

SUMMARY

On December 5, 2008, Alaska Railroad Corporation (ARRC or the Applicant) filed a petition with the Surface Transportation Board (STB or the Board) pursuant to 49 United States Code (U.S.C.) § 10502 for authority to construct and operate approximately 31 to 46 miles of rail line to connect the Port MacKenzie District in the Matanuska-Susitna Borough (MSB) to a point on the existing ARRC main line between Wasilla and just north of Willow, Alaska. Referred to as the Port MacKenzie Rail Extension, the proposed rail line would provide a rail connection for freight services between Port MacKenzie and Interior Alaska.

Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) regulations at 40 Code of Federal Regulations (C.F.R.) § 1501.6 emphasize agency cooperation early in the NEPA process and allow a lead agency (in this case, the STB) to request the assistance of other agencies with either jurisdiction by law or special expertise in matters relevant to the proposed action. Three Federal agencies are cooperating in the preparation of this Environmental Impact Statement (EIS). Table S-1 lists each cooperating agency and describes its roles and responsibilities.

Table S-1
Cooperating Agency Involvement in the Port MacKenzie Rail Extension EIS

Federal Railroad Administration	Could provide funding to ARRC for rail line construction or operation.
U.S. Army Corps of Engineers	Could grant a section 404 Clean Water Act permit and/or a section 10 Rivers and Harbors Act permit.
U.S. Coast Guard	Could issue bridge permits.

The Board’s environmental staff, known as the Office of Environmental Analysis (OEA)¹, and cooperating agencies (collectively known as OEA unless otherwise specified) prepared the EIS in accordance with NEPA, CEQ regulations, and the Board’s environmental regulations (49 C.F.R. part 1105) to provide the Board; the cooperating agencies; other Federal, state, and local agencies; Alaska Natives; and the public with clear and concise information on the potential environmental impacts of the proposed action and alternatives, including the No-Action Alternative.

OEA also prepared the EIS in accordance with Federal Railroad Administration (FRA) NEPA guidance at 64 *Federal Register (FR)* 28545 (May 26, 1999); U.S. Army Corps of Engineers (USACE) NEPA-implementing regulations at 33 C.F.R. part 230; and U.S. Coast Guard COMDTINST M16475.1D—NEPA-Implementing Procedures and Policy for Considering Environmental Impacts.

Following scoping, OEA issued the Draft EIS for public review and comment on March 16, 2010. OEA considered all comments received on the Draft EIS and responded to all substantive comments in this Final EIS. Comments on the Draft EIS and responses to those comments are provided in Chapter 23 of this Final EIS. This Final EIS is a republication of the Draft EIS, with modifications and additional analysis. Substantive modifications to the Draft EIS in this Final

¹ Subsequent to the close of the comment period on the Draft EIS, the Section of Environmental Analysis became the Office of Environmental Analysis. Thus, this Final EIS refers to Board’s environmental staff as OEA.

EIS are indicated by change bars in the left-hand margins of each chapter and appendix. This Final EIS includes final recommended environmental mitigation conditions, as applicable. The Board will consider the entire environmental record, including all public and agency comments, the Draft EIS, this Final EIS, and OEA's environmental recommendations in making its final decision on whether to authorize the construction and operation of the proposed Port MacKenzie rail line.

The construction and operation of rail lines require prior Board authorization either through issuance of a certificate under 49 U.S.C. § 10901 or, as requested here, by granting an exemption under 49 U.S.C. § 10502 from the formal application procedures of section 10901. Section 10901(c) as amended by the ICC Termination Act of 1995, Pub. L. No. 104-88, 109 Stat. 803 (1995) (ICCTA) is a permissive licensing standard. It directs the Board to grant rail line construction proposals "unless" the Board finds the proposal "inconsistent with the public convenience and necessity (PC&N)".² Thus, Congress made a presumption that rail construction projects are in the public interest unless shown otherwise. See Mid States Coalition for Progress v. STB, 345 F.3d 520, 552 (8th Cir. 2003); Alaska Railroad Corporation – Construction and Operation Exemption – Rail line Between North Pole and Delta Junction, Alaska, Docket No. FD 34658 (STB served January 5, 2010),³ slip op. at 5.

Under 49 U.S.C. § 10502, the Board must exempt a proposed rail line construction from the detailed application procedures of 49 U.S.C. § 10901 when it finds that: (1) those procedures are not necessary to carry out the rail transportation policy (RTP) of 49 U.S.C. § 10101; and (2) either (a) the proposal is of limited scope, or (b) the full application procedures are not necessary to protect shippers from an abuse of market power.

In making its final decision here, the Board will decide whether to approve, approve with conditions (which could include conditions designed to mitigate potential impacts on the environment), or deny the Applicant's request for a license to construct and operate a proposed rail line from Port MacKenzie to the existing main line to the north. The cooperating agencies that could issue individual decisions concerning the proposed action intend to use information in this Final EIS for their decisionmaking purposes under the statutes they administer.

² Although the statute does not define the term "public convenience and necessity", historically a three-part test has been used to evaluate that term: whether an applicant is financially fit to undertake proposed construction and provide the proposed service; whether there is public demand or need for the proposed service; and whether the proposal is in the public interest and will not unduly harm existing services.

³ Congress had first relaxed the section 10901 standard in the Staggers Rail Act of 1980, Pub. L. No. 96-448, 96 Stat. 1895 (1980). Before 1980, Congress directed the Interstate Commerce Commission (ICC), the Board's predecessor agency, to scrutinize rail construction proposals closely to prevent excess rail capacity. The ICC was to issue a license only if it found that the PC&N "require" the construction. See former 49 U.S.C. § 10901(a) (1978); see, e.g., Chesapeake & Ohio Ry. v. United States, 283 U.S. 35, 42 (1931). In the Staggers Act, Congress made it easier to obtain agency authorization for a new rail line by providing that the ICC need only find that the PC&N "permit," as opposed to "require" the proposed new line. See former 49 U.S.C. § 10901(a) (1995); H.R. Rep. No. 1430, 96th Cong., 2d Sess. 115-16 (1980), reprinted in 1980 U.S.C.C.A.N. 4147-48. With ICCTA, Congress completed its policy shift, directing that the Board "shall" issue construction licenses "unless" the agency finds a proposal "inconsistent" with the PC&N. See 49 U.S.C. § 10901(c).

S.1 Purpose and Need

The Applicant has stated that the purpose of the proposed rail line is to provide rail service to Port MacKenzie and to connect it with the existing ARRC main line, providing Port MacKenzie customers with rail transportation between Port MacKenzie and Interior Alaska.

According to the Applicant, Port MacKenzie is the closest deep-water port to Interior Alaska and has capacity to handle bulk commodities. The Port's market includes bulk commodities (such as wood chips, saw logs, sand/gravel, and cement), iron or steel materials (such as scrap metal), vehicles and heavy equipment, and mobile or modular buildings. The nearest other port in the area is the Port of Anchorage, which is an additional 35 rail/roadway miles from Interior Alaska. As indicated by the Applicant, Port MacKenzie is intended to handle bulk commodity shipments that originate in Interior Alaska. These shipments could expand as the result of new economic activity, if rail service to and from the port were available. The Applicant opines that a rail-connected Port MacKenzie would primarily complement, not compete with, the Port of Anchorage.

Port MacKenzie is situated on nearly 9,000 acres of land, and has existing dockside bulk materials loading capacity with a conveyor system to move materials from existing stockpile staging areas to the docks. The dredge-free draft of the port is in excess of 60 feet, providing the ability to load nearly any sized vessel. Unlike similar port facilities that serve Panamax and Capesize vessels, Port MacKenzie currently does not have rail service. At present, freight truck is the only available mode of surface transportation for bulk materials and other freight to and from Port MacKenzie. Trucks, as compared to rail, are inefficient for bulk commodity movements and generally are used for short-haul movements of these commodities. Bulk commodity shippers, which already have access to the existing ARRC network, currently 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 handlings of materials when they are transferred to or from different transportation modes. The Applicant states that the cost of intermediate transloading from rail to truck and the additional truck ton-mile cost for final delivery places Port MacKenzie at a significant disadvantage to other regional ports with rail service. The Applicant believes that by creating a rail connection with Port MacKenzie, the proposed project would make the development of existing natural resources in Interior Alaska, including the coal, limestone, timber, and metallic mineral resources along the existing ARRC main line corridor, more economically feasible.

Because of the economics and efficiencies that would be offered by direct rail service, the Applicant anticipates that bulk commodity movements to and from Port MacKenzie would likely be by rail, if such an option were available. The proposed rail line would thus provide Port MacKenzie's customers with multi-modal options for the movement of freight to and from Port MacKenzie similar to that offered by other ports in Alaska handling large vessels. The proposed project would also support ARRC's statutory goal to foster and promote long-term economic growth and development in Alaska.

S.2 Public Involvement

On February 12, 2008, OEA published the Notice of Intent to Prepare an EIS, Draft Scope of Study, Notice of Scoping Meetings, and Request for Comments (73 *FR* 8106 [Feb. 12, 2008]). OEA distributed a letter to more than 7,700 citizens; elected officials; Federal, state, and local agencies; tribal organizations; and other potentially interested organizations to introduce the proposed action, announce OEA's intent to prepare an EIS, request comments, and give notice of 6 public scoping meetings. The distribution encompassed the communities surrounding the proposed action and possible alternatives and groups outside the project area that could have an interest in the proposed rail line. OEA posted meeting notices in public locations (such as post offices, grocery stores, and restaurants) within the project area and initiated a toll-free project hotline. OEA also provided project information on the STB Web site at www.stb.dot.gov and on an STB-sponsored project Web site at www.stbportmacraileis.com. OEA placed notices of the scoping meetings in several newspapers, including the *Frontiersman*, the *Talkeetna Times*, and the *Anchorage Daily News*.

OEA held public scoping meetings in Knik, Big Lake, Willow, Houston, Wasilla, and Anchorage, Alaska, on March 3, 4, 5, 6, 10, and 11, 2008, respectively. OEA used a workshop format to allow attendees to provide comments and ask questions of OEA. Approximately 146 citizens, representatives of organizations, elected officials, and officials from Federal, state, and local agencies attended the meetings. Some attendees submitted written comments during the meetings, and OEA received additional scoping comment letters during the scoping comment period, which closed on March 21, 2008.

