Wasilla Realignment Alternatives Analysis Study

Prepared for:

Alaska Railroad Corporation
Alaska Department of Transportation & Public Facilities
City of Wasilla
Matanuska-Susitna Borough
Matanuska-Susitna Community Transit

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Introduction

Over the years, the City of Wasilla and others have expressed an interest in relocating the approximately 6 miles of Alaska Railroad Corporation (ARRC) track that passes through the city's downtown, to bypass the congested, urban core. This document presents an "alternatives analysis" of the options for bypassing downtown Wasilla with a realigned rail corridor.

Purpose of the Study

The purpose of this report, the "Wasilla Realignment Alternatives Analysis" is to identify and evaluate potential routes for the Alaska Railroad mainline track that would bypass downtown Wasilla. The analysis identifies a range of potential realignment routes, establishes evaluation criteria to assess the routes, and presents analysis to narrow the corridors to those which are reasonable.

According to the Federal Transit Administration (FTA), "alternatives analysis" has been a part of established transportation planning practice for several decades. The FTA allows local agencies participating in an alternatives analysis to have broad latitude in how the study is performed, including the choice of whether to conduct the analysis under the review process established by the National Environmental Policy Act (NEPA).[1]

Completing an alternatives analysis is an important process for requesting FTA funding and is required when seeking funds under the Section 5309 New Starts program. The results of this study could be used to pursue funding to conduct environmental analysis and additional design under NEPA. Under such a scenario, this analysis would serve as the basis for identifying reasonable alternatives to pursue in the environmental document.

Scope of Study

The FTA likes to see the following information presented in an alternatives analysis:

- Description of Study Area, Transportation Problems, and Needs.
- Goals, Objectives, and Preliminary Evaluation Measures.
- Description of Conceptual Alternatives and Evaluation.

[1] This analysis is being performed as a precursor to a NEPA process. If the ARRC decides to move forward with the project, formal environmental analysis would be initiated at that time.

This study identifies and evaluates possible rail alignments and refines those alignments down to the most reasonable based on an analysis of conceptual engineering and environmental factors. The alternatives analysis documents why certain alignments should be considered "unreasonable." Items considered in the fatal flaw analysis include:

- Technical engineering constraints such as slopes, soils, and water crossings.
- Ability to meet design criteria such as curvature and grade.
- Environmental factors such as wetlands, land use, and social impacts.
- Cost factors such as land values and existing development.

Study Area

The alternatives analysis evaluates possible rail realignment options between roughly ARRC Milepost 154 to Milepost 163. The Study examines two potential starting points for a future alignment, one near Milepost 154 and a second one near Milepost 158. All routes end at Milepost 163. The study area is depicted on Figure 1.

Transportation Problems and Needs

The Parks Highway and the ARRC mainline track travel through the heart of downtown Wasilla, Alaska, located approximately 40 miles north of Anchorage (see Figure 1). For more than two decades, long-term transportation plans in Wasilla have included either a rail or a highway bypass. Recently, there have been growing calls for downtown Wasilla to be bypassed by both the railroad and highway to help alleviate a number of the problems in the corridor. The ARRC is pursuing a rail bypass of downtown Wasilla for several reasons, as follows (not in any priority order).

Rail Line Inhibits Efficient Commercial Development

First, the existing railroad corridor through downtown Wasilla is inhibiting commercial development on the south side of the tracks because it impedes vehicle traffic access. The rail line has played not only a central role in the development of the City of Wasilla, and still runs through the city center, parallel to the Parks Highway. Areas to the north of the rail line and highway have extensive commercial development facilitated by the many local road connections. The City has expressed interest in improving the business climate on the south side of the downtown corridor. The City's comprehensive plan, for instance, recommends that the "City and Borough work with the Alaska Railroad to facilitate the eventual realignment of the tracks south of the city." The document notes that such a relocation would "remove barriers to commercial development in the downtown area south of the tracks, and open up greater options for highway and parking improvements" (B&B 1992, p. 6-16). The City of Wasilla's planning goal is to change the character and environment of the transportation corridor through the center of the community. If the bulk of the railroad traffic were relocated out of downtown, safety and capacity would be improved, making the downtown area a friendlier and more inviting place.

Wasilla Corridor History

Construction of the Alaska Railroad and the statewide road system fueled population growth in the Wasilla area. Wasilla's history as a community dates back to 1917 when the federal government sold town lots prior to constructing the ARRC. The Railroad officially opened service through the community from Anchorage to Fairbanks in 1923 and provided the only direct link between the Mat-Su valley and Anchorage until the road access came in the 1970s.

Slow Travel Times

Second, the railroad would like to reduce travel time between Wasilla and Anchorage. Because of the substantial curvature in the track, however, train speeds are lower than the ARRC desires. The curves inhibit efficient operation and limit development of commuter rail service. By relocating and developing a track with a higher design speed, the travel time could be reduced substantially.

Safety Concerns

Third, the ARRC has safety concerns associated with the crossing of Knik-Goose Bay (KGB) Road. Traffic is often backed up at the KGB Road-Parks Highway intersection, the busiest inter-section in Wasilla. Because the railroad crosses KGB Road 2 car lengths back from this congested intersection, vehicles often

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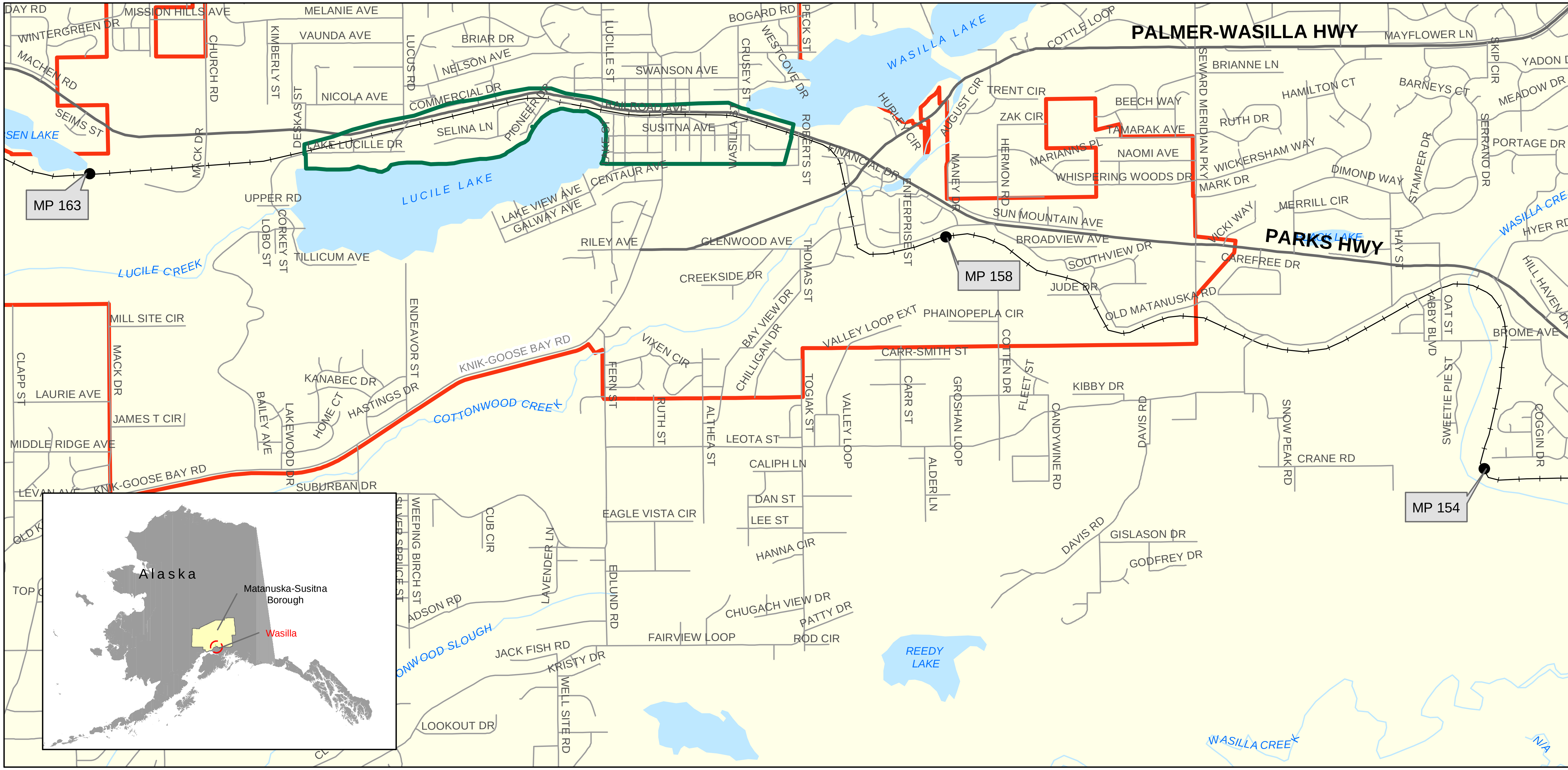

Legend

- City of Wasilla Boundary
- Lake
- River / Stream
- Railroad
- **Roads**
  - Arterials and Collectors
  - Highways
- Downtown Wasilla

FIGURE 1 PROJECT AREA

stop on or too close to the tracks. This can be problematic when the gate is trying to come down. Sometimes drivers try to drive through to miss waiting at the gate.

Depot Congestion & Safety

Fourth, there are problems associated with the existing railroad depot. The historic depot is located on the existing mainline, in downtown Wasilla near the intersection of the KGB Road and Parks Highway. The depot has a very small platform that creates a safety hazard for waiting passengers. While people are waiting for the train, oftentimes they are waiting too close to the tracks. The parking area is also on the opposite side of the tracks from the platform. This tempts people to cross under the train or across the tracks to reach the platform which is a safety concern. The existing depot is not suitable as a commuter rail station. In fact, the ARRC, no longer owns the depot and only uses it as a flag-stop because of the problems there.

Traffic Congestion

Fifth, the volume and growth of vehicle traffic causes unacceptable congestion on the Parks Highway and KGB Road. The barrier created by the railroad and increasing train traffic exacerbates the situation, and limits the solution options open to the Alaska Department of Transportation & Public Facilities (DOT&PF). The increasing traffic causes safety concerns for the ARRC. The DOT&PF constructed the Palmer-Wasilla Highway extension to KGB Road, which opened in October 2002, to provide a short roadway bypass of downtown (and the KGB Road-ARRC-Parks Highway intersection) for those traveling south and east of Wasilla. This road link was a temporary fix that helps to ease vehicle congestion in and through Wasilla.

Integration of Highway Bypass

Finally, major improvements for capacity, safety, and access management are needed on the Parks Highway near Wasilla. A roadway bypass of downtown Wasilla is an option that would provide a long-term solution. The opportunity to collocate a corridor for both rail and highway bypasses is an idea the ARRC and DOT&PF are interested in exploring. The Parks Highway Corridor Management Plan (Vision Statement and Scoping Document) (DOT&PF, 2002) calls for future improvements to include a limited access road bypass to the south of the existing Parks Highway. The plan indicates that a third corridor may even be needed to address the traffic volume anticipated on the Parks Highway by 2030. The Plan says that if all local roadways continue to have direct access to the Parks Highway, as many as 12 lanes could be needed to carry the expected east-west traffic in downtown Wasilla. The plan concludes that if traffic continues to grow as anticipated, eventually additional travel lanes will be needed on any section of the Parks Highway not bypassed.

More study, coordination, and partnering between the ARRC, City of Wasilla, Matanuska-Susitna Borough, and the DOT&PF is needed to determine whether a new joint transportation corridor should be developed to bypass the city. This report provides the next pieces of information these agencies will need to pursue such a project, and all routes evaluated assume a corridor right-of-way (ROW) wide enough (500 feet) to accommodate both rail and highway bypasses[2].

Goals and Objectives

As mentioned earlier, a number of problems with rail and road transportation in Wasilla has spurred the ARRC, DOT&PF, and City to explore a relocated bypass corridor of downtown. Without a bypass, the existing problems will continue to be exacerbated due to growing train and vehicle traffic. In realigning the ARRC tracks away from downtown Wasilla, the ARRC hopes to:

- Reduce rail travel time.
- Reduce vehicle delays.
- Improve safety.

Reduce Rail Travel Time

Accommodating faster passenger commuter service has been part of the ARRC's capital improvement goals in recent years. The ARRC plans on improving efficiency of its operations by upgrading and realigning its tracks to reduce sharp curves and at-grade crossings between Anchorage and Wasilla to support these goals. Track relocation would help to improve rail passenger travel times through the area to support existing and future passenger service and potential future commuter rail service. The goal would be for any new rail alignment to have a higher design speed (60 mph) thereby allowing trains to maintain a higher speed through the Wasilla area. The intent of the improvements is to reduce the train running time between Anchorage and Wasilla from 95 minutes to less than an hour. This time reduction will make rail commuter service between the Matanuska-Susitna Valley and Anchorage a more viable transportation alternative.

Reduce Vehicle Delays

Vehicle delays are common as vehicle traffic must stop for passing trains through the Wasilla corridor. Delays increase with train length as well as train frequency. Some delays, such as those found at the KGB Road crossing, can be several minutes in length. Considering there are approximately 13 trains going through Wasilla on a peak day (summer season), this creates significant delays to the traffic flow. ARRC's goal would be to align the Wasilla rail bypass to minimize vehicle delays and improve traffic flow. Any road crossings of the relocated track should be grade-separated, allowing uninhibited vehicle movement across the relocated tracks. It is the ARRC's intent to eliminate all at-grade crossings.

Improve Safety

A bypass would be designed with grade separated crossings thereby eliminating mainline/bypassing train traffic from several existing at-grade crossings in Wasilla. Grade separated crossings are considered safer than at-grade crossings because they physically separate train and vehicle traffic. In particular, the project would eliminate mainline trains from the at-grade crossing at KGB Road. By reducing the number of trains traveling and stopping in downtown Wasilla, safety would be improved. Straighter tracks will also reduce the potential for train derailments, thereby improving safety for train operators and passengers, and would help to safeguard the environment against spills of hazardous materials.

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[2] The 500 foot ROW assumes a highway ROW of 300 feet and a rail ROW of 200 feet. Additional ROW may be needed for highway interchanges.

Background

Previously Studied Rail Bypass Routes

Several bypass corridors have been identified for the Parks Highway and/or the railroad in past studies. Most routes have been south of the existing Parks Highway and railroad corridor. A 1982 Parks Highway location study investigated alternative alignments for the Parks Highway through and around Wasilla to accommodate the projected traffic growth. The study examined three bypass alignments and an upgrade to the existing alignment. In that study, "Alternative A" was selected as the preferred alignment based on an evaluation of construction costs, right-of-way costs, and social and economic impacts. "Alternative A is a two-lane, limited-access roadway with at-grade intersections. The alignment begins with a new interchange about 1 mile south of the existing Glenn Highway/Parks Highway intersection, and heads west on a new alignment across the tidal flats, continues northwest climbing from the tidal zone until it turns west before crossing Davis Road. The alignment continues west, crossing Fairview Loop before turning northwest and crossing Cottonwood Creek and Knik-Goose Bay Road north of Edlund Road. Continuing northwesterly across Lucille Creek, the alignment eventually turns west to tie into the existing Parks Highway tangent south of the railroad alignment near MP 47" (DOT&PF, 2002: 4-13). The connection to the Parks Highway at the west end of the proposed alternative is no longer viable because construction of the Wasilla Airport was developed in the proposed alignment (DOT&PF, 2002).

More recently, in 2001, five railroad bypass alternatives were conceptualized in a railroad relocation reconnaissance study spearheaded by the City of Wasilla. The purpose of this study was to develop alternative routes and estimate costs for relocating the ARRC around the City of Wasilla to improve safety, improve rail operations, and provide options consistent with the city's planning objectives for the downtown area.

The study examined five alternative route alignments, four of which (Routes A, B, C, and E) are variations of a northern corridor, and the fifth (Route D), which follows a more southerly corridor. See Figure 2 for the realignment alternatives considered in the Wasilla Railroad Relocation Reconnaissance Study.

Routes A, B, and C all essentially leave the existing ARRC corridor just west of Seward Meridian Parkway and continue west with varying alignments until becoming coincident before crossing Cottonwood Creek. The alignments continue west through the northern corridor across KGB Road before turning northwest around Lake Lucille, crossing Lucille Creek, and turning west traversing around the Wasilla Airport before joining the existing alignment south of Jacobsen Lake.

Route E leaves the existing rail alignment at the same location as Route D, then turns northwest for about two miles before joining the northern corridor near the beginning of Route C. The route then follows the same alignment as Routes A, B, and C before joining the existing rail alignment.

Route D (the southern-most route) leaves the existing rail alignment east of Wasilla Creek and runs west through the southern corridor, crosses Fairview Loop Road, then turns northwest before crossing Cottonwood Creek, Knik-Goose Bay Road, and Lucille Creek. Continuing northwest, (similar to Routes A, B, and C), Route D traverses around the Wasilla Airport before joining the existing alignment south of Jacobsen Lake.

The scope of the realignment study did not entail making a recommendation for a preferred alternative; however, the City of Wasilla preferred Route E. Route E begins at ARRC MP 153.7. This alignment was designed to eliminate eight at-grade crossings while also eliminating the four sharpest curves. Construction costs for the Route E realignment was estimated at approximately $35 million (Hattenburg, 2001). Total cost was estimated at approximately $62.5 million, which would include environmental engineering and permitting; right-of-way; design; and construction, construction management, and construction contingency. For more information about the routes, please see the Wasilla Alaska Railroad Relocation Reconnaissance Study.

Concurrent Alaska Railroad Wasilla Area Projects

The ARRC Wasilla Realignment Alternatives Analysis study entails looking at the "big picture" to identify where the placement of a realigned railroad could be located within the Wasilla corridor. The process of designing conceptual alignments, environmental analysis, and construction of a new rail corridor could, however, take 20 years or more. While this project is viewed as the long-term solution, the ARRC recognizes the need to address more immediate railroad transportation needs now. The following ARRC projects reflect these immediate railroad transportation needs.

