Gravina Access Project

Record of Decision and Final Supplemental Environmental Impact Statement

DOT&PF Project No: 67698
Federal Project No: ACHP-0922(5)

Prepared for:

Alaska Department of Transportation & Public Facilities
6860 Glacier Drive
Juneau, Alaska 99811

Prepared by:
HDR
2525 C Street, Suite 500
Anchorage, AK 99503

June 2017

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1. Decision

1.1 The Selected Alternative

This Record of Decision (ROD) for the Gravina Access Project was developed pursuant to 40 Code of Federal Regulations (CFR) §1505.2 and 23 CFR §771.127. The Alaska Department of Transportation and Public Facilities (DOT&PF), in cooperation with the Federal Highway Administration (FHWA) proposes to improve surface transportation between Revillagigedo Island and Gravina Island in the Ketchikan Gateway Borough (Borough) located in Southeast Alaska. The primary public access to Gravina Island from Revillagigedo Island is a Borough-operated ferry that transports vehicles, bicyclists, and pedestrians from a terminal on Revillagigedo Island, located approximately 2.6 miles north of downtown Ketchikan, to a terminal on Gravina Island at Ketchikan International Airport.

Based on the attached Final Supplemental Environmental Impact Statement (incorporated by reference), input from public and agency stakeholders, and in balancing the transportation need and the potential effects on the social, economic, and natural environments, the FHWA has selected Alternative G4v for design and construction.

Alternative G4v includes the reconstruction of existing airport ferry berths to meet current design standards, upgrades and improvements to pedestrian facilities at the airport ferry terminals, a new heavy freight mooring facility and new ferry layup dock on Gravina Island, shuttle vans to carry pedestrians and their luggage to/from the airport, and new toll facilities. It also includes replacement of the bridge over Airport Creek and reconstruction of Seley Road from Lewis Reef Road to approximately the end of the Airport Reserve.

The purpose of the Gravina Access Project is to improve surface transportation between Revillagigedo Island and Gravina Island. There are three needs this project will address:

- **Need 1: Improved Access to Developable Land**

The Borough and its residents need more reliable, efficient, convenient, and cost-effective access for vehicles, bicycles, and pedestrians to Borough lands and other developable or recreation lands on Gravina Island in support of the Borough's adopted land use plans. The lack of efficient, convenient vehicular access to developable lands on Gravina Island, combined with the geographic constraints of the region, have limited the base of developable land to a narrow strip along Tongass Narrows on Revillagigedo Island. Gravina Island has a suitable land base for expansion. Improved access to non-waterfront property on Gravina Island is needed to provide greater opportunities for non-water-dependent development to locate inland, at more economical sites, thereby freeing up waterfront land for water-related and water-dependent uses.

- **Need 2: Need for Improved Access to the Airport**

Improved convenience and reliability of access to Ketchikan International Airport is needed for passengers, airport tenants, emergency personnel and equipment, and shipment of freight. The airport is a primary transportation link into and out of the Borough, and the ferry is the only public access to the airport for passengers in vehicles and the primary means of airport access for passengers on foot. Improved access to Gravina Island is needed to help airport tenants conduct their business competitively and efficiently; provide timely transport of emergency personnel and equipment to the airport; and support the movement of cargo, fuel, and other products to and/or from the airport.

- **Need 3: Need for Economic Development**

Improved access is needed to promote environmentally sound and planned long-term economic development on Gravina Island. The lack of efficient, convenient access to developable land on Gravina Island limits development of the economy in the Borough. Improved access will increase opportunities for development of additional ports; harbors; and industrial, commercial, and residential properties on Gravina Island. Businesses need improved access to the airport to raise productivity levels and expand operations, which would enhance the local economy. Improvements to freight movement across Tongass Narrows will facilitate construction of needed infrastructure, such as power and other utilities, necessary to promote and sustain economic development. Tourism is a major component of the Borough's economy and will continue to play an important role. Improvements to the transportation link between Ketchikan International Airport and Revillagigedo Island is needed to increase opportunities for independent travelers, support cruise and touring operators who use Ketchikan as a point of departure, and expand tourism on Gravina Island.

Additional information regarding project purpose and need is described in Section 1.4 of the Gravina Access Project Final Supplemental Environmental Impact Statement (SEIS).

To address these needs, FHWA has selected Alternative G4v for design and construction.

1.2 Project Background

On March 4, 2016, DOT&PF and FHWA issued a public notice identifying Alternative G4v as their preferred alternative. The two agencies also announced their intent to prepare a combined Final SEIS and ROD. The Final SEIS provides additional information on the preferred alternative and explains why it was selected; documents and responds to all substantive comments on the Draft SEIS; describes findings, including any on wetlands, floodplains, and Section 106 effects, as applicable; provides a list of commitments for mitigation measures for the preferred alternative; and identifies any other findings to be made in compliance with all environmental laws, regulations, Executive Orders, and other related requirements with associated agency consultation documentation. DOT&PF and FHWA completed the Final SEIS in compliance with the National Environmental Policy Act of 1969, as amended (NEPA; 40 CFR Parts 1500-1508), and related FHWA regulations (23 CFR Parts 771, 772, and 777).

2. Alternatives Considered

Consistent with the intent of NEPA, FHWA and DOT&PF examined a range of alternatives for the Gravina Access Project. A screening process was used to identify reasonable alternatives for evaluation in the SEIS. FHWA and DOT&PF, with input from stakeholder agencies and the public, developed and utilized this screening process to eliminate alternatives that would not be reasonable and did not warrant detailed examination in the Gravina Access Project SEIS.

Fifteen build alternatives were examined in the screening process, including one tunnel and two moveable bridge alternatives, three bridge alternatives crossing Pennock Island, five bridge alternatives near the airport, and four ferry alternatives. Additional information on the screening of alternatives is provided in Section 2.2.3 of the Gravina Access Project Final SEIS. The information developed in the alternatives screening process narrowed the potential build alternatives from 15 to six, with two bridge Alternatives (C3-4 and F3) and four ferry alternatives (G2. G3, G4, and G4v). These six alternatives and the No Action Alternative were evaluated in detail in the Final SEIS. All of the action alternatives include roadway improvements on Gravina Island to enhance the transportation links to developable land.

The Final SEIS provides a detailed discussion of each reasonable alternative's direct, indirect, and cumulative impacts on the natural and human environment. All reasonable alternatives under consideration (including the No Action Alternative) were developed to a comparable level of detail in the Final SEIS and their comparative merits were evaluated. The following sections present a summary of the distinguishing characteristics of the reasonable alternatives; their environmental, economic, social, and cultural impacts; and the balancing of these values on which the selection of the G4v Alternative was based.

2.1 No Action Alternative – Continued Operation of Existing Airport Ferry

Under the No Action Alternative, no bridge would be constructed and no additional ferry service would be provided between Revillagigedo Island and Gravina Island. The existing airport ferry service across Tongass Narrows would continue to be the only public access between the islands, supplemented by private boats and floatplanes. There would be no improvements to the existing ferry terminals or amenities for pedestrians traveling between Revillagigedo Island and Ketchikan International Airport. There would be no new heavy freight mooring facility and the ferry layup dock would not be replaced. The ferry service would continue to operate 16 hours per day, and the frequency of service would remain the same, with departures every 30 minutes during the winter and every 15 minutes during the peak hours (8:00 a.m. to 4:00 p.m.) in summer.

2.2 Alternative C3-4: Airport Bridge

Alternative Description

Alternative C3-4 crosses Tongass Narrows near the airport. On Revillagigedo Island, the bridge would be accessed at the intersection of Don King Drive with Rex Allen Drive. Alternative C3-4 would follow the alignment of Rex Allen Drive around the Walmart store and continue to traverse the hillside southward along an existing topographic bench, gain elevation, and then make a right angle turn southwest, toward Gravina Island. The roadway would transition onto the bridge, cross over the North Tongass Highway and Tongass Narrows, and turn southward parallel to the airport runway. The bridge would cross over the seaplane facilities adjacent to the airport and ultimately touch down (i.e., reach the ground surface) on Gravina Island north of the airport terminal at the existing parking lot. The bridge would be supported by piers and would not require fill in Tongass Narrows other than the pier footings. Bridge abutments would be constructed on fill in uplands. The total length of the Alternative C3-4 alignment is 1.9 miles. Alternative C3-4 includes the following roadway improvements on Gravina Island: the bridge over Airport Creek would be replaced, and Seley Road would be reconstructed to 36 feet wide from Lewis Reef Road to approximately the end of the Airport Reserve.

The maximum height of the bridge over the navigational channel would be approximately 280 feet above mean higher high water (MHHW). The vertical navigational clearance would be 200 feet above MHHW. The horizontal navigational clearance would be 550 feet. These navigational clearances would accommodate one-way passage of cruise ships and two-way passage of most other ships, including AMHS ferries.

Comparison

Alternative C3-4 would have a construction and project development cost of $305 million and a life-cycle cost of $322 million. This alternative would affect the Part 77 airspace. FAA determined this bridge would be a hazard, adversely affecting the air navigational facility at Ketchikan International Airport and creating an obstacle for seaplane operations in Tongass Narrows. Safety concerns for large ships navigating under the bridge were noted by cruise ship lines and marine pilots in scoping comments and comments on the Draft SEIS. Longer ships would have an increased risk of allision with bridge piers, and taller ships would have to schedule transiting under the bridge with lower tides to have clearance under the bridge deck. No dredging would be required for this alternative. Wetland habitat loss with this alternative was estimated as 6.0 acres; 1.9 acres of marine Essential Fish Habitat (EFH) would be lost.

2.3 Alternative F3: Pennock Island Bridges

Alternative Description

Alternative F3 consists of two bridges crossing the East and West Channels of Tongass Narrows and a road across Pennock Island connecting the two bridges. On Revillagigedo Island, the alternative would begin at an intersection with South Tongass Highway approximately 1.5 miles south of downtown Ketchikan between the USCG Station and the Forest Park subdivision. From that terminus, the East Channel bridge would connect to Pennock Island. The roadway would cross Pennock Island, climbing in elevation to the West

Channel bridge. The roadway on Pennock Island would be approximately 4,500 feet long between the East Channel and West Channel bridge abutments. From Pennock Island, the West Channel bridge would connect to the Gravina Island Highway, approximately 3 miles south of the airport on Gravina Island. The total road distance between Revillagigedo Island and the airport passenger terminal is 5.87 miles.

The East Channel bridge would be approximately 1,985 feet long and have a maximum height of approximately 115 feet. The bridge would have a vertical navigational clearance of 60 feet above MHHW and a horizontal navigational clearance of approximately 350 feet. The main span of the bridge would be over water depths in excess of 40 feet (at low tide); however, the vertical and horizontal clearances would not accommodate cruise ships or most ferries. The primary waterway users of the East Channel under Alternative F3 would be tugs and barges, USCG vessels, charter boats, and local private craft.

The West Channel bridge would be approximately 2,470 feet long and have a maximum height of approximately 270 feet. The bridge would have a vertical navigational clearance of 200 feet above MHHW and a horizontal navigational clearance of approximately 550 feet. The main span would be located over water depths in excess of 40 feet (at low tide). These clearances would accommodate one-way passage of cruise ships and two-way passage of most other ships, including AMHS ferries, which typically use the West Channel. The bridge crossing of the West Channel would be perpendicular to the main navigational channel. To improve the navigational characteristics for cruise ships transiting the West Channel, the narrowest portion of the channel would be widened. The deepest part of the widened channel would be centered on the navigational opening of the West Channel bridge. These modifications would require dredging approximately 213,000 cubic yards over 14.8 acres.

Alternative F3 includes the following roadway improvements on Gravina Island: widening and paving the Gravina Island Highway and its bridges over Gravina and Government Creeks to 40 feet, widening and paving the Airport Access Road to 40 feet, creating a T-intersection at the Airport Access Road/Gravina Island Highway intersection, replacing the bridge over Airport Creek, and reconstructing Seley road to 36 feet wide from Lewis Reef Road to approximately the end of the Airport Reserve.

Comparison

Alternative F3 would have a construction and project development cost of $354 million and a life-cycle cost of $385 million. The bridges would not affect the Part 77 airspace associated with Ketchikan International Airport, but would create an obstacle for seaplanes.

The navigational clearance of the East Channel bridge would not accommodate cruise ships, AMHS ferries, or tall freight barges that currently use the East Channel. The West Channel bridge would have navigational clearance to accommodate one-way passage of cruise ships and two-way passage of most other ships, including AMHS ferries. The modifications to West Channel to improve its navigational characteristics would require dredging approximately 213,000 cubic yards over 14.8 acres.

The USCG has indicated this alternative would not meet the reasonable needs of navigation in Tongass Narrows. It would have an adverse effect on cruise ship operations because it would require additional maneuvering and increased sailing time. Safety concerns for large ships navigating under the West Channel bridge were also noted by cruise ship lines and marine pilots in scoping comments and comments on the 2013 Draft SEIS. Wetland habitat loss with this alternative was estimated as 26.0 acres, and 15.7 acres of marine EFH would be lost.

2.4 Ferry Alternatives

Four reasonable ferry alternatives were evaluated for the Gravina Access Project:

- Alternative G2: Peninsula Point to Lewis Point Ferry
- Alternative G3: Downtown to South of Airport Ferry
- Alternative G4: New Ferry Adjacent to Existing Ferry
- Alternative G4v: Lower Cost Variant of Alternative G4 Ferry

Alternatives G2, G3, and G4 include purchase of two new ferry vessels and construction of a new ferry terminal on each side of Tongass Narrows, as well as continued operation and maintenance of the existing airport ferry service under its current schedule and along its existing route.

All ferry alternatives include:

- A new passenger waiting facility with restrooms at the existing ferry terminal on Revillagigedo Island and other improvements to the terminal site, including:
    - Expansion of paved parking areas[1]
    - Lighting
    - Security (including security cameras)
    - Water
    - Sewer
    - Covered walkways
    - Fencing and landscaping
    - Parking meter system
    - Sidewalks
    - Tongass Highway access improvements
- Two shuttle vans to carry both pedestrians and their luggage from the existing ferry terminal on Revillagigedo Island to the airport terminal on Gravina Island.
- A new heavy freight mooring facility near the airport, to the south of the existing airport ferry layup dock, to provide heavy freight access to Gravina Island for highway loads that cannot be accommodated by the shuttle ferry

[1] DOT&PF does not assume property will be purchased and developed for parking facilities.

- Reconstruction of the existing airport ferry transfer bridges and ramps to meet current design standards
- Upgrades and improvements to all sidewalks and wheelchair ramps associated with the airport ferry facilities to meet applicable standards
- Construction of new toll facilities: Toll collection would continue at the existing rate for all ferry routes and toll revenue would be used to offset the costs of operation and maintenance of the ferry system. The cost estimates assume annual revenue of $1.5 million per year from ferry tolls.
- Replacement of the existing ferry layup dock and transfer bridge[2] to support layup and maintenance of the airport ferry system

2.4.1 Alternative G2: Peninsula Point to Lewis Point Ferry

Alternative Description

Alternative G2 would be a new ferry service that would complement the existing airport ferry for vehicles and passengers between Peninsula Point on Revillagigedo Island and Lewis Point on Gravina Island. This alternative would cross Tongass Narrows approximately 2.0 miles north of the airport passenger terminal and would have a sailing distance of approximately 0.8 mile. Two new ferry vessels and construction of a new ferry terminal on each side of Tongass Narrows would be required for this alternative. A 0.8-mile-long road would be constructed on Gravina Island to connect the ferry terminal at Lewis Point with Seley Road. Alternative G2 includes the following roadway improvements on Gravina Island: replacement of the bridge over Airport Creek, reconstruction and paving of Lewis Reef Road and Seley Road to 40 feet wide to the ferry terminal access road, reconstruction of Seley Road as 36-foot-wide gravel road to approximately the end of the Airport Reserve, creating a T-intersection at the Airport Access Road/Gravina Island Highway intersection, and widening and paving the Airport Access Road to 40 feet.

Comparison

Alternative G2 would have a construction and project development cost of $122 million and a life-cycle cost of $338 million. This alternative would have no impacts to aviation and, although it would introduce a new cross-channel ferry route in Tongass Narrows, it would not substantially affect marine navigation. Alternative G2 would require dredging of approximately 1,400 cubic yards over approximately 0.25 acre. Wetland habitat loss with this alternative was estimated at 17.2 acres, and 2.2 acres of marine EFH would be lost.

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[2] The existing layup dock was originally a segment of the State of Washington I-90 floating bridge. It was recycled for use as the Borough's dock. It has always had a slight list that cannot be corrected with ballasting, and it is not long enough to tie up the new ferries. The transfer bridge between the shore and dock has been regularly inspected by DOT&PF and is in such a state of disrepair that its load-carrying capabilities have been steadily downgraded and is now closed to public access.

2.4.2 Alternative G3: Downtown to South of Airport Ferry

Alternative Description

Alternative G3 would be new ferry service that would complement the existing airport ferry for vehicles and passengers between downtown Ketchikan at Jefferson Street (near the Plaza Mall at Bar Point) on Revillagigedo Island and a location approximately 1.3 miles south of the airport passenger terminal on Gravina Island near Clump Cove. The crossing distance would be approximately 1.3 miles. This alternative would require construction of a new ferry terminal on each side of Tongass Narrows and two new ferry vessels. Dredging may be required to provide adequate navigational depth for the ferry terminal on Revillagigedo Island. The existing breakwater could also be widened and extended for use as the ferry terminal pier. A paved road would be constructed on Gravina Island from the ferry terminal past the new Runway 11/29 extension and approximately 0.2 mile to the Gravina Island Highway. Alternative G3 includes the following roadway improvements on Gravina Island: widening and paving the Gravina Island Highway and its bridge over Government Creek to 40 feet, widening and paving the Airport Access Road to 40 feet, creating a T-intersection at the Airport Access Road/Gravina Island Highway intersection, replacing the bridge over Airport Creek, and reconstructing Seley road to 36 feet wide from Lewis Reef Road to approximately the end of the Airport Reserve.

Comparison

Alternative G3 would have a construction and project development cost of $107 million and a life-cycle cost of $316 million. This alternative would have no impacts to aviation and, although it would introduce a new cross-channel ferry route in Tongass Narrows, it would not substantially affect marine navigation. Alternative G2 would require dredging of approximately 18,600 cubic yards over approximately 2.2 acres. Wetland habitat loss with this alternative was estimated at 11.9 acres, and 5.1 acres of marine EFH would be lost.

2.4.3 Alternative G4: New Ferry Adjacent to Existing Ferry

Alternative Description

Alternative G4 would be new ferry service for vehicles and passengers adjacent to the existing airport ferry route between Charcoal Point on Revillagigedo Island and the existing ferry lay-up berth on Gravina Island on a quarter-mile crossing of Tongass Narrows, approximately 2.8 miles north of downtown. This alternative would require two new ferry vessels and construction of a new ferry berth on each side of Tongass Narrows adjacent to the existing airport ferry terminals. Alternative G4 includes the following roadway improvements on Gravina Island: the bridge over Airport Creek would be replaced and Seley Road would be reconstructed to 36 feet wide from Lewis Reef Road to approximately the end of the Airport Reserve.

Comparison

Alternative G4 would have a construction and project development cost of $91 million and a life-cycle cost of $294 million. This alternative would have no impacts to aviation and, although it would introduce a new cross-channel ferry route in Tongass Narrows, it would not substantially affect marine navigation. Alternative G4 would not require any dredging. Wetland habitat loss with this alternative was estimated at 6.0 acres, and 1.4 acres of marine EFH would be lost.

2.4.4 Alternative G4v: Lower Cost Variant of Alternative G4

Alternative Description

Alternative G4v is a lower cost variant of Alternative G4. It provides shoreside facilities to improve the convenience of airport travelers and heavy freight movement, but does not add new ferries or ferry berths. Like the other ferry alternatives, Alternative G4v includes the passenger waiting facility, shuttle vans, new heavy freight mooring facility, reconstructed airport ferry transfer bridges, upgraded sidewalks and ramps, continued toll collection, and replacement of the ferry layup dock. Improved access would only relate to the benefits provided by shoreside amenities. This alternative would cross Tongass Narrows approximately 2.8 miles north of downtown. The crossing distance is approximately 0.25 mile. Alternative G4v includes the following roadway improvements on Gravina Island: the bridge over Airport Creek would be replaced and Seley Road would be reconstructed to 36 feet wide from Lewis Reef Road to approximately the end of the Airport Reserve.