OEA considered agency and public input received during the scoping process and on July 17, 2009 issued the final scope of study for the Draft EIS. OEA published the final scope of study in the *Federal Register* (74 *FR* 34859), placed it on the STB and project Web sites, and mailed an announcement listing the availability of the final scope of study to approximately 8,000 individuals, agencies, and other interested parties on the OEA project mailing list. The final scope of study summarized the comments received and potential impacts to be analyzed.

On March 16, 2010, OEA published the Notice of Availability of the Draft EIS and delivered the EIS to the U.S. Environmental Protection Agency (USEPA). The USEPA published the Notice of Availability of the Draft EIS in the *Federal Register* on March 26, 2010. OEA distributed the Draft EIS to elected officials; Federal, state, and local agencies; interested organizations; and citizens who had requested a copy. OEA also made the Draft EIS available for public review in the reference section of 26 public libraries.

OEA encouraged the public and any interested parties to submit written comments on all aspects of the Draft EIS. OEA considered all comments in preparing this Final EIS, which includes responses to all substantive comments, OEA's final conclusions on potential impacts, and OEA's final recommendations. All comments on the Draft EIS were to be submitted within the prescribed comment period, which closed on May 10, 2010. When submitting comments on the Draft EIS, OEA encouraged commenters to be as specific as possible and substantiate concerns and recommendations.

Commenters were also able to submit comments electronically. Comments submitted electronically were given the same attention as mailed comments. Persons who submitted comments electronically did not have to also send those comments by mail. Environmental comments were filed electronically on the STB Web site at www.stb.dot.gov by clicking on the “E-FILING” link. By selecting “Environmental Comments” after the link, individuals were not required to log in to submit their comments. Comments could have been typed into the online form provided, or attached as Microsoft Word[®], Corel Word Perfect[®], or Adobe[®] Acrobat[®] files.

After publishing the Draft EIS, OEA hosted 6 public meetings to share information and gather comments from the general public. At each meeting, OEA gave a brief presentation of the proposed action and environmental review process and then accepted oral comments from the public. OEA retained a court reporter at each meeting to record the oral comments. Written comments were also submitted at the meetings. Meetings were held in Anchorage, Big Lake, Wasilla, Houston, Willow, and Wasilla, Alaska, on April 6, 7, 8, 12, 13, and 14, 2010, respectively. An average of 38 people signed in at each meeting. A total of 68 oral comments and 18 written comments were received at these meetings. Appendix Q of this Final EIS contains copies of the transcripts from the public meetings.

OEA received a total of approximately 162 written and oral comments during the Draft EIS comment period, which closed on May 10, 2010. Comments were received from elected officials; Federal, state, and local agencies; organizations; and citizens. Appendix R of this Final EIS contains copies of the comment letters.

In short, beginning with the earliest stages of the environmental review process, OEA has conducted broad public outreach activities informing the public about the proposed action and facilitating public participation. OEA consulted with Federal, state, and local agencies; tribal organizations; affected communities; and all interested parties to gather and disseminate information about the proposed project.

S.3 Alternatives Considered in the OEA Environmental Review

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 north of Willow, Alaska. ARRC proposes a right-of-way (ROW) of approximately 200 feet in width for the rail line. The ROW could contain a power line, buried utility lines, and an access road. In addition, ARRC would construct one rail line siding within the existing main line ROW at the tie-in location with the proposed rail line. ARRC proposes to transport freight on the rail line and would construct and maintain the rail line to Class 4 standards⁴, because of its anticipated 51 mile-per-hour average operating speed for freight service. ARRC anticipates an average of 2 freight trains per day, one in each direction.

⁴ FRA establishes the standards for class of track and maximum operating speed for freight on each class of track (49 C.F.R. part 213). Design and construction of the proposed Port MacKenzie Rail Extension to Class 4 standards (41-60 mile per hour operating speed) would be required for ARRC’s desired operating speed for freight service.

In addition to the proposed rail line, ARRC would construct operations support facilities. ARRC would construct a terminal reserve area along the southern terminus of the rail line. This area would eventually consist of yard sidings, storage areas, and a terminal building to support train maintenance. The locations of some of the 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 construction support facilities and would remove them after the completion of rail line and operations support facilities construction.

OEA has considered a total of 12 alternatives. The build alternatives considered in this Final EIS are composed of alternative southern and northern segments, with possible connector segments between. Two southern segments, Mac West and Mac East, would run either east or west of the Point MacKenzie Agricultural Project, while the Mac East Variant, the third southern segment, would run through the eastern portion of the Point MacKenzie Agricultural Project. There are 3 main segments north of the Point MacKenzie Agricultural Project – Willow, Houston, and Big Lake – with Houston having north and south variants. Connector segments would link the north and south segments to create 12 possible alternatives for the proposed rail line, as listed below and depicted in Figure S-1.

The build alternatives include:

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

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

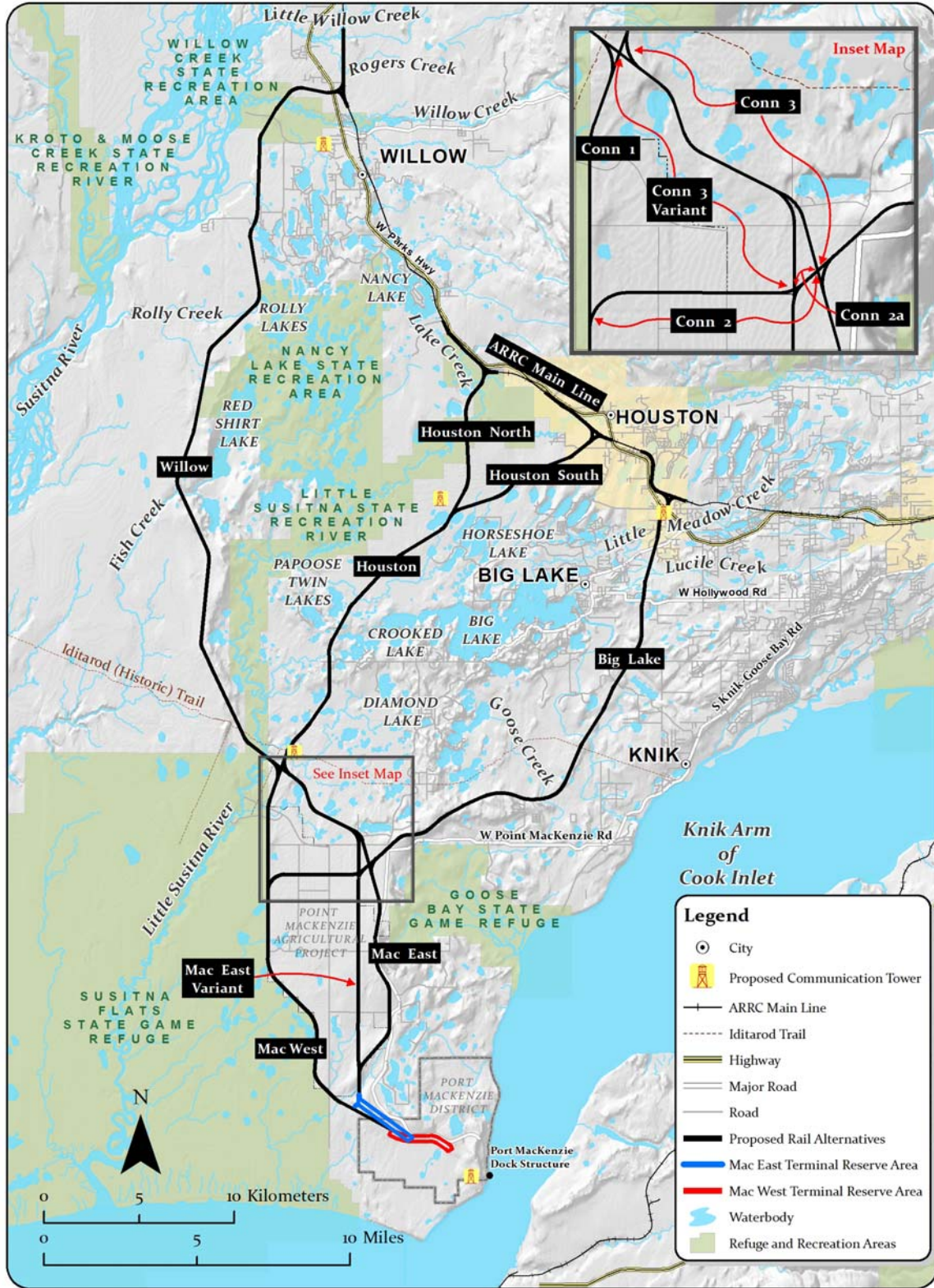


Figure S-1. Overview of Proposed Port MacKenzie Rail Extension Route Alternatives

S.3.1 Southern Segments

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

S.3.1.1 Mac West

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

S.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 to the east 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 6.0, the segment would follow the alignment of Point 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.

S.3.1.3 Mac East Variant

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

S.3.2 Connector Segments

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

S.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 Susitna Flats State Game Refuge on level terrain. The segment would cross a tributary of the Little Susitna River.

S.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.

