditions, to the extent practicable, consistent with rail line operating requirements. ARRC would need to acquire public and private lands to establish the linear ROW.

The locations of some of the associated facilities, such as construction staging areas and communication towers, would vary depending on which alternative segments, if any, the Board authorizes for construction. ARRC would also build temporary associated facilities to support rail construction and would remove them after the completion of construction of the proposed rail line and associated facilities. Most associated facilities would require permanent or temporary access roads. Locations for communications towers and terminal reserve areas (rail yards and maintenance facility at the southern terminus of the proposed rail line) have been identified. The locations of other associated facilities would be determined during final design. Where practicable, ARRC would site construction staging areas inside the 200-foot ROW.

[1] FRA establishes the standards for class of track and maximum operating speed for freight on each class of track (49 C.F.R. part 213). Design and construction of the proposed Port MacKenzie Rail Extension to Class 4 standards (60 miles per hour) would be required for ARRC's desired operating speed for freight service.

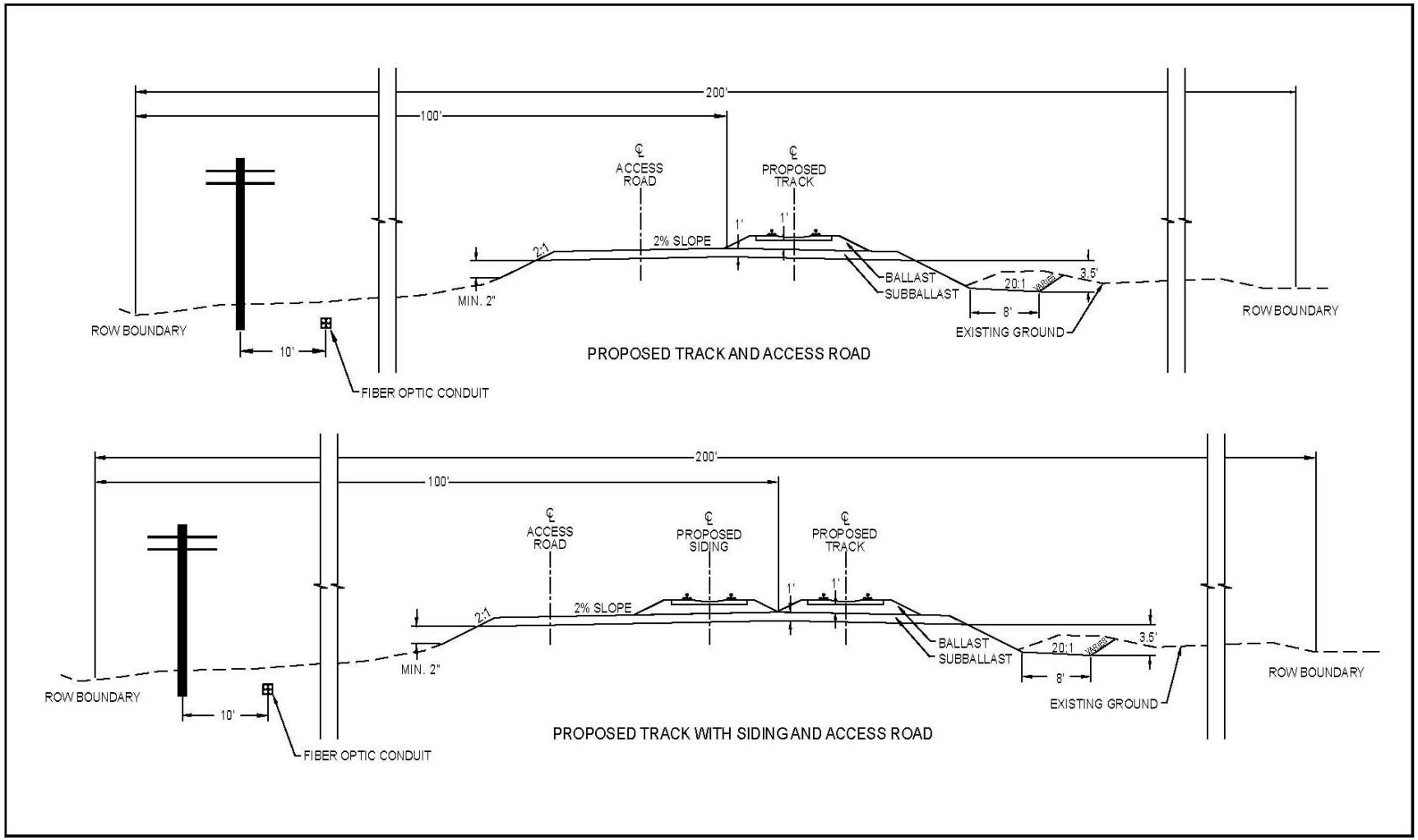

Figure 2-1. Cross-Sections of Rail Line Right-of-Way

2.1.1 Proposed Rail Line Construction

This section describes proposed rail line construction, including ROW needs, construction components and materials, roadways, bridges, and permanent and temporary facilities. This section also describes the general construction process and schedule.

2.1.1.1 Right-of-Way and Rail Line Footprint

Unless otherwise indicated, construction activities would occur within the 200-foot ROW. For purposes of analysis, OEA assumes that the entire ROW would be acquired for the rail line. However, only the rail line footprint would be permanently cleared of vegetation for construction and then operation. As part of ARRC's proposed action, those areas within the 200-foot ROW and outside the rail line footprint would be restored to natural conditions after construction, to the extent practicable, consistent with rail line operating requirements if disturbed, or left undisturbed if not needed.

2.1.1.2 Rail Line Access Road

For rail line construction and post-construction operations, ARRC would build a permanent access road parallel to the rail bed and within the rail line footprint. The Applicant stated that it would need to construct the access road before the rail line and would use the access road during construction and maintenance of the proposed rail line. This road would be installed before the rail line itself, and initially used to accomplish the construction of the proposed rail line, which is now the standard practice for railroad construction. It is also standard practice to leave those roads in place after the rail line is complete because the roads are used for maintenance of the track and rail bed, emergency access to the rail line, and other miscellaneous needs. The existence of an access road makes operation of the adjacent rail line cheaper and safer for all involved. Under Alaska law, the ROW on state-managed lands also would be available for use as a utility corridor and non-railroad vehicles could use the road to move along the ROW for utility inspection and maintenance activities. To reduce the potential project impacts to sensitive habitat, the access road would share the same embankment as the railroad track, keeping the embankment footprint to a minimum. ARRC would not maintain the access road as a public road.

Based on conceptual engineering information, ARRC does not anticipate constructing additional access roads. However, final engineering for the selected alternative could identify the need for new roads in certain areas to shorten haul distances for fill or track material.

2.1.1.3 Rail Bed Construction

Before any track could be placed, ARRC would construct a suitable rail bed. The rail bed would form the base upon which ARRC would lay the ballast, rail ties, and rail. Rail bed construction would require clearing, excavating earth and rock on previously undisturbed land, and removing and stockpiling topsoil, where needed. Construction would require both cuts and fills. To the extent practicable, ARRC would adjust the design profile grade to balance cut and fill quantities. ARRC would remove excess fill material created during rail bed construction and would transport and deposit it in an appropriate location. ARRC would store unsuitable rail bed

material on site for application to finished slopes and to facilitate revegetation and provide erosion control, or would remove unsuitable material from the area and dispose of it in an acceptable manner.

2.1.1.4 Track Construction

ARRC would place ties and rail using conventional construction and track-mounted equipment in successive application. In-place track construction would consist of placing ties, rail, and ballast on top of the rail bed. First, ARRC would place the ties on the subballast. ARRC would weld rails together to form rail strings and then use special equipment to unload and secure the rail onto the ties, unload ballast from rail ballast cars or trucks, and dump ballast evenly along the skeleton track. ARRC would then use equipment to raise the rail line to achieve the proper ballast depth.

Alternatively, ARRC could decide to construct skeleton track panels at several of its facilities. These 40- to 80-foot-long panels would consist of rails, ties, and fastening systems constructed and loaded onto railcars for delivery to the construction site. At the construction site, the panels would be lifted from the railcars and placed in their final location. The panels would be fastened together to form the skeleton track.

2.1.1.5 Acquisition of Materials for Rail Line Construction

Ballast, subballast, fill material, rail ties, and rail would be required for construction of the proposed rail line. This section briefly describes the acquisition and use of these materials.

ARRC would obtain ballast from existing commercial quarries or its existing quarry in Curry, Alaska. ARRC would transport ballast from Curry to the project area by rail or by a combination of rail and truck, and anticipates that ballast from other sources would likely be trucked directly to the construction site.

ARRC would obtain subballast primarily from materials excavated during rail bed construction, from existing commercial sources, and from borrow areas established along the rail line ROW. As part of the final design and permitting process, ARRC would perform geotechnical testing to identify borrow locations with suitable material. Consistent with other construction requirements, ARRC would maintain short intervals between borrow sites to minimize average haul distance. Any excess material (overburden) from these activities would be distributed evenly along the rail bed as nonstructural fill to support revegetation.

ARRC would obtain fill material from cut-and-fill activities during rail bed construction, and to the extent practicable, would adjust the design profile grade to balance cut and fill quantities. If needed, ARRC would obtain additional fill material from borrow sources within the ROW or off site.

ARRC would obtain rail ties and steel rail from commercial sources to create rail strings, and anticipates that these materials likely would be transported to the project area by ship, rail, and truck. The rail would be delivered in short lengths individually, or as preconstructed track panels.

2.1.1.6 Construction Staging Areas

The proposed rail line might require construction staging areas to store material, weld sections of the rail line, and otherwise support rail line construction activities. The staging areas would be identified before construction began. ARRC has stated that it would attempt to locate staging areas within the proposed ROW at relatively flat, previously disturbed areas with established access to existing public roads. The project would either consume all stockpiled materials or ARRC would remove them from the staging areas following construction.

2.1.1.7 Bridges and Culverts

Rail and access road bridges and culverts would be required for crossing streams, rivers, and some wetlands. New culverts would extend across the combined width of both the rail bed and access–road bed. Crossing structures the Applicant has identified as "drainage structures" would be determined during the final design process and could include culverts, pre-cast arches, natural bottom plate pipe or arch structures, and single or multiple short-span bridges. Existing culverts would also be extended and new bridges constructed for the new rail siding proposed along the existing ARRC main line where any of the alternatives would connect to the main line. The locations, types, and sizes of all proposed bridges, culverts, natural bottom plate pipe or arch structures, and drainage structures are approximate and preliminary; the exact locations, types, and sizes would be determined during the final design and permitting process. In addition, the Applicant could add culverts to maintain drainage and add equalization culverts through wetland areas. The need for, locations, types, and sizes of these additional culverts would be determined during the final design and permitting process.

Where it has not proposed bridges, the Applicant proposes to build culverts into the rail bed and vehicle road bed to allow water to flow under the rail line and access road. ARRC proposes to construct between 15 and 33 single culverts, between 2 and 7 drainage structures, and between 0 to 1 natural bottom plate pipe or arch structure, depending on alternative. The Applicant would design and construct culverts with a width greater than or equal to 125 percent of the width of the stream at the mean high water line of anadromous fish habitat. The Applicant would design and construct culverts so as not to impede fish passage. Culverts used for anadromous stream crossings would be designed and constructed in accordance with the National Marine Fisheries Service 2008 publication, "Anadromous Salmonid Passage Facility Design," ADF&G Title 16 fish habitat permit requirements, or as otherwise specified in permit conditions.

In addition, the Applicant proposes to construct up to 5 rail bridge crossings along the rail line, depending on alternative. Waterbodies that these bridges would cross include the Little Susitna River, Willow Creek, Rogers Creek, a tributary to Little Willow Creek, and several unnamed streams. With the exception of the tributary to Little Willow Creek, these crossings would likely consist of multiple spans of 28-foot standard ARRC deck girder bridges because the widths of the channels exceed the length of a single 28-foot span. The smaller crossing at the tributary to Little Willow Creek would likely consist of a single 28-foot standard-span ARRC deck girder bridge. Where a new crossing of the Little Susitna River would occur adjacent to the existing main line crossing of the river, the new bridge would match the existing bridge.

At a minimum, ARRC would design rail bridges to convey the mapped 100-year flood. ARRC would also design culverts to convey the 100-year flood event.

ARRC would start constructing bridges and large culverts before other infrastructure because they would take longer to construct and would be needed for construction activity. Each bridge would require a bridge construction staging area that could be within the 200-foot ROW.

2.1.1.8 Construction Schedule

Rail line construction would be conducted throughout the year, although severe weather would limit winter-time construction to land-clearing activities, material and equipment staging, most bridge construction, and interior work associated with facility buildings. The specific timeframe and sequence of construction would depend on funding, final design, and permit conditions, such as requirements to avoid sensitive breeding periods for migratory birds and raptors and when salmon are spawning, incubating, or rearing in specific areas.ARRC anticipates that construction of the proposed rail line could be completed in 24 months. To meet a 24-month construction schedule, there could be construction activities 24 hours a day (up to three crews working 8-hour shifts) along certain limited portions of the rail line, depending on environmental and human constraints. ARRC anticipates that the construction work force would vary from 66 persons during grading and embankment construction to 100 during ballast and track installation.

2.1.1.9 Grade Crossings

To maintain access to existing public and private roads across the proposed rail line, ARRC would install grade crossings where the rail line would cross a roadway. In places where the rail line would cross Parks Highway, Big Lake Road, Baker Farm Road, Holstein Avenue, or Hollywood Road, depending on the alternative, ARRC proposes grade-separated crossings. In other locations, where the rail line would cross public roadways with usage levels of 500 or more vehicles per day, the routes would cross at grade and the Applicant proposes active warning devices, such as flashing lights and gates. Where the rail line would cross public roadways with usage levels less than 500 vehicles per day, the routes would cross at-grade and the Applicant proposes passive warning devices, such as crossbucks and stop signs. Where the proposed rail line would cross a trail that is officially recognized, ARRC has stated that they would provide public access by a grade-separated crossing where practicable, or the trail could be relocated to avoid crossing the rail line. For purposes of this Final EIS, an officially recognized trail is one that is specifically established within currently-adopted plans by the Alaska Department of Natural Resources (ADNR) and/or the Matanuska-Susitna Borough (MSB or the Borough) or are established within these plans at the time of construction or ROW acquisition by the Applicant (whichever occurs first) (see glossary). In addition, officially recognized trails are used primarily for recreational activities. Their locations may or may not be provided for by recorded easements or ROW instruments. In some cases, trails may be adopted by and mapped in a recognized trails plan, but a recorded easement or ROW instrument may not exist. Such trails would meet the definition of officially recognized because of their inclusion in a trails plan. Conversely, the presence of a recorded easement or ROW instrument is not sufficient alone to make the property an officially recognized trail. The design of the crossing would accommodate existing trail users at the time of construction or ROW acquisition by the Applicant (whichever occurs first). ARRC would coordinate with the trail owner and consult with user groups as

appropriate where the crossing location could have to be relocated to accommodate a grade-separation, or where multiple crossings within 1 mile might be consolidated. ARRC does not propose to provide crossings for all trails. The trails for which crossings would not be provided would be blocked, and ARRC's trespassing regulations would prohibit crossing of the ROW. At this time, the following trails have been identified for grade-separated crossings and/or relocation.

Aurora Dog Mushers Club Trail

Crooked Lake Trail

Figure 8 Lake Loop Trail

Flat Lake Connector Trail

Flathorn Lake Trail

Herning Trail

Houston Lake Loop Trail

Iditarod Link Trail

Knik Connector Trail

Iron Dog Connector Trail (Big Lake Trail # 5)

Purinton Junction and Susitna River Loop Trail (Big Lake Trail #14)

Klondike Inn & Call of the Wild Trail (Big Lake Trail #1)

Beaver Lakes & North Little Su Trail (Big Lake Trail #2)

Iditarod National Historic Trail

Iron Dog Trail

Lucky Shot Trail

Mud Lake Trail

Pipeline Trail

West Gateway Trail

Nancy Lake – Susitna Trail

16 Mile Trail

2.1.1.10 Associated Facilities

The proposed action includes the construction and operation of several associated facilities. These permanent facilities would include a terminal reserve area, communications towers, and a track siding along the existing main line. ARRC would construct these facilities at the same time as the proposed rail line. While offloading facilities could be constructed along the proposed rail line, none have been proposed.

Terminal Reserve Area

ARRC would construct a terminal reserve area along the southern terminus of the rail line. This area would consist of yard sidings, storage areas, and a terminal building to support train maintenance. ARRC has proposed 2 terminal reserve areas, but would build only 1 depending on which alternative the Board authorized, if any. The terminal reserve area would be approximately 1,000 feet wide and approximately 9,800 feet long. The terminal reserve area for the Mac East and Mac East Variant Segment would also include relocation of a portion of Baker Farm Road, including construction of a grade-separated crossing of the proposed rail line, to provide vehicle access to the northern end of the terminal reserve area; construction of a road within the terminal reserve area; and construction of an approximately 1,500 foot access road, with a grade-separated crossing, between the terminal reserve area and Point MacKenzie Road along the northern edge of the Chugach Electrical Association transmission line ROW. The terminal reserve area for the Mac West Segment would affect Point MacKenzie Trailhead

Parking Lot, the Figure 8 Lake Loop Trail, and 5 contributing trails to the Iditarod Dog Sledding Historic District. The Applicant proposes to provide public access to officially recognized trails with a grade-separated crossing where practicable, or the trail could be relocated to avoid crossing the rail line.

Communications Towers

ARRC has identified 5 locations for communications towers throughout the project area; 2 or 3 new towers, depending on the alternative, are anticipated to be constructed to support rail line operation. Tower locations would depend on which alternative the Board authorized, if any. The tower locations include 1 near Port MacKenzie, 1 in the central area of the proposed project, and 3 in the northern portion of the proposed project area near the existing ARRC main line track. Tower sites could require new access roads if they would not be accessible via existing roads.

Track Sidings

ARRC would construct an 8,000-foot double-ended siding to the north of the proposed tie-in point with the main line. The siding would allow train passage and access to rail services. The arrangement of the track siding and tie-in would be a "wye" connection. The siding would be placed, where possible, on tangent sections of the alternative and would be in the 200-foot ROW.

2.1.2 Proposed Rail Line Operation

After rail line construction, trains would transport freight providing Port MacKenzie customers with rail transportation between Port MacKenzie and Interior Alaska. The Port's market includes bulk commodities (e.g., wood chips, saw logs, sand/gravel, cement), vans or containers, iron or steel materials (e.g., scrap metal), vehicles and heavy equipment, and mobile or modular buildings. ARRC anticipates an average of approximately 2 freight trains per day (1 in each direction) with an average of 40 to 80 freight cars each.[3] Train speeds would be a maximum 60 miles per hour and would average 51 miles per hour.

ARRC would perform periodic maintenance and inspections to ensure safe and reliable rail line operation. Primary maintenance activities would include signal testing and inspection; minor rail, tie, and turnout replacement; and routine ballasting and surfacing tasks. Additional maintenance activities would be performed on an as-needed basis and would include vegetation control, snow removal, and vehicle and equipment maintenance.

[3] This estimated level of train traffic would be sufficient to fill approximately 13 Panamax class ships per year with bulk materials. Based on current market opportunities, ARRC estimates ship traffic for export of bulk commodities from the Port MacKenzie Rail Terminal would include 5 Panamax class ships per year. As the estimated average of 2 trains per day, with an average of 40 to 80 freight cars each, represents an upper bound of potential ship traffic. The impacts might be less than the totality of impacts presented in this EIS, based on this volume of ship traffic.

2.2 Alternatives Development

Prior to filing its request to construct and operate a 31 to 46 mile proposed rail line with the STB, ARRC identified and considered several potential alternatives for this rail line extension. This section summarizes the process ARRC used to develop various alternatives and OEA's review and consideration of those alignments as EIS alternatives.

2.2.1 Alignment Development Process

More than 10 years ago, the MSB identified a potential need for rail transport between Port MacKenzie (which was not constructed at that time) and the ARRC main line north of Port MacKenzie. In 2003, the MSB commissioned a study of rail and road access to Port MacKenzie to determine feasibility and potential impacts. The study identified 11 potential rail and road corridors (MSB, 2003).

The MSB consulted with the U.S. Army Corps of Engineers (USACE) regarding potential impacts to wetlands, the ADNR regarding potential impacts to state lands and coastal resources, and the Alaska Department of Fish and Game (ADF&G) regarding potential impacts to fisheries and other wildlife. Based on these agency consultations and potential impacts to private property and wetlands, ARRC eliminated 9 of the 11 potential corridors from further consideration for construction of a rail line.

In 2007, the State of Alaska granted the MSB an appropriation to perform conceptual engineering and environmental documentation for the proposed rail line. From September to December 2007, the MSB and ARRC jointly conducted a constraints analysis based on engineering requirements and available environmental data to re-evaluate the alignments from the 2003 MSB study and develop alignments that could minimize potential impacts to the environment. The MSB and ARRC then conducted public open houses and agency overview meetings to provide information about and receive comments on the proposed project. ARRC used feedback from stakeholders to refine potential rail alignments to reduce potential impacts and develop preliminary voluntary mitigation measures. Based on this information, in January 2008 ARRC issued the Preliminary Environmental and Alternatives Report (ARRC, 2008), which presented 8 possible alignment configurations, which are new and different from the 11 corridors presented in the 2003 report.