South Wasilla Track Realignment. The ARRC is in the process of conducting an environmental assessment for the South Wasilla Track Realignment project. If constructed, this project would construct a straighter railroad track alignment between ARRC MP 154 and 158, and eliminate five at-grade roadway intersections to improve safety and operational efficiencies in the corridor. The project will bring the rail line up to a modern track design with curvatures that achieve a 50-60 mile per hour (mph) design speed to accommodate current and future passengers and freight trains through the corridor. The objectives of this project are to provide safety improvements, reduce train travel time, improve operating efficiencies, and reduce operations and maintenance costs. This project was advocated to move forward by the Wasilla Joint Intermodal Steering Committee (WJISC).

Wasilla Area Commuter Rail Station Analysis. Recently constructed capital improvements to the ARRC mainline tracks between Wasilla and Anchorage are, in part, intended to make commuter rail a more viable transportation alternative. In addition to track straightening projects currently underway, the ARRC is studying potential locations for commuter rail stations in the Wasilla area. A Commuter Rail Station Analysis report was completed in 2004. This report analyzes several locations for commuter rail stations. The potential locations include the current Alaska Railroad platform, the Kenai Supply area, the Fairview Loop area and the airport area. No decision has been made, but commuter rail could continue to use the existing rail line, even if a bypass were to be built, due to its proximity to population density.

Knik-Goose Bay Road Grade Separation Alternatives Analysis. The ARRC is analyzing alternatives to eliminate the at-grade rail crossing of KGB Road just south of the Parks Highway. The goals of that project are to: (1) improve vehicle travel times (by reducing congestion in Wasilla's core area); (2) improve traffic safety (by eliminating vehicles currently stopping on and crossing the railroad tracks); (3) improve capacity/circulation (by reducing congestion in Wasilla's core area); (4) maintain local access and through traffic; and (5) improve pedestrian access and safety. The grade separation project is closely related to this project, in that if the railroad is not relocated out of downtown, there will be a definitive need to move forward with the grade separation.

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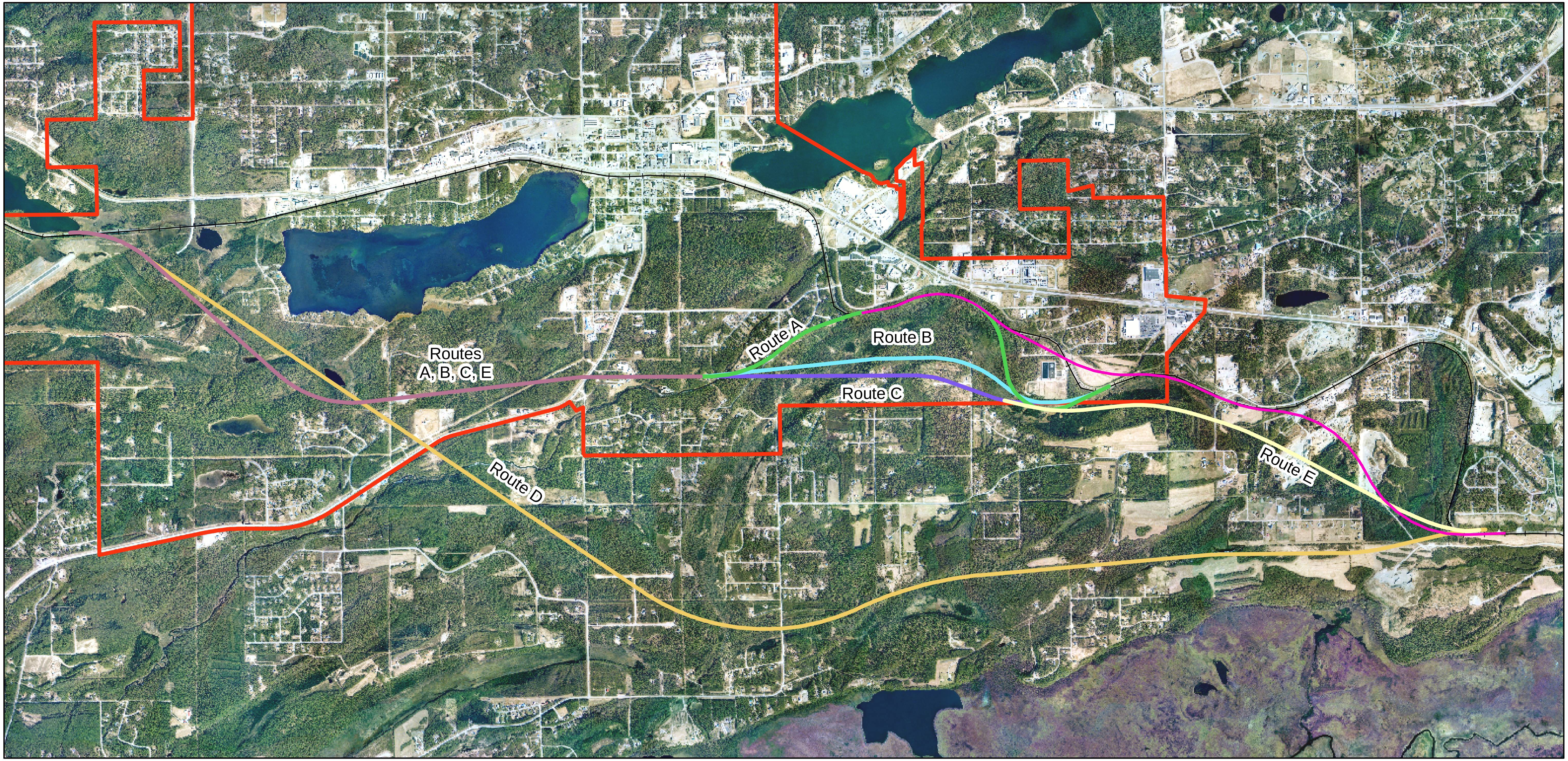
ALTERNATIVES ANALYSIS



Legend

City of Wasilla Boundary

Railroad

LCMF Alignments

Route A

Route B

Route C

Route D

Route E

Routes A, B, C, E

South Wasilla Track Realignment (EA)

Proposed Action

NORTH

0 0.25 0.5 1 Miles

Source Data: City of Wasilla

FIGURE 2 PREVIOUS ALIGNMENTS

Methodology

Although highway and rail bypass alignments have been conceptualized in the past by DOT&PF or the City of Wasilla, this report reanalyzes new potential routes, based on ARRC's design goals and reflecting the most recently available information regarding development and environmental conditions. This section presents information on the methodology used to identify and screen rail/highway corridors.

Analysis Process

To identify potential new alignment corridors, the project staff used a modern version of an overlay process introduced in the 1960s by Ian McHarg, a well-known landscape architect. McHarg developed this process to better consider the environment at the planning stage. It entails mapping environmental resources separately and then combining them in a layered format to develop a better understanding of the environmental opportunities and constraints of an area.

His process started with the identification of the factors to be considered. For each factor, a map transparency was developed with dark gradations representing areas with the greatest value (or greatest constraint) and the lightest gradations representing the areas with the lowest values (or least constraint). The transparencies were superimposed on each other to form a composite map. The darkest areas showed the areas with the greatest overall values (or constraints), and the lightest with the least.

The methodology used by the project team to develop potential corridors follows McHarg's process except a geographic information system (GIS) analysis was used instead of acetate transparencies.

The first step in the methodology was to identify the factors to be analyzed as constraints or opportunities for a new transportation corridor. The factors selected were based on the constructability issues most pertinent to rail development, environmental regulations, and social/political impacts. Only factors with readily available information were analyzed. The factors analyzed were:

- Wetlands
- Elevation/Slope
- Gravel Sub Surface
- Water Bodies
- Land Use
- Road Crossings
- Population Density
- Environmental Justice
- Taxable Building Value
- Taxable Building Value per Acre
- Appraised Land Value
- Special Sites

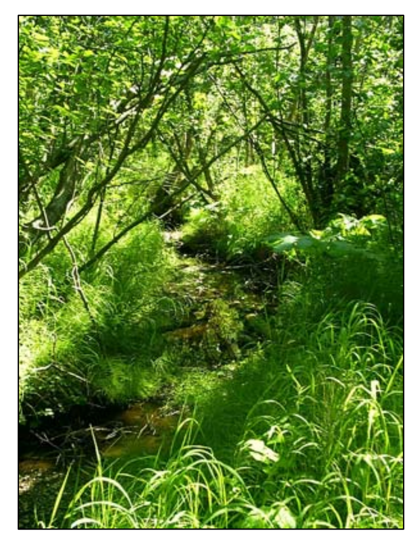
These factors were put into a GIS and converted to grids (a representation of the area as a series of equally sized cells or pixels). Each cell was then assigned a value based on its suitability for a new rail corridor, taking into account technical, environmental, and social considerations. Each factor, and the values assigned to each cell, are discussed in more detail in the "Preliminary Evaluation Measures" section of this report.

The third step was to combine the grids together to create a composite map showing the most suitable and unsuitable areas for a new rail corridor. Based on the composite map, potential corridors were developed by linking areas with large numbers of suitable cells. This process is discussed in more detail in the "Composite Corridor Suitability" analysis section.

Next, potential alignments were developed. They will be discussed further in the "Conceptual Alignments" section of the report. The final step was to identify which potential alignments had fatal flaws and should not be studied further. This process is discussed in greater detail in the "Fatal Flaw Analysis" section of this report.

Preliminary Evaluation Measures

The evaluation criteria are discussed in four sub-sections of the report; environmental factors, social factors, cost factors, and special sites.



Environmental Factors

Wetlands

Wetlands are protected by the Clean Water Act. The term "wetlands" refers to "those areas that are inundated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (33 Code of Federal Regulations [CFR] Part 328.3(b)). Other waterbodies are also regulated by the U.S. Army Corps of Engineers as "Waters of the U.S."; these include lakes and streams.

Construction in wetlands requires special permits and processes to ensure that wetlands are not needlessly impacted. Before a permit to work in a wetland is granted by the U.S. Army Corps of Engineers, a project is evaluated to determine whether wetlands have been avoided where possible. When avoiding wetlands is not possible, the Corps determines if wetland impacts have been minimized. If wetland impacts still must occur, the project proponent may need to compensate for the unavoidable wetland impacts. In addition, construction in wetlands may have more adverse effects than construction in uplands, and special construction methods must often be used, both for wetland protection and for the project to be technically feasible. Overcoming the technical and regulatory challenges may increase the cost of a project. By regulation, the ARRC must try to avoid and then minimize the adverse effects on wetlands that would result from rail relocation. Evaluation of this factor, builds into the corridor analysis a mechanism for identifying, avoiding, and minimizing potential impacts to wetlands, early in the process of route-finding.

The U.S. Fish & Wildlife Service's National Wetland Inventory (NWI) identified wetlands are shown in Figure 3. Currently, no wetlands management plan exists that would provide a more detailed inventory or functional analysis of wetlands within the Matanuska-Susitna Borough.

Wetlands may provide many environmental benefits including water quality, animal habitat, and flood protection, which make them more or less valuable. The project team classified uplands and wetlands within the project area into four categories based on their estimated importance within the local ecosystem. These categories were based on the wetland type as described by the NWI maps, and the general wetland functions these wetland types typically perform.

Figure 4 shows wetland suitability when converted to a grid and categorized by functional value.

The NWI wetland types listed in Category 1 were given a score of 1 (low value) (including all uplands) because they are unlikely to perform important wetland functions and no Section

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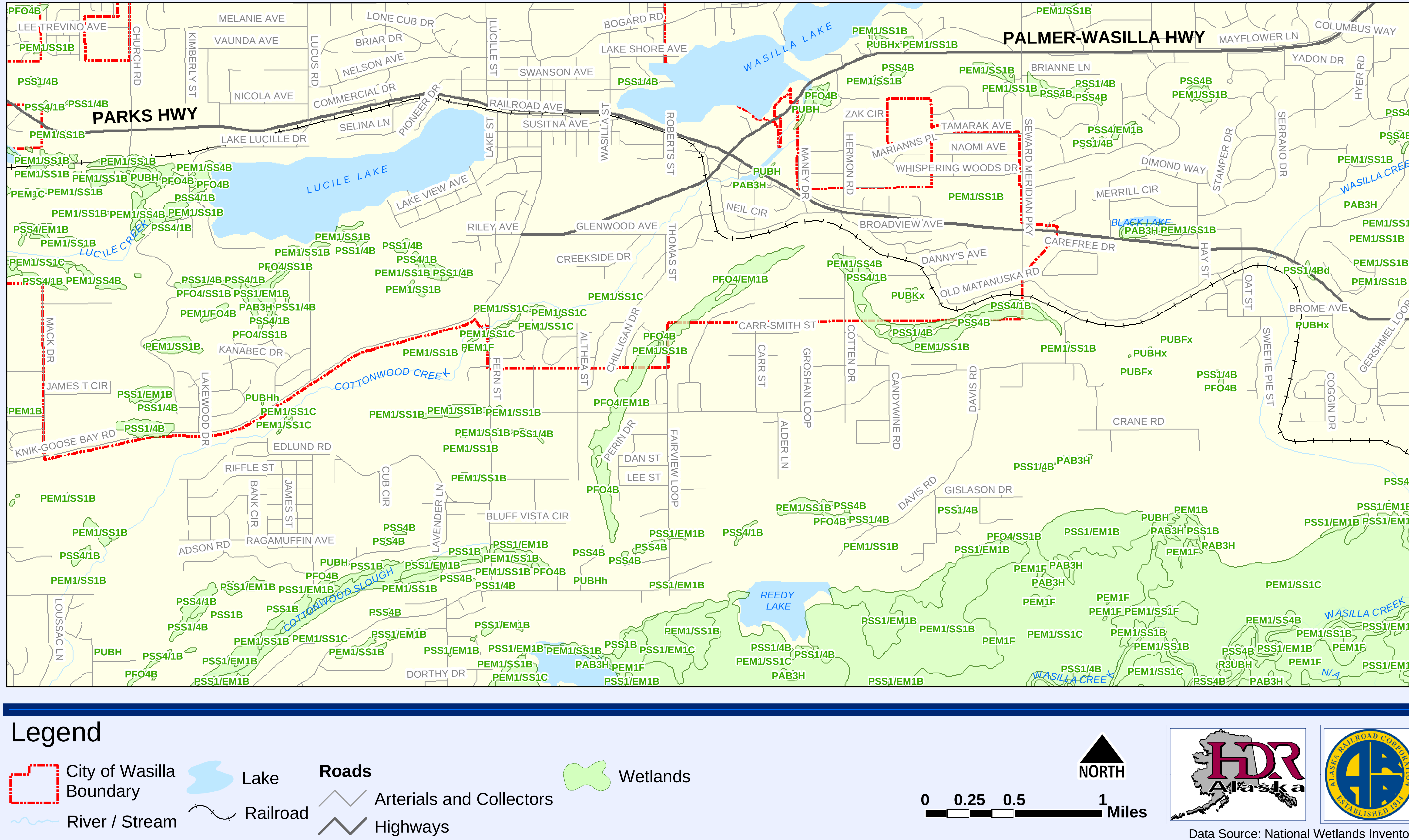
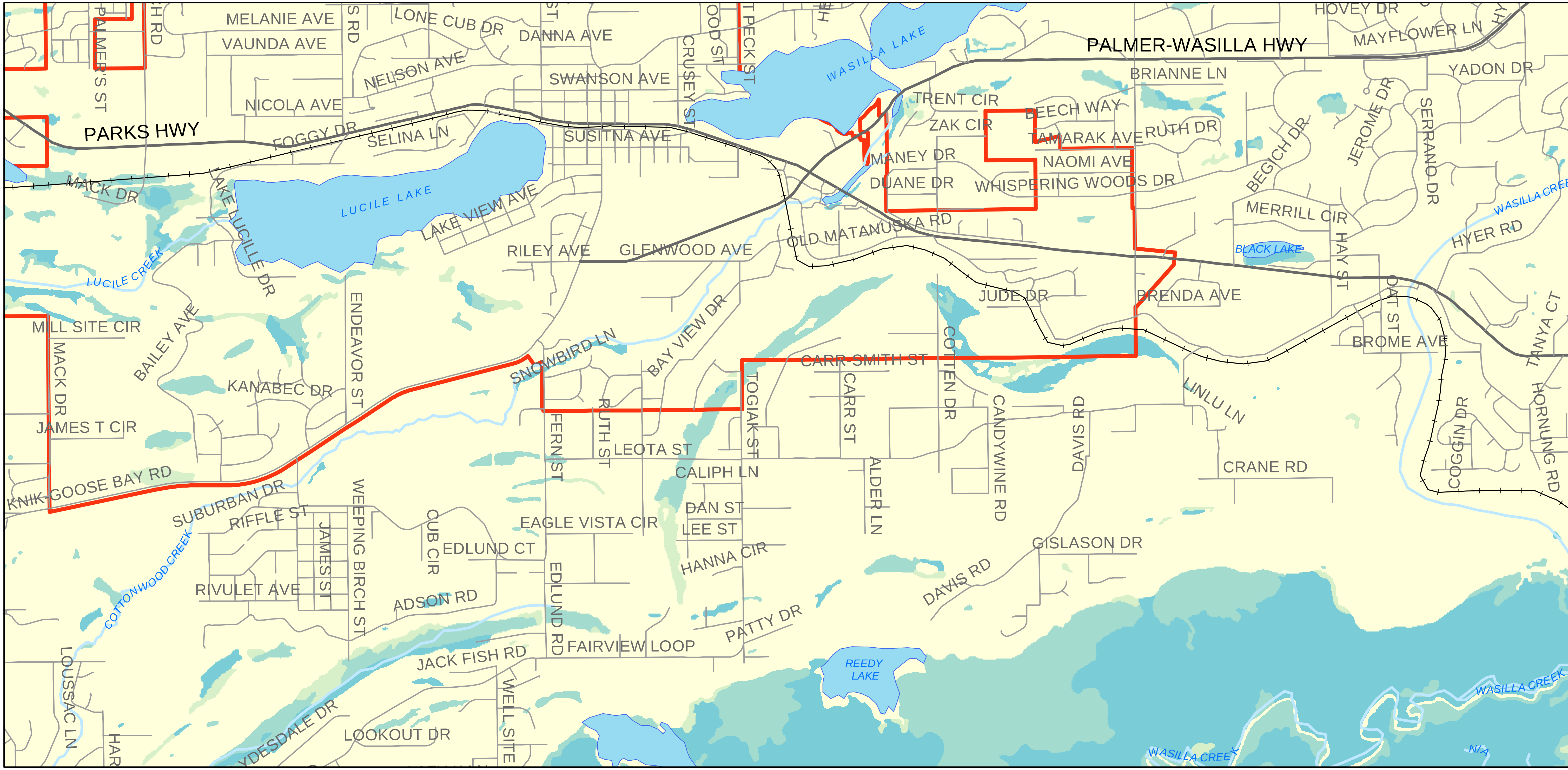


FIGURE 3 NWI WETLANDS



Legend

City of Wasilla Boundary

River / Stream

Lake

Railroad

Roads

Arterials and Collectors

Highways

1 (Category 1 Wetlands/Uplands)

5 (Category 2 Wetlands)

7 (Category 3 Wetlands)

9 (Category 4 Wetlands)

NORTH

0 0.25 0.5 1 Miles

FIGURE 4 WETLANDS SUITABILITY

404 Wetland Permit would be anticipated for construction in these areas.

The wetland types listed in Category 2 represent forested, scrub/shrub, and excavated, diked, partially drained, or ditched vegetated wetlands. These wetlands may perform several functions including groundwater discharge, sediment and other and pollutant retention, and providing wildlife habitats. This category was given a score of 5. These wetlands were assigned a slightly higher value, but not the highest value because forested and scrub/shrub wetlands are widespread throughout Southcentral Alaska and the Mat-Su Valley and are least likely of all the wetlands to perform functions that are unique to wetlands. The vegetated disturbed wetlands (excavated, diked, partially drained or ditched) were also placed in this category because their natural functions are likely to have already been compromised by the human alteration.