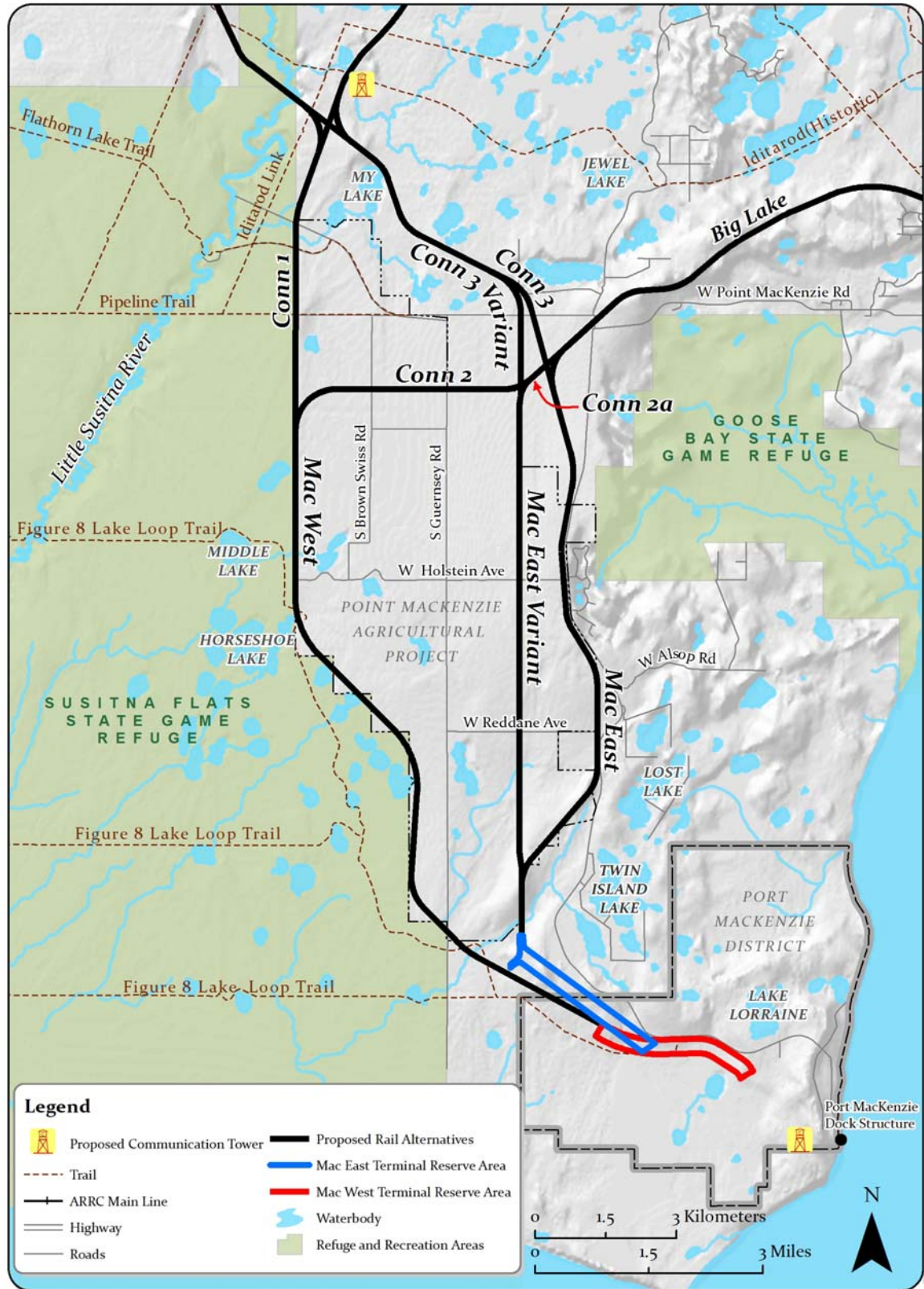


Figure S-2. Mac East, Mac West, and Connector Segments

S.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 segment would continue north of My Lake and cross an adjacent ravine. The remaining mile of the segment would be nearly level.

S.3.2.4 Connector 2a

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

S.3.2.5 Connector 3 Variant

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

S.3.3 Northern Segments

See Figures S-3 and S-4 for a detailed map of the northern segments.

S.3.3.1 Willow

From either the Connector 1, Connector 3, or Connector 3 Variant segment, the Willow Segment would continue northwest where it would cross a corner of the Susitna Flats State Game Refuge, the Little Susitna State Recreation River, and the Little Susitna River (see Figure S-3). 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 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 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.

S.3.3.2 Houston

From either the Connector 1, Connector 3, or Connector 3 Variant segment, the Houston Segment would proceed northeast, traveling through slightly undulating terrain with areas of wetland (see Figure S-3). The segment would pass between Papoose Twins and Crooked lakes, crossing an area of hilly terrain. The remaining 4 miles of the Houston Segment would be