In early 2008, ARRC submitted the Preliminary Environmental and Alternatives Report to OEA. Since then, ARRC has refined some of the potential alignments and OEA has evaluated those and other potential alignments during this environmental review process.

2.2.2 Alternatives Considered but Eliminated from Detailed Study

One of the most important aspects of the EIS process here was to develop reasonable and feasible alternatives for the proposed rail line. To do so, OEA first reviewed the alignments ARRC developed and analyzed in their Preliminary Environmental and Alternatives Report (ARRC, 2008) and reviewed the potential rail/road corridors identified in the previous MSB Rail Corridor Study (MSB, 2003). In April 2008, OEA asked ARRC to consider the feasibility of making adjustments to the Willow, Big Lake, Mac West, and Houston North segments, and to

consider a new segment to reduce potential environmental impacts. Table 2-1 below lists the adjustments, the new segment OEA identified for consideration, and ARRC responses. The Applicant found that the refinements listed in Table 2-1 would be infeasible or would result in potential increased environmental impacts. OEA reviewed the Applicant's responses to the suggested refinements and concurred with the Applicant's findings for the reasons set forth in Table 2-1.

Table 2-1
Potential Changes to Port MacKenzie Rail Extension Alignments Not Studied Further (page 1 of 2)

Potential Change	Reason Not Studied Further
Shift the Willow Segment to further avoid the Willow Creek State Recreation Area (SRA) by following the southern boundary of the Recreation Area.	ARRC considered this route in 2003 and 2007 but rejected it due to potential impacts to the Willow Airport and the Willow commercial area. Also, construction of a grade-separated crossing of the Parks Highway would require a major profile adjustment to the roadway, resulting in potential impacts to adjacent properties.
Shift the Willow Segment to the west to avoid the Nancy Lake SRA between approximately Mile Posts W12.8 and W13.8.	Relocating the segment as suggested would involve construction in an area with compressible soils and would likely impact between 3 and 4 acres of additional wetlands.
Shift the Willow Segment to the west along the east bank of the Susitna River	ARRC considered a similar alignment in 2003 and 2007. The alignment would create the longest, least efficient route of all alignments considered. The soils along the route are generally unsuitable for rail line construction. Because the Susitna River is braided, it is subject to substantial changes in water course, which would make rail construction extremely difficult. In addition, an alignment along the Susitna River would impact a considerable amount of weltands, more than the Willow Segment.
Shift the Big Lake Segment to the east to avoid a proposed grade-separated crossing of Big Lake Road and development in the area.	ARRC's constraints analysis determined this route to be infeasible because of potential impacts to Blodgett Lake, an unnamed lake, and 2 Native American allotments near the connection to the existing ARRC rail line. Also, the Parks Highway corridor near Pittman Road is highly developed and a rail line connection would further increase congestion in this area. The junction of Big Lake Road and Parks Highway is 1 of the busiest intersections between Wasilla and Talkeetna, and a grade-separated crossing at this location would result in a substantially larger footprint to accommodate traffic volumes.
Straighten the Big Lake Segment, especially between Mile Posts B5.9 and B8.4, with the objective of reducing impacts associated with a shorter segment.	The Big Lake Segment was located to minimize potential impacts to wetlands and reduce construction on compressible soils by using higher and drier ground. The curve between Mile Posts B5.9 and B8.4 would be necessary because of Goose Creek and its associated floodplain. The Goose Creek crossing is at a narrow point in the creek, which also has a more stable stream bed. To relocate this crossing upstream would make construction more difficult because Goose Creek spreads out into wider or multiple channels.

Table 2-1
Potential Changes to Port MacKenzie Rail Extension Alignments Not Studied Further (page 2 of 2)

Potential Change	ARRC Response
Shift the northern portion of the Houston North Segment to the west to reduce impacts on the Little Susitna State Recreation River.	Such a shift would have 2 major disadvantages: (1) the Nancy Lake Creek crossing location would potentially contribute to greater stream impacts due to the meandering nature of the creek in the proposed location and (2) the siding along the existing main line could impact numerous private lakeshore and commercial properties when railcars occupy the siding track and block driveways and would likely require that the affected properties be purchased and the buildings razed.
Adjust the portion of the Mac West Segment from Mile Post MW5.2 north to the end of the segment to avoid the Susitna Flats State Game Refuge.	Moving the segment into the agricultural area to avoid the game refuge would bisect farmland and increase potential impacts to property owners. If the change were to move forward, ARRC would suggest mitigation that could include land swaps between the Susitna Flats State Game Refuge and private agricultural landowners. Under this mitigation, agricultural lands isolated south and west of the rail line could become part of the Game Refuge, while refuge lands isolated north and east of the rail line could become agricultural lands. Moreover, any land swap would require approval from state agencies.
Add an alternative in the eastern portion of the study area, east of the Big Lake Segment, that would be in part or all of the existing Port MacKenzie Road and Knik-Goose Bay Road corridors.	An alignment in this location would draw additional freight traffic into Wasilla and increase an already difficult congestion problem. In addition, the east-west portion of the road is unsuitable for railroad construction due to undulating terrain in the western portion and large stretches of wetlands and compressible soils in the eastern portion. Constructing a rail line in the Knik-Goose Bay Road corridor also would impact numerous residential properties and require a railroad junction in downtown Wasilla. The Knik-Goose Bay Road corridor serves as a primary transportation artery, and this proposal would introduce transportation conflicts between rail, road, and routes for all-terrain vehicles, cycling, and dog sledding, requiring frequent grade crossings or grade separations. Also of concern would be potential noise impacts and safety issues related to illegal crossing of the track.
Create an alignment between the current Big Lake Segment and Knik-Goose Bay Road. Such an alignment could possibly swing east and then north in a broad curve, taking advantage of higher ground, and connect with the main line near the proposed location for the current Big Lake Segment.	An alignment in this location would require a substantial increase in maximum elevation and change in elevation. Such an alignment, when compared to the current Big Lake Segment, would require taking approximately twice as many residences; increase the length of the rail line by approximately 2 miles; increase the number of at-grade roadway/rail crossings; increase the maximum grade from 0.5% to 1.0%; and increase the amount of deep cuts, including a large, 100-foot fill area.

In response to comments on the Draft EIS, OEA also asked the Applicant to consider alignments between the Mac East and Mac West segments, to the west of the Willow Segment near the Susitna River, and to the east of the Big Lake Segment between the Big Lake Segment and Knik Goose Bay Road. OEA considered information provided by the Applicant and conducted

independent analysis of these aligments. OEA concluded that a route along the Susitna River and that a route east of the Big Lake Segment would be impractical. Details are provided in Table 2-1.

Based on the purpose and need for the proposed action (see Chapter 1) and all of the information on alternatives presented during the EIS process, OEA determined that the alignments described in Section 2.3 provide a reasonable set of feasible alternatives for detailed study in the EIS.

OEA also notes that a rail line on the proposed Knik Arm crossing connecting Port MacKenzie to the ARRC main line in Anchorage was considered, but determined impractical for several reasons. The Federal Highway Administration determined this option to be financially infeasible in the Knik Arm Crossing Final Environmental Impact Statement. The nearly $1 billion cost (in 2005 dollars) estimated for constructing this rail crossing would have exceeded the $600 million limit for the Knik Arm Crossing project. In addition, a route from Port MacKenzie to Interior Alaska using a Knik Arm crossing and the existing ARRC main line that travels east and north around the Knik Arm would have been considerably longer for operating trains (such as, in miles operated) than the alternatives analyzed in detail in this Final EIS. Such a routing also would not meet the Applicant's stated purpose of providing a rail connection suitable for shipment of bulk materials from Interior Alaska to Port MacKenzie.

Similarly, upgrades to the existing road to Port MacKenzie and construction of a new road also were not analyzed in detail because they would not meet the Applicant's stated purpose of providing Port MacKenzie customers with rail transportation between Port MacKenzie and Interior Alaska. As discussed in Section 1.2 of the EIS, trucks, as compared to rail, are less efficient for bulk commodity movements and are generally used for short-haul movements in that context. Bulk commodity shippers, which already have access to the existing ARRC network, currently utilize a combination of rail and transload, while requiring the use of trucks, for 30 miles for final delivery to Port MacKenzie. However, such intermediate truck movements and the additional handling requirements that the transload and use of trucks require are not efficient and impose increased costs to the shipper and consumer. The Applicant states that the cost for intermediate transloading from rail to truck and the additional truck ton-mile cost for final delivery places Port MacKenzie at a significant disadvantage relative to other regional ports with rail service.

For example, ARRC points out that a railroad can move 1 ton of freight 457 miles on a gallon of diesel fuel, compared to 133 miles for a truck.[4] FRA has also prepared a report comparing overall fuel efficiency of rail and truck transport on 23 competitive corridors throughout the nation, which concludes that, in all cases, moving freight by railroad is more fuel efficient than by truck.[5] The report concludes that while, "rail fuel efficiency varies from 156 to 512 ton-miles per gallon, truck fuel efficiency ranges from 68 to 133 ton-miles per gallon." Both efficiency in handling and efficiency in fuel use translate into substantial cost savings for freight shipped via rail transport rather than transported by truck over the highway.

[4] http://www.aar.org/Environment/Environment.aspx.
[5] Federal Railroad Administration, Comparative Evaluation of Rail and Truck Fuel Efficiency on Competitive Corridors, Final Report November 19, 2009.

Because of the economics and efficiencies that would be offered by direct rail service, the Applicant states that the use of trucks alone to provide bulk commodity movements to and from the Port would deprive Port MacKenzie's customers of the multi-modal options for the movement of freight that are offered by other ports handling large vessels and would limit the competitive position of the Port.

2.3 Alternatives Selected for Detailed Study

OEA independently reviewed the Applicant's Preliminary Environmental and Alternatives Report, as well as the additional information provided by the Applicant during the EIS process, conducted field studies, consulted various Federal and state agencies, reviewed scoping comments, and worked with cooperating agencies to determine a reasonable range of alternatives. Through this process, OEA determined that the alignments described below are the reasonable range of alternatives for detailed study.

The alternatives selected for detailed analysis are composed of southern and northern segments, with possible connector segments between. Two southern segments, the Mac West and Mac East Segments, would run either east or west of the Point MacKenzie Agricultural Project,[6] while the Mac East Variant Segment, the third southern segment, would run through the eastern portion of the Point MacKenzie Agricultural Project. There are 3 main sections north of the Point MacKenzie Agricultural Project – the Willow, Houston, and Big Lake segments – with the Houston Segment having north and south variants. Connector segments link the north and south segments to create 12 possible routes for the proposed rail line, as listed below and shown in Figure 2-2. The final preferred alternative would be comprised of a southern and northern segment linked by a connector segment.

In response to comments on the Draft EIS, OEA evaluated a slight westerly shift of the Mac East Segment to a location largely along a north-south section line. Upon evaluation, OEA determined that there was substantial merit to this derivation, as well as to the original Mac East Segment as a potential reasonable and feasible segment. Therefore, OEA added the derivation to this Final EIS as the Mac East Variant Segment while retaining the original Mac East Segment as a potential reasonable and feasible alternative. OEA also concluded that the Mac East Variant Segment was sufficiently similar to the Mac East Segment that it did not constitute "substantial changes in the proposed action" or "significant new circumstances or information" under the Council on Environmental Quality's (CEQ) regulations implementing National Environmental Policy Act (NEPA) at 40 C.F.R. § 1502.9(c)(1); and therefore, did not warrant the preparation of a supplemental draft EIS. The addition of the Mac East Variant Segment to this Final EIS is also consistent with CEQ regulations which specify that a Final EIS can "modify alternatives including the proposed action" and "develop and evaluate alternatives not previously given serious consideration by the agency" (40 C.F.R. § 1503.4(a)).

[6] The State of Alaska initiated the Point MacKenzie Agricultural Project in the 1980s. The Agricultural Project is an area of agricultural land sold or leased by the state with agricultural covenants. Owners are required to submit conservation plans for each parcel to the ADNR Division of Agriculture to ensure that the agricultural resources in the area are preserved. While the area's designation as an agricultural project does not confer special status on these parcels beyond the parcel's agricultural restrictions, the area is the largest contiguous agricultural area in Alaska. There are easements specifically reserved for railroad development throughout the agricultural area; however, these easements are discontiguous and generally cut through the middle of the arable land.

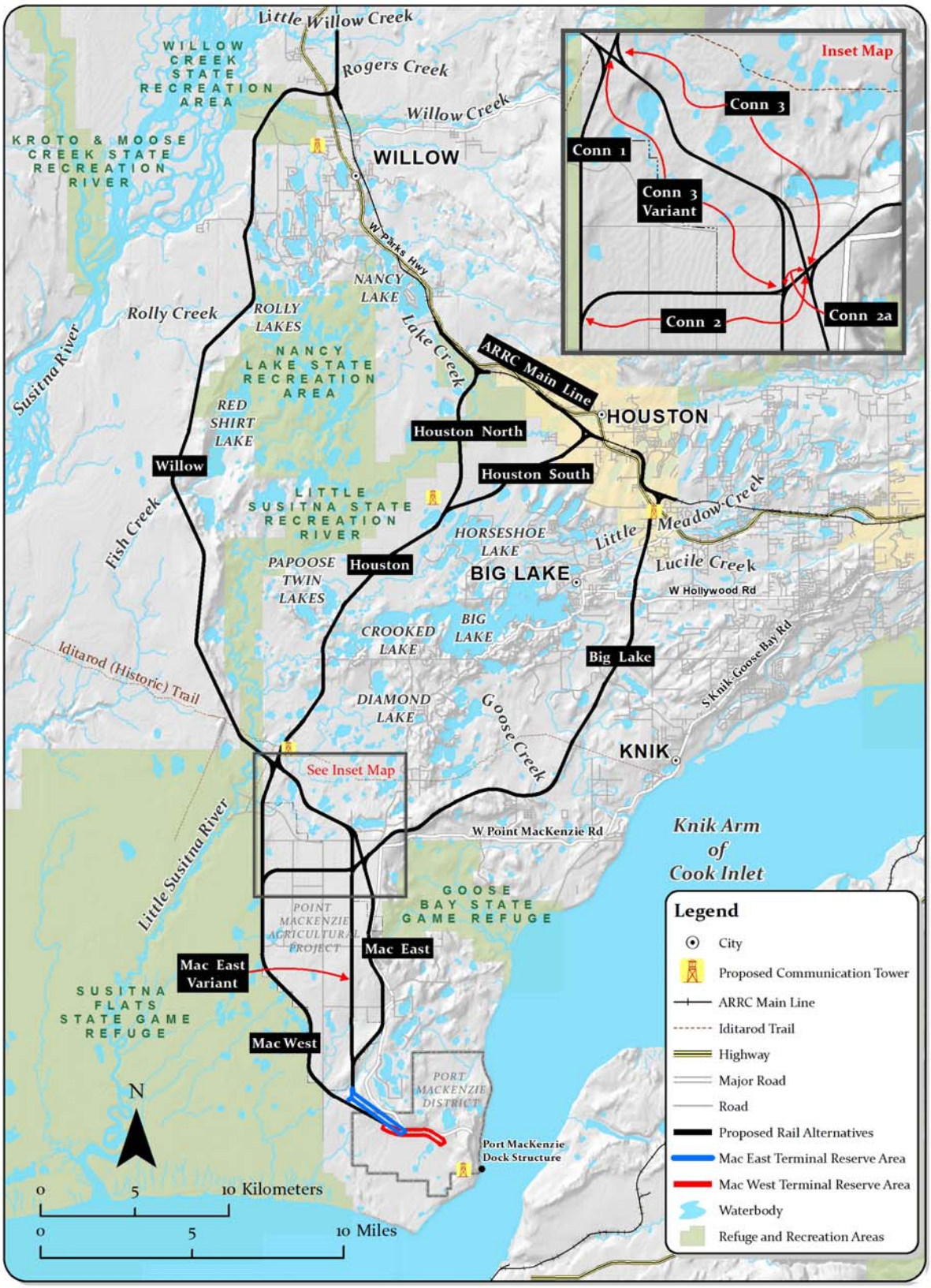

Figure 2-2. Alternatives Considered for the Port MacKenzie Rail Extension

The build alternatives include:

- Mac West, Connector 1, and Willow. This route would be the longest, 46.4 miles long.
- Mac West, Connector 1, Houston, and Houston North. This route would be 35.6 miles long.
- Mac West, Connector 1, Houston, and Houston South. This route would be 36.5 miles long.
- Mac West, Connector 2, and Big Lake. This route would be 36.7 miles long.
- Mac East, Connector 3, and Willow. This route would be 46.0 miles long.
- Mac East, Connector 3, Houston, and Houston North. This route would be 35.2 miles long.
- Mac East, Connector 3, Houston, and Houston South. This alternative would be 36.0 miles long.
- Mac East and Big Lake. This route would be 32.0 miles long.
- Mac East Variant, Connector 2a, and Big Lake. This alternative would be the shortest, 31.2 miles long.
- Mac East Variant, Connector 3 Variant, and Willow. This route would be 45.1 miles long.
- Mac East Variant, Connector 3 Variant, Houston, and Houston North. This route would be 34.3 miles long.
- Mac East Variant, Connector 3 Variant, Houston and Houston South. This route would be 35.1 miles long.

Although OEA has examined the 12 build alternatives listed above in detail, some of these alternatives may not be eligible for Federal funding from U.S. Department of Transportation (USDOT) agencies such as the FRA. Publicly-owned parks, recreation areas, wildlife and waterfowl refuges, and public and private historical sites are protected under section 4(f) of the Department of Transportation Act (DOT Act) of 1966, 49 U.S.C. § 303 (section 4(f)). The DOT Act, as amended by section 6009(a) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) of 2005, 23 U.S.C. § 138, provides that non-independent USDOT agencies[7] such as the FRA cannot approve the use of land from publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites – referred to as section 4(f) resources – unless:

- There is no "prudent and feasible alternative" to the use of the land, and the project includes "all possible planning to minimize harm" to the protected property resulting from use, or
- The use would result in *de minimis* impacts to section 4(f)[8] resources.

[7] Section 4(f) does not apply to the STB, an independent agency organizationally housed within DOT.

[8] Section 6009(a) of the "Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users" Act (23 U.S.C. 138) established that requirements of section 4(f) shall be considered to be satisfied if the Secretary of Transportation determines that the impact would be *de minimis*.

The Willow, Mac West, Connector 1, and Houston North segments would traverse the Willow Creek State Recreation Area, Nancy Lake State Recreation Area, Little Susitna State Recreation River, and/or Susitna Flats State Game Refuge. These recreation and refuge areas are all section 4(f) resources. Because there are prudent and feasible alternatives that would not use section 4(f) resources, FRA or any other USDOT agencies subject to section 4(f) could not provide funding for the project if the Board authorizes construction and operation of an alternative that includes any of these 4 segments. This Final EIS provides the information necessary for any decisions required under section 4(f).[9] Appendix M provides additional detail about section 4(f).

Descriptions of the southern, connector, and northen segments comprising the complete range of build alternatives are provided below.

2.3.1 Southern Segments

2.3.1.1 Mac West

The Mac West Segment would begin in the terminal reserve area and would proceed northwest across relatively flat terrain toward the southwest corner of the Point MacKenzie Agricultural Project. The segment would continue west of the agricultural area, traversing the eastern boundary of Susitna Flats State Game Refuge. The terminal reserve area is proposed along the south side of the Mac West Segment.

2.3.1.2 Mac East

The Mac East Segment would begin in the terminal reserve area and would proceed north along the side of a ridge along the east side of the Point MacKenzie Agricultural Project. Near Mile Post 4.7, the segment would cross a ravine and then curve to the northeast along the top of another ridge. North of Mile Post 6, the segment would follow the alignment of Port MacKenzie Road, offset 200 feet or more to the west. The segment would continue along undulating terrain before reaching its junction with the Big Lake Segment or Connector 3 Segment. The terminal reserve area is proposed along the north side of Mac East.[10]

2.3.1.3 Mac East Variant

The Mac East Variant Segment would begin in the terminal reserve area and would proceed north along the side of a ridge along the east side of the Point MacKenzie Agricultural Project. At approximately MP 4.7, the segment would continue to head north through the Port MacKenzie Agriculture Project. The segment would continue north and cross a deep depression before its junction with the Connector 2a or Connector 3 Variant segment.

[9] As previously noted, this EIS contains a section 4(f) analysis to give the USDOT agencies that are subject to section 4(f) and involved in this project, the information they will need to perform their responsibilities under section 4(f).