The wetland types assigned to Category 3 represent emergent wetlands—wetlands dominated by grass-like plants—were given a score of 7. The functions of emergent wetlands can be highly variable depending on their topographic position and level of inundation or saturation. In general, however, this wetland type provides functions for groundwater discharge, stormwater runoff attenuation, and habitat for water-dependent wildlife. In addition, many emergent wetlands perform water quality improvement functions and do so at a greater rate than other wetland types because they have more water movement within and through them. The water input and movement typically causes them to be more productive habitats and allows them to export organic material to support downstream ecosystems. If they are near human development, they may protect water quality by retaining sediments and other pollutants.

The wetland types listed in Category 4 represent open water habitats, estuarine habitats, and coastal (tidally influenced) swamps and marshes, were given a score of 9. In general, these wetlands represent the most unique wetland types within project area. Estuarine and other coastal marshes help maintain a stable shoreline by binding sediments and protecting against erosion. These are usually highly productive habitats, with the organic matter produced within them flowing directly to marine ecosystems, where it supports marine food webs. These areas generally provide important wildlife habitats because of the nutritious and productive marsh vegetation, proximity to marsh habitats, and early spring exposure of plants and sediment-dwelling organisms. The estuarine marshes may also support fish when flooded. Open water areas and mudflats may provide valuable waterfowl, shorebird, and fish habitat. Wetlands adjacent to creeks and streams were assigned to this category because they typically provide important wildlife movement corridors, often improve water quality in the stream, typically provide cover for fish, and usually stabilize the stream banks against erosion. Moreover, they're likely to export organics to aquatic systems, and are likely to perform flood flow attenuation that protects downstream habitats, water quality, and human developments. Any fill placed in the wetlands listed in Categories 2, 3, and 4 would likely require a Department of the Army Section 404 Permit.

Table 1 - Wetland Categorization

Category	Wetland Type and NWI Code	Value
Category 1	Uplands U Excavated Ponds in Gravel Pits PUBFx PUBHx PUBKx PUSCx PUBHh	1
Category 2	Forested Wetlands PF01/B PF04/SS1B PF04B Scrub/Shrub Wetlands PSS1/4B PSS1/4C PSS1B PSS1C PSS4/1B PSS4B Excavated, Diked, Partially Drained, or Ditched Vegetated Wetlands PSS1/4Bd PEM1/SS1Cx PEM1Cx PEM1Fh PEM1Fx PUB/AB3Hh	5
Category 3	Emergent Wetlands PEM1/FO4B PEM1/SS1B PEM1/SS1C PEM1/SS4B PEM1/SS4C PEM1B PEM1C PF04/EM1B PF04/EM1C PSS1/EM1B PSS1/EM1C PSS4/EM1B PEM1/SS1Cb	7
Category 4	Ponds PUBH Vegetated Ponds PAB3H PUB/EM1H PEM1/SS1F PEM1F PEM1Fb Estuarine Marshes E2EM1/USN E2EM1N E2EM1P Estuarine Mudflats E1UBL E2USN Coastal Swamps and Marshes PF01/SS1R PSS1/EM1R PSS1R PSS1S PEM1/SS1R PEM1N PEM1R PEM1S PEM1T Wetlands Adjacent to a Creek/Stream	9

Elevation

Railroads are very sensitive to changes in grade. The steepest grade on a track determines the maximum load a train can haul. If the train cannot pull a load up the grade, it would require assistance. Frequently, this involves using a helper locomotive. The helper locomotive could be attached to the train on the entire route but this is inefficient because the additional locomotive would only be used for a short section. Alternatively, the train could stop prior to the grade and attach the additional locomotive. Once at the top, the extra locomotive would be detached and sent back down the hill to await the next train. This is also inefficient as it would require the helper locomotive to remain at the hill, and would lengthen the trip time because of the time needed to attach and detach the helper locomotive. Either option would increase the operating costs to the railroad. Alternatively, the topography can be modified to make the grade more acceptable. This can, however, require a significant amount of earthmoving work which increases the cost of construction, and requires cutting into the topography resulting in visual impacts, or extensive fill resulting in greater impacts to right-of-way or sensitive areas. Achieving acceptable grades is not always technically, financially or environmentally feasible. Changes in elevation are less of a concern for a highway.

The source of the elevation data was the Computer Aided Design (CAD) files from the Matanuska-Susitna Borough. The CAD data was based on ground-rectified aerial photography taken in April 1986. The elevation data has 10-foot contour intervals. The contours are shown on Figure 5.

To better visualize the topography of the area, the contours were converted into a grid where each cell represented the slope of that area. These cells were then divided into 5 categories based on the slope's suitability for a new rail alignment. The categories are shown in Table 2 and Figure 6 shows the results of slope analysis graphically. The ARRC goal is for new track to be on a grade of 1% or less, with a maximum grade of less than 1.3%. Areas of greater slope represent areas that are more difficult to construct in to reach acceptable grades.

Table 2 Slope Categorization

Category	Value
< 5%	1
5 – 10 %	3
10 – 15%	5
15 – 20%	7
> 20%	9

Gravel Sub-surface

In general, the soils in the Wasilla area are glacial moraines and contain a one-inch to three foot cap or layer of silt. The presence of such silt defines the upper five feet of the soil as severely limiting for local road or rail construction. In many locations, the soils below five feet are gravels suitable for construction. Higher amounts of gravel are preferred because less site preparation is required and they tend to be better drained soils making for easier construction and long-term maintenance. In addition, the soils near Cook Inlet are probably poorer than the soils elsewhere resulting in higher construction costs to provide adequate drainage and structural foundations. More detailed soil studies may be needed.

The GIS dataset used for soil constructability originated with the Natural Resources Conservation Service's (NRCS) soil survey of the Matanuska-Susitna Valley Area.

Figure 7 depicts the various soil types and includes an overlay of all areas which have subsurface gravel content greater than 15%. Table 3 shows the grid values assigned to the NRCS's data, indicating the percentage gravel present. Figure 8 shows the percentage gravel content classified into grids. Areas with higher gravel content are assumed to be easier to construct in and were therefore assigned a lower constraint value. Areas with lower gravel content in the soil, areas of unknown content, and areas of standing water were assumed to be most difficult to construct in and were therefore penalized with a higher value.

Table 3 Gravel Content Classification

Category	Value
> 85%	1
50% – 85%	2
15% – 50%	3
< 15%	4
Not Rated	5
Water	10

Water Bodies

Lakes, streams and other water features are environmentally sensitive areas. Construction in or near these features would have more environmental impacts and may require additional permits. Bridges to cross any water body would also increase the cost of the project. In general, all potential alignments will cross Wasilla Creek and Cottonwood Creek. Near the Parks Highway, these streams are not large and should not be technically challenging to cross. This may not be the case further downstream of the Parks Highway. Further analysis will be required. Types of waterbodies classified and the corresponding suitability value is shown in Table 4 and is displayed on Figure 9.

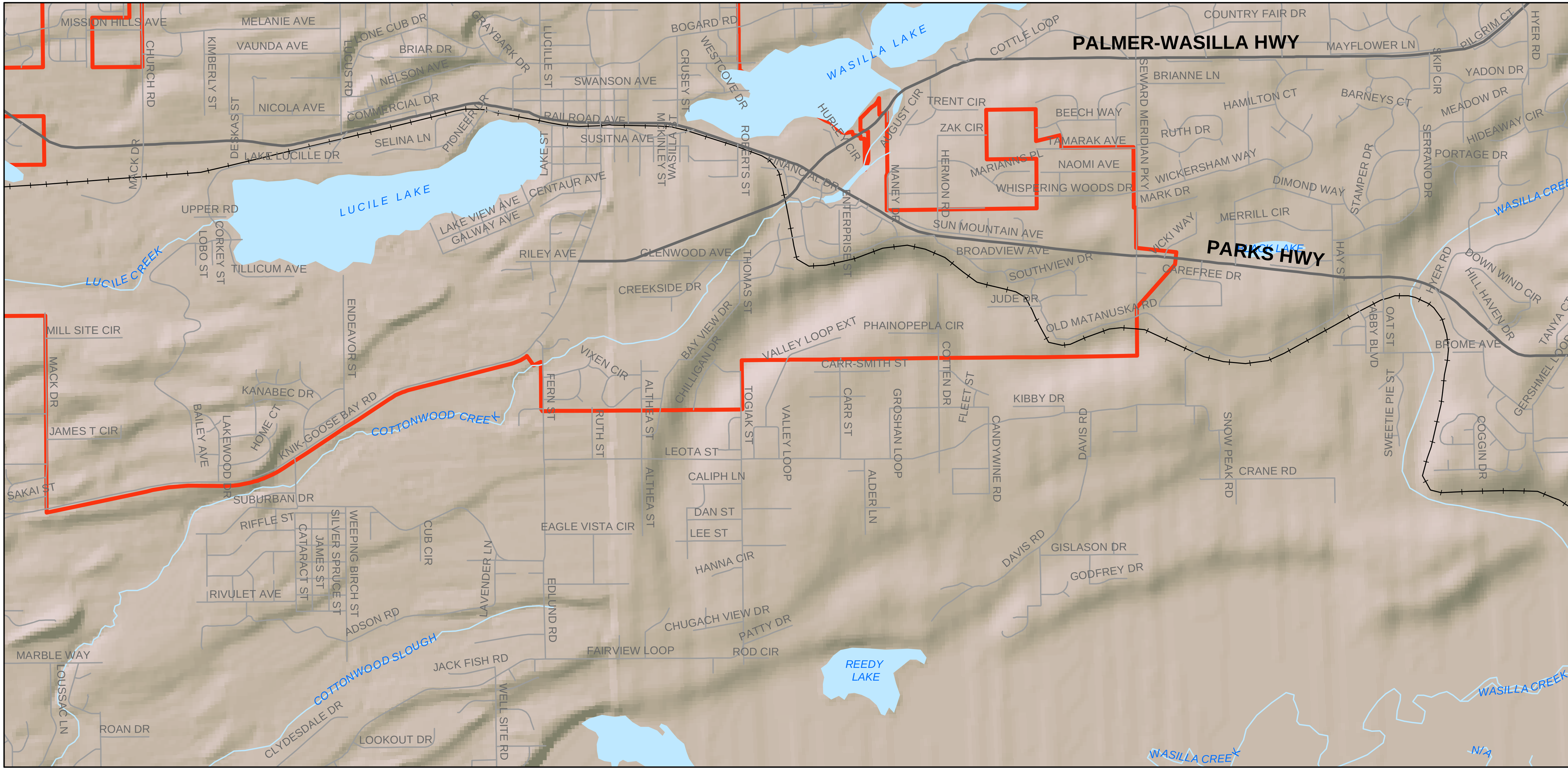
Table 4 Water Bodies Classification

Category	Value
Not a Stream	1
Stream	3
Anadromous Fish Stream	5
Lake	5

Social Factors

Land Use

For transportation corridor project development, undeveloped land is more desirable because it tends to be less expensive than already developed property, which would reduce the right-of-way acquisition cost of the project. Steering the project toward undeveloped land would also reduce the impact to existing businesses and residents because fewer relocations would be necessary. The closer to developed areas the alignment traverses, increases the likelihood of other social concerns like noise, vibration, and visual impacts.



Legend

- City of Wasilla Boundary
- Lake
- River / Stream
- Railroad

Roads
- Arterials and Collectors
- Highways

Elevation (Feet)
510
0

NORTH

0 0.25 0.5 1 Miles

Source: Matanuska-Susitna Borough

FIGURE 5 ELEVATION

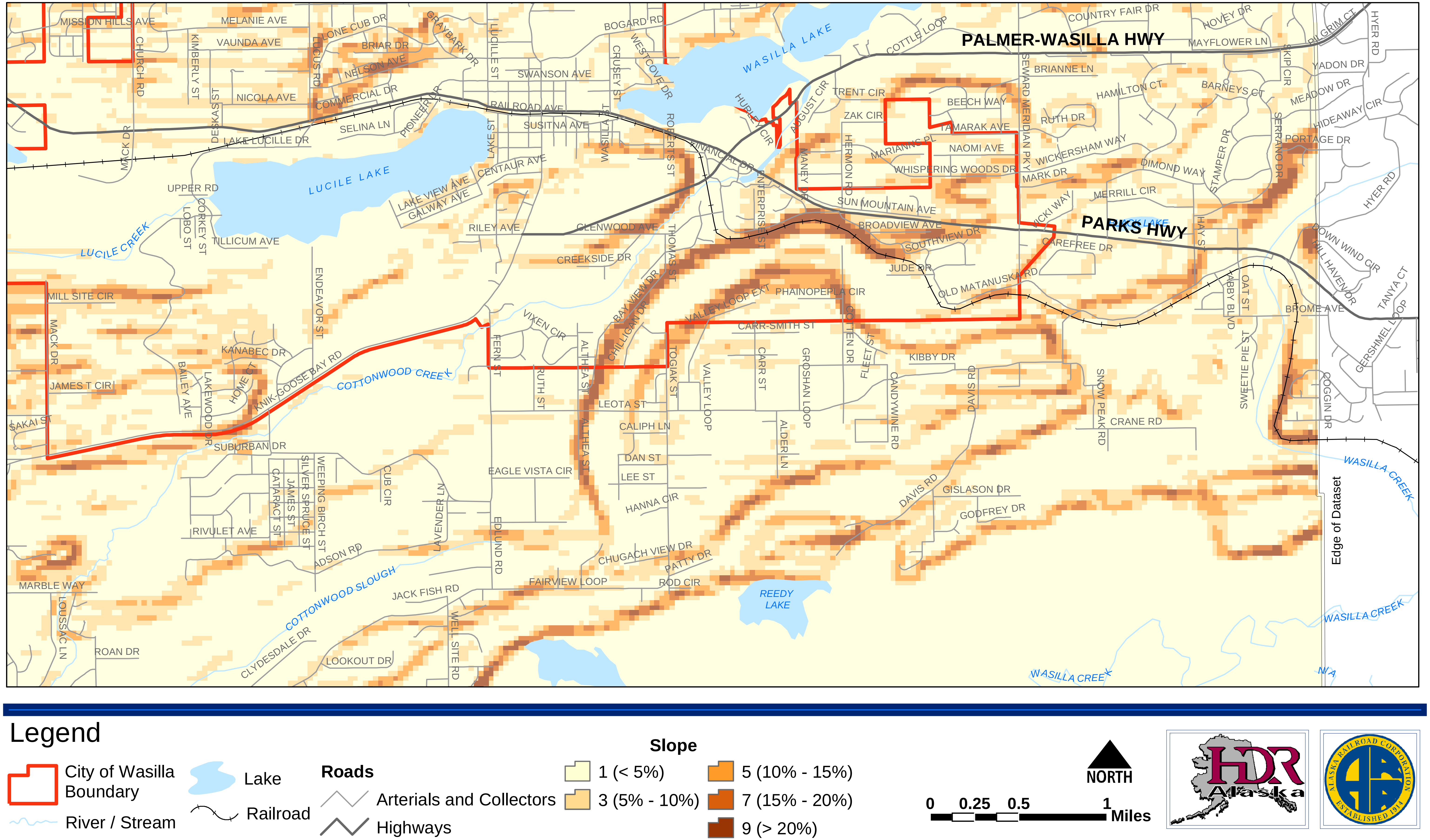
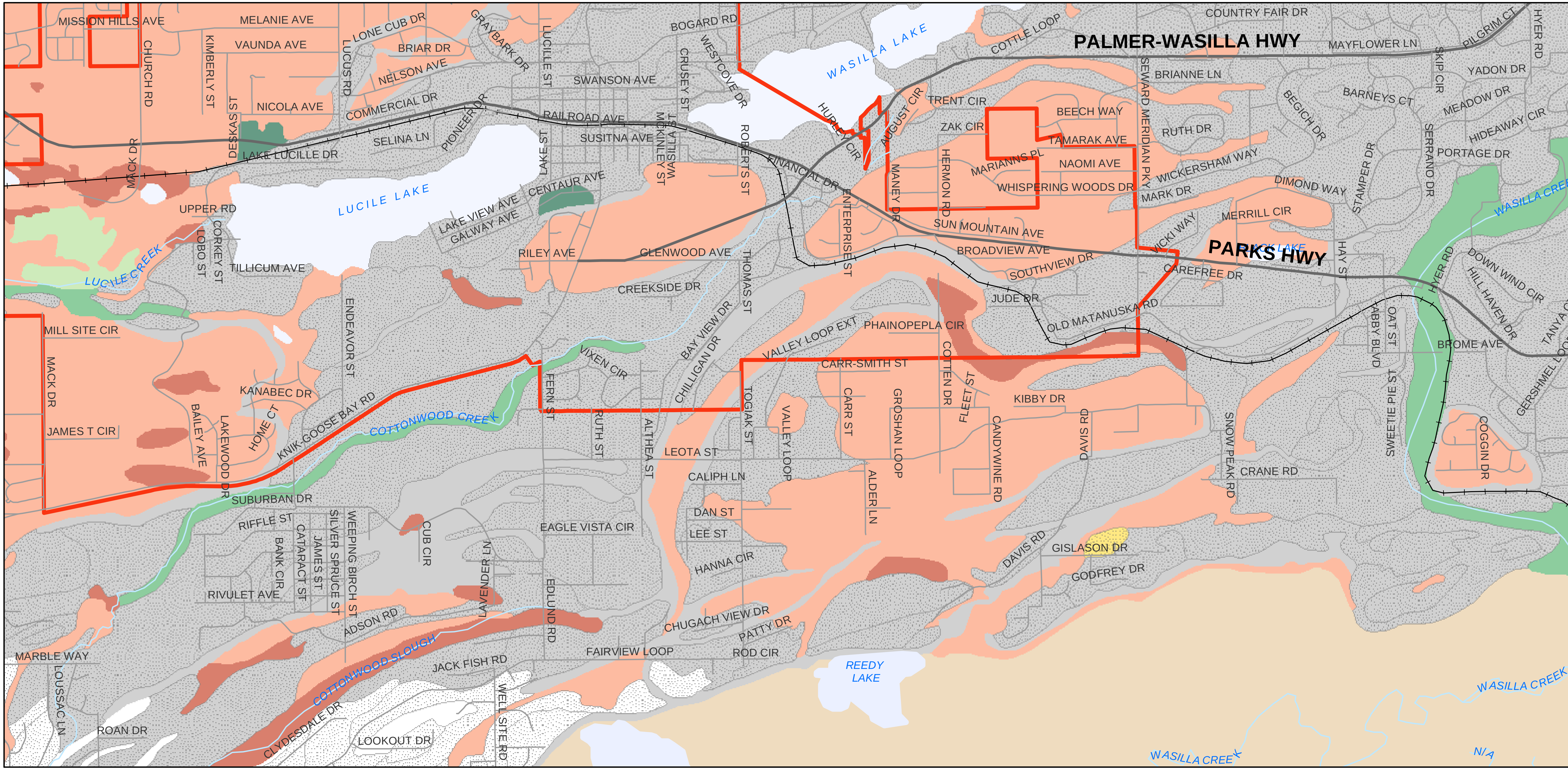


