Matanuska Susitna Borough
Official Streets and Highway Plan

Technical Report
and
Implementation Plan

Adopted
November 2022

IM 22-118
Or 22-063

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Abbreviations

AADT	Average Annual Daily Traffic
AMATS	Anchorage Metropolitan Area Transportation Solutions
ATV	All-Terrain Vehicle
CIP	Capital Improvement Project
DOT&PF	Alaska Department of Transportation and Public Facilities
DOWLD	Alaska Department of Labor and Workforce Development
FC	Functional Classification
FHWA	Federal Highway Administration
GIS	Geographic Information System
ISER	Institute of Social and Economic Research
LRTP	Long-Range Transportation Plan
MSB	Matanuska-Susitna Borough
MUTCD	Manual on Uniform Traffic Control Devices
OS&HP	Official Streets and Highway Plan
RIP	Road Improvement Project
ROW	Right-of-Way
SCM	Subdivision Construction Manual (2020)
STIP	Statewide Transportation Improvement Program
TAZ	Traffic Analysis Zone
TDM	Travel Demand Model
TRB	Transportation Research Board

1 Introduction

The Value of an Efficient Road Network

Roads are an important public resource. They are the conduits through which all commerce, recreation, and industry happen, and they are the foundation on which a community thrives. The design of the road network directly defines the limits to which a community can provide services and allow for growth while continuing to provide a community that people want to live in. If housing and commercial development outpace road network development without properly considering future needs, the community will quickly become constrained by the road network and community development will stop. Often, road infrastructure needs will only become apparent after they are affecting the community and solutions will become reactionary with options limited by the surrounding development. The Official Streets and Highway Plan (OS&HP) is a planning tool for the Matanuska-Susitna Borough (MSB) that helps decision makers reserve future road corridors and identify possible road network improvements so that when the need arises, reasonable options are still available.

The Nature of Road Development

Roads take a very long time to develop compared to other community development projects. Therefore, it is common in quickly growing areas for adequate road infrastructure to lag behind in the order of development, with housing and commercial development happening first and the necessary road development to support that growth happening later. This is the case for the Mat-Su Borough, where population growth since the 80s has been upwards of 6% a year. These are growth rates usually seen in dense urban areas[1] with multimodal transportation programs and road powers, etc. Much of this growth in the Mat-Su Borough has been allowed to occur in such a way that road network issues have recently become glaringly apparent, and the road solutions with the lowest impact and cost are no longer available due to adjacent development.

Growth and Roads

Population growth is expected to continue in the Mat-Su Borough through at least 2045 at the same 6% rate, assuming employment opportunities, housing, and services are made available. As population and traffic volumes grow, road congestion and safety issues on the existing road network will become exponentially worse if improvements are not made. It is essential that the MSB seriously consider action steps to prioritize road development that meets community demand. Routes identified in the OS&HP may have impacts

OS&HP Goals

- Link Planning to Engineering Design and Construction
- Provide a Plan for the Development of an Appropriate Road Network
- Guide Future Land Use
- Preserve Safe & Efficient Travel
- Promote Economic Development
- Produce Lower Cost Projects
- Extend Project Design Lives
- Improve Quality of Life

[1] Pew Research Group Report: What Unites and Divides Urban, Suburban and Rural Communities; May 22, 2018

and involve compromises and careful planning, but if they are not reserved, other far less beneficial projects will be needed at a higher cost. The goal of the OS&HP is not to hinder or control housing and commercial development, but to increase the capacity of the MSB to respond to community infrastructure needs due to population growth.

A detailed discussion of the growth analysis used to develop the OS&HP is included in Appendix A on page 38.

An Overview of the OS&HP

The OS&HP is a map-based transportation infrastructure plan developed by the MSB Planning Division, with support from Kinney Engineering and a steering committee consisting of members of MSB Public Works, MSB Platting, MSB GIS (Geographic Information System), the City of Palmer, and the City of Wasilla, as well as the input and coordination of the Alaska Department of Transportation (DOT&PF). The Plan was developed with a robust effort of modeling, analysis, and planning-level engineering with group workshops to select and include the most favorable road alignments and intersection locations in the Plan.

The primary component of the Plan is a map, included in Appendix B on page 45. The map shows the existing road network, possible future road alignments, and primary intersection locations. Each road segment is identified by a functional classification, which is a planning-level method of indicating the design parameters of the road. Functional classifications are tied to design manuals where the classification is translated into such design aspects as ROW width requirements or design speeds.

What is Functional Classification?

Functional Classification is a method of identifying the primary use of a road segment in the overall network. This communicates the context of the road between agencies, designers, and the public, and decides the design parameters of the road.

The road network displayed in the OS&HP represents the various routes and classifications needed to provide safe and efficient travel for existing and anticipated development. Since the timing and location of growth and development are dynamic, the road network presented in the OS&HP is not tied to a set horizon year, but serves as a guide to plan for growth and future travel demand. The purpose of the OS&HP is to highlight where roads are needed and to guide development and the subdivision of lands so the corridors are available for future road projects. The Platting Division implements the OS&HP. During the platting process, every subdivision development is assessed for compatibility with the OS&HP. If there is a conflict with the design, MSB Staff will work with the applicant to find a solution that allows for the proposed development and also preserves the OS&HP corridor.

Importance of the OS&HP

The road network outlined in the OS&HP emphasizes the following components:

- **Connectivity**. The Alaska road network has historically been very reliant on the interstate highway system and this has led many communities, including the MSB, to develop without proper connectivity in their secondary road network. The road network is very reliant on the interstate highway system. A majority of trips, regardless of their distance or purpose, are routed onto the highway at some point in their travel. This leads to major congestion along the interstate through the urban core. The OS&HP is designed to provide tools to recover that missing connectivity, leading to higher mobility and efficiency of travel.
- **Safety.** The role of functional classifications in a road network is to identify drivers' expectations at different places in the network. Mixing drivers with a wide range of expectations can greatly decrease safety. For instance, drivers on neighborhood roads expect a high number of turning vehicles, low speeds, and pedestrians on the road and shoulders. However, a deficient road network may push high mobility traffic onto the neighborhood road, causing "cut-through traffic." The mixing of drivers with different needs on the same road creates an obvious safety issue. Simply installing speed bumps and traffic calming may reduce the safety impacts, but it does not address the greater cause, which is a road network that is failing to provide all users with appropriate roads to serve their needs. The OS&HP shows a road network that, if fully built, would provide optimal routes for all users using the space currently available.
- **Cost-effectiveness**. A primary goal of the OS&HP is to reduce the financial and societal costs of road projects in the future. A study of the future community growth showed locations where issues will exist in the network if reasonable expectations about growth occur. Therefore, solutions to these issues will someday become urgent to the community, and decision-makers will need to have answers available to meet these needs. The most favorable solution in each case is included on the OS&HP map. If the MSB does not preserve these routes, then secondary, less favorable options will need to be explored. This will result in a slower road development process resulting in higher-cost solutions that provide less improvement to the road network.

The OS&HP is a part of the MSB process for designing and constructing road infrastructure. Decision makers will use the OS&HP to choose road projects for further study and design and the construction of infrastructure. The OS&HP works in tandem with the MSB Long-Range Transportation Plan (LRTP), the MSB Subdivision Construction Manual (SCM 2020), and other road-related policies and plans.

2 The Planning Process and the Role of the OS&HP

The OS&HP in the MSB Planning Process

The recommendation of a planned road network in the OS&HP is the first step in road infrastructure development. The connections shown are based on current development data and existing socioeconomic projections for the MSB. The exact corridor alignments and road network layout may change as projects are studied in more detail. The 2022 iteration of the OS&HP is now designed to be a "living document," which will be updated by MSB Planning Division as growth and development forecasts change.

Figure 1, below, presents the general planning and road design process in the MSB. Studies and road plans will generally follow a form of this process on their way to construction.

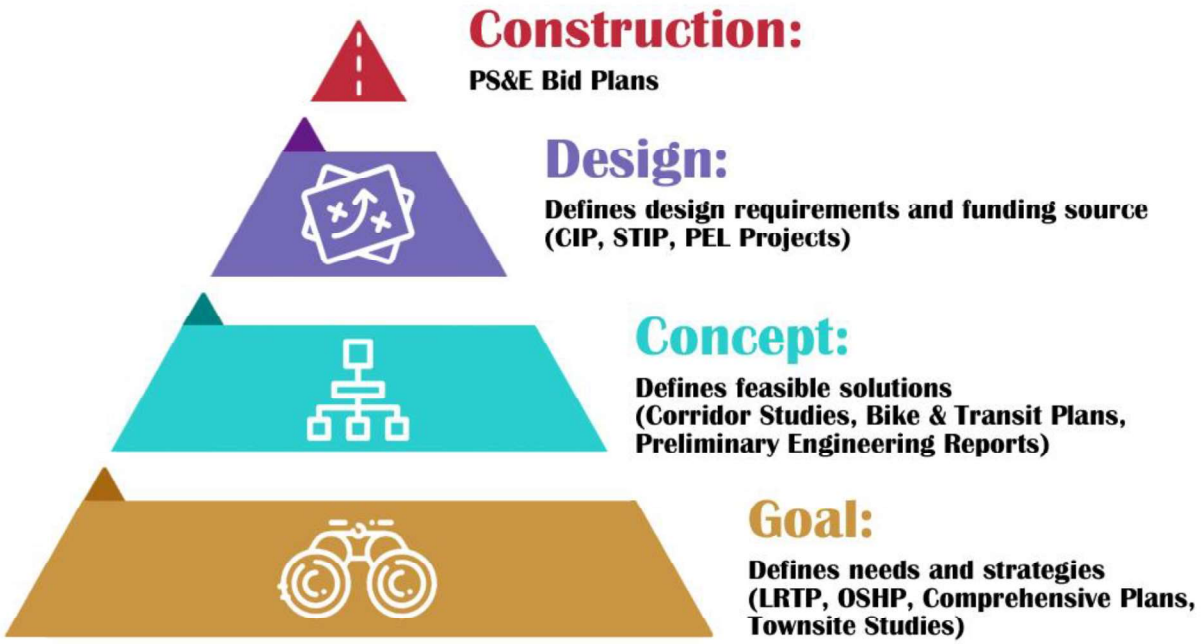

Figure 1. Road Development Pyramid

Goal Planning

At the foundational level of the pyramid are studies that identify infrastructure needs in the community and present solutions in the form of goals and strategies. For example, the community comprehensive plans identify needs in a community for road connections or transit services and explore possible solutions for further study. The LRTP is a key element at this stage of planning as it brings together a broad view of community transportation needs and prioritizes those needs using basic feasibility measurements with a constrained budget and defined horizon year.

Concept Planning

The second level of road planning involves studies that take broad-level goal-based strategies and transition them to more feasible engineering solutions. There are often many possible ways to

fulfill a single identified need in the community. Studies at this level typically determine the optimal solution through more detailed traffic engineering analysis, cost-benefit techniques, and public involvement.

Design Planning

On the "Design" level are projects which have an established alignment and design concept that has been vetted by feasibility analysis and environmental processes. They have more involved engineering design requirements, and their scope and layout are well defined. Another key element at this stage is establishing a funding source.

Construction and the Nature of Project Development

The final step of project development is the construction of the road. This step takes the feasible solutions and turns them into shovel-ready projects that may go out to bid for construction.

Depending on the size and scope of the project, a road may not pass through every step of this process before going to final design and construction, and no step of the process, including final design, guarantees the construction of a road project. This is to say, a road shown on the OS&HP maps is not a committed road but rather an indication of a possible future need. The alignment proposed in the OS&HP is likely to be the least impactful and most cost-effective solution for that future need. However, further discussion and study will take place before a road is built.

The Relationship between the OS&HP and the LRTP

The OS&HP is a long-term planning document that is an extension of the LRTP, and a part of the LRTP's implementation strategy. The LRTP is a fiscally constrained study that looks at all modes and transportation needs in the MSB and develops a plan with a set horizon year and limited budget forecast. The most recent MSB LRTP studied a horizon year of 2035 and recommended Short-term, Mid-term, and Long-term projects. The OS&HP includes the recommendations of the LRTP but also looks beyond 2035 to an undefined horizon year to predict, on a planning level, additional projects that may be included in future LRTPs and future Statewide Transportation Improvement Programs (STIP). The OS&HP's role in road planning is to forecast the connectivity and road function needs of the Borough and to reserve these corridors for future projects. The OS&HP helps fulfill Federal Highway Administration (FHWA) requirements for a planning process that leads to a STIP.

The OS&HP bridges the gap between the "Goal" level and the "Concept" level of road development, and it works in tandem with the LRTP as the basis for future road projects. Table 1, on page 9, compares the differences between the scope and purpose of the LRTP and the OS&HP.

Table 1. Key Goals and Purposes of LRTP vs OS&HP

LRTP	OS&HP
• Broad Transportation Focus • Performance-Based through 2035 • Developed Goals and Strategies • Recommended Fiscally Constrained Improvements • Models High-Volume Road Congestion in a Model that Primarily Provides Higher Function Road Solutions	• Road Network Access and Connectivity Focus • Protects Options for Projects Beyond 2035 • Part of the LRTP's Implementation Strategy • Not Fiscally Constrained • Defines Functional Classes and Patterns Network Design with Planning-Level Road Alignments • Designs Secondary Road Network Needed to Support Arterial-Level LRTP Solutions

3 Key Elements of the OS&HP

The OS&HP is a map designed in GIS software and updated by the MSB Planning Department. A current version of the map is included as figures in Appendix B of this report. The OS&HP highlights three main features.

1. Existing and Possible Future Road Alignments
2. Functional Classification of Road Segments
3. Primary Intersections along Arterial Road Corridors

3.1 Existing and Possible Future Road Alignments

Existing road alignments are based on MSB GIS data. The MSB GIS data used includes land features, land ownership, land development, road characteristics, public facilities, parcels, structures, and (Right-of-way) ROW. The main source of data was the MSB GIS Department's online data portal. Data was downloaded in September of 2020.

Important Data Referenced in the Study:

MSB GIS Data
2007 OS&HP (readopted in 2017
2020 DOT&PF Functional Classes
2020 Capital Improvement Project (CIP) list
2017 Long Range Transportation Plan (LRTP)
2020 Subdivision Construction Manual (SCM)
2015 MSB Build-Out Study
Community Council Area Comprehensive Plans
Alaska Moose Crash Location Database

Future road alignments were determined based on SCM and FHWA guidance design criteria regarding road networks. Road connections included in previous plans were considered first, and then additions were made using an iterative process of considerations, agency input, and steering committee workshop discussions.

The study also referenced the following Assembly Adopted plans:

- Area Comprehensive Plans currently available on the MSB website
- Alsop Townsite Plan, 2013
- Southwest MSB 2060 Futures Project, 2014
- Fish Creek Townsite Study
- Current design plans
    - Parks Highway, Lucus to Big Lake expansion project
    - Knik-Goose Bay Road expansion project
    - Seldon Road Extension to Pittman Road.

The Importance of Connectivity

One of the primary goals of the OS&HP was to provide better connectivity within the secondary road network. Connectivity provides intraregional access between different major destinations in

the community. Figure 2, below, shows an example of connectivity in a street network, comparing a typical cul-de-sac subdivision design to a street design with more connectivity.

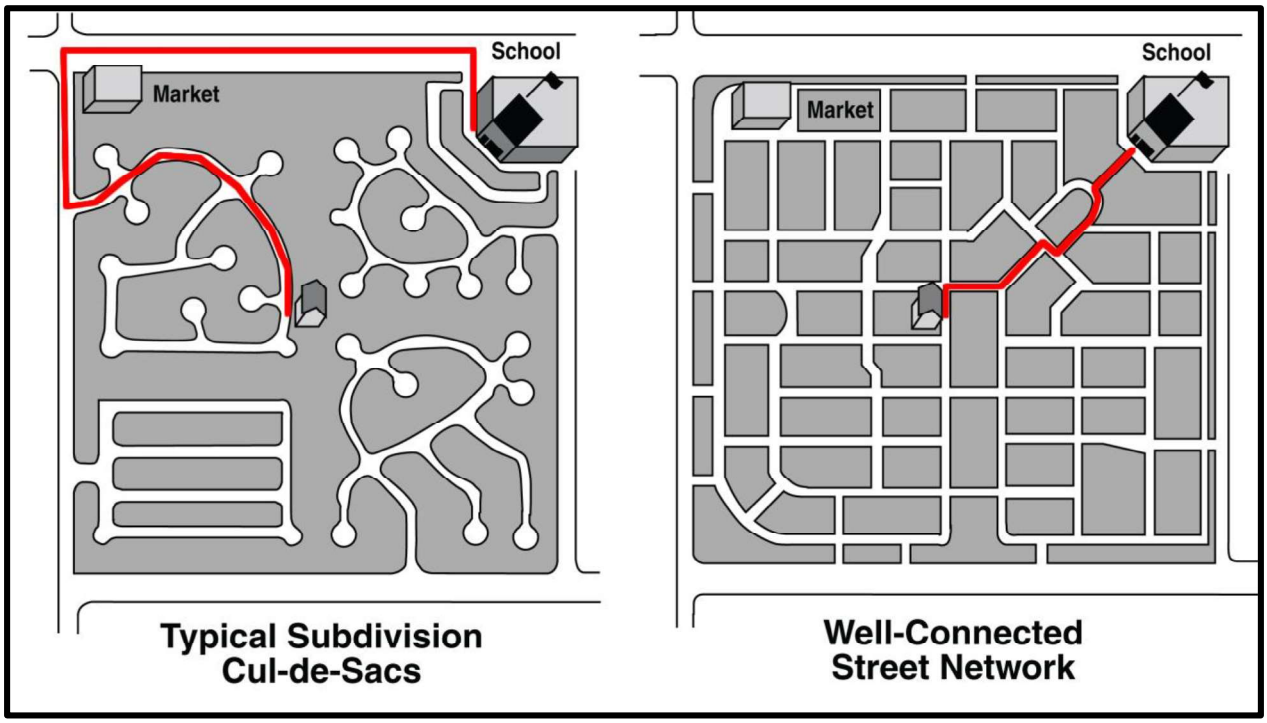

Figure 2. Example of Street Network Connectivity

Notice that trips between the subdivision and the school in the cul-de-sac design are forced onto the major road network. In the more connected street network example, however, the same trip has several possible routes to choose from, some of which can avoid the major road network entirely. Poor connectivity in the road network has a rippling effect throughout the community as it exasperates issues at overloaded intersections, increases safety risks due to more frequent turning on high mobility roads, and increases cumulative travel miles. The lost time to road users in the community can become extremely high. Note that the road network shown in Figure 2 is not entirely ideal and is merely shown as an example. It is unclear from the cartoon what the trip generation rates of the properties are and how these volumes would be distributed in the secondary road network. A well connected network for the MSB will need an appropriate design that better controls the routing of internal traffic since high volume through traffic on a residential street is not favorable.

Because of a disconnect between Platting and Land Use, the MSB has not effectively connected the secondary road network. Numerous subdivisions and commercial generators have been constructed in the past 20 years, resulting in secondary road network that forces all trips generated in the subdivision to take longer routes that must use the arterial road, regardless of their destination. One example of this disconnected development style is the Fishhook Triangle, the region contained within Palmer and Wasilla Fishhook Road, Bogard Road, and the north end of Trunk Road. Figure 3 , below, shows the road network in this region.

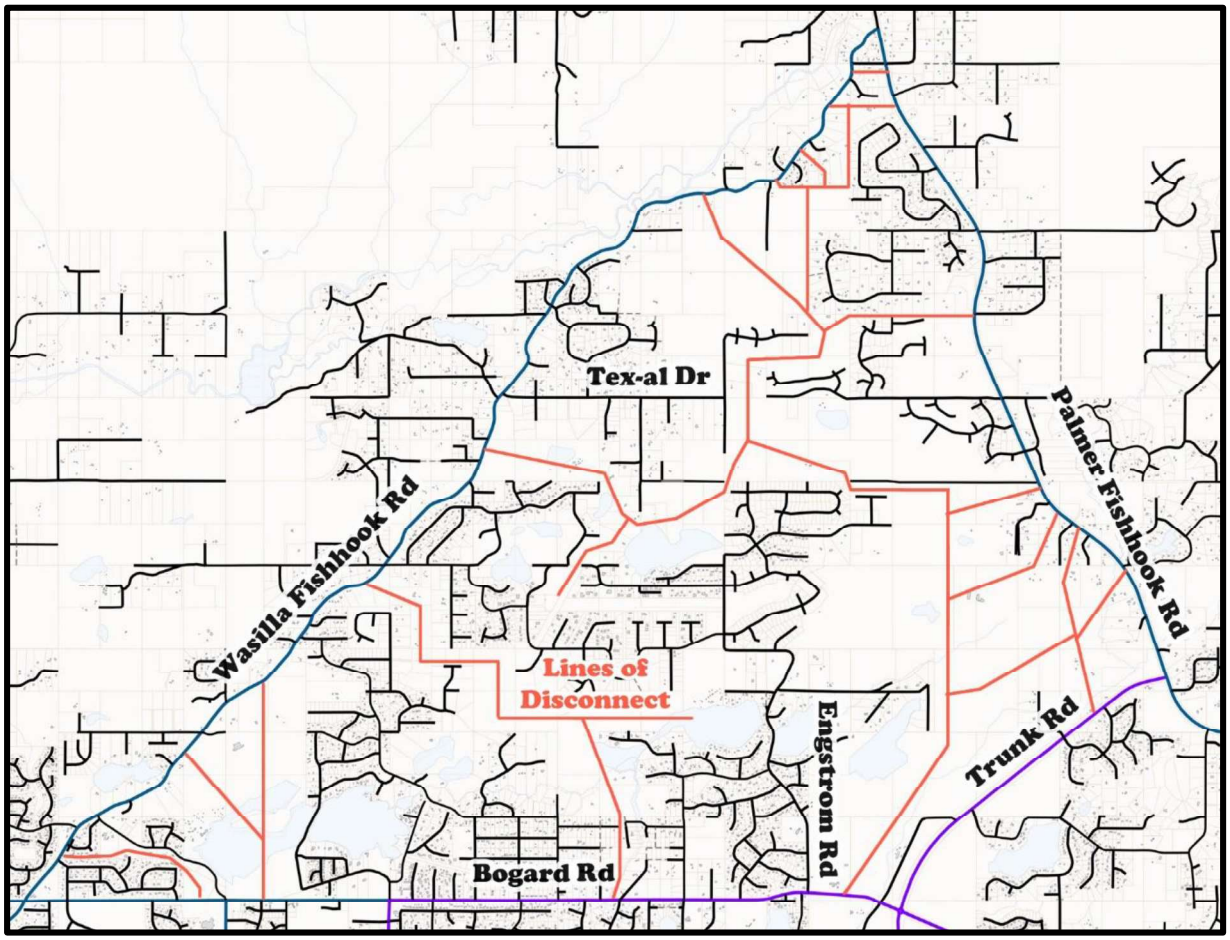

Figure 3. Lines of Disconnect in the Fishhook Triangle

Note the red lines are the lines of disconnect that roads do not cross. Any trip generated within these regions must be routed to the arterial road network, even if they are making a local trip. This prematurely overloads the arterial road network and creates a cascade of issues throughout the area. Notice Engstrom Road. The traffic congestion and safety issues at the intersection of Engstrom Rd and Bogard Rd are a prime example of internal connectivity creating problems in a different part of the road network. Connectivity in the secondary road network within the Fishhook triangle was a concern as far back as the 2007 OS&HP. Solutions for connectivity in this region were included in the 2007 OS&HP; however, they were not built and issues have continued to compound. The current OS&HP is proposing road connections that would solve some of the network issues like those identified in Figure 3. To develop a more efficient road network, it is vital that corridors shown on the OS&HP are protected.