Comparison

Alternative G4v would have a construction and project development cost of $46 million and a life-cycle cost of $171 million. This alternative would have no impacts to aviation or marine navigation. Alternative G4v would not require any dredging. Wetland habitat loss with this alternative, attributable to the road and bridge improvements on Gravina Island, was estimated at 6.0 acres, and 1.1 acres of marine EFH would be lost.

2.5 Environmentally Preferred Alternative

Alternative G4v is the Environmentally Preferred Alternative and the Selected Alternative. Alternative G4v would have the least impact on the natural environment as compared with other build alternatives; in addition, it would have no effect on historic resources, and would not require relocation of any residences or businesses.

3. Basis for Decision

FHWA selected Alternative G4v based on the analyses in the attached Final SEIS and public agency input. Alternative G4v addresses the immediate needs for improving access to Ketchikan International Airport and developable land on Gravina Island with improvements to the existing ferry system, freight transportation facilities, and Gravina Island roads. Alternative G4v provides improvements to the existing ferry system with new and reconstructed shoreside facilities (i.e., without adding ferry vessels or changing ferry operations). The selected alternative partially meets the need of promoting environmentally sound, planned long-term economic development on Gravina Island by providing new and improved roads to developable lands (i.e., Gravina Island Highway as constructed and Seley Road/Airport Creek Bridge Improvements). Alternative G4v would have the least impact on natural habitat as compared with other build alternatives, would not affect historic properties, and would not require relocation of any residences or businesses.

FHWA determined that the SEIS bridge alternatives, C3-4 and F3, would have the highest construction costs of all reasonable alternatives evaluated in the SEIS, with costs in excess of $300 million. Alternatives C3-4 and F3 also would result in adverse impacts to existing air and water navigation routes as stated by the U.S. Coast Guard (USCG) and Federal Aviation Administration (FAA):

- Under the provisions of 14 CFR Part 77, FAA filed a determination that Alternative C3-4 would have substantial adverse effect on the safe and efficient utilization of the Ketchikan International Airport's navigable airspace.
- The USCG indicated that Alternative F3 would not meet the reasonable needs of navigation in Tongass Narrows because vessels requiring more than 60 feet of vertical clearance would need to transit under the West Channel bridge or enter and exit Tongass Narrows from the north. Either option would have an adverse effect on cruise ship operations because it would require additional maneuvering and increased sailing time. Safety concerns for large ships navigating under either proposed bridge alternative (C3-4 or F3) were also noted by cruise ship lines and marine pilots in scoping comments and comments on the Draft SEIS. Longer ships would have an increased risk of allision with bridge piers and taller ships would have to schedule transiting under the bridge with lower tides to have clearance under the bridge deck.

When considering all ferry alternatives, FHWA found Alternative G4v preferable because it provides a similar benefit of induced growth at a lower cost than the other ferry alternatives. Project capital cost was the primary reason DOT&PF was directed by then-Governor Sarah Palin in 2007 to identify the most fiscally responsible alternative for the Gravina Access Project. Alternative G4v is the most fiscally responsible alternative for the Gravina Access Project. While G4v will not increase capacity of the ferry system, it will improve convenience and reliability of access to Gravina and Ketchikan International Airport and improve the movement of freight between Gravina and Revillagigedo Islands. Alternative G4v sufficiently meets the purpose of and need for the project.

4. Section 4(f)

FHWA determined no alternative evaluated in the Gravina Access Project SEIS would require land from any park, recreation area, wildlife refuge, or historic site subject to protection under Section 4(f) of the Department of Transportation Act of 1966 (as amended), 49 United States Code (USC) § 303(c).

5. Measures to Minimize Harm

Mitigation measures related to all alternatives evaluated in the SEIS are described in each section of Chapter 4 and compiled at the end of Chapter 4 in Section 4.30. The following presents DOT&PF's and FHWA's commitment to mitigate impacts that result from the development of Alternative G4v. All practicable means to avoid or minimize environmental harm have been adopted and incorporated into this Record of Decision pursuant to 40 CFR §

1505.2(c). In many cases, the construction contractor would implement the mitigation measures. Other mitigation measures would be incorporated during final design of Alternative G4v. Reports that provide additional background and detail are in the SEIS appendices.

5.1 Land Ownership Mitigation Measures

The movement of construction vehicles and equipment could temporarily affect access to properties and lands adjacent to the construction areas. These effects will be limited to a small corridor immediately adjacent to the construction activity. The construction contractor will identify temporary construction easements in a fashion that minimizes disturbance. Construction limits will be staked and clearly demarcated to prevent encroachment into adjacent areas.

5.2 Social Environmental Mitigation Measures

Vehicle access to all community and public safety facilities will be maintained throughout construction. The construction contractor will be required to work with the businesses and local residents to maintain property access throughout the construction phase. Properties and land uses will be returned to preconstruction conditions to the maximum extent practicable.

5.3 Transportation Mitigation Measures

Construction in the vicinity of the airport could require temporary changes to the airport circulation road and temporary elimination of adjacent parking to accommodate construction vehicles. The construction contractor will develop a Traffic Control Plan (TCP) to describe how traffic will be maintained and parking will be managed to minimize impacts to vehicle travel on Ketchikan roadways and at the airport. Construction that might cause lane closures will be timed for low-traffic periods. Temporary roads and driveways will be employed where necessary to ensure continued mobility during construction. The construction contractor will also develop a plan to address marine transportation and identify measures to divert small boats and watercraft using nearshore areas around construction areas.

5.4 Pedestrian and Bicyclists Mitigation Measures

The TCP will include provisions for maintaining pedestrian and bicycle traffic and safety through construction areas. The construction contractor will avoid obstructing or affecting roads, sidewalks, and bike paths whenever possible to maintain access. If obstructing access is unavoidable, the construction contractor will establish temporary detour routes.

5.5 Geology Topography and Wind Mitigation Measures

DOT&PF will develop an erosion and sediment control plan (ESCP). The ESCP will describe the methods to restore disturbed areas within the construction easement to preconstruction conditions to the extent possible.

5.6 Air Quality Mitigation Measures

The construction contractor will be required to implement measures to control dust at construction sites and minimize emissions from construction equipment. The construction contractor will implement measures to minimize emissions from construction equipment and minimize construction-related traffic delays as part of the TCP to reduce greenhouse gas emissions. To the extent practicable, Alternative G4v facilities will be designed using materials with the longest available life. These choices will result in new facilities that have a longer life before needing to be replaced than those built without such considerations, which in turn will reduce overall emissions for reconstruction and replacing materials.

- To reduce impacts associated with construction delays and changes in traffic flow, the construction contractor will execute its TCP, which will minimize construction-related congestion and maintain traffic flow throughout the construction site.
- To reduce impacts associated with construction equipment, unnecessary idling of construction vehicles, trucks, and heavy equipment will be prohibited.
- The construction contractor will be required to routinely maintain and service all construction vehicles, trucks, and equipment to ensure they are in proper working condition and running as efficiently as possible.
- To reduce energy use to retrieve construction materials, construction equipment and material will be located as close to project construction sites as possible to reduce hauling distances and energy consumption.

5.7 Noise and Vibration Mitigation Measures

In accordance with City of Ketchikan noise regulations, construction activities will be prohibited between the hours of 11:00 p.m. and 6:00 a.m. to minimize disruption to residents. The construction contractor may request from the City some exceptions to the noise regulations during special construction activities. In-water pile driving and/or drilling will be controlled to ensure that the pressure waves generated will not pose a consistent, adverse threat to fish and other marine resources. The construction contractor will adhere to permit conditions for in-water work during construction.

5.8 Water Quality Mitigation Measures

Final roadway design will include culverts or bridges along existing drainages and across streams on Gravina Island. The roadway design will incorporate a stormwater management system to minimize the effects of runoff.

The construction contractor will adhere to applicable state and federal permit conditions for all water body and wetland crossings. Best management practices (BMPs) will be implemented as part of the ESCP to control runoff from construction areas to minimize erosion and transport of sediment, to prevent any accidental leaks of oil or fuel from equipment from contaminating creeks or Tongass Narrows, and to contain any such leaks. DOT&PF will hold meetings at the beginning of construction with the construction contractor and agencies to emphasize the importance of implementing BMPs and other mitigation commitments.

Construction-related BMPs will include:

- Limiting clearing and grubbing outside of the fill footprint to the extent practicable to control physical disturbance of wetlands and habitats
- Installing sediment barriers adjacent to waterways just beyond the estimated toe of fill to capture fine-grained material contained in runoff
- Installing ditch checks to reduce bank erosion
- Locating all staging, fueling, and equipment-servicing operations at least 100 feet away from all streams and wetlands
- Having spill response equipment readily available and ensuring that construction personnel are trained in spill response to contain accidental leaks of oil or fuel from construction equipment

5.9 Wetlands and Vegetation Mitigation Measures

5.9.1 Wetlands

Impacts to wetlands were avoided wherever practicable in the preliminary design phase of the project alternatives. Avoidance measures include designing roadways with a minimum-width fill footprint, maximizing use of the existing roadway, increasing the angle of fill slopes, maintaining natural flow patterns by installing culverts through the fill, minimizing the use of wetlands for staging and storage areas, minimizing the area of allowable disturbance during construction, minimizing all temporary fill in wetlands, and restoring wetlands that are temporarily disturbed.

The use of wetlands for construction activities will be minimized to the extent practicable. DOT&PF requirements to operate construction equipment on geotextile mats will allow complete removal of the mat without further soil disturbance upon completion of construction, which will protect wetland soils in the construction easement.

After construction activities, shrubs and herbaceous plants likely will recover naturally, but the disturbed areas will be reseeded after construction to minimize erosion. Seeding of the disturbed areas will conform to Section 618 of the DOT&PF Standard Specifications for Seeding. No natural earthen material will be removed from under the geotextile mat (or equivalent materials) when the temporary fill is removed. Wetlands will be stabilized against erosion once construction equipment and protective mats are removed. DOT&PF will restore the 0.1 acre wetland that that will be temporarily filled by reseeding and revegetating the disturbed areas. Detailed mitigation measures will be developed and followed as conditions of the required federal permits.

In addition to the BMPs to mitigate water quality impacts, construction-related BMPs concerning wetlands mitigation will include:

- Limiting clearing and grubbing outside of the fill footprint to the extent practicable to control physical disturbance of wetlands and habitats
- Employing erosion control BMPs to reduce or eliminate sedimentation of adjacent wetlands and other waters and habitats

Using appropriate erosion control practices (including the installation of sediment barriers and sedimentation traps, and seeding and stabilizing road slopes) and implementing a SWPPP will minimize water quality impacts to wetlands.

DOT&PF proposes to compensate for unavoidable adverse impacts to wetlands through the creation of a Compensatory Mitigation Plan developed during the Section 404/10 permitting process in coordination with the USACE. The Compensatory Mitigation Plan will likely involve an in-lieu-fee and/or permittee-responsible enhancement, restoration, and preservation mitigation projects developed using a watershed approach.

Detailed mitigation measures will be developed and followed as conditions of the required federal permits.

5.9.2 Vegetation

Final design for Alternative G4v will avoid and minimize direct impacts to vegetation by reducing clearing limits and using previously disturbed areas for staging wherever feasible. Temporarily disturbed areas will be planted or reseeded.

5.10 Water Body Modification and Wildlife Mitigation Measures

5.10.1 Water Bodies

Final roadway design for Alternative G4v will provide for maintenance of natural water flow conditions. Culvert design will accommodate stormwater flow, not result in scour, and allow fish passage. In addition, gravels and streambed material will be used in the bottoms of culverts. The replacement bridge over Airport Creek will be a clear-span bridge, avoiding potential impacts to the creek.

Construction activity in any water body will adhere to applicable state and federal permit conditions. Temporary diversions will be designed so that the flow of the water body is not impeded. Any creek banks or beds affected by diversion structure placement will be restored to preconstruction conditions to the maximum extent practicable. Recontoured stream banks will be reseeded with native seed and annual rye to minimize erosion, as recommended in the DNR *Coastal Revegetation and Erosion Control Guide*[3].

5.10.2 Marine Mammals, Anadromous Fish, Marine Fish, and Essential Fish Habitat Impacts

All fish stream crossings will be designed to minimize impacts to proper stream function. Fish stream crossings will be designed to provide passage to both anadromous and resident fish. At all stream crossings (culvert and Airport Creek bridge crossings), stream banks will be recontoured to approximate original conditions and reseeded to minimize erosion. To mitigate the effects of placing new dolphins in nearshore areas, structures will be located in a manner that will leave a nearshore migration corridor (down to at least -5 feet mean lower low water [MLLW]) clear of obstruction to the extent practicable.

[3] Wright, Stoney J., and Philip K. Czapla. 2011. *Alaska Coastal Revegetation and Erosion Control Guide*. Palmer, Alaska: Alaska Department of Natural Resources, Division of Agriculture, Plant Materials Center.

Construction of this project will require a Title 16 Fish Habitat Permit and a USACE Section 404/10 Permit for fill in waters of the United States. Coordination with the National Marine Fisheries Service (NMFS) has been ongoing during the planning of this project. The following conservation measures will be incorporated to avoid, minimize, and mitigate impacts to marine species and EFH:

- In-water work in Tongass Narrows will be restricted as follows:
    - General use of boats and barges can occur year round for general survey work
    - Except for pile driving, work in marine waters can occur between July 1 and February 28
    - Pile driving will occur only November 1 through February 28.
- When pile driving in Tongass Narrows, a vibratory hammer will be used to drive steel pilings instead of an impact hammer; pile driving in intertidal and subtidal areas will occur during low tide
- All construction in and around anadromous fish streams will be conducted when stream disturbances have the least impact on anadromous fish species:
    - In-stream construction work in the Ketchikan area is June 15 through August 7
    - Isolate in-water work areas, except for stream crossings by construction equipment, from flowing waters of all anadromous fish streams
- Gravels and streambed material used in the bottoms of fish passage culverts will emulate natural streambed conditions
- Stream bank stabilization will be provided as necessary to maintain stream bank integrity, and will include the use of bioengineering techniques to improve habitat value of the riprap, by incorporation of willow stakes or other locally available vegetation

5.10.3 Amphibians, Birds, and Land Mammals Mitigation

To mitigate for construction impacts to wildlife, temporary areas of vegetation removal will be minimized to the extent practical. Throughout construction, BMPs will be utilized to minimize sedimentation, erosion, or other impacts to wildlife. Clearing of nests for species protected under the Migratory Bird Treaty Act will be conducted prior to construction and outside of nesting season (typically March through July). The construction contractor will be required to comply with the U.S. Fish and Wildlife Service (USFWS) construction advisory for protection of migratory birds.[4]

5.10.4 Bald Eagles Mitigation

If Alternative G4v were to come within 660 feet of a bald eagle nest, DOT&PF will be required to obtain a Bald Eagle Take Permit. This permit may require development of mitigation measures with USFWS. This permit may require development of mitigation measures with USFWS. Mitigation measures may require biologists to monitor construction activities around the area that will potentially affect eagle nests, and will limit certain construction activities during the nesting season (typically February through August).

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[4] Titled *Land Clearing Timing Guidance for Alaska*, the document is available at https://www.fws.gov/alaska/fisheries/fieldoffice/anchorage/pdf/vegetation_clearing.pdf and was accessed January 24, 2017.

5.11 Threatened and Endangered Species Mitigation Measures

To avoid injury to or harassment of humpback whales, or other marine mammals, DOT&PF and FHWA are committed to the measures listed below:

- Requiring the construction contractor to use trained and NMFS-approved observers to indicate when marine mammals were within a 164-foot (50-meter) zone around pier work or other in-water work, and delaying or ceasing work until the animals moved out of the area
- Acquiring all necessary permits prior to construction and incorporating stipulations into contract specifications
- Obtaining any necessary incidental harassment authorization from NMFS
- Finalizing mitigation measures with input from the Alaska Department of Fish and Game (ADF&G), NMFS, USACE, and USFWS

These mitigation measures are designed to be compatible with EFH mitigation measures for the project. All project-related activities will conform to the pertinent provisions of the Marine Mammal Protection Act and the Endangered Species Act.

5.12 Historic and Archaeological Preservation Mitigation Measures

Historic and archaeological sites in the vicinity of construction areas will be identified for the construction contractor to avoid. DOT&PF will continue coordination with the State Historic Preservation Officer (SHPO) through the design process, if necessary. If cultural resources or human remains are discovered during construction, construction at that location will be prohibited until the site is evaluated.

5.13 Hazardous Waste Mitigation Measures

The construction contractor will be required to meet all federal, state, and local regulatory requirements regarding the discovery and use of hazardous materials. Construction contractors on site must be trained to meet federal, state, and local regulatory requirements in recognizing and reporting discovery of unknown contamination, and proper use and handling of hazardous materials during construction. If unknown hazardous materials are encountered during construction, the contractor will be expected to isolate the area and prevent migration of any contaminants.

The construction contractor will develop a spill prevention and response plan. Hazardous materials used during project construction will be stored and handled according to state and federal regulations. Construction vehicles will contain spill prevention kits in case of minor hazardous materials or chemical spills during construction.

5.14 Visual Environment Mitigation Measures

All construction equipment and debris will be removed after construction is completed. Reseeding will repair bare soil areas. These efforts will repair the visual impacts of construction after the construction process is finished.

5.15 Utilities Mitigation Measures

Affected customers will be given advance notice of any service interruptions. For longer outages, temporary facilities will be provided to maintain service to affected customers.

6. Monitoring or Enforcement Program

In accordance with 40 CFR 1505.2(c): "A monitoring and enforcement program shall be adopted and summarized where applicable for any mitigation."

No monitoring or enforcement plan has been developed specifically for this project.

Both FHWA and DOT&PF will monitor this project to verify that mitigation measures contained in the ROD (and subsequent permits) are implemented. FHWA will continue to be involved in further review of project development and construction. DOT&PF procedures for design and construction include public outreach program.

Copies of this ROD will be provided to responsible public agencies and DOT&PF project personnel. Commitments within this document will be implemented through the inclusion of these measures in the construction plans for the project and the acquisition of necessary local, state, and federal permits.

7. Conclusion

The Gravina Access Project Final SEIS is in conformance with applicable provisions of 23 CFR 771 and 40 CFR 1505.2 and satisfactorily addresses the anticipated environmental impacts that will result from construction of Alternative G4v. All correspondence received on the Draft SEIS has been reviewed and considered (see Section 7.3 and Appendix I of the attached Final SEIS for substantive comments received and responses to those comments). Based on this review, we find that there were no substantive issues or impacts not addressed.

Based on the analysis and evaluation contained in this project's Final SEIS and after careful consideration of all social, economic and natural environmental factors and input from state and local governments, Tribes, and the public, it is my decision to select Alternative G4v for this project.

6/15/17

Date

Sandra A. Garcia-Aline, FHWA Alaska Division Administrator

Gravina Access Project

Final Supplemental Environmental Impact Statement

DOT&PF Project No: 67698
Federal Project No: ACHP-0922(5)

Prepared for:

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June 2017

FHWA-AK-EIS-03-01-F/67698

Gravina Access Project

Ketchikan, Alaska
Ketchikan Gateway Borough

Final Supplemental Environmental Impact Statement

Submitted Pursuant to 42 U.S. C. 4332 (2) (c)
by the
U.S. Department of Transportation
Federal Highway Administration
and
State of Alaska
Department of Transportation and Public Facilities

Cooperating Agencies
U.S. Coast Guard
U.S. Army Corps of Engineers

6/15/17
Date of Recommendation

Michael J. Coffey for DOT&PF

6/15/17
Date of Approval

Sandra A. Garcia-Aline for FHWA

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The Gravina Access Project would improve public access between Revillagigedo Island and Gravina Island. In June 2013, the Federal Highway Administration (FHWA) and the Alaska Department of Transportation and Public Facilities (DOT&PF) issued a draft Supplemental Environmental Impact Statement (SEIS) describing the purpose and need for improved access, alternatives considered, and the potential environmental effects of the alternatives. Six build alternatives were evaluated, along with the No Action Alternative. The draft SEIS examined the potential direct, indirect, and cumulative impacts associated with each alternative.

This final SEIS is a revision of the draft SEIS. The revisions presented in this Final SEIS are based on agency and public comments on the draft SEIS and updated information that is relevant to the alternatives analysis. This final SEIS identifies Alternative G4v as FHWA's and DOT&PF's preferred alternative. This final SEIS is issued concurrently with FHWA's Record of Decision, which identifies Alternative G4v as the selected alternative for design and construction.

