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; a reasonable range of alternatives for analysis in this Draft 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 [CFR] 213). ARRC proposes to transport commercial freight on the rail line, and would construct and maintain the rail line to Class 4 standards[1] because of its desired operating speed for freight service. ARRC proposes a right-of-way (ROW) of approximately 200 feet for the rail line. Unless otherwise noted, this Draft EIS assumes that all construction activities would occur within this 200-foot-wide ROW. ARRC might reduce the width of the ROW, as necessary, to minimize impacts to sensitive resources or accommodate the terrain. The ROW could contain an above-ground power line, buried utility lines, and an access road (see Figure 2-1). In addition, ARRC would construct one rail line siding within the existing main line ROW at the tie-in location with the rail extension. The area in the ROW that is 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.

In addition to the proposed rail line, ARRC would construct associated facilities to support rail line operations. 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.

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.

[1] 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 [CFR] 213). Compliance with Class 4 standards would provide for ARRC's anticipated operating speed of 40 miles per hour.

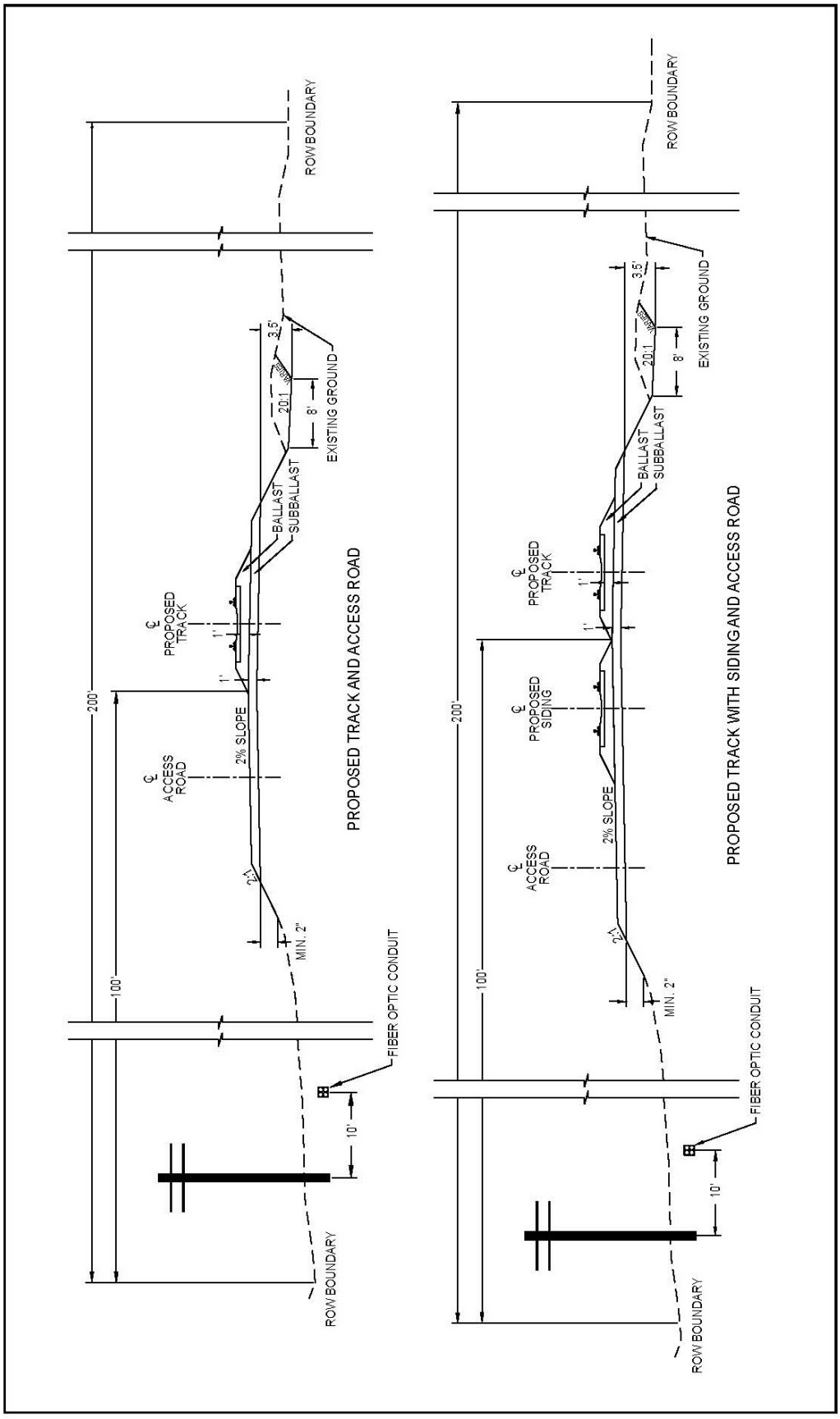

Figure 2-1. Cross-Sections of Rail Line Right-of-Way

2.1.1.1 Right-of-Way

Unless otherwise indicated, construction activities would occur within the 200-foot ROW. For purposes of analysis, SEA assumes that the entire ROW would be permanently cleared of vegetation for construction and then operations. However, some areas might not require full use of the ROW, and those areas would be restored after construction 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 alignment and within the 200-foot ROW. ARRC would construct the access road before the rail line and would use the access road for construction of the proposed rail line. ARRC would not maintain the access road as a public road.

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

2.1.1.3 Railbed Construction

Before any track could be placed, ARRC would construct a suitable railbed. The railbed would form the base upon which ARRC would lay the ballast, rail ties, and rail. Railbed 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 railbed construction and would transport and deposit it in an appropriate location. ARRC would store unsuitable railbed 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 railbed. 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 railbed 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 railbed as nonstructural fill to support revegetation.

ARRC would obtain fill material from cut-and-fill activities during railbed 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 shipped 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 railbed 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, 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 and culverts 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 railbed and vehicle roadbed to allow water to flow under the rail line and access road. ARRC proposes to construct between 16 and 34 single culverts and between 2 and 7 drainage structures, 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 four 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, and a tributary to Little Willow Creek. 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.

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

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 Port MacKenzie Rail Extension would 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 some portions of the rail line. However, there would not be construction activities 24 hours a day along significant portions of the project length because of 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 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, meaning specifically established within currently-adopted plans by ADNR and/or MSB or are established within these plans at the time of construction or ROW conveyance (whichever occurs first), and are located on state, MSB property, or whose locations are provided for by recorded ROW or easement, ARRC proposed to provide public access by a grade-separated crossing where practicable, or the trail could be relocated to avoid crossing the rail line. The design of the crossing would accommodate existing trail users at the time of construction or ROW conveyance (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 one mile might be consolidated. ARRC does not propose to provide crossings for unofficial trails. Unofficial trails would be blocked, and ARRC's trespassing regulations would prohibit crossing of the ROW. The following trails have been identified by ARRC for grade-separated crossings and/or relocation.

- Aurora Dog Mushers Club Trail
- Crooked Lake Trail
- Figure 8 Lake Loop Trail
- Flat Lake Connector
- Flathorn Lake Trail
- Herning Trail
- Houston Lake Loop Trail
- Iditarod Link Trail
- 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 two terminal reserve areas, but would build only one 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 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.

Communications Towers

ARRC has identified five locations for communications towers throughout the project area; two or three new towers, depending on the alternative, are anticipated to be constructed to support rail line operations. Tower locations would depend on which alternative the Board authorized, if any. The tower locations include one near Port MacKenzie, one in the central area of the proposed project, and three 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 one 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 alignment and would be in the 200-foot ROW.

2.1.2 Proposed Rail Line Operations

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.[2] Train speeds would be a maximum 60 miles per hour.

ARRC would perform periodic maintenance and inspections to ensure safe and reliable rail line operations. 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.

[2] 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 five Panamax class ships per year. As the estimated average of two trains per day, with an average of 40 to 80 freight cars each, represents an upper bound of potential ship traffic, all impacts presented in this EIS would be encompassed in an analysis based on this volume of ship traffic.