[10] Based on Port MacKenzie planning and development information and additional field data collected during the summer of 2008, ARRC revised the proposed location for the terminal reserve area for the Mac East Segment. This terminal reserve area has been shifted to the west. This change occurred after issuance of ARRC's Preliminary Environmental and Alternatives Report. ARRC also considered relocating the terminal reserve area for the Mac West Segment to this revised location as well, but found that topography and safety considerations made it impractical, so the location presented in the Preliminary Environmental and Alternatives Report was retained.

See Figure 2-3 for a detailed map of the southern segments and terminal reserve areas.

2.3.2 Connector Segments

2.3.2.1 Connector 1

This 4.8-mile-long segment would connect the Mac West Segment to the Willow or Houston segment. From Mac West, this connector segment would continue north along the eastern boundary of the Susitna Flats State Game Refuge on level terrain. The segment would cross a tributary of the Little Susitna River.

2.3.2.2 Connector 2

This 3.7-mile-long segment would connect the Mac West Segment to the Big Lake Segment. At the northwestern end of the Point MacKenzie Agricultural Project, this connector segment would turn due east and travel along the southern boundary of the Point MacKenzie Correctional Farm.

2.3.2.3 Connector 3

This 5.2-mile-long segment would connect the Mac East Segment to the Willow or Houston segment. At the northeastern end of the Point MacKenzie Agricultural Project, this connector segment would shift to the northwest and cross Ayrshire Avenue and W. Carpenter Lake Road. The Applicant has proposed to relocate approximately 500 feet of Farmers Road near the junction with W. Carpenter Lake Road to avoid a rail line crossing of Farmers Road. The segment would continue north of My Lake and cross an adjacent ravine. The remaining mile of the segment would be nearly level.

2.3.2.4 Connector 2a

This 0.25-mile-long segment would connect the Mac East Variant Segment to the Big Lake Segment. It runs along the same path as the Connector 2 Segment. This connector segment would turn due east and travel along the southern boundary of the Point MacKenzie Correctional Farm.

2.3.2.5 Connector 3 Variant

This 5.47-mile-long segment would connect the Mac East Variant Segment to the Willow or Houston segments. This connector segment is shifted to the west and would cross Ayrshire Avenue and Farmers Road before joining the same path as the Connector 3 Segment. The segment would continue north of My Lake and cross an adjacent ravine. The remaining mile of the segment would be nearly level.

See Figure 2-3 for a detailed map of the connector segments.

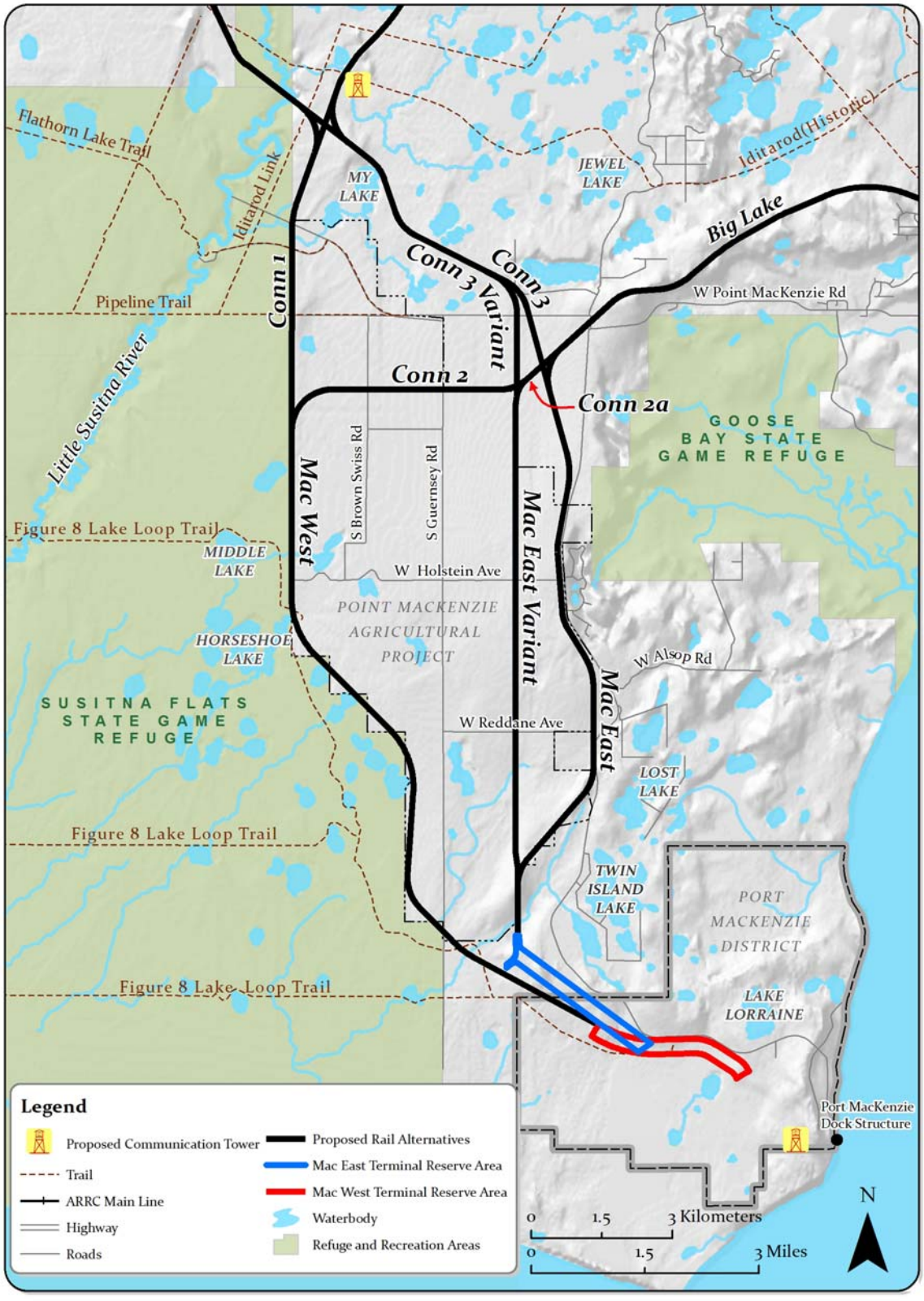

Figure 2-3. Mac East, Mac West, and Connector Segments

2.3.3 Northern Segments

2.3.3.1 Willow

From either the Connector 1, Connector 3, or Connector 3 Variant segment, the Willow Segment would continue northwest where it would cross a corner of the Susitna Flats State Game Refuge, the Little Susitna State Recreation River, and the Little Susitna River (see Figure 2-4). Over the next 7 miles, the segment would continue north through rolling terrain. The segment would cross Fish Creek, the outlet for Red Shirt and Cow lakes. It would then proceed north, generally following the west-facing slope of a glacial moraine west of Red Shirt Lake. It would continue north through the Nancy Lake State Recreation Area for approximately 0.5 mile. The Willow Segment would cross the outlet for Vera Lake, continue over rolling terrain, and cross Willow Landing Road. The segment would then continue through the Willow Creek State Recreation Area, where it would cross Willow Creek. The segment would curve to the east and cross Parks Highway with a grade separation, before connecting to the existing ARRC main line near Mile Post 188.9.

2.3.3.2 Houston

From either the Connector 1, Connector 3, or Connector 3 Variant segment, the Houston Segment would proceed northeast, traveling through slightly undulating terrain with areas of wetland (see Figure 2-4). The segment would pass between Papoose Twins and Crooked lakes, crossing an area of hilly terrain. The remaining 4 miles of the Houston Segment would be in a gradually rising wetland area to a point near Muleshoe and Little Horseshoe lakes, where it would connect to either the Houston North Segment or the Houston South Segment.

2.3.3.3 Houston North[11]

From the Houston Segment, the Houston North Segment would continue north (see Figure 2-4), crossing over the Castle Mountain Fault. The Houston North Segment would cross the Houston Lake Loop Trail. It would continue through the Little Susitna State Recreation River, where it would cross the Little Susitna River. The segment would continue north on rolling terrain along the east side of Houston and Little Houston lakes, descending gradually to lower terrain adjacent to Lake Creek. The Houston North Segment would tie into the existing ARRC main line near Mile Post 178 along the proposed rail line without crossing Parks Highway.

2.3.3.4 Houston South

Also beginning between Muleshoe and Little Horseshoe lakes, this segment would traverse northeast, passing just west of Pear Lake (Figure 2-4). The segment would cross several gravel ridges that parallel the lakes in this area. The segment would tie into the existing main line near Mile Post 174.0 without crossing Parks Highway.

[11] Based on potential environmental impacts associated with the original proposed connection with the main line as presented in the Preliminary Environmental and Alternatives Report, ARRC shifted the connection point south approximately 1 mile southeast to its present location.

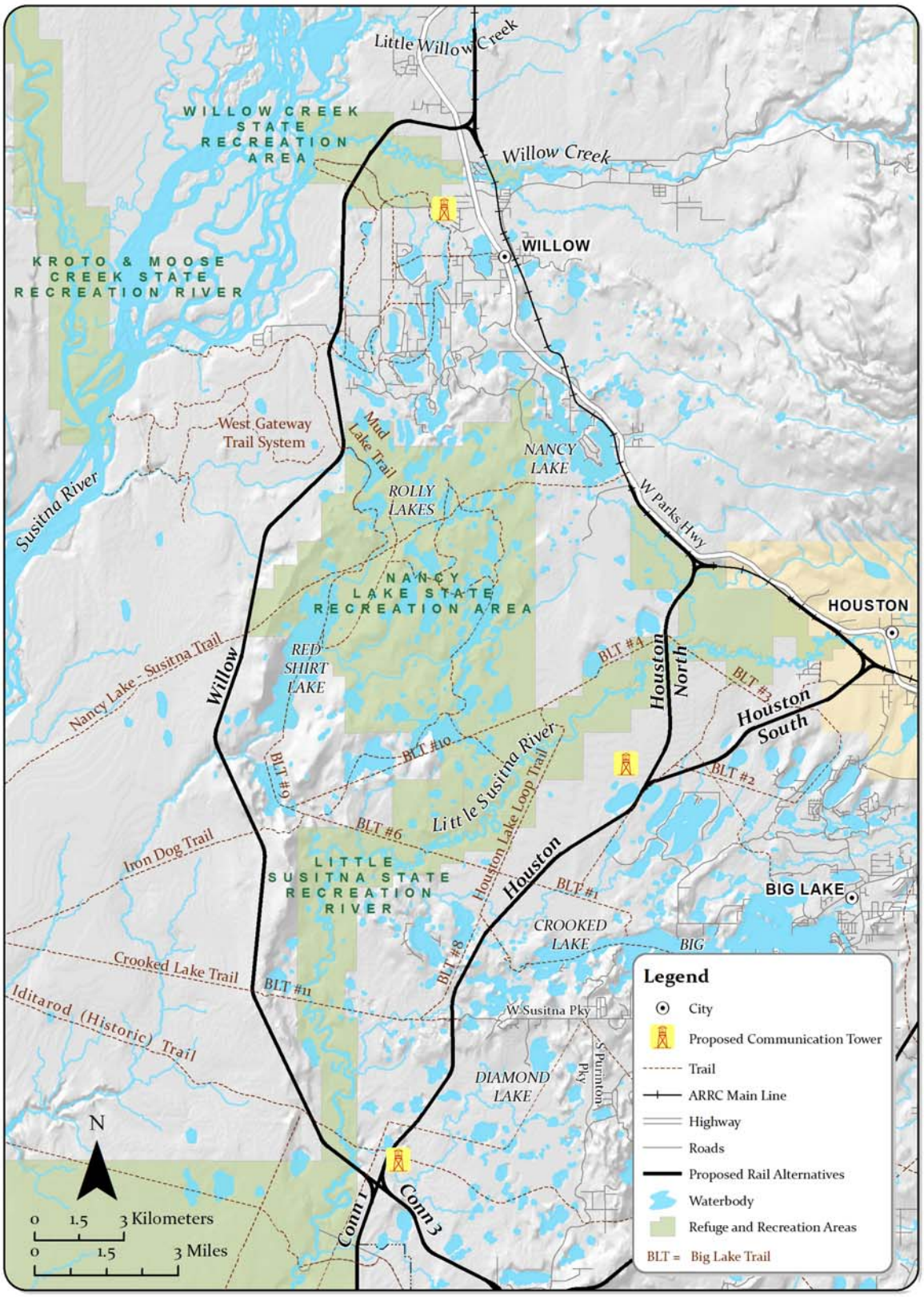

Figure 2-4. Willow and Houston Segments

The proposed track siding for Houston South would include reconfiguration of the existing main line to construct the new siding. Specifically, ARRC would construct 1.5 miles of new main line within the existing ROW and would convert 7,000 feet of existing main line to use as a new siding. ARRC would construct an additional 6,800 feet of new siding in the main line ROW to create a 13,800-foot siding.

2.3.3.5 Big Lake

From either the Mac East, Connector 2, or Connector 2a segment, the Big Lake Segment would run northeast for approximately 3 miles (See Figure 2-5). It would continue on rolling terrain, crossing over Goose Creek, Fish Creek, Lucile Creek, and tributaries of Lucile Creek and Little Meadow Creek. The segment would cross Burma Road and Big Lake Road, where it would be grade-separated over Big Lake Road. The Big Lake Segment would continue north through a residential area before crossing under Parks Highway with a grade-separated crossing.

The Big Lake Segment would connect with the existing ARRC main line near Mile Post 170.3 along the proposed rail line in a wetland area surrounding a stream that feeds into Long Lake.

Additional information ARRC collected during the 2008 summer field season provided the Applicant with better data to consider the location where the Big Lake Segment would connect to the existing main line. The following ARRC-supplied information supplements the Preliminary Environmental and Alternatives Report (Figure 2-5). Specifically, the Applicant would:

- Construct an approximately 430-foot bridge on Parks Highway over the proposed rail line and an unnamed anadromous fish stream.
- Relocate 2 sections of approximately 2,440 feet of unnamed anadromous fish stream adjacent to the proposed rail line.
- Relocate approximately 1,000 feet of Hawk Lane on the south side of Parks Highway (because of the new Parks Highway bridge).
- Close approximately 865 feet of Cheri Lake Drive where it crosses the existing main line and intersects with Parks Highway.
- Extend Ray Street approximately 1,405 feet from Loon Street to Parks Highway, which would include an at-grade crossing of the existing ARRC main line.
- Acquire 8 recreational/residential parcels along Loon Lake because access to the parcels would be permanently blocked due to lack of access from the relocated road crossing (Cheri Lake Drive) and the new siding.
- Relocate the business on the southwest corner of Parks Highway and Cheri Lake Drive due to the Hawk Lane relocation.

The Big Lake Segment also would cross 2 wetland mitigation bank parcels that are part of the Su-Knik Mitigation Bank. Use of these 2 mitigation bank parcels for the proposed rail line could require concurrence from the entities that created the mitigation bank or ROW acquisition through eminent domain.

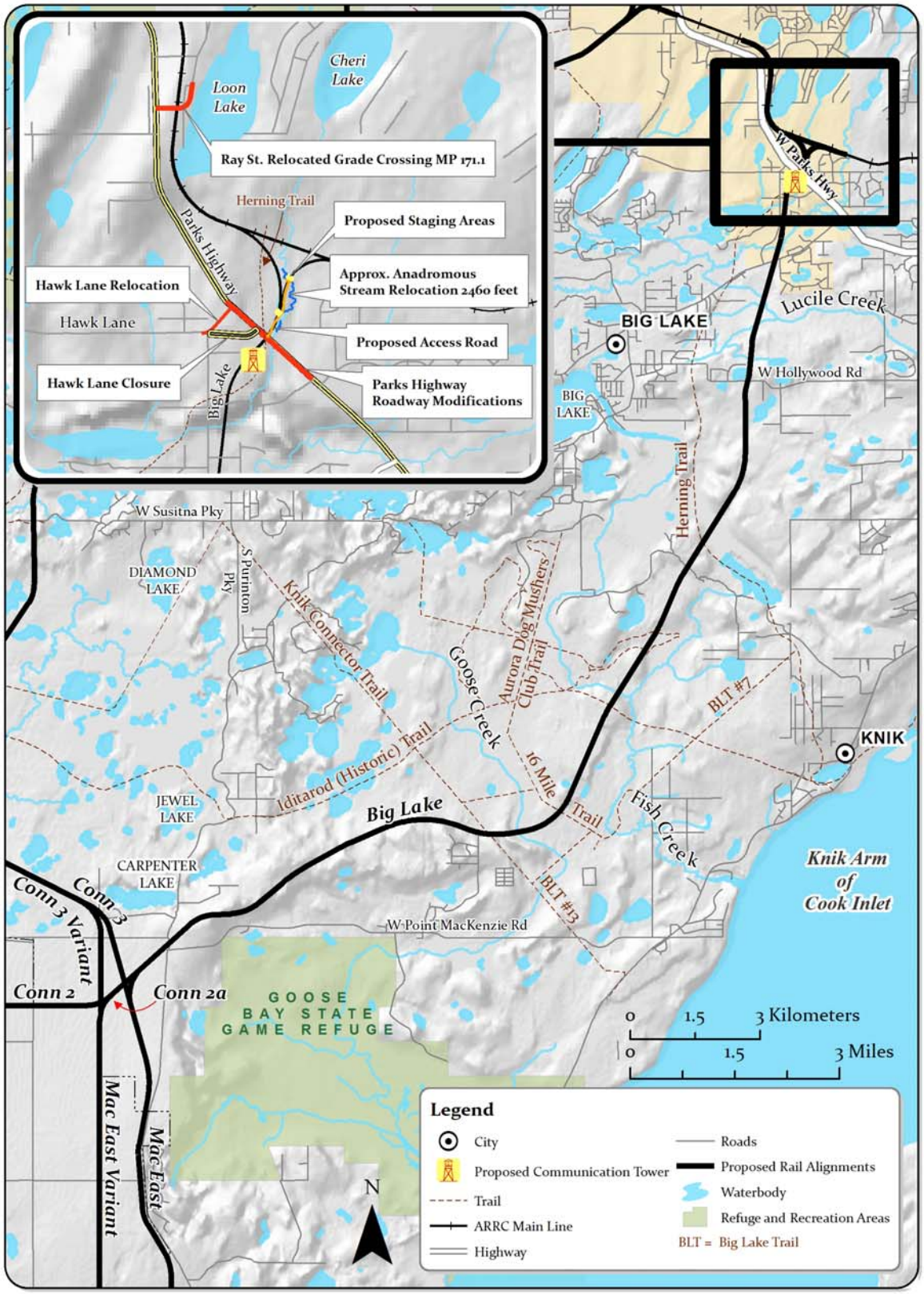

Figure 2-5. Big Lake Segment

2.3.4 No-Action Alternative

Under the No-Action Alternative, ARRC would not construct an extension of the existing rail line to transport commercial freight, and freight truck would remain the only available mode of surface transportation between Interior Alaska and Port MacKenzie.

2.4 Comparison of the Alternatives Considered in Detail

2.4.1 Topography, Geology and Soils

Steeper terrain requires a greater amount of either fill or cut and fill during rail line construction than flatter terrain and would therefore have a greater impact on topography. With 1 exception, the Big Lake Segment, the existing terrain for all segments and segment combinations that have been considered in detail would be relatively flat. The Big Lake Segment, however, would have approximately 15.2 percent of its length crossing land with slope greater than 1 percent and 5.4 percent of its length crossing land with slope greater than 5 percent, with the remaining 79.4 percent relatively flat. This segment would cross the highest percentage of slopes between 1 and 5 percent and the highest percentage of slopes greater than 5 percent. The Mac East Segment would have the second steepest conditions.

Although the construction of the proposed rail line would not result in any potential impacts to geological resources, construction activities would affect soils unsuitable for rail line construction, and these soils would need to be removed and replaced with imported, well-draining soils. In some locations, the rail line would be constructed on soils the MSB considers locally important for agricultural purposes, though some of these soils may not currently be in use for agricultural purposes. The southern segment and segment combinations (Mac West-Connector 1, Mac West-Connector 2, Mac East-Connector 3, Mac East, Mac East Variant-Connector 2a, and Mac East Variant-Connector 3 Variant) would cross a higher percentage of soils considered to be of local importance for agricultural purposes than the northern segments, but would also cross a high percentage of poor soils. The Mac West-Connector 2-Big Lake Alternative would have the least impact to soils the MSB considers locally important for agriculture.

The MSB is subject to seismic activity. The most likely impact on the proposed rail line from seismic activity would be misalignment or damage to the tracks, rail bed, or access road. This could be caused by ground shaking, offset lateral movement, or soil subsidence. If strong enough, ground shaking could also cause trains to derail. Because the segments and segment combinations OEA has considered in detail are relatively close to each other, the minor differences in distance between a segment and a seismic event would not have an appreciably different effect on the potential segments and segment combinations.

OEA is not recommending mitigation measures for potential impacts to topography, geology, and soils, because OEA concluded that such impacts from construction and operation of the proposed rail line would be negligible. Potential unavoidable impacts from rail line construction and operation would include: modifications of topography through excavation and fill associated with construction of the proposed rail line and associated facilities; removal and replacement of soils classified as unsuitable for construction of the rail line embankment and access road; and

conversion of land that contains soils the MSB considers to be of local importance for agricultural purposes to project-related uses.