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SUMMARY

Introduction

The Alaska Department of Transportation and Public Facilities (DOT&PF), in cooperation with the Federal Highway Administration (FHWA), has developed the Gravina Access Project to improve public access between Revillagigedo Island and Gravina Island. In July 2004, FHWA and DOT&PF issued a Final Environmental Impact Statement (FEIS) for the Gravina Access Project, identifying Alternative F1 as the preferred alternative. Alternative F1 would cross Tongass Narrows at Pennock Island, requiring two bridges (one across East Channel and one across West Channel) and roadway link to the airport on Gravina Island. Alternative F1 was the selected alternative in FHWA's Record of Decision, which was issued on September 15, 2004.

With Alternative F1 selected in FHWA's Record of Decision and identified and permitted as the Least Environmentally Damaging Practicable Alternative (LEDPA) by the U.S. Army Corps of Engineers (USACE), the DOT&PF moved forward with the first phase of implementing Alternative F1: construction of the Gravina Island Highway. Construction of the Gravina Island Highway was completed in 2008.

On September 21, 2007, due to rapidly escalating costs, Alaska Governor Sarah Palin directed the Department to look for the most fiscally responsible alternative for the Gravina Access Project instead of proceeding further with Alternative F1.

Purpose of the SEIS

Council on Environmental Quality (CEQ) Regulations for Implementing the National Environmental Policy Act (40 CFR 1500-1508) state that agencies shall prepare supplements to either draft or final EISs if:

> (i) The agency makes substantial changes in the proposed action that are relevant to environmental concerns; or
>
> (ii) There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.

FHWA and DOT&PF determined that a Supplemental Environmental Impact Statement (SEIS) should be prepared for the Gravina Access Project and, on July 2, 2008, FHWA issued a notice of intent to re-examine alternatives in an SEIS and identify and select a new preferred alternative.

Similar to an EIS, the SEIS shall ~~determine~~identify, characterize, analyze, and document the project's environmental impacts, as well as specify ~~possible~~ proposed mitigation of adverse impacts. On June 21, 2013, FHWA and DOT&PF ~~This Draft SEIS is made~~ issued the Draft SEIS for the Gravina Access Project and gave ~~available to~~ the ~~general~~ public and other interested parties (including government entities, regulatory agencies, and Native organizations) ~~who are given~~ an opportunity to comment on its content during a ~~45~~54-day comment period. The 2013 Draft SEIS did not identify a preferred alternative.~~These comments may range from simple statements of support or opposition to complex technical discussions of project alternatives, study methods, determination and characterization of impacts, and mitigation recommendations.~~

On October 22, 2015, DOT&PF announced its recommendation to FHWA that Alternative G4v be identified as the preferred alternative for the Gravina Access Project. On March 3, 2016, FHWA and DOT&PF issued a joint public notice identifying Alternative G4v as their ~~The Final SEIS will identify a~~ preferred alternative and making know ~~their~~FHWA's intent to issue a combined Final SEIS and Record of Decision. The FHWA and DOT&PF invited comments during a 35-day comment period. Only one comment was received during the comment period: it was a letter from the Ketchikan Gateway Borough, Office of the Borough Mayor, David Landis. The letter from Mayor Landis expressed the Borough's support for the preferred alternative and endorsement of the Final SEIS/Record of Decision as a combined document.

Alternative G4v would include improvements to the existing airport ferry system. This Final SEIS ~~and~~ provides additional information about the preferred alternative and explains why it was preferred; documents and responds to all substantive comments on the 2013 Draft SEIS~~. If comments received on the Draft SEIS are minor, FHWA and DOT&PF, in accordance with Section 1319 of the Moving Ahead for Progress in the 21st Century Act (MAP-21), may elect to issue the Final SEIS as errata sheets. The errata sheets would explain factual corrections to the Draft SEIS and explain why Draft SEIS comments do not warrant further response in the form of a full Final SEIS. In either approach (a full Final SEIS or errata sheets), the Final SEIS will identify a preferred alternative and explain why it was selected~~; describes findings, including any ~~on~~ required for wetlands, floodplains, and ~~section 106 effects~~cultural resources~~, as applicable~~; and provides a list of commitments for mitigation measures for the preferred alternative.~~;~~ This Final SEIS ~~and~~ also identifies~~y~~ any other findings to be made in compliance with all environmental laws, regulations, Executive Orders, and other related requirements with associated agency consultation~~ documentation~~. ~~An additional 30-day review would follow publication of the Final SEIS.~~ FHWA's ~~The~~ Record of Decision is issued concurrently with~~ll include responses to comments on the~~ this Final SEIS. The Record of Decision identifies Alternative G4v as the selected alternative.

Organization of the Final SEIS

This Final~~e~~ SEIS is organized as follows:

- Summary
- Contents (including listings of all tables, figures, and appendices)
- Acronyms and Abbreviations
- Chapter 1.0: Purpose of and Need for Action
- Chapter 2.0: Alternatives
- Chapter 3.0: Affected Environment
- Chapter 4.0: Environmental Consequences
- Chapter 5.0: List of Preparers
- Chapter 6.0: SEIS Distribution List
- Chapter 7.0: Comments and Coordination
- Chapter 8.0: Index
- Appendices:
  - ~~A – DOT&PF Commissioner Letters~~
  - ~~B – Conceptual Stage Relocation Study and Assessment of Right-of-Way Acquisition Costs and Addendum~~
  - ~~C – FAA Determination of No Hazard to Air Navigation~~
  - ~~D – ADEC letter to FHWA on Air Quality Conformity Analysis~~
  - ~~E – Essential Fish Habitat and Threatened and Endangered Species Consultation~~
  - F – Updated Cost Estimates for Alternatives
  - G – FAA Determination of Hazard to Air Navigation
  - H – Draft Section 404/10 Permit Application, Draft Section 404(b)(1) Analysis, and Wetland Finding
  - I – Comments on the Draft SEIS

The basis of this document is the 2013 Draft SEIS text in its entirety, with changes made throughout the document to reflect the selection of a preferred alternative, refinements to the project design, updated information on the affected environment, changes in the assessment of impacts, corrections, the selection of mitigation measures, the results of coordination, comments received on the 2013 Draft SEIS, and responses to those comments. Important changes are indicated with colored text for easy identification by the reader: added text is underlined; deleted text has a line through it. New appendices are included in printed versions of this Final SEIS. Appendices issued with the 2013 Draft SEIS (i.e., Appendices A through E) can be viewed on the CD version of the Final SEIS and on the project website (http://www.dot.alaska.gov/sereg/projects/gravina_access/index.shtml).

Proposed Action

The proposed action is to improve surface transportation between Revillagigedo Island and Gravina Island in the Ketchikan Gateway Borough (Borough) of Alaska. The purpose of and need for the Gravina Access Project, which have not changed since the 2004 FEIS was issued, are as follows:

> ***Purpose:*** The purpose of the Gravina Access Project is to improve surface transportation between Revillagigedo Island and Gravina Island.
>
> ***Need:*** The need for improving access is threefold:
>
> - To provide the Borough and its residents more reliable, efficient, convenient, and cost-effective access for vehicles, bicycles, and pedestrians to Borough lands and other developable or recreation lands on Gravina Island in support of the Borough's adopted land use plans
> - To improve the convenience and reliability of access to Ketchikan International Airport for passengers, airport tenants, emergency personnel and equipment, and shipment of freight
> - To promote environmentally sound, planned long-term economic development on Gravina Island

Currently, there is no "hard link" (surface) transportation between Gravina Island and Revillagigedo Island. Public access between the islands is available via a ferry that transports vehicles, bicyclists, and pedestrians from Ketchikan across Tongass Narrows to the Ketchikan International Airport terminal on Gravina Island. The proposed action addresses the need for improved access to developable land, improved access to the airport, and long-term economic development on Gravina Island. Chapter 1 provides a detailed description of the purpose of and need for the project.

Summary of Gravina Access Project Alternatives Considered

> Note that descriptions of the ferry alternatives have been revised in this Final SEIS to clarify terminology: "ferry terminal" refers to the site that includes all shoreside facilities at a given location, and "ferry berth" refers to the transfer bridge and ramp where a ferry vessel would moor to load and unload passengers.

The FHWA and DOT&PF have examined a range of alternatives for the Gravina Access Project in this SEIS: one bridge alternative that crosses Tongass Narrows near the airport, one bridge alternative that crosses Pennock Island, three ferry alternatives that would supplement the existing airport ferry service with new ferries and terminals, and one ferry alternative that makes improvements to the existing airport ferry facilities. All of the action alternatives include roadway improvements on Gravina Island to enhance the transportation links to developable land. The Gravina Access Project SEIS presents and analyzes the following alternatives.

No Action Alternative - Continued operation of existing airport ferry

Under the No Action Alternative, no bridge would be constructed and no additional ferry service would be provided between Revillagigedo Island and Gravina Island. The only public access between the two islands would continue to be provided by the existing airport ferry service across Tongass Narrows, private boats, and floatplanes. On Revillagigedo Island, the existing ferry terminal is located 2.8 miles north of downtown Ketchikan; on Gravina Island, the terminal is on the waterfront, just east of the airport terminal. The Borough operates the airport ferry service. The ferry service would continue to operate 16 hours per day and the frequency of service would remain the same, with departures every 30 minutes in winter and every 15 minutes in summer.

Alternative C3-4 – Airport Bridge with 200 feet of vertical navigational clearance

Alternative C3-4 would include construction of a road along a topographic bench on Revillagigedo Island connecting to Rex Allen Drive/Misty Marie Lane/Signal Road near Wal-Mart and a bridge across Tongass Narrows touching down on Gravina Island near the airport terminal. The Alternative C3-4 bridge would be approximately 4,190 feet long and total length of the alternative would be 1.9 miles. It would include an 8-foot-wide walkway on the bridge structure, which can be used by pedestrians and bicycles. The maximum height of the bridge over the navigational channel would be approximately 280 feet above mean higher high water (MHHW), which would penetrate FAA Part 77 airspace. The vertical navigational clearance would be 200 feet above MHHW. The horizontal navigational clearance would be 550 feet. These navigational clearances would accommodate one-way passage of cruise ships and two-way passage of most other ships, including Alaska Marine Highway System (AMHS) ferries.

Alternative F3 – Pennock Island bridges with 60 feet of vertical navigational clearance over the East Channel and 200 feet of vertical navigational clearance over the West Channel

Alternative F3 is approximately 5.9 miles long and would cross Tongass Narrows with two bridges via Pennock Island. The access would begin at South Tongass Highway south of the U.S. Coast Guard Station and cross the East Channel to Pennock Island and the West Channel to Gravina Island. The East Channel bridge would be approximately 1,985 feet long and have a maximum height of approximately 115 feet above MHHW. The bridge would have a vertical navigational clearance of 60 feet above MHHW and a horizontal clearance of approximately 350 feet. These clearances would not accommodate cruise ships, AMHS ferries, or tall freight barges that currently use the East Channel as their primary navigational route. The primary users of the East Channel are anticipated to be smaller tugs and barges, and commercial and recreational vessels with air drafts less than 60 feet. The West Channel bridge would be approximately 2,470 feet long and have a maximum height of approximately 270 feet above MHHW. The bridge would have a vertical navigational clearance of 200 feet above MHHW and a horizontal navigational clearance of approximately 550 feet, which would accommodate one-way passage of cruise ships and two-way passage of most other ships, including AMHS ferries. Both bridge structures would include an 8-foot-wide walkway, which can be used by pedestrians and bicycles. Neither bridge would penetrate FAA Part 77 airspace. This alternative requires dredging the West Channel to improve its navigational characteristics. The dredged quantity is approximately 213,000 cubic yards over approximately 15 acres.

Alternative G2 - New ferry between Peninsula Point and Lewis Point; continued operation of existing ferry

Alternative G2 would be a new ferry service that would complement the existing airport ferry for vehicles and passengers between Peninsula Point on Revillagigedo Island and Lewis Point on Gravina Island. This alternative would cross Tongass Narrows approximately 2.0 miles north of the airport passenger terminal and would have a sailing distance of approximately 0.8 miles. Two new ferry vessels and construction of a new ferry terminal on each side of Tongass Narrows would be required for this alternative. A 0.8-mile-long road would be constructed on Gravina Island to connect the ferry terminal at Lewis Point with Seley Road.

Alternative G3 - New ferry between downtown and south of airport; continued operation of existing ferry

Alternative G3 would be new ferry service that would complement the existing airport ferry for vehicles and passengers between downtown Ketchikan at Jefferson Street (near the Plaza Mall at Bar Point) on Revillagigedo Island and a location approximately 1.3 miles south of the airport passenger terminal on Gravina Island near Clump Cove. The crossing distance would be approximately 1.3 miles. This alternative would require construction of a new ferry terminal on each side of Tongass Narrows and two new ferry vessels. Dredging may be required to provide adequate navigational depth for the ferry terminal on Revillagigedo Island. The existing breakwater could also be widened and extended for use as the ferry terminal pier. A paved road would be constructed on Gravina Island from the ferry terminal past the new Runway 11/29 extension approximately 0.2 mile to the Gravina Island Highway.

Alternative G4 - New ferry adjacent to existing ferry; continued operation of existing ferry

Alternative G4 would be new ferry service for vehicles and passengers adjacent to the existing airport ferry route between Charcoal Point on Revillagigedo Island and the existing ferry lay-up berth on Gravina Island on a quarter-mile crossing of Tongass Narrows, approximately 2.6 miles north of downtown. This alternative would require two new ferry vessels and construction of a new ferry ~~terminal~~ berth on each side of Tongass Narrows adjacent to the existing airport ferry berth~~terminal~~s.

Alternative G4v - Continued operation of existing ferry with improved shoreside amenities

Alternative G4v ~~was added as~~is a lower cost ~~alternative~~ variant of ~~to~~ Alternative G4: ~~because~~ it provides new, replaced, and reconstructed shoreside facilities to improve the convenience of airport travelers and heavy freight movement, but it does not ~~add~~ include new ferry vess~~i~~els or ferry berths. ~~terminals until~~ The 2013 Draft SEIS described Alternative G4v as including new ferry vessels and ferry berths when ferry demand increases enough to warrant the additional capacity~~.~~; however, based on traffic studies, ~~S~~such demand is not anticipated in the 75-year design life of this alternative. This Final SEIS, therefore, eliminates any reference to new ferries or ferry berths in association with Alternative G4v. Ferry operations under Alternative G4v would be the same as under the No Action Alternative.

Per a request by DOT&PF, bridge alternatives were evaluated with and without tolls to offset, in part, the cost of bridge construction and operation.

All ferry alternatives include:

- A ~~60~~ new passenger waiting facility and other improvements to the terminal site on Revillagigedo Island.
- Two shuttle vans to carry both pedestrians and their luggage from Revillagigedo Island to the airport terminal on Gravina Island.
- A new heavy freight ~~dock~~ mooring facility on Gravina Island for highway loads that cannot be accommodated by the shuttle ferry.
- Reconstruction of the existing airport ferry transfer bridges and ramps.
- Upgrades and improvements for all sidewalks and wheelchair ramps associated with the airport ferry facilities to meet applicable standards.
- New ~~T~~toll facilities.
- Replacement of the existing ferry layup dock and transfer bridge to support layup and maintenance of the airport shuttle ferry system.

Each action alternative includes the maintenance and operation of:

- The recently constructed Gravina Island Highway;
- Lewis Reef and Seley roads to the northern airport reserve boundary; and
- Airport Access Road, which extends from the airport terminal to its intersection with the Gravina Island Highway and Lewis Reef Road.

Each action alternative also includes replacement of the existing 24-foot wide bridge over Airport Creek (west fork) at the end of Lewis Reef Road with a new 36-foot wide bridge and reconstruction of Seley Road to the northern airport reserve boundary. The existing Airport Creek bridge is a temporary structure constructed by a private entity for access to land in the Lewis Reef development area. While the creek crossing was authorized by FHWA as part of Alternative F1, it was not included in the first phase of construction by DOT&PF. Although Alternative F1 had been selected by FHWA in the 2004 Record of Decision and identified and permitted as the LEDPA by USACE, it was not carried forward as a reasonable alternative in the SEIS because its construction costs were estimated to exceed available funding. Under the USACE permit for Alternative F1, a total of 82.2 acres of permanent fill were permitted and DOT&PF provided $405,000 of compensatory mitigation as a fee in lieu type of mitigation. With completion of Phase 1 (i.e., construction of the Gravina Island Highway), 54.3 acres of wetlands had been filled and DOT&PF had paid the compensatory mitigation to the Southeast Alaska Land Trust. The USACE permit expired June 30, 2011.

DOT&PF and FHWA Identification of the Preferred Alternative

Based on the analyses in the 2013 Draft SEIS and public and agency input, the DOT&PF and FHWA identified Alternative G4v to be the preferred alternative. Alternative G4v meets the immediate needs of improving access to Ketchikan International Airport and developable land on Gravina Island by improving shoreside facilities for travelers. It partially meets the need of promoting environmentally sound, planned long-term economic development on Gravina Island by providing and improving roads to developable lands (i.e., Gravina Island Highway as previously constructed and Seley Road/Airport Creek Bridge improvements). Alternative G4v would have the least impact on natural habitat as compared with other build alternatives, would have no effect on historic properties, and would not require relocation of any residences or businesses.

Alternative G4v would not affect Federal Aviation Administration (FAA) Part 77 airspace[1] nor would it affect cruise ship access and operations.

Alternative G4v is the least expensive alternative to construct. With identification of Alternative G4v as their preferred alternative, FHWA and DOT&PF meet the State of Alaska's objective "to identify the most fiscally responsible alternative."

Summary of Beneficial and Adverse Impacts

No Action Alternative - Continued operation of existing airport ferry

The No Action Alternative would not affect airport property, existing airport or floatplane facilities, or FAA Part 77 airspace (14 CFR 77.1) in the vicinity of Ketchikan International Airport. Existing problems associated with access, convenience, and reliability for passengers, airport tenants, emergency personnel, equipment, and freight shipment would continue. Also, the No Action Alternative would have no change in the impact of current infrastructure and operation on cruise ship operations, the Ketchikan docking and berthing areas and facilities used by the cruise ships, or on facilities used by the AMHS ferries. There would be no traffic improvements that would change vehicular access to Ketchikan International Airport. The Gravina Island Highway and Lewis Reef Road would continue to provide access to other Borough and developable lands on Gravina Island. No wetlands or Essential Fish Habitat (EFH) would be lost to the construction of new facilities. Based on traffic forecasts and economic studies prepared for this project to assess indirect impacts, development would likely continue at the existing rate, with approximately 16 acres developed on Gravina Island by 2030.

Alternative C3-4 – Airport Bridge

Alternative C3-4 is estimated to have a $305 million construction and project development cost, a $322 million lifecycle cost, and a total life cost of $490 million ($427 million with a toll). The bridge associated with this alternative would intrude into the FAA Part 77 airspace for Ketchikan International Airport, obstruct flight under normal visual flight rules and could greatly reduce the effectiveness of special visual flight rules for seaplane operators. Cruise ship passage would continue, but some cruise lines may choose to change operations to avoid navigating under the bridge. Wetland habitat loss is estimated as 5.9 acres and 1.9 acres of EFH are expected to be lost. Based on traffic forecasts and economic studies prepared for this project, development on Gravina Island is projected to be about 336 acres by 2033. Adding a $5 toll to the bridge would reduce the amount of development by approximately 13 percent.

Alternative F3 – Pennock Island Bridges

Alternative F3 is estimated to have a $354 million construction and project development cost, a $385 million lifecycle cost, and a total life cost of $675 million ($624 million with a toll). The Alternative F3 bridges would not intrude into the FAA Part 77 airspace, but would affect seaplane operations because seaplanes would need to fly over or taxi under them (primarily the East Channel bridge). The bridges associated with this alternative would alter cruise ship navigation patterns by requiring large vessels to use the West Channel around Pennock Island. Some cruise lines may choose to change operations to avoid navigating West Channel. Wetland habitat loss is estimated as 25.9 acres, 15.7 acres of marine EFH are expected to be lost and 6 anadromous

[1] Part 77 airspace refers to the protected airspace for aeronautical navigation. Objects that affect navigable airspace are identified by the FAA in accordance with Part 77.

streams crossed. Based on traffic forecasts and economic studies prepared for this project, development on Gravina Island is projected to be about 336 acres by 2033. Adding a $5 toll to the bridge would reduce the amount of development by approximately 14 percent.