FIGURE 6 SLOPE SUITABILITY

ARRC WASILLA REALIGNMENT
ALTERNATIVES ANALYSIS



Legend

City of Wasilla Boundary

River / Stream

Railroad

Roads

<all other values>

Highways

Gravel Content

15 - 100 %

SOIL TYPES (MUNAME)

- 0 - 13 Silt Loam, 13-60 Gravelly Loam
- 0 - 15 Silt Loam, 15-60 Gravelly Loam
- 0-5 peat, 5-60 mucky peat
- 0-2 sandy loam, 2-8 sand and silt, 8-60 gravelly coarse sand
- 0-60 silt loam
- 0-7 silt loam, 7-32 sand and silt, 32-60 cobbly gravelly loam
- 0-9 sandy loam, 8-60 sand and silt
- pits, gravel
- water

NORTH

0 0.25 0.5 1 Miles

Source: Natural Resource Conservation Service

FIGURE 7 SOILS

ARRC WASILLA REALIGNMENT ALTERNATIVES ANALYSIS

Legend

City of Wasilla Boundary

Railroad

Roads

Arterials and Collectors

Highways

Gravel Content

1 (>85%)

2 (50% - 85%)

3 (15% - 50%)

4 (<15%)

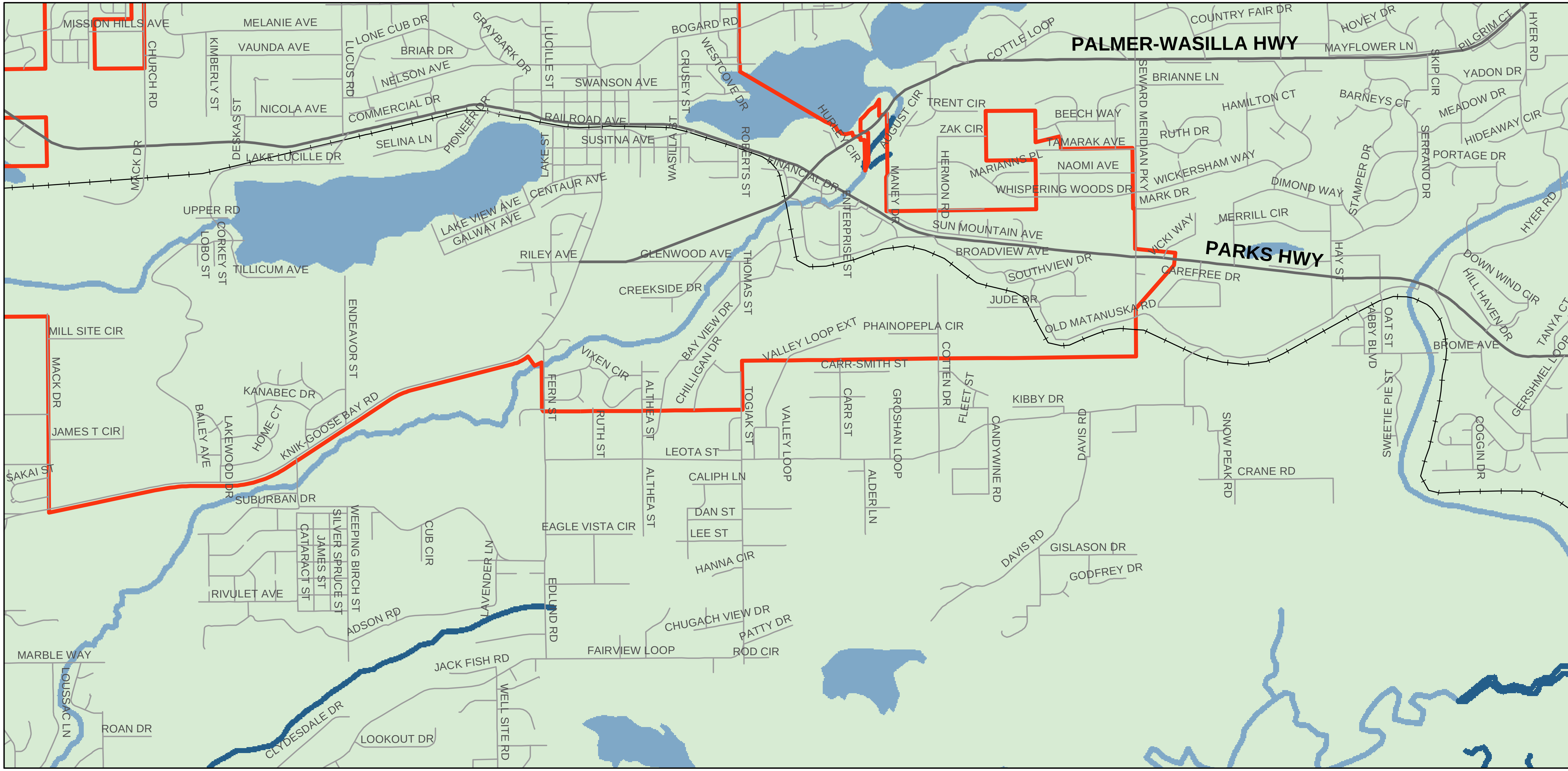
5 (Not Rated)

10 (Water)

NORTH

0 0.25 0.5 1 Miles

FIGURE 8 SOIL SUITABILITY



Legend

City of Wasilla Boundary

Railroad

Roads

Arterials and Collectors

Highways

Water Features

Anadromous Fish Stream/Lake

Stream

Not a Stream or Lake

NORTH

0 0.25 0.5 1 Miles

Source: Matanuska Susitna Borough

FIGURE 9 WATER BODIES

The GIS dataset for land use used in this analysis is from the Matanuska-Susitna Borough Assessment Division (2003).

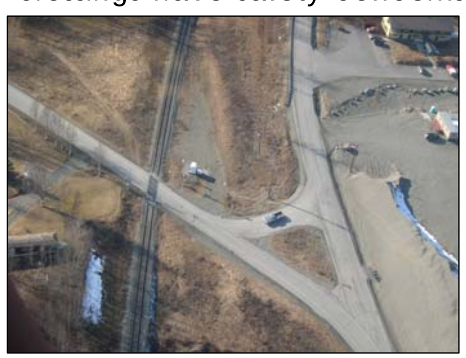
Figure 10 shows the land use in the project area. South of the Parks Highway, much of the land is either vacant or does not have a land use declared. Because of the rapid development occurring in the Wasilla area, however, it is likely that some of the vacant and undeclared parcels have been developed. Table 5 shows the values assigned to different land uses and Figure 11 shows that land use categorization as grid values. Vacant land is assumed to have the fewest social impacts, while residential land is assumed to be the most sensitive.

Table 5 Land Use Classification

Category	Value
None	1
Non-Residential	3
Residential	5

Roads

Grade-separated crossings are expensive and increase the cost of construction. At-grade crossings have safety concerns and impede the free flow of traffic, and thus, could result in local roads being closed or rerouted (impacting travelers and emergency service providers among others). As a result, the project team assumed that minimizing the number of road crossings would be desirable.



The road network was categorized to penalize corridors that had more road crossings. Moreover, roads of higher functional classification were deemed of greater importance to avoid (they carry more traffic and therefore a project could impact greater numbers of travelers). Each road segment was buffered by a distance based on the road's functional classification. The Matanuska-Susitna Borough's road GIS file classified roads as minor, medium, major and highway. Minor roads were assigned a 60 foot buffer, with medium, major and highway having buffers of 80, 100, and 200 feet respectively. Figure 12 shows the road grid with the buffers and Table 6 shows the values assigned to the grid. This methodology will result in higher penalties to alignments that cross more roads or roads of higher functional classification.

Table 6 Road Classification

Category	Value
Not Road	1
Road	3

Population Density

To minimize the number of people impacted, densely populated areas were identified and assigned higher penalties depending on the density of the population. Keeping the tracks away from densely populated areas will help reduce noise and vibration impacts. Figure 13 shows the raw population numbers from the 2000 Census by census tract in the study area. The population density in people per acre was computed and divided into 5 categories from lowest population density to highest. Higher penalty values were assigned to areas of higher population density as shown in Table 7 and depicted in Figure 14.

Table 7 Population Density

Category	Value
0 – 0.309	1
0.31 – 1.134	3
1.135 –2.423	5
2.424 – 4.742	7
4.743 – 13.197	9

Environmental Justice

Research shows that impacts often do not fall equally on everyone in a community and that the effects of an action can be disproportionate because of cultural, social, historical, and economic characteristics. Environmental justice populations (low-income or minority) could be more sensitive to such effects, and less resilient in adapting to them. Executive Order 12898 states:

> *Each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.*

Executive Order 12898 also defines a "disproportionately high and adverse effect on minority and low-income populations" as follows:

> *An adverse effect that is predominantly borne by a minority population and/or a low-income population; or will be suffered by the minority population and/or low-income population, and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population.*

Low-Income is defined as a household income at or below the poverty guidelines of the U.S. Department of Health and Human Services.

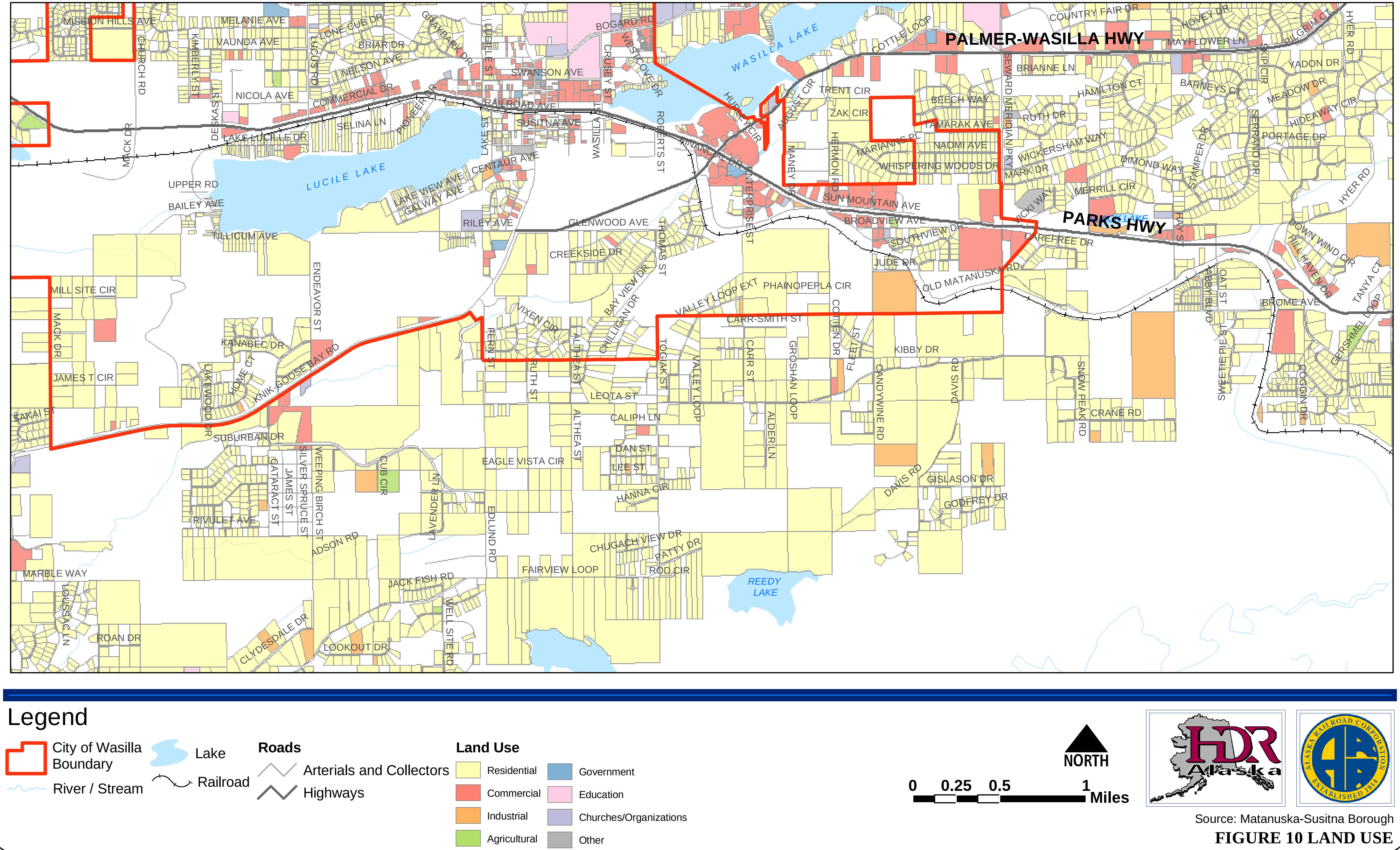
Minorities are defined as follows:

- Black (having origins in any of the black racial groups of Africa);
- Hispanic (of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race);
- Asian-American (having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands);
- American Indian or Alaskan Native (having origins in any of the original people of North America and who maintain cultural identification through tribal affiliation or community recognition);

In accordance with Executive Order 12898, the project team analyzed the demographics of the area to assess the impacts on minority or low-income groups. The 2000 Census data was used to identify areas of low income and minority populations in the study area. Income data by Census Block Group was used to determine and classify median household income. Block groups below the median borough household income ($51,221) were classified as a 5 (to be avoided) and those block groups above the median borough household income were classified as 1 (less impact).

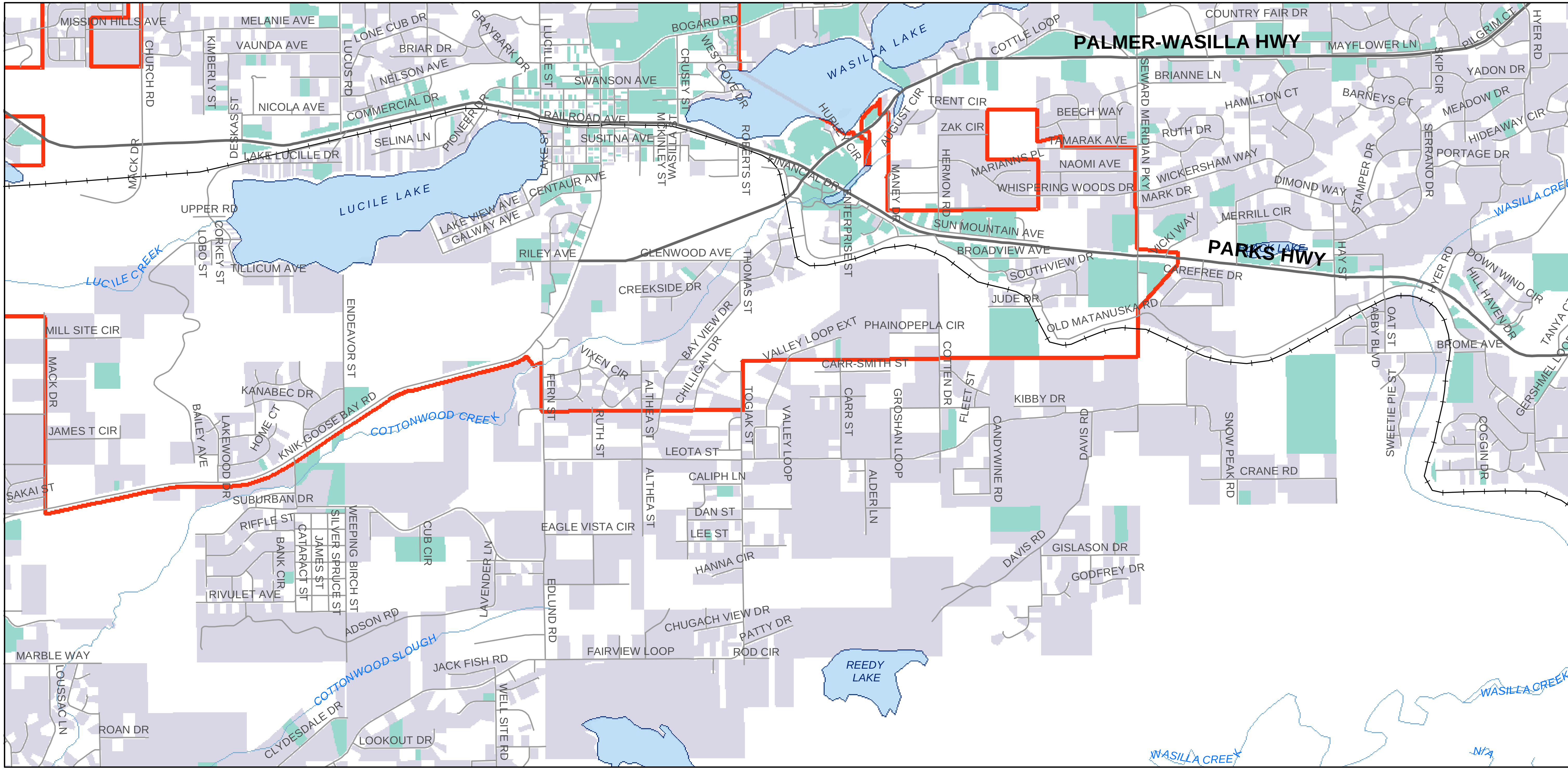
The environmental justice factors were included in the analysis to adjust for the appraised land and building value factors discussed later. These factors unintentionally "target" low income and/or minority populations living in less expensive areas. Adding income and minority status factors ensure low