2.2 Alternatives Development

Prior to filing its request to construct and operate a 30 to 45 mile proposed rail line with the STB, ARRC identified and considered several potential alignments for this rail line extension. This section summarizes the process ARRC used to develop various alignments and SEA's review and consideration of those alignments as EIS alternatives.

2.2.1 Alignment Development Process

More than 10 years ago, Matanuska-Susitna Borough (MSB or the Borough) identified a potential need for rail transport from Port MacKenzie (which was not constructed at that time) to the ARRC main line north of Port MacKenzie. In 2003, 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).

MSB consulted the U.S. Army Corps of Engineers regarding potential impacts to wetlands, the Alaska Department of Natural Resources (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 MSB an appropriation to perform conceptual engineering and environmental documentation for the Port MacKenzie Rail Extension. From September to December 2007, 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. 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 eight possible alignment configurations. Compared to the eleven corridors presented in the 2003 report, these eight alignments are considered new alignments that are different from the eleven corridors.

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

2.2.2 Alternatives Considered but Eliminated from Detailed Study

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

Table 2-1
SEA Questions on Port MacKenzie Rail Extension Alignments and ARRC Responses (page 1 of 2)

Potential Change	ARRC Response
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 during investigations in 2003 and 2007 but rejected it due to 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 highway, resulting in 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 alignment as suggested would involve construction in an area with compressible soils and would likely impact between 3 and 4 acres of additional wetlands. ARRC would propose to adjust the Nancy Lake SRA boundary so that the SRA land area would not be reduced or degraded and the rail extension alignment would be outside the SRA. This boundary adjustment would be subject to Alaska State Legislature approval as well as other agencies.
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 impacts to Blodgett Lake, an unnamed lake, and two Native American allotments near the tie-in to the existing rail line. Also, the Parks Highway corridor near Pittman Road is highly developed and a rail connection would further increase congestion in this area. The junction of Big Lake Road and the Parks Highway is one 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 with a shorter segment.	The rail alignment was located to minimize 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 streambed. To relocate this crossing upstream would be more difficult because Goose Creek spreads out into wider or multiple channels.

Table 2-1
SEA Questions on Port MacKenzie Rail Extension Alignments and ARRC Responses (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 two major disadvantages: (1) the Nancy Lake Creek crossing location would 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 rail cars 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 alignment into the agricultural area to avoid the game refuge would bisect farmland and increase potential impacts to property owners. ARRC would suggest mitigation that could include land swaps between the Susitna Flats State Game Refuge and private agricultural landowners so that 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. This land swap would require approval from state agencies.
Add an alignment 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. In addition, constructing a rail line in the Knik-Goose Bay Road corridor 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 noise impacts and safety issues related to illegal crossing of the track.

Based on the purpose and need for the proposed action (see Chapter 1), SEA and the cooperating agencies reviewed the ARRC initial alignments and alignments proposed in scoping comments to determine appropriate build alternatives. Through this review, SEA and the cooperating agencies determined that the alignments described in Section 2.3 provided a reasonable set of feasible alternatives for detailed study.

SEA also notes that rail across 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 (FHWA) 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 (i.e., in miles operated) than the alternatives being analyzed. 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 this Draft EIS, trucks, as compared to rail, are inefficient 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, utilize a combination of rail and transload to truck 30 miles away for final delivery to Port MacKenzie. However, such intermediate movements and handling requirements are not efficient and impose increased costs to the shipper and consumer due to multiple transfers of materials between transportation modes. The Applicant states that the cost for intermediate transloading from rail to truck, and the additional truck ton-mile cost for final delivery, actually places Port MacKenzie at a significant disadvantage to other regional ports with rail service.

For example, a railroad can move one ton of freight 457 miles on a gallon of diesel fuel, compared to 133 miles for a truck.[3] FRA compared overall fuel efficiency of rail and truck transport on 23 competitive corridors throughout the nation and concluded that, in all cases, moving freight by railroad was more fuel efficient than by truck.[4] The report concluded that, "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 transport by truck over the highway.

Because of the economics and efficiencies offered by direct rail service, the Applicant states that the use of freight 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

SEA independently reviewed the Applicant's Preliminary Environmental and Alternatives Report, 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, SEA and the cooperating agencies determined that the alignments described below are a reasonable range of alternatives for detailed study.

The alternatives are composed of southern and northern segments, with possible connector segments between. The southern segments, Mac West and Mac East, would run either east or

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

west of the Point MacKenzie Agricultural Project.[5] There are three main sections north of the Point MacKenzie Agricultural Project – Willow, Houston, and Big Lake – with Houston having north and south variants. Connector segments link the north and south segments to create eight possible routes for the proposed rail line, as listed below and shown in Figure 2-2.

- Mac West, Connector 1, and Willow. This route would be the longest, 46.0 miles long.
- Mac West, Connector 1, Houston, and Houston North. This route would be 34.9 miles long.
- Mac West, Connector 1, Houston, and Houston South. This route would be 35.6 miles long.
- Mac West, Connector 2, and Big Lake. This route would be 36.8 miles long.
- Mac East, Connector 3, and Willow. This route would be 44.9 miles.
- Mac East, Connector 3, Houston, and Houston North. This route would be 33.7 miles long.
- Mac East, Connector 3, Houston, and Houston South. This alternative would be 34.3 miles long.
- Mac East and Big Lake. This alternative would be the shortest, 31.4 miles.

Although SEA and the cooperating agencies have examined the eight alternatives listed above in detail, the agencies note that some of these alternatives may not be eligible for federal funding from 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, codified at 49 U.S.C. § 303. 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, provides that some USDOT agencies[6] 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) resources.

The Willow, Mac West 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. 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 three segments unless impacts would be *de minimis* because there are prudent and feasible alternatives that do not use Section 4(f) resources. This Draft EIS provides the information necessary for any decisions required under Section 4(f). Appendix M provides additional detail about Section 4(f).

[5] 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.