Ferry Alternatives

Alternatives G2, G3, G4, and G4v would have lower construction and project development costs ($46 million to $122 million) and lower lifecycle costs ($171 million to $338 million) than the bridge alternatives, but would have higher total life costs ($1,163 to $2,017 million without toll or $784 to $1,512 million with toll) than the No Action and the bridge alternatives. The ferry alternatives would have no impacts to aviation. Alternatives G2, G3, and G4 would have a slight effect on marine navigation by increasing the amount of cross-channel traffic. These alternatives would not provide the convenience and reliability of access to the airport and other lands on Gravina Island as well as a bridge alternative would. Wetland habitat loss with Alternatives G2, G3, G4, and G4v is estimated as 17.1, 11.8, 5.9, and 5.9 acres, respectively, approximately 2.1, 5.1, 1.4, and 1.1 acres of marine EFH, respectively, are expected to be lost and Alternative G3 would cross 1 anadromous stream. Based on traffic forecasts and economic studies prepared for this project, development on Gravina Island under Alternatives G2, G3, and G4, at approximately 43 acres by 2033, is nearly three times the amount of development projected under the No Action Alternative and about one-tenth of what either bridge alternative would provide. Those same studies show Alternative G4v with the same level of projected growth on Gravina Island as the No Action Alternative.

The following table, "Table S-1. Summary of Impacts by Alternative," presents the major environmental impacts, both beneficial and adverse, associated with each alternative. Alternative F1, the preferred alternative in the 2004 FEIS and selected alternative in the 2004 Record of Decision, is included in the table: although it is no longer a reasonable alternative under consideration in this ~~Draft~~ SEIS, its potential adverse impacts are provided here as a point of comparison.

Note that the construction cost estimate for each of the build alternatives has increased substantially relative to the construction costs presented in the 2013 Draft SEIS. This increase is also reflected in the lifecycle and total life costs for each alternative. The reason for the cost increases are related to having updated information and greater design detail, and correcting for previous unintentional omissions. Section 2.1 of this Final SEIS provides a detailed explanation of the cost differences between the 2013 Draft SEIS and this Final SEIS. Changes to environmental impacts are relatively minor and, for the most part (e.g., wetland loss and fill in marine waters), are the result of having more detailed design information in this Final SEIS.

Table S-1. Summary of Impacts by Alternative [Updated]

Impact Categories	No Action	Bridge Alternatives		Ferry Alternatives				2004 FEIS Preferred and Record of Decision Selected Alternative F1[10]
		C3-4 Airport Bridge	F3 Pennock Island Bridges	G2 Peninsula Point to Lewis Point	G3 Downtown to South of Airport	G4 New Ferry Adjacent to Existing	G4v Low Cost Variant of G4~~v~~	
Cost Factors								
Construction and Project Development ($ million)	0	305~~223~~	354~~276~~	122~~81~~	107~~70~~	91~~62~~	~~23~~46	375
Average Annual ~~O&M~~ Operations and Maintenance ($ million)	~~2.1~~3.5	0.20~~4~~	0.19	5.9	5.9	5.9	3.6	ND
75-year Lifecycle ($ million)[1]	~~35~~108	~~222~~322	~~286~~385	~~331~~338	~~314~~316	~~301~~294	~~182~~171	ND
Total life cost ($million)	1,024~~929~~	490~~391~~	675~~576~~	2,017~~330~~	1,942~~1.262~~	1,872~~1,207~~	1,163~~1, 050~~	ND

Impact Categories	No Action	Bridge Alternatives		Ferry Alternatives				2004 FEIS Preferred and Record of Decision Selected Alternative F1[10]
		C3-4 Airport Bridge	F3 Pennock Island Bridges	G2 Peninsula Point to Lewis Point	G3 Downtown to South of Airport	G4 New Ferry Adjacent to Existing	G4v Low Cost Variant of G4~~v~~	
Total life cost assuming toll revenue ($ million)	645~~590~~	427~~335~~	624~~531~~	1,512~~879~~	1,436~~811~~	1,366~~756~~	784~~712~~	ND
Purpose and Need Factors								
Reliability of Access								
Hours of operation per day[2]	16	24	24	16	16	16	16	24
Round Trips (RT) per hour (summer/winter)	4 RT/ 2 RT	NA	NA	4 RT/ 2 RT	4 RT/ 2 RT	4 RT/ 2 RT	4 RT/ 2 RT	NA
Hours of downtime per day[2]	8	0	0	8	8	8	8	0
Restrictions to hazmat transport and oversized/overweight[3] vehicles? (Yes/No)	Yes	No	No	Yes	Yes	Yes	Yes	No
Efficiency & Convenience of Access								
Vehicular travel time[4] (in minutes) to airport from:								
Downtown Ketchikan	28	**14**	**13**	43	35	**25**	28	**13**
Carlanna Creek	19	**6**	22	34	33	**16**	19	21
Ward Cove	25	**8**	28	34	39	**22**	25	27
Vehicular travel time[4] (in minutes) to developable land from:								

Impact Categories	No Action	Bridge Alternatives		Ferry Alternatives				2004 FEIS Preferred and Record of Decision Selected Alternative F1[10]
		C3-4 Airport Bridge	F3 Pennock Island Bridges	G2 Peninsula Point to Lewis Point	G3 Downtown to South of Airport	G4 New Ferry Adjacent to Existing	G4v Low Cost Variant of G4~~v~~	
Downtown Ketchikan	32	**17**	**11**	35	**29**	**29**	32	**7**
Carlanna Creek	24	**8**	**19**	26	28	**21**	24	**15**
Ward Cove	30	**11**	**25**	**26**	34	**27**	30	**21**
Economic Development Projected development on Gravina Island (in acres): Residential	13	308	308	40	40	40	13	383
Industrial/commercial	3	23	23	3	3	3	3	22
Projected development on Pennock Island (in acres): Residential	0	0	12	0	0	0	0	75
Industrial/commercial	0	0	0	0	0	0	0	1
Social and Economic Impacts								
Private Property impacts (# of parcels; total acres)	0	19 parcels; 42 acres	7 parcels; 4 acres	0	6 parcels; <1 acre	0	0	ND
Residential Relocations	0	2	0	0	0	0	0	0
Business Relocations	0	6	0	2	0	0	0	0
Estimated number of affected parcels	0	24	14	7	11	5	5	30

Impact Categories	No Action	Bridge Alternatives		Ferry Alternatives				2004 FEIS Preferred and Record of Decision Selected Alternative F1[10]
		C3-4 Airport Bridge	F3 Pennock Island Bridges	G2 Peninsula Point to Lewis Point	G3 Downtown to South of Airport	G4 New Ferry Adjacent to Existing	G4v Low Cost Variant of G4~~v~~	
Total construction jobs[5]	0	1,560	1,780	470	510	470	120	470
Annual Operations and Maintenance ~~&M~~ jobs (without toll for bridge alternatives)[6]	13	2	3	28	28	28	13	1
User economic benefits ($ million)[7]	0	63	51.4	(24.8)	(24.5)	(22.0)	(1.3)	ND
Transportation Impacts								
Intrusion into Part 77 airspace? (Yes/No)	No	Yes	No	No	No	No	No	No
Obstruction for seaplanes? (Yes/No)	No	Yes	Yes	No	No	No	No	Yes
Natural Resources Impacts								
Permanent upland habitat losses (acres)	0	10	2	4	3	1	1	10.7
Permanent wetland habitat losses – marine (acres)	0	0	0	1.2	2.9	0	0	96.5 (incl. fresh water)
below the high tide line (HTL)	0	0	0	0.6	1.1	0	0	ND
below the Mean High Water (MHW) mark	0	0	0	0.6	1.8	0	0	ND

Impact Categories	No Action	Bridge Alternatives		Ferry Alternatives				2004 FEIS Preferred and Record of Decision Selected Alternative F1[10]
		C3-4 Airport Bridge	F3 Pennock Island Bridges	G2 Peninsula Point to Lewis Point	G3 Downtown to South of Airport	G4 New Ferry Adjacent to Existing	G4v Low Cost Variant of G4~~v~~	
below the ordinary high water mark (OHWM)	0	0	0	0	0	0	0	ND
Permanent wetland habitat losses – fresh water (acres)	0	~~13~~5.9	~~33~~25.9	~~23~~17.1	~~16~~11.8	~~13~~5.9	~~13~~5.9	ND
Temporary upland habitat disturbance (acres)	0	3	2	1	1	1	1	ND
Temporary wetland habitat disturbance – marine (acres)	0	0	0	0	0	0	0	0
Temporary ~~upland~~ wetland habitat disturbance – fresh water (acres)	0	5.3	16.3	13.3	9.3	4.3	4.3	11.3
Essential Fish Habitat losses (acres)								
Marine	0	1.9	15.7~~3~~	~~1.2~~2.1	~~4~~5.1	~~0.7~~1.4	~~0.1~~1.1	0.2
Fresh water	0	0	0	0	0	0	0	0
Number of anadromous stream crossings[8]	0	0~~2~~	~~7~~6	0~~2~~	1~~3~~	0~~2~~	0~~2~~	5
Number of piers in Tongass Narrows[9]	0	12	6	0	0	0	0	6
Discharge of fill in marine waters of Tongass Narrows								
Quantity (cubic yards)	0	0	0	24,500~~1,000~~	21,500~~18,000~~	3,500~~0~~	3,500~~0~~	0
Area (acres)	0	0	0	~~1.2~~1.9	~~2.9~~3.6	0.7	0.7	0

Impact Categories	No Action	Bridge Alternatives		Ferry Alternatives				2004 FEIS Preferred and Record of Decision Selected Alternative F1[10]
		C3-4 Airport Bridge	F3 Pennock Island Bridges	G2 Peninsula Point to Lewis Point	G3 Downtown to South of Airport	G4 New Ferry Adjacent to Existing	G4v Low Cost Variant of G4~~v~~	
Dredging/removal of sediment from marine waters								
Quantity (cubic yards)	0	0	213,000	1,400	18,600	~~15,20~~0	0	ND
Area (acres)	0	0	~~15~~14.8	0.~~25~~3	2.2	~~0.4~~0	~~0.4~~0	ND
Cultural Resources Impacts								
Eligible historic/ archaeological properties in direct area of potential effect	NA	1	7	1	1	0	0	0

1 Lifecycle costs reported are for the no toll option.
2 Hours of operation and downtimes would be the same for all ferries.
3 Ferry service is typically limited to vehicles less than 20 feet in length. The weight limit is 30,000 pounds.
4 Numbers in **bold** type indicate travel times shorter than existing conditions. Values provided represent travel times using new ferry facility only. Travel time for the existing airport ferry would the same as for the No Action alternative.
5 Assumes a three-year construction period. Jobs can be full-time, part-time, or seasonal.
6 Number of jobs represents ~~one~~ number of full-time employees.
7 Benefits are shown in 2012 dollars (with no toll option) and are a compilation of savings over 75 years (2012-2086). See Section 4.26.3.6 in the SEIS for more information.
8 Number of anadromous fish streams shaded by bridge or covered with culvert. No permanent loss of EFH is anticipated at these locations.
9 Bridge alternatives include piers 30 feet square. Ferry alternatives include small-diameters pilings which are not included in this total.
10 All table entries for Alternative F1 are derived from the 2004 FEIS with the exception of Construction and Project Development Costs, which were developed during the alternatives screening process for the SEIS.
NA = Not applicable
ND = Not determined

Major Unresolved Issues

There are no major unresolved issues related to the Gravina Access Project and FHWA and DOT&PF's preferred alternative.

Federal Actions Necessary

Alternative G4v requires a Section 404 permit from the USACE for impacts to waters of the United States, including wetlands, subject to Section 404 jurisdiction. Alternative G4v also requires a Section 10 permit from the USACE for work in navigable waters. A Section 10/404 permit application is attached to the Final SEIS in Appendix H. The permit public review period is 30 days.

As delegated under the Clean Water Act, Alaska Department of Environmental Conservation requires an Alaska Pollutant Discharge Elimination System construction permit for all construction activities that would result in ground disturbance of 1 acre or greater.

The SEIS considers, and the project complies with, the ~~The~~ following federal laws and executive orders, which are the primary federal laws that apply to one or more project alternatives:

- Clean Air Act
- Clean Water Act, Section 401
- Clean Water Act, Section 404
- Coastal Zone Management Act
- Endangered Species Act
- Fish & Wildlife Coordination Act
- Magnuson-Stevens Fishery Conservation & Management Act (Essential Fish Habitat)
- Marine Mammal Protection Act
- Marine Protection, Research, and Sanctuaries Act, Section 102/103
- Migratory Bird Treaty Act
- Bald and Golden Eagle Protection Act
- National Historic Preservation Act, Section 106
- Rivers and Harbors Act, Section 9
- Rivers and Harbors Act, Section 10
- Executive Order 11988 Floodplain Management
- Executive Order 11990 Protection of Wetlands
- Executive Order 12898 Environmental Justice
- Executive Order 13175 Consultation and Coordination with Tribes

Sections 3.13 and 4.13 provide additional information about the federal laws and regulations applicable to the Gravina Access Project.

SEIS and Record of Decision Availability

The ~~Draft~~ Final SEIS and Record of Decision are~~is~~ available free of charge on compact disk (CD) for viewing electronically. The documents ~~is~~are also available for viewing on the project web site at http://dot.alaska.gov/sereg/projects/gravina_access/. Bound versions of the documents are available for public review at the following locations:

Ketchikan Public Library

629 Dock Street, Ketchikan, Alaska

Ketchikan Gateway Borough Department of Planning and Community Development

344 Front Street, Ketchikan, Alaska

DOT&PF Southcoast~~east~~ Region

6860 Glacier Highway, Juneau, Alaska

City of Ketchikan Clerk's Office

334 Front Street, Ketchikan, Alaska

City of Saxman Clerk's office

2841 South Tongass Highway, Ketchikan, Alaska

Ketchikan Indian Community

2960 Tongass Avenue, Ketchikan, Alaska

Organized Village of Saxman

Route 2, Box 2, Ketchikan

Metlakatla Library

4th and Milton Street, Metlakatla, Alaska

For information on obtaining a CD or bound version of the Final SEIS and Record of Decision, or alternative formats of the documents, please contact Deborah Holman at DOT&PF at deborah.holman@alaska.gov or (907) 465-1828, or visit the project web site at: http://dot.alaska.gov/sereg/projects/gravina_access/.

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Contents

List of Figures

List of Tables

List of Appendices

Appendices A through E were issued with the 2013 Draft SEIS and can be viewed on the CD version of the Final SEIS and on the project website: http://www.dot.alaska.gov/sereg/projects/gravina_access/index.shtml

Acronyms and Abbreviations

Acronym/ Abbreviation	***Definition***
A	
AAC	Alaska Administrative Code
AASHTO	American Association of State Highway Transportation Officials
ACMP	Alaska Coastal Management Program
ACS	American Community Survey
ADA	Americans with Disabilities Act
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
AHRS	Alaska Heritage Resources Survey
AMHS	Alaska Marine Highway System
Anchorage Center	FAA Anchorage Air Route Traffic Control Center
APDES	Alaska Pollutant Discharge Elimination System
APE	Area of Potential Effect
ARFF	Airport Rescue and Firefighting
AS	Alaska Statute
ASD	Alaska Ship and Drydock, Inc.
B	
BLM	Bureau of Land Management
BMP	best management practice
Borough	Ketchikan Gateway Borough
C	
CEG	Conditionally Exempt Small Quantity Generator
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CPV	Commercial Passenger Vessel
Cruise Ship Program	Commercial Passenger Vessel Environmental Compliance Program
D	
dB	decibels
dB(A)	decibels, A-weighted scale
DCED	(Alaska) Department of Community and Economic Development
DEIS	Draft Environmental Impact Statement
DHHS	(U.S.) Department of Health and Human Services
DNR	(Alaska) Department of Natural Resources
DOT&PF	(Alaska) Department of Transportation and Public Facilities
DPS	Distinct Population Segment
E	
EIS	Environmental Impact Statement
EFH	Essential Fish Habitat
EPA	(U.S.) Environmental Protection Agency
EO	Executive Order
ESA	Endangered Species Act

Acronym/ Abbreviation	Definition
F	
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
FAR	Federal Aviation Regulation
FEMA	Federal Emergency Management Agency
FHWA	(U.S. Department of Transportation) Federal Highway Administration
FR	Federal Register
FRC	Fast Response Cutter
FSS	Flight Service Station
G	
GDVLVLR	Guidelines for Geometric Design of Very Low-Volume Local Roads
GHG	greenhouse gas
H	
HDR	HDR, Inc.
HH	Household
HTL	High tide line
I	
IFA	Inter-Island Ferry Authority
IFR	instrument flight rules
ILMA	Interagency Land Management Assignment
I-O	input-output
K	
KCMP	Ketchikan Coastal Management Plan
KPC	Ketchikan Pulp Company
KPU	Ketchikan Public Utilities
kWh	kilowatt hours
L	
LEDPA	Least Environmentally Damaging Practicable Alternative
L_{eq}(h)	average sound level over a 1-hour period
LOS	level of service
LUST	leaking underground storage tank
M	
MAP-21	Moving Ahead for Progress in the 21st Century Act
medevac	medical evacuation
MHW	mean high water
MHHW	mean higher high water
MLLW	mean lower low water
MMBF	million board feet (of timber)
MMT	million metric tons
MOVES	Motor Vehicle Emissions Simulator
mph	Miles per hour
MPO	metropolitan planning organization
MPRSA	Marine Protection, Research, and Sanctuaries Act

Acronym/ Abbreviation	***Definition***
MSL	mean sea level
MV	motor vessel
N	
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
Native	Alaska Native
NEPA	National Environmental Policy Act
NHS	National Highway System
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
O	
O&M	operation and maintenance
OEDP 1994	1994 *Overall Economic Development Plan*
OEDP 1998	1998 *Overall Economic Development Plan*
OHA	(Alaska) Office of History and Archaeology
OHW	Ordinary High Water
OPAF	Only Practicable Alternatives Finding
P	
PA	Programmatic Agreement
PDT	project development team
PHV	peak hourly volume
PIANC	International Navigation Association (formerly: Permanent International Association of Navigation Congresses)
$PM_{2.5}$	particulate matter up to 2.5 microns in size
PM_{10}	particulate matter up to 10 microns in size
R	
RSA	Runway Safety Area
RCRA	Resource Conservation and Recovery Act
S	
SATP	Southeast Alaska Transportation Plan
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SDZ	Surface Danger Zone
SEIS	Supplemental Environmental Impact Statement
SFHA	Special Flood Hazard Areas
SHPO	State Historic Preservation Officer
SO_2	sulfur dioxide
State	State of Alaska
SVFR	special visual flight rules
SWPPP	Storm Water Pollution Prevention Plan

Acronym/ Abbreviation	***Definition***
T	
TAMS	Tippetts-Abbett-McCarthy-Stratton Engineers
TDF	Tailings Disposal Facility
TEA-21	Transportation Equity Act for the 21st Century
TCP	Traffic Control Plan
TNM	Traffic Noise Model
U	
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USCG	U.S. Coast Guard
USDOT	U.S. Department of Transportation
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
V	
VFR	visual flight rules
VMT	Vehicle miles traveled
VOC	Volatile organic compounds

1.0 PURPOSE OF AND NEED FOR ACTION

1.1 Introduction

In July 2004, the Federal Highway Administration (FHWA) and Alaska Department of Transportation and Public Facilities (DOT&PF) issued a Final Environmental Impact Statement (FEIS) for the Gravina Access Project, a proposed action to improve public access between Revillagigedo Island and Gravina Island in Ketchikan, Alaska. The preferred alternative identified in the FEIS was Alternative F1, which involved two bridges across the East and West channels of Tongass Narrows, with a roadway link on Pennock Island and a highway connection to Ketchikan International Airport on Gravina Island. Alternative F1 was the selected alternative in FHWA's Record of Decision, which was issued on September 15, 2004.

Following FHWA's Record of Decision and after securing permits for the project, the DOT&PF began the first phase of implementing Alternative F1: construction of the highway connection to Ketchikan International Airport. Construction of the highway, known as the Gravina Island Highway, was completed in 2008.

On September 21, 2007, due to rapidly escalating costs, then-Governor Sarah Palin directed the DOT&PF to identify the most fiscally responsible alternative for the Gravina Access Project rather than proceed with Alternative F1. This directive generated the need for FHWA to review its obligations under the National Environmental Policy Act (NEPA) with respect to the project.