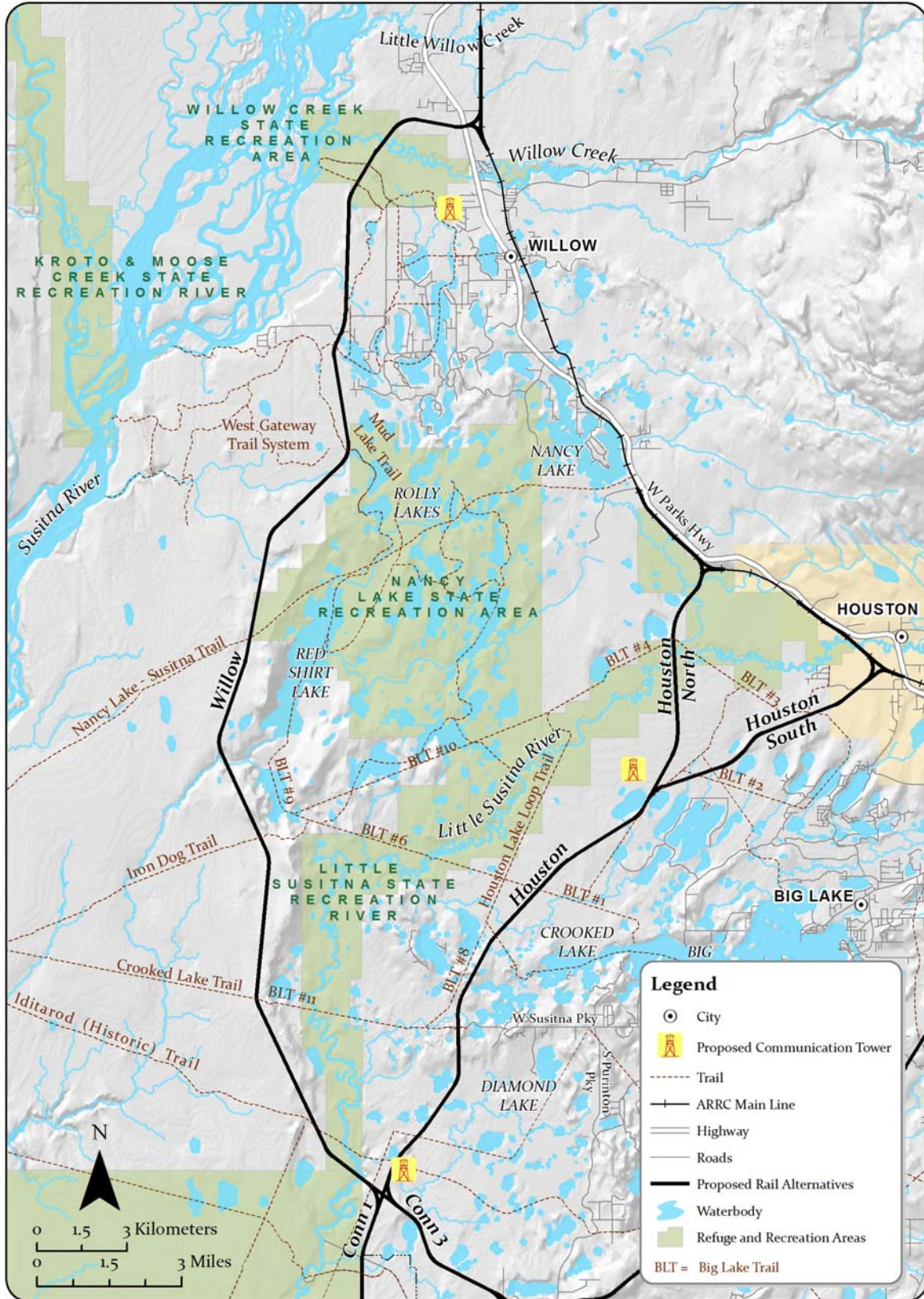


Figure S-3. Willow, Houston, Houston North, and Houston South Segments

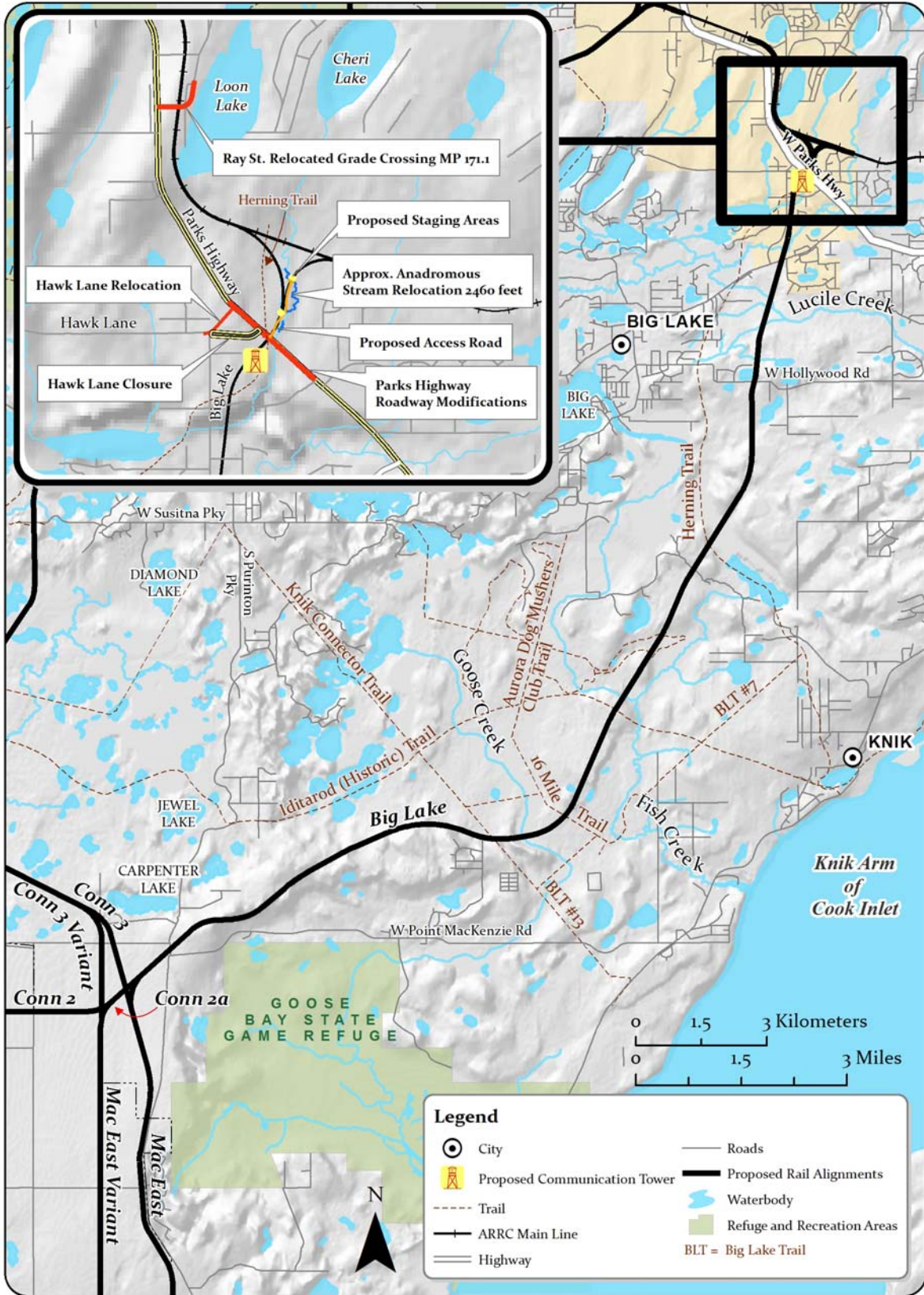


Figure S-4. Big Lake Segment

in a gradually rising wetland area to a point near Muleshoe and Little Horseshoe lakes, where it would connect to either the Houston North Segment or the Houston South Segment.

S.3.3.3 Houston North

From the Houston Segment, the Houston North Segment would continue north (see Figure S-3), crossing over the Castle Mountain Fault. The segment would cross the Houston Lake Loop Trail. It would continue through 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 178.0 along the proposed rail line without crossing Parks Highway.

S.3.3.4 Houston South

Also beginning between Muleshoe and Little Horseshoe lakes, this segment would traverse northeast, passing just west of Pear Lake (Figure S-3). The segment would cross several gravel ridges that parallel the lakes in this area. The segment would tie into the existing main line near Mile Post 174.0 without crossing Parks Highway.

S.3.3.5 Big Lake

From either the Mac East, Connector 2, or Connector 2a segment, the Big Lake Segment would run northeast for approximately 3 miles, crossing Burma Road (See Figure S-4). 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 above Big Lake Road. The Big Lake Segment would continue north through a residential area before crossing under Parks Highway as a newly constructed grade-separated crossing.

S.3.3.6 No-Action Alternative

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

S.4 Alternatives Considered But Eliminated from Detailed Study

One of the most important aspects of the EIS process here was to develop reasonable and feasible alternatives for the proposed rail line. To do so, OEA reviewed the alignments ARRC developed and analyzed in its Preliminary Environmental and Alternatives Report (ARRC, 2008) and reviewed the potential rail corridors identified in the previous Matanuska-Susitna Borough (MSB or the Borough) Rail Corridor Study (MSB, 2003). In April 2008, OEA asked ARRC to consider the feasibility of making adjustments to the Willow, Big Lake, Mac West, and Houston North segments, and to consider a new segment to reduce potential environmental impacts.

ARRC responded that OEA's proposed refinements were infeasible or would result in increased environmental impacts. OEA reviewed the Applicant's responses to the suggested refinements and to the new segment OEA identified for consideration and concurred with the Applicant's findings. Some examples are as follows: an alignment shifting the Willow Segment west to avoid the Nancy Lake State Recreation Area was not selected for detailed study because relocating this alignment would involve construction in an area with compressible soils and would likely impact over 3 additional acres of wetlands; a shift east in the Big Lake Segment was eliminated from detailed study because of the potential impacts to Blodgett Lake, 2 Native American allotments, and additional congestion in an area containing higher traffic volumes; and an alignment that shifted the Mac West Segment to avoid the Susitna Flats State Game Refuge was eliminated from detailed study because it would bisect farmland and increase potential impacts on property owners. Based on the purpose and need for the proposed action and a review of ARRC's initial alignments and variations proposed in scoping comments, OEA determined that the alignments described in S.3 provide a reasonable set of feasible alternatives for detailed study.

In response to comments on the Draft EIS, OEA also asked the Applicant to consider alignments between the Mac East and Mac West segments, to the west of the Willow Segment near the Susitna River, and to the east of the Big Lake Segment between the Big Lake Segment and Knik Goose Bay Road. OEA considered information provided by the Applicant and conducted an independent analysis. Based on further analysis, OEA decided to include an analysis of the Mac East Variant Segment in this Final EIS, because the potential impacts generally would be similar to or less than the potential impacts of the Mac East or the Mac West segments. OEA found that alignments closer to the Susitna River in the west and Knik Goose Bay Road in the east would not be practical. An alignment shifting the Willow Segment west along the bank of the Susitna River was eliminated because it would be the longest, least efficient route of all alignments considered for detailed study. The soils along this route are generally unsuitable for construction and the impacts to wetlands would be greater than for the Willow Segment. An alignment closer to the Knik Goose Bay Road was considered, but eliminated from detailed study because this route would require the taking of approximately twice as many residences as the current Big Lake Segment, increase the length of the rail line by approximately 2 miles, and increase the number of at-grade crossings.

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

Similarly, upgrades to the existing road to Port MacKenzie and construction of a new road also were not analyzed in detail because they would not meet the Applicant's stated purpose of

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

S.5 Overview of Affected Environment

The project area is generally located north of Anchorage, Alaska, on the opposite side of the Knik Arm of the Cook Inlet. The proposed rail line would connect the Port MacKenzie District in the MSB to a point on the existing ARRC main line between Wasilla and north of Willow, Alaska. The area is relatively rural, with a few recreation areas managed by the state and the MSB located nearby. The area is within the MSB and Susitna River valley, bounded by the Susitna River on the west, Knik Arm of Cook Inlet on the south and east, and Parks Highway and the existing ARRC main line on the north. The project area lies within the Susitna Lowland, which is the landward extension of the Cook Inlet Depression. The depression is a structural basin that contains the lowland basins of the Susitna River, its tributaries, and several other rivers that flow directly into the head of Cook Inlet. The project area is located in the Cook Inlet Basin Ecoregion, a gently sloping lowland basin characterized by a variety of wetland and woodland habitats including evergreen, deciduous, and mixed forest stands. The area provides habitat for wildlife such as bear, moose, wolf, furbearers (like squirrels and wolverines), fish, and birds. Cultural and historic resources are found within the project area including cabins and trails. The project area includes several designated recreation areas, including the Willow Creek State Recreation Area, the Nancy Lake State Recreation Area, the Little Susitna State Recreation River, and 2 state recreation sites on the northern and southern shores of Big Lake. The project area also includes the Susitna Flats and Goose Bay state game refuges.

S.6 Summary of Environmental Consequences

OEA performed an in-depth review of the Applicant's proposal, which included independent environmental analysis of potential project impacts and evaluation of issues raised by government agencies and the public. The following discussion provides an overview and comparison of the potential direct and indirect impacts of the alternative segments that have been considered. Table S-2 at the end of this Summary compares noteworthy potential impact variations among the build alternatives.

S.6.1 Topography, Geology and Soils

Steeper terrain requires a greater amount of either fill or cut and fill during rail line construction than flatter terrain and would therefore have a greater impact on topography. With one

exception, the Big Lake Segment, the existing terrain for all segments and segment combinations that have been considered in detail would be relatively flat. The Big Lake Segment, however, would have approximately 15.2 percent of its length crossing land with slope greater than 1 percent and 5.4 percent of its length crossing land with slope greater than 5 percent, with the remaining 79.4 percent relatively flat. This segment would cross the highest percentage of slopes between 1 and 5 percent, and the highest percentage of slopes greater than 5 percent. The Mac East Segment would have the second steepest conditions.

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

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

OEA is not recommending mitigation measures for potential impacts to topography, geology, and soils, because OEA concluded that such impacts from construction and operation of the proposed rail line would be negligible. Potential unavoidable impacts from rail line construction and operation would include modifications: of topography through excavation and fill associated with construction of the proposed rail line and associated facilities; removal and replacement of soils classified as unsuitable for construction of the rail line embankment and access road; and conversion of land that contains soils the MSB considers to be of local importance for agricultural purposes to project-related uses.

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

S.6.2 Water Resources

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

S.6.2.1 Surface Water

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

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

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

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

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

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

S.6.2.2 Groundwater

Construction of the proposed rail line, sidings, power lines, buried communications cables, access road, and other facilities could affect groundwater movement and quality. Groundwater movement could be altered by changes in infiltration and recharge rates due to compaction of the overlying soil. These effects would be limited to the footprint of the proposed rail line – which includes the rail bed, terminal reserve areas, access road, and associated facilities – and staging areas, which represent 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 areas⁵ could affect groundwater due to the changes in local hydrogeology that would result from the removal of saturated materials. These changes include the creation of new ponds that would serve as sources of groundwater discharge through evaporation during the summer and sources of groundwater during major rainstorms and the break-up of ice.

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

⁵ Borrow areas are locations from which materials such as soil, rock, or gravel are excavated for a specific purpose.

Notwithstanding the recommended mitigation measures, there still would be potential unavoidable impacts to groundwater from the proposed rail line. Potential impacts would include: changes to recharge potential and aquifer dewatering due to increased ground compaction within the rail line footprint and an increased risk of groundwater contamination from the rail line providing additional sources or pathways for pollutants. OEA concluded such mitigated impacts from construction and operation of the proposed rail line would be negligible.

S.6.2.3 Floodplains

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

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

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

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

reduction in floodplain storage within the rail line footprint; constriction of flood flow paths and increases in flood water elevation upstream of crossings; and potential changes in floodplain hydraulics within the rail line footprint, which could lead to alterations in channel alignment and channel erosion. OEA concluded that such mitigated impacts from construction and operation of the proposed rail line would be negligible.