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

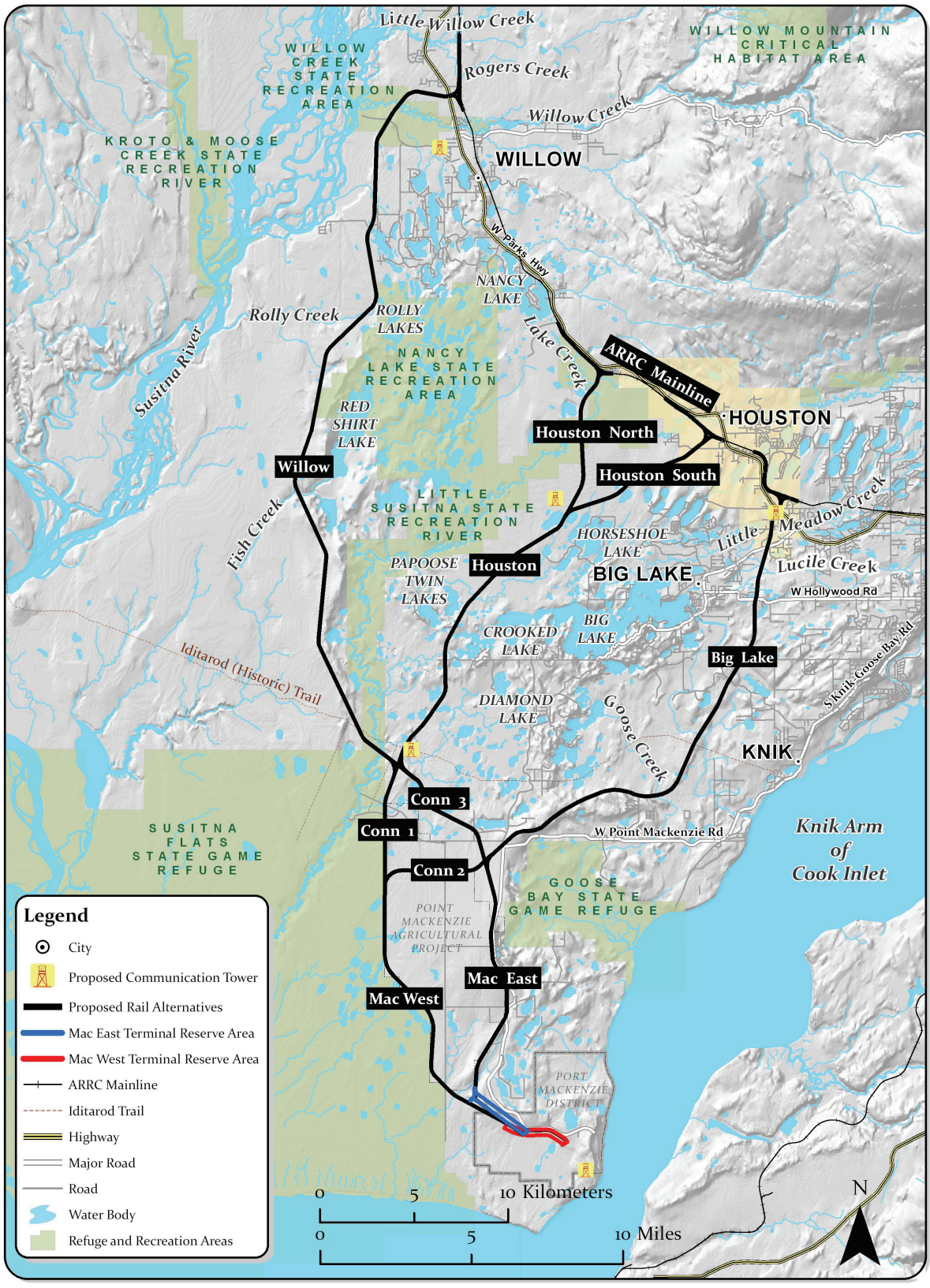

Figure 2-2. Alternatives Considered for the Port MacKenzie Rail Extension

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 along the eastern boundary of Susitna Flats State Game Refuge. The terminal reserve area is proposed along the south side of Mac West.

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.[7]

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 Farmers Road. The

[7] 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 is shifted to the west in relation to its previous location. 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.

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.

2.3.3 Northern Segments

2.3.3.1 Willow

From Connector 1 Segment or Connector 3 Segment, the Willow Segment would continue northwest where it would cross a corner of Susitna Flats State Game Refuge, 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 Connector 1 Segment or Connector 3 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 Lakes and Crooked Lake, 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 Lake and Little Horseshoe Lake, where it would connect to either the Houston North Segment or the Houston South Segment.

2.3.3.3 Houston North[8]

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 Cow Lake Trail, which is part of 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.

[8] Based on 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.