According to the Council on Environmental Quality (CEQ) *Regulations for Implementing the National Environmental Policy Act* (40 Code of Federal Regulations [CFR] 1500-1508) and FHWA Technical Advisory T 6640.8A, agencies shall prepare supplements to either draft or final environmental impact statements (EISs) if:

> (i) The agency makes substantial changes in the proposed action that are relevant to environmental concerns; or
>
> (ii) There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.

The following is noted in *Forty Most Asked Questions Concerning CEQ's NEPA Regulations* (46 FR 18026):

> If an agency has made a substantial change in a proposed action that is relevant to environmental concerns, or if there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts, a supplemental EIS must be prepared for an old EIS so that the agency has the best possible information to make any necessary substantive changes in its decisions regarding the proposal.

Based on these regulations and guidance documents, FHWA and DOT&PF determined that a Supplemental EIS (SEIS) should be prepared for the Gravina Access Project. On July 2, 2008, FHWA issued a notice of intent to reexamine alternatives in an SEIS and identify and select a different preferred alternative. The purpose of and need for the project have not changed. The alternatives under consideration in this ~~Draft~~ SEIS include alternatives considered in the 2004 FEIS that have been updated to reduce costs and minimize environmental impacts. Changes in regulations, policies, and the existing environmental conditions of the project area since FHWA issued the 2004 FEIS are described in this document.

On June 21, 2013, FHWA and DOT&PF issued the Draft SEIS for the Gravina Access Project and gave the public and other interested parties (including government entities, regulatory agencies, and Native organizations) an opportunity to comment on its content during a 54-day comment period. The 2013 Draft SEIS did not identify a preferred alternative.

On October 22, 2015, DOT&PF announced its recommendation to FHWA that G4v be identified as the preferred alternative. On March 3, 2016, FHWA and DOT&PF issued a public notice identifying Alternative G4v as their preferred alternative. Alternative G4v provides improvements to the existing ferry system with new, replaced, and reconstructed shoreside facilities (i.e., without adding ferry vessels or changing ferry operations). This Final SEIS explains why Alternative G4v was identified as the preferred alternative; documents and responds to substantive comments on the 2013 Draft SEIS; describes findings, including any required for wetlands, floodplains, and cultural resources; and provides a list of commitments for mitigation measures for the preferred alternative. This Final SEIS also identifies any other findings to be made in compliance with all environmental laws, regulations, Executive Orders, and other related requirements with associated documentation of agency consultation. ~~FHWA and DOT&PF reviewed data from the 2004 FEIS and determined that, while some of the information contained therein remains current and useful, much of it needed to be updated with newly gathered information obtained through agency consultation, field investigation, updated model application, and other research.~~ The information contained in this document represents the best possible information available for the decision-makers. Sources are referenced throughout.

Pursuant to the provisions contained in Section 1319 of the Moving Ahead for Progress in the 21st Century Act (Public Law 112-141; MAP-21), FHWA is issuing its Record of Decision for the Gravina Access Project concurrently with release of the Final SEIS. The Record of Decision identifies Alternative G4v as the selected alternative.

1.2 Description of the Project Area

This general description of the project area is the same as what was described in the 2004 FEIS. The Gravina Access Project area is in the Ketchikan Gateway Borough (Borough) in Southeast Alaska, about 680 miles north of Seattle, Washington, and 235 miles south of Juneau, Alaska (see Figure 1.1 at the end of this chapter). The Borough contains two major islands, Gravina Island and Revillagigedo Island. The two islands are separated by Tongass Narrows, a 13-mile-long waterway that varies in width from ¼ to 1 mile. Most of the Borough's 13,000 residents live on Revillagigedo Island (on the eastern side of Tongass Narrows), whose major communities are Ketchikan and Saxman.

Gravina Island (on the western side of Tongass Narrows) is undeveloped except for the Ketchikan International Airport (on its eastern shore), a timber processing plant to the north of the airport, a few private homes in the northernmost portion of the island and on the southeastern shore along Clam Cove, and some access roads to private and public lands. The island includes large parcels of undeveloped land owned by the Borough, the Alaska Department of Natural Resources (DNR), the Alaska Mental Health Trust Authority, and the U.S. Forest Service (USFS).

At the southern end of Tongass Narrows, between Revillagigedo Island and Gravina Island, lies Pennock Island. Pennock Island is undeveloped except for some privately owned parcels with single-family homes along the northern shores of the island. As Tongass Narrows flows around Pennock Island, it is divided in two: East Channel to the east of Pennock Island and West Channel to the west.

The principal modes of transportation to islands within the Borough are by airplane (including seaplane) and ship. There is no "hard link" (surface) transportation between the islands. The primary public access to Gravina Island from Revillagigedo Island is an airport ferry that transports vehicles, bicyclists, and pedestrians from a terminal on Revillagigedo Island approximately 2.6 miles north of downtown Ketchikan across Tongass Narrows directly to the airport terminal. Travelers may continue on the Airport Access Road to exit the airport property and travel south on the Gravina Island Highway or north on Lewis Reef Road.

Terrain constraints, ownership patterns, and access limitations restrict the availability of developable parcels to the waterfront areas along Tongass Narrows. Consequently, opportunities for development in these areas have become a major factor in land use planning and economic forecasting.

1.3 Proposed Action

The following description of the proposed action is the same as what was described in the 2004 FEIS.

The DOT&PF, in cooperation with FHWA, has developed the Gravina Access Project to improve public access between Revillagigedo Island and Gravina Island. This project was one of 17 high-priority infrastructure projects in the State of Alaska to be federally funded under the federal Transportation Equity Act for the 21st Century (TEA-21), enacted in 1998. The TEA-21 authorized approximately $20 million for construction of a bridge joining Gravina Island to the community of Ketchikan on Revillagigedo Island.[1]

1.4 Purpose of and Need for the Proposed Action

The purpose of and need for the Gravina Access Project, which have not changed since the 2004 FEIS was issued, are as follows:

> ***Purpose:*** The purpose of the Gravina Access Project is to improve surface transportation between Revillagigedo Island and Gravina Island.
>
> ***Need:*** The need for improving access is threefold:
>
> - To provide the Borough and its residents more reliable, efficient, convenient, and cost-effective access for vehicles, bicycles, and pedestrians to Borough lands and other developable or recreation lands on Gravina Island in support of the Borough's adopted land use plans
> - To improve the convenience and reliability of access to Ketchikan International Airport for passengers, airport tenants, emergency personnel and equipment, and shipment of freight
> - To promote environmentally sound, planned long-term economic development on Gravina Island

The following Sections 1.4.1 through 1.4.3 explain these needs further. These sections are reprinted from the 2004 FEIS and updated where appropriate to reflect changes in the project area (e.g., the opening of the Gravina Island Highway in 2008 and new population data from the 2010 Census).

1.4.1 Need for Improved Access to Developable Land

To provide the Ketchikan Gateway Borough and its residents more reliable, efficient, convenient, and cost-effective access for vehicles, bicycles, and pedestrians to Borough lands and other developable or recreation lands on Gravina Island in support of the Borough's adopted land use plans.

[1] Public Law 105-178, Subtitle F (High-Priority Projects), Section 1602 (Project Authorizations).

Borough Land Grant. Under Title 29 of the Alaska Statutes (AS 29.65), a general grant of land was made to the Borough to help the Borough meet “its legitimate needs for public or private settlement or development.” The lack of efficient, convenient vehicular access to Title 29 entitlement lands on Gravina Island combined with the geographic constraints of the region have limited the base of developable land to a narrow strip along Tongass Narrows on Revillagigedo Island. Within this narrow strip, the scarcity of suitable vacant land for expansion has caused several problems:

- High land costs (due to low supply and high demand)
- Loss of business opportunities
- Increased pressure to develop lands that are environmentally marginal in terms of development potential (e.g., wetlands and steep slopes), which is an unsound land management practice
- High land development costs (because developing the environmentally marginal lands is extremely costly)
- Development patterns that result in inappropriate or incompatible land use for some geographic locations (e.g., waterfront development that excludes water access dependent industries)

These are the very problems the Alaska State Legislature was trying to avoid when it enacted Title 29, which indicates that the purposes of the general grant of land have not been fulfilled. The land grant in itself is not enough because, without reasonable access to the land, the State cannot fulfill the purposes for which Title 29 was enacted—namely, to meet the legitimate needs of the Borough for settlement and development and to attain sound land management through rational ownership patterns (AS 29.65)

Other Landowners. The undeveloped properties of several other Gravina Island landholders, including the Alaska Mental Health Trust Authority, USFS, DOT&PF, DNR, and Alaska Native (Native) corporations, could also be used to meet the needs of the property owners and the community for settlement and development. Improved access to Gravina Island would enhance the opportunity for the landowners to use, sell, or lease these properties.

Accessibility Issues. The airport ferry provides the only public access for vehicles to Ketchikan International Airport and Gravina Island. From the airport ferry terminal on Gravina Island, vehicles can go directly to the airport or use the Airport Access Road to reach the Lewis Reef Road and the Gravina Island Highway, which provide access to other public and private properties on Gravina Island. Most of the year, the ferry leaves the terminal every half-hour, but during the summer (May/June through August/September, depending on need), a second ferry operates to handle the higher demand, and service increases to every 15 minutes. The airport ferry schedule is limited, essentially serving the airport during the airport’s hours of operation (opening at 6:00 a.m. year round, and closing at 8:00 p.m. during the winter season and at 10:00 p.m. during the summer season). Without improved access to its entitlement lands on Gravina Island, the Borough’s ability to make this land available to its residents is severely constrained.

The toll associated with the ferry crossing is applied directly to operations and maintenance costs of the airport ferry system. The current toll rates for one-way travel are $6 for automobiles, light trucks, and vans; $10 for commercial trucks and commercial passenger transportation; $35 for vehicles over 35 feet; $5 per adult (age 12 and over); and $2 per child (age 6 to 11). Although same day return trips can be made at no additional charge, the cost of the ferry crossing may be a barrier to people interested in regular access to and development of Gravina Island.

Suitable Use of Developable Lands. Ketchikan is one of the most densely populated cities in Alaska, with a limited land base for development. Gravina Island has a suitable land base for expansion. Because of easy waterfront access, development on Revillagigedo and Gravina Islands is focused along the water. Without improved access to expansion areas, development will continue to crowd the waterfronts. Improved access to non-waterfront property on Gravina Island would provide greater opportunities for non-water-dependent development to locate inland, at more economical sites, thereby freeing up waterfront land for water-related and water-dependent uses.

1.4.2 Need for Improved Access to Airport

To improve the convenience and reliability of access to Ketchikan International Airport for passengers, airport tenants, emergency personnel and equipment, and shipment of freight.

Ketchikan International Airport is owned by the State of Alaska (State), but is operated and maintained by the Borough under a long-term lease with DOT&PF. The airport is the primary transportation link into and out of the Borough, accommodating the air traffic of commercial air carriers, air taxi and flightseeing (i.e., sightseeing by aircraft) operators, general aviation, cargo carriers, and the U.S. Coast Guard (USCG). Ketchikan, the largest city in the Borough and seventh largest city in Alaska, is the primary air and marine hub in the southern portion of Southeast Alaska. As such, the airport serves as the air-connecting point for all of the Borough's approximately 13,500[2] residents and for the 8,500 residents in neighboring communities, such as Metlakatla, Klawock, Craig, and other Prince of Wales Island communities.

The airport ferry provides the only access to the airport for passengers in vehicles and the primary means of access for passengers on foot. Passengers may also arrive at the airport by seaplane at the seaplane terminal, which is 600 feet north of the ferry terminal on Gravina Island, or by water taxi.

Ketchikan International Airport is a major intermodal facility with respect to the National Highway System (NHS) in Ketchikan, as are the Ketchikan Alaska Marine Highway System (AMHS) ferry terminal and the Ketchikan port area along the waterfront.[3] Tongass Avenue from Bawden Street to the airport ferry terminal is a designated NHS Intermodal Connector on Revillagigedo Island. The airport road from the ferry terminal to the airport terminal on Gravina Island is also a designated NHS Intermodal Connector. The airport ferry, however, is not part of the NHS; thus, there is no NHS connectivity between air travel and other modes in Ketchikan.

1.4.2.1 Improved Convenience and Reliability of Access for Passengers

Restricting air passengers to travel by ferry between the airport and community is inconvenient in many respects:

- Negotiating the ramps is particularly difficult for the elderly and physically challenged. During most of the tide cycles, the ramps do not comply with Americans with Disabilities Act (ADA) standards because of the steepness of the ramp. The steepness of the ramp and the distance between the airport terminal and ferry is arduous for the physically challenged.
- The average total travel time to the airport from the ferry terminal on Revillagigedo Island is 19 minutes, which includes waiting for, loading, and unloading the ferry.
- During heavy travel periods, embarking and disembarking from the ferry and the crossing travel time adds as much as 30 minutes to each end of a trip to/from Ketchikan.

[2] U.S. Census Bureau 2010 estimate is 13,477.

[3] DOT&PF, 2006. *State of Alaska National Highway System Maps*. Prepared by DOT&F Division of Program Development in cooperation with FHWA. April 2006.

- Mechanical problems with the ferry or shoreside facilities (occurring about ten to twenty times per year) can add further delays to travel and result in missed plane flights.
- During peak season, when full planeloads of passengers are deplaning, the ferry fills up quickly. Many passengers must then wait for the next ferry, adding even more time to their trip.
- The airport ferry limits the potential transport of planeloads of passengers from chartered aircraft to and from cruise ships.
- Travel to the airport is tied completely to the ferry schedule; missing a ferry can mean missing a plane flight. Coordinating an air travel schedule with the ferry schedule adds inconvenience and stress to travel.
- Plane flights missed in Ketchikan because of the ferry travel time and unanticipated delays often have a domino effect of missed connections or appointments at the other end of the trip, which frustrates passengers and raises costs to airlines, businesses, and the public.
- The average waiting time for ferry passengers during the winter months (i.e., when the ferry departs from both terminals every 30 minutes) is 9 minutes for pedestrian passengers and 12 minutes for vehicle passengers.

Each of these factors contributes to a decrease in the quality of travel into and out of Ketchikan. Improved convenience and reliability of access would mean airport travelers would have fewer issues to confront and consider when moving between the airport and their point of origin or destination in Ketchikan.

1.4.2.2 Improved Convenience and Reliability of Access for Airport Tenants

In many cities, airports are generators of economic development in their own right. Air carriers, rental car operators, and other support services such as airplane repair, aircraft fuel distributors, charter operators, hotels, restaurants, couriers, and light manufacturers often want to locate their business next to an airport. Operating these services at Ketchikan International Airport, however, costs more than at other airports because of the inconvenience, additional handling of materials, and extra time to work around the ferry schedules. These costs and difficulties reduce the economic potential of the Ketchikan International Airport. There is a considerable disincentive to locating a business at the airport in terms of cost and inconvenience to both employees and customers. Because of the direct cost of access and the more difficult scheduling (to coordinate the timing of the trip with the ferry schedule), only essential services are located on airport property. This, in turn, reduces airport lease revenues, and increases the Borough’s airport operation costs.

In addition to enhancing overall economic development of the Borough, improved access to Gravina Island is needed to help airport tenants conduct their business competitively and efficiently:

- Employers at the airport often need to move parts, supplies, and personnel between Ketchikan and the airport. The ferry trip adds up to an hour in lost productivity.
- The ferry service schedule prohibits after-hours access to the airport, which limits employers’ ability to perform aircraft and building maintenance during off-peak hours.
- Deliveries of goods and services to the airport may be delayed as a result of ferry schedule or capacity, extreme tides that affect the ability of large vehicles to load onto and unload from the ferry, and mechanical problems. These delays lessen the ability of airport tenants to promptly and efficiently provide services to their customers.

- The ferry's schedule, capacity, and restrictions on the type and weight of transportable materials limit the services that airport tenants can provide.

1.4.2.3 Improved Convenience and Reliability of Access for Emergency Personnel and Equipment

Every year, Ketchikan's fire department and hospital personnel coordinate more than 160 medical evacuations (medevacs) using Ketchikan International Airport. The city's fire department is also responsible for responding to fires on Gravina Island that are not within the jurisdiction of the airport's Aircraft Rescue and Fire Fighting (ARFF) department.[4] Transporting emergency personnel and equipment between the airport and Ketchikan is inconvenient and limits the ability of emergency personnel to respond to emergencies quickly and efficiently. Emergency medical services staff must coordinate their activities with the airport manager to ensure timely transport of personnel and equipment, specifically:

- In a typical medevac situation during off hours (when the ferry is not operating), the fire department first informs the airport manager by telephone of the medevac operation. Then the airport manager alerts the ferry crew; the ferry crew then goes to the ferry, starts the engines, and waits some time for the engines to warm up. Finally the ferry transports the emergency personnel and equipment to the airport. In some cases when the emergency is critical enough not to wait for the ferry to become operational, a helicopter is used to expedite transport. Ferry maintenance activities, typically conducted during off-hours, can affect the ability of ferry operators to respond to emergencies.
- During the day when the ferry is operating, emergencies also require coordinating with the airport administrator, and the ferry schedule is interrupted to respond immediately.

Emergency fire equipment, such as a water and ladder truck, has difficulty accessing Gravina Island using the airport ferry. The ferry has both weight and length restrictions on vehicles, which would require the water truck to dump its load before getting on the ferry, adding delays to boarding and refilling once on Gravina Island. The ladder truck is restricted by its length, so another piece of equipment would have to be substituted or the truck would have to be transported by barge. The Ketchikan Fire Department responded to approximately 15 medical emergencies on Gravina Island in 2010.[5]

1.4.2.4 Improved Convenience and Reliability of Access for Shipment of Freight

Numerous companies on Revillagigedo Island rely on the airport ferry to ship cargo, fuel, and other products to and/or from the airport. The restrictions of the ferry schedule and its capacity, unexpected mechanical difficulties, and extreme tides can limit the abilities of shipping services to move freight expediently. The main problems of using the ferry to transport freight to and/or from the airport are as follows:

- Couriers and others picking up packages must work around the ferry schedule, which can increase their delivery times. This system is not only inefficient and inconvenient, but it also adds to the cost of doing business in Ketchikan.
- Delays caused by the ferry system (e.g., by capacity issues, schedule and travel time, and mechanical difficulties) can be detrimental to the shipment of seafood products (especially fresh) by air. To a large extent, seafood processors consider the ferry schedule when scheduling their packaging activities to ensure that the freshest possible product is delivered

[4] Although ARFF can respond to fires on Gravina Island that are not related to the airport, such duties are beyond the ARFF's designated use.

[5] Personal communication with Jim Hill, Ketchikan Fire Chief, November 30, 2010, by Sandra Cook, HDR.

to the customers. If ferry delays cause a flight to be missed, the seafood products must be held in cold storage at the airport while waiting for the next available flight.

- The travel and waiting time associated with the ferry crossing reduces the amount of time a truck and driver can be actively making deliveries. A driver and truck can be tied up for an hour or more while waiting for the ferry, which adds to the cost of shipping.
- There is a limit on the amount of fuel that can be transported by ferry. Shippers transporting fuel to the airport must use small tanker trucks (or only partially fill larger trucks) and make deliveries more often, which is inefficient and costly.
- Because the ferry operates only during the daytime, shipping services cannot transport freight late at night or in the early morning, when traffic congestion would be at a minimum and they could operate more efficiently.

1.4.3 Need for Economic Development

To promote environmentally sound, planned long-term economic development on Gravina Island.

Historically, the economy of the Borough has been driven by natural resource development (fishing, mining, timber) and tourism, and has thus suffered over the years from instability and economic downturns. Ketchikan began with a salmon saltery and a cannery in the 1880s. In the mid-1890s the local mining industry took off, prior to the famed Klondike Gold Rush of 1898. By 1900, there were a thousand people in Ketchikan, which had become a hub for mining operations. It was during this time that Ketchikan incorporated. The fishing and mining industries continued until the 1920s when the mining industry went flat. A decade later, the fishing industry peaked and then declined for two decades. There was a short economic boost to the area during World War II with sailors and soldiers stationed in the area as part of Alaska's military defense. Then, with the decline of fishing and mining, timber became the dominant economic force.