S.6.2.4 Wetland Resources

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

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

Of the remaining build alternatives, the Mac West-Connector 1-Houston-Houston South Alternative would impact 278 acres of wetlands and waters, the Mac West-Connector 2-Big Lake Alternative would impact 275 acres, the Mac West-Connector 1-Willow Alternative would impact 255 acres, the Mac East-Connector 3-Houston-Houston North Alternative would impact 204 acres, the Mac East Variant-Connector 3 Variant-Houston-Houston North Alternative would impact 200 acres, the Mac East-Big Lake Alternative would impact 175 acres, the Mac East Variant-Connector 2a-Big Lake Alternative would impact 169 acres, the Mac East-Connector 3-Houston-Houston South Alternative would impact 164 acres, the Mac East Variant-Connector 3 Variant-Houston-Houston South Alternative would impact 160 acres, and the Mac East-Connector 3-Willow Alternative would impact 140 acres.

Overall, wetlands within all proposed build alternatives are high functioning for 5 of the 8 wetland functions analyzed for the proposed rail line. The wetlands within all proposed build alternatives would be moderate to low functioning for groundwater recharge. The wetlands along the various proposed build alternatives are highest functioning for wildlife habitat, modification of water quality, and vegetation diversity. Ninety-nine to 100 percent of the wetlands along any given alternative scored as high functioning for these functions. OEA's

analysis compared high-functioning wetlands on the various alternatives where there would be notable differences, such as for export of detritus, groundwater discharge, stream flow moderation, and storm water and flood water storage.

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

The Big Lake Segment would also impact 25 acres of the Su-Knik Mitigation Bank, 6 acres primarily composed of riverine wetlands and riparian wetlands, but also including scrub/shrub wetlands and uplands. Within this mitigation bank is the Goose Creek Fen, a floating mat fen system. A floating fen is an important ecological feature supporting diverse plant communities and providing high value rearing habitat for anadromous fish species. Goose Creek Fen would require draining or filling for construction of the Big Lake Segment. The wetlands in the mitigation bank are locally important to the MSB and are highly valued. The impact to wetlands would reach beyond the 200-foot ROW because, for the purposes of the mitigation bank, the value of the wetlands is based on their contiguous, unfragmented state.

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

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

Notwithstanding the recommended mitigation measures, there still would be potential unavoidable impacts to wetlands within and adjacent to the proposed rail line ROW. Potential impacts would include: unavoidable filling of wetlands; permanent loss of wetland functions within the fill area; potential changes to natural drainage and altered flood hydraulics near crossings; increased potential for debris jams and overbank flooding upstream of water

⁶ A mitigation bank is a wetland, stream, or other aquatic resource area that has been restored, established, enhanced, or (in certain circumstances) preserved for the purpose of providing compensation for unavoidable impacts to aquatic resources permitted under section 404 of the Clean Water Act, 33 U.S.C. § 1251, or a similar state or local wetland regulation.

crossings; changes to recharge potential and aquifer dewatering; impacts to the Su-Knik Mitigation Bank; and impacts to Goose Creek Fen (for alternatives that include the Big Lake Segment). As discussed in the mitigation measures, the Applicant would be required to provide compensatory mitigation for unavoidable impacts to wetlands and waters of the United States. This could include utilizing wetland banks or creating new wetlands. Though wetland acreage and functionality could be compensated, functionality from an existing system would be lost. If wetland creation is required as part of the permitting process, a created wetland at a different site might not have the same ecological value as the wetlands being filled.

S.6.3 Biological Resources

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

S.6.3.1 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 rail bed, excavation of gravel, and construction of rail line support facilities. Other potential impacts would include the loss or alteration of forested habitat due to the removal of vegetation at temporary workplaces that would be restored after project construction. Potential operation impacts would include ongoing vegetation removal and control from the track ballast and adjacent areas, where necessary, for safe operations. In addition, potential impacts to vegetation resources could include altered vegetation communities due to soil compaction and the spread of invasive plant species and altered vegetation succession caused by changes in fire cycles. There are no known Federal- or state-protected threatened, endangered, or candidate plants species within the study area.

Of the build alternatives, the Mac East-Connector 3-Willow Alternative would result in the clearing of 822 acres of vegetation from the rail line footprint, the most of any alternative. The alternative with the second highest area of vegetation loss would be the Mac East Variant-Connector 3 Variant-Willow Alternative, with 821 acres of vegetation cleared. Following in descending order of area of vegetation cleared would be: the Mac West-Connector 1-Willow Alternative (779 acres), Mac East-Big Lake Alternative (731 acres), Mac West-Connector 2-Big Lake Alternative (716 acres), Mac East Variant-Connector 2a-Big Lake Alternative (714 acres), Mac East-Connector 3-Houston-Houston South Alternative (708 acres), Mac East Variant-Connector 3 Variant-Houston-Houston North Alternative (707 acres), Mac West-Connector 1-Houston-Houston North Alternative (663 acres), Mac East-Connector 3-Houston-Houston South Alternative (652 acres), and Mac East Variant-Connector 3 Variant-Houston-Houston South (651 acres) alternatives. The Mac West-Connector 1-Houston-Houston South Alternative would result in the fewest acres of vegetation loss (608 acres). Vegetation clearing would result in a long-term impact for forest communities, even with restoration, especially for late-succession forests and wetlands that would be slow to recover. As part of ARRC's proposed action, some cleared areas would likely be restored after construction; other areas would be covered by fill.

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

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

S.6.3.2 Wildlife

A variety of wildlife species are known to inhabit the project area. These include: bears, moose, wolves, beaver, mink, muskrat, river otter, ermine, martens, wolverines, red fox, coyote, lynx, hares, mice, squirrels, bats, shrews, voles, lemmings, porcupine, and numerous avian species, including 42 birds of conservation concern.⁷ The potential impacts of the proposed rail line construction and operation to wildlife would be influenced by the animals' dependence on specific habitats, the availability of preferred and used habitats, the amount of preferred habitat the project would affect, ecology and life history, and past and present population trends. Because game mammal populations are managed for sustainable human harvest, project-related effects to population abundance and distribution, available habitat, and predator-prey relationships could also affect the sustainable harvest of these game mammals. Potential construction impacts common to all build segment combinations and alternatives could include habitat alteration and loss, disturbance and displacement of wildlife, and direct mortality from construction vehicles and equipment. Common potential impacts related to the operation of the proposed rail line could include moose-train collision mortality, bird-power line and communications tower collision mortality, habitat fragmentation, disturbances leading to reduced wildlife survival and productivity, and potential exposure to spills of toxic materials.

The proposed rail line would result in the loss of wildlife habitat ranging from 608 acres to 822 acres depending on the alternative, which is less than 1 percent of the 435,895 acres of available habitat in the study area. The Mac East-Connector 3-Willow Alternative would result in the greatest amount of habitat loss (822 acres) and the Mac West-Connector 1-Houston-Houston South Alternative would result in the least amount of habitat loss (608 acres). Of the remaining alternatives, the Mac East Variant-Connector 3 Variant-Willow Alternative would result in the greatest loss of wildlife habitat (821 acres), followed in descending order by the Mac West-Connector 1-Willow Alternative (779 acres), Mac East-Big Lake Alternative (731 acres), Mac West-Connector 2-Big Lake Alternative (716 acres), Mac East Variant-Connector 2a-Big Lake Alternative (714 acres), Mac East-Connector 3-Houston-Houston North Alternative (708 acres), Mac East Variant-Connector 3 Variant-Houston-Houston North Alternative (707 acres), Mac

⁷ 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.

West-Connector 1-Houston-Houston North Alternative (663 acres), Mac East-Connector 3-Houston-Houston South Alternative (652 acres), and Mac East Variant-Connector 3 Variant-Houston-Houston South (651 acres) alternatives. While OEA's analysis indicates that the proposed rail line would reduce the amount of available habitat, the loss would be less than 1 percent of the total forested habitat available in the project area and less than 1 percent of the total wetland habitat available in the project area, regardless of the alternative chosen.

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

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

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

S.6.3.3 Fisheries Resources

A variety of both resident and anadromous fish species are present in the project area. Resident fish species are those whose life cycle does not include migration into marine waters, and include lake trout, burbot, northern pike, sculpins, sticklebacks, suckers, and pond smelt in the project area. Anadromous fish species are those whose life cycle include migration into marine waters, and include all 5 Pacific salmon: Chinook (king), chum (dog), coho (silver), pink (humpy), and sockeye (red), as well as rainbow trout, Dolly Varden, and eulachon in the project area. Of the species that are present, Cook Inlet Salmon (Chinook [king], chum [dog], coho [silver], pink [humpy], and sockeye [red]) are federally regulated and, as a result, habitat for these species is protected under the Magnuson-Stevens Fishery Management and Conservation Act.

Construction of the proposed rail line would require multiple stream crossings at locations that have fish or fish habitat. Project construction methods and timing, the type of stream crossing structure installed, and daily operation procedures would influence the severity and types of potential impacts to fish and fish habitat at each stream crossing. The primary potential impacts of crossing structures to fish and fish habitat would be loss and degradation of instream habitats due to placement of structures, alteration of stream hydrology and water quality, and blockage of fish movements. Potential rail construction impacts common to all build alternatives would include loss or alteration of instream and riparian habitats, mortality from instream construction, blockage of fish movement, degradation of water quality, alteration of stream hydrology and ice breakup, and noise and vibration impacts. Potential rail operation impacts common to all build alternatives would include loss or alteration of instream and riparian habitats, blockage of fish movements, and degradation of water quality through sedimentation and turbidity.

All of the build alternatives would cross streams or waterbodies that provide habitat for fish. This fish habitat could be adversely affected by rail line construction and operation. All crossings of fish-bearing streams would result in some loss or alteration of stream and riparian habitats. Bridged crossings would likely result in a smaller area of instream habitat loss than closed-bottomed culverts (circular or oblong culverts constructed of corrugated steel or concrete). In general, clear-span bridges (those without instream supports) would have less potential to create conditions that could cause loss of spawning habitats, blockage of fish movements, alteration of stream hydrology, and increased erosion and sedimentation. The proposed build alternatives would require a minimum of 10 and a maximum of 18 crossings of streams that have been documented to contain either fish or fish habitat. The alternatives requiring the least number of fish-bearing stream crossings (10) are the Mac East-Big Lake, Mac East Variant-Connector 2a-Big Lake, Mac East Variant-Connector 3 Variant-Houston-Houston South, and Mac East-Connector 3-Houston-Houston South alternatives. The alternative requiring the greatest number of crossings (18) is the Mac West-Connector 1-Houston-Houston North Alternative. Of the remaining alternatives, the Mac West-Connector 1-Willow Alternative would cross the greatest number of fish-bearing waterbodies (16), followed by the Mac East-Connector 3-Houston-Houston North and Mac East Variant-Connector 3 Variant-Houston-Houston North alternatives (15 crossings for both); the Mac West-Connector 1-Houston-Houston South, Mac East Variant-Connector 3 Variant-Willow, and Mac East-Connector 3-Willow alternatives (13 crossing for each); and the Mac West-Connector 2-Big Lake Alternative (12).