Appropriate connectivity provides mobility, which greatly benefits the community by decreasing travel times, increasing route options, and allowing for more direct travel between regions of the MSB. This, in turn, increases economic viability, opens up new areas for development, increases public safety, creates smaller intersections with less frequent need for traffic signals, diversifies the negative aspects of roads, increases the available pedestrian routes, moves bicyclists off of

major roadways, reduces the peak hour congestion on high mobility roads, and provides alternative routes to accommodate road closures or emergency service access.

3.2 Functional Classifications

A second core feature of the OS&HP is the functional classification of the road segments in the network. Functional classes is a road planning tool that helps define the road's design needs by identifying the expectations of the drivers on the road segment. The OS&HP establishes the functional classification of the road, new and existing, which is key to linking design criteria to functional needs. The MSB OS&HP applies a functional classification system recommended by FHWA and is consistent with existing MSB policy and design guidance and that of the DOT&PF.

The FHWA functional classification system used in the MSB OS&HP identifies roads in the following categories:

- Interstate Highway
- Major/Minor Arterial Roads
- Major/Minor Collector Roads
- Local Roads

Each of these classes fulfills a specific role in the road network.

Note that roads are identified for their future use, and not necessarily their current design. Many existing roads will need to be upgraded to adapt to the OS&HP network.

What are Access and Mobility?

Access is the ability for a road to provide access safely and efficiently to and from destinations adjacent to a roadway. High access roads would likely be designed to allow frequent turns through conflicting vehicle paths.

Mobility is the ability for a road to allow travel safely and efficiently through an area at a relatively high rate of speed with limited disturbance due to conflicting traffic or road capacity constraints.

Functional Classifications: Access vs Mobility

The basic principle of functional classification is to identify the expectation of drivers at different points along a trip, so that the road section can be designed in a way that best suits that need. For example, when pulling in or out of a driveway, drivers may expect relatively low traffic volumes traveling at lower speeds so that they can safely and comfortably access the road network; however, later in that trip, the same driver may expect to travel at a much higher more consistent rates of speed, with greater separation between themselves and other high-speed traffic, without the conflict of turning vehicles. Functional classification assists in the design of roads that meet the driver’s dominant expectation on the road and provides a well-connected network that will help separate drivers with different expectations onto different road segments, increasing the efficiency and safety of all roads.

In general, there are two functions of a road: Access and Mobility. These road functions are each crucial to the operation of the road network; however, the two functions often are in opposition to one another. Access degrades the mobility function of a roadway as the unpredictable movement

of turning traffic and the acceleration/deceleration of cars tend to slow the progress of through traffic. For this reason, roads should be planned into the network in such a way that they can provide the needed function when and where it is required.

Figure 4, below, shows the relationship between access and mobility as it pertains to the functional classifications.

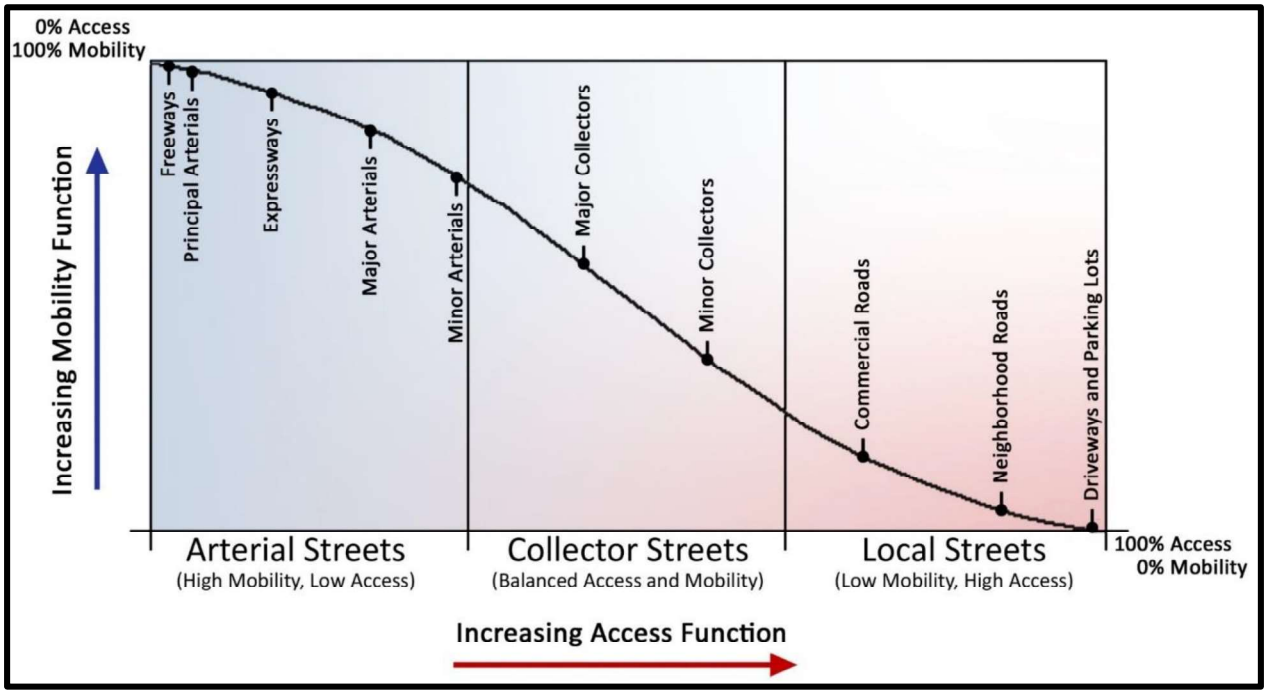

Figure 4. The Relationship of Access and Mobility in Functional Classifications

Of particular interest to the OS&HP are the Collector Streets which serve as transition routes between local roads (as described in the SCM) and arterials**.** The design and location of these routes are of special importance since they are the routes where the driver expectations will be especially mixed, meaning they will require special study, planning, and design. Also, these are the routes that are more likely to be Borough-owned and maintained.

Functional Classifications: Assignment Goals

Functional classifications definitions are crucial to the road network. Road links that are inadequately designed will not properly serve the necessary role in the community. The collector roads in the MSB OS&HP are assigned based on **three main goals:**

1. **Access –** Design for access to existing and future residential developments
2. **Connectivity –** Produce connectivity in the proposed road network
3. **Diversity –** Create a network with an appropriately balanced assignment of road functions

Goal #1 – Access

The first goal was to provide proper access to existing and planned residential areas following the SCM Average Annual Daily Traffic (AADT) guidance. The SCM recommends road classification based on forecasted AADT levels. Higher AADTs on residential roads result in higher function design criteria as a way to preserve access function on lower volume roads.

Goal #2 - Connectivity

The second goal was to provide connectivity in the network. This goal is independent of projected volumes and provides for such things as secondary access to isolated communities and higher mobility roads between sub communities.

Goal #3 – Functional Class Diversity

The third goal was to ensure that the planned road network provides an appropriate amount of each functional class. This was used as a metric to measure how well the network was being planned and distributed.

What is Average Annual Daily Traffic?

Average Annual Daily Traffic is the average number of cars that are on a road every day over the course of a year. This is an indication of how frequently the road is being used, and is a key value when determining the design of the road.

However, many other factors play a part in the design of a road and AADT is not always the most reliable. For example a road may have an AADT of 1,000 vehicles per day, and a very high percentage of those vehicles may be heavy trucks. A different road may have the same 1,000 AADT, but with very directional commuter trips of single-person vehicles passing one way in the morning and the opposite in the evening. These examples would both have the same AADT, but require very different designs.

Functional Classifications: Access

The goal of providing "Access" in the network reflects the need for people to have adequate roads in front of houses and businesses where access-related maneuvers take place. Some access-related maneuvers are turning, walking, backing up, and often making distracted decisions. These maneuvers are high risk, and therefore, are safest when performed on low-volume, low-speed roads.

The SCM provides guidance for the design of roads that serve residential areas, and part of the SCM is an AADT limit requirement that encourages subdivisions to be designed with low-volume roads. If a subdivision is forecast to produce volumes higher than the specific AADT limit, the SCM requires a higher speed design. The SCM AADT limits were used in the OS&HP study to determine where collector roads should be considered based on future growth projected in the Growth Study (see Appendix A on page 38).

Table 2. Functional Class AADT Limits (per SCM)

SCM Classification	OS&HP Classification	AADT Limit	Approximate Upper Limit of Households
Residential Street	Local Road	< 400	~ 50
Residential Sub-Collector	Local Road	400 – 1,000	~ 150
Residential Collector	Minor Collector	1,000 – 3,000	~ 300
Major Collector	Major Collector	> 3,000	Undefined

Table 2, above, shows the AADT limits for the various classifications specified in the SCM, the equivalent OS&HP functional class, and the approximate upper limit of households in a region that would suggest higher function designs may be required.

As shown in the table, based on trip generation rates in the SCM, a minor collector road would be needed for any development with more than 150 households, and a major collector would be needed for a development serving more than 300 households.

These volume limits were compared to the forecasted population growth to identify areas where the traffic volumes generated in a region would warrant a collector road. Figure 5, below, shows the regions that the study indicated would likely generate traffic volumes higher than the SCM AADT limits. Consideration was given to how drivers get to high mobility roadways since several regions in combination may also generate traffic volumes that are over the volume limits.

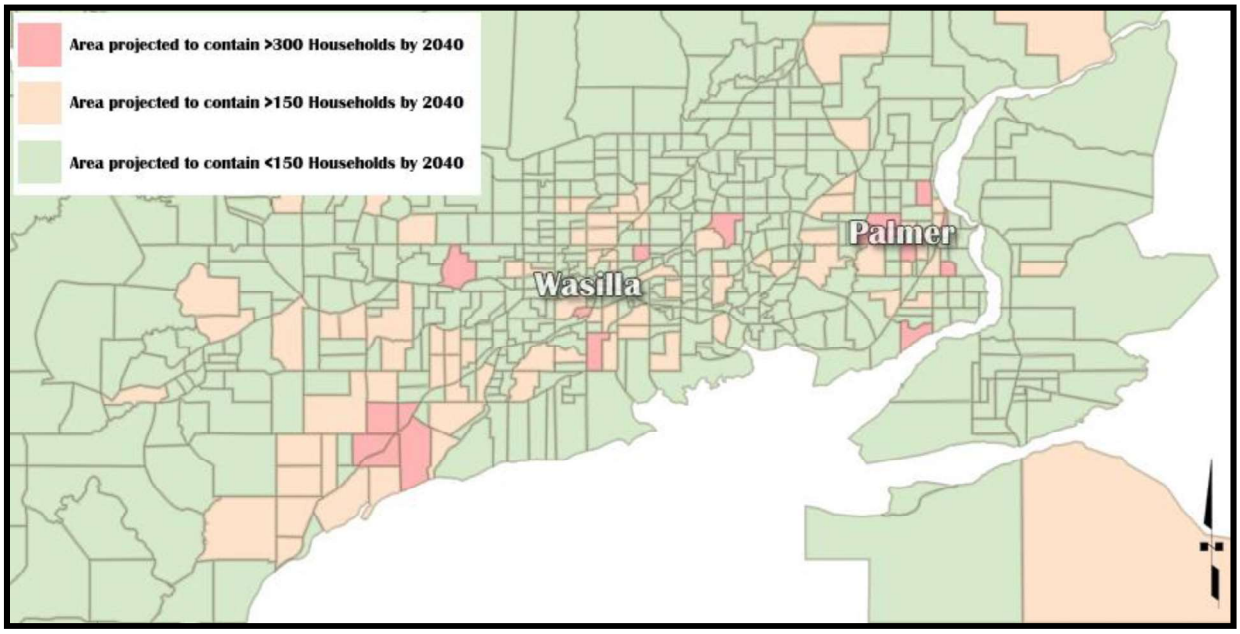

Figure 5. 2040 Household Density Map (Based on SCM AADT Thresholds)

Notice that relatively few regions are projected to warrant a major collector road (red) or even a minor collector road (orange) based on the SCM AADT limits which have been adopted into the MSB code.

The FHWA provides guidance on functional classifications in their 2013 publication "Highway Functional Classification Concepts Criteria and Procedures." This guidance provides suggested AADT limits for collector roads. Table 3, below, presents the AADT limits that are suggested by the FHWA as compared to what is currently required by the Borough's SCM.

Table 3. Functional Class AADT Limit Comparison SCM vs FHWA

Functional Classification	SCM Minimum AADT Limit	FHWA Recommended AADT Range	
		Rural	Urban
Local Road	0 – 1,000	0 – 400	0 – 700
Minor Collector	1,000 – 3,000	150 – 1,100	1,100 – 6,300
Major Collector	> 3,000	300 – 2,600	1,100 – 6,300

Note that the SCM AADT limits are much higher than the FHWA AADT limits on rural roads. This means that subdivisions in the MSB built according to the SCM guidelines are likely being under-designed compared to national standards.

Table 3 includes the FHWA AADT limits for rural and urban roads. MSB SCM AADT limits are more similar to the urban limits. The MSB does not qualify as an urban area, outside the dense commercial confines of the Core Area. An urban area is allowed to have higher volume collector

roads because urban density tends to slow traffic and increase their expectation for delays with transit systems and high numbers of pedestrians. Without these natural traffic calming elements, a network of under-designed roads will be less safe, less efficient, and less supportive of growth. This is the trend that is currently being seen in the MSB as vital links in the road network are being built for too low of a functional class. Then, when issues arise because of the inappropriate design, there are no low-cost, low-impact solutions to repair the network.

Figure 6, below, shows what the household growth study would look like using FHWA guidance to determine the AADT values.

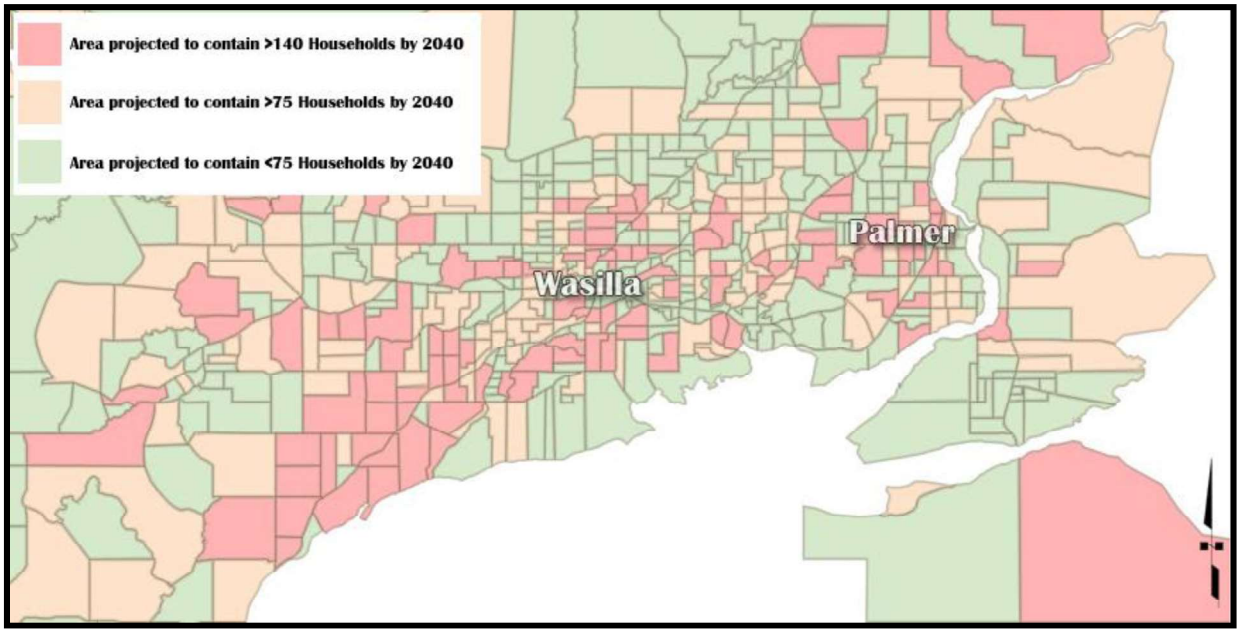

Figure 6. 2040 Household Density Map (Based on FHWA AADT Thresholds)

Application of the FHWA limits would clearly result in more residential collector roads.

The SCM AADT limits were used to identify collector roads in the OS&HP since those are the limits that are currently adopted into MSB code and will be the standards applied when new developments are constructed. But, it is highly recommended that the SCM volume limits be re-evaluated as discussed in the implementation plan in section 4 on page 27.

Functional Classifications: Connectivity

In addition to the "Access" goal, which is purely AADT based, functional classifications were also assigned based on "Connectivity" which does not depend on AADTs. Connectivity was discussed earlier in Section 2 as it pertains to links in the road network. However, connectivity also is important to consider when assigning functional classes. Suppose the network is well connected, but all the roads are designed as local roads. In that case, the network will actually operate worse than a network without connectivity because the local road connectivity will promote cut-through travel. To prevent this, proper connectivity must exist in the collector network to allow drivers to get through an area more efficiently and at a higher rate of speed on a road that is appropriately

designed for this behavior. In short, connectivity must exist in the local road network, and if it is designed into the local road network, it absolutely must also exist in the collector road network as well.

The OS&HP, therefore, assigns functional classes to new and existing roads in the proposed network in such a way that properly connects sub-communities with major and minor collector road corridors, which are intended to move high mobility traffic from local roads.

Functional Classifications: Functional Class Diversity

One final goal of the functional classification assignment is to produce a network in which all functions are provided in balance.

FHWA guidance recommends a proportion of each functional class that should exist in a well-built network. The total road miles in each class should fall within a certain range, otherwise, it would indicate that the network may be deficient. The FHWA recommended distribution was compared to the OS&HP proposed distribution of classes to measure whether the MSB network is adequate. Functional classes were adjusted to better fit this recommended diversity.

Note that the FHWA guidance specifically states that the functional class proportions do not always apply in Alaska as it is predominantly rural and so much of the Alaska road mileage consists of the interstate highway system. However, the guidance *is* applicable in the core area of the MSB where road density is typical to other urban communities and a true network should exist, especially in the future with moderate build-out. A region of the core area roads was isolated and compared to the FHWA guidance. Table 4, below, presents the results of this study.

Table 4. Percent of Total Mileage in Functional Class System

Classification	FHWA Guidance	2022 OS&HP	2022 OS&HP (with +30% more Local Roads)
Interstate	1 – 3%	4%	4%
Major Arterial	2 – 6%	4%	4%
Minor Arterial	2 – 6%	4%	4%
Major Collector	8 – 19%	10%	7%
Minor Collector	3 – 15%	20%	13%
Local Road	62 – 74%	58%	68%

The proposed OS&HP road network closely matches the FHWA guidance. The numbers show a high average number of arterial road miles, which is to be expected in such a large region as the core of the MSB. In terms of collector roads, the percentages show an overabundance of minor collectors and a relatively low number of major collector roads. This is a result of the SCM AADT

limits making it difficult to justify major collectors based on volumes. The major collector roads included in the Plan are recommended based on the connectivity of sub-communities and not access. The percentage of local roads in the planned network is lower than recommended. This is because unplatted local roads are not included in the OS&HP. Therefore, they are not showing up in the total road miles. The table includes a column showing what the approximate distribution would be with 300 more local road miles (30% increase in local roads than the current network) to approximate the actual distribution after the network has been constructed. Notice that after this adjustment is made the percentage of major collectors in the network is 7% which is below the 8% recommended by FHWA guidelines. It is, therefore, most important for the MSB to preserve and construct the major collector road network.

3.3 Primary Intersections

The third key element of the OS&HP is the Primary Intersection locations. The Primary Intersection Study analyzed all roads classified in the OS&HP as a Minor Arterial or higher mobility functional class. The term "Primary Intersections" is used in the OS&HP to describe locations where future side street connections should be prioritized for consolidation of access and the potential access control options in the future.

As traffic volumes grow in the community, designers often seek to preserve the mobility function of arterial roads by limiting access to side streets and driveways via medians or approach road closures, or by installing traffic control devices such as traffic lights or roundabouts. For example, the recent upgrades of the Parks Highway (from Lucus to Big Lake), and Knik-Goose Bay Road (from Centaur to Vine) designed depressed medians that prevent left turns in and out of side streets. This led to the inclusion of frontage roads and secondary connections to move access to the most desirable locations.

The purpose of the Primary Intersections Study is to apply the access control principles used in the previous arterial road studies to other arterial roads, well in advance of them being possibly upgraded to include access control. This will assist decision-makers to design access to the arterials at intersection locations that are most desirable to the arterial road network. This tool is expected to be used when new connections to arterials are designed either for residential side streets or borough collector roads. Consideration should be given to consolidating roads at these primary intersection locations and aligning access on either side of the arterial to avoid offset intersections.

Example: The Engstrom Road and Bogard Road intersection mentioned previously is an example of an intersection location where a primary intersection designation could have saved the community from issues. There are obvious problems at this intersection that could have been avoided if it had been planned as a primary intersection. The offset alignment of Engstrom Road and Green Forest

What are "Primary Intersections"?

The term "Primary Intersections" was coined by the 2022 OS&HP as a way to identify preferred intersections locations along arterial roads where future road connections should be prioritized.

Drive creates major turning conflicts and makes upgrades costly and difficult. The inconsistent design function of Engstrom as a major collector, and Green Forest as a local road, weakens the road network and promotes cut-through traffic on Green Forest Drive since there is an obvious demand for connectivity that is not being provided. The approach grades and sight distances are not favorable for the amount of uncontrolled activity the intersection experiences during peak hours. This has created a major bottleneck that has degraded the public's trust in the Borough's ability to protect and design the road network as a resource. The primary intersections shown in the OS&HP all have the potential to create similar problems as those at Engstrom Road if their importance in the network is disregarded or if the road network connections are not preserved.