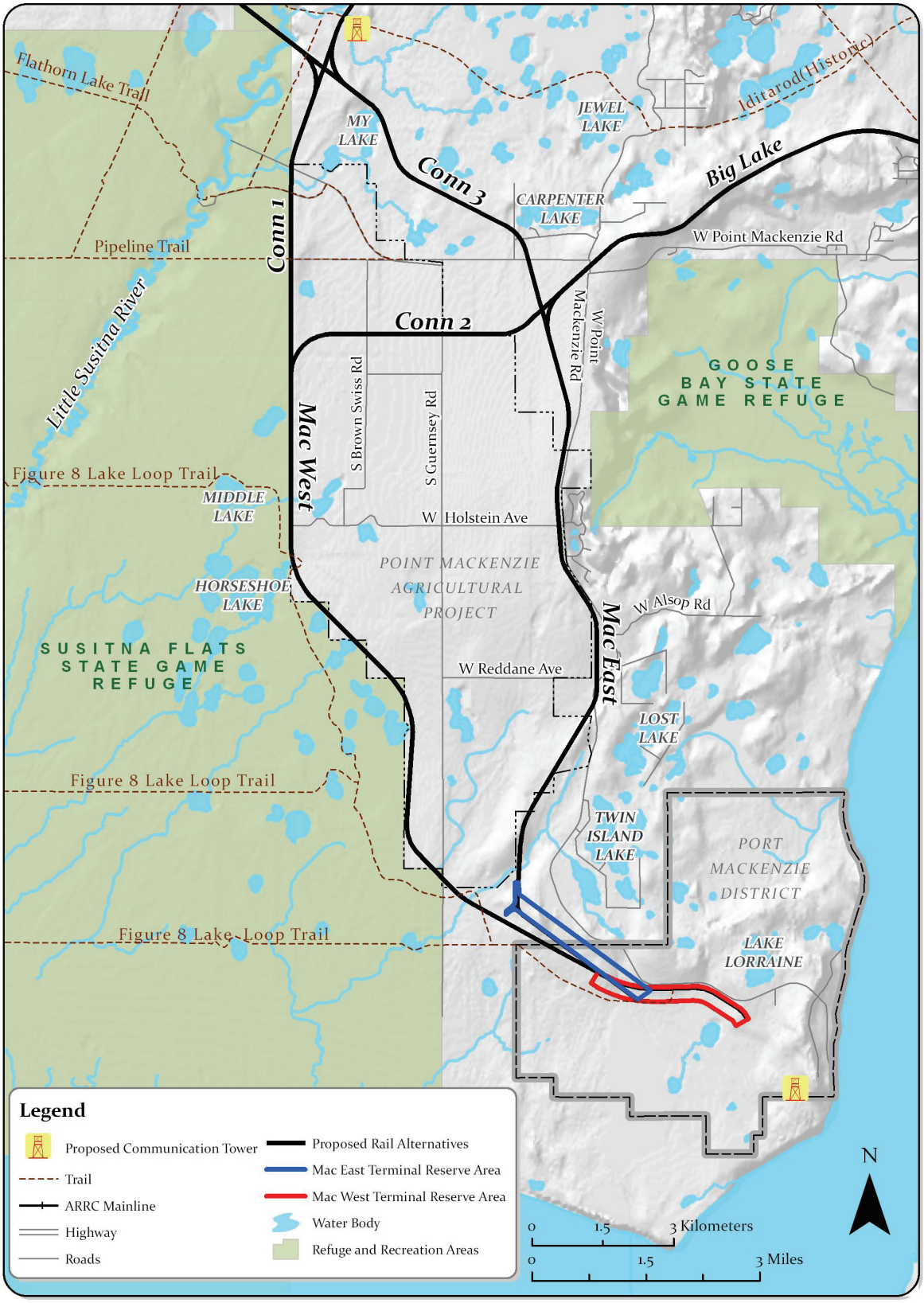

Figure 2-3. Mac East, Mac West, and Connector Segments

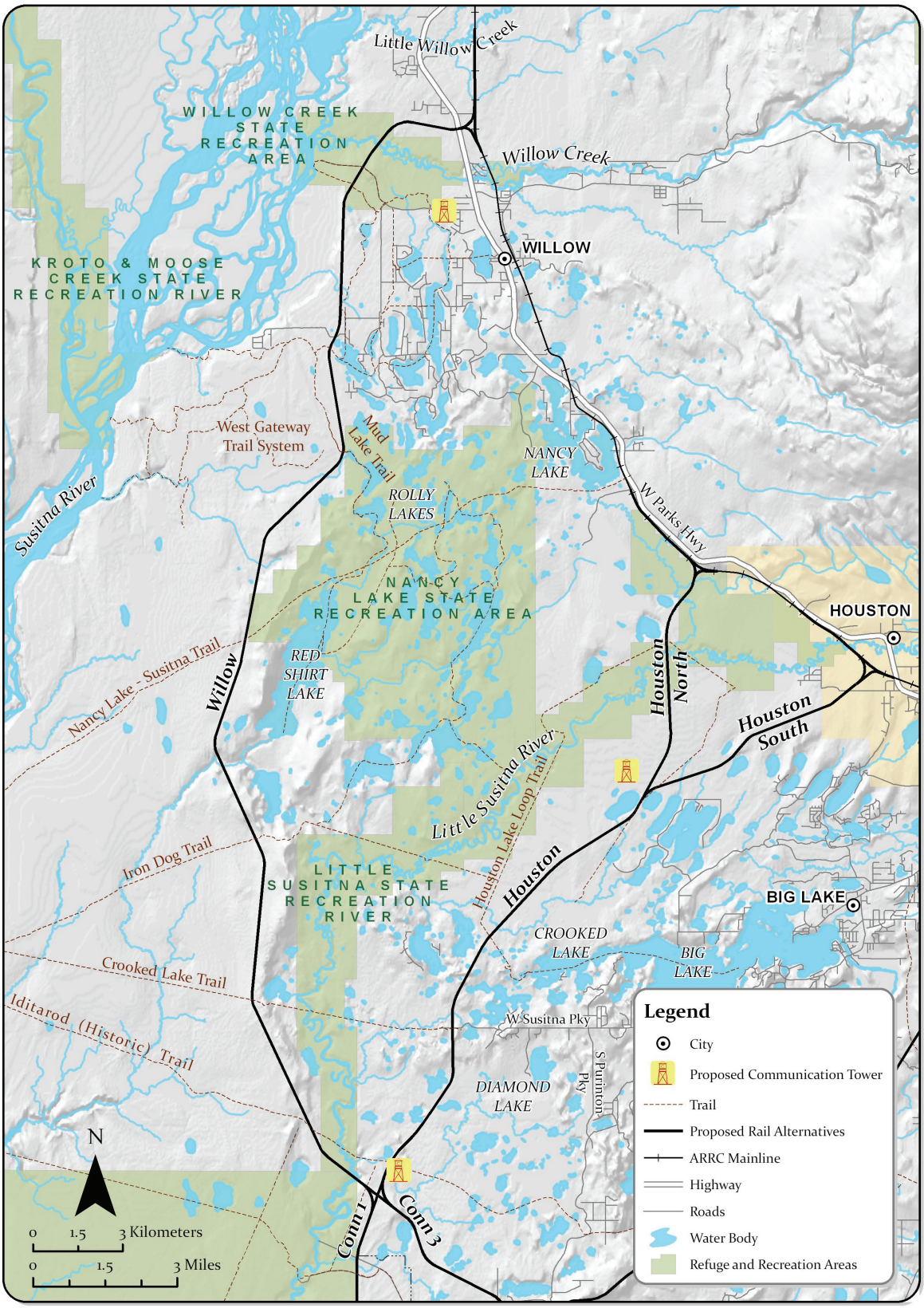

Figure 2-4. Willow and Houston Segments

2.3.3.4 Houston South

Also beginning between Muleshoe Lake and Little Horseshoe Lake, this proposed 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 the Parks Highway.

The proposed track siding for Houston South would include reconfiguration of the main line to construct the new siding. 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 the Mac East Segment or Connector 2 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 tie-in location for the Big Lake Segment. The following ARRC-supplied information supplements the Preliminary Environmental and Alternatives Report (Figure 2-5):

- Construct an approximately 430-foot bridge on Parks Highway over the proposed rail line and an unnamed anadromous fish stream.
- Relocate two 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.

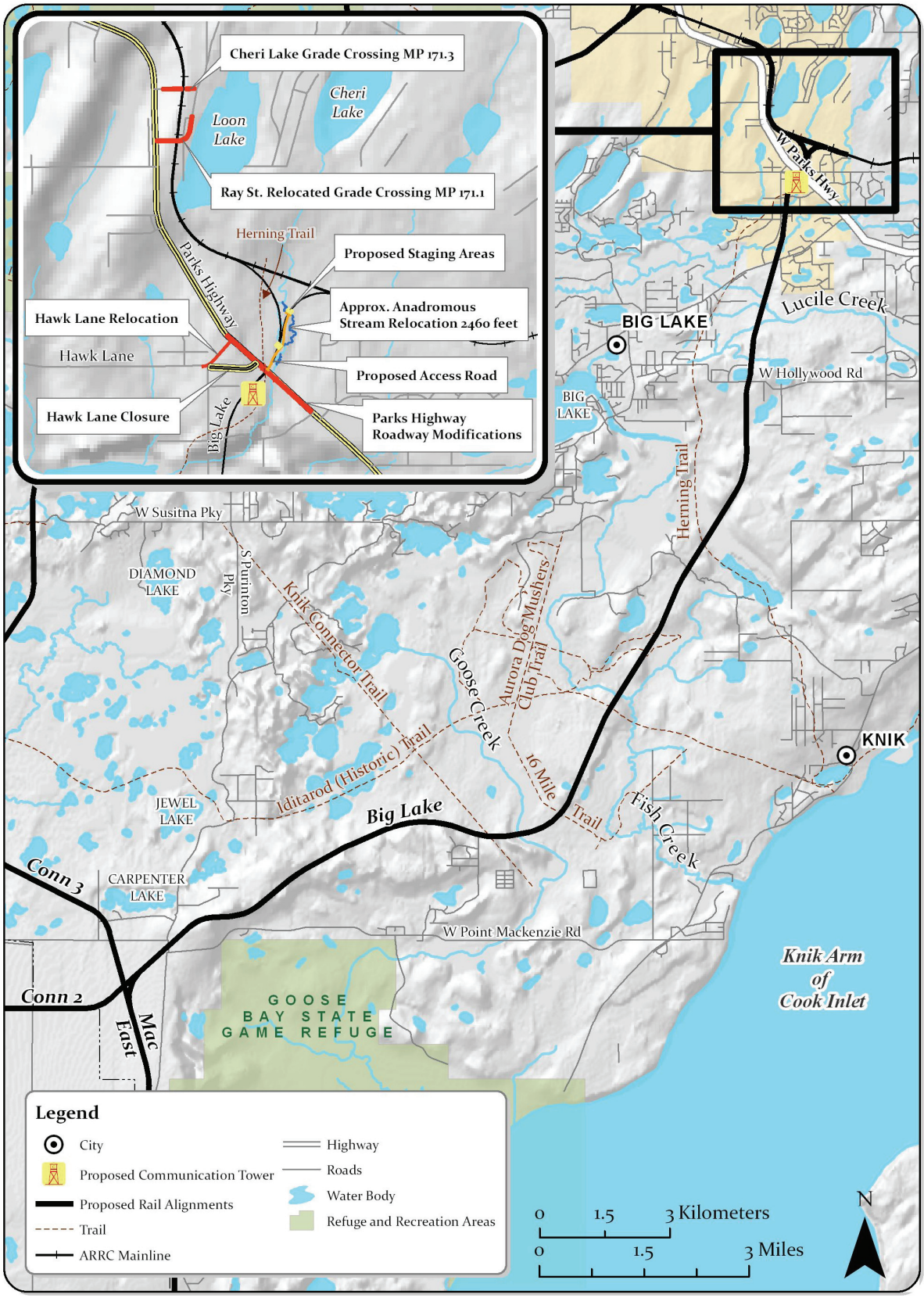

Figure 2-5. Big Lake Segment

- Acquire eight 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 two wetland mitigation bank parcels that are part of the Su-Knik Mitigation Bank. Use of these two mitigation bank parcels for the proposed rail line could require concurrence from the entities that created the mitigation bank or ARRC ROW acquisition through eminent domain.

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 to and from Port MacKenzie.

2.4 Comparison of Alternatives

2.4.1 Topography, Geology and Soils

Steeper terrain would require 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 one exception, the Big Lake Segment, the existing terrain for all segments and segment combinations that have been considered would be relatively flat. The Big Lake Segment, however, would have approximately 20 percent of its length crossing ground with slope greater than 1 percent, with the remaining 80 percent relatively flat. This segment would cross the highest percentage of slopes between one and five percent, slopes greater than five percent, and would cross ground with the highest maximum slope (27 percent). The Mac East Segment has 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 railroad would be constructed on soils the MSB considers locally important for agricultural purposes, though some of these soils may not be in use for agricultural purposes. The Mac East-Connector 3-Willow Alternative would have the greatest impact to soils the MSB considers locally important for agricultural purposes. The Mac West-Connector 1-Houston-Houston North Alternative would have the least impact to soils the MSB considers locally important for agriculture. However, the Mac West-Connector 1-Houston-Houston North Alternative would contain both the greatest percentage of poor soils for construction and the greatest length of peat and organic soils. Soft, compressible organic and peat soils, present in wetland areas, would have to be compacted or removed and replaced.

The MSB is subject to seismic activity. The most likely impact on the rail line from seismic activity would be misalignment or damage to the tracks, railbed, 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. With the segments and segment combinations being relatively close to one another, the minor differences in distance between a segment and a seismic event would not have an appreciably different effect on the segments and segment combinations.