As part of this Final EIS, OEA prepared estimates of potential fish abundance to compare the geographic quantity and geomorphic quality of fisheries habitat upstream of crossings under the

build alternatives. The resulting index of fish habitat potential assumes relatively undisturbed conditions with unimpaired passage throughout the watersheds and does not represent forecasts or estimates of actual biological performance. Fish-bearing waters and upstream habitat along the Mac West-Connector 1-Willow Alternative would have the highest estimated index of fish habitat potential and the highest estimated fish abundance for all fish species modeled. Fish-bearing waters and upstream habitat along the Mac East-Connector 3-Willow Alternative and the Mac East Variant-Connector 3 Variant-Willow Alternative would have the second highest estimated index of fish habitat potential. Fish-bearing waters and upstream habitat along the Mac East-Connector 3-Houston-Houston South Alternative and the Mac East Variant-Connector 3 Variant-Houston-Houston South Alternative would have the lowest estimated index of fish habitat potential across the alternatives studied in detail.

All of the build alternatives would cross waters important for sustaining recreational and commercial salmon fisheries, with the greatest number of important waters crossed by alternatives that include the Willow Segment and the fewest number crossed by alternatives that include the Houston-Houston South Segment Combination. The Houston-Houston South Segment Combination and the Willow Segment crossings of the Little Susitna River would require instream pilings and would affect spawning habitat for salmon species. Alternatives that include the Big Lake Segment would cross Goose Creek, a large unique fen system that would likely have to be drained or filled to provide an area for construction, resulting in the potential disturbance of about 4 acres within the 200-foot ROW. These potential impacts likely would extend outward within the 18-acre high-value wetland and juvenile rearing habitat in the study area. Of the total 44 proposed fish-bearing stream crossings, 19 contain either sticklebacks, Pacific lamprey, or both. These species are considered Species of Conservation Concern by ADF&G.

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

Notwithstanding the recommended mitigation measures, there still would be potential unavoidable impacts to fisheries from the proposed rail line. Potential impacts include fish habitat loss and modification at stream crossings along the proposed rail line; loss of rearing, foraging, and cover habitat along the banks within the rail line footprint; loss of overhanging bank habitat structure and vegetation within the rail line footprint; potential changes to natural drainage and altered flood hydraulics; potential for debris jams and overbank flooding upstream of water crossings; potential direct mortality of fish during construction; and potential loss of

redds, eggs, and fry due to changes in sedimentation, turbidity, and pollutants during construction.

S.6.3.4 Threatened and Endangered Species

Through consultations with the U.S. Fish and Wildlife Service and the NMFS potential threatened or endangered species that could be affected by the proposed rail line, OEA determined that the proposed rail line could indirectly affect the federally-endangered Cook Inlet beluga whale (*Delphinapterus leucas*). OEA identified and evaluated potential indirect effects on beluga whale. OEA determined that: 1) beluga whale forage fish in freshwater streams that support anadromous salmon and smelt and would be crossed by the proposed rail line and 2) induced noise and disturbance effects in the immediate vicinity of Port MacKenzie at the entrance of the Knik Arm could potentially occur as a result of induced increases in vessel traffic to and from Port MacKenzie. OEA, in consultation with the NMFS, did not identify any direct impacts from the proposed project to the beluga whale or beluga whale habitats.

To avoid or minimize potential impacts to the Cook Inlet beluga whale from the proposed rail line, OEA is recommending that the Board impose mitigation measures to protect anadromous fisheries, as outlined in Section S.6.3.3. Notwithstanding implementation of OEA's recommended impact avoidance and minimization measures at anadromous stream crossings and for ship traffic servicing Port MacKenzie, OEA determined that the Port MacKenzie Rail Extension Project may affect, but is not likely to adversely affect, the Cook Inlet beluga whale (Appendix H). The NMFS concurred with OEA's findings on March 9, 2010 (Appendix A). OEA's analysis indicates that though some unavoidable impacts to fisheries resources can be anticipated (see Section S.6.3.3), these impacts are considered unlikely to adversely affect the Cook Inlet beluga whale.

S.6.4 Cultural and Historic Resources

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

Archaeological sites that could not be avoided in the ROW could be inadvertently or purposefully destroyed through surface and subsurface disturbances, primarily during rail line construction. Historic and potentially historic trails could be blocked if they are not officially recognized trails. Officially recognized trails would be grade-separated or relocated, facilitating free passage; however, the integrity of any historic trails would still be adversely affected through the introduction of auditory and visual effects. The *Iditarod Dog Sledding Historic District/Historical Vernacular Landscape* (Iditarod Dog Sledding Historic District) would be adversely affected to varying degrees through loss of visual integrity.

Depending on the alternative authorized by the Board, if any, the proposed rail line would potentially directly impact from 4 to 27 known cultural resources within the rail line ROW and potentially impact an additional 9 to 23 resources outside the 200-foot ROW, but within 1 mile of the rail line center line. The Mac East-Connector 3-Willow Alternative would potentially

affect the most known cultural resources (49) and pass through areas with a high probability of having large numbers of undocumented cultural resources. The Mac East Variant-Connector 3 Variant-Houston-Houston South Alternative would affect the fewest known cultural resources (15) and pass through areas with a low probability (such as wetlands) of having large numbers of undocumented cultural resources. Of the remaining alternatives, the Mac West-Connector 1-Willow Alternative would potentially affect 44 cultural resources, followed in descending order by the Mac East Variant-Connector 3 Variant-Willow (42), Mac East-Big Lake (38), Mac West-Connector 2-Big Lake (35), Mac East Variant-Connector 2a-Big Lake (32), Mac East-Connector 3-Houston-Houston North (24), Mac East-Connector 3-Houston-Houston South (23), Mac West-Connector 1-Houston-Houston North (20), Mac West-Connector 1-Houston-Houston South (19), and Mac East Variant-Connector 3 Variant-Houston-Houston North (16) alternatives.

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

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

Because all effects on historic properties cannot be fully determined prior to approval of this type of undertaking, OEA has developed a PA, a mechanism under section 106 of the National Historic Preservation Act that allows agencies to fully evaluate which properties are listed in or eligible for listing in the *National Register of Historic Places* and would govern the completion of the section 106 process if the proposal before the Board is authorized and the rail line is built. The PA provides for the completion of a Level 2 identification survey,⁸ if the Board authorizes the project and the locations of associated rail line facilities have been established. Additionally, the PA establishes responsibilities for the treatment of historic properties, the implementation of mitigation measures, and ongoing consultation efforts.

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

⁸ Level of investigation required to evaluate the eligibility of a resource for the National Register.

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

S.6.5 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)⁹ 16B, such as moose, bear, and waterfowl, could migrate through the project area. Train-animal collisions could result in changes in distribution, abundance, and health of resources migrating to and from GMU 16B.

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

OEA is not recommending mitigation measures for impacts to subsistence, because OEA concluded that impacts on subsistence from construction and operation of the proposed rail line would be negligible. A potential negligible unavoidable impact from rail line construction and

⁹ A Game Management Unit (GMU) is 1 of 26 geographical areas listed under game management units in the codified Alaska hunting and trapping regulations and the GMU maps of Alaska shown in the Alaska State Hunting Regulation book.

operation would be potential changes in subsistence resource availability due to potential minimal changes in wildlife distribution, survival rates, or harvest patterns. OEA does not believe any mitigation to subsistence is warranted or reasonable.

S.6.6 Climate and Air Quality

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

To evaluate the potential impacts of increased emissions of NAAQS air pollutants plus greenhouse gas emissions, OEA developed emissions estimates for the proposed rail line construction and operation. To be conservative, OEA estimated construction and operation emissions for the longest potential alternative, the 46-mile Mac West-Connector 1-Willow Alternative, and for the maximum average train length of 80 cars. OEA found that the estimated emissions of all criteria pollutants from construction and operation of the proposed rail line would be below the *de minimis* conformity thresholds established for each pollutant and, thus, the increase would be considered *de minimis* regardless of the alternative that might be authorized to be constructed. To the extent that commodities that would be transported by truck were shifted to rail, and to the extent that commodities transported between the Interior of Alaska and the ports of Anchorage or Seward were shifted to Port Mackenzie, at a shorter rail haul distance, 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 (CO₂) emissions. OEA estimated that operation of the proposed rail line would represent a 2 percent increase in Alaska rail CO₂ emissions and an increase in CO₂ emissions of less than 0.01 percent for the state as a whole. OEA concluded that estimated increases from proposed rail line construction and operation would be minimal and that any direct project-related impacts to climate would be low for all of the alternatives evaluated.