The locations of the primary intersection points were determined based on a planning level analysis of the corridors. The analysis considered existing intersection locations, adjacent topography, current and projected land development, property ownership, planned road corridors, and intersection spacing.

One parameter of the primary intersection study was a desire to keep major intersections properly spaced. The DOT&PF recommendations are for major intersections to be no closer than ¼ mile apart. This guidance is similar to Manual on Uniform Traffic Control Devices (MUTCD), which warrants 6 concerning coordinated signal systems. The goal of this guidance is to provide satisfactory signal progression through a signal network along a controlled-access highway.

Signal spacing of less than ¼-mile is not desirable because of progression considerations. A spacing of ½-mile is preferred because there would be less need for interconnection or offset timing. The Transportation Research Board (TRB) Access Management Manual indicates that signal spacing of less than ¼-mile will result in progression speeds of less than 15 mph, and that signal spacing of ¼-mile can maintain progression speeds up to 30 mph (depending upon cycle length).

Signal spacing of ½-mile will allow for progression speeds of around 40 to 60 mph for typical cycle lengths on an arterial corridor with low volume side street approaches. Half-mile spacing is the DOT&PF's goal for at-grade access and signal spacing on a Major Arterial.

This study was conducted with cooperation from MSB staff and reviewed by the DOT&PF. The locations agree with all DOT&PF access management studies on DOT&PF corridors. However, it should be noted that the primary intersection locations included in this study represent the planning level preference for where major intersections may be desired in the future. A primary intersection in the OS&HP does not guarantee access in future designs.

The primary intersection locations are shown on the OS&HP maps starting on page 45.

3.4 Other Plans and Considerations

Key Question for OS&HP Updates

- Are growth forecasts still applicable?
- Does the plan still provide appropriate access and connectivity?
- Is any part of the plan no longer feasible or are options limited?
- Are there any regulatory changes that need to be updated?

The OS&HP includes all roads and corridors that are required to create a road network that will support a reasonable expectation of future growth in the Borough. This growth has been studied and forecasted using the best possible data currently available, and recommendations have been made with the agreement of a multi-departmental steering committee. However, changes to growth projections or development patterns could, in turn, change the infrastructure needs targeted in this OS&HP. For this reason, the 2022 OS&HP is designed to be a "Living Document". This means that the OS&HP is expected to be updated on a regular basis, ideally on a 3-to-5-year cycle. The GIS files used to create the Functional Class Maps and the Primary Intersection locations are being collected by the MSB to include in the Borough GIS databases. These databases can be adjusted as situations arise, such as arterial and interstate road statuses change, or development that progresses differently from forecasts.

Future Projects

The OS&HP is focused on designing a road network where every piece works in concert with the adjacent roads. Major changes to the arterial network or other major community developments will have a ripple effect throughout the Plan. For this reason, several major projects are not included in the OS&HP because of the uncertainty of their alignment, design, or construction and the impact they would have on the OS&HP in the short term.

Some of these projects are the following:

- Parks Highway Alternative Corridor
- Knik-Arm Bridge
- West Susitna Parkway
- Willow Bypass
- Big Lake Bypass
- Houston Bypass
- Natural Gas Project on Ayrshire

These projects are currently being studied, and alignments and designs are being determined. They would have an extreme impact on the road network. Due to the uncertainty of both their construction schedule and their exact locations, they are not currently included in the OS&HP. As soon as a settled alignment is available, and/or funding and schedule are secured, the OS&HP should be updated to prepare for these projects.

For example, the Parks Highway Alternative Corridor (PHAC), is currently being studied as part of a Planning and Environment Linkage Study (PEL). The nature of a PEL is that it will include a broad array of alignment, design, and intersection options. The beginning and endpoints of the PHAC may change as a result of the PEL as well as the crossing locations and designs. For instance, the location and treatment of the Knik-Goose Bay Road crossing are still undetermined.

Figure 7 shows the area that is most likely to be impacted by the new bypass road.

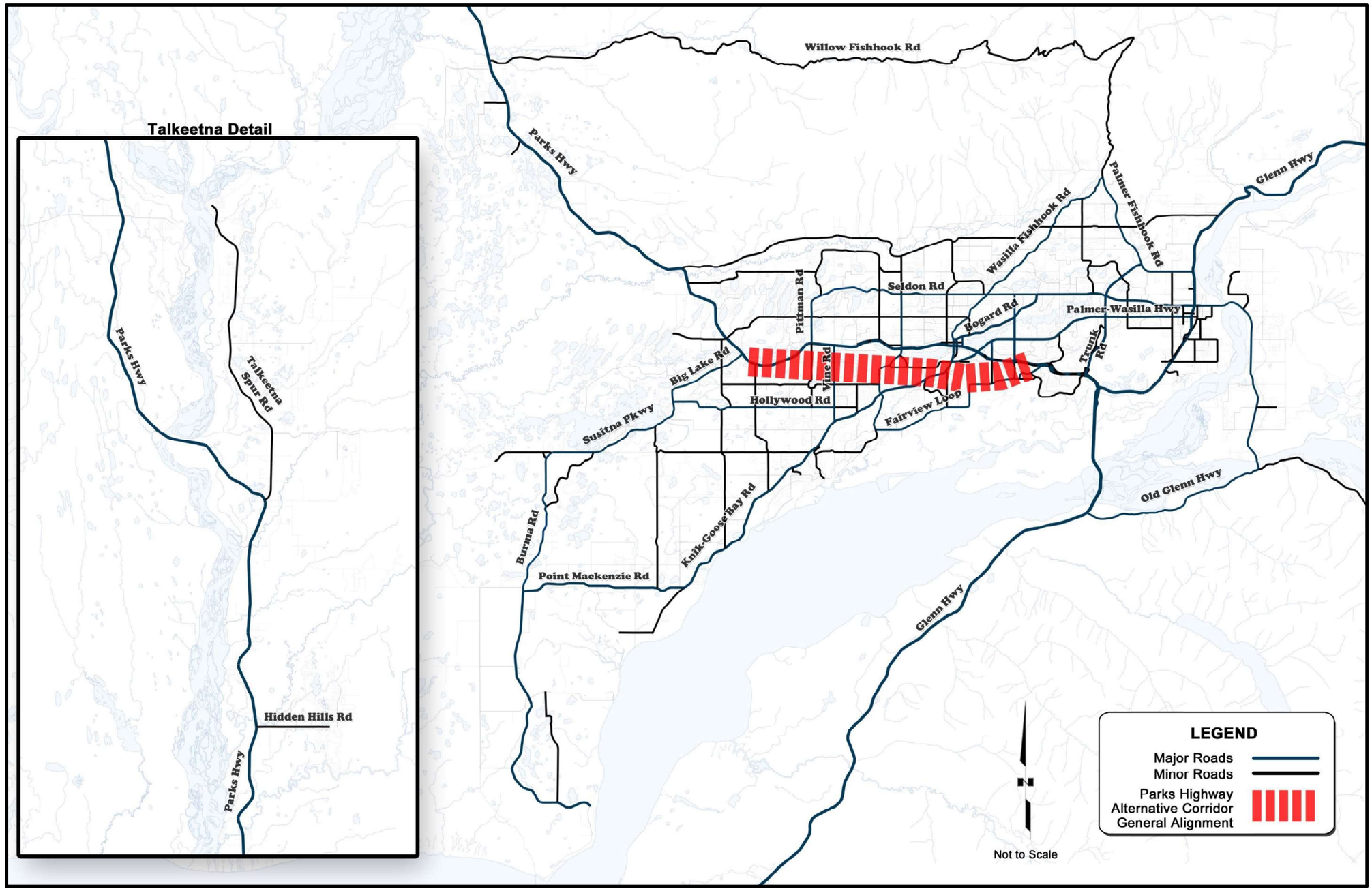

Figure 7. Parks Highway Alternative Corridor, General Alignment

The PHAC would be classified as an interstate highway and would need supporting arterial road connections and secondary collector roads designed in harmony with the high mobility design. Therefore, once the highway alignment is determined, the OS&HP will need to be updated respectively.

Several other DOT&PF bypass and realignment projects would possibly require the use of MSB property adjacent to the Parks Highway. This is a special case where these alignments are still not determined, but the use of these MSB properties should be carefully considered and the DOT&PF should be consulted if the development of this land is pursued by the MSB.

The MSB parcels in question are shown in Figure 8.

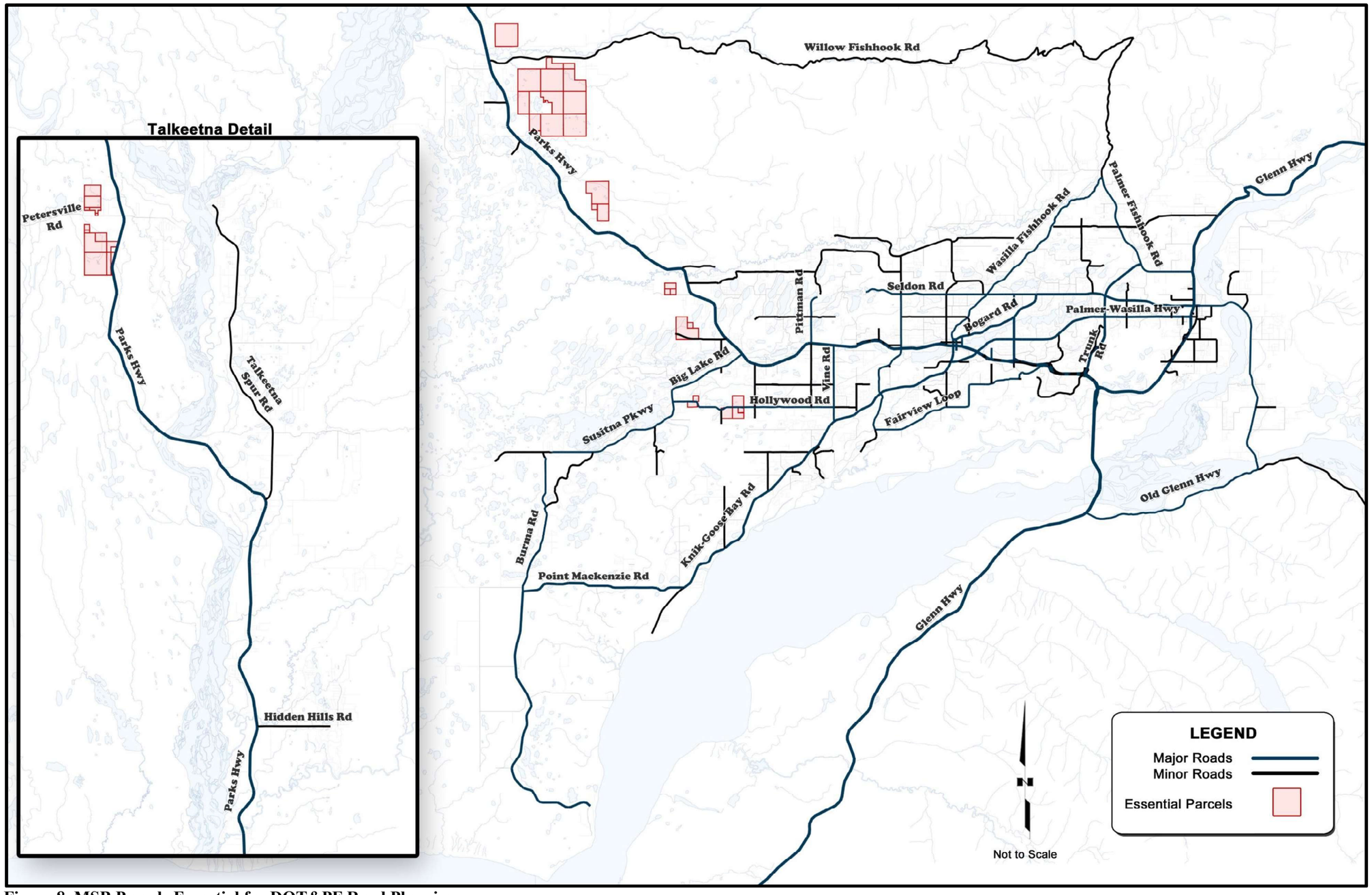

Figure 8. MSB Parcels Essential for DOT&PF Road Planning

4 Implementation Plan

Once the OS&HP is adopted into Borough Code, it guides Platting actions and works to preserve road network connections and corridors and helps prioritizes Public Works improvement projects. If implemented fully, the OS&HP will assist with managing traffic growth and travel demands, help to minimize traffic congestion, reduce safety issues, and limit high-cost maintenance issues in the future. Implementation of the OS&HP map is step one, but there are other actions the MSB can take to further enhance the development of a safe and efficient road network.

4.1 Implementation Plan Overview

The following section outlines some of the additional tools and policies that would further enhance the OS&HP:

Adopt OS&HP

- Pursue acceptance of the OS&HP plan by public and decision making bodies and advisory groups: RSA Board, TAB, Assembly, Planning Commission, DOT&PF, Cities of Palmer and Wasilla, and MSB Departments
- Adopt the OS&HP into Borough Code

Apply Plan using Current Tools

- Educate and train MSB staff on the role and purpose of the OS&HP
- Agree on responsibilities as outlined in Table 5 on page 29
- Include projects in Road Improvement Program (RIP) list
- Include new OS&HP roads in the LRTP update
- Incorporate OS&HP functional classifications into MSB GIS layering
- Publish OS&HP GIS Maps of roads, functional classes, and primary intersections

Adapt Policy to Provide New Tools

- Develop policy stating that OS&HP routes and recommendations be incorporated into all aspects of planning, design, project development, and construction within the MSB
- Revise the SCM to better align with the OS&HP and FHWA AADT thresholds
- Adopt ROW standards for each functional classification for use in plat reviews, setback requirements, and road network development
- Draft or revise MSB code to require all streets to conform to the OS&HP
- Require Developers to identify the intended use of the property to better plan for trip generation
- Require developments to document how traffic will impact the surrounding road network
- Require developments with impacts that result in a change of functional class to the immediately adjacent road network as outlined in the OS&HP, change of intersection location, and/or change in OS&HP present a plan for bringing impacted road to the applicable functional classification

- Develop policy and plans for access management
- Develop a timeline or triggers for implementing zoning and/or adopting road powers

Update Planning Documents to Conform to OS&HP

- Review and update supporting plans on a regular schedule:
    - LRTP
    - Area Comprehensive Plans
    - Bike and Pedestrian Plans
    - Transit Plans
    - Hub Community Plans

Develop Design Criteria to Define Functional Classifications

- Develop and adopt a Design Criteria Manual (DCM), which includes standard criteria for the design and construction of each functional class of roads in the OS&HP
- Survey existing road designs and compare them with standards in DCM
- Determine locations where road upgrades are needed to conform to standards
- Prioritize projects to upgrade existing roads to meet the OS&HP recommendations

Conduct Further Studies and Projects to Reinforce the OS&HP

- Updated population build-out study
- Employment growth study
- Corridor management studies
- Commercial and industrial hub studies
- Potential funding source identification

Update OS&HP to Keep Current with New Trends and Policies

- Review and update the OSHP every 3 to 5 years
- Develop policies and processes to guide how revisions and updates are incorporated into the OS&HP
- Keep OS&HP GIS maps up to date and published online

4.2 Adoption Process

The first step of implementation is the adoption of the OS&HP into the Borough code.

The Plan was developed by a steering committee of MSB department heads and decision-makers, as well as members of DOT&PF Planning, and the City of Palmer and Wasilla Planning. The Plan was then presented to the Road Service Area (RSA) Board, Transportation Advisory Board (TAB), MSB Platting Board, Planning Commission, and the MSB Assembly, along with a public hearing and comment period. Documents and maps were online and available for comment throughout this period.

4.3 Decision-maker Responsibilities

Through the planning process, key responsibilities for MSB departments, agency partners and the public were outlined to better clarify how the OS&H is intended to be used. Table 5, below, summarizes the responsibilities.

Table 5. User and Agency Responsibilities

User or Agency	Responsibility
MSB Planning	• Own and maintain the OS&HP • Maintain the connection between LRTP and OS&HP by regularly revisiting OS&HP and updating with the newest developments and road changes • Assist in preserving ROW and maintaining access control • Coordinate among various plans • Advance and prioritize OS&HP projects for inclusion in the RIP and Capital Projects lists • Identify potential funding sources • Follow and manage the implementation process • Execute conceptual level planning studies • Coordinate agency and department cooperation • Recommend code changes that allow the OS&HP to function effectively • Develop access management plans for key areas • Preserve land highlighted by DOT&PF as "Essential for DOT&PF Road Planning" (see Figure 8 on page 26)
MSB Platting	• Preserve ROW and/or the future corridors during Platting actions • Encourage subdivision roads to connect at Primary Intersections locations • Ensure subdivision roads are built to appropriate standards • Notify MSB Planning if any changes make features of the OS&HP less favorable • Educate the public about the OS&HP purpose and function
MSB Public Works	• Manage and maintain Borough ROWs • Ensure design conformance to functional classifications • Manage, upgrade, and build process for MSB projects • Create a Memorandum of Understanding (MOU) with DOT&PF to adhere to plans
MSB GIS	• Maintain current OS&HP database • Assist planning in OS&HP map updates

MSB Assembly	• Help secure funding for road studies, designs, and construction projects shown in OS&HP • Approve updates to the OS&HP with consideration of OS&HP's goal-oriented scope • Fund road projects • Approve code changes to assist with implementation
DOT&PF	• Coordinate new road planning studies and projects with MSB to maintain functional classifications and primary intersections in MSB OS&HP • Nominate projects to the STIP that are consistent with the OS&HP
Developers	• Produce designs that fulfill both development and OS&HP community goals
Designers	• Design road sections to the assigned functional classes in the OS&HP or design in a way that does not preclude future upgrades
Advisory Boards	• Advise Borough on issues related to OS&HP
Cities	• Create or Update City OS&HPs to incorporate Borough plan • Notify MSB planning when the City plan conflicts with MSB OS&HP

4.4 Preservation of Right-of-Way

One of the main purposes of the OS&HP is the preservation of ROW for future road corridors. To preserve ROW, decision-makers in the MSB are expected to use the OS&HP maps as a reference when directing road projects. Road projects pursued for construction, including DOT&PF arterial roads, secondary MSB roads, and private roads platted through the MSB, should agree with the OS&HP plan, or trigger an update of the OS&HP if no feasible agreement can be made.

Roads designed as part of residential developments are required to apply standards specified by the *MSB Subdivision Construction Manual 2020*. The SCM says the following regarding its connection to the OS&HP:

> "Subdivisions shall be designed in a manner that does not conflict with the Long-Range Transportation Plan or the Official Streets and Highways Plan. Subdivisions containing future road corridors identified in the LRTP or OS&HP are encouraged to include the future road corridor as part of the road layout of the subdivision.
>
> Building setbacks prohibiting the location of any permanent structure within the future corridor may be voluntarily designated on the final plat. The area within the future road corridor shall be excluded from usable septic area calculations. The area within the future road corridor and building setbacks shall be excluded from usable building calculations. "

The SCM provides minimum ROW widths per road functional class which can be expected to be reserved for this purpose as shown in Table 6, below.

Table 6. Minimum ROW Width per Functional Class (From SCM)

	Local Road	Minor Collector	Major Collector	Minor Arterial	Major Arterial	Interstate
Minimum Right-of-Way Width	60'	60'	80'	100'	100'	200'

Note that the ROW widths shown in the SCM are defined as the "minimum" requirements. In many cases, the design needs of the road will greatly increase the amount of ROW needed. Requiring developers to identify land use would help Platting ensure enough ROW is being reserved.

Care should be taken in preserving ROW in areas with:

- Significant vertical topography since the design may require wide cut and fill slope limits that will need to be within the limits of the ROW.
- Roads that are part of a future pathway may need additional ROW to accommodate the path with proper separation.
- Roads adjacent to commercial properties or roads that have many side streets will require additional ROW for turn lanes or median treatments, especially at intersections with major collectors or arterial roads where roundabouts or traffic signals may be required.

For reference, Table 7 on page 32 includes a list of the design features that might change the ROW requirements for each functional classification.

Note that the OS&HP is not a design manual. The actual features included in a road's design should be selected based on the context of the roadway, engineering judgment, and the applicable design standards if available. The features shown below are simply a general idea of what roads of various classifications typically include.

Table 7. Expected Design Features per Functional Class

Classification	Local Road	Minor Collector	Major Collector	Minor Arterial	Major Arterial	Interstate
ROW	60 feet	60 feet	**80 feet**	**100 feet**	100 feet	**200 feet**
Design Speed	25 – 30 mph	**35 mph**	**35-45 mph**	**35-45 mph**	**55 mph**	**55-70 mph (As defined by DOT&PF)**
Road Surface	Possibly unpaved, 2-lanes, 10-foot lanes	Possibly unpaved, 2-lanes, 10-foot lanes	**Paved,** 2 lanes, **12-foot lanes**	2-4 lanes, 12-foot lanes	2-4 lanes, 12-foot lanes	4-6 lanes, 12-foot lanes
Access	Encouraged (Residential and Commercial)	Encouraged (Residential and Commercial)	**Restricted,** **Commercial access with possible traffic lights**	Restricted, Commercial access with traffic lights, **Frontage and backage roads**	Restricted, Commercial access with traffic lights, Frontage and backage roads	**Driveway access strongly discouraged,** **Access directed to specific intersections or ramps**
Intersection Treatments	Stop control, No traffic signals expected	Stop control, No traffic signals expected	Stop Control, **Traffic signals or roundabouts at arterial or major collector crossings**	Traffic lights and roundabouts	**Traffic signals with dual left-turn lanes,** **Double-lane roundabouts,** **Separated grade interchanges**	**Signalized intersections very probable,** **Separated grade interchanges,** **Roundabouts very unlikely**
Median Treatments	No turn lanes, No medians except for traffic calming	**Turn lanes at intersections with higher function roads,** No medians except for traffic calming	Turn lanes, No medians, **No traffic calming,** **Center-two-way-left-turn lanes**	**Turn lanes for left turns off Arterial**, No medians, Center-two-way-left-turn lanes	**Divided medians**	Divided medians, **Disconnected alignments per direction of travel**
Shoulder Treatments	2' gravel shoulder	2' gravel shoulder	4' paved shoulders Sidewalks, **Pedestrians discouraged from using the roadway but possible bikes and bike lanes**	**4-8 foot paved shoulders,** Bike Lanes No pedestrians in roadway	4-8 foot shoulders, Bike lanes No pedestrians in roadway	**12-foot paved,** **Bikes on the shoulder** No pedestrians in roadway
Pedestrian Treatments	Urban sidewalks, Expectation for pedestrians in the roadway	Possible urban sidewalks expectation for pedestrians in the roadway	**Separated pathways likely** **Possible Crosswalks at planned locations**	Separated pathways likely, crosswalks likely	Separated pathways likely, crosswalks	Separated pathways likely, **possible separated grade pedestrian crossings**
Other Expectations	Possible Speed bumps, Transit stops, Mailbox pullouts, Cul-de-sacs, Mini-roundabouts	**No Cul-de-sacs** Possible speed bumps, Transit stops, Mailbox pullouts, Mini-roundabouts	**On-street features such as mailbox pullouts are discouraged**	**Mobility design, but without passing lanes or interchange features**	**Possible freeway design,** **Possible passing lanes or slow vehicle turnouts,** **Designed for heavy vehicle use**	Possible freeway design with passing lanes and slow vehicle turnouts, Designed for heavy vehicle use

NOTE: **Bold** text indicates features that are different from lower mobility function roads (Moving from left to right).