ARRC WASILLA REALIGNMENT ALTERNATIVES ANALYSIS



Source: Matanuska-Susitna Borough

FIGURE 10 LAND USE



Legend

- City of Wasilla Boundary
- Lake
- River / Stream
- Railroad

Roads

- Arterials and Collectors
- Highways

Land Use

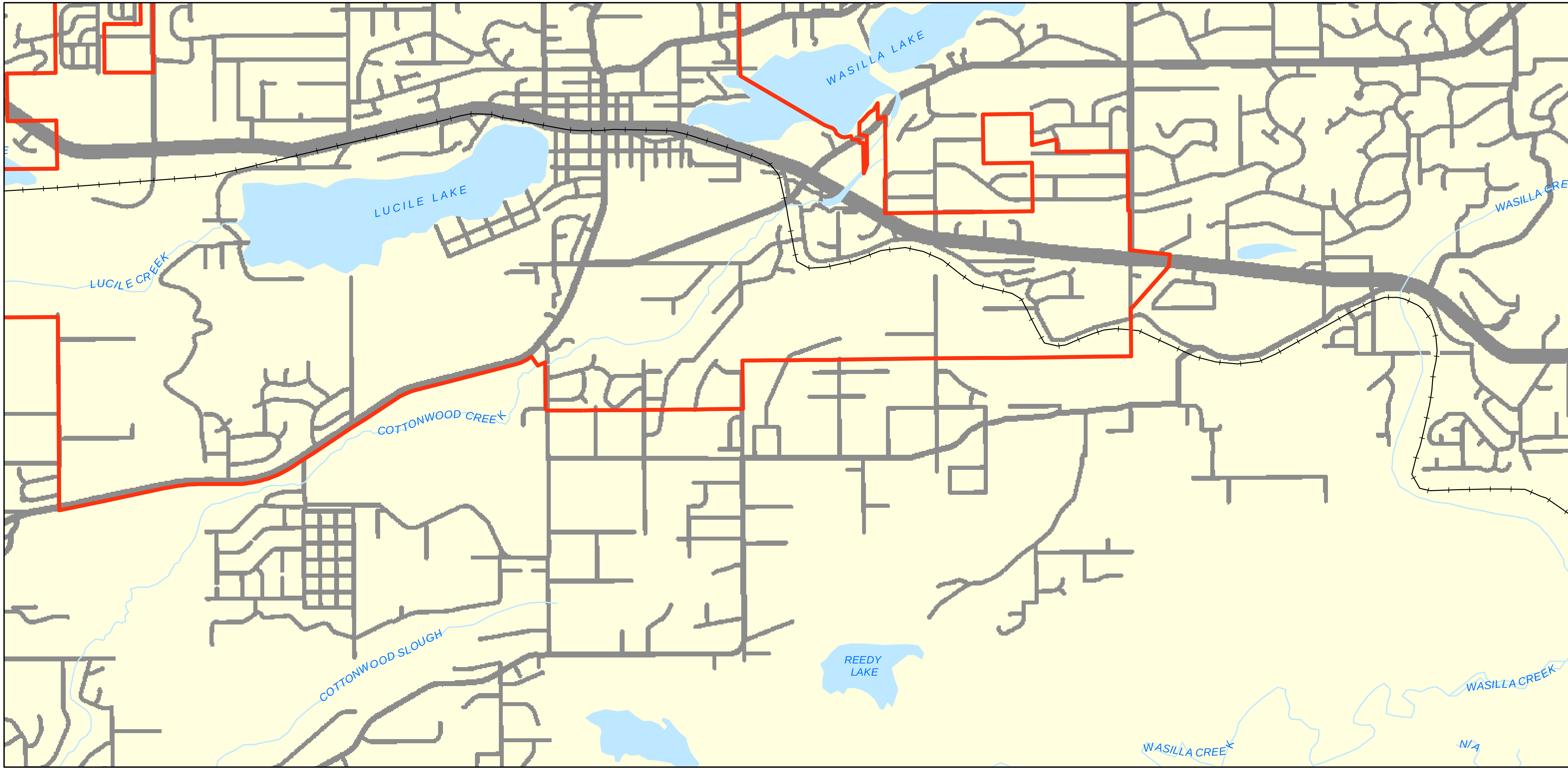
- 1 (Vacant)
- 3 (Non-Residential)
- 5 (Residential)

NORTH

0 0.25 0.5 1 Miles

FIGURE 11 LAND USE SENSITIVITY

ARRC WASILLA REALIGNMENT
ALTERNATIVES ANALYSIS



Legend

- City of Wasilla Boundary
- River / Stream
- Lake
- Railroad

Road

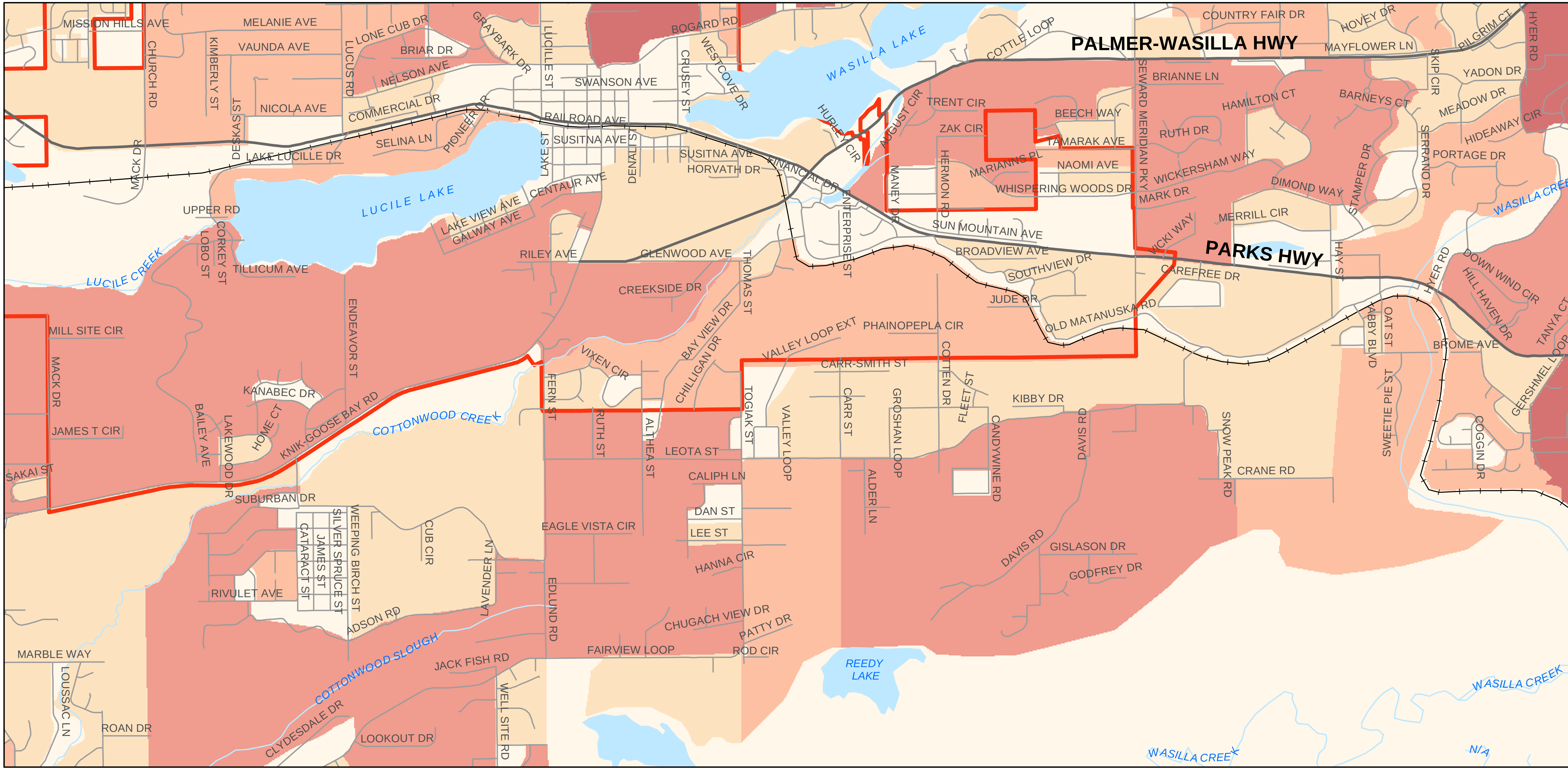
- 1 (Not Road)
- 3 (Road)

NORTH

0 0.25 0.5 1 Miles

FIGURE 12 ROADS

ARRC WASILLA REALIGNMENT
ALTERNATIVES ANALYSIS



Legend

City of Wasilla Boundary
River / Stream
Lake
Railroad

Roads
Arterials and Collectors
Highways

Population (# of people)
0 - 25
26 - 73
74 - 140
141 - 277
278 - 592

NORTH
0 0.25 0.5 1 Miles

Source: 2000 Census

FIGURE 13 POPULATION BY CENSUS TRACT

ARRC WASILLA REALIGNMENT ALTERNATIVES ANALYSIS

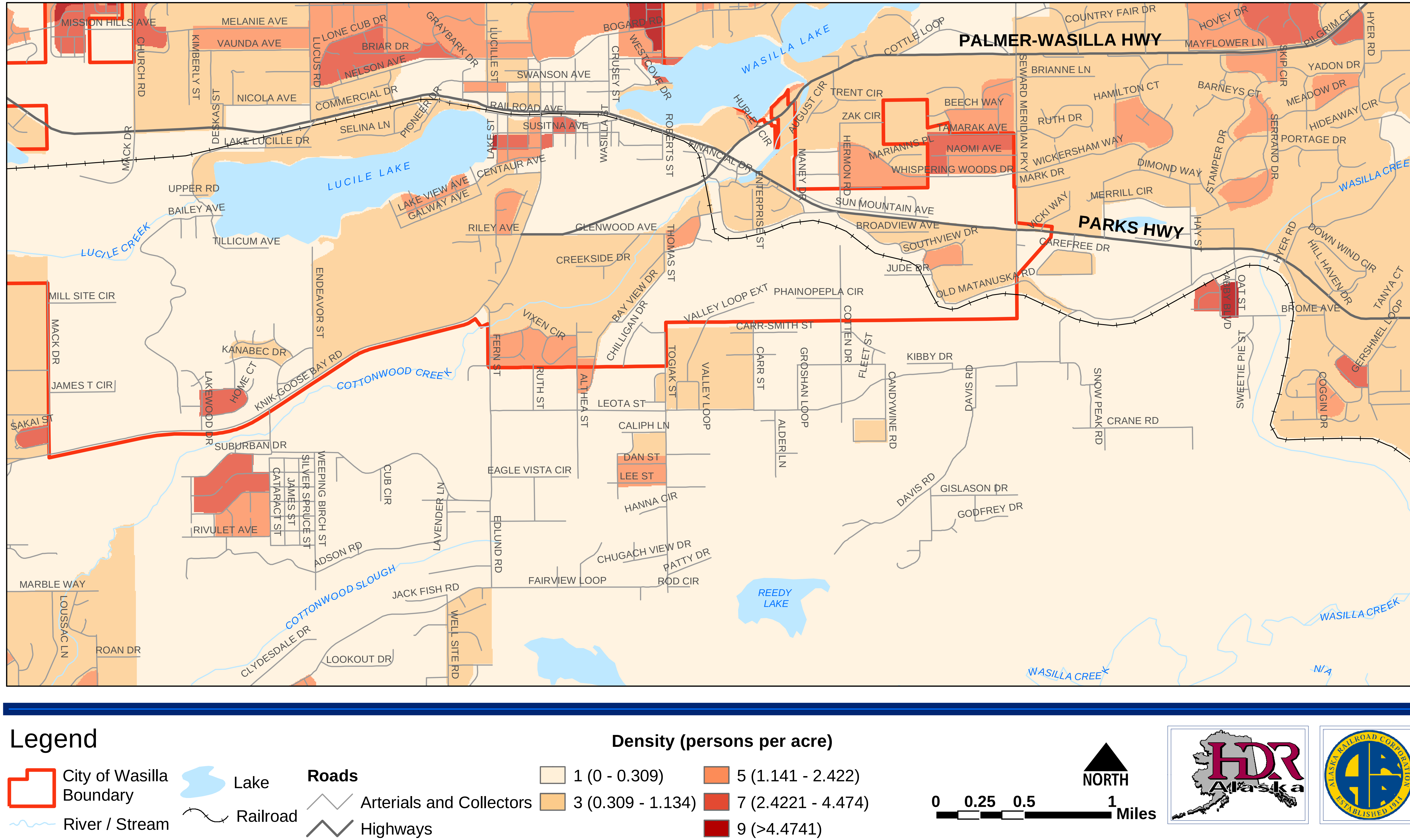


FIGURE 14 POPULATION DENSITY

income and/or minority areas are not being disproportionately impacted by this project.

Table 8 shows the values assigned to the census data and Figure 15 shows median household income by block group.

Table 8 Income Classification

Category	Value
> $51,221	1
< $51,221	5

Table 9 shows the grid values assigned to race data to identify and avoid areas of higher minority population (non-white population). Areas with a lower minority population than the Borough average were scored a 1, those higher than the borough average but less than the statewide average were scored a 3, and those areas higher than the statewide average were scored a 5. Figure 16 shows minority population areas represented by the percentage of non-white population by census block.

Table 9 Minority Populations

Category	Value
0 – 12.4%[1]	1
12.41%– 30.6%[2]	3
> 30.61%	5

1. 12.4% of the MSB is non-white
2. 30.6% of AK is non-white

Cost Factors

Appraised Land Value

Right-of-way acquisition can be one of the most expensive components of any new construction project. The taxable value of a property is an indicator of potential right-of-way acquisition costs. Maximizing the alignment on areas with a lower land taxable value should reduce right-of-way acquisition costs.

Land value is influenced by many factors including land use, size, utility service, access, location. An appraised land value of 0 may indicate that the property is owned by a government agency which does not pay property taxes. The appraised land value of a parcel can be significantly less than the right-of-way acquisition cost of that parcel. Appraised land value is being used to represent the relative cost of land.

The taxable value of the parcels used in this analysis comes from the Matanuska-Susitna Borough Assessment Division for 2003. The appraised value was used to calculate the land value per acre in 2003 dollars.

Figure 17 shows the appraised land value by parcel in the Study area. To better reflect costs where only a portion of the parcel would be needed, the appraised value was divided by the size of the parcel to generate a per acre land value. The gridded land value was then categorized on the value per acre, with more expensive land being penalized a higher amount. The categories and values are shown in Table 10 and displayed in Figure 18, respectively.

Table10 Appraised Land Value

Category	Value
$0	1
$1 – $10,000	2
$10,001 – $20,000	3
$20,001 – $30,000	4
> $30,001	5

Appraised Building Value

In addition to purchasing land, structures sometimes have to be purchased if they are in or too near the right-of-way. Figure 19 shows the raw building appraised value according to the borough tax assessor. Appraised building value is also influenced by many things including size, condition and improvements made to a structure. Figure 20 shows the same data to which penalties have been assigned, with more expensively appraised building assigned higher penalties. Table 11 shows the appraised building value categorized by cost.

Table 11 Appraised Building Value

Category	Value
$0	1
$1 – $100,000	2
$100,001 – $200,000	3
$200,001 – $300,000	4
> $300,001	5

Building Value Per Acre

This factor measures how likely it might be that an alignment may need to take an entire parcel. A high value will tend to represent an expensive structure on a small lot (e.g. condo development). A low value is more likely to be a single family house on a large lot, representing a parcel where it may be possible to avoid taking the entire parcel or displacing the structure by slight alignment variation. The building values/acre were assigned into five categories. The categories and values are shown in Table 12 and displayed in Figure 21.