To avoid or minimize the potential environmental impacts to the proposed rail line from seismic events, OEA is recommending that the Board impose 1 mitigation measure (volunteered by the Applicant) requiring adherence to appropriate engineering criteria and design codes related to seismic events (see Section 19.1). Notwithstanding implementation of this mitigation measure, potential unavoidable impacts from seismic activities along the proposed rail line could still include damage to rail line infrastructure. OEA does not believe additional mitigation of seismic events is warranted or reasonable.

2.4.2 Water Resources

Potential impacts to water resources could result from clearing and grading; the excavation of fill material; construction of an unpaved access road, bridges, and culverts; and use of transportation and staging areas. The following paragraphs summarize the relevant effects of such project-related activities on surface water, groundwater, floodplains, and wetlands and the mitigation measures OEA is recommending to minimize these impacts.

2.4.2.1 Surface Water

Construction of the proposed rail line and the unpaved access road could result in potential adverse impacts to water quality in areas where the rail line and access road would be near, adjacent to, or span waterbodies. In these areas, clearing, grading, and construction of the proposed rail line, staging areas, and access road within the ROW could lead to potential impacts on surface waters from increased erosion and nutrient loading. If subballast and fill materials were obtained from borrow areas, this could disrupt shallow-water areas (former borrow areas), including disturbing sediment, increasing turbidity, and generally degrading water quality. However, OEA expects no long-term water quality impacts from borrow areas located near shallow water areas, because turbidity levels would return to normal after the disturbance ceased. New borrow areas might also be identified in surface-water areas. Depending on the annual and seasonal variation of flood stage and hydraulics of the waterbodies at the borrow areas, there could be potential impacts to water quality.

In areas where the proposed rail line and access road would be near waterbodies, the potential consequences to water quality during spring ice break-up, snowmelt, or rainstorms could include increased transport of fine-grained sediments that could alter waterbody chemistry and pH.

The Applicant intends to construct bridges and culverts to convey water under the proposed rail line and the access road. Potential impacts that could result from the culvert and bridge construction and installation along the ROW would include degradation of stream banks and riparian areas, increased stages and velocities of flood water, increased channel scour and downstream sedimentation, and changes to natural drainage. The presence of bridges and culverts in or over a channel could alter channel hydraulics, which could increase channel scour and erosion processes, which, in turn could subsequently lead to an increase in sediment transport loads and downstream sedimentation. This impact, however, would generally be short term, because it would end after ARRC finished construction.

In general, the more bridges or culverts that occur along a given segment, the greater the likelihood of potential impacts. However, the magnitude of potential effects at individual crossings also would depend on site-specific factors. Bridges would generally be expected to result in fewer hydrologic impacts than culverts due to their ability to maintain stream structure and flow characteristics. The Mac East-Connector 3-Houston-Houston South Alternative and the Mac East Variant-Connector 3 Variant-Houston-Houston South Alternative would require the fewest water crossings with the fewest number of drainage structures and culvert extensions and one of the fewest numbers of culverts. The Mac West-Connector 1-Houston-Houston North Alternative would require the most crossings.

To avoid or minimize the potential environmental impacts to surface water from the proposed rail line, OEA is recommending that the Board impose 28 mitigation measures, including 10 measures volunteered by the Applicant (see Section 19.2). These measures include requiring: acquisition of appropriate Federal and state permits; mitigation of unavoidable impacts to surface water; avoidance and minimization of impacts to wetlands and waters of the United States; maintenance of natural water flow and drainage; design of bridges and culverts over fish-bearing waters to meet National Marine Fisheries Service (NMFS) requirements; limitation of construction in anadromous streams during low-flow conditions and following other ADF&G timing recommendations to the extent practicable; utilization of best management practices imposed by the USACE; marking of stream channels prior to snowfall; removal of debris from waterbodies at rail line crossings; construction of project-related winter roads to avoid water quality degradation; consultation with the USACE on gravel mining within the limits of ordinary high water; and compliance with appropriate regulations governing hazardous substances and potential contamination.

Notwithstanding the recommended mitigation measures, there still would be potential unavoidable impacts to surface water from the proposed rail line. Potential impacts would include: potential changes to natural drainage and altered flood hydraulics near crossings; increased potential for debris jams and overbank flooding upstream of water crossings; reduced floodplain area; increased scour and bank erosion at crossings; and increased turbidity, sediment loads, and concentrations of pollutants during construction.

2.4.2.2 Groundwater

Construction of the proposed rail line, sidings, power lines, buried communications cables, access road, and other facilities could affect groundwater movement and quality. Groundwater movement could be altered by changes in infiltration and recharge rates due to compaction of the overlying soil. These effects would be limited to the footprint of the proposed rail line – which includes the rail bed, terminal reserve areas, access road, and associated facilities – and staging areas, which represents a small fraction of the total area where water enters the ground and infiltrates to the water table. The extraction of materials from the borrow areas[12] could affect groundwater due to the changes in local hydrogeology that would result from the removal of saturated materials. These changes include the creation of new ponds that would serve as sources of groundwater discharge through evaporation during the summer and sources of groundwater during major rainstorms and the break-up of ice.

[12] Borrow areas are locations from which materials such as soil, rock, or gravel are excavated for a specific purpose.

To avoid or minimize the potential environmental impacts to groundwater from the proposed rail line, OEA is recommending that the Board impose 10 mitigation measures, including 4 measures volunteered by the Applicant (see Section 19.2). These measures include requiring: acquisition of appropriate Federal and state permits; maintenance of natural water flow and drainage; utilization of best management practices imposed by the USACE; construction of project-related winter roads to avoid water quality degradation; abandonment of project-related geotechnical boreholes in compliance with appropriate regulations; and compliance with appropriate regulations governing hazardous substances and potential contamination.

Notwithstanding the recommended mitigation measures, there still would be potential unavoidable impacts to groundwater from the proposed rail line. Potential impacts would include: 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. OEA concluded such mitigated impacts from construction and operation of the proposed rail line would be negligible.

2.4.2.3 Floodplains

Within the study area, there are 100-year floodplains along Willow Creek, Little Willow Creek, Lake Creek, Deception Creek, Lucile Creek, and the Little Susitna River. With the exception of the floodplain along Little Willow Creek, all of the proposed alternative rail line segments would cross all of these floodplains. The proposed rail line and access road that would be placed within the 100-year floodplain would require fill placement and could reduce floodplain volume, constrict flood flow paths, and increase floodwater elevation upstream of the restricted floodplain area. However, affected areas would be small compared to the total floodplain storage available, and OEA expects minimal impacts to floodplain storage from the placement of the proposed rail line and the access road. Moreover, ARRC would size all water crossings to convey the 100-year flow event associated with local drainages as part of its voluntary mitigation measures (VM-8). For larger stream and river crossings, ARRC would construct bridges as single- or multiple-span structures that would either completely or partially span (or clear) the existing active river channel.

The alternatives that include either the Houston North or the Willow segments would occupy several times as many Federal Emergeny Management Agency (FEMA)-mapped floodplain acres as the alternatives that include the Houston South or Big Lake segments and would require waterbody crossings within a FEMA designated floodplain and floodway. Approximately 6,600 feet (about 1.25 miles) of the Houston-Houston North segment combination rail line footprint would cross 27 acres of FEMA-designated 100-year floodplains. Approximately 8,065 feet (about 1.5 miles) of the Willow Segment rail line footprint would cross 26 acres of FEMA-designated 100-year floodplains. The Mac West-Connector 1-Willow Alternative also would cross an additional 8 streams that have a high potential for floodplains, 2 more than the Mac East-Connector 3-Willow Alternative and the Mac East Variant-Connector 3 Variant-Willow Alternative. All build alternatives that include the Big Lake Segment would impact the least acreage of floodplains, with approximately 460 feet of rail line crossing approximately 1 acre of 100-year floodplain; these alternatives would require only 1 waterbody crossing within a FEMA-designated floodplain.

To avoid or minimize the potential environmental impacts to floodplains from the proposed rail line, OEA is recommending that the Board impose 4 mitigation measures, including 3 measures volunteered by the Applicant (see Section 19.2). These measures include requiring: acquisition of appropriate Federal and state permits; maintenance of natural water flow and drainage, including maintaining connectivity of floodplains; and the utilization of best management practices imposed by the USACE.

Notwithstanding the recommended mitigation measures, there still would be potential unavoidable impacts to floodplains from the proposed rail line. Potential impacts would include: reduction in floodplain storage within the rail line footprint; constriction of flood flow paths and increases in floodwater elevation upstream of crossings; and potential changes in floodplain hydraulics within the rail line footprint, which could lead to alterations in channel alignment and channel erosion. OEA concluded that such mitigated impacts from construction and operation of the proposed rail line would be negligible.

2.4.2.4 Wetland Resources

Several wetland types were found within the wetland study area (500 feet on either side of the proposed rail line centerline). These include forested wetlands, scrub/shrub wetlands, emergent wetlands, and other wetlands and waters. Rail line construction would directly affect wetlands within the rail line footprint and could also indirectly affect wetlands adjacent to and within the ROW by fragmenting wetland vegetation and hydrology. Rail line construction would require clearing, excavation, and placement of fill material in wetlands. The placement of fill would cause a permanent loss of wetland functions within the fill area and could result in additional impacts to adjacent wetland areas inside and outside the rail line footprint. Because many wetland functions depend on the size of the wetland or the contiguous nature of the wetland with other habitats, clearing and filling a wetland could lower the ability of adjacent wetlands to perform functions that depend on size or an unfragmented connection to a waterbody.

Potential impacts to wetlands within the ROW from the proposed rail line construction would vary by project alternative. Construction of the Mac East Variant-Connector 3 Variant-Willow Alternative would impact 137 acres of wetlands and waters (comprising 16 percent of the rail line footprint), the lowest impact to wetlands across all the build alternatives. Construction of the Mac West-Connector 1-Houston-Houston North Alternative would impact 318 acres of wetlands and waters, the greatest overall acreage of wetlands that would be affected. It also would affect the highest proportion of wetlands of any build alternative, 48 percent. Many wetlands along this alternative consist of bog wetlands that have diverse vegetation communities and are considered high-functioning wetlands.

Of the remaining build alternatives, the Mac West-Connector 1-Houston-Houston South Alternative would impact 278 acres of wetlands and waters, the Mac West-Connector 2-Big Lake Alternative would impact 275 acres, the Mac West-Connector 1-Willow Alternative would impact 255 acres, the Mac East-Connector 3-Houston-Houston North Alternative would impact 204 acres, the Mac East Variant-Connector 3 Variant-Houston-Houston North Alternative would impact 200 acres, the Mac East-Big Lake Alternative would impact 175 acres, the Mac East Variant-Connector 2a-Big Lake Alternative would impact 169 acres, the Mac East-Connector 3-Houston-Houston South Alternative would impact 164 acres, the Mac East Variant-Connector 3

Variant-Houston-Houston South Alternative would impact 160 acres, and the Mac East-Connector 3-Willow Alternative would impact 140 acres.

Overall, wetlands within all proposed alternatives are high functioning for 5 of the 8 wetland functions analyzed for the proposed rail line. The wetlands within all proposed alternatives would be moderate to low functioning for groundwater recharge. The wetlands along the proposed alternatives are highest functioning for wildlife habitat, modification of water quality, and vegetation diversity. Ninety-nine to 100 percent of the wetlands along any given alternative scored as high functioning for these functions. The analysis compares high-functioning wetlands between alternatives where there would be notable differences, such as for export of detritus, groundwater discharge, stream flow moderation, and storm water and flood water storage.

OEA's analysis shows that the Mac West-Connector 2-Big Lake Alternative would affect the highest proportion of wetlands with high functionality for storm water and flood water storage of all alternatives considered in detail. The Mac East-Connector 3-Willow Alternative, along with the Mac East Variant-Connector 3 Variant-Willow Alternative, would affect the highest proportion of wetlands with high functionality for stream flow moderation. The Mac East-Connector 3-Houston-Houston North Alternative would affect the largest proportion of wetlands with high functionality for export of detritus and, along with the Mac East-Connector 3-Houston-Houston South Alternative, affect the largest proportion of wetlands with high functionality for groundwater discharge.

The Big Lake Segment would also impact 25 acres of the Su-Knik Mitigation Bank ,13 primarily composed of riverine wetlands and riparian wetlands, but also including scrub/shrub wetlands and uplands. Within this mitigation bank is the Goose Creek Fen, a floating mat fen system. A floating fen is an important ecological feature supporting diverse plant communities and providing high value rearing habitat for anadromous fish species. Goose Creek Fen would require draining or filling for construction of the Big Lake Segment. The wetlands in the mitigation bank are locally important to the MSB and are highly valued. The impact to wetlands would reach beyond the 200-foot ROW because, for the purposes of the mitigation bank, the value of the wetlands is based on their contiguous, unfragmented state.

The Big Lake Segment would also involve the relocation of 2,440 feet of anadromous stream. The relocated stream channel would be located within emergent and scrub/shrub wetlands. The area where the stream is flowing is a large contiguous emergent and scrub/shrub wetland mosaic providing high-value functions to the watershed.

To avoid or minimize the potential environmental impacts to wetlands from the proposed rail line, OEA is recommending that the Board impose up to 9 mitigation measures, including 3 measures volunteered by the Applicant and 1 alternative-specific mitigation measure (see Section 19.2). These measures include requiring: acquisition of appropriate Federal and state permits; measures to mitigate unavoidable impacts to wetlands, including mitigating encroachment on the Su-Knik Mitigation Bank; avoidance and minimization of impacts to wetlands and waters of the United States; construction designed to maintain natural water flow

[13] A mitigation bank is a wetland, stream, or other aquatic resource area that has been restored, established, enhanced, or (in certain circumstances) preserved for the purpose of providing compensation for unavoidable impacts to aquatic resources permitted under section 404 of the Clean Water Act, 33 U.S.C. § 1251, or a similar state or local wetland regulation.

and drainage; utilization of best management practices imposed by the USACE; and removal of debris from wetlands and waters at rail line crossings.

Notwithstanding the recommended mitigation measures, there still would be potential unavoidable impacts to wetlands within and adjacent to the proposed rail line ROW. Potential impacts would include: unavoidable filling of wetlands; permanent loss of wetland functions within the fill area; potential changes to natural drainage and altered flood hydraulics near crossings; increased potential for debris jams and overbank flooding upstream of water crossings; changes to recharge potential and aquifer dewatering; impacts to the Su-Knik Mitigation Bank; and impacts to Goose Creek Fen (for alternatives that include the Big Lake Segment). As discussed in the mitigation measures, the Applicant would be required to provide compensatory mitigation for unavoidable impacts to wetlands and waters of the United States. This could include utilizing wetland banks or creating new wetlands. Though wetland acreage and functionality could be compensated, functionality from an existing system would be lost. If wetland creation is required as part of the permitting process, a created wetland at a different site might not have the same ecological value as the wetlands being filled.

2.4.3 Biological Resources

The proposed rail line and facilities construction and operation would impact biological resources. The following paragraphs summarize the relevant effects of this project on vegetation, fisheries, wildlife, birds, and threatened and endangered species and the mitigation measures OEA is recommending to minimize these impacts.

2.4.3.1 Vegetation Resources

The primary impacts of the proposed rail line construction and operation to vegetation would be the destruction of vegetation cover and the replacement of some cover with gravel fill. Potential permanent impacts would include vegetation loss due to placement of gravel fill for the rail bed, excavation of gravel, and construction of rail line support facilities. Other potential impacts would include the loss or alteration of forested habitat due to the removal of vegetation at temporary workplaces that would be restored after project construction. Potential operation impacts would include ongoing vegetation removal and control from the track ballast and adjacent areas, where necessary, for safe operations. In addition, potential impacts to vegetation resources could include altered vegetation communities due to soil compaction and the spread of invasive plant species and altered vegetation succession caused by changes in fire cycles. There are no known Federal- or state-protected threatened, endangered, or candidate plants species within the study area.

Of the build alternatives, the Mac East-Connector 3-Willow Alternative would result in the clearing of 822 acres of vegetation from the rail line footprint, the most of any alternative. The alternative with the second highest area of vegetation loss would be the Mac East Variant-Connector 3 Variant-Willow Alternative, with 821 acres of vegetation cleared. Following in descending order of area of vegetation cleared would be the Mac West-Connector 1-Willow (779 acres), Mac East-Big Lake (731 acres), Mac West-Connector 2-Big Lake (716 acres), Mac East Variant-Connector 2a-Big Lake (714 acres), Mac East-Connector 3-Houston-Houston South (708 acres), Mac East Variant-Connector 3 Variant-Houston-Houston North (707 acres), Mac

West-Connector 1-Houston-Houston North Alternative (663 acres), Mac East-Connector 3-Houston-Houston South Alternative (652 acres), and Mac East Variant-Connector 3 Variant-Houston-Houston South (651 acres) alternatives. The Mac West-Connector 1-Houston-Houston South Alternative would result in the fewest acres of vegetation loss (608 acres). Vegetation clearing would result in a long-term impact for forest communities, even with restoration, especially for late-succession forests and wetlands that would be slow to recover. As part of ARRC's proposed action, some cleared areas would likely be restored after construction; other areas would be covered by fill.

To avoid or minimize the potential environmental impacts to vegetation from the proposed rail line, OEA is recommending that the Board impose 4 mitigation measures, including 1 measure volunteered by the Applicant (see Section 19.3). These measures include requiring: acquisition of appropriate state permits and authorizations; minimization of ground disturbance and vegetation clearing; development and implementation of a nonnative invasive species control plan; and development of a restoration and revegetation plan for disturbed areas.

Notwithstanding the recommended mitigation measures, there still would be potential unavoidable impacts to vegetation from the proposed rail line. Potential impacts would include: loss in vegetation; loss or alteration of forested habitat; ongoing vegetation removal and control from the track ballast and adjacent areas, where necessary, for safe operation; altered vegetation communities due to soil compaction; and altered vegetation succession caused by changes in fire cycles.

2.4.3.2 Wildlife

A variety of wildlife species are known to inhabit the project area. These include: bears, moose, wolves, beaver, mink, muskrat, river otter, ermine, martens, wolverines, red fox, coyote, lynx, hares, mice, squirrels, bats, shrews, voles, lemmings, porcupine, and numerous avian species, including 42 birds of conservation concern.[14] The potential impacts of the proposed rail line construction and operation to wildlife would be influenced by the animals' dependence on specific habitats, the availability of preferred and used habitats, the amount of preferred habitat the project would affect, ecology and life history, and past and present population trends. Because game mammal populations are managed for sustainable human harvest, project-related effects to population abundance and distribution, available habitat, and predator-prey relationships could also affect the sustainable harvest of these game mammals. Potential construction impacts common to all build segment combinations and alternatives could include habitat alteration and loss, disturbance and displacement of wildlife, and direct mortality from construction vehicles and equipment. Common potential impacts related to the operation of the proposed rail line could include moose-train collision mortality, bird-power line and communications tower collision mortality, habitat fragmentation, disturbances leading to reduced wildlife survival and productivity, and potential exposure to spills of toxic materials.

The proposed rail line would result in the loss of wildlife habitat ranging from 608 acres to 822 acres depending on the alternative, which is less than 1 percent of the 435,895 acres of available habitat in the study area. The Mac East-Connector 3-Willow Alternative would result in the

[14] Birds of conservation concern include migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent the highest conservation priorities of the U.S. Fish and Wildlife Service.

greatest amount of habitat loss (822 acres) and the Mac West-Connector 1-Houston-Houston South Alternative would result in the least amount of habitat loss (608 acres). Of the remaining alternatives, the Mac East Variant -Connector 3 Variant-Willow Alternative would result in the greatest loss of wildlife habitat (821 acres), followed in descending order by the Mac West-Connector 1-Willow (779 acres), Mac East-Big Lake (731 acres), Mac West-Connector 2-Big Lake Alternative (716 acres), Mac East Variant-Connector 2a-Big Lake (714 acres); the Mac East-Connector 3-Houston-Houston North (708 acres), Mac East Variant-Connector 3 Variant-Houston-Houston North (707 acres), Mac West-Connector 1-Houston-Houston North (663 acres), Mac East-Connector 3-Houston-Houston South (652 acres), and Mac East Variant-Connector 3 Variant-Houston-Houston South (651 acres) alternatives. While OEA's review and analysis indicates that the proposed rail line would reduce the amount of available habitat, the loss would be less than 1 percent of the total forested habitat available in the project area and less than 1 percent of the total wetland habitat available in the project area, regardless of the alternative chosen.