4.5 Design Criteria Manual

The MSB does not currently have a Design Criteria Manual for roads. The absence of a DCM means there are no standards for road design based on functional classes other than the minimal requirements of the SCM. Having a DCM would define the design goals for the functional classes assigned in the OS&HP and the DCM would define ROW standards.

Design manuals used for roads within the MSB

- MSB SCM, for Residential Streets
- DOT&PF Highway Preconstruction Manual
- Municipality of Anchorage Design Criteria Manual, as guidance, particularly for urban streets
- City of Palmer Development Standards, 1985
- Geometric Design of Highways and Streets (Also known as "The Green Book"), published by the American Association of State Highway and Transportation Officials
- Highway Capacity Manual, published by the TRB

Once an MSB DCM is available, a survey should be conducted to compare the existing design of roads to determine what functional class they are actually built to. This study should then reference back to the OS&HP to identify routes that need to be upgraded. Evaluation of available ROW can be made to determine the cost and impacts of upgrades. This data should be used to prioritize road upgrade projects.

4.6 Miles of Unconstructed Road

If ROW is being preserved for road projects, then funding for the design and construction of those roads must be prioritized.

Table 8, below, shows the total number of unconstructed road miles in the 2022 OS&HP road network. A total of 164 miles of road are required to fully construct the OS&HP. The OS&HP does not have a horizon year and the planned road segments are therefore assumed to be built as they are needed and as funding is available. The number of planned road miles suggests an approximate rate of one mile of collector road constructed for every two miles of local road constructed in the Borough.

Table 8. Total Mileage of Unconstructed Roadway in Secondary Road Network

Functional Classification	Unconstructed Road Miles in 2022 OS&HP
Major Collector	59
Minor Collector	105
Total	164

Figure 9, on page 34, shows the location of the unconstructed road miles within the Core Area of the MSB.

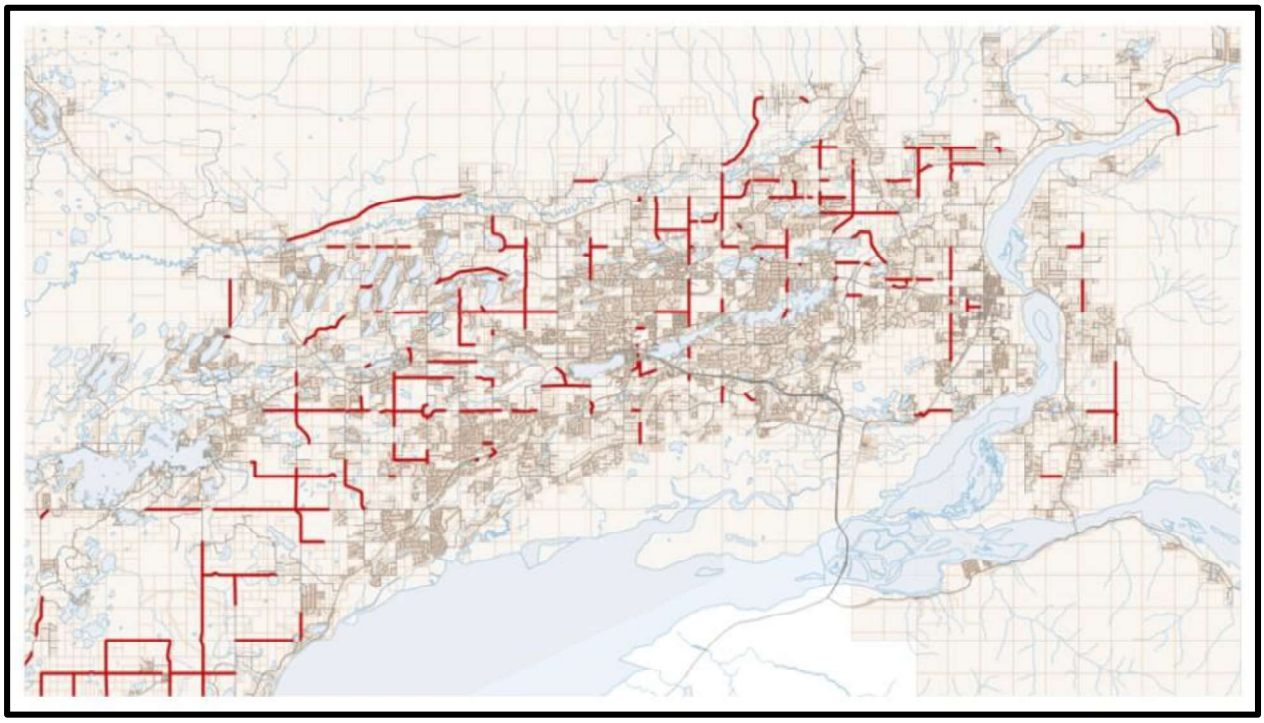

Figure 9. Unconstructed Secondary Road Network in Core Area

Note that future studies, such as a possible update of the LRTP, or arterial road corridor plans, would be needed to prioritize projects for promotion to design.

Once these projects have final alignments, and funding sources and are moving into detailed design, the OS&HP will be updated to include them and make the needed changes to the surrounding secondary road network to fully integrate them into the system.

Note this section does not include existing roads that will require upgrades to higher mobility function design standards.

4.7 Additional Studies

Throughout the process of the OS&HP development, numerous studies or projects were discussed which would either be informed by the OS&HP or would be triggered by its publication. Table 9, on page 35, includes a summary of some of the projects and studies that would require some level of integration with the OS&HP once adopted or would be recommended as follow up studies:

Table 9. Studies Impacted by the OS&HP

Study	*Description of Possible Impacts*
Agency Interaction	The OS&HP for the MSB designs a secondary road network that is meant to support the residential road network and the arterial road network. To bridge this gap properly, communication between agencies will be crucial to make sure that the OS&HP plan keeps up with any changes in the networks it is designed to bridge.
Comprehensive Plan Updates	Comprehensive plans for smaller communities, as well as for the MSB as a whole, will need to be updated to include the road connections and intersection locations shown in the OS&HP.
Corridor Studies	A DOT&PF study of arterial road corridors in the MSB should study how improvements to the MSB secondary road network, as shown in the OS&HP, will enhance or improve the arterial roads without having to focus all upgrades on the arterial roads themselves.
Reinstate the Land Use Permit	Reinstating the land use permit will support the implementation of OS&HP goals by identifying land use to better plan for traffic generated.
Future Metropolitan Planning Organization (MPO) policy	The future MPO designation will require several federally required planning policies to be used in the MSB. Once the MPO is formed the MSB will work with the MPO to ensure the OS&HP is a tool that both organizations can use.
LRTP Update	The existing LRTP has a horizon year of 2035 and was created in 2017. The LRTP considered arterial level congestion and suggested arterial level solutions. As a result of the DOT&PF corridor studies and the OS&HP, an update to the LRTP could extend the horizon year and include MSB projects that may support the arterial road network with less impact and cost.
MSB GIS Cartegraph Databases	The MSB uses an asset management system known as Cartegraph, a GIS-based system that includes data about each road segment. Currently, this data includes functional classification data that will need to be updated to reflect the OS&HP assigned designations.
Bike and Pedestrian Plan	A Bike and Pedestrian Plan for the MSB should consider the functional class designation of roads and the location of future road connections so that pathways can best utilize the relationship between roads and pathways.
Potential Funding Source Identification	The OS&HP should be referenced when seeking funding for future projects. Having an OS&HP may open up new opportunities for grants or bond packages. The designation of roads is often linked to federal funding sources.
Project Prioritization	Studies will need to be made to identify which roads in the OS&HP need to be upgraded based on OS&HP functional class designations, and what the estimated cost would be to design and build new road connections. The benefits of the road connections should be measured and estimated so that projects can be prioritized on a basis of a comparison of benefit vs cost to optimize road funds in the MSB.

Transit Plan	A transit plan in the MSB should consider how the OS&HP plans for traffic to circulate within the MSB based on the road connections and functional class designations.
Moose Crossing Study	Moose-related crashes are a significant issue in the MSB and the interaction between moose and cars will likely increase as the MSB population continues to grow, traffic volumes rise, and intraregional travel speeds are increased. A study of high moose crash areas may be needed to address moose hotspots in the MSB with possible road design features, such as fencing or animal crossings.
Revisit of SCM Chapter B	The Subdivision Construction Manual was revised in 2020 and adopted in January of 2021. Chapter B of the SCM discusses general design standards for major road corridors, including the minimum ROW width requirements for each functional class and the frontage road conditions and setback requirements. This section of the SCM would need to be updated as the MSB becomes an MPO and adopts more detailed design policies and manuals.
Rail Crossing Study	The OS&HP includes several planned roads that would require crossings of the Alaska Railroad. Additionally, there are several crossings of the rail extension south of Houston that are currently not being used by the borough road network. A study of these existing and future rail crossings should be conducted to properly preserve and utilize rail crossings as a resource and determine the feasibility of new connections early on in the road planning process.
Road Use Study (Residential, Commercial, Industrial)	In support of the OS&HP and a future MSB Design Criteria Manual, a study should be conducted which identifies the road use of the various segments in the OS&HP. Currently, the OS&HP classifies roads by their functional class which is focused on the relationship between access and mobility; however, the use of the road as, for example, a residential, commercial, or industrial street may change the design criteria that would be applied for roads.

4.8 OS&HP Update Process

The 2022 OS&HP is designed to exist within the MSB as a "Living Document," which will need to be updated periodically based on a planned schedule and updated methodology defined by MSB planning.

It is recommended that the OS&HP be updated every 3 to 5 years, or as major developments or changes trigger changes in the network. The OS&HP alignments, functional classes, and primary intersection locations are all subject to adjustments.

However, it is highly recommended that policies be codified, which establish thresholds for when changes can be made. It is also recommended to determine who, at a minimum, should be involved; establish timelines for comments; and determine when changes are appropriate (for example, sufficient community comment/support, alternative planning, changes to comprehensive plans,

major road corridor changes, scheduled updates, etc.). These recommendations are to prevent cases where changes are made unilaterally without proper cause.

Appendix A Growth Study

A major part of the OS&HP study was a growth forecast for the MSB. The growth study created GIS maps of the MSB showing areas where population and employment development has recently happened, where it is predicted to occur in the next 20 years, and where it is projected to occur by full build-out. The goal of the study was to create a vision of growth, with approximate traffic volume projections so that the infrastructure can be planned in advance of land development.

Demographic Projections

Population projections from the Alaska Department of Labor and Workforce Development (DOLWD) and projections from the Institute of Social and Economic Research (ISER) agree on an approximate growth rate of around 5.8% annually within the MSB through 2045.

In this study, the population growth for the region was distributed to various sub-regions in a GIS mapping environment. These GIS regions are known as Traffic Analysis Zones (TAZs) and are used by the AMATS Travel Demand Model (TDM) to predict traffic volumes. The TAZs for the AMATS TDM were used as a basis for this study. The AMATS TDM TAZs were subdivided into smaller regions to better isolate the traffic volumes on neighborhood streets where small differences in volumes can determine the difference between various functional classifications.

What is a Traffic Analysis Zone (TAZ)?

A Traffic Analysis Zone is a region used in travel demand modeling. The regions are defined by GIS polygons. The Mat-Su Borough is divided into TAZs of various shapes and sizes. Within the GIS databases for the TAZs is information about the region, such as population rates, average income levels, and employment numbers in different industries.

Figure 10, on page 39, shows an example of the TAZ region divisions.

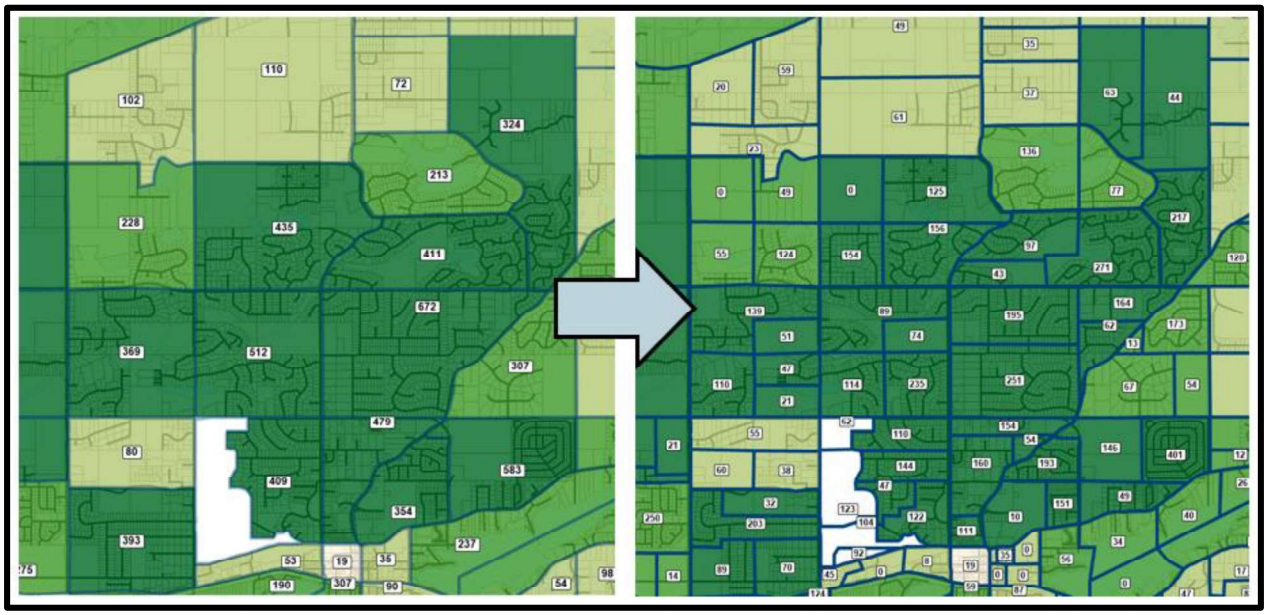

Figure 10. Example Conversion of TAZ Region Refinement

The growth study uses the new TAZ regions as containers for estimating the location of existing and future population and employment. Future growth is located based on projections from the AMATS Travel Demand Model (TDM) and the MSB Build-out Study. Both of these studies distributed data into larger TAZ regions. This growth study further divided the data among the smaller regions based on the availability of developable land. "Developable land" is land with favorable topography, wetlands designations, water and septic suitability, access availability, land ownership, lake setbacks, and many other considerations determined from available GIS mapping data.

AMATS Travel Demand Model (TDM)

The AMATS TDM is a traffic forecasting model produced by AMATS, with the cooperation of DOT&PF. The model covers an area from Talkeetna to Girdwood. The basis for the model is a 2013 household and employment GIS layer that divides the model area into zones known as Traffic Analysis Zones (TAZs). Each TAZ contains values identifying how many households and employees live and work in the region in 2013 and 2040. The model generates vehicle trips using these values and distributes them onto the roadway to forecasts traffic volumes and capacity problems.

MSB Build-out Study

The MSB Build-out Study was produced between 2011 and 2015. The goal of the study was to forecast the maximum possible density in the MSB at an undetermined future year beyond 100 years from now (based on moderate growth trend calculations). The Build-out Study assumes extreme redevelopment and heavy densification. It also imagines new urban areas in the vicinity of Settler's Bay, Meadow Lakes, Point MacKenzie, and Willow.

Note that, given the very long-term horizon of the Build-out Study data, the OS&HP never uses the outcomes of the Build-out Study as the sole justification for a road functional class upgrade or a new road connection. The build-out data was used as a reference to support decisions made based on other collected data.

Also note, that the MSB Build-out Study does not include employment projections, therefore, the OS&HP growth study only predicted employment development through 2040 using the AMATS TDM forecasts.

Growth Study Conclusions

The results of the population analysis for the Growth Study are shown in Figure 11 through Figure 13, starting on page 41, and the employment analysis results are shown in Figure 14 and Figure 15, starting on page 43. These figures are intensity maps, where the regions with the brightest color intensity indicate regions with the highest relative growth between the years.

The population study showed that available land for development is quickly disappearing, especially in the core area of the MSB. **To keep up with the projected population demand, growth will continue to move west, into Meadow Lakes, Houston, Settlers Bay, Point MacKenzie, and also up into Willow and Talkeetna.** Growth in these areas will be further encouraged by the road expansion projects along the Parks Highway and Knik-Goose Bay Road, which makes land in these directions closer to the borough core area, by travel time.

Additionally, to achieve the growth rates projected by the DOLWD and ISER, the core area will need to start increasing the density of both residential and commercial developments, which implies an increase in utilities and services, such as municipal water and sewer. This makes preparing for future road upgrades even more critical. Additionally, the increasing density within the core area will likely bring a culture change, with a population that is more urban-minded and open to transit and walking paths. Around 2040, when developable land becomes more limited, growth in the core area can be expected to slow.

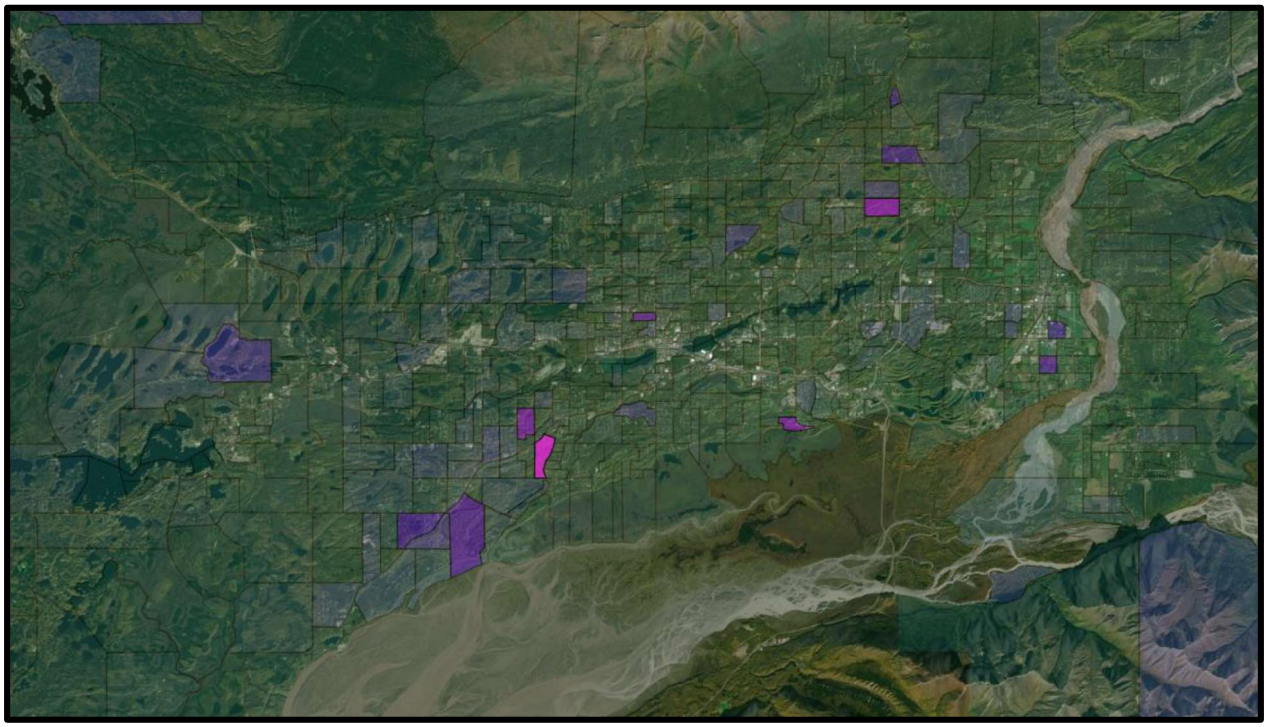

Figure 11. Population Growth 2013 to 2020 (Based on Observation of Existing Data)

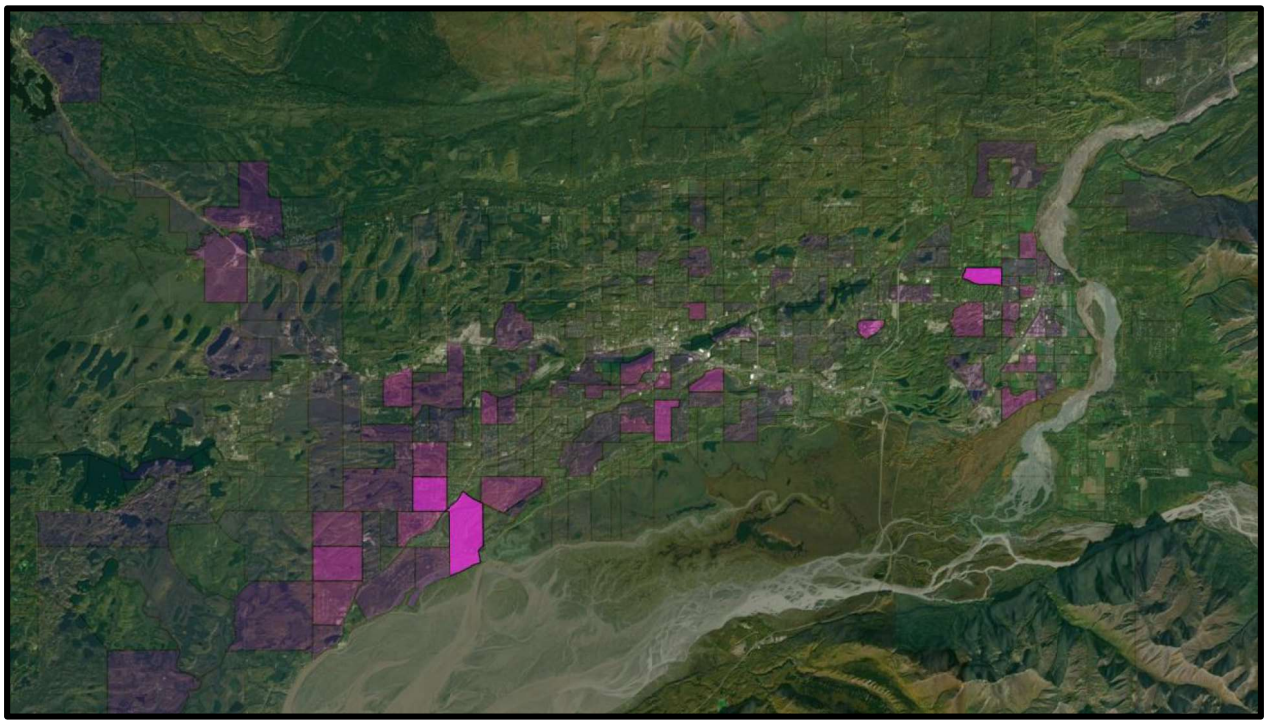

Figure 12. Population Growth 2020 to 2040 (Based on AMATS TDM Forecasts)