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.

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 were the rail line and access road would be near, adjacent to, or span waterbodies. In these areas, ROW clearing, grading, and construction of the rail line, staging areas, and access road could lead to impacts on surface waters from increased erosion and nutrient loading. If subballast and fill materials are obtained from borrow areas, this could disrupt shallow-water areas (former borrow areas), including disturbing sediment, increasing turbidity, and generally degrading water quality; however, SEA 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 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 would 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 steambanks and riparian areas; increased stages and velocities of floodwater; 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 could subsequently lead to an increase in sediment transport loads and downstream sedimentation. This impact, however, would generally be short-term and 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 depends 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 would require the fewest crossings with the smallest number of drainage structures and culvert extensions, and

one of the smallest numbers of culverts. The Mac West-Connector 1-Houston-Houston North Alternative would require the most crossings.

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, facilities, access road, 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[9] could affect groundwater due to the changes in local hydrogeology that would result from the removal of saturated materials and 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.

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 rail line and access road 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 SEA expects minimal impacts to floodplain storage from the placement of the proposed rail line and the access road. ARRC would size all water crossings to convey the 100-year flow event associated with local drainages as part of their voluntary mitigation measures. 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 Mac West-Connector 1-Willow and Mac East-Connector 3-Willow alternatives would impact the greatest amount of FEMA-designated floodplains, with approximately 8,065 feet (about 1.5 miles) of rail line crossing 37 acres of 100-year floodplain. The Mac West-Connector 1-Willow Alternative would also cross an additional eight streams, two more than the Mac East-Connector 3-Willow Alternative, that have a high potential for floodplains. The Mac West-Connector 2-Big Lake and the Mac East-Big Lake alternatives would impact the least acreage of floodplains with approximately 460 feet of rail line crossing 2.1 acres of 100-year floodplain; both of these alternatives would require only one waterbody crossing within a FEMA-designated floodplain.

2.4.2.4 Wetlands

Several wetland types were found within the wetland study area (500 feet on either side of the rail centerline). These include forested wetlands, scrub/shrub wetlands, emergent wetlands, and other waters and riverine wetlands. Rail line construction would directly affect wetlands within the 200-foot ROW and could also indirectly affect wetlands adjacent to the ROW by fragmenting

[9] Areas from which materials such as soil, rock, or gravel are excavated for a specific purpose.

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 ROW. 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 proposed rail line construction would vary by project alternative. Construction of the Mac East-Connector 3-Willow Alternative would impact 188 acres of wetlands, (comprising 15 percent of the ROW), the lowest impact to wetlands of all the alternatives. The Mac East-Connector 3-Willow Alternative would also have the lowest proportion of high-functioning wetlands. Construction of the Mac West-Connector 1-Houston-Houston North Alternative would impact 478 acres of wetlands; the greatest overall acreage of wetlands that would be affected by any of the alternatives. Although this alternative would occupy less overall acreage compared to the other alternatives, 45 percent of the alignment comprises wetlands, the highest of the alternatives. Many wetlands along this alternative consist of bog wetlands that have diverse vegetation communities and are considered high-functioning wetlands.

Of the remaining alternatives, Mac West-Connector 1-Houston-Houston South would impact 424 acres, Mac West-Connector 1-Willow would affect 363 acres of wetlands and waters, Mac West-Connector 2-Big Lake would impact 347 acres, Mac East-Connector 3-Houston-Houston North would impact 301 acres, Mac East-Connector 3-Houston-Houston South would impact 248 acres, and Mac East-Big Lake would impact 209 acres. The Big Lake Segment would also impact 25 acres of a wetland mitigation bank,[10] primarily composed of riverine wetlands (wetlands situated in a river channel that contain moving water, either continuously or periodically) and riparian wetlands (wetlands situated alongside a river), 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 MSB and are highly valued. The impact 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.

2.4.3 Biological Resources

The proposed rail line and facilities construction and operations would impact biological resources. The following paragraphs summarize the relevant effects of this project on vegetation, fisheries, wildlife, birds, and threatened and endangered species.

[10] 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 Clean Water Act or a similar state or local wetland regulation.

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. Permanent impacts would include vegetation loss due to placement of gravel fill for the railbed, 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 operations impacts would include vegetation removal and control within the 200-foot ROW 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 the interruption of natural wildland fire ecology. There are no known Federal- or state-protected threatened, endangered, or candidate plants species within the study area.

Of the build alternatives, the Mac West-Connector 1-Willow Alternative would result in the clearing of 1,272 acres of vegetation from the 200-foot ROW, the most of any alternative. The alternative with the second highest area of vegetation loss would be the Mac East-Connector 3-Willow Alternative, with 1,249 acres of vegetation cleared. Following in descending order of area of vegetation cleared would be: Mac West-Connector 2-Big Lake Alternative (1,056 acres); Mac West-Connector 1-Houston-Houston North Alternative (1,038 acres); Mac West-Connector 1-Houston-Houston South Alternative (1,032 acres); Mac East-Connector 3-Houston-Houston North Alternative (1,010 acres); and Mac East-Connector 3-Houston-Houston South Alternative (1,003 acres). The Mac East-Big Lake Alternative would result in the fewest acres of vegetation loss of all the possible alternatives; 930 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. Some cleared areas would likely be restored after construction; other areas would be covered by fill.

2.4.3.2 Wildlife Resources

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.[11] 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 can also affect management of these game mammals. Potential construction impacts common to all 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

[11] 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.

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, potential exposure to spills of toxic materials, and potential changes in human disturbance and harvest patterns resulting from unauthorized access to the remote portions of the project area facilitated by the access road along the ROW.

The proposed rail line would result in the loss of wildlife habitat ranging from 930 acres to 1,272 acres depending on the alternative, which is less than one percent of the 435,895 acres of available habitat in the study area. The Mac West-Connector 1-Willow Alternative would result in the greatest amount of habitat loss and the Mac East-Big Lake Alternative would result in the least. Of the remaining alternatives, the Mac East-Connector 3-Willow Alternative would result in the greatest loss of wildlife habitat (1,249 acres) followed in descending order by Mac West-Connector 2-Big Lake Alternative (1,056 acres); Mac West-Connector 1-Houston-Houston North Alternative (1,038 acres); Mac West-Connector 1-Houston-Houston South Alternative (1,032 acres); Mac East-Connector 3-Houston-Houston North Alternative (1,010 acres); and Mac East-Connector 3-Houston-Houston South Alternative (1,003 acres). SEA's review and analysis indicates that the rail line would reduce the amount of available habitat, although across all alternatives, rail line construction would result in the loss of less than one percent of the total forested habitat available in the project area, as well as less than one percent of the total wetland habitat available in the project area.

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 one habitat is bordered by a differing habitat. This can adversely affect wildlife by creating barriers to movement, leading to edge effects, reducing core areas of available habitats, facilitating predator movements, and by increasing the intrusion of invasive species and humans. 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 alternatives, the Mac West-Connector 1-Houston-Houston South Alternative would result in fragmentation by crossing the largest area of forest and wetland habitat (3,210 acres). Of the remaining alternatives, the Mac East-Connector 3-Houston-Houston South Alternative would result in fragmentation by crossing the second largest amount of forest and wetland habitat (3,038 acres) followed in descending order by Mac West-Connector 1-Willow (2,847 acres), Mac East-Connector 3-Willow (2,675 acres), Mac West-Connector 2-Big Lake (2,631 acres), Mac West-Connector 1-Houston-Houston North (2,592 acres), Mac East-Connector 3-Houston-Houston North (2,419 acres), and Mac East-Big Lake (1,725 acres).