The proposed rail line would also contribute to habitat fragmentation of core forested and wetland habitats. Habitat fragmentation occurs when large areas of contiguous core habitat are split into smaller pieces, thereby increasing the amount of habitat edge or the area where 1 habitat is bordered by a differing habitat. Habitat fragmentation can adversely affect wildlife by creating barriers to movement, leading to edge effects, reducing core areas of available habitats, facilitating predator movements, and increasing the intrusion of invasive species and humans. In this case, the southern segments and segment combinations would contribute to fragmentation by crossing primarily agricultural and woody wetland core habitats, while the northern segments and segment combinations would contribute to fragmentation by crossing primarily forested and emergent wetland habitats. Of the rail line build alternatives, the Mac West-Connector 1-Houston-Houston South Alternative would result in fragmentation by crossing the largest area of forested and wetland habitats (3,210 acres). Of the remaining alternatives, the Mac West-Connector 1-Willow Alternative would result in fragmentation by crossing the second largest amount of forest and wetland habitat (2,847 acres), followed in descending order by the Mac West-Connector 2-Big Lake (2,631 acres), Mac West-Connector 1-Houston-Houston North (2,592 acres), Mac East Variant-Connector 3 Variant-Houston-Houston South (2,501 acres), Mac East-Connector 3-Houston-Houston South (2,495 acres), Mac East Variant-Connector 3 Variant-Willow (2,139 acres), Mac East-Connector 3-Willow (2,133 acres), Mac East Variant-Connector 3 Variant-Houston-Houston North (1,883 acres), Mac East-Connector 3-Houston-Houston North (1,877 acres), Mac East Variant-Connector 2a-Big Lake (1,402 acres), and Mac East-Big Lake (1,191 acres) alternatives.

To avoid or minimize the potential environmental impacts to wildlife from the proposed rail line, OEA is recommending that the Board impose 12 mitigation measures, including 6 measures volunteered by the Applicant (see sections 19.2 and 19.3). The measures include requiring: restriction of worker harassment of wildlife; acquisition of appropriate state permits and authorizations; minimization of disturbance to migratory bird and bald eagle nests during construction; development of preferred habitat away from the proposed rail line; proper handling, storage, and disposal of food waste during construction; minimization of impacts to habitat areas; reduction of potential collision and electrocution impacts to birds; a strategy to reduce the moose-train collision mortality rate; a bear-human interaction plan; and minimization of disturbance to bear dens.

Notwithstanding the recommended mitigation measures, there still would be potential unavoidable impacts to wildlife from the proposed rail line. Potential impacts would include: habitat loss and altered suitability within and near the rail line footprint; wildlife mortality; habitat fragmentation and reductions in core area size; increased barriers to movement for some species.

2.4.3.3 Fisheries Resources

A variety of both resident and anadromous fish species are present in the project area. Resident fish species are those whose life cycle does not include migration into marine waters, and include lake trout, burbot, northern pike, sculpins, sticklebacks, suckers, and pond smelt in the project area. Anadromous fish species are those whose life cycle include migration into marine waters, and include all 5 Pacific salmon: Chinook (king), chum (dog), coho (silver), pink (humpy), and sockeye (red), as well as rainbow trout, Dolly Varden, and eulachon in the project area. Of the species that are present, Cook Inlet Salmon (Chinook [king], chum [dog], coho [silver], pink [humpy], and sockeye [red]) are federally-regulated and, as a result, habitat for these species is protected under the Magnuson-Stevens Fishery Management and Conservation Act. Construction of the proposed rail line would require multiple stream crossings at locations that have fish or fish habitat. Project construction methods and timing, the type of stream crossing structure installed, and daily operation procedures would influence the severity and types of potential impacts to fish and fish habitat at each stream crossing. The primary potential impacts of crossing structures to fish and fish habitat would be loss and degradation of instream habitats due to placement of structures, alteration of stream hydrology and water quality, and blockage of fish movements. Potential rail construction impacts common to all build alternatives would include loss or alteration of instream and riparian habitats, mortality from instream construction, blockage of fish movement, degradation of water quality, alteration of stream hydrology and ice breakup, and noise and vibration impacts. Potential rail operation impacts common to all build alternatives would include loss or alteration of instream and riparian habitats, blockage of fish movements, and degradation of water quality through sedimentation and turbidity.

All of the build alternatives would cross streams or waterbodies that provide habitat for fish. This fish habitat could be adversely affected by rail line construction and operation. All crossings of fish-bearing streams would result in some loss or alteration of stream and riparian habitats. Bridged crossings would likely result in a smaller area of instream habitat loss than closed-bottomed culverts (circular or oblong culverts constructed of corrugated steel or concrete). In general, clear-span bridges (those without instream supports) would have less potential to create conditions that could cause loss of spawning habitats, blockage of fish movements, alteration of stream hydrology, and increased erosion and sedimentation. The proposed build alternatives would require a minimum of 10 and a maximum of 18 crossings of streams that have been documented to contain either fish or fish habitat. The alternatives requiring the least number of fish-bearing stream crossings (10) are the Mac East-Big Lake, Mac East Variant-Connector 2a-Big Lake, Mac East Variant-Connector 3 Variant-Houston-Houston South, and Mac East-Connector 3-Houston-Houston South alternatives. The alternative requiring the greatest number of crossings (18) is the Mac West-Connector 1-Houston-Houston North Alternative. Of the remaining alternatives, the Mac West-Connector 1-Willow Alternative would cross the greatest number of fish-bearing waterbodies (16), followed by the Mac East-Connector 3-Houston-Houston North and Mac East Variant-Connector 3 Variant-Houston-Houston North alternatives

(15 crossings for both); the Mac West-Connector 1-Houston-Houston South, Mac East Variant-Connector 3 Variant-Willow, and Mac East-Connector 3-Willow alternatives (13 crossing for each); and the Mac West-Connector 2-Big Lake Alternative (12).

As part of this Final EIS, OEA prepared estimates of potential fish abundance to compare the geographic quantity and geomorphic quality of fisheries habitat upstream of crossings under the build alternatives. The resulting index of fish habitat potential assumes relatively undisturbed conditions with unimpaired passage throughout the watersheds and does not represent forecasts or estimates of actual biological performance. Fish-bearing waters and upstream habitat along the Mac West-Connector 1-Willow Alternative would have the highest estimated index of fish habitat potential and the highest estimated fish abundance for all fish species modeled. Fish-bearing waters and upstream habitat along the Mac East-Connector 3-Willow Alternative and the Mac East Variant-Connector 3 Variant-Willow Alternative would have the second highest estimated index of fish habitat potential. Fish-bearing waters and upstream habitat along the Mac East-Connector 3-Houston-Houston South Alternative and the Mac East Variant-Connector 3 Variant-Houston-Houston South Alternative would have the lowest estimated index of fish habitat potential across the alternatives studied in detail.

All of the build alternatives would cross waters important for sustaining recreational and commercial salmon fisheries, with the greatest number of important waters crossed by alternatives that include the Willow Segment and the fewest number crossed by alternatives that include the Houston-Houston South Segment Combination. The Houston-Houston South Segment Combination and the Willow Segment crossings of the Little Susitna River would require instream pilings and would affect spawning habitat for salmon species. Alternatives that include the Big Lake Segment would cross Goose Creek, a large unique fen system that likely would have to be drained or filled to provide an area for construction, resulting in the potential disturbance of about 4 acres within the 200-foot ROW and likely extend outward within the 19-acre high-value wetland and juvenile rearing habitat. Of the total 44 proposed fish-bearing stream crossings, 19 contain either sticklebacks, Pacific lamprey, or both. These species are considered Species of Conservation Concern by ADF&G.

To avoid or minimize the potential environmental impacts to fisheries from the proposed rail line, OEA is recommending that the Board impose 28 mitigation measures, including 12 measures volunteered by the Applicant (see sections 19.2 and 19.3). These measures include requiring: acquisition of appropriate Federal and state permits; maintenance of natural water flow and drainage by installing bridges and equalization culverts; minimization of temporary stream crossings and stream disturbance; design of bridges and culverts for fish-bearing waters to meet NMFS requirements; limitation of construction in anadromous streams during low-flow conditions and following other ADF&G timing recommendations to the extent practicable; utilization of best management practices imposed by the USACE; removal of debris from wetlands and waters at rail line crossings; inspections of culverts to ensure fish passage; implementation of Essential Fish Habitat conservation measures; minimization of detonation impacts to fish-bearing waters; and prior written authorization to narrow an anadromous waterbody within mean high water.

Notwithstanding the recommended mitigation measures, there still would be potential unavoidable impacts to fisheries from the proposed rail line. Potential impacts would include:

fish habitat loss and modification at stream crossings along the proposed rail line; loss of rearing, foraging, and cover habitat along the banks within the rail line footprint; loss of overhanging bank habitat structure and vegetation within the rail line footprint; potential changes to natural drainage and altered flood hydraulics; potential for debris jams and overbank flooding upstream of water crossings; potential direct mortality of fish during construction; and potential loss of redds, eggs, and fry due to changes in sedimentation, turbidity, and pollutants during construction.

2.4.3.4 Threatened and Endangered Species

Through consultations with the U.S. Fish and Wildlife Service and the NMFS potential threatened or endangered species that could be affected by the proposed rail line, OEA determined that the proposed rail line could indirectly affect the federally-endangered Cook Inlet beluga whale (*Delphinapterus leucas*). OEA identified and evaluated potential indirect effects on beluga whale. OEA determined that: 1) beluga whale forage fish in freshwater streams that support anadromous salmon and smelt and would be crossed by the proposed rail line and 2) induced noise and disturbance effects in the immediate vicinity of Port MacKenzie at the entrance of the Knik Arm could potentially occur as a result of induced increases in vessel traffic to and from Port MacKenzie. OEA, in consultation with the NMFS, did not identify any direct impacts from the proposed project to the beluga whale or beluga whale habitats. With implementation of OEA's recommended impact avoidance and minimization measures at anadromous stream crossings and for ship traffic servicing Port MacKenzie (see Sections 19.2 and 19.3), OEA determined that the Port MacKenzie Rail Extension Project may affect, but is not likely to adversely affect, the Cook Inlet beluga whale (Appendix H). NMFS concurred with OEA's findings on March 9, 2010 (Appendix A).

To avoid or minimize potential impacts to the Cook Inlet beluga whale from the proposed rail line, OEA is recommending that the Board impose mitigation measures to protect anadromous fisheries (see sections 19.2 and 19.3). Notwithstanding implementation of OEA's recommended impact avoidance and minimization measures at anadromous stream crossings and for ship traffic servicing Port MacKenzie, OEA determined that the Port MacKenzie Rail Extension Project may affect, but is not likely to adversely affect, the Cook Inlet beluga whale (Appendix H). The NMFS concurred with OEA's findings on March 9, 2010 (Appendix A). OEA's analysis indicates that though some unavoidable impacts to fisheries resources can be anticipated, these impacts are considered unlikely to adversely affect the Cook Inlet beluga whale.

2.4.4 Cultural and Historic Resources

The project area is replete with cultural and historic resources. OEA analyzed archaeological sites, historic sites (including historic trails), cultural landscapes (geographic areas, including both natural and cultural resources, associated with a historic event, activity, or person), and traditional cultural properties within the project area.

Archaeological sites that could not be avoided in the ROW could be inadvertently or purposefully destroyed through surface and subsurface disturbances, primarily during rail line construction. Historic and potentially historic trails could be blocked if they are not officially recognized trails. 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. The *Iditarod Dog Sledding Historic District/Historical Vernacular Landscape* (Iditarod Dog Sledding Historic District) would be adversely affected to varying degrees through loss of visual integrity.

Depending on the alternative authorized by the Board, if any, the proposed rail line would potentially directly impact from 4 to 27 known cultural resources within the rail line ROW and potentially impact an additional 9 to 23 resources outside the 200-foot ROW, but within 1 mile of the rail line centerline. The Mac East-Connector 3-Willow Alternative would potentially affect the most known cultural resources (49) and pass through areas with a high probability of having large numbers of undocumented cultural resources. The Mac East Variant-Connector 3 Variant-Houston-Houston South Alternative would affect the fewest known cultural resources (15) and pass through areas with a low probability (such as wetlands) of having large numbers of undocumented cultural resources. Of the remaining alternatives, the Mac West-Connector 1-Willow Alternative would potentially affect 44 cultural resources, followed in descending order by the Mac East Variant-Connector 3 Variant-Willow (42), Mac East-Big Lake (38), Mac West-Connector 2-Big Lake (35), Mac East Variant-Connector 2a-Big Lake (32), Mac East-Connector 3-Houston-Houston North (24), Mac East-Connector 3-Houston-Houston South (23), Mac West-Connector 1-Houston-Houston North (20), Mac West-Connector 1-Houston-Houston South (19), and Mac East Variant-Connector 3 Variant-Houston-Houston North (16) alternatives.

Some adverse effects to cultural resources could be mitigated by minor rerouting of any alternative that might be authorized by the Board to avoid cultural resources identified within the ROW. If avoidance is not possible, potential mitigation could include data recovery for archaeological sites, maintaining accessibility of historic trail crossings and minimizing visual impacts.

To avoid or minimize the potential environmental impacts to cultural and historic resources from the proposed rail line, OEA is recommending that the Board impose 3 mitigation measures, including 2 volunteered by the Applicant (see sections 19.4 and 19.9). These measures include requiring: compliance with a Programmatic Agreement (PA); the identification of trails to be given grade-separated crossings within the historic district; and development of protocols to inform construction supervisors of the importance of protecting and identifying cultural resources discovered as rail line construction takes place.

Because all effects on historic properties cannot be fully determined prior to approval of this type of undertaking, OEA has developed a PA. A PA is mechanism under Section 106 of the National Historic Preservation Act that allows agencies to fully evaluate which properties are listed in or eligible for listing in the National Register of Historic Places and would govern the completion of the section 106 process if the proposal before the Board is authorized and the rail line is built. The PA provides for the completion of a Level 2 identification survey,[15] if the Board authorizes the project and the locations of associated facilities have been established. Additionally, the PA establishes responsibilities for the treatment of historic properties, the implementation of mitigation measures, and ongoing consultation efforts.

[15] Level of investigation required to evaluate the eligibility of a resource for the National Register.

OEA held a meeting and teleconference for interested parties on October 21, 2010 to discuss the draft PA, which had been published in the Draft EIS. In response to comments received during and after this meeting, as well as on the Draft EIS, OEA revised the PA accordingly. On February 10, 2011, OEA distributed the revised PA to the consulting parties for comment and held a teleconference on February 24, 2011 to discuss comments on the revised PA. OEA accepted comments on the revised PA until March 10, 2011 and anticipates distributing the PA for signature on April 1, 2011.

Notwithstanding the recommended mitigation measures, there still would be potential unavoidable impacts to cultural and historic resources from the proposed rail line. Potential impacts would include: the potential damage to archaeological sites in the rail line ROW and footprint through surface and subsurface disturbances; potential loss of and changes to access within the ROW; and the introduction of auditory and visual effects depending on the resource and location. The Iditarod Dog Sledding Historical District would be adversely affected to varying degrees through loss of visual integrity, potential loss of and changes to access within the ROW, and changes to traditional or culturally significant use of and connection to the property.

2.4.5 Subsistence

Subsistence uses are customary and traditional uses of wild renewable resources for food, shelter, fuel, clothing, and other uses. The evaluation of potential subsistence impacts associated with the proposed action includes analyzing the potential impacts on the areas used for subsistence activities, access to those areas, availability of resources used for subsistence and changes in the degree of competition among harvesters for subsistence resources.

Because the entire project would be outside areas designated by the state as subject to subsistence regulations, and because there are no Federal public lands in the project area, there would be no direct impacts to subsistence in the project area; however, potential indirect impacts could occur. Certain subsistence resources that use Game Management Unit (GMU)[16] 16B, such as moose, bear, and waterfowl, could migrate through the project area. Train-animal collisions could result in changes in distribution, abundance, and health of resources migrating to and from GMU 16B.

Construction activities in the proposed rail line ROW and operation of the rail line could reroute subsistence user access across project area lands into areas west of the Susitna River. Construction of the Mac East-Big Lake Alternative would affect the fewest users because all residents in the study area to the west of the alternative would have continued unobstructed access to lands west of the Susitna River. The Mac West-Connector 1-Willow Alternative could change access for the greatest number of subsistence users; the Mac East-Big Lake Alternative could change access for the fewest number of subsistence users. The farther west the alternative, the more users would be potentially affected; more communities would have to use rail line crossings to reach GMU 16B. Competition could be affected because changes in access created by the proposed rail line could cause harvesters to begin using other communities' subsistence

[16] A Game Management Unit (GMU) is one of 26 geographical areas listed under game management units in the codified Alaska hunting and trapping regulations and the GMU maps of Alaska shown in the Alaska State Hunting Regulation book.

use areas, subsequently increasing the number of harvesters competing for resources in those places. Potential impacts to resource availability could most affect the communities of Beluga, Skwentna, and Tyonek because members of those communities harvest most of their subsistence resources in GMU 16B.

OEA is not recommending mitigation measures for impacts to subsistence, because OEA concluded that impacts on subsistence from construction and operation of the proposed rail line would be negligible. A potential negligible unavoidable impact from rail line construction and operation would be potential changes in subsistence resource availability due to potential minimal changes in wildlife distribution, survival rates, or harvest patterns. OEA does not believe any mitigation to subsistence is warranted or reasonable.

2.4.6 Climate and Air Quality

The U.S. Environmental Protection Agency national ambient air quality standards (NAAQS) regulations specify the maximum acceptable ambient concentration level for 6 primary or "criteria" air pollutants – ozone, nitrogen dioxide, carbon monoxide, sulfur dioxide, respirable particulate matter, and lead – and Alaska Department of Conservation has adopted the same standards for Alaska. The MSB is currently in attainment of the standards for these 6 criteria pollutants.

To evaluate the potential impacts of increased emissions of NAAQS air pollutants plus greenhouse gas emissions, OEA developed emissions estimates for the proposed rail line construction and operation. To be conservative, OEA estimated construction and operation emissions for the longest potential alternative, the 46-mile Mac West-Connector 1-Willow Alternative, and for the maximum average train length of 80 cars. OEA found that the estimated emissions of all criteria pollutants from construction and operation of the proposed rail line would be below the *de minimis* conformity thresholds established for each pollutant and, thus, the increase would be considered *de minimis* regardless of the alternative that might be authorized to be constructed. To the extent that commodities that would be transported by truck were shifted to rail, and to the extent that commodities transported between the Interior of Alaska and the ports of Anchorage or Seward were shifted to Port Mackenzie, at a shorter rail haul distance, reductions in air pollutant emissions from truck traffic or from rail to and from the ports of Anchorage and Seward would decrease.

Greenhouse gas emissions associated with the proposed action would be primarily carbon dioxide (CO_2) emissions. OEA estimated that operation of the proposed rail line would represent a 2 percent increase in Alaska rail CO_2 emissions and an increase in CO_2 emissions of less than 0.01 percent for the state as a whole. OEA concluded that estimated increases from proposed rail line construction and operation would be minimal and that any direct project-related impacts to climate would be low for all of the alternatives evaluated.

To avoid or minimize the potential environmental impacts to climate and air quality from the proposed rail line, OEA is recommending that the Board impose 2 mitigation measures (volunteered by the Applicant) requiring minimization of fugitive dust and construction-related emissions (see Section 19.5).

Notwithstanding the recommended mitigation measures, there still would be some potential unavoidable impacts to climate and air quality from the proposed rail line due to unavoidable construction and operation emissions. OEA has concluded that such mitigated increases in emissions from construction and operation of the proposed rail line would be minimal in the context of existing conditions.

2.4.7 Noise and Vibration

OEA compared estimated noise levels during the proposed construction to Federal Transit Administration (FTA) construction noise criteria and found that the criteria would not be exceeded, unless construction occurs during the nighttime hours. If nighttime general construction would occur, OEA found that estimated construction noise levels would exceed the residential construction noise limit at 1 location on the Mac East Variant Segment. If nighttime pile driving for bridge construction would occur, OEA found that estimated noise levels from pile driving would exceed the criteria at 3 locations on the Big Lake Segment.

OEA evaluated whether operation of the proposed rail line would result in noise levels (attributable to wayside noise and the locomotive warning horn) that would equal or exceed a 65 decibel day-night average noise level (DNL) or result in an increase of 3 decibels (dBA) or greater (OEA's noise analysis thresholds). Because of the relatively low ambient noise levels and proximity of the proposed rail line to receptors, the 3 dBA increase contour would encompass a number of receptors. However, only 2 of these receptors, 1 receptor on the Mac East Variant Segment and 1 receptor on the Connector 3 Segment, would also meet or exceed 65 DNL due to horn noise. OEA considers potential noise impacts adverse when a receptor experiences both an increase in DNL of 3 dBA and a noise level of 65 DNL or greater.