Table 12 Building Value per Acre

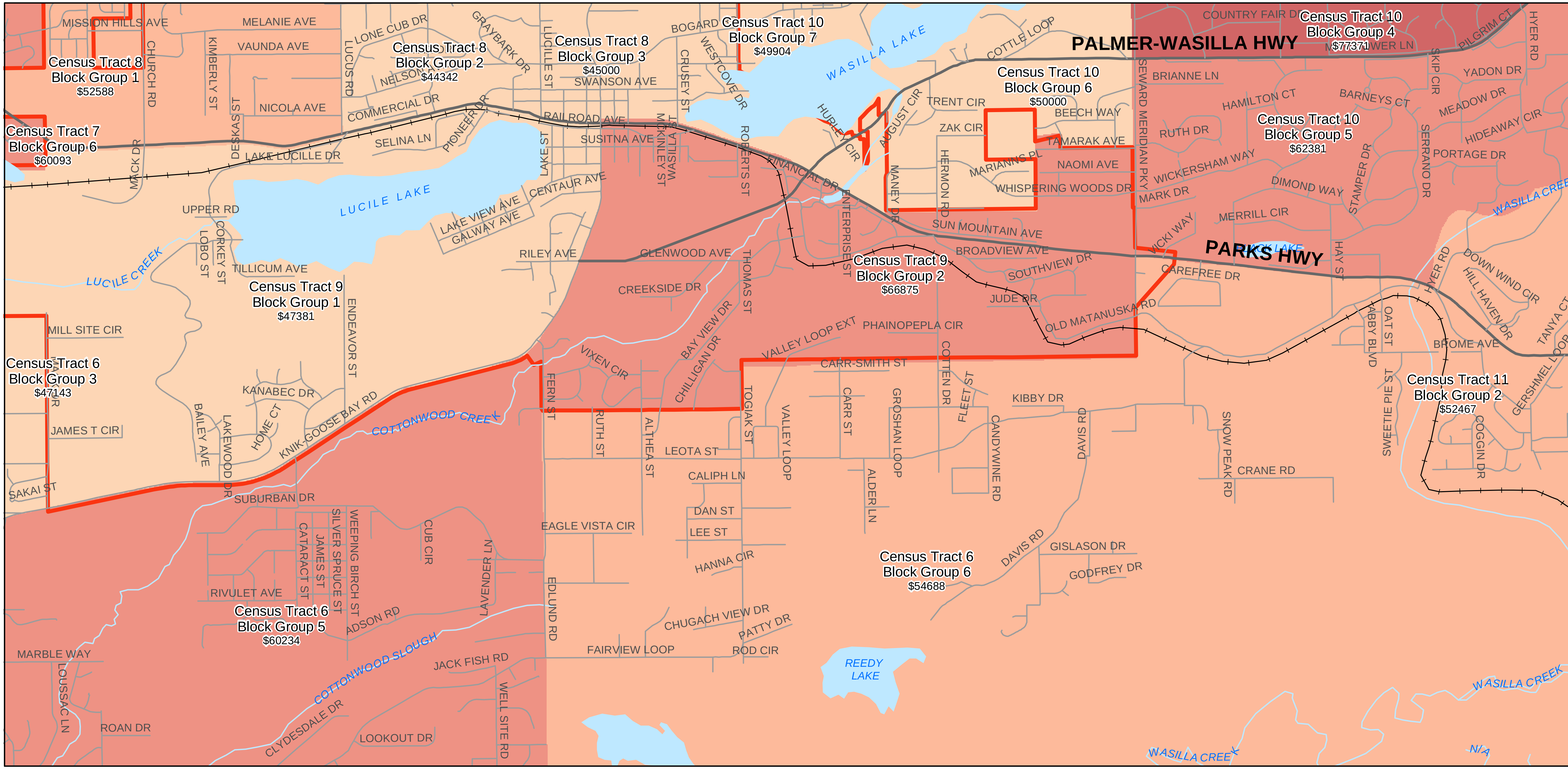
Category	Value
$0	1
$1 – $50,000	2
$50,001 – $100,000	3
$100,001 – $150,000	4
> $150,000	5

Special Sites

Some sites that should be avoided were not adequately represented by the above factors so they were assessed separately. Each of these special sites is considered an area to be avoided because the impacts to routing through them would result in unacceptable impacts. These sites include parkland, the Wasilla Municipal Airport, and the sewage treatment plant. Downtown Wasilla was also avoided. Any route or corridor through downtown would not be consistent with the purpose and need for the project.

Parkland and wildlife refuges constrain alignment options because Section 4(f) of the Department of Transportation Act requires transportation projects being built with federal transportation funds to avoid park and recreation lands, refuges, and historic sites unless there is no prudent and feasible alternative. Lake Lucille Park and the Palmer Hay Flats are considered Section 4(f) properties. The ballfield and future park were also identified because they are potential Section 4(f) properties. As disclosing the exact location of historic sites is a sensitive issue, historic sites were not included in the screening criteria. Any potential impacts to historic sites would need to be identified and addressed during the NEPA phase of the project.

ARRC WASILLA REALIGNMENT
ALTERNATIVES ANALYSIS



Legend

- City of Wasilla Boundary
- River / Stream
- Lake
- Railroad

Roads

- Arterials and Collectors
- Highways

Median Household Income

- $0 - $30,000
- $30,001 - $40,000
- $40,001 - $50,000
- $50,001 - $60,000
- $60,001 - $70,000
- $70,001 - $80,000

NORTH

0 0.25 0.5 1 Miles

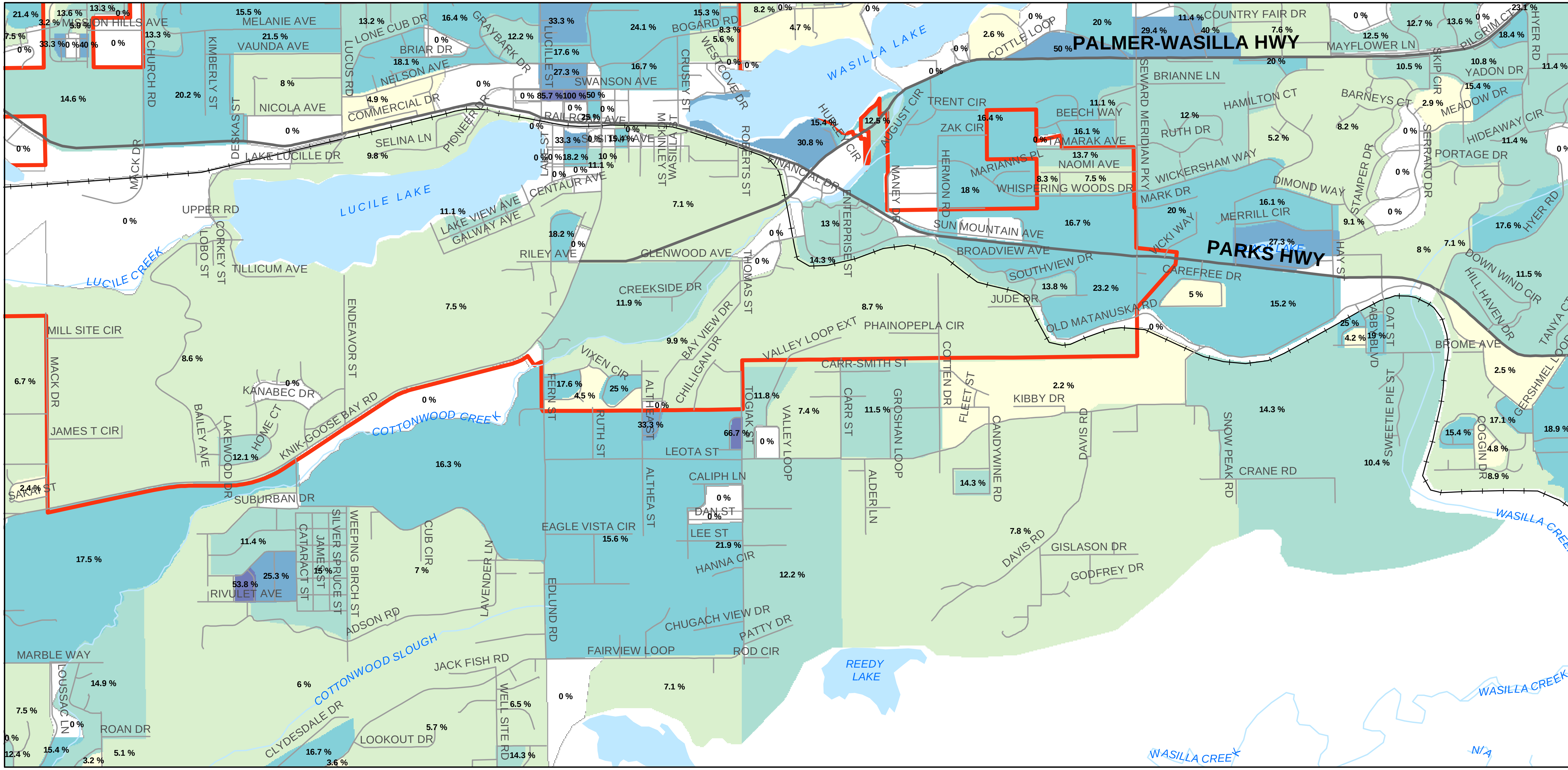
HDR Alaska

ALASKA RAILROAD CORPORATION ESTABLISHED 1914

Data Source: 2000 Census

FIGURE 15 MEDIAN HOUSEHOLD INCOME

ARRC WASILLA REALIGNMENT
ALTERNATIVES ANALYSIS



Legend

- City of Wasilla Boundary
- River / Stream
- Lake
- Railroad

Roads

- Arterials and Collectors
- Highways

Percent of Non-White Population by Census Block

- Zero Population Census Block
- 0 - 5%
- 5.1 - 10%
- 10.1 -15%
- 15.1 - 25%
- 25.1 - 50%
- > 50% (map max 67%)

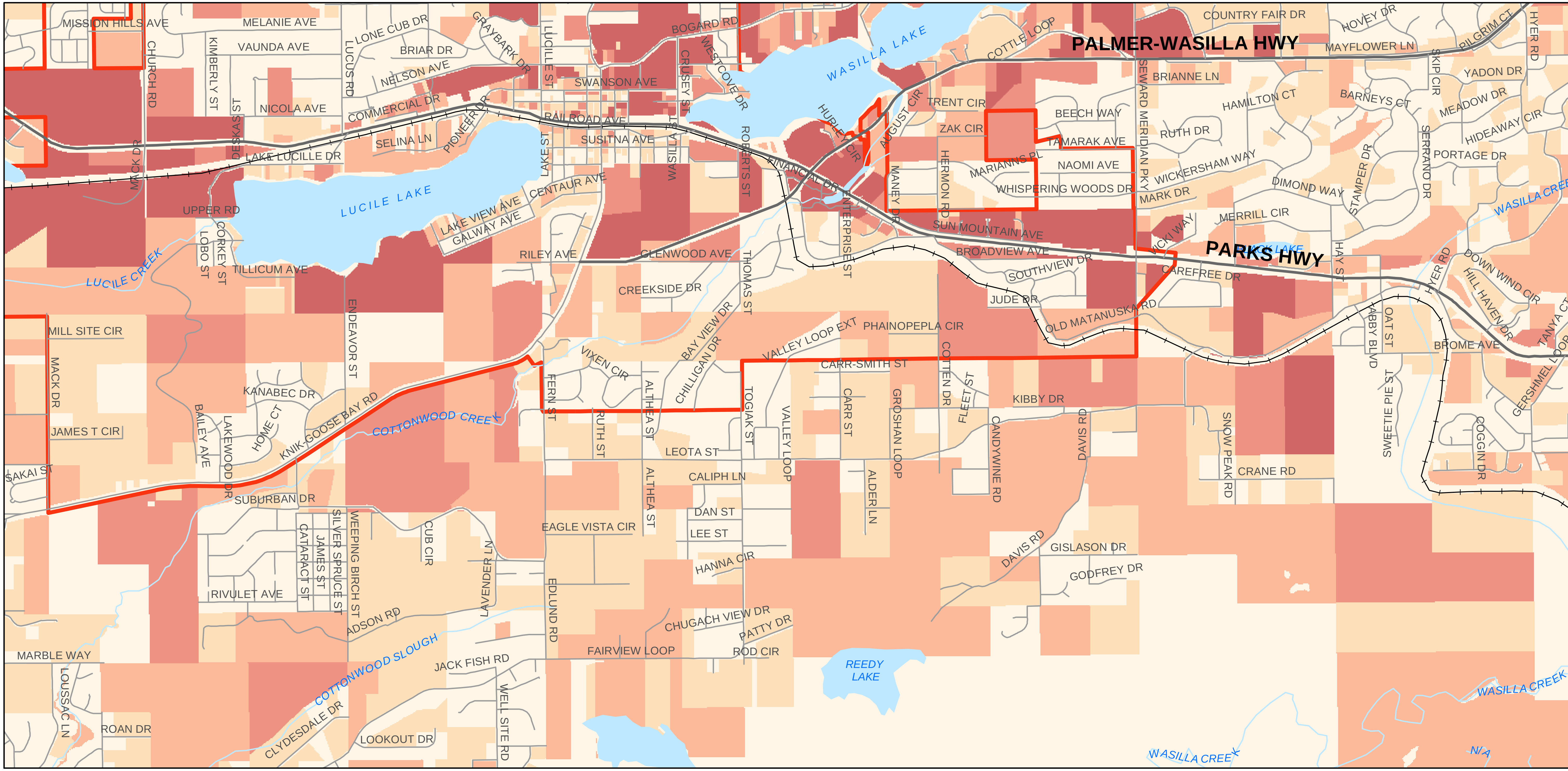
NORTH

0 0.25 0.5 1 Miles

Data Source: 2000 Census

FIGURE 16 MINORITY POPULATIONS

ARRC WASILLA REALIGNMENT ALTERNATIVES ANALYSIS



Legend

- City of Wasilla Boundary
- River / Stream
- Lake
- Railroad

Roads

- Arterials and Collectors
- Highways

Appraised Land Value

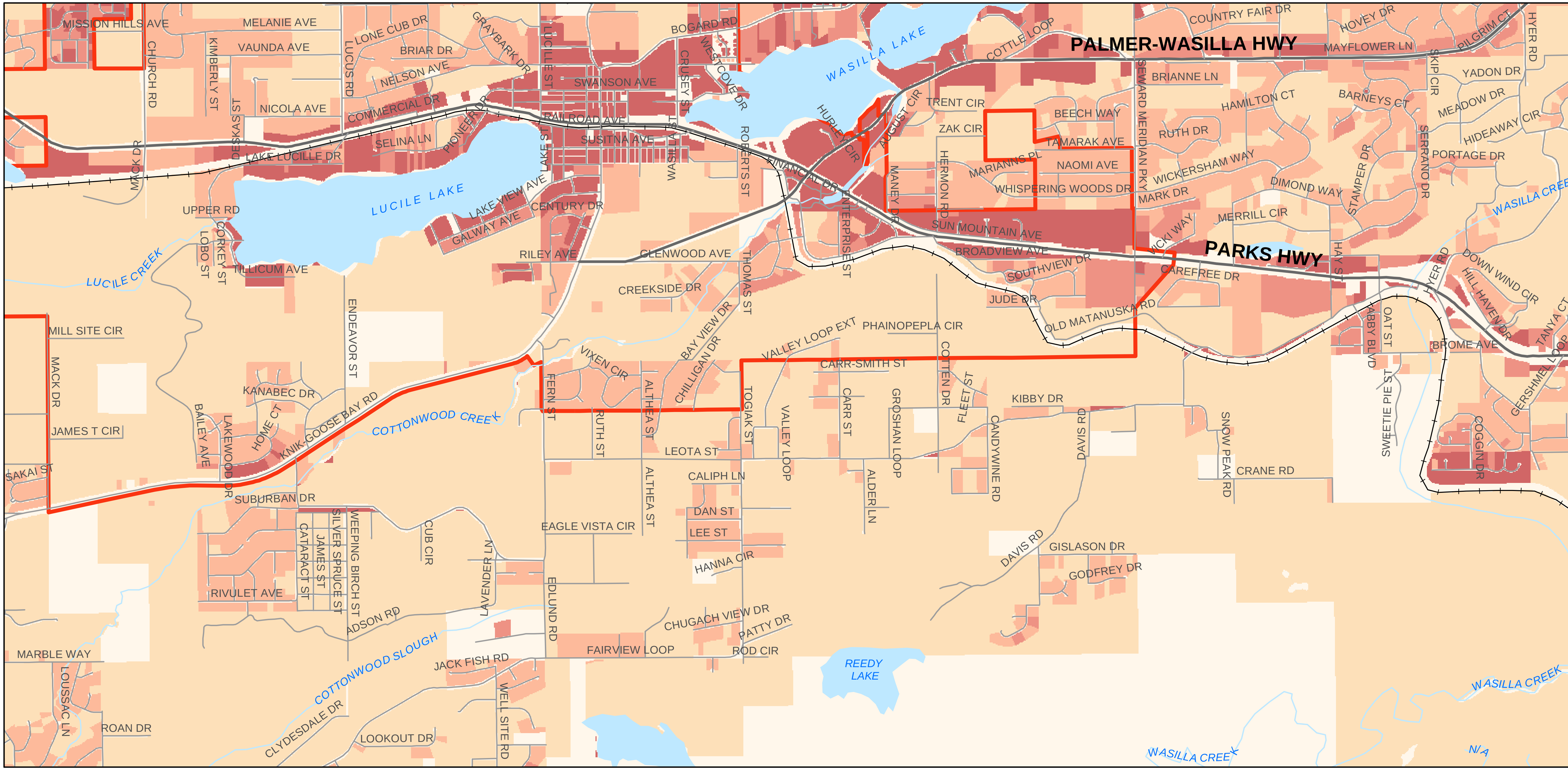
- $0.00 - $25,000
- $25,001 - $50,000
- $50,001 - $100,000
- $100,001 - $200,000
- $200,001 - $2,037,500

NORTH

0 0.25 0.5 1 Miles

Source: Matanuska-Susitna Borough

FIGURE 17 APPRAISED LAND VALUE



Legend

- City of Wasilla Boundary
- River / Stream
- Lake
- Railroad

Roads

- Arterials and Collectors
- Highways

Land Value per Acre

- 1 ($0)
- 2 ($1 - $10,000)
- 3 ($10,001 - $20,000)
- 4 ($20,001 - $30,000)
- 5 (> $30,001)