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 five 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, the Federal resources these species use are protected under the Magnuson-Stevens Fishery Management and Conservation Act. Rail line construction 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 operations 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 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 operations impacts common to all 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 and this habitat could be affected by rail line construction and operations. 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 compared to closed-bottomed culverts. In general, clear-span bridges (those without instream supports) would have less potential to create conditions that would cause loss of spawning habitats, blockage of fish movements, alteration of stream hydrology, and increased erosion and sedimentation. The proposed project 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 minimum number of fish-bearing stream crossings (10) are Mac East-Big Lake and Mac East-Connector 3-Houston-Houston South. The alternative requiring the maximum number of crossings (18) is Mac West-Connector 1-Houston-Houston North. Of the remaining alternatives, the Mac West-Connector 1-Willow Alternative would cross the greatest number of fish-bearing waterbodies (16), followed by Mac East-Connector 3-Houston-Houston North (15) Mac West-Connector 1-Houston-Houston South and Mac East-Connector 3-Willow (13 crossing for each), and Mac West-Connector 2-Big Lake (12).

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 smallest 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 would likely have to be drained or filled to provide an area for construction, resulting in the loss of about 4 acres within the 200-foot ROW and likely extending outward within the 19-acre high-value wetland and juvenile rearing habitat. Of the total 43 proposed fish-bearing stream crossings, 18 contain either sticklebacks, Pacific lamprey, or both. These two species are considered Species of Conservation Concern by ADF&G.

2.4.3.4 Threatened and Endangered Species

Through consultations with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service on potential threatened or endangered species that could be affected by the proposed project, SEA determined that the proposed project could indirectly affect the federally endangered Cook Inlet beluga whale (*Delphinapterus leucas*). SEA identified and evaluated potential indirect effects on beluga whale that included: 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, as a result of induced increases in vessel traffic to and from Port MacKenzie. SEA, in consultation with National Marine Fisheries Service, did not identify any direct impacts from the proposed project to the beluga whale or beluga whale habitats.

SEA completed a Biological Assessment (Appendix H) and determined that the proposed action, if authorized, may affect, but is not likely to adversely affect the Cook Inlet beluga whale. NMFS has stated they will review and comment on the Biological Assessment after the public comment period for the designation of critical habitat for the Cook Inlet beluga whale closes on March 3, 2010.

2.4.4 Cultural and Historic Resources

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 are likely to be found or have been found 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 construction. Historic and potentially historic trails would be blocked in the case of unofficial 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 dog sledding cultural landscape would be adversely affected to varying degrees through loss of visual integrity.

The Mac East-Connector 3-Willow Alternative would potentially affect the most known cultural resources (51) and pass through areas with a high probability of having large numbers of undocumented cultural resources. The Mac West-Connector 1-Houston-Houston South Alternative would affect the fewest known cultural resources (20) and pass through areas with a low probability of having large numbers of undocumented cultural resources. Of the remaining alternatives, the Mac West-Connector 1-Willow alternative would potentially affect 46 cultural resources, followed in descending order by Mac East-Big Lake (39), Mac West-Connector 2-Big Lake (36), Mac East-Connector 3-Houston-Houston North (26), Mac East-Connector 3-Houston-Houston South (24), and Mac West-Connector 1-Houston-Houston North (22).

Adverse effects to cultural resources could be mitigated by minor rerouting of any alternative that may be authorized by the Board to avoid cultural resources identified within the ROW. If

avoidance is not possible, mitigation could include data recovery for archaeological sites, maintaining accessibility of historic trail crossings, implementing noise and vibration reduction measures, and minimizing visual impacts.

Cultural resources listed on or determined eligible for listing on the National Register of Historic Places (NRHP) are subject to compliance with Section 106 of the National Historic Preservation Act (NHPA). Through the Section 106 process, the NHPA requires that agencies consult with the State Historic Preservation Office (SHPO) and other relevant consulting parties to develop a determination of the project's affect on cultural resources. Several consultation meetings to date regarding Section 106 and cultural resource issues have occurred with the SHPO, Matanuska-Susitna Borough Historic Preservation Commission and Knik Tribal Council. As a result, four potential cultural landscapes have been evaluated for eligibility to the NRHP and potential effects from the proposed action on eligible landscapes have been assessed for the EIS. A fifth potential cultural landscape has also been identified and an assessment of effects is ongoing.

Because all effects on historic properties cannot be fully determined prior to approval of this type of undertaking, SEA has developed a Draft Programmatic Agreement (PA) for the proposed action that would govern the completion of the Section 106 process if the proposal before the Board is authorized and the rail line is built. The Draft PA provides for the completion of the Level 2 identification survey,[12] if the Board authorizes the project and the locations of associated facilities have been established. Additionally, the Draft PA establishes responsibilities for the treatment of historic properties, the implementation of mitigation measures, and ongoing consultation efforts. The draft PA is included as Appendix J to the Draft EIS and will be published for public review and comment with the Draft EIS.

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 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)[13] 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. Migratory moose could experience a disproportionate level of mortality due to movements across the proposed rail line.

Construction activities in the proposed rail line ROW and operations of the rail line could reroute subsistence user access across project area lands into areas west of the Susitna River.

[12] Level of investigation required to evaluate the eligibility of a resource for the National Register.
[13] A Game Management Unit (GMU) is one of 26 geographical areas listed under game management units in the codified State of Alaska hunting and trapping regulations and the GMU maps of Alaska shown in the Alaska State Hunting Regulation book.

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 rail line could cause harvesters to begin using other communities' subsistence use areas, subsequently increasing the number of harvesters competing for resources in those places. Impacts to resource availability could most affect Beluga, Skwentna, and Tyonek because members of those communities harvest most of their subsistence resources in GMU 16B.

2.4.6 Climate and Air Quality

The U.S. Environmental Protection Agency (USEPA) national ambient air quality standards (NAAQS) regulations specify the maximum acceptable ambient concentration level for six primary or "criteria" air pollutants – ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), respirable particulate matter (PM), and lead (Pb) – and ADEC has adopted the same standards for Alaska. MSB is currently in attainment of the standards for these six criteria pollutants. To evaluate the potential impacts of increased emissions of NAAQS air pollutants plus greenhouse gas emissions, SEA developed emissions estimates for the proposed rail line construction and operation. To be conservative, SEA estimated construction and operations 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. SEA found that the estimated emissions of all criteria pollutants from construction and operation would be below the *de minimis* conformity thresholds established for each pollutant and, thus, the increase would be minimal in the context of existing conditions for all of the alternatives evaluated. 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. SEA also estimated that operation of the proposed rail line would represent a two 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. SEA concluded that estimated increases from proposed rail line construction or operations would be minimal and that any direct project-related impacts to climate would be low under any of the alternatives evaluated.

2.4.7 Noise and Vibration

SEA evaluated whether operation of the proposed rail line alternatives 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 at least 3 decibels (dBA) or greater (SEA's noise analysis thresholds). SEA found no receptors for which both thresholds would be exceeded and, therefore, concluded that there would be no adverse

noise impacts associated with operation of any of the build alternatives. SEA compared estimated noise levels during construction to Federal Transit Administration (FTA) construction noise criteria and found that the criteria would not be exceeded unless impact pile driving for bridge construction occurs during the nighttime hours. If nighttime pile driving would occur, SEA found that estimated noise levels from pile driving would exceed the criteria at three locations on the Big Lake Segment.

On behalf of FRA, SEA also analyzed the potential noise impacts on Section 4(f) properties using FRA/FTA methods.[14] All project alternatives that include the Willow Segment would result in potential noise impacts to the Little Susitna State Recreation River, the Susitna Flats State Game Refuge, the Willow Creek State Recreation Area, and the Nancy Lake State Recreation Area. None of these refuges and recreation areas are anticipated to experience noise impacts as a result of either the Mac East-Connector 3-Houston-Houston South or Mac East-Big Lake alternative. The estimated acreage of potential noise impacts within the Willow Creek State Recreation Area is approximately 9 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 4 percent (for alternatives that include the Houston North Segment) of the recreation river. All other estimated potential noise impacts would affect less than 1 percent 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, ranging from approximately 992 to 1762 acres, depending on the alternative.

SEA 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, SEA found that estimated vibration levels could be perceptible during construction activities such as pile driving, but would be temporary, and that vibration from operations at levels that could be annoying would not occur outside the ROW. Therefore, SEA anticipates no vibration impacts resulting from the proposed rail line.

2.4.8 Energy Resources

Energy consumption during the construction period would be temporary and would place minimal additional demand on the local energy supply. During rail line operations, 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. SEA anticipates that there would be a diversion of freight from truck to rail transport, which is more fuel-efficient, decreasing fuel consumption.