Ketchikan's forest products industry began in 1951, with a 50-year timber sale contract between the Ketchikan Pulp Company (KPC, now owned by the Louisiana Pacific Corporation) and USFS. KPC built a $52.5 million pulp mill, operated sawmills in Ketchikan and Metlakatla, and became the community's largest employer. However, in the late 1980s, timber harvests began to decline significantly. Between 1988 and 1998, the total value of the industry's international exports from Alaska declined by 56 percent (from $475 million to $208 million). These declines in the timber industry caused a correspondingly sharp decline in the industry's employment in Southeast Alaska. Consequently, the Ketchikan area created specialized forest products that appeal to many markets.[6]

Economic Planning. The Borough has aggressively planned for economic development as a way to stabilize its local economy. The 1998 Overall Economic Development Program[7] (OEDP 1998) identifies bridge access to Gravina Island as a priority for increased opportunities for development of additional ports, harbors, and industrial, commercial, and residential properties. According to its *Comprehensive Plan 2020*,[8] one goal for economic development is the creation of a development plan for Gravina Island that "provides for new economic opportunities to diversify and strengthen Ketchikan's economic health."

Role of Transportation. A key component of the project's purpose is to provide a transportation system that benefits the local economy. The lack of efficient, convenient access to developable

[6] DOT&PF, Gravina Access Project, *Demographic and Socioeconomic Analysis,* April 2000.

[7] Ketchikan Gateway Borough Planning Department, *Ketchikan Gateway Borough Overall Economic Development Program: Major Program Revision 1998*, September 1998.

[8] Ketchikan Gateway Borough Planning Department, *Comprehensive Plan 2020*, 2009.

land on Gravina Island limits development of the economy in the Borough. Businesses that currently operate from Gravina Island or otherwise rely on transportation to Gravina Island are limited by the inconvenience of the current access options (i.e., airport ferry, plane, seaplane, boat, or barge). Transporting employees and products on the airport ferry is costly, inefficient, and limits productivity. Improved access would give businesses opportunities to raise productivity levels and expand operations, which would enhance the local economy. Improved access would also facilitate construction of needed infrastructure, such as power and other utilities, necessary to promote and sustain economic development.

Recreational Use. Tourism would continue to be a major component of the Borough's economy. Improving the transportation link between Ketchikan International Airport and Revillagigedo Island would create opportunities for independent travelers and for cruise and tour ships to use Ketchikan as a point of departure. Access to federal and state-owned lands on Gravina Island for recreational use and tourism would encourage the development of visitor facilities, which would broaden these sectors of the economy.

1.5 History and Background: Planning Studies

The history of land development and planning in the Borough provides a background on the need for improving access to Gravina Island. No new planning studies addressing Gravina Island access have been initiated since the 2004 FEIS was issued; therefore, the following descriptions of planning studies are the same as those presented in the 2004 FEIS.

For many years, the Borough has conducted several studies that characterize the availability and accessibility of developable land. A statement in the foreword to its Tongass Narrows Crossing Study[9] report (issued nearly 30 years ago) states that "[h]ard access to Gravina Island has been the desire of the Ketchikan community for a number of years."

The study's statement of purpose also states that "[i]ntermittent access, such as provided by the existing shuttle ferry, is not considered adequate to spur development upon Gravina Island, nor does it provide convenient accessibility for traffic to and from the airport and other points on the island."

The Tongass Narrows Crossing Study report cited previous studies of crossing locations, costs, and local impacts,[10] some of which also explored the possibility of including access to Pennock Island as part of the crossing.

Problems with land use and accessibility, as supported in the Borough's studies and plans, are summarized as follows:

- Lack of access to Borough lands on Gravina Island has made it difficult for the Borough to provide the land needed for the Borough's economy to grow and develop reasonably.
- The scarcity and high cost of land on Revillagigedo Island severely limit opportunities for the growth, development, and diversity of industrial, commercial, residential, and recreational pursuits.
- Airport access is inconvenient and inefficient for airport users and businesses. The airport ferry operates 16 hours per day with departures every 15 to 30 minutes, depending on the

[9] Ketchikan Gateway Borough Planning Department, Tongass Narrows Crossing Study reports, prepared by EMPS-Sverdrup: *Phase I–Site Selection Study,* November 1981; *Phase II—Alternative Corridor Investigation*, December 1981; *Alternative Corridors* and *Summary of Findings,* May 1982.

[10] City of Ketchikan, *Ketchikan Comprehensive Plan Policies*, September 1976; Ketchikan Gateway Borough, *Waterfront Development/Management Study, Phase One*, prepared by Charles Pool & Associates, December 1980; and Reid, Middleton and Associates, *Ketchikan International Airport Master Plan*, March 1981.

season, which requires travelers to consider the ferry schedule when making plans to meet a flight at the airport.

Table 1-1 lists Borough-sanctioned or adopted studies and plans that discuss land availability and provide the Borough's direction for addressing land availability issues. These documents assume and consistently express the Borough's explicit, long-standing intentions to promote and facilitate land settlement and development on Gravina Island. The Borough's principal motivation is to improve the economic health of the region by establishing residential, commercial, and industrial uses of its developable lands.

Table 1-1: Planning Studies Addressing Access to Gravina Island

STUDY	YEAR
Waterfront Development Management Study	1982
Land Use Inventory and Projections	1984
Pennock and Gravina Island Neighborhood Plan	1985
Ketchikan Gateway Borough Comprehensive Plan	1986, 1996, and 2009
Coastal Management Program	1984, 1989, and 2007
Land Use Inventory	1991
Ketchikan International Airport Industrial Development Plan	1993
Overall Economic Development Plan	1994 and 1998
Land Use Surveys	1995 and 1996
Lewis Reef Development	1997
Gravina Island Plan	2005

The descriptions provided in the following sections summarize the purpose, findings, and conclusions of these studies as they relate to the Gravina Access Project. For more detailed information, refer to the original documents, which are available from the Borough for public reference.

1.5.1 Waterfront Development Management Study (1982)

This study analyzed existing waterfront uses within the Borough and predicted a need for road-accessible commercial and industrial waterfront land by the year 2000. The study's inventory of waterfront land uses showed that the available sites within the City of Ketchikan could meet the land needs of small commercial or industrial activities, but not those of larger enterprises. The study concluded that the Gravina Island airport area has the best short-term development potential because of its existing transportation links and utilities infrastructure. The eastern shoreline of Gravina Island was identified as one of the two best areas for long-term development, based on topography, existing land uses, and land availability.

1.5.2 Land Use Inventory and Projections (1984)

The Borough inventoried all private property and Borough land on the road system from Settlers Cove to Herring Cove (Revillagigedo Island) and projected land use needs to the year 2000. This inventory and projection became the baseline information for the 1986 update of the Borough's *Comprehensive Plan* (see Section 1.5.4).

1.5.3 Pennock and Gravina Island Neighborhood Plan (1985)

The *Pennock and Gravina Island Neighborhood Plan*, prepared in 1985, constructed a framework for the development of the lands on Gravina and Pennock Islands. One plan objective was to develop a transportation system that would provide access to interior land without compromising the qualities that attracted residents to the area. The plan clearly articulates a vision for future transportation access that would include a ferry. Regarding a bridge, the plan states: "Hard access by bridge or tunnel from Pennock to Gravina Island is not envisioned in the foreseeable future and, in light of the rural characteristics, should not be pursued. Hard access and its possible location is of concern to the community as a whole and should be determined by a borough-wide vote." The *Pennock and Gravina Island Neighborhood Plan* was written at a time when considerable economic and population growth was anticipated in Ketchikan as a result of mineral development. That mineral development did not occur and the growth of Ketchikan was not consistent with the assumptions of the plan.

1.5.4 Ketchikan Gateway Borough Comprehensive Plan (1986, 1996, and 2009)

In 1986, the Borough updated its *Comprehensive Plan.* The plan stated that the supply of residential, commercial, and industrial land was enough to generally meet short-term demand; however, the "Borough's roaded system may not be able to supply large industrial tracts or tracts with suitable waterfront," and that these land use needs "could require the opening up of new growth areas prior to residential expansion needs."

The plan set two specific goals for Gravina Island access:

> We shall provide for a broad and secure economic base and orderly growth while preserving the health, safety, beauty, and essential character of the community…Specific public projects with significant community wide economic benefits include…improved access to the airport [among others].
>
> Air, water, and surface transportation systems within the borough that facilitate the development goals of the community will be provided… [including those to] improve access to Gravina and Pennock Islands.[11]

In the 1996 *Comprehensive Plan*, the Borough supported access to additional developable lands on Gravina Island as its economic development strategy to "expand and diversify the local economy" through "Gravina Island development*."* The plan's development strategies for Gravina Island included identification of ownership for lands needed for:

- Transportation (building roads north and south of the airport)
- Water-related uses on the waterfront
- Airport-related industrial uses
- Maintenance of recreation and subsistence uses
- Lewis Reef development
- Airport expansion
- Seafood industry facilities
- Residential development and large residential lots
- Public beaches
- Common waterfronts

[11] Objective 4 of that goal

- Greenbelts
- Moorage for small boats and small planes
- Support of commerce and industry with utilities infrastructure (power, roads, sewer, and water)

According to the plan's Land Use Element, industrial needs were projected to use at least half of the available 1991 supply of vacant industrial land and at least 80 percent of the commercial land would be consumed over the next 10 years (presumably by 2006). The plan indicated that:

> While the supply of vacant industrial and commercial lands can meet projected acreage needs, the supply is not sufficient for effective market competition. Type, location, and size of vacant land frequently lower their desirability. To optimize competition, it is generally recommended that a supply three times the amount of land needed should be available. Using this formula means demand would exceed supply of vacant commercial land [and] demand would equal 90 percent of the supply of vacant industrial land in the next ten years.

A Commercial and Industrial Land Committee was formed as part of the planning process. The committee preferred the development of Lewis Reef on Gravina Island, but concluded that development there might require hard-link access to the airport. The Comprehensive Plan's Transportation Element indicated that "a bridge spanning Tongass Narrows has been a planning topic ever since the airport was opened," but that high construction costs had deterred planning from going forward.

The plan further indicated that the Borough could take advantage of the airport's waterfront location by using it for an aviation-related industrial park. The plan recommended zoning the area against competing uses; this restriction has occurred to some extent, with industrial zoning being applied to portions of the Airport Reserve zone and private property north of the airport. The analysis indicated that, because of similar land use and the noise constraints to residential development, the areas around the airport are most suitable for industrial development. The plan continues, stating, "Industrially zoned land is in short supply, especially with saltwater access. Land on Gravina Island, both within the Airport Reserve (leased from the state), and elsewhere, is available for development but lacks access except by marine craft." The section concluded with a statement that expanding the community's land base to any extent depends on providing road access to it—in this case, a hard link.

In 2009, the Borough published its *Comprehensive Plan 2020*, which serves as a general guide to facilitate long-range growth and development through consistent application of Borough regulations. The Borough identifies development on Gravina Island as a goal within the plan's Economic Development section. Development potential on Gravina Island was encouraged to provide for "new economic opportunities to diversify and strengthen Ketchikan's economic health." The plan stated that the Borough may develop strategies that provide access to Gravina Island that "include, but are not limited to, a bridge, an enhanced ferry service, or other practical access solutions."

1.5.5 Coastal Management Program (1984, 1989, and 2007)

This program inventoried commercial and industrial waterfront, and found that the downtown area was one of the few areas in Ketchikan where waterfront use was balanced between water-dependent, water-related, and non-water-dependent uses. The plan attributed this balance to the adjoining tracts of level land that allow efficient use. At the other end of the spectrum was the "west end" commercial area, where only 3 percent of the waterfront use was water-related. The plan concluded that the west end's commercial center is an example of how the scarcity of large, level lots for commercial development impinged upon another scarce resource—prime waterfront property within city limits.

The inventory showed 32 miles of shoreline accessible from the road system, with approximately 2 miles of remaining shoreline considered to be available, suitable, and accessible for water-related commercial and industrial uses. To accommodate the need for more commercial and industrial waterfront property, the plan discussed a proposed hard link to Gravina Island. The plan noted that a bridge or a tunnel has been seriously considered for decades, and that the purposes of a hard link included airport development, access to commercial and industrial waterfront property, access to Borough land, and mutual aid for fire and police services.

This plan was revised in 2007 to provide a contemporary perspective on local development goals and objectives for coastal resources in the district and to establish policies that balance and manage the competition for these resources. The revised *2007 Ketchikan Coastal Management Plan* consisted of two volumes. Volume One described all enforceable policies and designated areas and includes local Best Management Practices and Administrative Policies. Volume Two provided background information and an inventory and analysis of coastal resources.

The plan identified the insufficient availability of suitable developable land in the Ketchikan region. As a result of the limiting physical constraints, all land use types are concentrated along a narrow strip of shoreline and frequently land use conflicts arise making community expansion difficult and expensive. Access to developable land on Gravina Island was identified as necessary to meet the future needs of the Ketchikan community. The construction of a bridge to Gravina Island from Revillagigedo Island was listed among the transportation needs.

1.5.6 Land Use Inventory (1991)

In 1991, the Borough Department of Planning and Community Development inventoried the developed and vacant land in the urbanized portion of the Borough and reported that approximately 85 percent of the vacant (i.e., undeveloped) land was zoned for residential use. Half of the remaining acreage was designated for industrial use, one-quarter for commercial use, and one-quarter for public use. Of the 901 acres zoned for industrial use, only 256 acres were vacant in and around Ketchikan. The inventory reported that most of the vacant industrial land (157 acres) was held by DNR and Louisiana Pacific Corporation (i.e., KPC).

1.5.7 Ketchikan International Airport Industrial Development Plan (1993)

In this report, the Borough estimated how long the remaining supply of industrial land would last, based upon the 1991 inventory. From 1980 to 1990, an average of 18 acres of commercial/ industrial land had been used each year. Based on the absorption rates and the 1991 supply (i.e., 256 acres), the report estimated 10 to 20 years of supply but supposed that, depending on the rate of consumption, it could be as few as 5 years or as many as 30 years of supply. The report did not take into account the developability of the remaining 256 acres of land zoned for industrial use.

According to the analysis, there may “eventually be a shortage of developable land in Ketchikan.” The analysis noted that Ketchikan is surrounded by vacant land that is “severely limited by land ownership and mandated uses;” and that without changes to ownership of state and federal lands, the land “shortage is at least true in the short run.” The market analysis concluded that the amount of land available for uses that would most likely locate at or near an airport was limited, and that land for future economic development was limited unless more land could be added to the inventory of developable or developed land.

The plan considered six sites for industrial development on Revillagigedo Island plus Pennock Island, but found none of them suitable. The study recommended that the Borough pursue strategies for developing industrial land adjacent to the airport on Gravina Island. According to the study, the one negative aspect of airport industrial development was that “access to the Ketchikan airport is problematic, requiring improvements in the auto and passenger ferry service and capacity or significant capital costs of bridges.”

1.5.8 Overall Economic Development Plan (1994 and 1998)

The 1994 *Overall Economic Development Plan* (OEDP 1994) identified economic issues and developed strategies for addressing them. One of the main issues was “a shortage of industrial sites with infrastructure, roaded access, appropriate locations, and adequate size.”

Although other areas were investigated as potential industrial sites, an industrial sites task force proposed that the Borough identify sites along the Tongass waterfront, from the northern end of the airport to the northern end of Gravina Island, that would be suitable for wood products manufacturing and seafood processing. The task force also proposed that the Borough assist potential developers in applying for the permits necessary to develop the lands. The task force reported that there were only seven undeveloped industrial sites (totaling 19 acres) in Ketchikan that had water, sewer, and power.

The Borough issued a major revision of this plan in 1998. It identified bridge access to Gravina Island among its top three priorities. The OEDP 1998 states:

> The Ralph M. Bartholomew Veterans Memorial Bridge addresses the need for roaded transport of goods and services between Revillagigedo Island and Gravina Island. This bridge will provide access to the Ketchikan International Airport and support regional air cargo growth for the region’s emerging industries. This bridge is expected to significantly increase opportunities for development of additional ports, harbors, and industrial/commercial, and residential properties. Ketchikan has identified this project as a priority in its OEDP efforts since 1976.

1.5.9 Land Use Surveys (1995 and 1996)

A fall 1995 survey of the road system from Settler’s Cove on the North Tongass Highway to Herring Cove on the South Tongass Highway found approximately 1,250 vacant parcels of land. The Borough’s 1996 *Comprehensive Plan* indicated that “topographical constraints might physically rule out development on many of these sites, or make them prohibitively expensive to develop.” There appeared to be “sufficient land base to satisfy the community’s short-term future needs for residentially zoned property.” Commercial and industrial properties, particularly those with waterfront access, however, were “perceived to be in short supply.”[12]

In the winter of 1996, the Borough surveyed the Tongass Highway corridor from Beaver Falls to Settlers Cove to determine actual land use. With few exceptions, commercial and industrial development occurred adjacent to the highway corridor, interspersed with residential development either immediately adjacent to it or directly opposite across the highway. The analysis concluded that, “[i]n part, because of the scarcity of developable land for commercial and industrial purposes, adjacent conflicting land uses are prevalent in the Borough.”[13]

[12] Ketchikan Gateway Borough Planning Department, *Comprehensive Plan*, 1996.

[13] Ketchikan Gateway Borough Planning Department, *Comprehensive Plan*, 1996.

1.5.10 Lewis Reef Development: Purpose, Needs, and Alternatives (1997)

Based on its past planning studies, and to implement its comprehensive plan goals, the Borough pursued a marine industrial park for marine-related commerce and industry operations north of the airport at Lewis Reef. The purpose was to "meet the fundamental need in the area of supporting industrial development that requires immediate access to both marine and air transportation support. It [was also to] meet a need for additional areas to locate industrial facilities to resolve land use conflicts." Of the seven sites explored, only a site on Gravina Island (at Lewis Reef) was deemed to have the characteristics needed to support the industrial park; no suitable land on Revillagigedo Island was identified.

Development of a timber processing facility has since occurred near Lewis Reef. The Borough received a provisional permit from the U.S. Army Corps of Engineers (USACE) to construct a new road around the west side of the airport to the Lewis Reef development area. When DOT&PF developed the Gravina Island Highway as part of the first phase of implementing Alternative F1 (see Section 1.3), it included development of Lewis Reef Road from the Airport Access Road north to the Airport Creek crossing. The Borough took ownership of the access road to the Lewis Reef development area.

1.5.11 Gravina Island Plan (2005)

In 2005, the Borough published the *Gravina Island Plan* to define and organize development goals, policies, and strategies for Gravina Island. The plan was intended to ensure orderly change through devising separate but integrated plans for five geographic areas. Each area plan identified road and trail corridors, streamlined improvements by resolving conflicts, organizes economic development initiatives, provided direction for land management, and protected the values important to citizens.

The plan was intended for use as a framework to make local planning decisions and enact a new zoning ordinance. As outlined in the Borough's *Gravina Island Plan Citizen's Guide to Public and Private Decision-making* (April 2005)[14], the key issues facing planners are improving access from Ketchikan, building a new road system, promoting commerce and industry, accommodating tourism and recreational users, developing residential areas, providing services and infrastructure, supporting commercial resource harvesting, and sustaining subsistence uses.

Central to the Borough's planning perspective is that the relatively untouched landscape of Gravina Island demands and deserves careful management, and that protecting the natural setting that attracts tourists is the best long-term economic strategy. Four major types of development are already slated for the near term: timber harvesting, airport expansion, road construction, and industrial construction.

1.6 History and Background: Engineering and Environmental Studies

With the exception of studies completed in support of this SEIS, no new engineering or environmental studies addressing Gravina Island access have been initiated since the 2004 FEIS was issued; therefore, the following descriptions of previous engineering and environmental studies are the same as those presented in the 2004 FEIS. A summary of the 2004 FEIS is provided in Section 1.6.5.

Since the early 1970s, numerous engineering and environmental studies have addressed various alternatives for providing access via a hard link (bridge or tunnel) across Tongass Narrows (see Table 1-2). These studies demonstrate a long-term commitment by the community and

[14] Ketchikan Gateway Borough, *Gravina Island Plan Citizen's Guide to Public and Private Decision-making*, April 2002.

governmental entities to improve access to Gravina Island, beginning in 1973 with the opening of the Ketchikan International Airport and the start of the airport ferry service across Tongass Narrows. The State of Alaska responded that year by examining five proposed bridge crossings. Since then, several other engineering studies of bridges and tunnels have been conducted.