NORTH

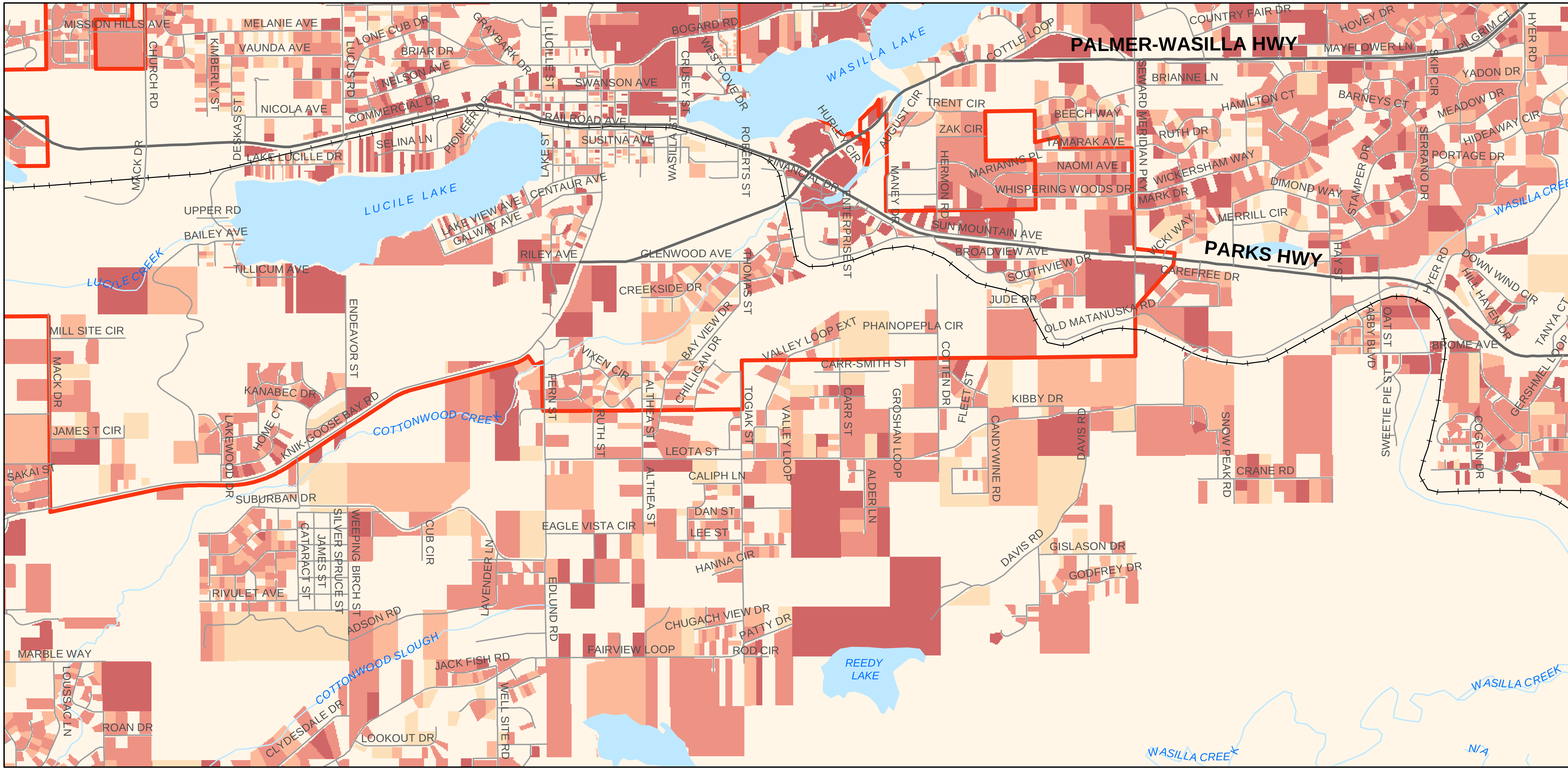
0 0.25 0.5 1 Miles

HDR Alaska

ALASKA RAILROAD CORPORATION ESTABLISHED 1914

FIGURE 18 APPRAISED LAND VALUE PER ACRE

ARRC WASILLA REALIGNMENT
ALTERNATIVES ANALYSIS



Legend

City of Wasilla Boundary
Lake
River / Stream
Railroad

Roads
Arterials and Collectors
Highways

Appraised Building Values ($/parcel)

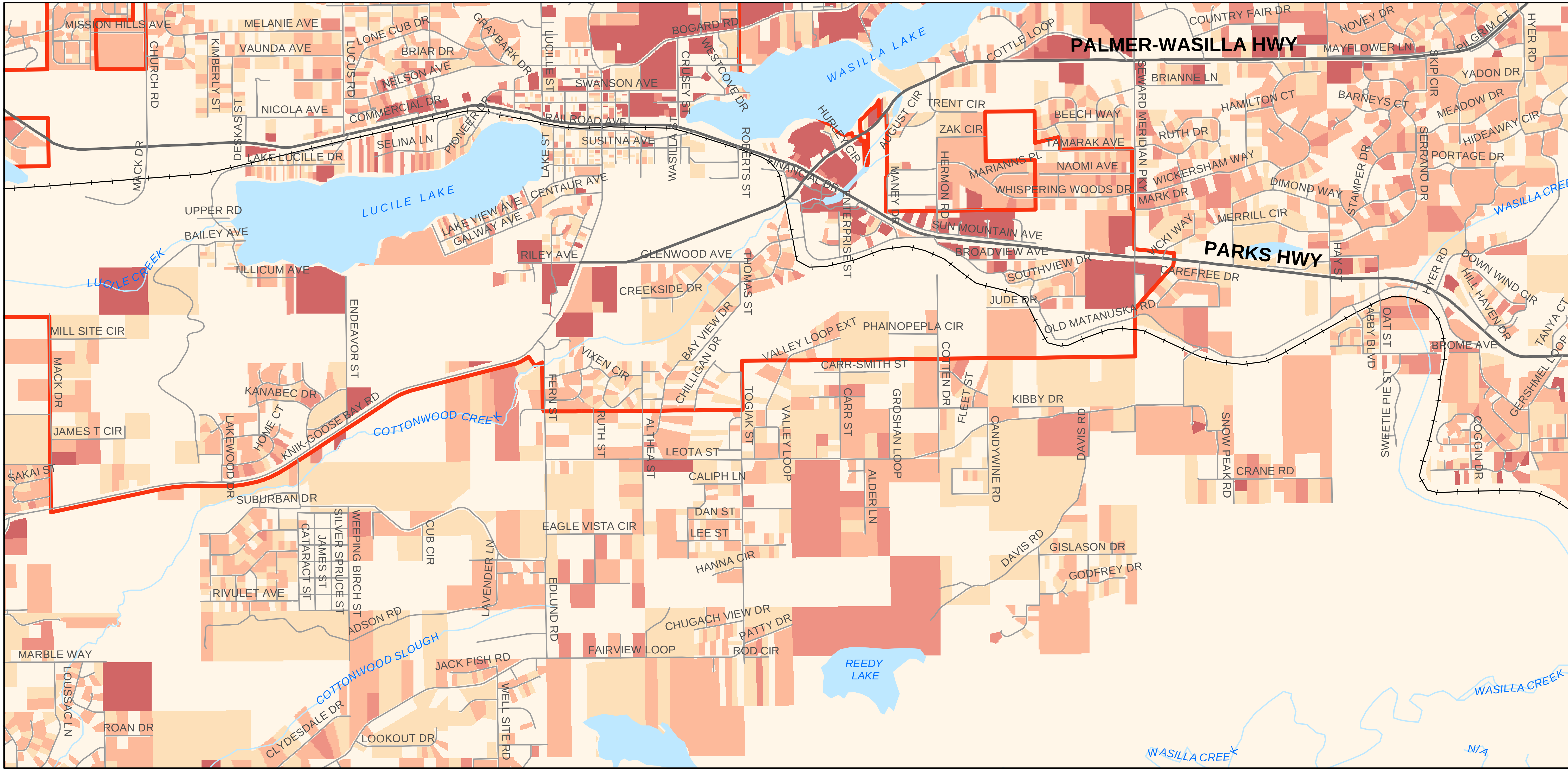
- $0 - $25,000
- $25,001 - $50,000
- $50,001 - $100,000
- $100,001 - $200,000
- $200,001 - $45,000,000

NORTH

0 0.25 0.5 1 Miles

Source:Matanuska-Sustina Borough

FIGURE 19 APPRAISED BUILDING VALUES



Legend

- City of Wasilla Boundary
- Lake
- River / Stream
- Railroad

Roads

- Arterials and Collectors
- Highways

Appraised Building Value

- 1 ($0)
- 2 ($1 - $100,000)
- 3 ($100,001 - $200,000)
- 4 ($200,001 - 300,000)
- 5 (> $300,001)

NORTH

0 0.25 0.5 1 Miles

FIGURE 20 APPRAISED BUILDING VALUE CATEGORIZATION

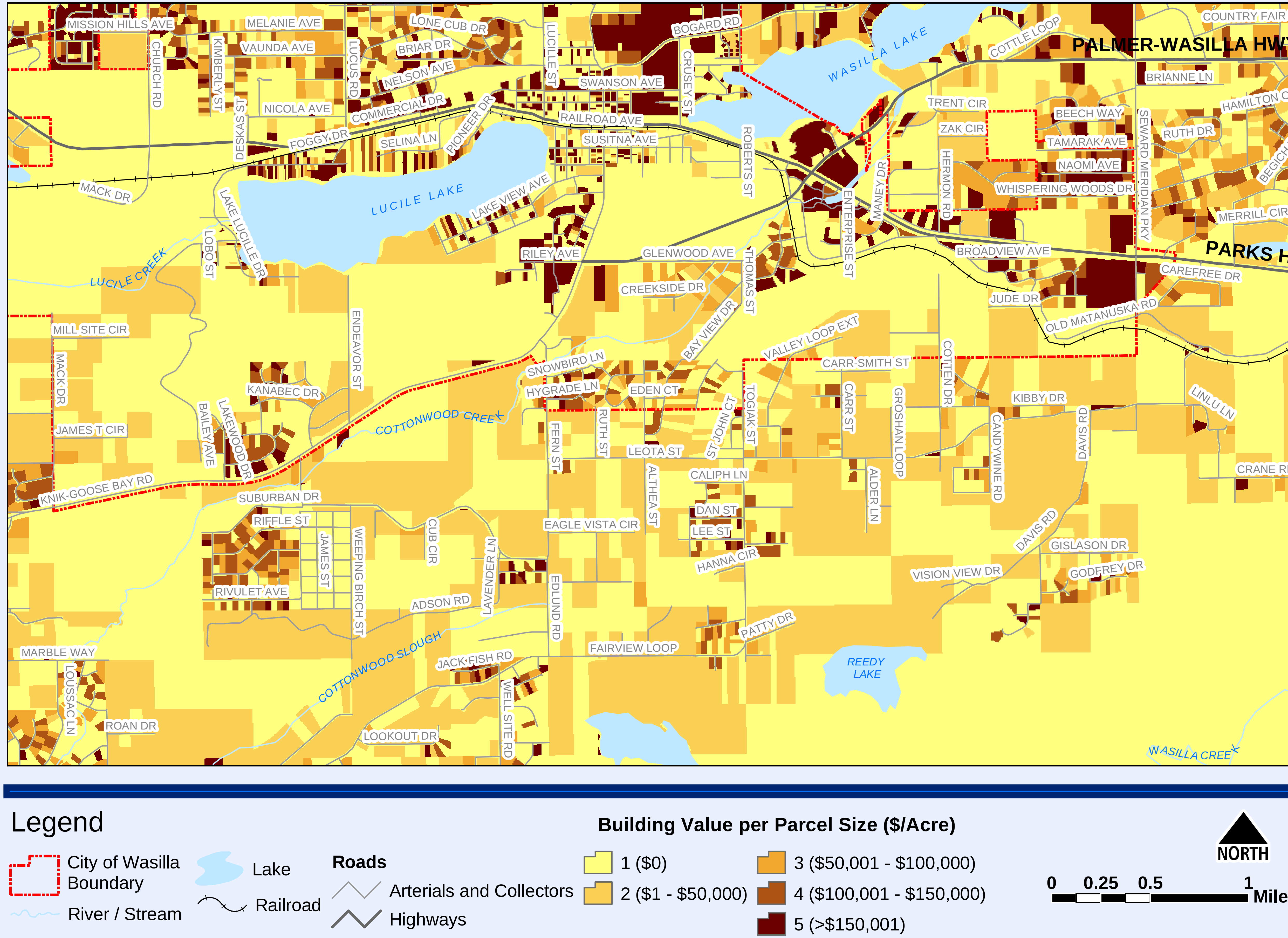


FIGURE 21 APPRAISED BUILDING VALUE PER ACRE (CATEGORIZED)

Aircraft operating at the Wasilla Airport need certain airspaces to be clear for safe operation. The Federal Aviation Administration (FAA) defines approach slopes that should be clear of obstructions. The Alaska Railroad Standard Clearance Diagram requires a minimum vertical clearance of 23 feet for the trains.

To prevent the trains or anything the trains are carrying from penetrating the approach slope to the runway, the center of the tracks should be located 469 feet away from the end of the runway; for planning purposes this number was rounded up to 500 feet. This distance assumes terrain 500 feet north of the runway is approximately the same elevation as the runway end.

Lake crossings are extremely undesirable because of the costs, environmental impacts, and construction challenges associated with building over a lake. As a result, lakes should be avoided unless there is no alternative.

The sewer treatment plant represents a significant capital investment to the City of Wasilla. It should be avoided because of the high cost of relocation and potential impacts to residents. The Wasilla Multi-Use Sports Complex also represents a significant capital investment. Consequently, it should also be avoided.

Table 13 shows the penalties assigned to each special site while Figure 22 shows the location of these special sites.

Table 13 Special Sites Classification

Category	Value
Not Special	1
Future Parkland	5
Ballfield - Private	5
Parkland - Public	15
Airport	15
Lake	15
Sewer Treatment Plant	15
Palmer Hay Flats Wildlife Refuge	15
Wasilla Multi-Use Sports Complex	15

Composite Corridor Suitability

Once all the individual factors were classified into grid maps, they were combined additively by the computer to create a composite map showing the areas that are the least constrained and most constrained for a new rail corridor (see Figure 23). Essentially, the computer added the scores for each cell for each of the defined factors and assigned a total score to each cell. The composite scores for any given cell ranged from 13 to 69. These scores were then divided into categories to reflect overall suitability:

Table 14 Grid-cell Overall Suitability Rating

Values	Rating
13-23	Good
24 – 29	Acceptable
> 30	Potentially Serious Flaws

Cells with a rating of "good" would be most suitable for a new rail corridor. "Acceptably" rated cells, while not ideal, could be used but may have greater impacts or costs. Cells with a value above 30 were considered likely to have potentially serious flaws for a new rail corridor and were avoided to the extent possible.

The composite map was used to identify areas with large amounts of contiguous areas of "good to acceptable" composite suitability ratings (i.e. the most advantageous corridors). Regardless of the scores near downtown Wasilla, this area was deliberately avoided as the purpose of this project is to relocate the railroad away from this area. Figure 24 depicts the identified reasonable corridors based on the analysis.

Conceptual Alignments

Based on the corridor analysis, previous rail realignment studies, and other factors, potential alignments were developed and tested against the mapped factors. Figure 25 depicts the (long list of potential alignments between Milepost 154/158 and 163. The following alignments were considered:

Shortest Alignments

The shortest, straight-line alignments are depicted on Figure 25. These alignments minimize the length the of the alignment and are essentially straight lines. If the area was perfectly flat, with no other factors to consider, these alignments would be the shortest and therefore likely the cheapest to build. Two alignments are shown:

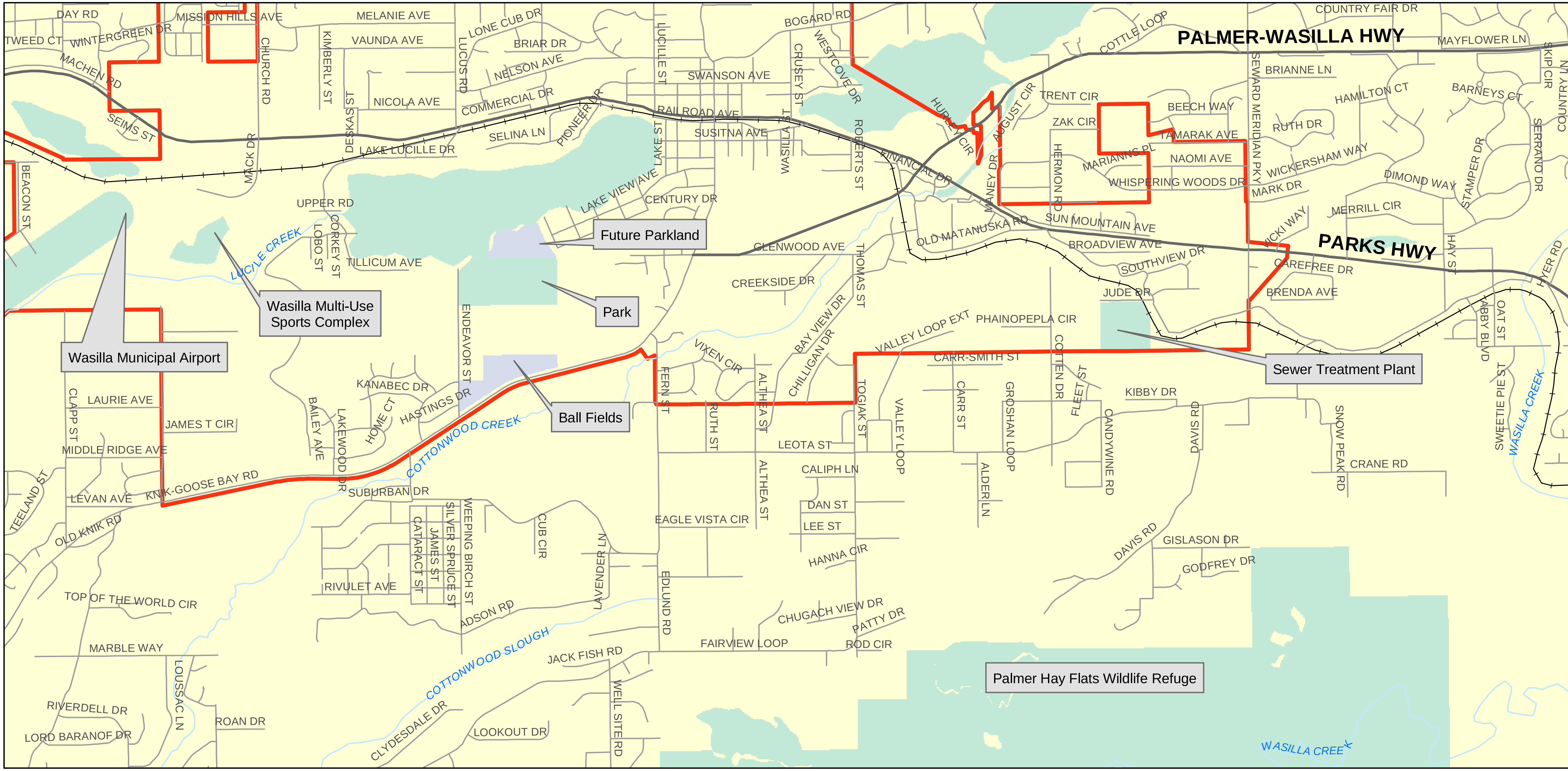
- Shortest MP 154-163
- Shortest MP 157-163

Because there are other factors to consider, however, it is relatively clear why the straight-line alternatives are not reasonable; they cut directly across lakes, subdivisions, steep slopes, and wetlands. They are primarily shown for reference purposes to illustrate the shortest possible connection. It can be a useful intellectual approach to start with the straight line during route finding reconnaissance and then modify that line to avoid known hazards, constraints, and sensitive areas. For example, the shortest route from MP 158 to 163, to avoid the sewage treatment plant, Lake Lucille, Lake Lucille Park, and major subdivisions, quickly lead to the conclusion that routes closer to the City's Route B are more realistic. Note, that for these reasons, the "shortest route" starting point was also moved from 158 to 157 to try to get a more representative comparison. Routes that vary from the straight line, but which are closest to it will generally be the shortest.