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 mainline at the point north of Willow where the Willow Segment would connect to the main line, SEA

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

estimated predicted accident frequency for the existing at-grade crossings along the ARRC mainline between this connection point and the point where the Big Lake Segment would connect to the main line. SEA found that the added rail traffic (two trains per day) would have a small 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 (i.e., accidents would be predicted to occur slightly more often). To provide an approximate upper bound of predicted accident frequency for the new at-grade crossings, SEA estimated predicted accident frequency for the crossings with the highest annual average daily traffic (AADT) in two 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 West-Connector 1-Houston-Houston South alternative has the highest hazard index which is about 80 percent higher than the alternative with the lowest index, the Mac East-Connector 3-Willow.

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

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. SEA anticipates that the effect of the proposed action on grade crossing delay would be minimal. All alternatives 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. SEA anticipates that the increased rail traffic during the construction period, due to transport of construction material, would be less than during operations, and potential delay impacts would also be less.

2.4.9.3 Rail Safety

ARRC anticipates transporting bulk materials and containers on the proposed rail line and has not indicated any plans to carry hazardous materials. SEA has 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 potential impacts to be low. Thus, SEA concludes that potential impacts of transporting hazardous materials, even if it were it to occur, would be minimal.

2.4.10 Navigation

The proposed rail line alternatives include a total of 30 stream crossings that have been determined to be or that might be considered navigable waterways. Where an alternative would cross a navigable waterway, as designated by the U.S. Coast Guard and Alaska Department of Natural Resources, 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 and Mac East-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 Alternative would cross 11 possible navigable waterways. The Mac West-Connector 1-Willow Alternative and Mac East-Connector 3-Willow Alternative would each cross three navigable streams. The Mac West-Connector 1-Willow Alternative would also cross eight possible navigable waterways, and the Mac East-Connector 3-Willow Alternative would cross six possible navigable waterways.

2.4.11 Land Use

2.4.11.1 Land Use

Land owners in the study area include the State of Alaska, the Federal Government, the MSB, the Alaska Mental Health Trust, the University of Alaska, private citizens, and Native Alaskans/Native Alaskan Corporations. 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 cleared for construction but not needed for permanent structures would be restored to conditions consistent with rail line maintenance requirements. 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 operations support facilities. Operations of the new freight rail service as part of the proposed project are not expected to stimulate changes in existing land uses or shift development patterns along the rail line.

The Mac West-Connector 1-Houston-Houston North Alternative would impact the least amount of private land (210 acres). Overall, this alternative would impact the fourth lowest total number of acres (1,054 acres) after the Mac East-Big Lake Alternative (990 acres), the Mac East-Connector 3-Houston-Houston North Alternative (1,040 acres), and the Mac East-Connector 3-Houston-Houston South Alternative (1,053 acres). Of these four alternatives, Mac East-Big Lake Alternative would impact the most acres of private land (422 acres) and is the second highest of all alternatives. In comparison, the Mac West-Connector 1-Houston-Houston North Alternative would cross mostly undeveloped land. The Mac West-Connector 2-Big Lake Alternative would impact the greatest amount of private land (487 acres) and the sixth total number of acres overall (1,105 acres). The Mac East-Connector 3-Houston-Houston North Alternative would impact 228 acres of private land; Mac West-Connector 1-Willow would impact 244 acres of private property; Mac East-Connector 3-Willow would impact 262 acres; Mac West- Connector 1- Houston- Houston South would impact 317 acres; and Mac East-Connector 3-Houston-Houston South alternatives would impact 335 acres of private land. Alternatives with the Mac East Segment would affect fewer acres of land in agricultural use than

alternatives with the Mac West Segment. The Mac West-Connector 2-Big Lake Alternative would affect the most acres of land in agricultural use. In the area of the Big Lake Segment, the proposed rail line extension would require taking 17 residences and three structures. The Connector 3 Segment would displace two non-residential structures and the Mac East Segment would displace one residential structure.

2.4.11.2 Parks and Recreational Resources

The project area includes several designated recreation areas, including Willow Creek State Recreation Area, Nancy Lake State Recreation Area, Little Susitna State Recreation River, and two 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 operations impacts common to all alternatives would include: loss of connectivity of unofficial trails 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; visual intrusion on the landscape that could affect the experience of recreationists. Where the proposed rail line would cross an officially recognized trail, ARRC proposed to provide public access by a grade-separated crossing. Alternatively, the trail could be relocated to avoid crossing the rail line. ARRC does not propose to provide crossings for unofficial trails. Unofficial trails 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 (four of the eight 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 impact any recreation areas or refuges and would have the least effect on trails – intersecting four officially recognized trails. The Mac East-Big Lake Alternative also would not impact any recreation areas or refuges and would intersect five officially recognized trails. The Mac-West-Connector 1-Willow Alternative would impact four recreation areas/facilities and eleven named trails. The other six alternatives would result in impacts greater than the Mac East-Connector 3- Houston-Houston South-Big Lake Alternative and less than the Mac West-Connector 1-Willow Alternative.

The U.S. Department of Transportation (USDOT) regulation known as "Section 4(f)" (see 23 CFR 774) mandates that the Secretary of Transportation shall not approve any transportation project requiring the use of publicly owned parks, recreation areas or wildlife and waterfowl refuges, or significant public or private historic sites, regardless of ownership, unless the impact would be *de minimis* or there is no prudent and feasible alternative to using that land, and the program or project includes all possible planning to minimize harm to the public park, recreation

area, wildlife or waterfowl refuge, or significant site, resulting from that use. Section 4(f) resources affected by one or more alternatives include three recreation areas, one game refuge, and 13 officially recognized trails within the project area. A Programmatic Agreement (a draft is provided in Appendix J of this Draft EIS) would guide future efforts during final design and construction to identify and evaluate cultural resources including those that could be protected under Section 4(f) and would establish procedures for avoiding and mitigating impacts. There are only two alternatives that FRA and STB anticipate would result in *de minimis* impacts on Section 4(f) resources: the Mac East-Big Lake Alternative and the Mac East-Connector 3-Houston-Houston South Alternative. Of these two alternatives, the Mac East-Connector 3-Houston-Houston South Alternative would affect the fewest number (1) and length (204 feet) of Section 4(f) trails, while the Mac East-Big Lake Alternative would affect the greatest number (4) and length (2,408 feet) of Section 4(f) trails. Neither of these alternatives would require use of or cause severe noise impacts, as defined by FRA, on the Susitna Flats State Game Refuge, the Little Susitna State Recreation River, the Nancy Lakes State Recreation Area, or the Willow Creek State Recreation Area. Additionally neither alternative would result in severe noise impacts, as defined by the FRA, to Section 4(f) properties. Of the remaining alternatives that would require the use of Section 4(f) resources, the Mac West-Connector 1-Willow Alternative would potentially affect the greatest number of recreational trails (10), the longest length of recreational trails (4,187 feet), and the ROW for this alternative would affect the greatest acreage of parks and recreation areas and the wildlife refuge (217 acres). The operation of trains along this alternative would result in severe noise impacts, as defined by the FRA, to approximately 2,765 acres of Section 4(f) properties. Of these remaining alternatives, the Mac East-Connector 3-Houston-Houston North would have the lowest impacts on number of trails (1), acreage of parks and recreational areas and the wildlife refuge affected by the ROW (69 acres), and length of trail crossed (204 feet). It would result in severe noise impacts, as defined by the FRA, to approximately 769 acres of Section 4(f) properties.

2.4.11.3 Hazardous Materials and Waste Sites

Potential safety or environmental impacts could result from proposed rail line construction activities 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 during rail line construction. The Mac West, Mac East, Connector 1, Connector 2, Connector 3, and Big Lake segments 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 three 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 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 operations would not be expected to result in adverse impacts to hazardous waste sites.

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 a third 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 the Port 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 the Port. Additionally, access to resources such as coal could attract new industries to the Port MacKenzie District.