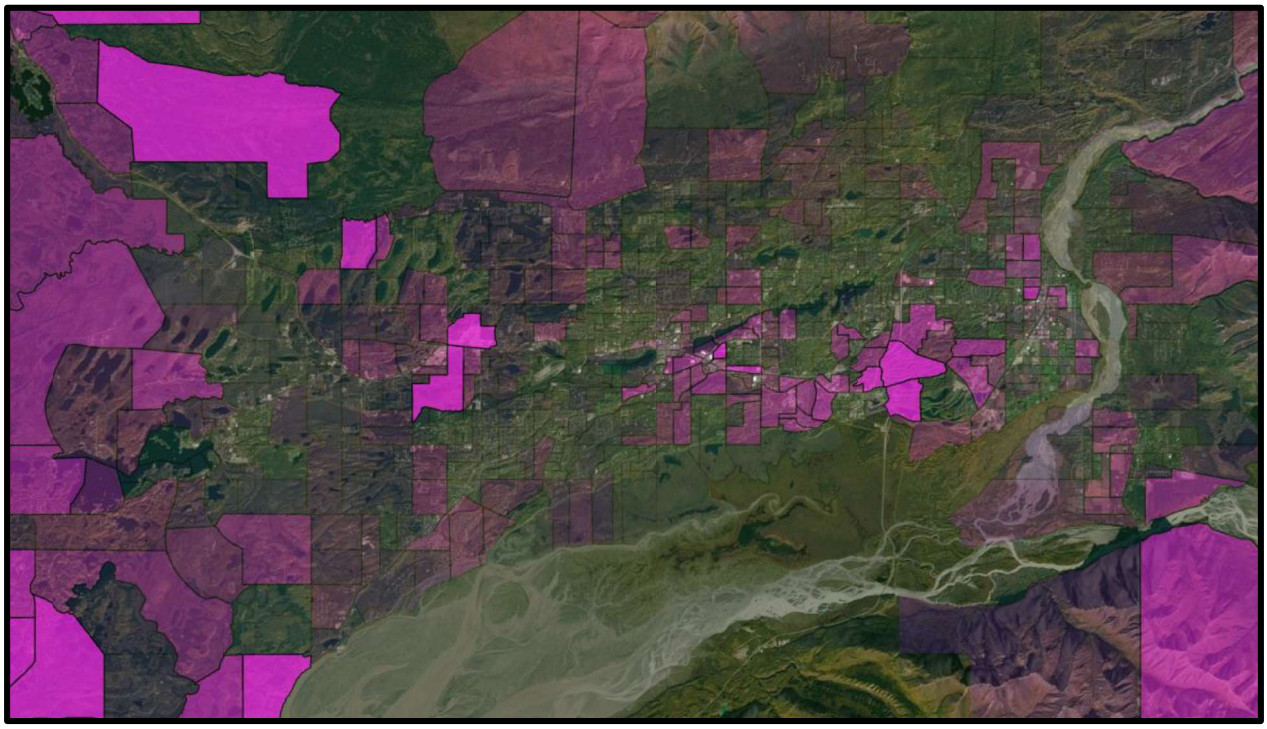

Figure 13. Population Growth 2040 to Full Build-out (Based on MSB Build-out Study)

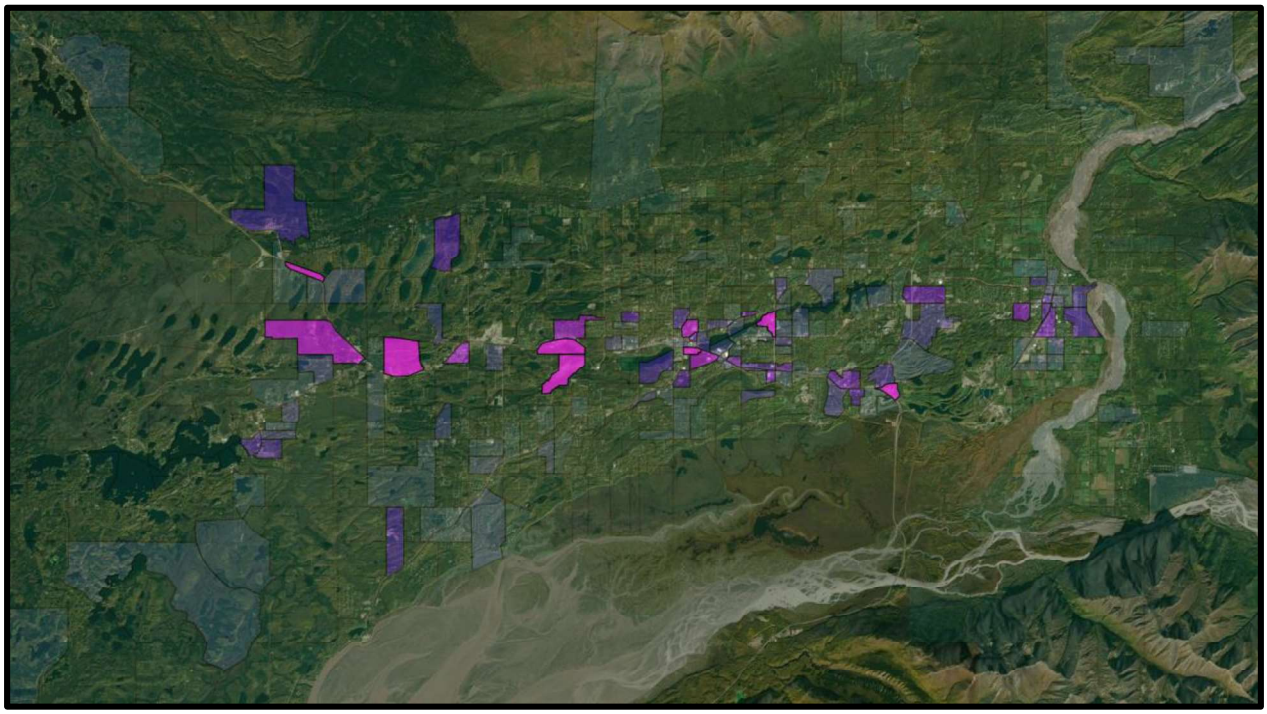

Figure 14. Employment Growth 2013 to 2020 (Based on Observation of Existing Data)

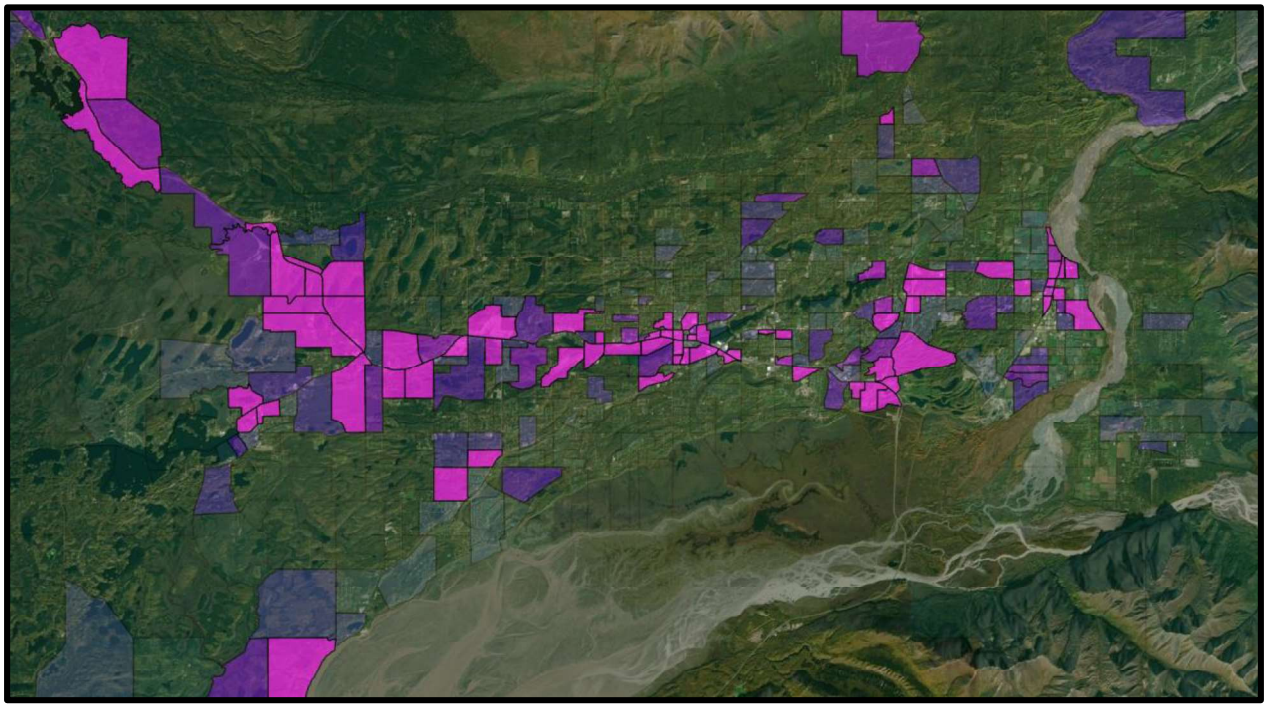

Figure 15. Employment Growth 2020 to 2040 (Based on AMATS TDM Forecasts)

Notice in the previous figures that population growth from 2013 to 2020 was able to stay primarily in the urban core. The study from 2020 to 2040 shows higher population growth to the southwest towards Point MacKenzie and in the area of Big Lake. This is due in part to the urban core reaching capacity, with all of the easily developed land having already been used. Also, major road projects

like the Parks Hwy upgrade from Lucus to Big Lake, and the Knik-Goose Bay Road upgrade to Settlers Bay, will effectively make regions serviced by these roads closer to the urban core, based on shorter travel times and reduced traffic congestion. This will increase the desirability of these areas for housing development. Note that this also points out the key relationship between suitable road networks and economic development.

Appendix B OS&HP Maps

The following maps present the 2022 Official Streets and Highway Plan for the Matanuska-Susitna Borough including planned roads, road functional classifications, and primary intersection points.