Table 1-2: Engineering and Environmental Studies Addressing Access to Gravina Island

Study	Year	Prepared For
Gravina Island Crossing Reconnaissance Report	1973	Alaska Department of Highways Southeastern District Reconnaissance Section
Tongass Narrows Crossing Study	1981-1982	Borough Planning Department
Tongass Narrows Crossing Benefit/Cost Study	1985	Borough Planning Department
Gravina Road Corridor/Airport—Hard Link	1989	Borough Planning Department
Tongass Narrows Crossing Preliminary Scoping Study	1992	James M. Montgomery Consulting Engineers
Preliminary Draft Environmental Impact Statement	1994	DOT&PF
Final Environmental Impact Statement	2004	DOT&PF

In 1981, the Borough examined eight bridges and three underwater tube crossings of Tongass Narrows. In 1985, Tippetts-Abbett-McCarthy-Stratton analyzed the costs of proposed bridge, tube, and ferry crossings on behalf of the Borough.

In 1988, the Borough passed Resolution 794 supporting a hard-link crossing and the preparation of an ~~Environmental Impact Statement (~~EIS~~)~~. In 1989, the Borough studied road routes on Pennock and Gravina Islands to the airport.

In 1991, the Alaska Legislature authorized funding for the Ketchikan hard-link EIS. In 1994, the DOT&PF prepared a Draft EIS of three crossing options, as discussed in Section 1.6.4. Most recently, in 1998, TEA-21 allocated $20.4 million specifically for this project. Additional funding will be required to begin construction of a selected access alternative.

The reports of these studies are briefly described in this section (Section 1.6). The reports are available to the public at the Ketchikan Public Library at 629 Dock Street.

1.6.1 Gravina Island Crossing Reconnaissance Report (1973)

The *Gravina Island Crossing Reconnaissance Report* study,[15] which was completed during the construction of the Ketchikan International Airport, evaluated five potential bridge routes across the Tongass Narrows:

- A – From Mile 4.6 on North Tongass Highway (just south of Peninsula Point) to Lewis Point
- B – From Mile 4 on North Tongass Highway to the northern end of the airfield
- C – From Charcoal Point to the southern end of the airfield
- D-North – From Mile 1.1 on South Tongass Highway (just south of the USCG Station) to just south of Clam Cove, via Pennock Island
- D-South – From Mile 3 on South Tongass Highway (just south of Saxman) to just south of Clam Cove

[15] Alaska Department of Highways Southeastern District Reconnaissance Section, *Gravina Island Crossing Reconnaissance Report*, Project S-0922(1), April 1973.

All five alternatives were proposed with horizontal navigational clearances of 500 feet and vertical clearances of 130 feet, and two alternatives included less costly variations with vertical clearances of 50 or 75 feet. These lower clearances would prevent passage of larger vessels, such as state ferries, cruise ships, and oil tankers. Alternative C included a moveable (vertical lift) bridge as one variation.

The report recommended deferring bridge site selection and design until the effects of the new airport operations on development and traffic trends were more fully established.

1.6.2 Tongass Narrows Crossing Study (1981–1982)

In 1981 and 1982, the Borough undertook an extensive *Tongass Narrows Crossing Study*[16] regarding a hard-link route from Ketchikan to Gravina Island. The study as originally conceived had three phases: I—Site Selection; II—Investigation of Alternatives; and III—Feasibility (tube versus bridge).

1.6.2.1 Phase I—Site Selection

The study established institutional and physical crossing constraints, investigated 11 crossing corridors (eight bridges and three tunnels), and recommended corridors for further investigation in later phases of the study. Each of the eight bridge alternatives, two of which crossed Pennock Island, was proposed with horizontal navigational clearances of 500 feet and vertical clearances of 145 feet. For the Pennock Island alternatives, the West Channel bridges were proposed with horizontal and vertical navigational clearances of 500 feet and 145 feet, respectively, whereas the East Channel bridges were proposed with horizontal navigational clearances of 300 feet and vertical navigational clearances of 55 feet. For corridor assessment, investigators used a full range of evaluation factors: traffic congestion, travel distance, marine navigation, airport activity, environmental effects, community development, right-of-way displacement, costs, geologic and soils concerns, air navigation risks, and geometric design.

The resulting assessment narrowed the focus of the next study phase to three bridge corridors and one tunnel corridor. These four corridors were judged the most favorable crossing locations because of their convenient connections; minimal impacts on development, environmental resources, and traffic modes; excellent foundation potentials; and shorter crossing lengths.

1.6.2.2 Phase II—Investigation of Alternatives

This report identifies the general considerations and constraints applicable to the four crossing corridors recommended in Phase I, as well as one new corridor, added by the Borough after its review of the report. The new crossing corridor was a tube tunnel from the intersection of Tongass Highway and Shoreline Drive either to the Lewis Reef area or near the medium-intensity approach lighting system of the airport runway.

The Phase II investigation reflected the constraints developed in Phase I, as well as information gathered from the public and government agencies, bathymetric data, and more-detailed engineering analysis. For one of the bridge corridors (Corridor 7), the additional possibility was raised of constructing a causeway instead of a bridge, which would require thorough investigation of the effects on tidal movements. The report recommended two corridors for further feasibility evaluation in Phase III: Corridors 3 (bridge) and 11 (tube tunnel).

[16] Ketchikan Gateway Borough Planning Department, *Tongass Narrows,* November 1981; *Phase II—Alternative Corridor Investigation*, December 1981; *Alternative Corridors* and *Summary of Findings,* May 1982.

1.6.2.3 Phase III—Additional Studies

In the original project scope, Phase III was to be a feasibility study that would compare the most favorable bridge and tunnel options and recommend a preferred crossing type. However, in light of comments received at a public hearing in February 1982, the Phase III scope was redirected to address the specific concerns of the public and, consequently, was enlarged to investigate five corridors rather than just the two corridors designated as most favorable in Phase II. The Phase III additional studies developed additional background information and details for both bridge and tube crossings, and provided additional studies of crossing alternatives for Corridors 3 and 7 (including a partial causeway). The Corridor 2 bridge crossing and the Corridor 12 tube crossings were included in the detailed studies.

The report concluded that a bridge crossing was the most feasible hard link across Tongass Narrows, and the most favorable crossing locations were Corridor 7 (south of the airport) and Corridor 2 (north of the airport). The final recommendation was for further studies of Corridors 2, 7, and 11 to obtain additional field data, prepare an environmental assessment, develop more technical information as a basis for preliminary design plans, and determine the most favorable crossing corridor.

1.6.3 Other Tongass Narrows Crossing Studies (1985-1992)

Tongass Narrows Crossing Benefit/Cost Study. This 1985 study for the Borough[17] emphasized the importance of access to Gravina Island with this statement: “One central fact underscored all of the discussions and meetings held to examine this topic: the citizens and leaders of Ketchikan unanimously support improved access between the islands and view [such access] as essential to the growth of the community.”

Nine access alternatives were compared, based on quantifiable benefits and costs. The hard-link alternatives assessed were the three corridors favored by the Tongass Narrows Crossing Study conducted in 1981 and 1982: Corridor 2 (bridge), Corridor 7 (bridges via Pennock Island), and Corridor 11 (tube tunnel). In addition, the study assessed a low-level bridge or causeway to Pennock Island, three ferry systems to access Gravina Island (existing service, remodeled ferries, and larger vehicular ferries), and two ferry systems to access Pennock Island (passenger and vehicular ferries).

Gravina Road Corridor/Airport—Hard Link. This 1989 study[18] defined an alignment for a two-lane access road to the Ketchikan International Airport, with 0.6 mile of roadway on Pennock Island and 3.4 miles on Gravina Island. The study considered topography, soils, property ownership, future development, and drainage. The roadway system was designed to serve the West Channel bridge crossing that was part of Corridor 7 recommended in the Tongass Narrows Crossing Study in 1982.

Tongass Narrows Crossing Preliminary Scoping Study. This scoping study[19] summarized previous crossing reports and briefly compared three crossing corridors from the Tongass Narrows Crossing Study in 1992 (i.e., Corridors 2, 7, and 11) and one new crossing, referred to as “PN&D 72/92” after the study preparers: Peratrovich, Nottingham & Drage, Inc. The scoping study included the following 1992 cost estimates:

[17] Ketchikan Gateway Borough Planning Department *Tongass Narrows Crossing Benefit/Cost Study,* prepared by TAMS Engineers (Tippetts-Abbett-McCarthy-Stratton, a Professional Corporation), (apparently published in 1985).

[18] Ketchikan Gateway Borough Planning Department, *Gravina Road Corridor/Airport—Hard Link*, prepared by PEI Consultants, 1989.

[19] James M. Montgomery Consulting Engineers, *Tongass Narrows Crossing Preliminary Scoping Study*, prepared by Peratrovich, Nottingham & Drage, Inc., April 15, 1992.

Corridor 2 (bridge):		$100 million
Corridor 7/7A (two bridges or a bridge/causeway):		$100 million
Corridor 11 (tube tunnel):		$180 million
PN&D 72/92 (bridge):	approximately	$ 60 million

These cost estimates were based on a vertical navigational clearance of 160 feet for the bridges, and introduced a new and costly element to project requirements—protection of bridge piers from ship collisions. The report also noted that, from 1962 to 1990, bridge costs in Alaska had escalated an average of 3.5 percent per year.

The study concluded that only Corridor 7/7A and the PN&D 72/92 crossing (all bridge alternatives) had merit, and recommended that they undergo future environmental studies and comparison with the existing airport ferry access system.

1.6.4 Preliminary Draft Environmental Impact Statement (1994)

In 1994, the DOT&PF evaluated the potential environmental impacts of three alternatives for a Tongass Narrows crossing and a No Action Alternative in an EIS.[20] The proposed action was developed to address future limitations on the capacity of the existing ferry service and to provide a more reliable direct link between the City of Ketchikan and the airport on Gravina Island. Scoping for this study evaluated five bridge alternatives, an underwater crossing, and a drawbridge.

The three "action" alternatives selected as reasonable alternatives for evaluation in the Preliminary Draft EIS were:

1 – A two-lane bridge from north of downtown Ketchikan on Revillagigedo Island to the north end of the airport on Gravina Island and 1.5 miles of access road ($61 million to construct). This alternative included a horizontal navigational clearance of 500 feet and a vertical navigational clearance of 160 feet.

2 – A two-lane bridge from south of downtown Ketchikan (near the USCG Station) to Pennock Island, a second bridge from Pennock Island to south of Clam Cove on Gravina Island, and 4 miles of access road ($74 million to construct). Navigational clearances for the West Channel bridge were proposed at 500 feet horizontal and 160 feet vertical. The East Channel bridge navigational clearances were proposed at 300 feet horizontal and 60 feet vertical.

3 – Improvements to the existing ferry system ($9 million to $10 million), including replacement of the existing ferry vessel with a much larger (120-foot) vessel having capacity for 12 to 15 additional vehicles and 20 to 30 additional passengers, and redesign and replacement of the transfer bridge at the ferry terminal on Gravina Island.

Alternative 1 included a rock breakwater that might have impeded nearshore salmon migrations, but would have been mitigated by a 100-foot opening in the breakwater. The bridge pier supports (rock islands) would cover about 2.8 acres of marine habitat, but it was anticipated that these rock islands would create equally productive habitat for marine species. Alternative 2 would have taken 80 acres of wetlands, and would have the same impacts from rock islands as Alternative 1. Most residents of Pennock Island opposed Alternative 2. Alternative 3 would not have had any new major environmental impacts.

[20] DOT&PF, *Ketchikan, Alaska, Tongass Narrows Crossing Preliminary Draft Environmental Impact Statement,* prepared by Montgomery Watson, October 1994.

This Preliminary Draft EIS was prepared for internal DOT&PF review only and did not recommend a preferred alternative. The State of Alaska chose not to pursue the project due to lack of funding.

1.6.5 Environmental Impact Statement (2004)

As mentioned in Section 1.3, FHWA and DOT&PF issued the Gravina Access Project FEIS in July 2004. The 2004 FEIS examined nine reasonable action alternatives: two high bridges near the airport with navigational clearances adequate to accommodate large cruise ships (Alternatives C3a and C4); two lower bridges near the airport with navigational clearances adequate to accommodate ships as large as the largest AMHS ferries (Alternatives C3[b] and D1); two bridge alternatives that cross Pennock Island (Alternatives F1 and F3); and three ferry alternatives with locations north of the airport, south of the airport, and at the airport (Alternatives G2, G3, and G4, respectively).

The 2004 FEIS identified Alternative F1 as FHWA's and DOT&PF's preferred alternative. Alternative F1 was the selected alternative in FHWA's Record of Decision, which was issued on September 15, 2004.

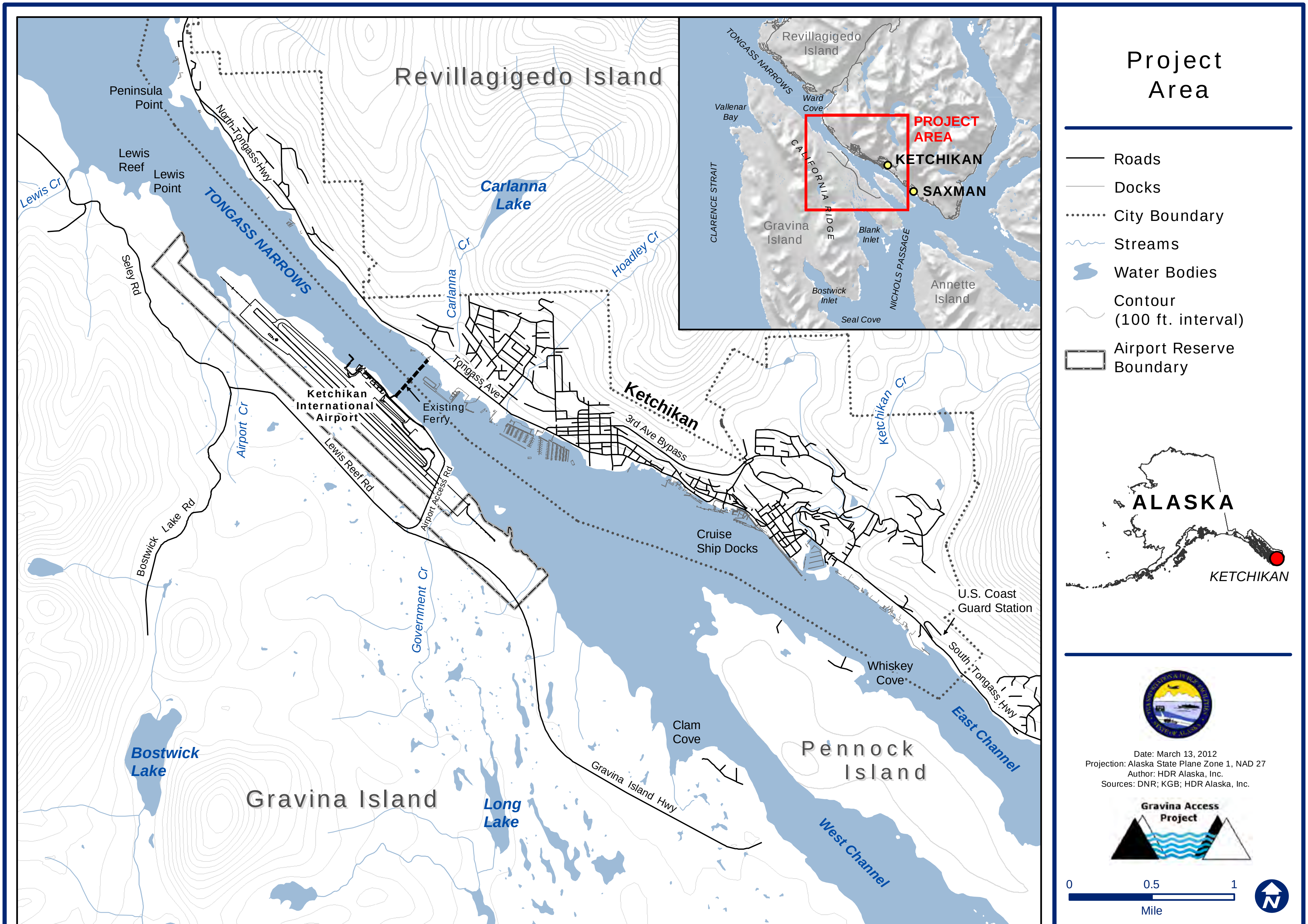
Revillagigedo Island
Peninsula Point
Lewis Reef
Lewis Point
Lewis Cr
TONGASS NARROWS
North Tongass Hwy
Carlanna Lake
Carlanna Cr
Hoadley Cr
Seley Rd
Ketchikan International Airport
Existing Ferry
Tongass Ave
Ketchikan
3rd Ave Bypass
Airport Cr
Lewis Reef Rd
Airport Access Rd
Bostwick Lake Rd
Government Cr
Cruise Ship Docks
Ketchikan Cr
U.S. Coast Guard Station
Whiskey Cove
South Tongass Hwy
East Channel
Clam Cove
Pennock Island
Gravina Island Hwy
West Channel
Bostwick Lake
Gravina Island
Long Lake
Revillagigedo Island
TONGASS NARROWS
Ward Cove
Vallenar Bay
PROJECT AREA
KETCHIKAN
SAXMAN
CALIFORNIA RIDGE
CLARENCE STRAIT
Gravina Island
Blank Inlet
NICHOLS PASSAGE
Annette Island
Bostwick Inlet
Seal Cove
Project Area
Roads
Docks
City Boundary
Streams
Water Bodies
Contour (100 ft. interval)
Airport Reserve Boundary
ALASKA
KETCHIKAN
Date: March 13, 2012
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: DNR; KGB; HDR Alaska, Inc.
Gravina Access Project
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Figure 1.1

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2.0 ALTERNATIVES

In preparation of this ~~Draft~~ Final SEIS, FHWA and DOT&PF reviewed the 2013 Draft SEIS, the 2004 FEIS, and previous engineering studies,~~;~~ conducted engineering and environmental studies~~;~~, and obtained input from the Ketchikan community,~~;~~ local, state, and federal agencies~~;~~, Tribal governments~~;~~, and other Native organizations, to develop and evaluate the project alternatives. This chapter describes the seven project alternatives evaluated in this ~~Draft~~ SEIS (see Section 2.1) and compares the environmental consequences associated with each alternative (see Section 2.2.3.2). The chapter also identifies those alternatives that were considered during preliminary analysis but eliminated from detailed analysis, and the reason they were eliminated (see Section 2.1.4~~2.2~~). As noted in the previous chapter (see Section 1.2), Alternative F1 was the preferred alternative in the 2004 FEIS and the selected alternative in the 2004 Record of Decision; however, Alternative F1 is among the alternatives eliminated from detailed analysis in this SEIS (see Section 2.1.4~~2.2~~). The 2013 Draft SEIS did not identify a preferred alternative. This Final SEIS identifies Alternative G4v as the preferred alternative, with further explanation provided in Section 2.1.4.

All figures referenced in this chapter may be found at the end of the chapter.

2.1 Alternatives Evaluated in this ~~Draft~~ SEIS

Sections 2.1.1 through 2.1.3 describe the alternatives that are evaluated in detail in this ~~Draft~~ SEIS:[1]

- No Action Alternative
- Bridge alternatives (C3-4 and F3)
- Ferry alternatives (G2, G3, G4, and G4v)

Figure 2.1 shows the alignments of the proposed "action" alternatives and the existing ferry route (i.e., the No Action Alternative). All action alternatives begin with access from the North Tongass Highway/Tongass Avenue, which is part of the National Highway System (NHS), and end on Gravina Island on Seley Road, approximately at the northern end of the Airport Reserve[2] (these are the project termini). All action alternatives (C3-4, F3, G2, G3, G4, and G4v) include ~~maintenance and operation of~~ the previously~~recently~~ constructed Gravina Island Highway, Airport Access Road, and Lewis Reef and Seley roads (to the Airport Reserve boundary, approximately). These roads were constructed subsequent to the 2004 FEIS and Record of Decision.[3] Each action alternative also includes replacement~~construction~~ of the Lewis Reef Road bridge over Airport Creek (west fork), and reconstruction of a segment of Seley Road to meet DOT&PF design standards.[4] The existing bridge over Airport Creek is a temporary structure constructed by a private entity for access to land in the Lewis Reef development area. While the Airport Creek bridge replacement~~creek crossing~~ was ~~authorized by FHWA as part~~ a component of Alternative F1, it was not included in the first phase of construction by DOT&PF.

[1] A Transportation System Management (TSM) Alternative was not identified or evaluated because the project does not occur in an urbanized area with a population of more than 200,000 (per FHWA Technical Advisory T6640.8a *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*).