Because FRA is subject to section 4(f), [17] OEA also analyzed the potential noise impacts on section 4(f) properties using FRA/FTA methods.[18] To be conservative, OEA assumed that the entire area of the game refuge and recreation areas are noise-sensitive sites, although this actually depends on how the specific property is used. Based on FRA analysis methods, section 4(f) properties used for passive purposes would be more noise-sensitive than ones used for active recreational pursuits. All project alternatives that include the Willow Segment would result in potential noise impacts to the Little Susitna State Recreation River, Susitna Flats State Game Refuge, Willow Creek State Recreation Area, and Nancy Lake State Recreation Area. None of these refuges and recreation areas are anticipated to experience noise impacts as a result of the Mac East-Connector 3-Houston-Houston South, Mac East Variant-Connector 3 Variant-Houston-Houston South, Mac East Variant-Connector 2a-Big Lake, or Mac East-Big Lake alternatives. The estimated acreage of potential noise impacts within the Willow Creek State

[17] Section 4(f) of the U.S. Department of Transportation Act of 1966, 49 United States Code [U.S.C.] § 1653(f) and later recodified as 49 U.S.C. § 303, mandates that the Secretary of Transportation shall not approve any transportation project requiring the use of publicly-owned parks, recreation areas, wildlife or waterfowl refuges, or significant historic sites, regardless of ownership, unless (1) there is no prudent and feasible alternative to using that land and (2) the program or project includes all possible planning to minimize harm to the public park, recreation area, wildlife or waterfowl refuge, or significant historic site, resulting from that use. Section 6009(a) of the "Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users" Act (23 U.S.C. § 138) established that requirements of section 4(f) shall be considered to be satisfied if the Secretary of Transportation determines that the impact would be *de minimis*. Section 4(f) does not apply to the Board, an independent agency, but does apply to the FRA, one of the cooperating agencies for the EIS.

[18] Federal Railroad Administration. 2005. High-Speed Ground Transportation Noise and Vibration Impact Assessment.

Recreation Area is approximately 12 percent of the total acreage of the state recreation area, while the acreage of potential noise impacts within the Little Susitna Recreation River would range from 3 percent (for alternatives that include the Willow Segment) to 6 percent (for alternatives that include the Houston North Segment) of the total acreage of the recreation river. All other estimated potential noise impacts would affect 1 percent or less of the total acreage of the Nancy Lake State Recreation Area and the Susitna Flats State Game Refuge, although the total acreage potentially affected would be greatest within the Susitna Flats State Game Refuge.

OEA also evaluated whether vibration during construction and operation would exceed FTA fragile building damage criterion and found that estimated vibration levels would not exceed the criterion at any receptor locations. Similarly, OEA found that estimated vibration levels could be perceptible during construction activities such as pile driving, but would be temporary, and that vibration from train operations at levels that could be annoying would not occur outside the ROW. Therefore, OEA anticipates no vibration impacts resulting from the proposed rail line.

To avoid or minimize the potential environmental impacts from noise and vibration during construction of the proposed rail line, OEA is recommending that the Board impose up to 5 mitigation measures, including 3 measures volunteered by the Applicant and 2 alternative-specific mitigation measures (see Section 19.6). These measures include requiring: maintenance of properly functioning mufflers on construction vehicles; minimization of construction-related noise disturbances near residential areas; establishment of a Community Liaison to consult with affected communities; no pile driving associated with bridge construction during nighttime hours; and no construction in the vicinity of West Holstein Avenue during nighttime hours. Notwithstanding the recommended mitigation measures, there still would be potential unavoidable impacts from noise and vibration during construction of the proposed rail line due to noise from the use of heavy construction equipment and pile driving for bridges, if required. However, any such impacts would be temporary.

OEA is not recommending mitigation measures for potential impacts from noise and vibration during rail line operation because OEA concluded that such impacts do not warrant mitigation. No impacts from vibration due to rail operation are anticipated. Potential unavoidable impacts from noise during rail operation would include wayside noise and horn sounding at at-grade rail/roadway crossings. Because of relatively low ambient noise levels and proximity to receptors along the Big Lake, Willow, Houston South, Mac East Variant, Connector 3, Connector 3 Variant, and Mac West segments, train noise would be more noticeable than in other areas with higher ambient noise levels. However, only 1 receptor on the Mac East Variant Segment and 1 receptor on the Connector 3 Segment would experience noise levels at or above 65 DNL due to horn sounding (68 and 65 DNL, respectively). These projected noise levels fall below levels at which OEA generally recommends mitigation (70 DNL and 5 dBA increase).

2.4.8 Energy Resources

OEA anticipates that there would be a diversion of freight from truck to rail transport, is this project is approved and built. Train transportation is more fuel-efficient than truck transportation. Thus, fuel consumption should decrease if the proposed action is authorized and built.

Energy consumption during the project-related construction period would be temporary and would place minimal additional demand on the local energy supply. During rail line operation, energy requirements would primarily be for operation of trains. The total demand for diesel generated by the proposed action would be a very small share of the annual statewide consumption of distillate fuel.

OEA is not recommending mitigation measures for potential impacts to energy resources, because OEA concluded that such impacts from construction and operation of the proposed rail line would be minor. Potential unavoidable impacts from rail line construction and operation would include: all segments crossing under a transmission line between Tyonek and Port MacKenzie District; the Big Lake, Houston South, and Houston North segments crossing under a transmission line between Knik Fairview and Willow; and the Connector 1, Connector 3, Connector 3 Variant, and Big Lake segments crossing a gas pipeline that runs along Ayrshire Road. However, the Applicant would need to employ appropriate construction industry standards to minimize any potential to disrupt the provision of energy resources.

2.4.9 Transportation Safety and Delay

2.4.9.1 Grade Crossing Safety

To enable comparison of alternatives between Port MacKenzie and the existing ARRC main line at the point north of Willow where the Willow Segment would connect to the main line, OEA estimated predicted accident frequency for the existing at-grade crossings along the ARRC main line between this connection point and the point where the Big Lake Segment would connect to the main line. OEA found that the added project-related rail traffic (2 trains per day) would have a minimal effect on the predicted accident frequency at the existing at-grade crossings. At the at-grade crossing with the highest predicted accident frequency for existing conditions, the predicted interval between individual accidents would decrease from 54 to 51 years (indicating accidents would be predicted to occur slightly more often if the proposed rail line is authorized and built).

To provide an approximate upper bound of predicted accident frequency for the new at-grade crossings that would be required for this project, OEA estimated predicted accident frequency for the crossings with the highest annual average daily traffic (AADT) in 2 categories – those above 500 AADT and those below 500 AADT – and found that the predicted interval between accidents would be more than 100 years for all new at-grade crossings. The Mac East Variant-Connector 3 Variant-Houston-Houston South Alternative would have the highest hazard index, which is approximately twice that of the alternative with the lowest index, the Mac East-Connector 3-Willow Alternative.

OEA anticipates that the increased rail traffic for transport of equipment and materials during the project-related construction period would be less than during operation (that is, less than 2 trains per day). Thus, potential impacts on safety also would be less during project-related construction.

To avoid or minimize the potential impacts to grade crossing safety from the proposed rail line, OEA is recommending that the Board impose 6 mitigation measures volunteered by the Applicant (see sections 19.7 and 19.9). These measures include requiring: permanent signs

displaying a toll-free telephone number at grade crossings to address public inquiries; development of a team to address rail line/roadway crossing safety; incorporation of the proposed project into the Applicant's existing emergency response process and the contact of appropriate emergency response organizations; notification to road users of temporary road closings and construction-related activities; to the extent practicable, confinement of all construction traffic within the ROW or to public roads; removal and restoration of any temporary access outside the ROW; and consultation with appropriate agencies on final design of crossings and warning devices.

Notwithstanding the recommended mitigation measures, there still would be potential unavoidable impacts to grade crossing safety from the proposed rail line. Potential impacts would include increased predicted accident frequency as a result of at-grade crossings. OEA concluded that such mitigated impacts from operation of the proposed rail line would be minimal.

2.4.9.2 Traffic Delay

Vehicle delay at grade crossings varies depending on roadway and rail traffic volumes, the number of roadway lanes, train length, and train speed. OEA anticipates that the effect of the proposed action on grade crossing delay would be minimal. All of the alternatives studied in detail would have a very small impact on road delay at grade crossings, with a maximum increase of about 7 minutes of delay per day (total for all vehicles) for any of the alternatives. OEA anticipates that the increased rail traffic during the construction period, when construction materials would be transported, would be less than during rail line operation. The potential delay impacts also would be less.

To avoid or minimize the potential impacts to traffic delay from the proposed rail line, OEA is recommending that the Board impose 3 mitigation measures volunteered by the Applicant (see Section 19.7). These measures include requiring: notification to road users of temporary road closings and construction-related activities; to the extent practicable, confinement of all construction traffic within the ROW or to public roads; removal and restoration of any temporary access outside the ROW; and consultation with appropriate agencies on final design of crossings and warning devices.

Notwithstanding the recommended mitigation measures, there still would be potential unavoidable impacts to transportation delay from the proposed rail line. Potential impacts would include vehicle delays during construction at new at-grade crossings and increased delay as a result of at-grade crossings. OEA concluded that such mitigated impacts from operation of the proposed rail line would be minimal.

2.4.9.3 Rail Safety

ARRC anticipates transporting bulk materials and containers on the proposed rail line and does not intend to carry hazardous materials. Nevertheless, OEA analyzed rail transport of hazardous materials in situations involving transportation of flammable and/or toxic materials in areas with relatively high population densities and overall train traffic, and found the likelihood of release

to be low. ARRC has a low accident rate, and few accidents have resulted in the release of hazardous materials when they are being transported.

If a release of hazardous material were to occur, ARRC would implement emergency response and clean-up operations as required by Occupational Safety and Health Administration rules in 29 C.F.R. § 1910.120, Hazardous Waste Operations and Emergency Response. The potential environmental impacts of a release would depend on the accident location, the amount released, the material released, and the weather conditions at the time of the release.

To avoid or minimize the potential impacts to rail safety from the proposed rail line, OEA is recommending that the Board impose 2 mitigation measures volunteered by the Applicant (see Section 19.9). These measures include requiring: incorporation of the proposed project into the Applicant's existing emergency response process, the contact of appropriate emergency response organizations, and consultation with appropriate agencies on final design of crossings and warning devices. OEA concluded that mitigated impacts to rail safety would be negligible and believes that the proposed rail line would not result in high and adverse impacts to human health or the environment.

2.4.10 Navigation Resources

The proposed rail line alternatives include a total of 35 stream crossings that have been determined to be, or that might be considered to be, navigable waterways. Where an alternative would cross a navigable waterway, as designated by the U.S. Coast Guard and ADNR, there could be small temporary effects to navigability due to temporary bridges and normal bridge construction activities. Impacts to navigation from each potential crossing would be negligible because structures crossing navigable streams are required to provide vertical and horizontal clearances adequate for watercraft to pass unimpeded.

Depending on the alternative, the proposed rail line ROW would intersect from 0 to 3 navigable waterways and from 5 to 12 possible navigable waterways. The Mac West-Connector 2-Big Lake, Mac East-Big Lake, and Mac East Variant-Connector 2a-Big Lake alternatives could be constructed without crossing a navigable stream. However, the Mac West-Connector 2-Big Lake Alternative would cross 12 possible navigable waterways and the Mac East-Big Lake and Mac East Variant-Connector 2a-Big Lake alternatives would cross 11 possible navigable waterways. The Mac West-Connector 1-Willow, Mac East-Connector 3-Willow, and Mac East Variant-Connector 3 Variant-Willow alternatives would each cross 3 navigable streams. The Mac West-Connector 1-Willow Alternative would also cross 8 possible navigable waterways, and the Mac East-Connector 3-Willow and Mac East Variant-Connector 3 Variant-Willow alternatives would cross 6 possible navigable waterways.

To avoid or minimize the potential environmental impacts to navigation from the proposed rail line, OEA is recommending that the Board impose 3 mitigation measures, including 2 measures volunteered by the Applicant (see Section 19.8). These measures include requiring a section 9 Bridge Permit; coordination with the U.S. Coast Guard; adequate clearance over navigable rivers; and development of a plan to ensure that bridges and culverts placed on navigable or public waters are designed to accommodate recreational boat users and public access.

Notwithstanding the recommended mitigation measures, there still would be potential unavoidable impacts to navigation from the proposed rail line, including bridges and structures that would cross inland rivers and stream. OEA concluded that such mitigated impacts to navigation would be negligible.

2.4.11 Land Use

2.4.11.1 Land Use

Land owners in the study area include Federal and state governments, the MSB, the Alaska Mental Health Trust, the University of Alaska, private citizens, the Alaska Native Regional Corporation (Cook Inlet Regional Incorporated) and the Alaska Native Village Corporation (Knikatnu 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. Land in the area is commonly used for sport hunting and fishing and for traditional hunting, fishing, and gathering. Recreational use of land in the area by MSB and Anchorage residents and tourists is high, and wildlife habitat and water features are extensive. Forestry and timber harvesting are some of the designated uses of state land. ARRC would acquire the land within the proposed rail line ROW from existing land owners.

The area in the ROW that would be cleared for construction but not needed for permanent structures would be restored to conditions consistent with rail line maintenance requirements following project-related construction. Construction support facilities would be sited, where possible, within the 200-foot ROW. Potential impacts to land use from these staging and construction areas would be temporary, because ARRC would remove them and rehabilitate the areas after completing construction of the rail line and operation support facilities. OEA determined that while land uses outside the 200-foot ROW could be influenced by non-rail related development trends in the area, OEA does not foresee induced development or changes in land use outside the ROW as a result of the proposed rail line. For example, there are currently no proposals to install any rail spurs to new shippers (or new industrial development) along the proposed rail line. Additionally, a flag-stop or any other form of passenger rail service, which could encourage new residential development, is not part of the proposed action. The Applicant has also stated that the majority of rail traffic on the proposed rail line would likely move to and from locations in Interior Alaska (far removed from the project area).

All alternatives that include the Willow Segment would impact the greatest amount of total acreage. The Mac West-Connector 1-Willow Alternative would impact the greatest amount of total acres (1,322 acres), but would impact the third least amount of private land (244 acres), because it would cross mostly undeveloped land. The Mac East-Connector 3-Willow Alternative would cross the second greatest amount of total acres (1,309 acres), and would also cross mostly undeveloped land (269 acres private land). The Mac East Variant-Connector 3 Variant-Willow Alternative would impact 1,289 total acres. Overall, this alternative would cross mostly undeveloped land and would only affect 283 acres of private land.

All alternatives that include the Big Lake Segment would impact the greatest amount of private land and the greatest number of residences. The Mac West-Connector 2-Big Lake Alternative

would have the greatest impact on private land (487 acres) and would impact 1,105 total acres with 10 structures, 5 residences, and 1 business. The Mac East Variant-Connector 2a-Big Lake Alternative would impact the second highest amount of private land (445 acres), including potential impacts to 11 structures, 5 residences, and 1 business, and would cross the least amount of total acres (973 acres). Overall, the Mac East-Big Lake Alternative would impact the third highest amount of private land (429 acres) with 10 structures, 5 residences, and 1 business and would cross the second least amount of total acres (992 acres). Other than these alternatives, the alternatives that include the Houston-Houston North Segment Combination would impact the least amount of private land (between 200 and 250 acres). Those alternatives that include the Mac West-Connector 1 Segment Combination would have no impact to residences or structures; those alternatives that include the Mac East-Connector 3 Segment Combination would impact 2 structures; and those alternatives that include the Mac East Variant-Connector 3 Variant Segment Combination would only impact 1 structure.

Overall, the Mac East Variant-Connector 3 Variant-Willow Alternative would impact the greatest amount of land with agricultural covenants, 192 acres. The Mac West-Connector 2-Big Lake Alternative would impact 185 acres of land with agricultural covenants, second highest. All alternatives that include the Mac East Segment would impact the lowest amount of land with agricultural covenants. The Mac East-Big Lake Alternative would have the least amount of impact on land with agricultural covenants (91 acres) and the Mac East-Connector 3-Houston-Houston North and Mac East-Connector 3-Houston-Houston South alternatives would impact 124 acres of land with agricultural covenants (second lowest).

To avoid or minimize the potential environmental impacts to land use from the proposed rail line, OEA is recommending that the Board impose up to 12 mitigation measures, including 8 measures volunteered by the Applicant and 1 alternative-specific mitigation measure (see Section 19.9). These measures include requiring: restoration of disturbed lands to their former use or original condition; maintenance of a Web site during construction; coordination with appropriate land, business, and farm owners to address construction activity issues; minimization of blocked entrances and exits for businesses during construction; minimization of damage and disruptions to utilities; salvage of timber within the ROW; ROW acquisition in conformance with appropriate Federal and state regulations; coordination with local airports on communication tower placement; establishment of a Community Liaison and a public outreach program; and restriction of construction vehicles, equipment, and workers from crossing residential properties without permission.

Notwithstanding the recommended mitigation measures, there still would be potential unavoidable impacts to land use from the proposed rail line. Potential impacts would include: the need to acquire land within the proposed rail line ROW from existing land owners; the conversion of lands within the rail line ROW, including agricultural lands, to rail line use; and the restriction of access within the ROW without an ARRC entry permit. In the area of the Big Lake Segment, the proposed rail line would require taking 5 residences, 10 structures, and 1 business. Two structures in the Connector 3 Segment ROW would be taken, and 1 structure in the Mac East Variant Segment ROW would be taken. Given the small number of residential displacements, difficulty in identifying and providing comparable nearby housing would not be expected.

2.4.11.2 Parks and Recreation Resources

The project 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. Many recreational trails cross the area, and there are varied recreation opportunities available to the public. The area is well suited for both winter and non-winter outdoor recreation activities.

Potential construction impacts common to all build alternatives would be temporary. These include: the obstruction of trails and waterways used to access recreation areas and resources; the generation of noise affecting hikers, boaters, and campers; increased dust and discordant visual elements in the landscape; impacts to water quality affecting recreational fishing; and alteration of local distribution of wildlife, which could affect the experience of users engaging in recreational hunting and wildlife viewing. Potential operation impacts common to all alternatives would include: loss of connectivity of some trails that would be crossed by the proposed rail line; the presence of communication towers that could permanently alter the localized movement of private aircraft; change in recreational access patterns to and along certain recreational waters; and visual intrusion on the landscape that could affect the experience of recreationists. Where the proposed rail line would cross an officially recognized trail, ARRC has stated it would provide public access by a grade-separated crossing. Alternatively, the trail could be relocated by ARRC to avoid crossing the rail line. Trails for which ARRC would not provide a grade-separated crossing would be blocked and ARRC's trespassing regulations would prohibit the public from crossing of the ROW without first obtaining approval from ARRC.

All of the alternatives would intersect the Iditarod National Historic Trail and all alternatives that include the Mac West Segment (4 of the 12 alternatives) would cross the Point MacKenzie Trailhead and Parking Area and the Figure 8 Lake Loop Trail. The Mac East-Connector 3-Houston-Houston South Alternative would not result in the conversion of any recreation areas and would intersect 8 officially recognized trails. The Mac East Variant-Connector 3 Variant-Houston-Houston South Alternative would have identical impacts. Both the Mac East-Big Lake and Mac East Variant-Connector 2a-Big Lake alternatives would not impact any recreation areas or refuges and would intersect 5 officially recognized trails. The Mac-West-Connector 1-Willow Alternative would result in the conversion of 4 recreation areas/facilities and 11 officially recognized trails. The other 7 alternatives would result in impacts greater than the Mac East-Connector 3-Houston-Houston South or Mac East Variant-Connector 3 Variant-Houston-Houston South alternatives and less than the Mac West-Connector 1-Willow Alternative.

All potential rail line alternatives would cross resources protected by section 4(f) of the Department of Transportation Act of 1966 as significant recreational resources and properties. All of the proposed rail line segments evaluated in this Final EIS and discussed in the Draft Section 4(f) Evaluation (Appendix M) are technically feasible to build and any combination of the segments that would connect the existing main line to Port MacKenzie would satisfy the project's purpose and need. There are 4 alternatives that would result in *de minimis* impacts on recreational section 4(f) resources: the Mac East Variant-Connector 2a-Big Lake, Mac East Variant-Connector 3 Variant-Houston-Houston South, Mac East-Big Lake, and Mac East-Connector 3-Houston-Houston South alternatives. Of these 4 alternatives, the Mac East-Connector 3-Houston-Houston South and Mac East Variant-Connector 3 Variant-Houston-

Houston South alternatives would intersect the fewest number (1) and length (204 feet) of recreational section 4(f) trails, while the Mac East-Big Lake Alternative would intersect the greatest number (4) and length (2,202 feet) of recreational section 4(f) trails. None of these 4 alternatives would affect the Susitna Flats State Game Refuge, Little Susitna State Recreation River, Nancy Lakes State Recreation Area, or Willow Creek State Recreation Area.

Of the remaining alternatives that would cross recreational section 4(f) resources, the Mac West-Connector 1-Willow Alternative would intersect the greatest number of recreational trails (9) and the longest length of recreational trails (3,436 feet). The operation of trains along this alternative would result in potential severe noise impacts, as defined by the FRA, to an estimated 3,622 acres of section 4(f) properties – the most of any alternative. The ROW from the Mac West-Connector 1-Houston-Houston North Alternative would affect the greatest acreage of parks and recreation areas and of wildlife refuge (158 acres). The Mac East-Connector 3-Houston-Houston North and the Mac East Variant-Connector 3 Variant-Houston-Houston North alternatives would intersect the lowest number of recreational trails (1) and length of trail (204 feet). The Mac West-Connector 2-Big Lake Alternative would have the lowest impact on acreage of parks and recreational areas and of wildlife refuge affected by the ROW (57 acres).