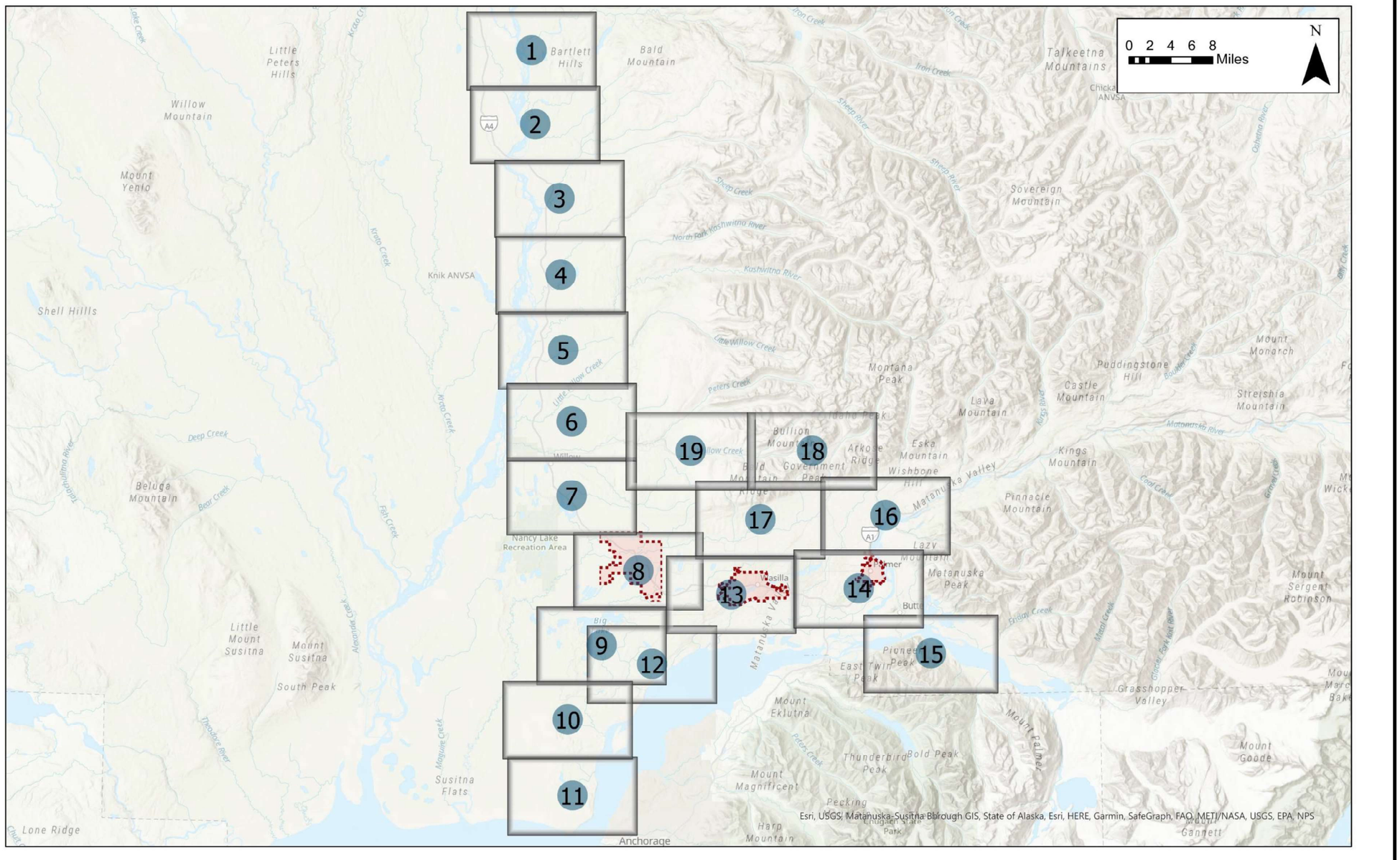

Figure 16. OS&HP Vicinity Map

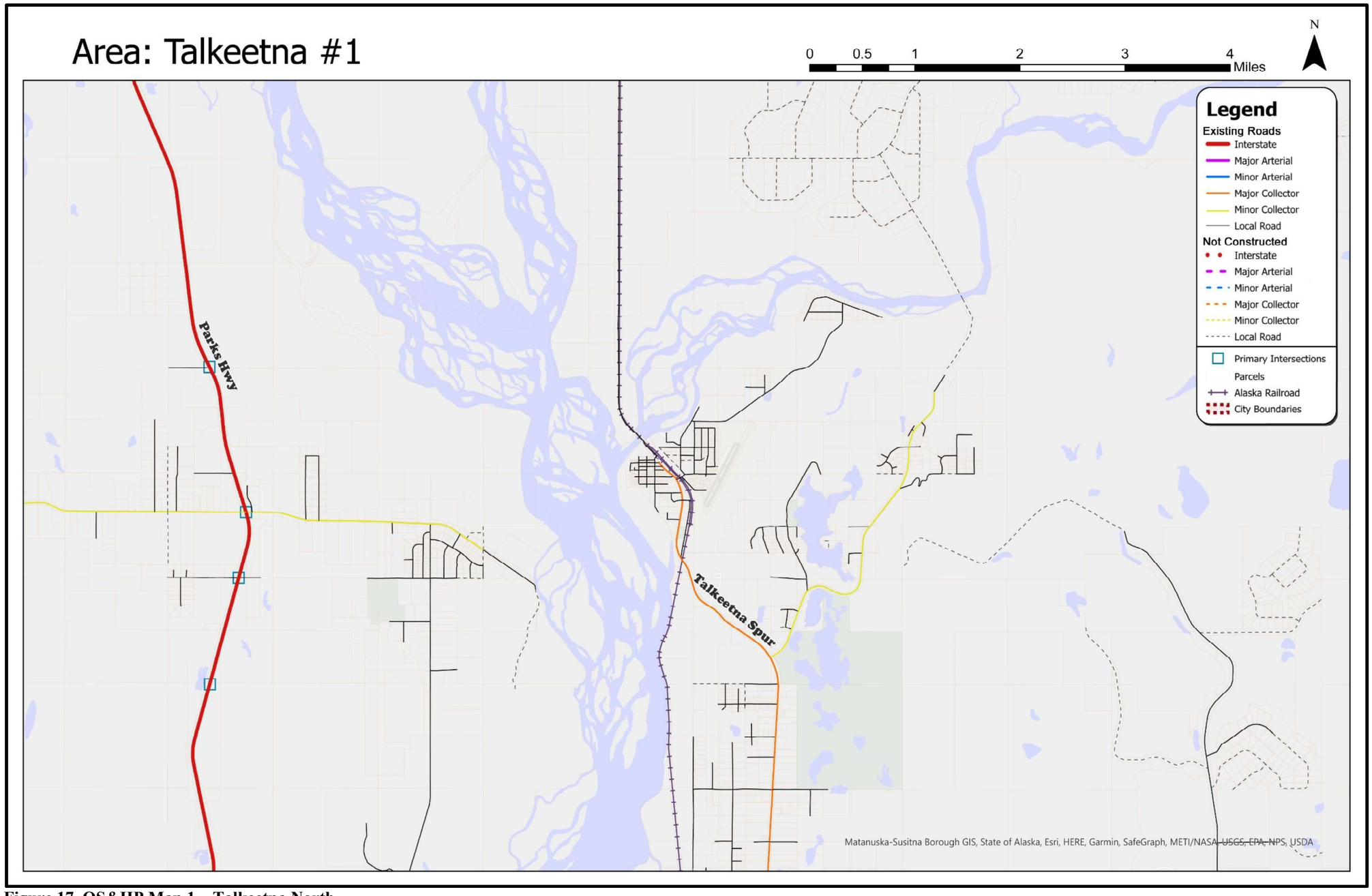

Figure 17. OS&HP Map 1 – Talkeetna North

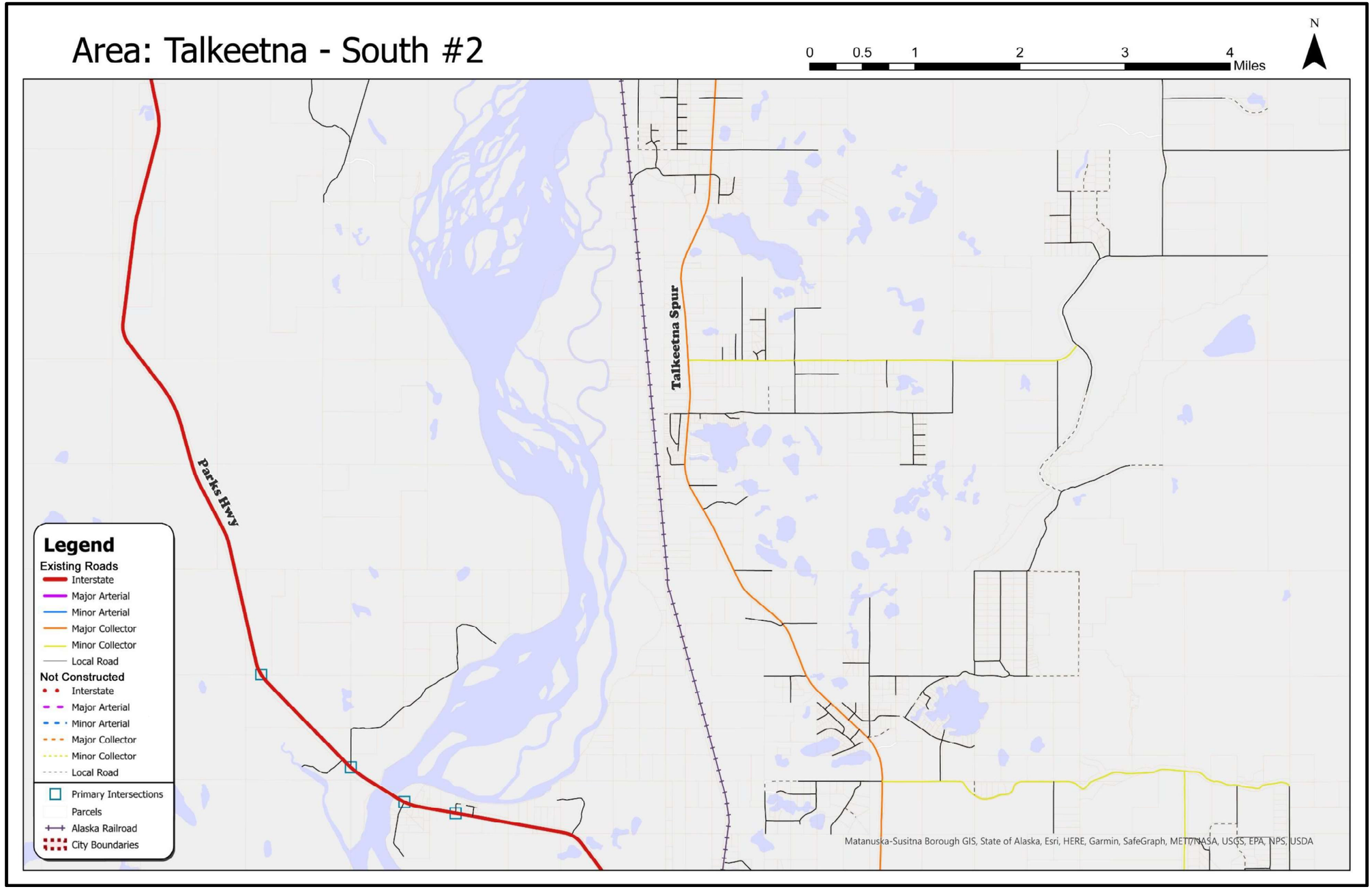

Figure 18. OS&HP Map 2 – Talkeetna South

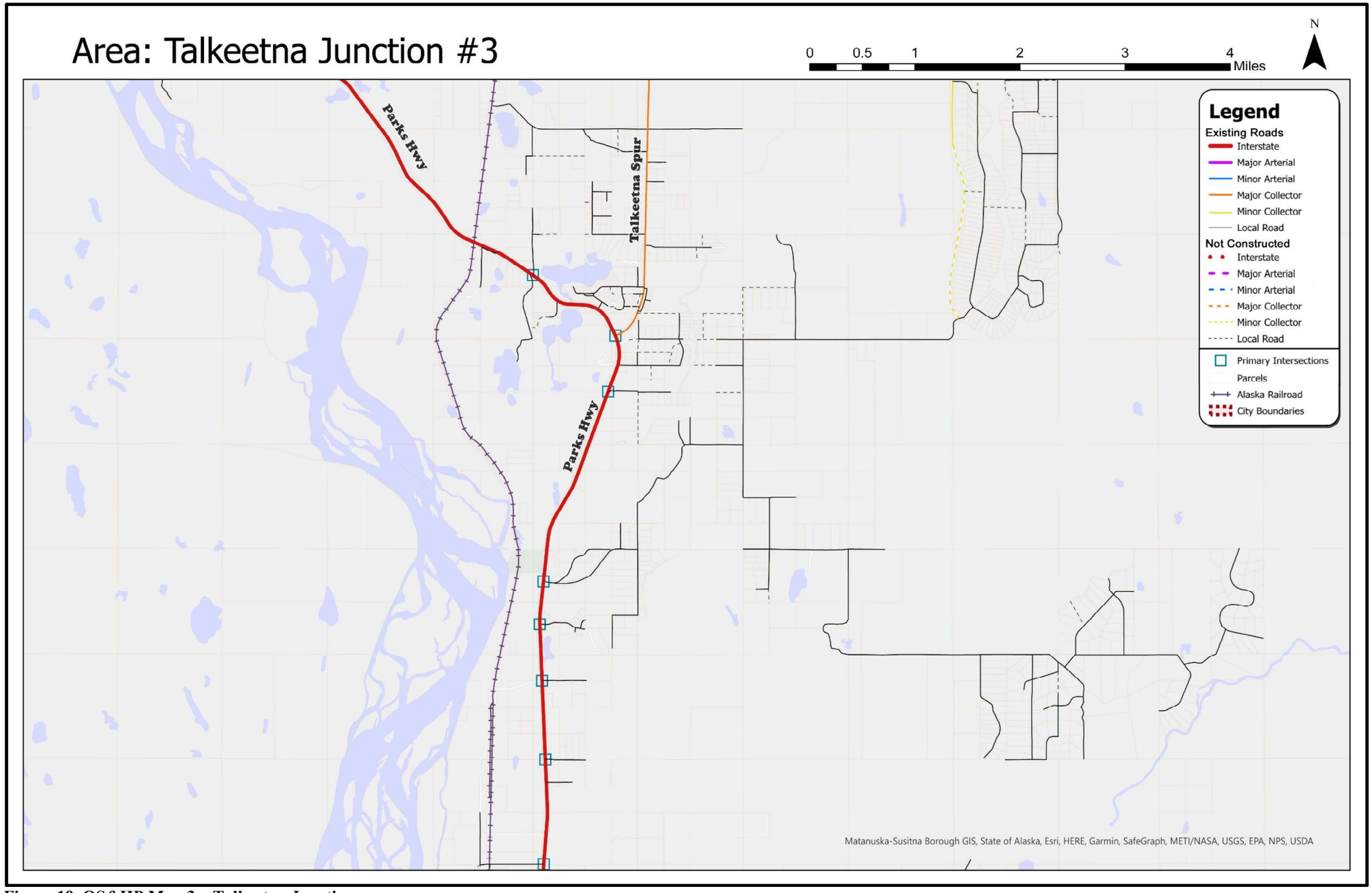

Figure 19. OS&HP Map 3 – Talkeetna Junction

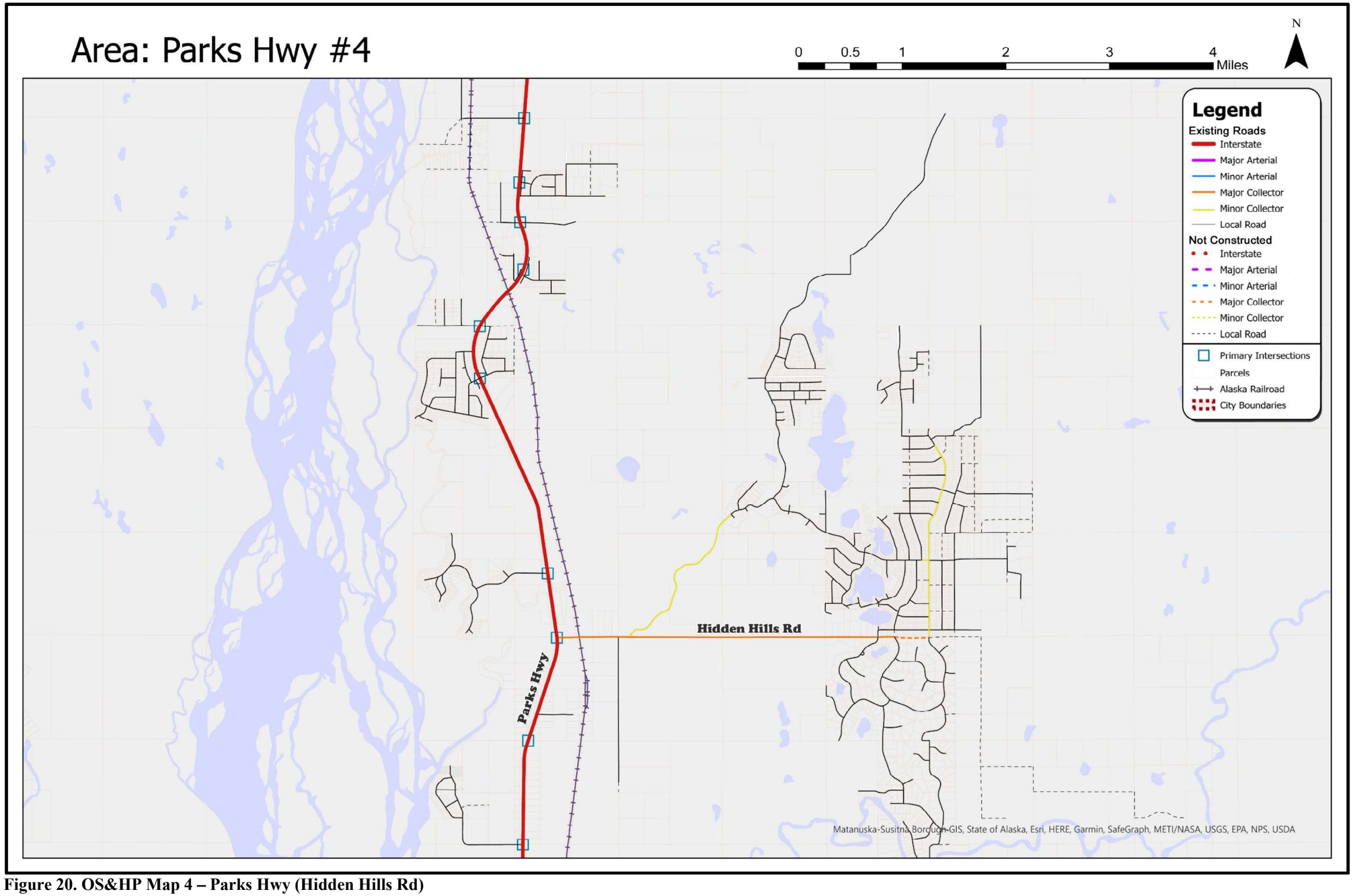

Figure 20. OS&HP Map 4 – Parks Hwy (Hidden Hills Rd)

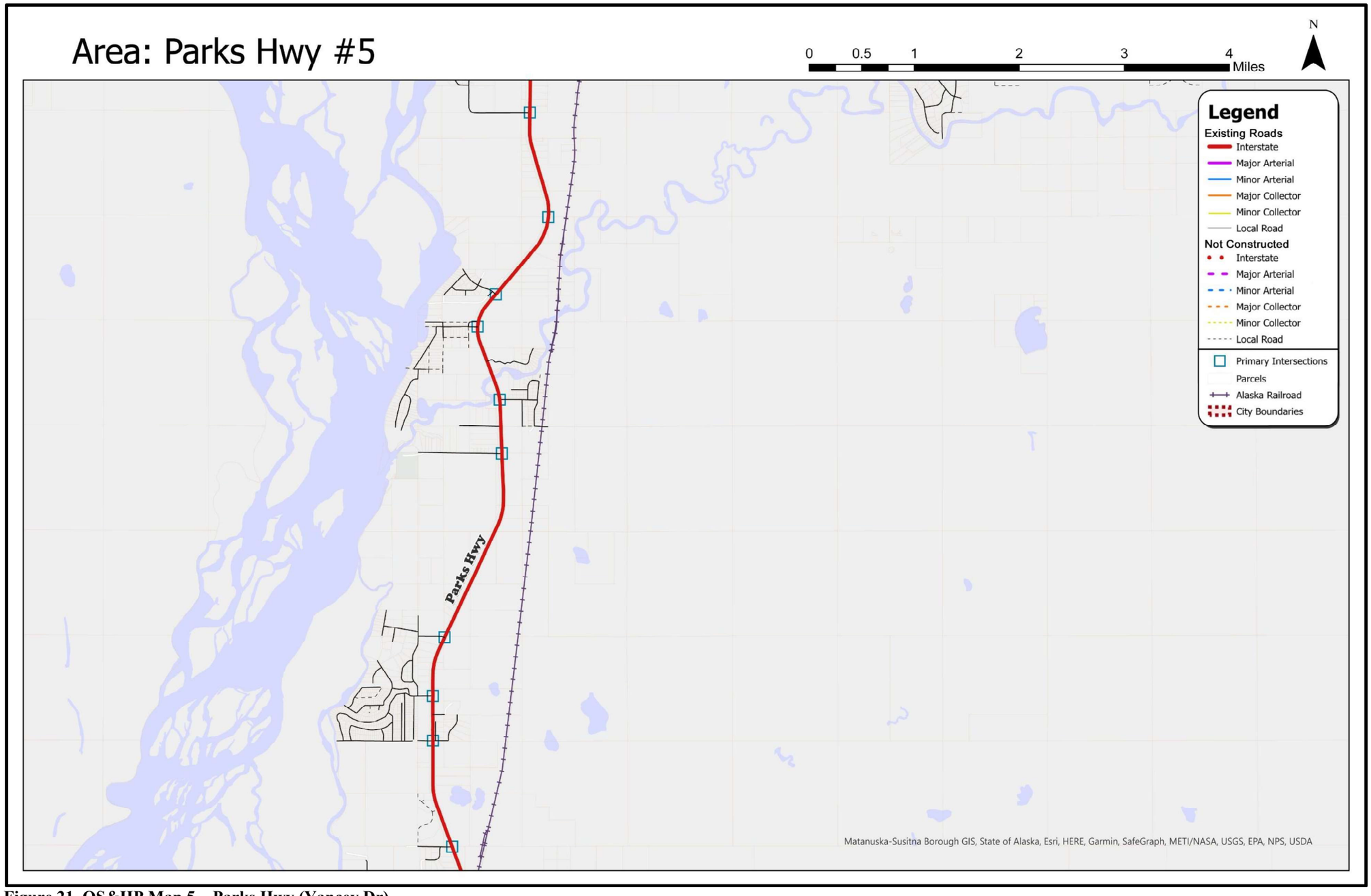

Figure 21. OS&HP Map 5 – Parks Hwy (Yancey Dr)

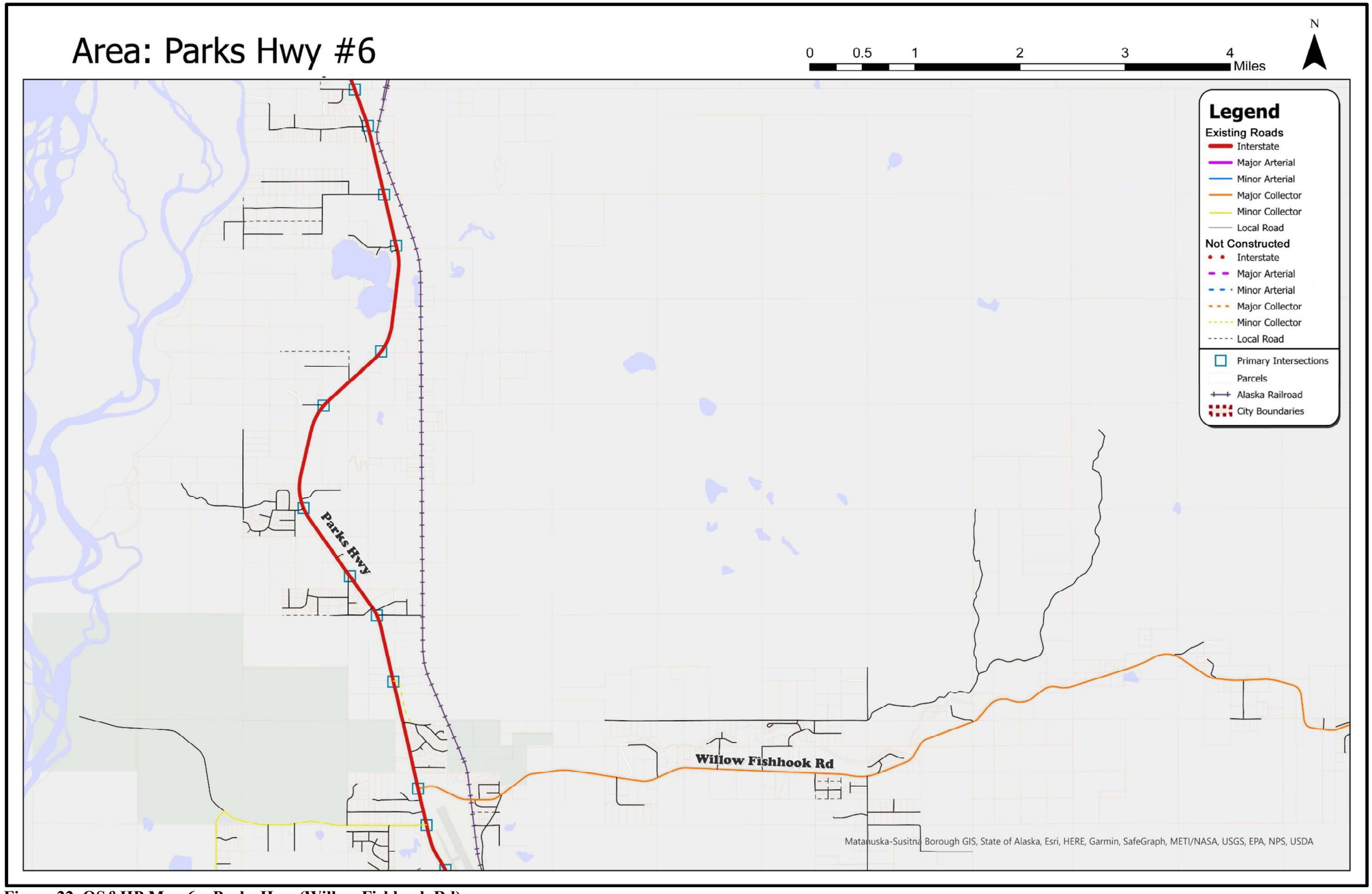

Figure 22. OS&HP Map 6 – Parks Hwy (Willow Fishhook Rd)

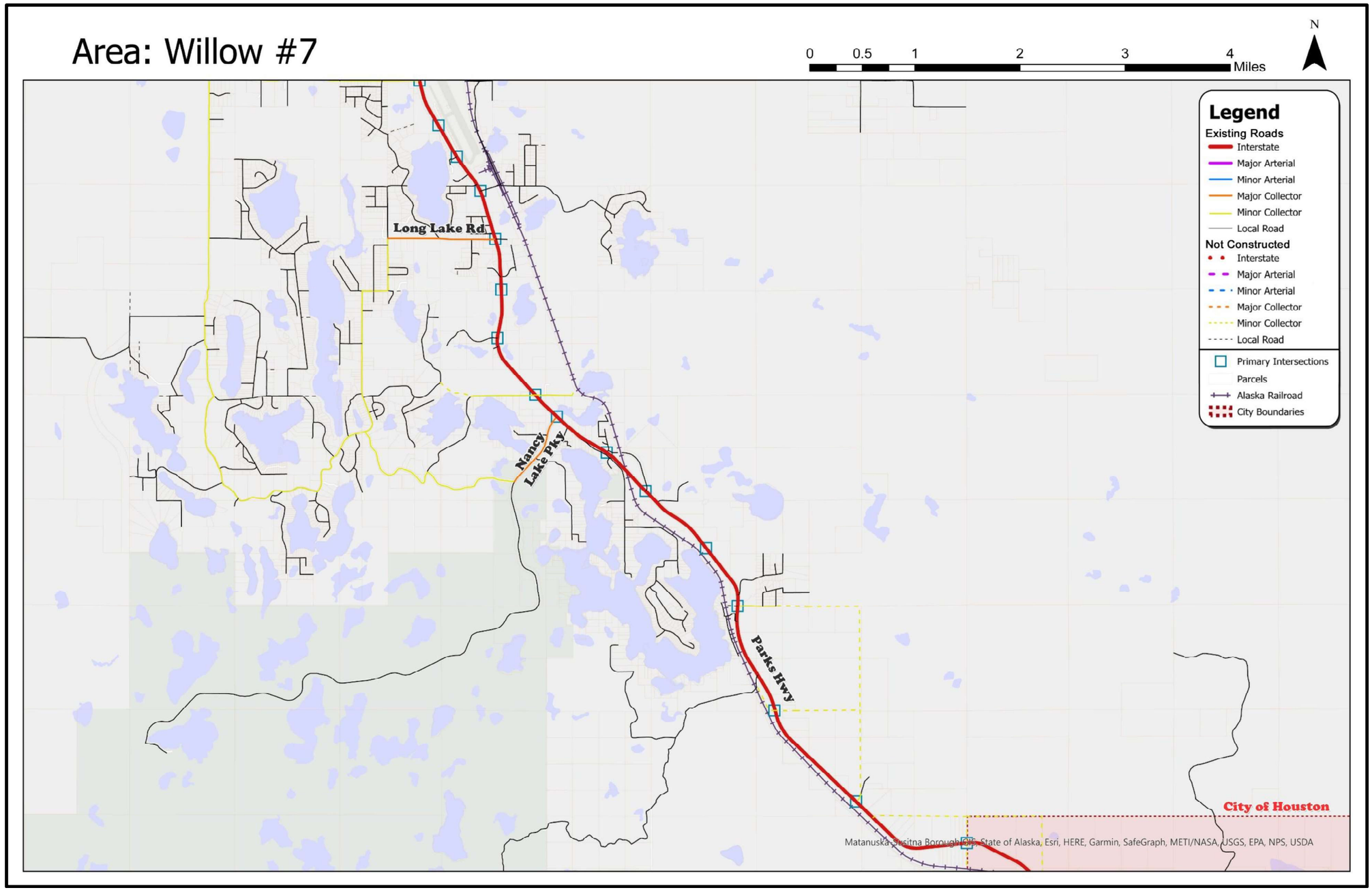

Figure 23. OS&HP Map 7 – Parks Hwy (Long Lake Rd)