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

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

S.6.7 Noise and Vibration

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

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

Because FRA is subject to section 4(f)¹⁰ OEA also analyzed the potential noise impacts on section 4(f) properties using FRA/FTA methods.¹¹ To be conservative, OEA assumed that the entire area of the game refuge and recreation areas are noise-sensitive sites, although this actually depends on how the specific property is used. Based on FRA analysis methods, section 4(f) properties used for passive purposes would be more noise-sensitive than ones used for active recreational pursuits. All project alternatives that include the Willow Segment would result in potential noise impacts to the Little Susitna State Recreation River, Susitna Flats State Game Refuge, Willow Creek State Recreation Area, and Nancy Lake State Recreation Area. None of these refuges and recreation areas are anticipated to experience noise impacts as a result of the Mac East-Connector 3-Houston-Houston South, Mac East Variant-Connector 3 Variant-Houston-Houston South, Mac East Variant-Connector 2a-Big Lake, or Mac East-Big Lake alternatives. The estimated acreage of potential noise impacts within the Willow Creek State Recreation Area is approximately 12 percent of the total acreage of the state recreation area, while the acreage of potential noise impacts within the Little Susitna Recreation River would range from 3 percent (for alternatives that include the Willow Segment) to 6 percent (for alternatives that include the Houston North Segment) of the total acreage of the recreation river. All other estimated potential noise impacts would affect 1 percent or less of the total acreage of

¹⁰ Section 4(f) of the U.S. Department of Transportation Act of 1966, 49 U.S.C. § 1653(f) and later recodified as 49 U.S.C. § 303, mandates that the Secretary of Transportation shall not approve any transportation project requiring the use of publicly-owned parks, recreation areas, wildlife or waterfowl refuges, or significant historic sites, regardless of ownership, unless (1) there is no prudent and feasible alternative to using that land and (2) the program or project includes all possible planning to minimize harm to the public park, recreation area, wildlife or waterfowl refuge, or significant historic site, resulting from that use. Section 6009(a) of the "Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users" Act (23 U.S.C. § 138) established that requirements of section 4(f) shall be considered to be satisfied if the Secretary of Transportation determines that the impact would be *de minimis*. Section 4(f) does not apply to the Board, an independent agency, but does apply to the FRA, one of the cooperating agencies for the EIS.

¹¹ Federal Railroad Administration. 2005. High-Speed Ground Transportation Noise and Vibration Impact Assessment.

the Nancy Lake State Recreation Area and the Susitna Flats State Game Refuge, although the total acreage potentially affected would be greatest within the Susitna Flats State Game Refuge.

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

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

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

S.6.8 Energy Resources

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

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

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

S.6.9 Transportation Safety and Delay

S.6.9.1 Grade Crossing Safety

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

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

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

To avoid or minimize the potential impacts to grade crossing safety from the proposed rail line, OEA is recommending that the Board impose 6 mitigation measures volunteered by the Applicant. These measures include requiring: permanent signs displaying a toll-free telephone number at grade crossings to address public inquiries; development of a team to address rail line/roadway crossing safety; incorporation of the proposed project into the Applicant's existing emergency response process and the contact of appropriate emergency response organizations; notification to road users of temporary road closings and construction-related activities; to the extent practicable, confinement of all construction traffic within the ROW or to public roads;

removal and restoration of any temporary access outside the ROW; and consultation with appropriate agencies on final design of crossings and warning devices.

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

S.6.9.2 Traffic Delay

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

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

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

S.6.9.3 Rail Safety

ARRC anticipates transporting bulk materials and containers on the proposed rail line and does not intend to carry hazardous materials. Nevertheless, OEA analyzed rail transport of hazardous materials in situations involving transportation of flammable and/or toxic materials in areas with relatively high population densities and overall train traffic, and found the likelihood of release to be low. ARRC has a low accident rate, and few accidents have resulted in the release of hazardous materials when they are being transported.

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

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

S.6.10 Navigation Resources

The proposed rail line alternatives include a total of 35 stream crossings that have been determined to be, or that might be considered to be, navigable waterways. Where an alternative would cross a navigable waterway, as designated by the U.S. Coast Guard and 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, Mac East-Big Lake, and Mac East Variant-Connector 2a-Big Lake alternatives could be constructed without crossing a navigable stream. However, the Mac West-Connector 2-Big Lake Alternative would cross 12 possible navigable waterways and the Mac East-Big Lake and Mac East Variant-Connector 2a-Big Lake alternatives would cross 11 possible navigable waterways. The Mac West-Connector 1-Willow, Mac East-Connector 3-Willow, and Mac East Variant-Connector 3 Variant-Willow alternatives would each cross 3 navigable streams. The Mac West-Connector 1-Willow Alternative would also cross 8 possible navigable waterways, and the Mac East-Connector 3-Willow and Mac East Variant-Connector 3 Variant-Willow alternatives would cross 6 possible navigable waterways.

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

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

S.6.11 Land Use

S.6.11.1 Land Use

Land owners in the study area include Federal and state governments, the MSB, the Alaska Mental Health Trust, the University of Alaska, private citizens, the Alaska Native Regional Corporation (Cook Inlet Region Incorporated) and the Alaska Native Village Corporation (Knikatu Inc.) established under the Alaska Native Claims Settlement Act of 1971, 43 U.S.C. § 1601, and land given to an authorized individual Indian, Aleut, or Eskimo in Alaska under the Native Allotment Act of 1906, 43 U.S.C. § 270. 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 the MSB and Anchorage residents and tourists is high, and wildlife habitat and water features are extensive. Forestry and timber harvesting are some of the designated uses of state land. ARRC would acquire the land within the proposed rail line ROW from existing land owners.

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

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

All alternatives that include the Big Lake Segment would impact the greatest amount of private land and the greatest number of residences. The Mac West-Connector 2-Big Lake Alternative would have the greatest impact on private land (487 acres) and would impact 1,105 total acres with 10 structures, 5 residences, and 1 business. The Mac East Variant-Connector 2a-Big Lake Alternative would impact the second highest amount of private land (445 acres), including potential impacts to 10 structures, 5 residences, and 1 business, and would cross the least amount of total acres (973 acres). Overall, the Mac East-Big Lake Alternative would impact the third

highest amount of private land (429 acres) with 10 structures, 5 residences, and 1 business and would cross the second least amount of total acres (992 acres). Other than these alternatives, the alternatives that include the Houston-Houston North Segment Combination would impact the least amount of private land (between 200 and 250 acres). Those alternatives that include the Mac West-Connector 1 Segment Combination would have no impact to residences or structures; those alternatives that include the Mac East-Connector 3 Segment Combination would impact 2 structures; and those alternatives that include the Mac East Variant-Connector 3 Variant Segment Combination would only impact 1 structure.

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

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

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

S.6.11.2 Parks and Recreation Resources

The project area includes several designated recreation areas, including the Willow Creek State Recreation Area, Nancy Lake State Recreation Area, Little Susitna State Recreation River, and 2 state recreation sites on the northern and southern shores of Big Lake. Many recreational trails

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

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

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

All potential rail line alternatives would cross resources protected by section 4(f) of the Department of Transportation Act of 1966 as significant recreational resources and properties. All of the proposed rail line segments evaluated in this Final EIS and discussed in the Draft Section 4(f) Evaluation (Appendix M) are technically feasible to build and any combination of the segments that would connect the existing main line to Port MacKenzie would satisfy the project's purpose and need. There are 4 alternatives that would result in *de minimis* impacts on recreational section 4(f) resources: the Mac East Variant-Connector 2a-Big Lake, Mac East Variant-Connector 3 Variant-Houston-Houston South Alternative, Mac East-Big Lake Alternative, and Mac East-Connector 3-Houston-Houston South alternatives. Of these 4 alternatives, the Mac East-Connector 3-Houston-Houston South and the Mac East Variant-Connector 3 Variant-Houston-Houston South alternatives would intersect the fewest number (1) and length (204 feet) of recreational section 4(f) trails, while the Mac East-Big Lake Alternative would intersect the greatest number (4) and length (2,202 feet) of recreational section 4(f) trails. None of these 4 alternatives would affect the Susitna Flats State Game Refuge, Little Susitna

State Recreation River, Nancy Lake State Recreation Area, or Willow Creek State Recreation Area.

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

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

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

Notwithstanding the recommended mitigation measures, there still would be potential unavoidable impacts to parks and recreation resources from the proposed rail line. Potential impacts include diminished experience for users engaged in activities such as recreation, hunting, fishing, and wildlife viewing; a loss of connectivity of trails for which grade-separated crossings would not be provided; the conversion of lands within the rail line ROW to rail line use; and the restriction of access within the ROW without an ARRC entry permit.

There also would be potential unavoidable impacts to section 4(f) and 6(f)¹² properties. Construction and operation of the following 8 alternatives would result in greater than *de minimis* impacts on recreational 4(f) properties: the Mac West-Connector 1-Willow, Mac East-Connector 3-Willow, Mac East Variant-Connector 3 Variant-Willow, Mac West-Connector 1-Houston-Houston North, Mac East-Connector 3-Houston-Houston North, Mac East Variant-Connector 3 Variant-Houston-Houston North, Mac West-Connector 1-Houston-Houston South, and Mac West-Connector 2-Big Lake alternatives. The section 4(f) properties include the Willow Creek State Recreation Area, Nancy Lake State Recreation Area, Little Susitna State Recreation River, and Susitna Flats State Game Refuge, depending on the alternative authorized, if any. A portion of the Nancy Lake State Recreation Area, a section 6(f) property, would be permanently converted from recreational to non-recreational uses in the event that either the Mac West-Connector 1-Willow, Mac East Variant-Connector 3 Variant-Willow, or Mac East-Connector 3-Willow alternatives were authorized by the Board.

S.6.11.3 Visual Resources

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

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

To avoid or minimize the potential environmental impacts to visual resources from the proposed rail line, OEA is recommending that the Board impose up to 3 mitigation measures, including 1 alternative-specific mitigation measure, to reduce glare from lighting, minimize clearing at road

¹² Section 6(f) of the Land and Water Conservation Fund, 16 U.S.C. § 4601, applies to all public areas that have received Conservation Fund monies to acquire or develop public recreation facilities. Section 6(f)(3) requires that these areas be maintained in perpetuity for public outdoor recreation use, unless the National Park Service approves substitution property of reasonably equivalent usefulness and location and of at least equal fair market value.

and trail crossings, and require the use of native plants in revegetation plans. Notwithstanding OEA's recommended mitigation measures, there still would be potential unavoidable impacts to visual resources from the proposed rail line. Potential impacts would include: a conversion of existing land use to a use that includes permanent, built features at the terminal reserve area or a permanent linear corridor including the rail line, access road, transmission line, culverts under the tracks, and vegetative maintenance within the 200-foot ROW. Trains operating over the proposed rail line could impact the experience of people engaged in hunting, fishing, wildlife viewing, and/or other recreational activities in the project area.

S.6.11.4 Hazardous Materials and Waste Sites

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

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

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

S.6.12 Socioeconomics

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

Most potential 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 Port for the movement of bulk materials and to support the use of Port MacKenzie as a general cargo port. The extent of the socioeconomic impact would depend on the extent to which the rail line was used and generated demand for services at Port MacKenzie. Additionally, access to resources, such as coal, that the proposed rail line would provide could attract new industries to the Port MacKenzie District.