In addition to the 13 section 4(f) trails discussed above, there are 6 additional trails that have been identified as contributing features of the Iditarod Dog Sledding Historic District. Five of these trails cross the Mac West Segment; the Connector 2 Segment crosses 2 of these trails; and the Mac East, Connector 1, Connector 3, Connector 3 Variant, and Willow segments all cross 1 of these trails. The NHPA section 106 Programmatic Agreement (PA) being developed for this project (see Appendix J of this Final EIS) would provide a mechanism to fully evaluate which properties are listed in or eligible for listing in the National Register, what their significant historic features are, and whether those properties would be adversely affected by the proposed project.

To avoid or minimize the potential environmental impacts to parks and recreation resources from the proposed rail line, OEA is recommending that the Board impose up to 13 mitigation measures, including 4 measures volunteered by the Applicant and 4 alternative-specific mitigation measures (see Section 19.9). These measures include requiring: restoration of public lands to their former use or original condition; maintenance of a public information Web site during construction; warning devices to notify boaters of bridge construction; creation of a plan to identify officially recognized trails, appropriate timeframes for construction and temporary access points; the design of bridges to accommodate winter modes of transportation; grade-separated trail crossings with an average distance of 3 miles between crossings; ROW acquisition in conformance with appropriate Federal and state regulations; minimization of impacts to the Susitna Flats Game Reserve, Point MacKenzie Trailhead, Figure 8 Loop Trail, Nancy Lake State Recreation Area, Little Susitna State Recreation River, Willow Creek State Recreation Area, and Nancy Lake Creek Junction public use site; preparing a report on any officially recognized trails that the Applicant proposes to relocate; and the identification of trails to be given grade-separated crossings within the historic district.

Notwithstanding the recommended mitigation measures, there still would be potential unavoidable impacts to parks and recreation resources from the proposed rail line. Potential impacts would include: diminished experience for users engaged in activities such as recreation,

hunting, fishing, and wildlife viewing; a loss of connectivity of trails for which grade-separated crossings would not be provided; the conversion of lands within the rail line ROW to rail line use; and the restriction of access within the ROW without an ARRC entry permit.

There also would be potential unavoidable impacts to section 4(f) and 6(f)[19] properties. Construction and operation of the following 8 alternatives would result in greater than *de minimis* impacts on recreational 4(f) properties: the Mac West-Connector 1-Willow, Mac East-Connector 3-Willow, Mac East Variant-Connector 3 Variant-Willow, Mac West-Connector 1-Houston-Houston North, Mac East-Connector 3-Houston-Houston North, Mac East Variant-Connector 3 Variant-Houston-Houston North, Mac West-Connector 1-Houston-Houston South, and Mac West-Connector 2-Big Lake alternatives. The section 4(f) properties include the Willow Creek State Recreation Area, Nancy Lake State Recreation Area, Little Susitna State Recreation River, and Susitna Flats State Game Refuge, depending on the alternative authorized, if any. A portion of the Nancy Lake State Recreation Area, a section 6(f) property, would be permanently converted from recreational to non-recreational uses in the event that either the Mac West-Connector 1-Willow, Mac East Variant-Connector 3 Variant-Willow, or Mac East-Connector 3-Willow alternatives were authorized by the Board.

2.4.11.3 Visual Resources

Potential impacts to visual resources from rail line construction activities would be temporary, but operation of the rail line would have some permanent effects. All alternatives would affect existing visual resources in the project area and alter the existing visual character of undeveloped, natural and agricultural areas by converting it to a rail transportation corridor with trail and waterway crossings. Developed areas could also be adversely affected by the potential taking of residences and buildings and the addition of road crossings, especially those that are grade-separated. Visual effects resulting from the taking of residences and buildings would vary based on location, and landowners and adjacent viewers could perceive the taking neutrally, adversely, or beneficially.

The southern segments would be located within and/or adjacent to the agricultural area and would tend to have similar visual impacts. Therefore, OEA's analysis of potential impacts to visual resources in this Final EIS has focused on the northern segments. Alternatives that include the Willow Segment would have the greatest visual impact. While these areas could receive fewer viewers, the alternatives containing the Willow Segment would pass through state recreation areas and a refuge, cross several waterways noted for their recreation and visual resources, cross a number of official trails, and alter larger areas of natural, undisturbed forested and wetland habitats. Alternatives that include the Big Lake Segment would have the second largest visual impact because the Big Lake Segment would require the most road crossings, taking of property, and a large impact to forested and wetland habitats. Those alternatives including the Houston-Houston North and Houston-Houston South segments would have the least impact to visual resources. The Houston, Houston North, and Houston South segments would cross undisturbed lands in proximity to developed areas.

[19] Section 6(f) of the Land and Water Conservation Fund, 16 U.S.C. § 4601, applies to all public areas that have received Conservation Fund monies to acquire or develop public recreation facilities. Section 6(f)(3) requires that these areas be maintained in perpetuity for public outdoor recreation use, unless the National Park Service approves substitution property of reasonably equivalent usefulness and location and of at least equal fair market value.

To avoid or minimize the potential environmental impacts to visual resources from the proposed rail line, OEA is recommending that the Board impose up to 3 mitigation measures, including 1 alternative-specific mitigation measure, to reduce glare from lighting, minimize clearing at road and trail crossings, and require the use of native plants in revegetation plans (see Section 19.9). Notwithstanding OEA's recommended mitigation measures, there still would be potential unavoidable impacts to visual resources from the proposed rail line. Potential impacts would include: a conversion of existing land use to a use that includes permanent, built features at the terminal reserve area or a permanent linear corridor including the rail line, access road, transmission line, culverts under the tracks, and vegetative maintenance within the 200-foot ROW. Trains operating over the proposed rail line could impact the experience of people engaged in hunting, fishing, wildlife viewing, and/or other recreational activities in the project area.

2.4.11.4 Hazardous Materials and Waste Sites

Potential safety or environmental impacts could result from proposed rail line construction activities such as grubbing (clearing stumps and roots), filling, excavating, or related dewatering operations (removal of water from solid materials or removal of groundwater) in areas of contaminated soils or groundwater within the rail line ROW and other work areas. The Mac West, Mac East, Mac East Variant, Connector 1, Connector 2, Connector 3, Connector 2a, and the Connector 3 Variant segments and a small portion of the Big Lake Segment would be located within the former Susitna Gunnery Range, a Formerly Used Defense Site that could potentially contain munitions and explosives of concern. There are 3 known low-risk sites along the Houston South Segment that contain contaminated soils. There are no known sites of concern that present a potential for environmental consequences along the Willow, Houston, and Houston North segments. One low-risk site with petroleum-contaminated soil is known along the Connector 2 Segment. During construction, the Applicant states that it would use information regarding the location of these sites to minimize any risks, and would follow applicable regulations to address sites identified. Routine rail line operation would not be expected to result in adverse impacts to hazardous waste sites.

To avoid or minimize the potential environmental impacts from hazardous materials and waste sites from the proposed rail line, OEA is recommending that the Board impose 5 mitigation measures, including 3 voluntary measures proposed by the Applicant (see Section 19.9). These measures include requiring: development of a spill prevention, control, and countermeasure plan and/or a response plan for hazardous materials; notification to appropriate agencies in the event of a hazardous materials release; notification to the fire departments, FEMA, and MSB Emergency Operations Department of the construction schedule and an emergency telephone number; contractor training for the identification of hazardous materials, including unexploded ordnance; and observation of the findings and recommendations of the USACE investigation into contamination at the former Susitna Gunnery Range.

Notwithstanding the recommended mitigation measures, there still would be potential unavoidable impacts from hazardous materials and waste sites along the proposed rail line. Potential safety or environmental impacts that cannot be reasonably mitigated include the risk of disturbing contaminated soils, contaminated groundwater, and unexploded ordnance during rail

line construction. OEA does not believe additional mitigation to hazardous materials and waste sites is warranted or reasonable.

2.4.12 Socioeconomics

As of 2007, the MSB had an estimated population of 82,668 and a labor force of 39,308 people. The southern segments of the proposed rail line are 36 miles away from the most populous area of the MSB, the area between Wasilla and Sutton. The MSB is part of the Anchorage Metropolitan Area and about 33 percent of the employed residents of the Borough commute to Anchorage. Tourism and recreation are important economic sectors in the Borough, and trails are often the main access available to recreational cabins and facilities.

Most socioeconomic impacts to the affected area are expected to be the same under all alternatives. The proposed action would result in a temporary stimulus to the Borough's economy and labor market. ARRC estimates it would employ 66 to 100 workers in the various phases of the 2-year construction period; however, the positive impact to employment would be temporary because it would be limited to the construction period. The impact from direct expenditures in the project area and local employment would increase from local expenditures by employees and providers of services during the rail construction period. The operation of the proposed rail line is expected to provide Port MacKenzie with a transportation alternative to the existing truck access to the Port for the movement of bulk materials and to support the use of Port MacKenzie as a general cargo port. The extent of the socioeconomic impact would depend on the extent to which the rail line was used and generated demand for services at Port MacKenzie. Additionally, access to resources, such as coal, that the proposed rail line would provide could attract new industries to the Port MacKenzie District.

Potential socioeconomic impacts that would differ by segment include displacement of residences, businesses, and agricultural use and potential impacts to economic activities related to the use of unofficial trails. Some unofficial trails would be blocked, and ARRC's trespassing regulations would prohibit crossing of the ROW to access those trails. While recreation and tourism activities that use unofficial trails could be blocked by the proposed rail line, they could potentially be diverted to officially recognized trails that would be retained. This could have a potentially adverse effect on economic activities directly or indirectly related to the current use of the blocked trails. The southern rail line segments would cross agricultural parcels, with the Mac East Variant-Connector 2a Segment Combination affecting the greatest number of acres. Alternatives with the Mac East Segment would affect the least number of acres of agricultural land. Some agricultural production would likely be lost. Given the small number of residential displacements, no difficulties in identifying and providing comparable nearby housing is expected.

OEA is not recommending mitigation measures for potential impacts to socioeconomics, because OEA concluded that such impacts from construction and operation of the proposed rail line would be minor. Potential unavoidable impacts from rail line construction and operation include the benefits that would arise from an increase in employment during the construction period along with the adverse affects of a potential change in economic activities directly or indirectly related to the areas where use of surrounding trails would be reduced or eliminated. In the area of the Big Lake Segment, the proposed rail line would require taking 5 residences, 10 structures,

and 1 business. Two structures in the Connector 3 Segment ROW would be taken, and 1 structure in the Mac East Variant Segment ROW would be taken. Given the small number of residential displacements, no difficulty in identifying and providing comparable nearby housing would be expected.

2.4.13 Environmental Justice

OEA assessed whether any high and adverse impacts to human health or the environment would occur as a result of the proposed action. OEA expects no high and adverse human health or environmental effects from the proposed action. Therefore, high and adverse impacts to environmental justice populations in the project area would not be expected.

OEA is not recommending mitigation measures for potential impacts to environmental justice because, OEA concluded that such impacts from construction and operation of the proposed rail line would be negligible. OEA believes that the proposed rail line would not result in high and adverse impacts to human health or the environment, and minority and low-income groups would not experience disproportionately high and adverse impacts.

2.4.14 Cumulative Impacts

OEA collected and reviewed information on relevant past, present, and reasonably foreseeable future projects and actions that could have effects that coincide in time and space with the potential effects from the proposed action. For those identified relevant projects, OEA identified where there could be potential cumulative impacts. Reasonably foreseeable activities within the project area could include: Alaska Stand Alone Pipeline Project; Cook Inlet Areawide Oil and Gas Lease Sale; Cook Inlet Ferry; Cook Inlet OCGen™ Power Project; Knik Arm Crossing; Knik-Willow Transmission Line Upgrade; Goose Creek Correctional Center; MSB Regional Aviation System Plan; a suite of Port MacKenzie Development Projects;[20] Port of Anchorage Marine Terminal Redevelopment Project; a host of road projects in the MSB; South Wasilla Rail Line Relocation; the Su-Knik Wetland Bank – Umbrella Mitigation Bank Instrument – Big Lake South Individual Bank Plan; and the West Mat-Su Access Project. The effects of these projects in combination with the potential impacts of the proposed action could result in cumulative adverse effects to surface water and wetland resources, biological resources, cultural and historic resources, climate and air quality, and land use.

2.4.15 Comparison of Potential Impacts

At the end of the chapter, Table 2-2 highlights potential impacts by resource areas where there are noteworthy differences among the build alternatives. The largest potential impacts would occur to water, cultural, and recreational resources. Alternatives that include the Mac West Segment would tend to require a greater number of waterbody crossings and impact a greater amount of floodplains and wetlands when compared with alternatives containing the Mac East and Mac East Variant segments. Alternatives including the Big Lake Segment would impact 25 acres of the Su-Knik Mitigation Bank . The Iditarod Dog Sledding Historic District would be

[20] These include the development of a bulk materials facility, gravel mining operations, deep draft dock expansion, and barge dock expansion.

crossed by all build alternatives. Alternatives including the Big Lake and Willow segments would tend to impact a greater number of known cultural resources and have many medium to high level probability areas for encountering cultural resources. Alternatives including the Mac West-Connector 1 Segment Combination or the Willow Segment would tend to cross a greater number of trails and recreation areas. Although all of the proposed rail line segments are technically feasible to build, and any combination of the segments that would connect the existing main line to Port MacKenzie would satisfy the project's purpose and need, only 4 alternatives are expected to result in *de minimis* impacts on section 4(f) resources: the Mac East-Big Lake, Mac East Variant-Connector 2a-Big Lake, Mac East Variant-Connector 3 Variant-Houston-Houston South, and Mac East-Connector 3-Houston-Houston South alternatives. Under section 4(f) of the Department of Transportation Act of 1966, the FRA would not be permitted to provide funding for any STB authorized alternative that would involve the use of a section 4(f) property unless the potential impacts would be *de minimis* or there were no prudent and feasible alternatives that avoided section 4(f) properties. Under the No-Action Alternative there would be no impacts from the proposed project because it would not be built.

2.5 Environmentally Preferable Alternative

CEQ NEPA implementing regulations (40 C.F.R. § 1502.14(e)) require an agency to identify its preferred alternative in a Final EIS, if it has not already done so in a Draft EIS. This section sets forth OEA's environmentally preferable alternative. The cooperating agencies (the USACE, FRA, and U.S. Coast Guard) have not identified an environmentally preferable alternative at this time, but may do so in separate Records of Decision.

Section 2.3 discusses the proposed rail line alignments that OEA selected for detailed environmental review as alternatives in this Final EIS. To facilitate comparison of the alternatives, OEA divided the alternatives into southern, northern, and connector segments. The alternatives considered in the EIS include construction and operation of a rail line along southern, northern, and connector segments and a No-Action Alternative (see Figure 2-2 for a key to map areas). Details on the selection of OEA's environmentally preferable alternative are provided below.

2.5.1 Weighing the Environmental Impacts of the Build Alternatives

In this EIS, OEA has conducted an extensive and detailed evaluation of the potential environmental impacts (including concerns raised by Federal and state government agencies; private citizens; and other interested parties during the EIS process) associated with the proposed action and alternatives. This evaluation demonstrated that all of the build alternatives would result in numerous environmental impacts, including potential impacts to wetlands and other waters, anadromous fisheries, land access, vegetation and terrestrial wildlife habitat, parks and recreational resources, private property including residences, and cultural resources. Moreover, while the mitigation recommended in this Final EIS is reasonable and feasible to minimize environmental effects that would be caused by the proposed rail line, potential environmental effects would remain.

OEA has carefully balanced all of the information available on potential environmental impacts (including concerns raised by Federal and state government agencies, private citizens, and other

interested parties during the EIS process) in identifying its environmentally preferable alternative. The widely varying nature of the potential impacts by alternative complicated this balancing and identification process. As an example, the Mac East Variant-Connector 3 Variant-Willow Alternative would directly impact the fewest acres of wetlands and waters of the United States. However, this alternative also could result in some of the greatest potential impacts to fisheries, waterways (via bridge and culvert crossings), terrestrial habitat (via habitat fragmentation), land access, state recreation and wildlife areas (for example, it would bisect the Willow State Recreation Area), floodplains, and cultural resources.

As explained below, OEA has identified the Mac East Variant-Connector 3 Variant-Houston-Houston South Alternative (see Figure 2-6) as its environmentally preferable alternative for the proposed rail line. OEA believes that this alternative, with OEA's final mitigation recommendations, would most effectively avoid, minimize, and reduce potential environmental impacts to the extent reasonable if the Board decides to authorize the construction and operation of the proposed rail line. Notwithstanding OEA's final recommended mitigation, adverse impacts would still occur to recreational access, wetlands, anadromous fisheries, and other resource areas. The only means to completely avoid these potential impacts would be for the Board to deny the proposed action. In making its final decision, the Board will consider the entire environmental record (including these unavoidable impacts), as well as the transportation merits of the proposed rail line.

This section summarizes the potential environmental impacts and describes in more detail OEA's basis for recommending the Mac East Variant-Connector 3 Variant-Houston-Houston South Alternative as the preferred alternative.

The Mac East Variant-Connector 3 Variant-Houston-Houston South Alternative would have a comparatively low level of potential impacts to most of the specific resource categories in Table 2-2, making it the alternative with the least potential for environmental effects overall. This alternative is located in an area of flat topography. In addition, it is 1 of 2 alternatives with the fewest overall water crossings, proposed drainage structures, and culvert extensions; one of the alternatives with the fewest number of proposed culverts; it has a comparatively low level of both floodplain acres and floodplain and potential floodplain crossings; and it has the third lowest amount of wetlands and water acreages disturbed. This alternative also would have the second lowest amount of habitat acreage disturbed. It is 1 of 4 alternatives with the fewest number of fish-bearing stream crossings, 1 of 2 alternatives with the fewest number of anadromous stream crossings, and 1 of 2 alternatives with the lowest estimated index of upstream fish habitat potential. OEA's preferred alternative also would have the lowest number of known cultural resources affected, as well as a low probability for cultural resources, only 1 structure and no residences or businesses within the 200-foot ROW, a moderate number of officially recognized trails crossed and a small number of Iditarod Dog Sledding Historic District contributing trails crossed, and no impacts to state recreation or refuge areas.

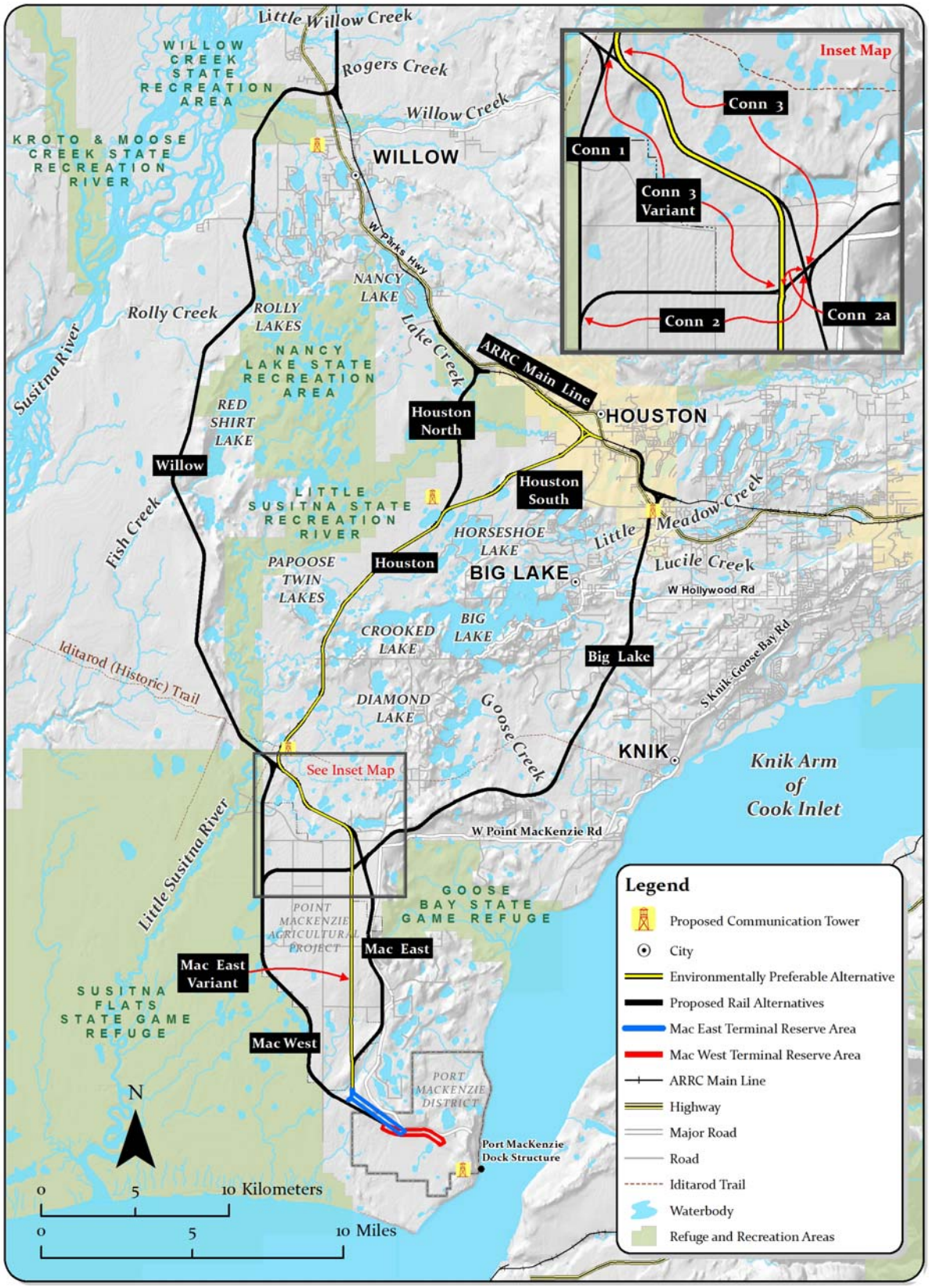

Figure 2-6. OEA's Environmentally Preferable Alternative

Below is a summary of additional weighting factors from segments and segment-combinations which led OEA to select the Mac East Variant-Connector 3 Variant-Houston-Houston South Alternative as the environmentally preferable alternative.