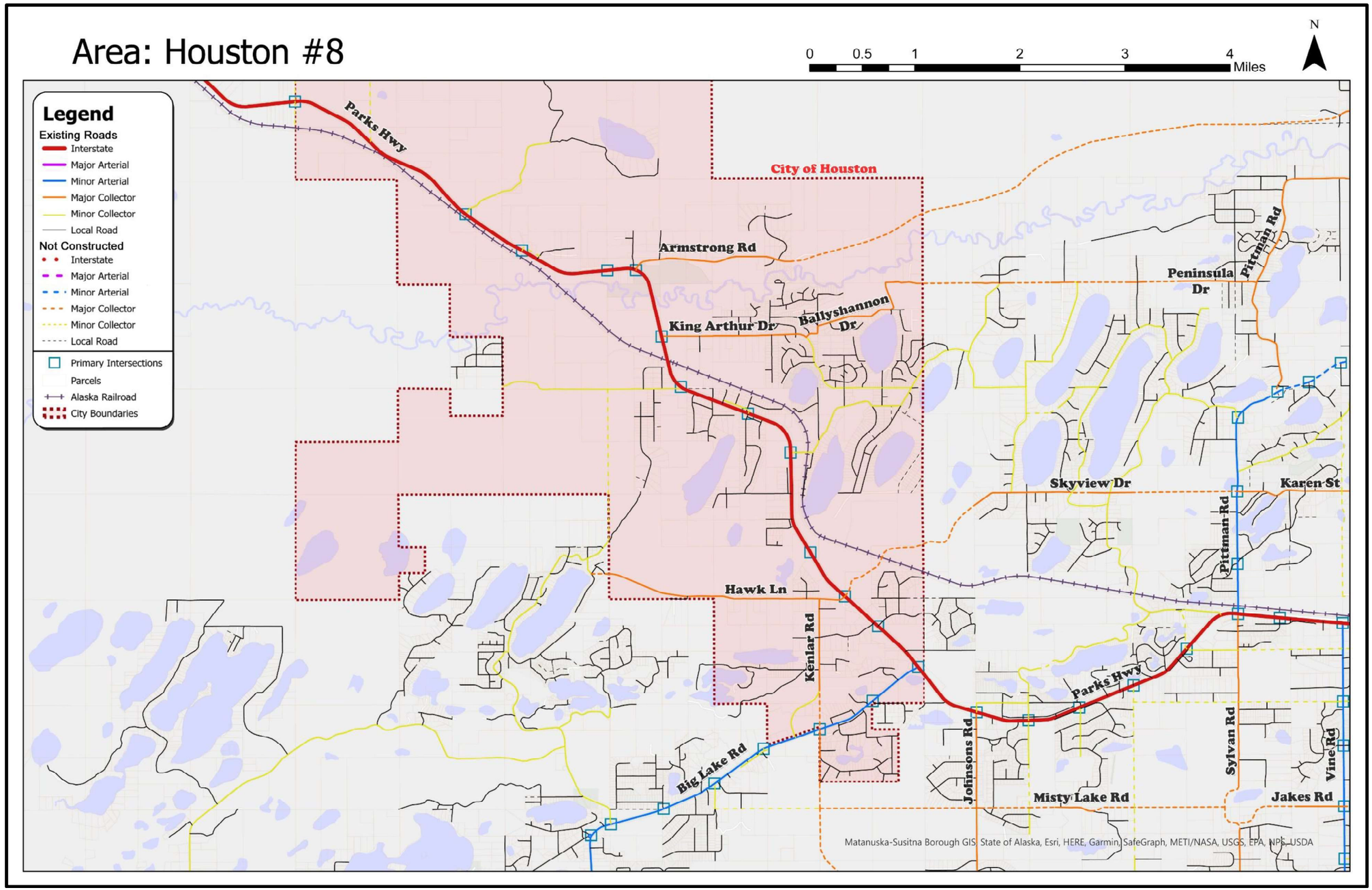

Figure 24. OS&HP Map 8 – Houston

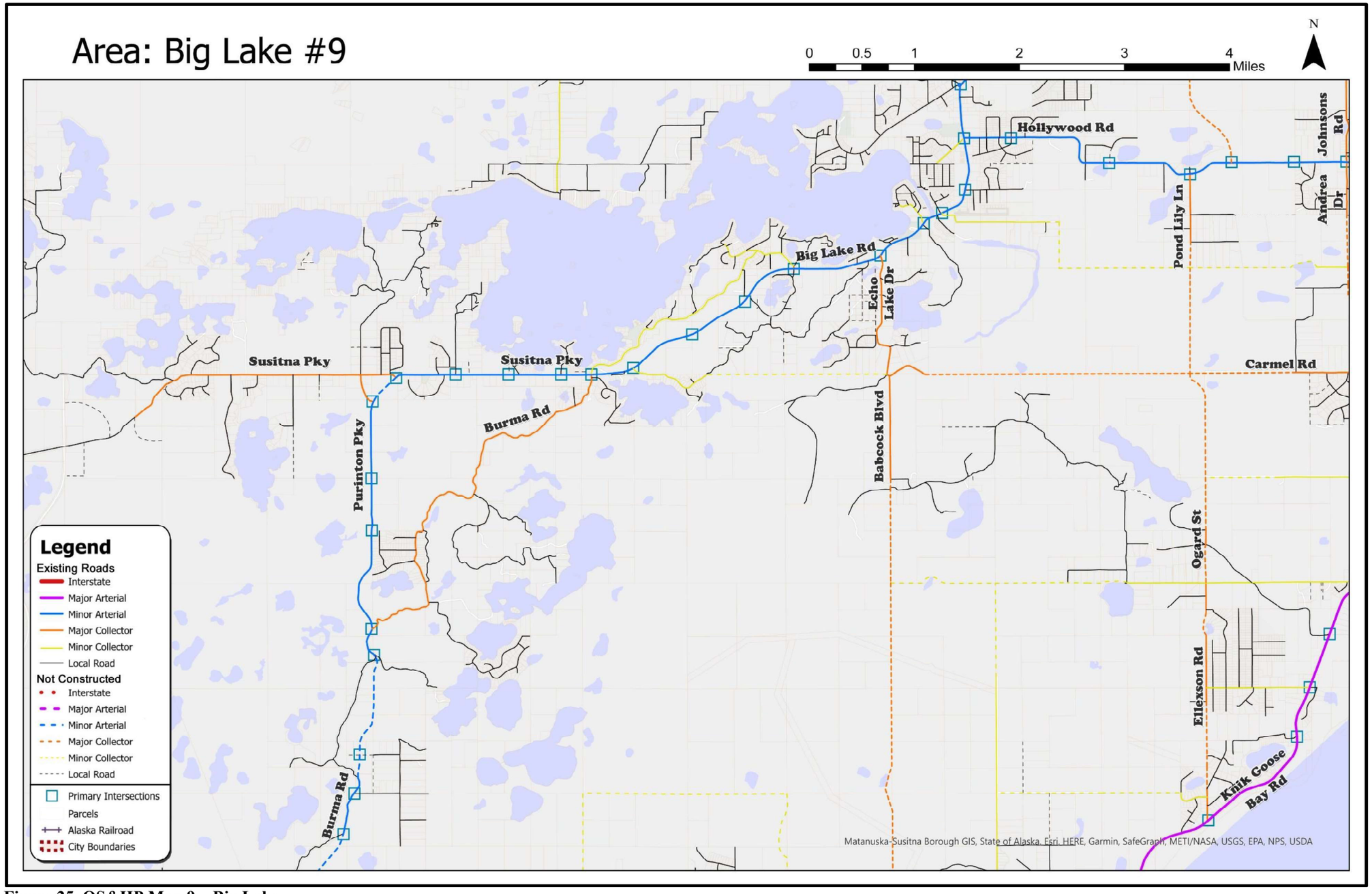

Figure 25. OS&HP Map 9 – Big Lake

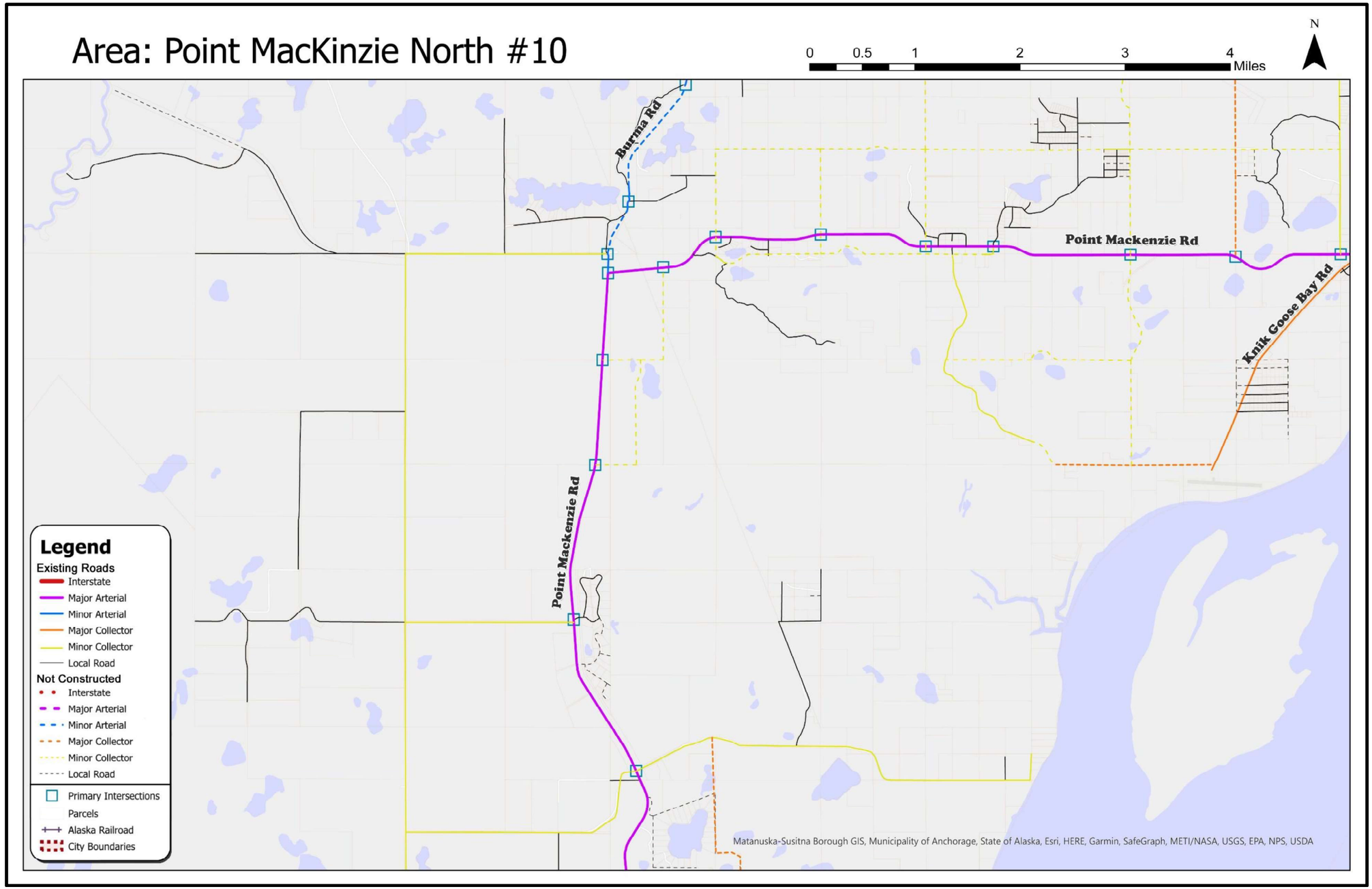

Figure 26. OS&HP Map 10 – Point MacKenzie North

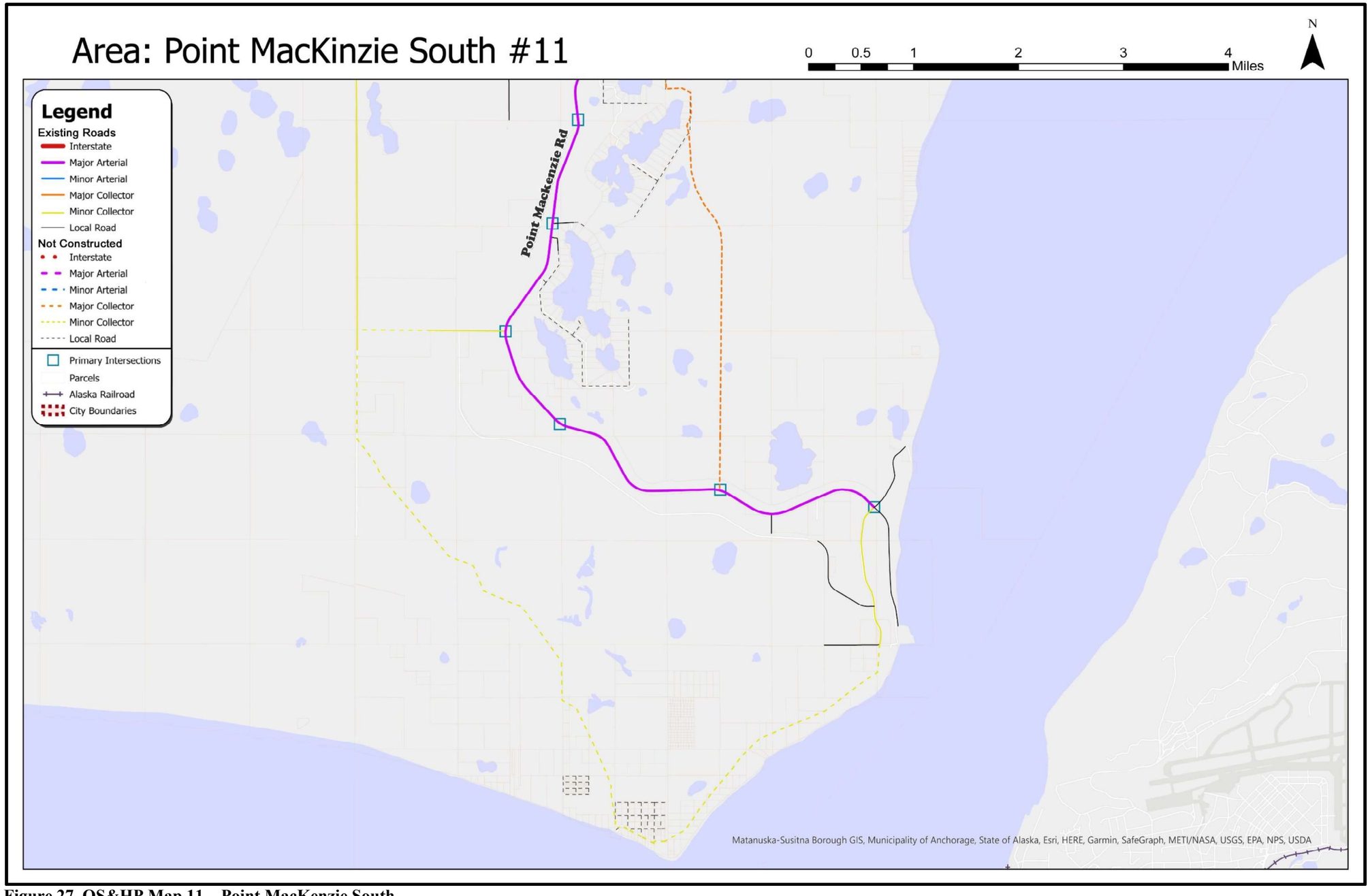

Figure 27. OS&HP Map 11 – Point MacKenzie South

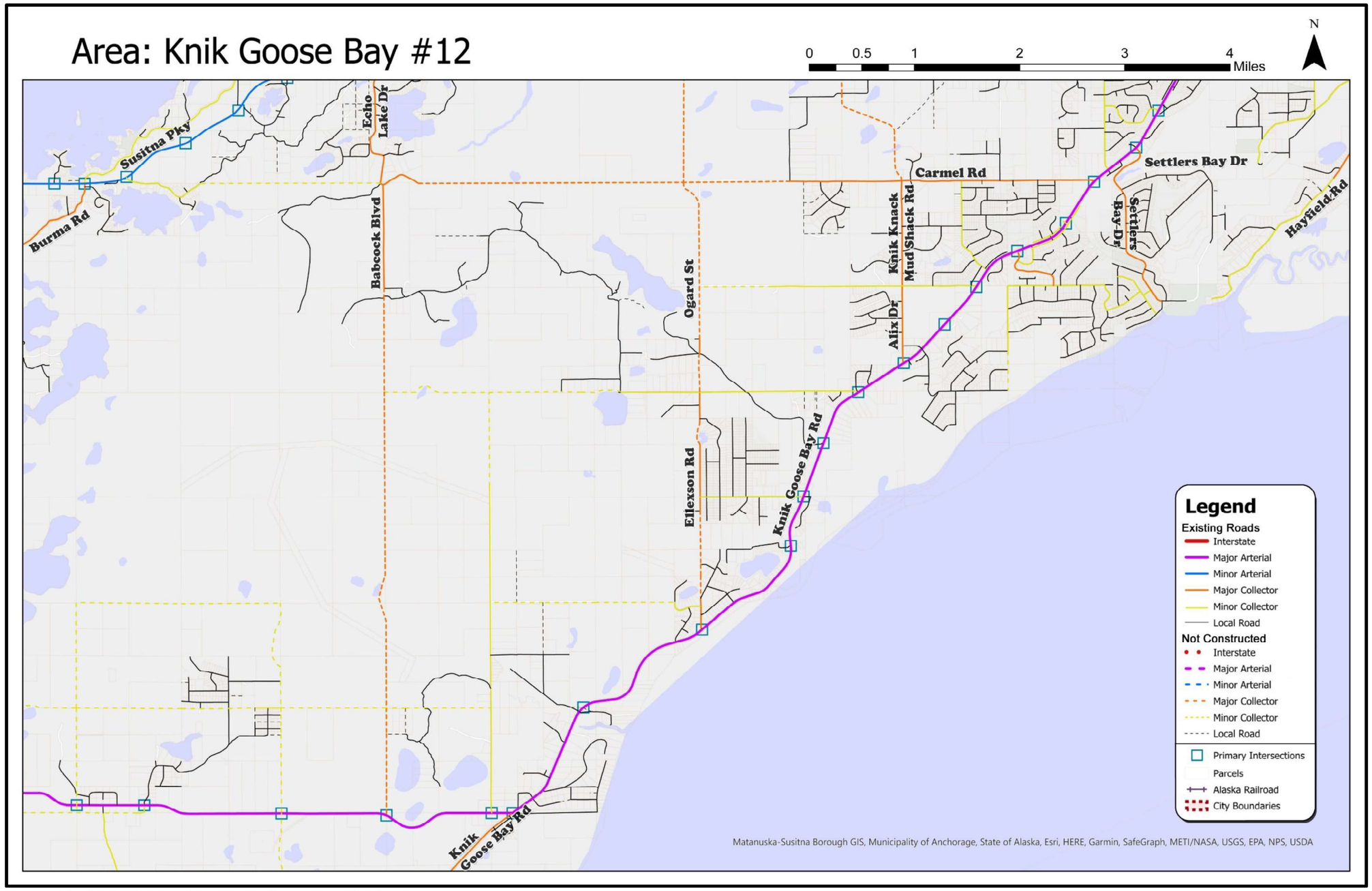

Figure 28. OS&HP Map 12 – Knik-Goose Bay Rd South

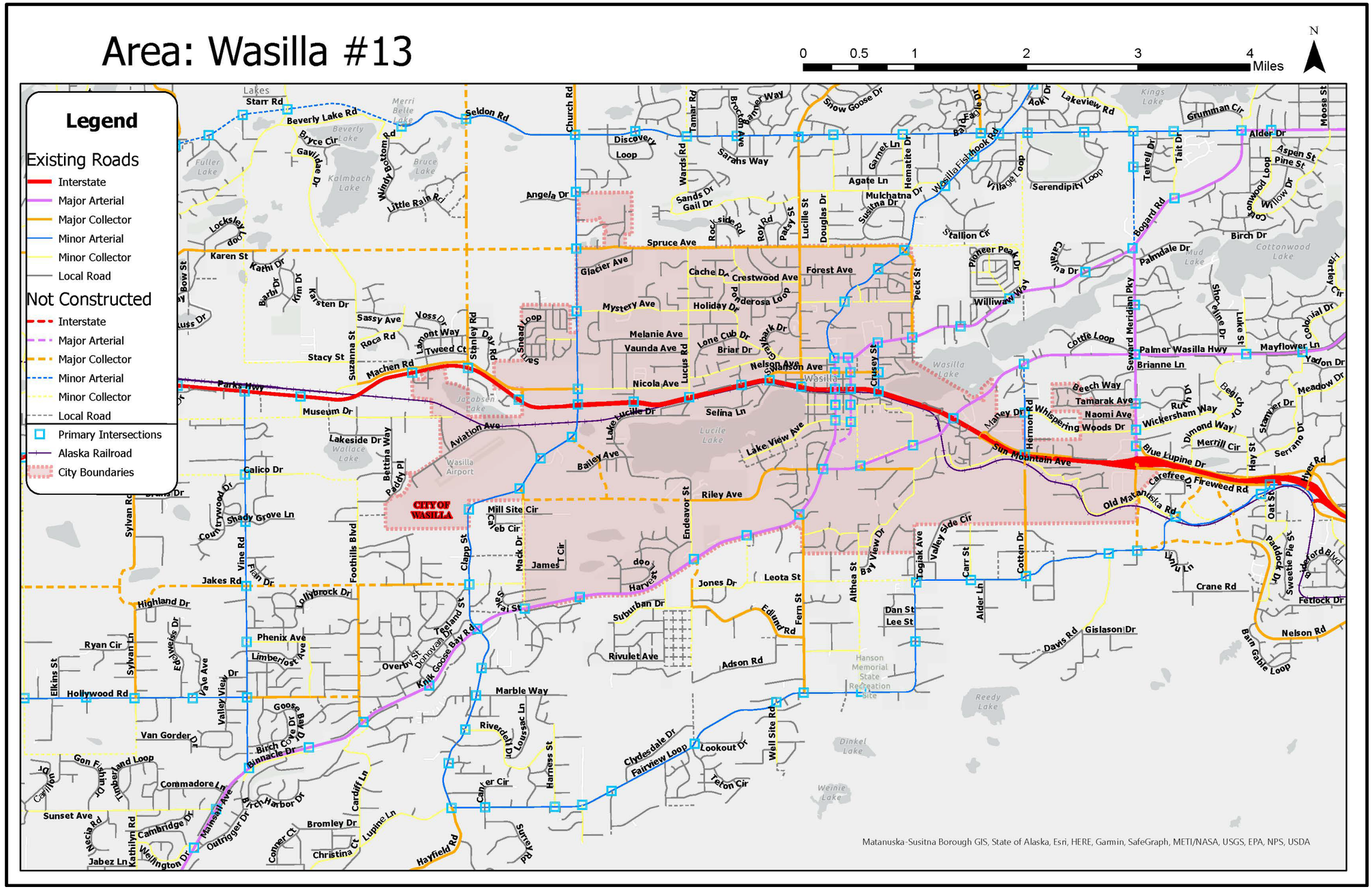

Figure 29. OS&HP Map 13 – Wasilla

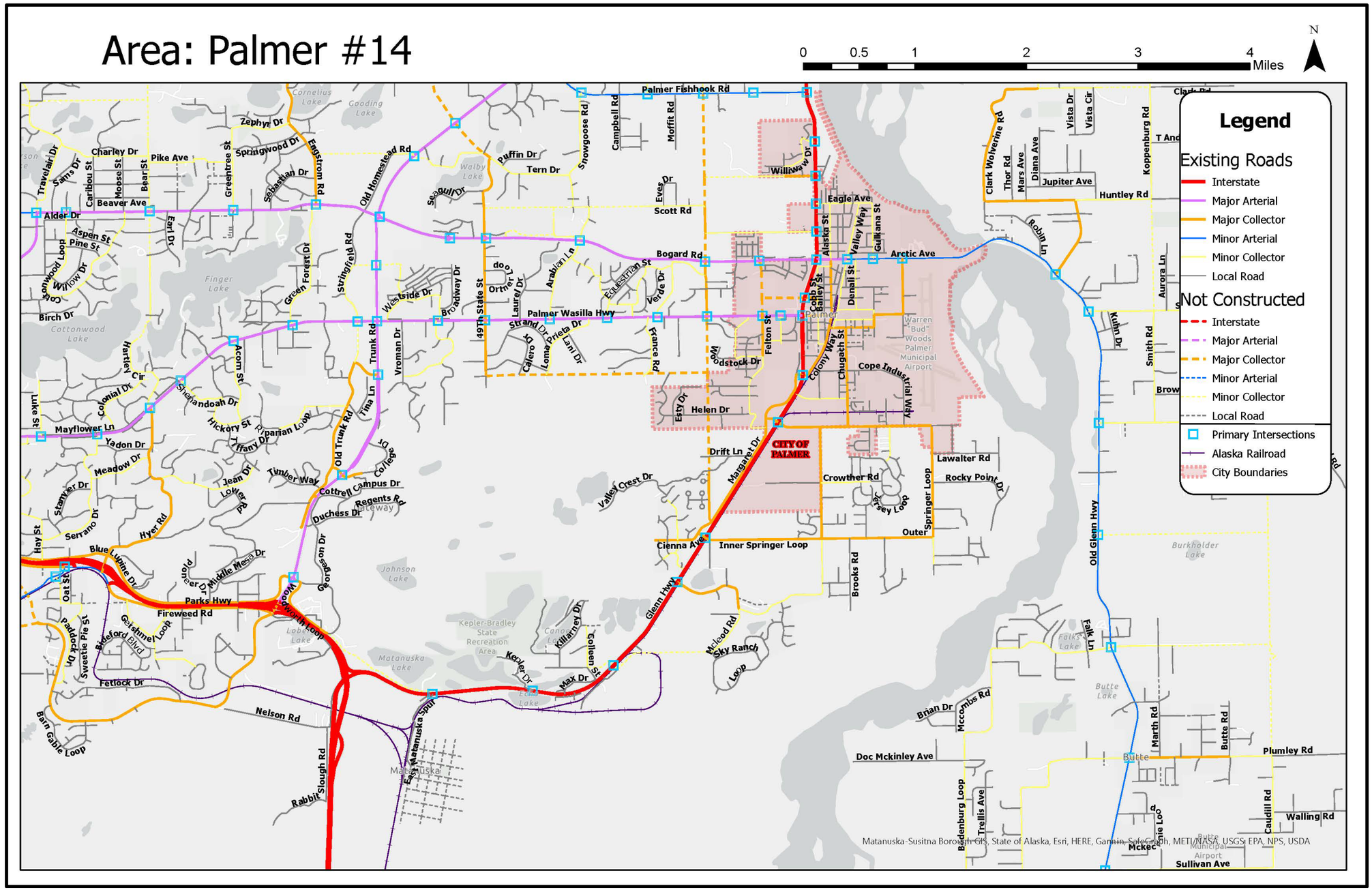

Figure 30. OS&HP Map 14 – Palmer

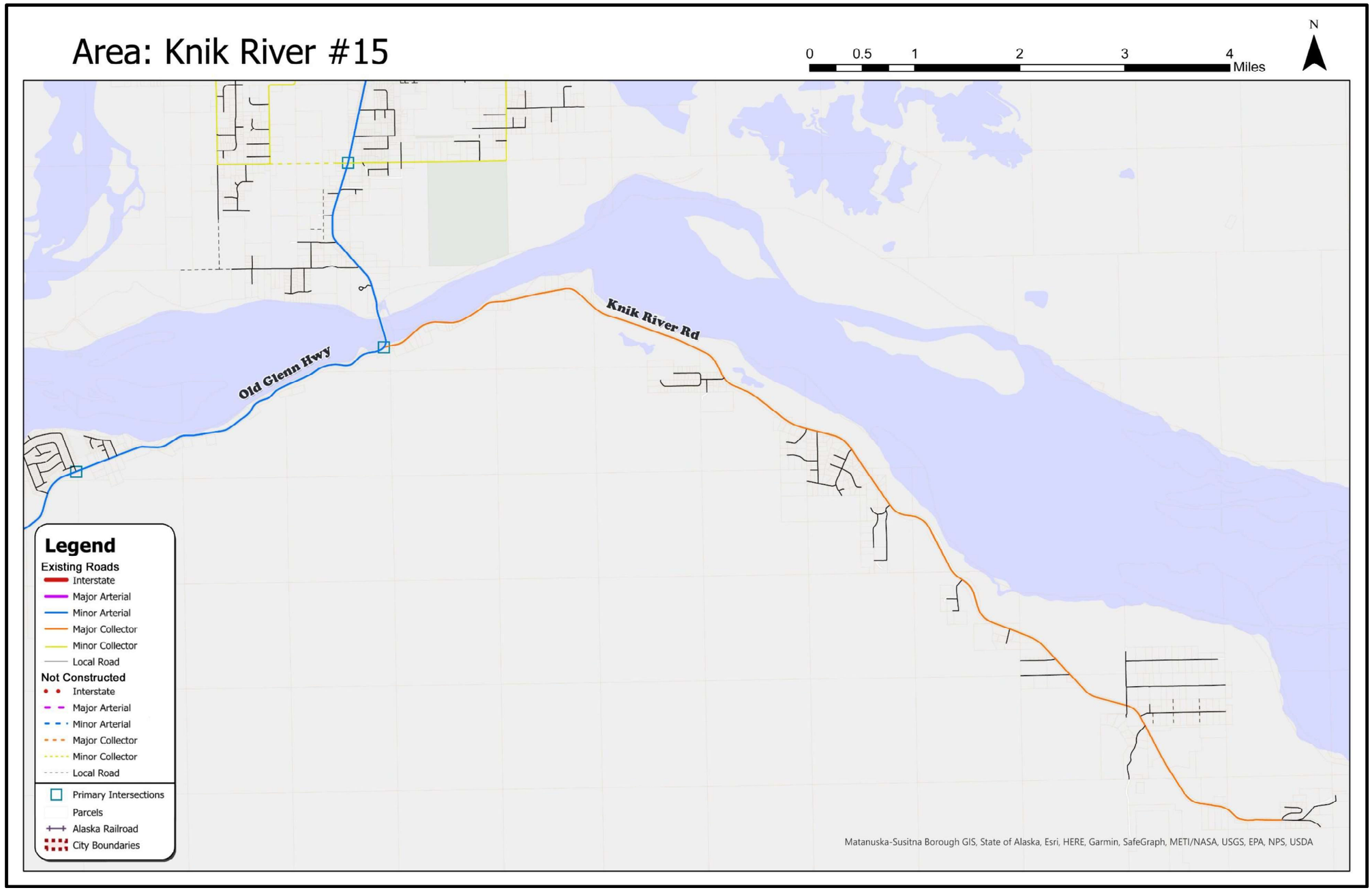

Figure 31. OS&HP Map 15 – Knik River Rd

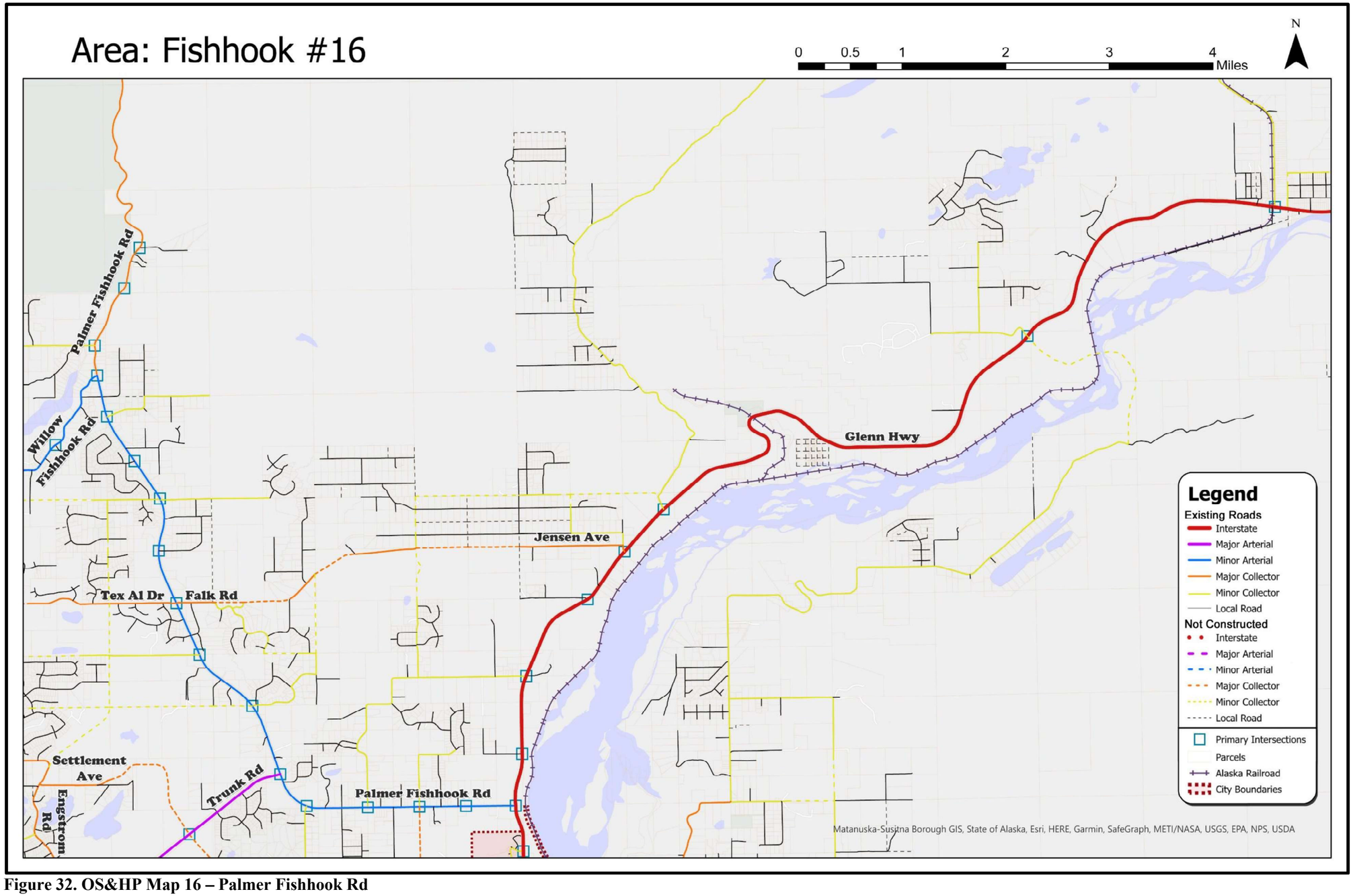

Figure 32. OS&HP Map 16 – Palmer Fishhook Rd

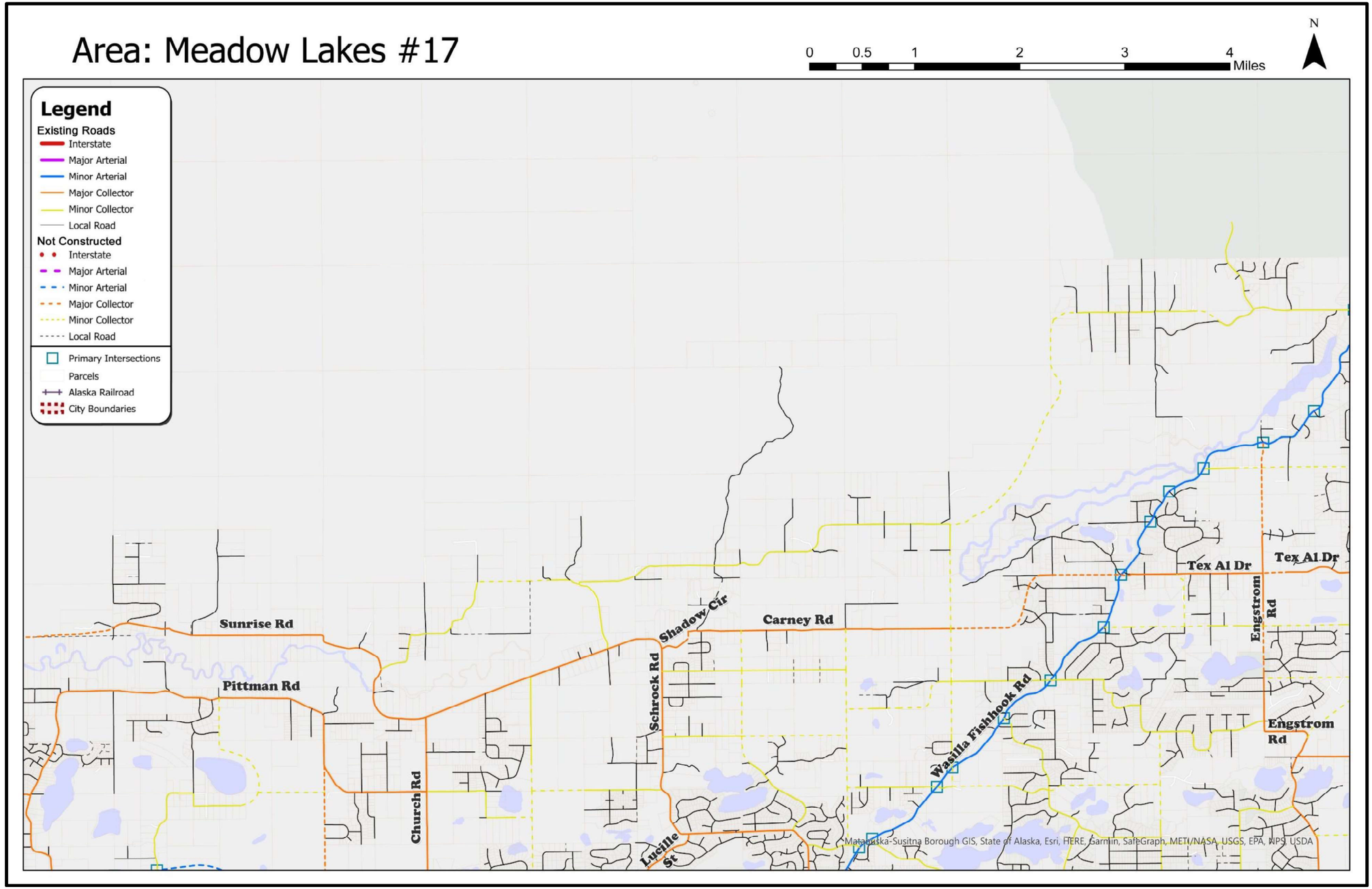

Figure 33. OS&HP Map 17 – Wasilla Fishhook Rd

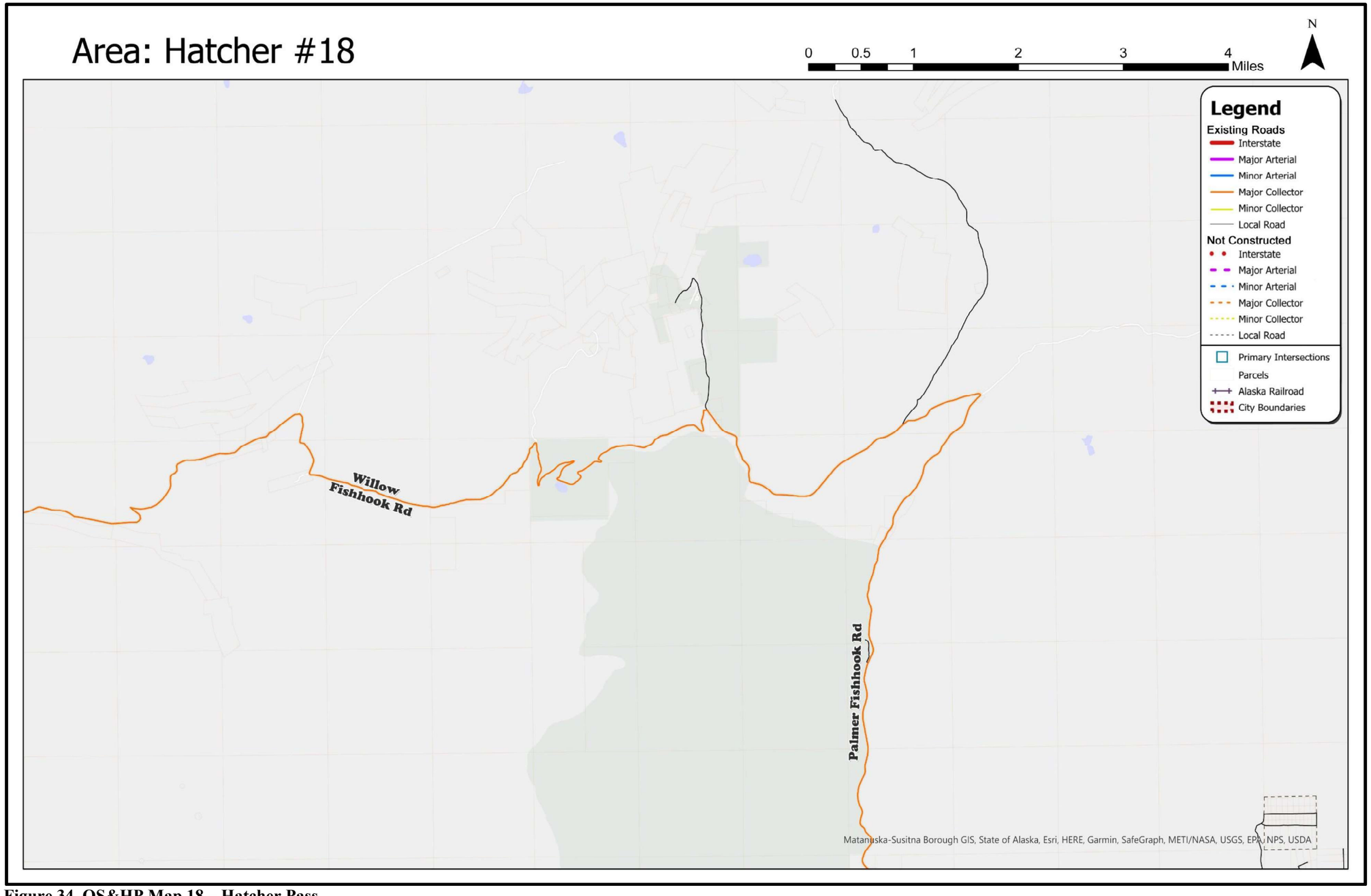

Figure 34. OS&HP Map 18 – Hatcher Pass

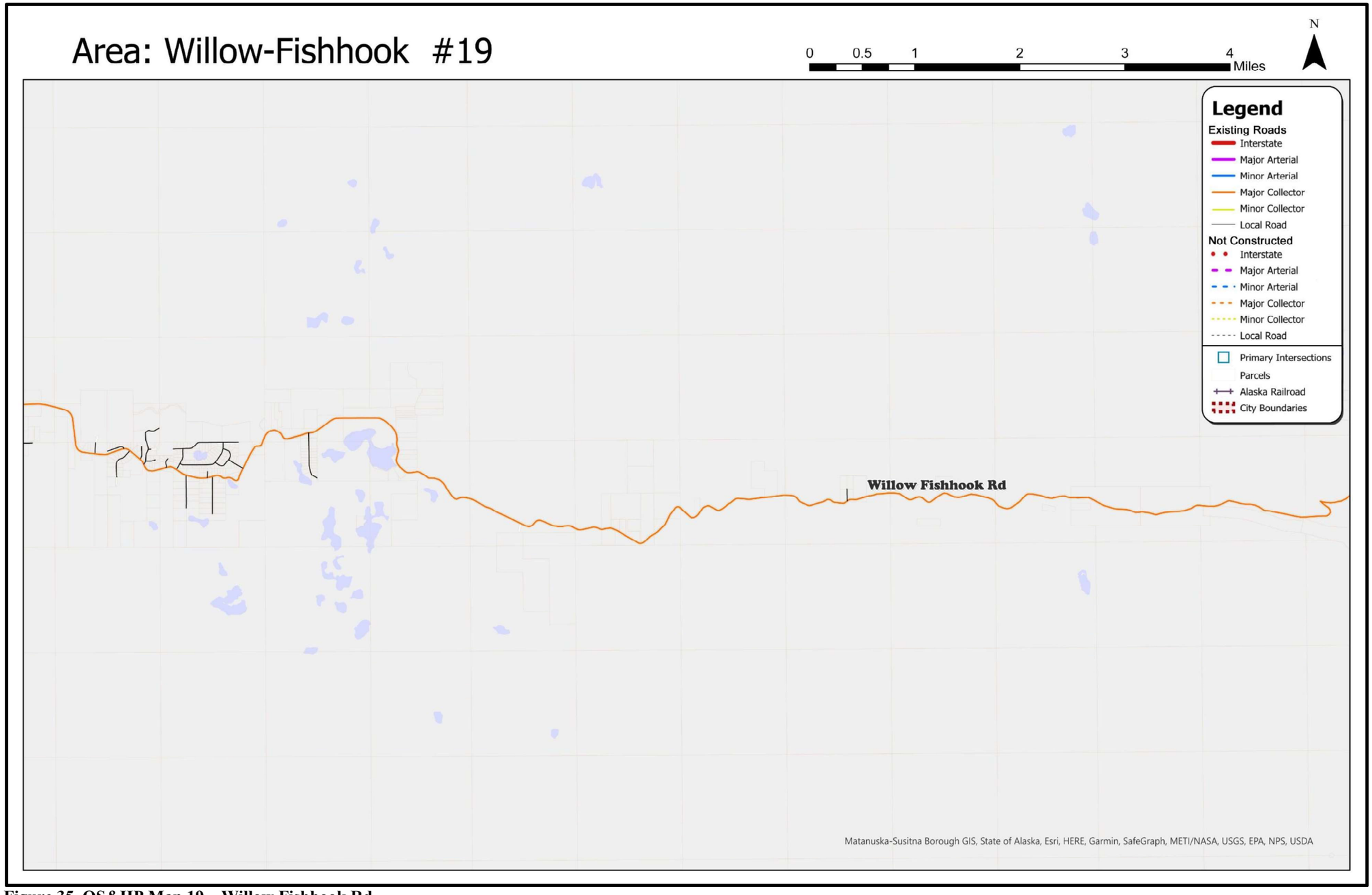

Figure 35. OS&HP Map 19 – Willow Fishhook Rd

CODE ORDINANCE

Sponsored by: Borough Manager
Introduced: 06/21/22
Public Hearing: 07/19/22
Adopted: 07/19/22
Reconsidered: 07/19/22
Amended: 07/19/22
Adopted: 07/19/22
Amended OSHP: 11/22/22
Adopted: 11/22/22

MATANUSKA-SUSITNA BOROUGH
ORDINANCE SERIAL NO. 22-063