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

OEA is not recommending mitigation measures for potential impacts to socioeconomics, because OEA concluded that such impacts from construction and operation of the proposed rail line would be minor. Potential unavoidable impacts from rail line construction and operation include the benefits that would arise from an increase in employment during the construction period along with the adverse affects of a potential change in economic activities directly or indirectly related to the areas where use of surrounding trails would be reduced or eliminated. In the area of the Big Lake Segment, the proposed rail line would require taking 5 residences, 10 structures, and 1 business. Two structures in the Connector 3 Segment ROW would be taken, and 1 structure in the Mac East Variant Segment ROW would be taken. Given the small number of

residential displacements, no difficulty in identifying and providing comparable nearby housing would be expected.

S.6.13 Environmental Justice

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

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

S.6.14 Cumulative Impacts

OEA collected and reviewed information on relevant past, present, and reasonably foreseeable future projects and actions that could have effects that coincide in time and space with the potential effects from the proposed action. For those identified relevant projects, OEA identified where there could be cumulative impacts. Reasonably foreseeable activities within the project area could include: Alaska Stand Alone Pipeline Project; Cook Inlet Areawide Oil and Gas Lease Sale; Cook Inlet Ferry; Cook Inlet OCGen™ Power Project; Knik Arm Crossing; Knik-Willow Transmission Line Upgrade; Goose Creek Correctional Center; MSB Regional Aviation System Plan; a suite of Port MacKenzie Development Projects;¹³ Port of Anchorage Marine Terminal Redevelopment Project; a host of road projects in the MSB; South Wasilla Rail Line Relocation; the Su-Knik Wetland Bank – Umbrella Mitigation Bank Instrument – Big Lake South Individual Bank Plan; and the West Mat-Su Access Project. The effects of these projects in combination with the impacts of the proposed action could result in cumulative adverse effects to surface water and wetland resources, biological resources, cultural and historic resources, climate and air quality, and land use.

S.6.15 Comparison of Potential Impacts

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

¹³ These include the development of a bulk materials facility, gravel mining operations, deep draft dock expansion, and barge dock expansion.

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

S.7 Environmentally Preferable Alternative

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

Section S.3 discusses the proposed rail line alignments that OEA selected for detailed environmental review as alternatives in this Final EIS. To facilitate comparison of the alternatives, OEA divided the alternatives into southern, northern, and connector segments. The alternatives considered in the EIS include construction and operation of a rail line along southern, northern, and connector segments and a No-Action Alternative (see Figure S-2 for a key to map areas). Details on the selection of OEA's environmentally preferable alternative are provided below.

S.7.1 Weighing the Environmental Impacts of the Build Alternatives

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

OEA has carefully balanced all of the information available on potential environmental impacts (including concerns raised by Federal and state government agencies, private citizens, and other interested parties during the EIS process) in identifying its environmentally preferable alternative. The widely varying nature of the potential impacts by alternative complicated this

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

As explained below, OEA has identified the Mac East Variant-Connector 3 Variant-Houston-Houston South Alternative (see Figure S-5) as its environmentally preferable alternative for the proposed rail line. OEA believes that this alternative, with OEA's final mitigation recommendations, would most effectively avoid, minimize, and reduce potential environmental impacts to the extent reasonable if the Board decides to authorize the construction and operation of the proposed rail line. Notwithstanding OEA's final recommended mitigation, adverse impacts would still occur to recreational access, wetlands, anadromous fisheries, and other resource areas. The only means to completely avoid these potential impacts would be for the Board to deny the proposed action. In making its final decision, the Board will consider the entire environmental record (including these unavoidable impacts), as well as the transportation merits of the proposed rail line.

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

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

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

Alternatives that include the Mac West Segment generally would have higher environmental impacts than the alternatives that include other southern segments. Those potential impacts would include a larger number of water crossings, increased impacts to and crossings of

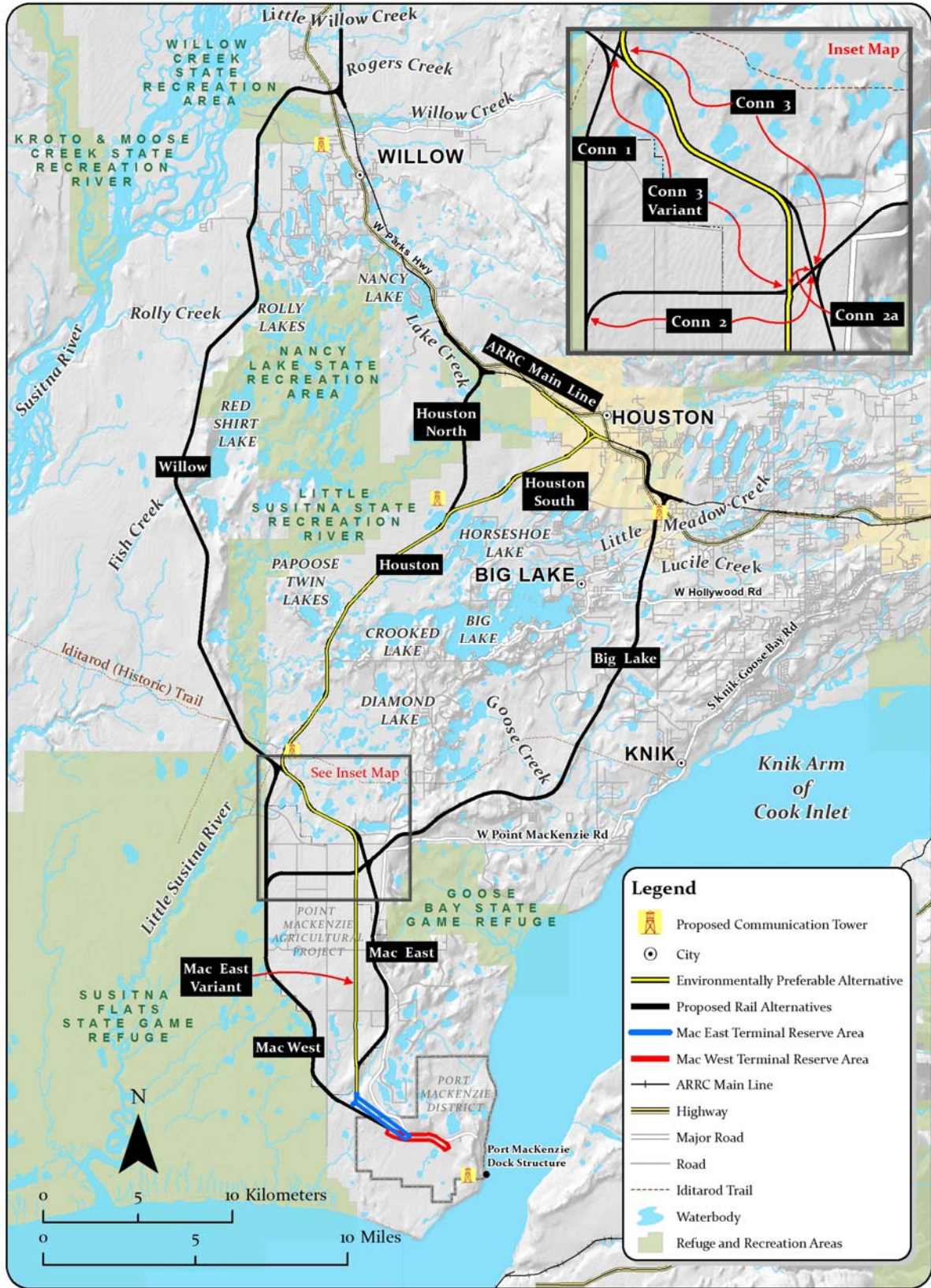


Figure S-5. OEA's Environmentally Preferable Alternative

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

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

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

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

Alternatives that include the Houston North segment would have a greater number of water crossings, a larger impact to wetlands and waters, and a larger number of fish-bearing and anadromous stream crossings than other northern segments. When compared to alternatives including the Houston South Segment, alternatives including the Houston North Segment also would have an additional floodplain or potential floodplain crossing, a larger amount of habitat loss, a higher index of fish habitat potential, 1 additional cultural resource affected, and a greater impact to state recreation and refuge areas, and a higher noise impact to section 4(f) resources. Thus, alternatives that include the Houston North Segment would not be environmentally preferable to the alternatives that include the Houston South Segment.

S.7.2 Relationship to the LEDPA

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

Although it is not OEA's role to identify the LEDPA, it was incumbent upon OEA to consider as part of its NEPA analysis whether one of the routing alternatives among those carried forward for detailed analysis in the EIS could be found, at the appropriate time and by the USACE, to be the LEDPA. OEA fully understands that it is the USACE's responsibility to determine whether the routing alternative set forth in the Applicant's Clean Water Act application constitutes the LEDPA.¹⁴ OEA believes that the USACE could reasonably determine that the environmentally preferable alternative in this Final EIS could also be the LEDPA.

S.8 Summary of OEA's Final Recommended Mitigation Measures

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

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

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

¹⁴ To achieve the LEDPA, the Applicant would need to incorporate appropriate wetland avoidance and minimization strategies and design features into its section 404 permit application. Examples of these avoidance and minimization strategies include horizontal shifts in the rail line footprint to avoid wetland areas and utilization of bridges rather than culverts to minimize direct impacts to streams and rivers. The USACE would determine whether ARRC's project-specific avoidance and minimization proposals are sufficient to justify the LEDPA designation.

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

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

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

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

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

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

^a Drainage structures are defined as crossing structures whose structure would be determined by the Applicant during the final design process and could include multi-plate culverts, pre-cast arches, and single or multiple short-span bridges.

^b Includes 2,440 feet of stream relocation, the crossing of 2 parcels of the Su-Knik Wetland Mitigation Bank, and impacts to Goose Creek Fen.

^c Contributing trails are trails associated with the *Iditarod Dog Sledding Historic District/Historic Vernacular Landscape*. These are additional trails and do not include those trails that are also officially recognized, such as Iditarod National Historic Trail.