Alternatives that include the Mac West Segment generally would have higher environmental impacts than the alternatives that include other southern segments. Those potential impacts would include a larger number of water crossings, increased impacts to and crossings of floodplains and potential floodplains, a greater potential impact to wetlands and waters, increased fragmentation of core habitat, a higher loss of moose foraging habitat, a larger number of fish-bearing stream crossings, a greater estimated index of fish habitat potential, a greater impact to official trails and trails contributing to the Iditarod Dog Sledding Historic District, larger impacts to recreation and refuge areas, and a higher noise impact to section 4(f) properties. Thus, alternatives that include this segment were not considered environmentally preferable.

The Mac East Variant and Mac East segments would have similar potential impacts, but the Mac East Variant would be environmentally preferable because alternatives including the Mac East Variant Segment would have a lower impact to wetlands and waters, a smaller impact on habitat, would affect a lower number of cultural resources, would require the taking of fewer structures within the 200-foot ROW, and fewer trails contributing to the Iditarod Dog Sledding Historic District.

Alternatives that include the Willow Segment generally would have higher environmental impacts than alternatives that include other northern segments. Alternatives that include the Willow Segment would have a greater number of bridges and new water crossings, increased impacts to and crossings of floodplains and potential floodplains, a larger amount of habitat lost, a greater estimated index of fish habitat potential, a larger impact to cultural resources, a greater impact to recreation and refuge areas, and a higher noise impact to section 4(f) resources. Thus, alternatives that include this segment would not be environmentally preferable.

Alternatives that include the Big Lake Segment would have greater potential impacts to moose foraging habitat, a larger impact to private land, and a greater number of structures taken within the 200-foot ROW than other northern segments. When compared to alternatives including the Houston South Segment, alternatives including the Big Lake Segment also would have higher potential impacts to wetlands and waters, a greater amount of habitat loss, a greater number of anadromous fish crossings, a higher index of estimated fish habitat potential, and a significantly higher impact to cultural resources. In addition to those potential impacts in Table 2-2, the Big Lake Segment would impact 25 acres of the Su-Knik Mitigation Bank; would disturb a minimum of 4 acres within the Goose Creek Fen, an important ecological feature supporting diverse plant communities and providing high-value rearing habitat for anadromous fish species; and would require the relocation of 2,440 feet of anadromous fish stream. Thus, alternatives that include this segment would not be environmentally preferable.

Alternatives that include the Houston North segment would have a greater number of water crossings, a larger impact to wetlands and waters, and a larger number of fish-bearing and anadromous stream crossings than other northern segments. When compared to alternatives including the Houston South Segment, alternatives including the Houston North Segment also would have an additional floodplain or potential floodplain crossing, a larger amount of habitat

loss, a higher index of fish habitat potential, 1 additional cultural resource affected, and a greater impact to state recreation and refuge areas, and a higher noise impact to section 4(f) resources. Thus, alternatives that include the Houston North Segment would not be environmentally preferable to the alternatives that include the Houston South Segment.

2.5.2 Relationship to the LEDPA

In addition to authority from the Board, ARRC would also need to obtain a Clean Water Act section 404 permit from the USACE before beginning construction of the proposed rail line. This permit is required for the discharge of dredged or fill materials into waters of the United States, including wetlands (33 U.S.C. § 1251 *et seq.*). Among the various requirements to obtain a section 404 permit, ARRC would need to demonstrate to the USACE that the routing alternative it seeks to permit under the Clean Water Act is the least environmentally damaging practicable alternative (LEDPA), as defined at 40 C.F.R. § 230.10(a).

Although it is not OEA's role to identify the LEDPA, it was incumbent upon OEA to consider as part of its NEPA analysis whether one of the routing alternatives among those carried forward for detailed analysis in the EIS could be found, at the appropriate time and by the USACE, to be the LEDPA. OEA fully understands that it is the USACE's responsibility to determine whether the routing alternative set forth in the Applicant's Clean Water Act application constitutes the LEDPA.[21] OEA believes that the USACE could reasonably determine that the environmentally preferable alternative in this Final EIS could also be the LEDPA.

2.6 Summary of OEA's Final Recommended Mitigation Measures

Based on the information to date; consultation with Federal, state, and local agencies; input provided by a wide variety of organizations and citizens of Alaska; and its own independent environmental analysis, OEA has developed in this Final EIS additional recommended mitigation measures to address the environmental impact of the proposed action.

The final recommended mitigation measures include measures initially volunteered or suggested by the Applicant and additional measures developed by OEA. OEA recommends that the Board impose all of these mitigation measures in any decision granting ARRC the authority to construct and operate the proposed rail line.

ARRC would be required to comply with all mitigation imposed by the Board, regardless of whether the specific measure was developed by OEA or volunteered or suggested by ARRC. OEA's final recommended mitigation measures are provided in Chapter 19.

[21] To achieve the LEDPA, the Applicant would need to incorporate appropriate wetland avoidance and minimization strategies and design features into its section 404 permit application. Examples of these avoidance and minimization strategies include horizontal shifts in the rail line footprint to avoid wetland areas and utilization of bridges rather than culverts to minimize direct impacts to streams and rivers. The USACE would determine whether ARRC's project-specific avoidance and minimization proposals are sufficient to justify the LEDPA designation.

Table 2-2
Summary and Comparison of Potential Impacts (page 1 of 3)

	Mac West-Conn 1-Willow	Mac West-Conn 1-Houston-Houston North	Mac West-Conn 1-Houston-Houston South	Mac West-Conn 2- Big Lake	Mac East-Conn 3-Willow	Mac East-Conn 3-Houston-Houston North	Mac East-Conn 3-Houston-Houston South	Mac East- Big Lake	Mac East Var-Conn 2a- Big Lake	Mac East Var-Conn 3 Var-Willow	Mac East Var-Conn 3 Var-Houston-Houston North	Mac East Var-Conn 3 Var-Houston-Houston South
Topography, Geology, Soils	Topography relatively flat, little need for cutting and filling expected	Topography relatively flat, little need for cutting and filling expected	Topography relatively flat, little need for cutting and filling expected	Topography relatively flat, some areas of rolling hills, greater need for cutting and filling expected	Topography relatively flat, little need for cutting and filling expected	Topography relatively flat, little need for cutting and filling expected	Topography relatively flat, little need for cutting and filling expected	Topography relatively flat, some areas of rolling hills, greater need for cutting and filling expected	Topography relatively flat, some areas of rolling hills, greater need for cutting and filling expected	Topography relatively flat, little need for cutting and filling expected	Topography relatively flat, little need for cutting and filling expected	Topography relatively flat, little need for cutting and filling expected
	Locally important soil acres lost: 286	Locally important soil acres lost: 180	Locally important soil acres lost: 186	Locally important soil acres lost: 170	Locally important soil acres lost: 405	Locally important soil acres lost: 299	Locally important soil acres lost: 305	Locally important soil acres lost: 257	Locally important soil acres lost: 254	Locally important soil acres lost: 405	Locally important soil acres lost: 299	Locally important soil acres lost: 305
Water Resources	Crossings include 32 culverts, 3 culvert extensions, 4 drainage structures,[a] and 5 bridges	Crossings include 31 culverts, 13 culvert extensions, 4 drainage structures, and 3 bridges	Crossings include 33 culverts, 2 culvert extensions, 3 drainage structures, and 2 bridges	Crossings include 32 culverts, 3 culvert extensions, and 7 drainage structures	Crossings include 18 culverts, 3 culvert extensions, 3 drainage structures, and 5 bridges	Crossings include 17 culverts, 13 culvert extensions, 3 drainage structures, and 3 bridges	Crossings include 19 culverts, 2 culvert extensions, 2 drainage structures, and 2 bridges	Crossings include 15 culverts, 3 culvert extensions, 7 drainage structures, and 1 bridge	Crossings include: 15 culverts, 3 culvert extensions, 7 drainage structures, and 1 bridge	Crossings include: 18culverts, 3 culvert extensions, 3 drainage structures, and 5 bridges	Crossings include: 17 culverts, 13 culvert extensions, 3 drainage structures, and 3 bridges	Crossings include: 19 culverts, 2 culvert extensions, 2 drainage structures, and 2 bridges
	11 identified floodplain crossings and potential floodplain crossings	10 identified floodplain crossings and potential floodplain crossings	9 identified floodplain crossings and potential floodplain crossings	6 identified floodplain crossings and potential floodplain crossings	9 identified floodplain crossings and potential floodplain crossings	8 identified floodplain crossings and potential floodplain crossings	7 identified floodplain crossings and potential floodplain crossings	5 identified floodplain crossings and potential floodplain crossings	5 identified floodplain crossings and potential floodplain crossings	9 identified floodplain crossings and potential floodplain crossings	8 identified floodplain crossings and potential floodplain crossings	7 identified floodplain crossings and potential floodplain crossings
	Total wetland/water acres: 255 (Forested 120, Scrub/shrub 113, Emergent 19, Waters 3)	Total wetland/water acres: 318 (Forested 134, Scrub/shrub 153, Emergent 29, Waters 3)	Total wetland/water acres: 278 (Forested 123, Scrub/shrub 130, Emergent 23, Waters 2)	Total wetland/water acres: 275 (Forested 118, Scrub/shrub 138, Emergent 18, Waters <1)	Total wetland/water acres[b]: 140 (Forested 82, Scrub/shrub 51, Emergent 6,Waters 2)	Total wetland/water acres: 204 (Forested 96, Scrub/shrub 91, Emergent 14, Waters 3)	Total wetland/water acres: 164 (Forested 85, Scrub/shrub 68, Emergent 9, Waters 2)	Total wetland/water acres[18]: 175 (Forested 82, Scrub/shrub 86, Emergent 6, Waters <1)	Total wetland/water acres[18]: 169 (Forested 82, Scrub/shrub 82, Emergent 5, Waters <1)	Total wetland/water acres: 137 (Forested 84, Scrub/shrub 46, Emergent 5, Waters 2)	Total wetland/water acres: 200 (Forested 98, Scrub/shrub 86, Emergent 14, Waters 3)	Total wetland/water acres: 160 (Forested 86, Scrub/shrub 64, Emergent 9, Waters 2)

Table 2-2
Summary and Comparison of Potential Impacts (page 2 of 3)

	Mac West-Conn 1-Willow	Mac West-Conn 1-Houston-Houston North	Mac West-Conn 1-Houston-Houston South	Mac West-Conn 2- Big Lake	Mac East-Conn 3-Willow	Mac East-Conn 3- Houston-Houston North	Mac East-Conn 3- Houston-Houston South	Mac East- Big Lake	Mac East Var-Conn 2a- Big Lake	Mac East Var-Conn 3 Var-Willow	Mac East Var-Conn 3 Var-Houston-Houston North	Mac East Var-Conn 3 Var-Houston-Houston South
Biological Resources	Total habitat acres lost: 779	Total habitat acres lost: 663	Total habitat acres lost: 608	Total habitat acres lost: 716	Total habitat acres lost: 822	Total habitat acres lost: 708	Total habitat acres lost: 652	Total habitat acres lost: 731	Total habitat acres lost: 714	Total habitat acres lost: 821	Total habitat acres lost: 707	Total habitat acres lost: 651
	Fragmentation of core habitats: 2,847 acres of forest and woody wetland	Fragmentation of core habitats: 2,592 acres of primarily woody and emergent wetland	Fragmentation of core habitats: 3,210 acres of primarily woody and emergent wetland	Fragmentation of core habitats: 2,631 acres of forest and wetland	Fragmentation of core habitats: 2,133 acres of forest and woody wetland	Fragmentation of core habitats: 1,877 acres of emergent and woody wetland and forest	Fragmentation of core habitats: 2,495 acres of emergent and woody wetland and forest	Fragmentation of core habitats: 1,191 acres of forest and woody wetland	Fragmentation of core habitats: 1,402 acres of forest and woody wetland	Fragmentation of core habitats: 2,139 acres of forest and woody wetland	Fragmentation of core habitats: 1,883 acres of forest and woody wetland	Fragmentation of core habitats: 2,501 acres of forest and woody wetland
	Moose foraging habitat acres lost: 194	Moose foraging habitat acres lost: 267	Moose foraging habitat acres lost: 268	Moose foraging habitat acres lost: 270	Moose foraging habitat acres lost: 152	Moose foraging habitat acres lost: 222	Moose foraging habitat acres lost: 223	Moose foraging habitat acres lost: 231	Moose foraging habitat acres lost: 232	Moose foraging habitat acres lost: 156	Moose foraging habitat acres lost: 226	Moose foraging habitat acres lost: 228
	Fish-bearing stream crossings: 16	Fish-bearing stream crossings: 18	Fish-bearing stream crossings: 13	Fish-bearing stream crossings: 12	Fish-bearing stream crossings: 13	Fish-bearing stream crossings: 15	Fish-bearing stream crossings: 10	Fish-bearing stream crossings: 10	Fish-bearing stream crossings:10	Fish-bearing stream crossings:13	Fish-bearing stream crossings:15	Fish-bearing stream crossings:10
	Anadromous stream crossings: 7 (5 bridges, 1 culvert, 1 plate pipe/arch)	Anadromous stream crossings: 9 (3 bridges, 1 culvert)	Anadromous stream crossings: 6 (2 bridges, 1 culvert)	Anadromous stream crossings: 8	Anadromous stream crossings: 6 (4 bridges, 1 plate pipe/arch)	Anadromous stream crossings: 8 (2 bridges, 1 culvert	Anadromous stream crossings: 5 (1 bridge, 1 culvert)	Anadromous stream crossings: 8	Anadromous stream crossings: 8	Anadromous stream crossings: 6 (4 bridges, 1 plate pipe/arch)	Anadromous stream crossings: 8 (2 bridges, 1 culvert)	Anadromous stream crossings: 5 (1 bridge, 1 culvert)
	Index of Fish Habitat Potential: 271,400	Index of Fish Habitat Potential: 97,000	Index of Fish Habitat Potential: 75,500	Index of Fish Habitat Potential: 80,800	Index of Fish Habitat Potential: 266,800	Index of Fish Habitat Potential: 92,500	Index of Fish Habitat Potential: 70,600	Index of Fish Habitat Potential: 79,400	Index of Fish Habitat Potential: 79,400	Index of Fish Habitat Potential: 266,800	Index of Fish Habitat Potential: 92,500	Index of Fish Habitat Potential: 70,600
Cultural Resources	Total cultural resources potentially affected: 44	Total cultural resources potentially affected: 20	Total cultural resources potentially affected: 19	Total cultural resources potentially affected: 35	Total cultural resources potentially affected: 49	Total cultural resources potentially affected: 24	Total cultural resources potentially affected: 23	Total cultural resources potentially affected: 38	Total cultural resources potentially affected:32	Total cultural resources potentially affected:42	Total cultural resources potentially affected:16	Total cultural resources potentially affected:15
	Cultural resource probability: low, medium, high level areas	Cultural resource probability: low	Cultural resource probability: low	Cultural resource probability: low, medium, high level areas	Cultural resource probability: many medium to high level areas	Cultural resource probability: low, medium, high level areas	Cultural resource probability: low, medium, high level areas	Cultural resource probability: many medium to high level areas	Cultural resource probability: low, medium, high level areas	Cultural resource probability: low, medium, high level areas	Cultural resource probability: low	Cultural resource probability: low

Table 2-2
Summary and Comparison of Potential Impacts (page 3 of 3)

	Mac West-Conn 1-Willow	Mac West-Conn 1-Houston-Houston North	Mac West-Conn 1-Houston-Houston South	Mac West-Conn 2- Big Lake	Mac East-Conn 3-Willow	Mac East-Conn 3- Houston-Houston North	Mac East-Conn 3- Houston-Houston South	Mac East- Big Lake	Mac East Var-Conn 2a- Big Lake	Mac East Var-Conn 3 Var-Willow	Mac East Var-Conn 3 Var-Houston-Houston North	Mac East Var-Conn 3 Var-Houston-Houston South
Land Use	244 acres private land	210 acres private land	317 acres private land	487 acres private land	269 acres private land	235 acres private land	342 acres private land	429 acres private land	445 acres private land	283 acres private land	249 acres private land	356 acres private land
	Structures in the 200-foot ROW: 0	Structures in the 200-foot ROW: 0	Structures in the 200-foot ROW: 0	Structures in the 200-foot ROW: 10 structures, 5 residences, 1 business	Structures in the 200-foot ROW: 2	Structures in the 200-foot ROW: 2	Structures in the 200-foot ROW: 2	Structures in the 200-foot ROW: 10 structures, 5 residences, 1 business	Structures in the 200-foot ROW: 11 structures, 5 residences, 1 business	Structures in the 200-foot ROW:1	Structures in the 200-foot ROW: 1	Structures in the 200-foot ROW: 1
	Acres under agricultural covenant: 181	Acres under agricultural covenant: 181	Acres under agricultural covenant: 163	Acres under agricultural covenant: 185	Acres under agricultural covenant: 143	Acres under agricultural covenant: 124	Acres under agricultural covenant: 124	Acres under agricultural covenant: 91	Acres under agricultural covenant: 141	Acres under agricultural covenant: 192	Acres under agricultural covenant: 173	Acres under agricultural covenant: 173
	Official trails crossed: 11 Contributing trails crossed[c]: 6	Official trails crossed: 9 Contributing trails crossed: 6	Official trails crossed: 11 Contributing trails crossed: 6	Official trails crossed: 6 Contributing trails crossed: 6	Official trails crossed: 8 Contributing trails crossed[19]: 4	Official trails crossed: 6 Contributing trails crossed: 3	Official trails crossed: 8 Contributing trails crossed: 3	Official trails crossed: 5 Contributing trails crossed: 2	Official trails crossed: 5 Contributing trails crossed: 1	Official trails crossed: 8 Contributing trails crossed[19]: 3	Official trails crossed: 6 Contributing trails crossed: 2	Official trails crossed: 8 Contributing trails crossed: 2
	4 state recreation or refuge areas crossed	2 state recreation or refuge areas crossed	2 state recreation or refuge areas crossed	1 state recreation or refuge area crossed	3 state recreation or refuge areas crossed	1 state recreation or refuge area crossed	0 state recreation or refuge area crossed	0 state recreation or refuge areas crossed	0 state recreation or refuge areas crossed	3 state recreation or refuge areas crossed	1 state recreation or refuge areas crossed	0 state recreation or refuge areas crossed
	Adverse noise impact to 3,622 acres of section 4(f) properties	Adverse noise impact to 2,920 acres of section 4(f) properties	Adverse noise impact to 1,944 acres of section 4(f) properties	Adverse noise impact to 1,376 acres of section 4(f) properties	Adverse noise impact to 1,678 acres of section 4(f) properties	Adverse noise impact to 976 acres of section 4(f) properties	Adverse noise impact to 0 acres of section 4(f) properties	Adverse noise impact to 0 acres of section 4(f) properties	Adverse noise impact to 0 acres of section 4(f) properties	Adverse noise impact to 1,678 acres of section 4(f) properties	Adverse noise impact to 976 acres of section 4(f) properties	Adverse noise impact to 0 acres of section 4(f) properties

[a] Drainage structures are defined as crossing structures whose structure would be determined by the Applicant during the final design process and could include multi-plate culverts, pre-cast arches, and single or multiple short-span bridges.
[b] Includes 2,440 feet of stream relocation, the crossing of 2 pacels of the Su-Knik Wetland Mitigation Bank, and impacts to Goose Creek Fen.
[c] Contributing trails are trails associated with the *Iditarod Dog Sledding Historic District/Historic Vernacular Landscape*. These are additional trails and do not include those trails that are also officially recognized, such as Iditarod National Historic Trail.