Potential socioeconomic impacts that would differ by segment include displacement of residences, businesses, and agricultural land and potential impacts to economic activities related to the use of unofficial trails. Unofficial trails would be blocked, and ARRC's trespassing regulations would prohibit crossing of the ROW. While recreation and tourism activities that use unofficial trails would be blocked by the proposed rail line, they could potentially be diverted to officially recognized trails. This could have a potentially adverse effect on economic activities directly or indirectly related to the use of such trails. The southern rail line segments would cross agricultural parcels with the Mac West-Connector 2-Big Lake Alternative 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.

2.4.13 Environmental Justice

SEA assessed whether any high and adverse impacts to human health or the environment would occur as a result of the proposed action. SEA expects no high and adverse human health or environmental effects from the proposed action. Therefore there would be no high and adverse impacts to environmental justice populations in the project area.

2.4.14 Cumulative Effects

SEA 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, SEA identified where there could be cumulative impacts. Reasonably foreseeable activities within the project area could include: Cook Inlet Areawide Oil and Gas Lease Sale; Cook Inlet Ferry; Cook Inlet OCGen™ Power Project; Knik Arm Crossing; Knik-Willow Transmission; Goose Creek Correctional Center; MSB Regional Aviation System Plan; Natural Gas Pipeline: Beluga to Fairbanks; a suite of Port MacKenzie Development Projects;[15] Port of Anchorage (POA) Marine Terminal Redevelopment Project; a host of road projects in the MSB; South Wasilla Rail Line Relocation; the Su-Kink 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 impacts of the proposed action could result in cumulative adverse effects to geology and soils, water resources, biological resources, cultural and historic resources, subsistence, climate and air quality, noise, energy, transportation safety and delay, and land use.

2.4.15 Comparison of Potential Impacts

Table 2-2 highlights potential impacts for resource areas and topics for which there are noteworthy differences among the build alternatives. The largest impacts would occur to water, cultural and recreational resources. Alternatives that include the Mac West Segment would tend to require a greater number of water body crossings and impact a greater amount of floodplains and wetlands when compared with alternatives containing the Mac East Segment. Alternatives including the Big Lake Segment would impact 25 acres of a wetland mitigation bank. The dog sledding cultural landscape would be adversely affected 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 recreational 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, there are only two alternatives that FRA and STB anticipate would result in *de minimis* impacts on Section 4(f) resources: the Mac East-Big Lake Alternative and the Mac East-Connector 3-Houston-Houston South Alternative. Based on Section 4(f) provisions, 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 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.

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

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
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, with 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, with some areas of rolling hills, greater need for cutting and filling expected
	Locally important soil acres lost: 510	Locally important soil acres lost: 297	Locally important soil acres lost: 312	Locally important soil acres lost: 317	Locally important soil acres lost: 608	Locally important soil acres lost: 390	Locally important soil acres lost: 406	Locally important soil acres lost: 322
Water Resources	Crossings include 34 culverts, 3 culvert extensions, 4 drainage structures,[16] and 4 bridges	Crossings include 33 culverts, 13 culvert extensions, 4 drainage structures, and 1 bridge	Crossings include 34 culverts, 2 culvert extensions, 3 drainage structures, and 1 bridge	Crossings include 32 culverts, 3 culvert extensions, and 7 drainage structures	Crossings include 20 culverts, 3 culvert extensions, 3 drainage structures, and 4 bridges	Crossings include 19 culverts, 13 culvert extensions, 3 drainage structures, and 1 bridge	Crossings include 20 culverts, 2 culvert extensions, 2 drainage structures, and 1 bridge	Crossings include 16 culverts, 3 culvert extensions, and 7 drainage structures
	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
	Total wetland acres: 363 (Forested 148, Scrub/shrub 179, Emergent 32, Other waters 4)	Total wetland acres: 478 (Forested 169, Scrub/shrub 253, Emergent 50, Other waters 6)	Total wetland acres: 424 (Forested 153, Scrub/shrub 226, Emergent 41, Other waters 4)	Total wetland acres: 347 (Forested 135, Scrub/shrub 187, Emergent 24, Other waters 1)	Total wetland acres: 188 (Forested 94, Scrub/shrub 78, Emergent 13 Other waters 3)	Total wetland acres: 301 (Forested 116, Scrub/shrub 151, Emergent 30 Other waters 4)	Total wetland acres: 248 (Forested 100, Scrub/shrub 124, Emergent 21 Other waters 3)	Total wetland acres: 209 (Forested 88, Scrub/shrub 112, Emergent 8, Other waters 1)

[16] 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.

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
Biological Resources	Total habitat acres lost: 1,272	Total habitat acres lost: 1,038	Total habitat acres lost: 1,032	Total habitat acres lost: 1,056	Total habitat acres lost: 1,249	Total habitat acres lost: 1,010	Total habitat acres lost: 1,003	Total habitat acres lost: 930
	Fragmentation of core habitats: 2,847 acres of forested and woody wetland habitat	Fragmentation of core habitats: 2,592 acres of primarily woody wetland and emergent wetland habitat	Fragmentation of core habitats: 3,210 acres of primarily woody wetland and emergent wetland habitat	Fragmentation of core habitats: 2,631 acres of forested and wetland habitat	Fragmentation of core habitats: 2,675 acres of forested and woody wetland habitat	Fragmentation of core habitats: 2,419 acres of emergent wetland, woody wetland, and forested habitat	Fragmentation of core habitats: 3,038 acres of emergent wetland, woody wetland, and forested habitat	Fragmentation of core habitats: 1,725 acres of forested and woody wetland habitat
	Moose foraging habitat acres lost: 326	Moose foraging habitat acres lost: 451	Moose foraging habitat acres lost: 506	Moose foraging habitat acres lost: 408	Moose foraging habitat acres lost: 224	Moose foraging habitat acres lost: 348	Moose foraging habitat acres lost: 403	Moose foraging habitat acres lost: 315
	Fish-bearing streams 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
	Anadromous Stream crossings: 7	Anadromous Stream crossings: 9	Anadromous Stream crossings: 6	Anadromous Stream crossings: 8	Anadromous Stream crossings: 6	Anadromous Stream crossings: 8	Anadromous Stream crossings: 5	Anadromous Stream crossings: 8
Cultural Resources	Total number of known cultural resources potentially affected: 46	Total number of known cultural resources potentially affected: 22	Total number of known cultural resources potentially affected: 20	Total number of known cultural resources potentially affected: 36	Total number of known cultural resources potentially affected: 51	Total number of known cultural resources potentially affected: 26	Total number of known cultural resources potentially affected: 24	Total number of known cultural resources potentially affected: 39
	Probability for cultural resources: low, medium and high level areas	Probability for cultural resources: low	Probability for cultural resources: low	Probability for cultural resources: low, medium and high level areas	Probability for cultural resources: many medium to high level areas	Probability for cultural resources: low, medium and high level areas	Probability for cultural resources: low, medium and high level areas	Probability for cultural resources: many medium to high level areas

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
Land Use	244 acres private land	210 acres private land	317 acres private land	487 acres private land	262 acres private land	228 acres private land	335 acres private land	422 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: 20 displaced most of which are residences	Structures in the 200-foot ROW: 3 (1 residence)	Structures in the 200-foot ROW: 3 (1 residence)	Structures in the 200-foot ROW: 3 (1 residence)	Structures in the 200-foot ROW: 21 displaced most of which are residences
	Acres in agricultural use lost: 66	Acres in agricultural use lost: 64	Acres in agricultural use lost: 64	Acres in agricultural use lost: 94	Acres in agricultural use lost: 94	Acres in agricultural use lost: 7	Acres in agricultural use lost: 5	Acres in agricultural use lost: 5
	Official trails crossed: 11	Official trails crossed: 8	Official trails crossed: 8	Official trails crossed: 6	Official trails crossed: 8	Official trails crossed: 4	Official trails crossed: 4	Official trails crossed: 5
	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	4 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
	Adverse noise impact to 2,765 acres of Section 4(f) properties	Adverse noise impact to 2,258 acres of Section 4(f) properties	Adverse noise impact to 1,489 acres of Section 4(f) properties	Adverse noise impact to 992 acres of Section 4(f) properties	Adverse noise impact to 1,276 acres of Section 4(f) properties	Adverse noise impact to 769 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