AN ORDINANCE REPEALING MSB 15.30, OFFICIAL STREETS AND HIGHWAYS PLAN MAP; AMENDING MSB 17.55.004(A), BY STRIKING THE UNUSED DEFINITION "OFFICIAL STREETS AND HIGHWAY PLAN;" AND ADOPTING MSB 15.24.030 (B)(46), OFFICIAL STREETS AND HIGHWAY PLAN.

BE IT ENACTED:

Section 1. Classification. This ordinance is of a general and permanent nature and shall become a part of the Borough Code.

Section 2. Repeal of chapter. MSB 15.30 OFFICIAL STREETS AND HIGHWAYS PLAN MAP is hereby repealed in its entirety.

Section 3. Amendment of Subsection. MSB 17.55.004(A) is hereby amended as follows:

[• "OFFICIAL STREETS AND HIGHWAY PLAN" MEANS A MAP AND ATTENDANT DOCUMENT DEPICTING THE PROPOSED SYSTEM OF FREEWAY, ARTERIAL, AND COLLECTOR STREETS IN THE BOROUGH, AS ADOPTED BY THE PLANNING COMMISSION AND BY THE ASSEMBLY, AND WHICH IS ON FILE IN THE PLANNING DEPARTMENT OFFICE, TOGETHER WITH ALL AMENDMENTS THERETO SUBSEQUENTLY ADOPTED.]

Section 4. Amendment of Subsection. MSB 15.24.030(B) is hereby amended as follows:

(46) Official Streets and Highways Plan, adopted 2022.

Section 5. Effective date. This ordinance shall take effect upon adoption.

ADOPTED by the Matanuska-Susitna Borough Assembly this 19 day of July, 2022.

EDNA DeVRIES, Borough Mayor

ATTEST:

LONNIE R. McKECHNIE, CMC, Borough Clerk

(SEAL)

07/19/22 vote:
PASSED UNANIMOUSLY: Hale, Nowers, McKee, Yundt, Tew, Sumner, and Bernier

11/22/22 vote:
PASSED UNANIMOUSLY: Hale, Nowers, McKee, Yundt, Tew, Sumner, and Bernier