Section Line Alignments

Two routes were devised to maximize the use of section lines based on the assumption that some of the land along the section lines is likely in public right-of-way or may have transportation easements along them. Two concepts were considered: a southern route taking off from Milepost 154 and a northern route taking off from Milepost 158.

ARRC WASILLA REALIGNMENT ALTERNATIVES ANALYSIS



Legend

City of Wasilla Boundary

River / Stream

Railroad

Roads

Arterials and Collectors

Highways

Special Sites

1 (Not a Special Site)

5 (Ballfield/Future Park)

15 (Park/Lake/Airport/Wildlife Refuge/Sewer Treatment Plant/Sports Complex)

NORTH

0 0.25 0.5 1 Miles

HDR Alaska

ALASKA RAILROAD CORPORATION ESTABLISHED 1914

FIGURE 22 SPECIAL SITES

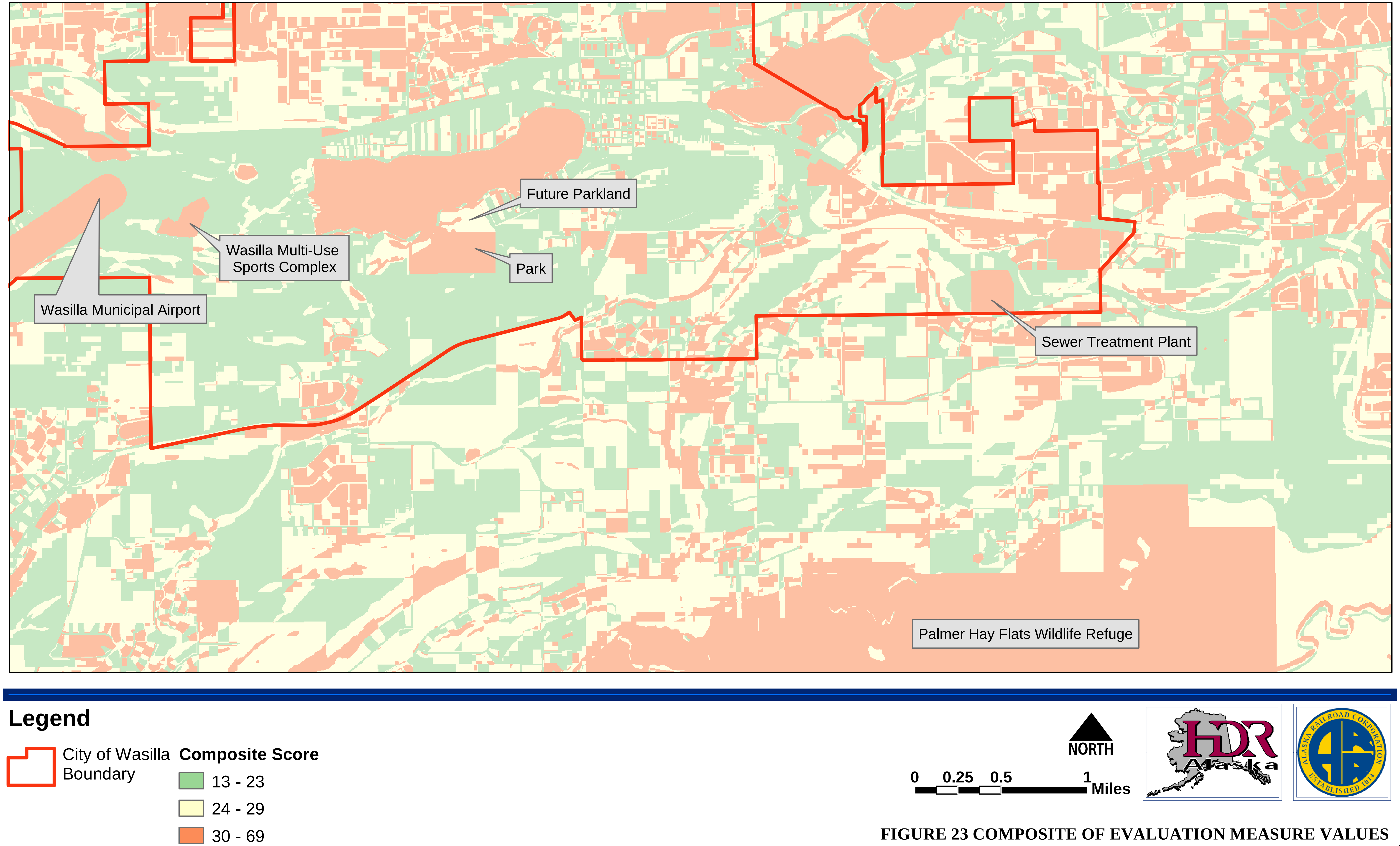


FIGURE 23 COMPOSITE OF EVALUATION MEASURE VALUES

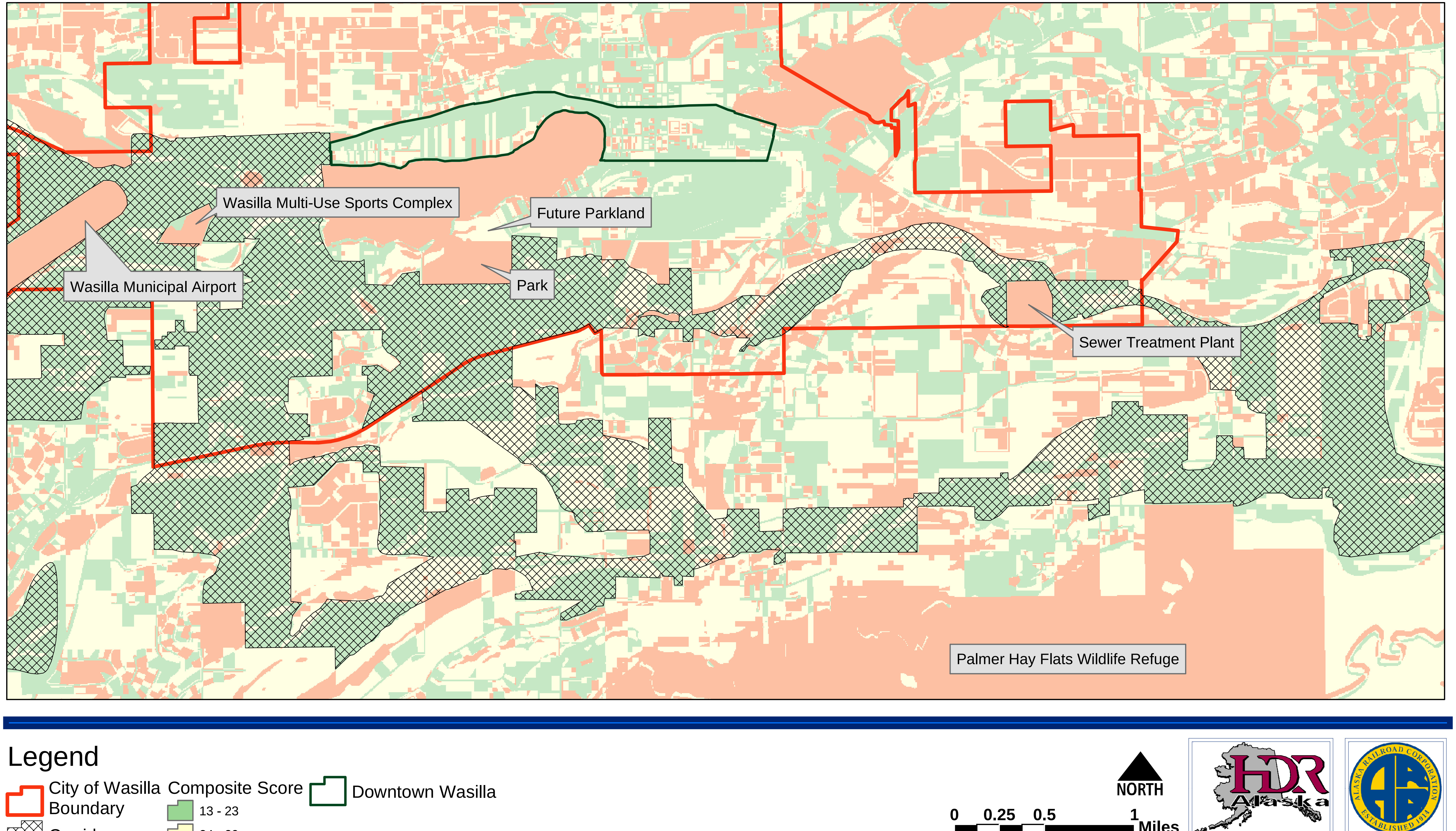
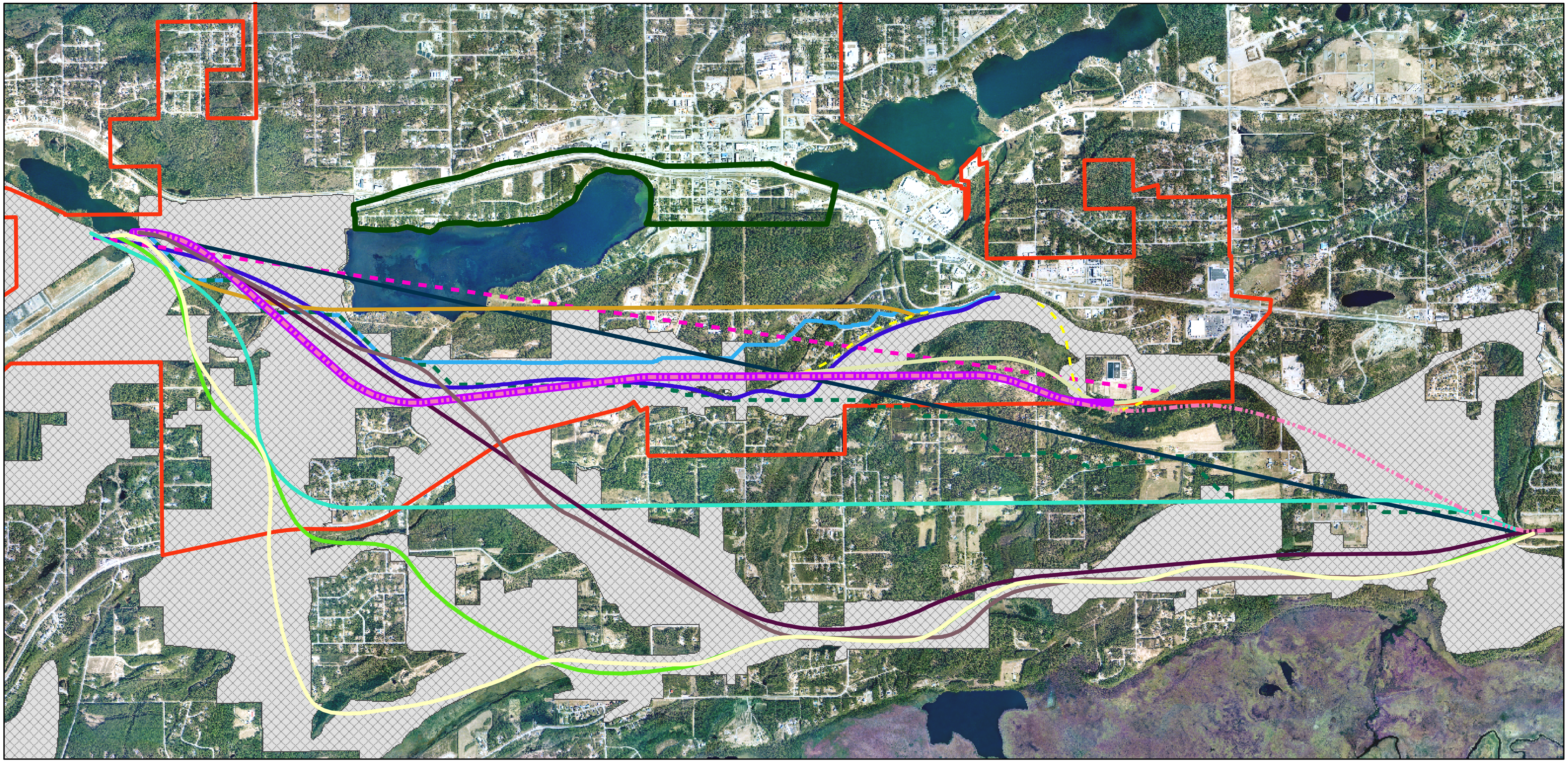


FIGURE 24 CORRIDOR IMPACT AREAS



Legend

- Corridor
- City of Wasilla Boundary
- Downtown Wasilla

Alignment Name

- City Route A
- City Route B
- City Route C
- City Route D
- City Route E
- Analysis MP 154 - 163
- Analysis MP 158 - 163
- Northern Corridor
- Section Line MP 154 - 163
- Section Line MP 158 - 163
- Shortest MP 154 - 163
- Shortest MP 157 - 163
- Southern Corridor 1
- Southern Corridor 2
- Southern Corridor 3

NORTH

0 0.25 0.5 1 Miles

Source Data: City of Wasilla

FIGURE 25 ALIGNMENTS

- Section Line MP 154-163
- Section Line MP 158-163

Similar to the shortest routes, on their face, the section line alignments cut directly through established subdivisions and have severe topographical challenges that render them unreasonable.

Corridor Alignments

In each of the four corridors identified through the suitability analysis, the best engineered alignment was evaluated. Four potential alignments were identified:

- Southern Corridor 1 (154-163)
- Southern Corridor 2 (154-163)
- Southern Corridor 3 (154-163)
- Northern Corridor 1 (158-163)

City of Wasilla Alignments

Each of the five routes examined by the City of Wasilla in their "Wasilla Railroad Relocation Reconnaissance Study" was reexamined in this analysis. The city had evaluated five alternative route alignments, four of which (Routes A, B, C, and E) are variations of a northern corridor, and the fifth (Route D), which follows a more southerly corridor.

- City Route A
- City Route B
- City Route C
- City Route D
- City Route E

Computer Generated Alignments

The project team used GIS to develop lowest "cost" routes, meaning routes that minimized the composite score from the start and end points. The GIS software used an automated function to evaluate the composite scores shown in Figure 23 to identify routes that minimize the total value of the cells crossed by that route relative to the length of the alignment. Two potential alignments were identified (one from each starting point):

- Computer Analysis MP 154-163
- Computer Analysis MP 158-163

That brought the total potential alignments identified to 15 as shown on Figure 25. To identify the possible alignments that would advance to the conceptual engineering phase, each alignment was looked at to see if it had any fatal flaws.

Reasonable Alternatives Analysis

The alignments were analyzed relative to the mapped constraint factors to test the reasonableness of the identified corridors and previously identified rail alignments. The methodology assumed that routes that were substantially outside the identified corridors would encounter greater constraints and result in higher impacts. To test the routes project staff evaluated how the route compared against the following criteria:

- Composite constraint score of the 500-foot wide right-of-way.
- Normalized Constraint Score
- Number of Fatal Flaw Cells
- Acres of wetland
- Parcels with a structure appraised at over $100,000
- Parcels with a residential land use affects
- Gravel sub surface
- Number of road crossings
- Number of stream crossings

The impacts by route are shown in Table 15. To be objective, the project team developed minimum standards that each route had to meet in order to be considered a suitable alignment/corridor. The minimum standards are:

- Composite constraint score less than 5 million.
- Seriously flawed cells less than 20,000.
- Less than 50 acres of wetland impact.
- Less than 40 parcels with a building appraised value over $100,000.
- Less than 60 residential parcels affected.

Other factors that weighed in the considered include:

- High per linear foot constraint scores
- Greater numbers of road crossings
- Greater numbers of stream crossings
- Lower percentages of the alignment with good gravel/soils

Two other factors are presented but were not deemed critical to the analysis.

- (1) Number of cells with a minority population above the Borough Average. While interesting, none of the census blocks have such a high minority population as to make this a critical factor.
- (2) Number of cells with a median income below the Borough Average. While interesting, none of the census blocks have such low income as to make this a critical factor.

Results

Table 15 shows the results of the results of the analysis. Two of the four corridors are deemed reasonable for further exploration during preliminary engineering and environmental analysis - one northern corridor and one southern corridor (see Figure 26). Within these corridors several alignment variations are possible. As expected alignments that fall substantially outside of these corridors faired poorly against the criterion and are not reasonable. Routes that are largely within the corridors scored well and should be evaluated further. As this analysis was conducted at the planning level, routes that best represented each of the corridors were evaluated further at a conceptual engineering level (Appendix A). All routes not specially rejected still have merit and should be considered during the next phase of the project.

Rejected Alternatives

Shortest Alternatives. As expected, both of the straight line alternatives have serious fatal flaws which render them unreasonable. These alternatives have the highest number of flawed cells (49,071 to 51,037) and very high per linear foot constraint scores. These scores verify what can be readily seen with a visual inspection of the various factor maps. These routes cross directly through subdivisions, section 4(f) property, waterbodies, steep slopes and wetlands.

Section Line Alternatives. Similar to the straight line alternatives, the section line alternatives cross large numbers of cells with serious flaws and because of their disregard for residentially developed land have the highest numbers of residential properties and expensive buildings that would be affected. As a result, they also have amongst the highest per linear foot constraint scores. Because they were not drawn with land form as a primary factor, they have amongst the lowest percent gravel content and cross steep slopes at perpendicular angles, indicating that they would also be expensive to overcome the poor soils and steep terrain.