[2] The Airport Reserve boundary is shown in Figure 1.1.

[3] FHWA's Record of Decision, which identified Alternative F1 as the agency's selected alternative, led to the construction of the Gravina Island Highway and Airport Access Road improvements.

[4] The road has been designed in accordance with the American Association of State Highway and Transportation Officials (AASHTO) Guidelines for Geometric Design of Very Low-Volume Local Roads (GDVLVLR). The design is for a 40 mph design speed.

Improved access resulting from any of the action alternatives would result in more vehicular use of some roadways or portions of roadways on Gravina Island. Therefore, the action alternatives include improvements to roadway segments connecting with Ketchikan International Airport. These improvements vary by alternative because the roadway segments connecting the bridge or ferry crossing with the airport are different for each alternative. The roadway improvements specific to each alternative are described below in the sub-section for each alternative.

Project costs presented in the 2013 Draft SEIS for each of the alternatives have been updated for this Final SEIS to reflect, when available, updated design information and inflation. For the bridge alternatives, these updates involved taking engineering information and per-square-foot unit costs developed for Alternative C3-4 in late 2013 and applying those to Alternative F3. These costs were adjusted for inflation to 2015 dollars using the Alaska Consumer Price Index. For the ferry alternatives, updated costs were developed using more detailed design information and a greater level of analysis of the different elements required to implement each of the ferry alternatives. More information on how project costs were developed has been added to this Final SEIS in the highlighted section below.

The current funding source for the project is a blend of high-priority and bridge set-aside earmarks authorized within the TEA-21 and the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) transportation reauthorization legislations. When SAFETEA-LU was adopted in 2005, it contained three earmarks totaling $223 million to construct a bridge between Revillagigedo Island and Gravina Island. One high priority project in SAFETEA-LU for $48 million was dedicated to roadway construction on Gravina Island. Later that same year, Congress passed HR 3058 which reallocated the other two earmarks, totaling $175 million, to DOT&PF to use for any project eligible to receive surface transportation program funds under Section 133(b) of SAFETEA-LU. In accordance with state regulations for use of unrestricted funds, 48 percent of those funds were allocated to the NHS, and then-Governor Murkowski directed DOT&PF to assign that entire allotted amount (i.e., 48 percent of $175 million, or $84 million) to the Gravina Access Project. Funding for complete project construction costs above what is held in reserve, both federal and state funds, is approximately $96 million.~~has not yet been identified.~~ Any improvements constructed as a result of the Gravina Access Project would become state facilities that would be maintained and operated by DOT&PF or under an agreement with the local government(s). ~~Because the project would enhance NHS intermodal connectivity, it could be eligible for funding under the Moving Ahead for Progress in the 21st Century Act (MAP-21).~~

A REVIEW OF PROJECT COSTS

There are several factors to consider when examining project costs. There are the initial costs associated with construction of the project. There are also the annual costs for maintenance and operation of project facilities. Lifecycle costs represent the construction costs and the annual maintenance and operational costs over the lifespan of the project, in this case 75 years. Most of the cost of the bridge alternatives is realized during construction; whereas, most of the cost of a ferry alternative stems from operations and maintenance of the facilities over the life of the project.

In October 2015, when DOT&PF announced it would recommend Alternative G4v as the state's preferred alternative to FHWA, DOT&PF recognized the need to update the cost estimates for all alternatives given the age of the previous estimate. In addition, when DOT&PF and FHWA identified Alternative G4v as the agencies' preferred alternative, they realized that more specific information for the design of the components and construction sequencing of the alternative would require a review of the overall cost estimate. Updated construction cost estimates for the individual elements comprising each of the alternatives are provided in Appendix F.

The following paragraphs provide more detail on how construction cost estimates for the Gravina Access Project alternatives were developed and updated for this Final SEIS.

UPDATED COSTS FOR BRIDGE ALTERNATIVES

Considerable engineering design work was done to develop cost estimates for bridge alternatives because of the complexity of the bridge structures. After FHWA and DOT&PF selected Alternative F1 in the 2004 Record of Decision, costs for that alternative were refined and updated as part of the design and construction process, which continued through 2006. With initiation of the Draft SEIS in 2008, the refined construction costs of Alternative F1 were used as the basis for the development of the cost estimates for the SEIS alternatives. The 2006 Alternative F1 costs were updated to 2008 dollars and then the individual element costs (i.e., cost of foundations in deep water, foundations in shallow water, long span box girder, etc.) and unit costs for roadways were used to develop cost estimates for the applicable elements of all of the other alternatives evaluated in the SEIS alternative screening process (see Section 2.2.3). Those costs were then escalated to 2011 dollars for the reasonable alternatives in the 2013 Draft SEIS.

In late 2013, because of concerns that the cost estimates for the bridge alternatives were outdated, DOT&PF prepared a new cost estimate for Alternative C3-4, converted it to per-square-foot costs, and applied those unit costs to Alternative F3's design elements. The 2013 estimate for Alternative C3-4 relied on more detailed examination of design and construction requirements for the bridge structure compared with what was used in the estimate prepared for the 2013 Draft SEIS. For this Final SEIS, the costs for bridge construction have been adjusted for inflation to 2015 dollars. Overall, the costs for Alternatives C3-4 and F3 have increased by approximately 37 percent and 28 percent, respectively, based largely on the late 2013 updated cost estimate for Alternative C3-4 and, to a lesser extent, the rate of inflation.

UPDATED COSTS FOR FERRY ALTERNATIVES

The engineering design of the ferry alternatives was less rigorous than the bridge alternatives in the 2013 Draft SEIS. The cost estimates for the ferry alternatives in the 2013 Draft SEIS relied mostly on prior State of Alaska construction bidding experience for similar projects in Southeast Alaska and generic concepts for ferry terminal sites and associated facilities. Updating ferry costs for the Final SEIS involved developing more detailed design information, accounting for changes to recent and planned transportation improvements in the Ketchikan Gateway Borough, adding costs for elements that had been unintentionally omitted from the original cost calculations, and adjusting all costs to 2015 dollars. With Alternative G4v identified as the preferred alternative and all elements of Alternative G4v being elements of the other ferry alternatives, DOT&PF first updated the cost of Alternative G4v to use in the cost estimates of the other ferry alternatives. Information to explain the cost variance between the 2013 Draft SEIS and Final SEIS is provided in the following paragraphs.

Construction Costs in the 2013 Draft SEIS

The cost of Alternative G4v as presented in the 2013 Draft SEIS was approximately $22.8 million (2011 dollars). This cost estimate was based on costs to construct a new passenger waiting facility and new heavy freight mooring facility, replace the ferry layup dock, reconstruct the existing airport ferry transfer bridges and ramps, replace Airport Creek Bridge, and upgrade a portion of Seley Road.

The 2013 Draft SEIS unintentionally omitted cost estimates for:

- Shuttle vans
- Reconstruction of the existing airport ferry transfer bridges and ramps
- Upgrades and improvements to shoreside pedestrian facilities

- Construction of new toll facilities

These additional costs apply to all ferry alternatives.

Updated Costs for Alternative G4v (Preferred Alternative)

In developing more detailed engineering information for Alternative G4v following its identification by DOT&PF and FHWA as the preferred alternative, DOT&PF evaluated the generic concepts for ferry terminal sites to develop a more comprehensive picture of the alternative and the specific elements required. New costs were added for those elements that had not been previously included in the cost estimates for ferry alternatives. The revised cost for Alternative G4v is approximately $45.9M. Key elements affecting the alternative and its associated cost are explained in the following paragraphs.

Increased costs for ferry layup dock and reduced costs for the heavy freight mooring facility: With improved design information and escalation to 2015 dollars, the cost of the layup dock has increased considerably. The increase is largely attributed to the greater level of design information that DOT&PF developed. The design of the heavy freight mooring facility has changed, reducing costs and providing a facility that, in consultation with the Borough, is better suited for the needed freight access. The new facility is a mooring facility at the same location as the heavy freight dock proposed in the 2013 Draft SEIS.

	Updated cost	**Change from 2013 Draft SEIS**
New heavy freight mooring facility	$2.9 million	-$2.5 million
Replacement ferry layup dock and transfer bridges	$14.5 million	+$8.5 million

Unintentionally omitted costs for reconstruction of the existing airport ferry transfer bridges and ramps: These costs had not been included in the estimates developed for the 2013 Draft SEIS. They represent one third of the difference between the total construction cost in the 2013 Draft SEIS and this Final SEIS. The costs include improvements to pedestrian facilities on the transfer bridges and ramps.

Reconstruct ferry transfer bridge and ramp on Revillagigedo Island	+$4.4 million
Reconstruct ferry transfer bridge and ramp on Gravina Islands	+$2.9 million

Unintentionally omitted costs for shuttle vans: These costs had not been calculated for the 2013 Draft SEIS. Costs to provide shuttle vans are considered here as initial purchase costs and, like other costs described herein, do not include operations and maintenance, or future replacement.

Two shuttle vans	+$0.3 million

Increased costs for construction of upland facilities: These costs increased as a result of better design information and escalation to 2015 dollars.

	Updated cost	**Change from 2013 Draft SEIS**
New passenger waiting facility on Revillagigedo	$2.5 million	+$1.1 million
Airport Creek Bridge Replacement, Seley Road improvements, etc.	$5.8 million	+$1.6 million

Increased costs for project development: These costs were escalated to 2015 dollars.

	Updated cost	Change from 2013 Draft SEIS
Design, utilities, right-of-way	$5.6 million	+2.8 million
Construction administration, mobilization/demobilization, contingency etc.	$7.0 million	+4.0 million

The current cost estimate (2015 dollars) for Alternative G4v is approximately $45.9 million. The total cost increase for this alternative relative to the 2013 Draft SEIS is $23.1 million. As noted above, this increase is largely attributable to the previously unintentionally omitted costs of reconstructing the ferry transfer bridges and ramps ($7.3 million), and the advanced design information for the layup dock (costing $8.5 million more than originally anticipated).

Updated Construction Costs for Alternatives G2, G3, and G4

For the most part, revised costs for Alternative G4v were incorporated into the costs for the elements common to Alternatives G2, G3, and G4. The cost of adding two new ferries for these alternatives was adjusted for inflation to 2015 dollars from approximately $8 million per ferry to $10 million per ferry. Roadway costs and right-of-way acquisition costs for Alternatives G2 and G3 were escalated to 2015 dollars. The increased construction costs for these alternatives have increased by 45 percent to 50 percent.

2.1.1 No Action Alternative

The regulations implementing the National Environmental Policy Act (NEPA) require federal agencies to assess the effects of a No Action Alternative in an EIS (40 CFR Section 1502.14[d]) and use it as a basis for comparison of the magnitude of the environmental effects of the action alternatives.[5]

Under the No Action Alternative, no bridge would be constructed and no additional ferry service would be provided between Revillagigedo Island and Gravina Island. No improvements to roadways or bridges on Gravina Island would be made. The only public access between the islands would continue to be provided by the existing airport ferry service across Tongass Narrows, supplemented by private boats and floatplanes. There would be no improvements to the existing ferry terminals, located 2.8 miles north of downtown Ketchikan on Revillagigedo Island and on the waterfront, adjacent to the airport terminal on Gravina Island. The No Action Alternative is shown on Figure 2.2.

The Borough would continue to operate and maintain the airport ferry service. The ferry service would continue to operate 16 hours per day, and the frequency of service would remain the same, with departures every 30 minutes: ~~during the winter and every 15 minutes during the peak hours (8:00 a.m. to 4:00 p.m.) in summer~~on the quarter hour from the ferry terminal on Revillagigedo Island and on the hour and half hour from the airport ferry terminal.

Cost. The 75-year lifecycle cost for the No Action Alternative~~, assuming that annual revenue from ferry tolls would be $1.5 million per year,~~ would be approximately $~~35~~ 108 million. This estimate assumes ferry replacement every 35 years, operation and maintenance (O&M) costs of the ferry facilities, and maintenance of the Gravina Island Highway and the Lewis Reef and

[5] Council on Environmental Quality, *Forty Most Asked Questions Concerning CEQ's NEPA Regulations*, 46 FR 18026 (March 23, 1981), as amended, 51 FR 15618 (April 25, 1986).

Seley roads. The estimated average annual O&M cost would be approximately $3.5~~2.1~~ million.~~[6]~~ (See Appendix F for detailed cost information.)

Another useful way to look at project costs is as the summation of the annual expenses and revenue over the lifetime of the facility. If all the costs were inflated over a 75-year lifespan (assuming a 2.3 percent Forward Inflation Rate[7]) and then added, regardless of funding source, that summation would give a true picture of the total cost of ownership. The "total life costs" therefore represent the summation of the estimated annual budget appropriations (inflation adjusted) required to fund a particular alternative over the facilities' lifespan. For the No Action Alternative, the total life cost is approximately $~~929~~ 1,024 million. Adjusting for revenue estimated at $~~339~~ 379 million, the total life costs would be $~~590~~ 645 million.

2.1.2 Bridge Alternatives

The FHWA and DOT&PF identified two reasonable bridge alternatives to evaluate in this ~~Draft~~ SEIS (see Figure 2.~~2~~1):

- Alternative C3-4 – Airport Bridge. This alternative is a lower cost variant of two alternatives (C3[a] and C4) that were analyzed in the 2004 FEIS.
- Alternative F3 – Pennock Island Bridges. This alternative was analyzed in the 2004 FEIS, but the alignment has been slightly modified on Gravina Island to connect with the existing Gravina Island Highway. It includes two bridges crossing at Pennock Island: one bridge over the East Channel and one over the West Channel.

The preferred alternative identified in the 2004 FEIS, Alternative F1, which also involved bridges over the East and West channels at Pennock Island, was not carried forward as a reasonable alternative in this ~~Draft~~ Final SEIS for reasons discussed in Section 2.3.

For Alternatives C3-4 and F3, the bridge structures would be designed to be consistent with the typical roadway section of the Gravina Island Highway, which was designed as part of the NHS and has one 12-foot lane and one 8-foot shoulder on each side of the centerline. The proposed bridges also would include an 8-foot-wide pedestrian walkway on one side. Typical cross-sections of the proposed roadways and bridges are shown on Figure 2.3. Under the bridge alternatives, the existing airport ferry service would be discontinued. Ferries and related assets would be decommissioned and removed. The Borough would decide how to manage the ferry terminal properties on both sides of Tongass Narrows after the facilities are decommissioned.

In 2009, then-DOT&PF Commissioner Leo von Scheben requested that the bridge alternatives be evaluated with tolls to offset, in part, the cost of constructing and operating the bridge.[8] With tolling, each bridge alternative would include an electronic tolling device comprised of a transponder or a radio frequency identification system that uses readers on stationary poles at the bridge approach and tags on vehicles to count the number of trips. The information would be sent electronically to an office for processing and billing.

An investigation of toll rates for the bridge alternatives considered the potential effect of a range of toll values on traffic volumes.[9] Revenue from each of the three toll options ($2, $5, and $16) was determined using corresponding traffic projections. Table 2-1 characterizes the range of

~~6 DOT&PF, Gravina Access Project Supplemental EIS Cost Estimate Report, prepared by HDR Alaska, Inc., August 2012.~~

7 Congressional Budget Office *The Budget and Economic Outlook: An Update*, August 2011, Table B-1 <http://www.cbo.gov/ftpdocs/123xx/doc12316/08-24-BudgetEconUpdate.pdf> Accessed March 3, 2012.

8 Memorandum from Leo von Scheben, Commissioner, DOT&PF, to Gary L. Davis, Southeast Regional Director, DOT&PF, September 17, 2009.

9 DOT&PF, Gravina Access Project Supplemental EIS Traffic Forecast, prepared by HDR Alaska, Inc., August 2012.

potential revenues from the bridge alternatives, assuming that the bridge opens for traffic starting in 2018.

Table 2-1: Anticipated Bridge Revenue with Tolling Options

Alternative	Toll per Vehicle ($)	2018 Vehicles per Day	2018 Revenue[a] ($M)	2030 Vehicles per Day	2030 Revenue[a] ($M)	2040 Vehicles per Day	2040 Revenue[a] ($M)
C3-4	2	961	0.35	2,284	0.83	2,388	0.87
	5	943	0.86	1,469	1.34	1,606	1.47
	16	879	2.57	1,268	3.70	1,369	4.00
F3	2	977	0.36	2,373	0.87	2,495	0.91
	5	957	0.87	1,584	1.45	1,749	1.60
	16	883	2.58	1,350	3.94	1,471	4.30

[a] Revenue is calculated assuming the toll would be charged in one direction only for a full calendar year (i.e., 365 days).

For purposes of comparing the alternatives, DOT&PF identified a toll amount that would cover annual expenses for maintaining and operating the bridge(s) and road. The average annual bridge and approach road expenses would be approximately $250,000 for Alternative C3-4 and $200,000 for Alternative F3.[10] Considering these costs and based on anticipated traffic volumes associated with different toll amounts,[11] the toll amount associated with Alternative C3-4 would be $5 for the first 4 years, reduced to $2 in following years. For Alternative F3, the initial toll would also be $5, reduced to $2 after 2 to 3 years.

2.1.2.1 Alternative C3-4: Airport Bridge

Simulation of Alternative C3-4 bridge from north of Wolff Point on Tongass Avenue, looking south

Alignment. Alternative C3-4 was developed as a lower cost variant of Alternatives C3(a) and C4, which were analyzed in the 2004 FEIS. The alignment of Alternative C3-4 is shown on Figure 2.4. On Revillagigedo Island, travelers would access this alternative from North Tongass Highway by using the existing Don King Drive. The alternative would begin at the intersection of Don King Drive with Rex Allen Drive. No new construction is proposed along Don King Drive. Alternative C3-4 would follow the alignment of Rex Allen Drive around the Walmart store and continue to traverse the hillside southward along an existing topographic bench, gain elevation, and then make a right angle turn southwest, toward Gravina Island. By taking off from Don King Drive and making use of a topographic bench on Revillagigedo Island, the cost of providing a curved structure on the east side of the bridge is eliminated. The roadway would transition onto the bridge, cross over the North Tongass Highway and Tongass Narrows, and turn southward parallel to the airport runway. The bridge would cross over the seaplane facilities adjacent to the airport and ultimately touch down (reach the ground surface) on Gravina Island north of the airport terminal at the existing parking lot. The curve on the west approach to the bridge can be constructed using precast concrete girders, further reducing costs. The bridge would be supported by piers and would not require fill in Tongass Narrows other than the pier footings; i.e., there would be no fill placement in the airport seaplane basin. Bridge abutments would be constructed on fill on uplands. There would

[10] DOT&PF, Gravina Access Project Supplemental EIS Cost Estimate Report, prepared by HDR Alaska, Inc., August 2012.

[11] DOT&PF, Gravina Access Project Supplemental EIS Traffic Forecast, prepared by HDR Alaska, Inc., August 2012.

be no need to permanently relocate airport seaplane facilities; however, temporary relocation may be required during construction. The total length of the Alternative C3-4 alignment is 1.9 miles.

The following improvements would be made to Gravina Island roadways under Alternative C3-4.

- The Airport Creek Bridge would be ~~reconstructed~~ replaced with a new bridge constructed to be 36 feet wide.
- Seley Road would be constructed as a 36-foot-wide, gravel surface road from Lewis Reef Road to approximately the end of the Airport Reserve.

Bridge Structure. The Alternative C3-4 bridge across Tongass Narrows would be 48 feet wide and approximately 4,190 feet long. The maximum height of the bridge over the navigational channel would be approximately 280 feet above mean higher high water (MHHW). The main span of the bridge would have a vertical navigational clearance of 200 feet above MHHW and a horizontal navigational clearance of 550 feet (see Figure 2.5). The design requires an adjustment of the cruise ship navigational trackline slightly to the east (i.e., toward Revillagigedo Island) so that it would be centered under the main span of the bridge.[12] The main span of the bridge would be over water with depths in excess of 40 feet (at low tide). These clearances would accommodate one-way passage of cruise ships (i.e., only one cruise ship could pass under the bridge at one time) and two-way passage of most other ships (including AMHS ferries).

Cost. The cost to construct this alternative is estimated to be $305~~223~~ million. According to estimates, the 75-year lifecycle cost of this alternative would be approximately $~~222~~ 322 million. The average annual O&M cost would be approximately $244,000.~~[13]~~ An electronic toll facility would add $85,000 in construction costs and approximately $150,000 in O&M costs. ~~Assuming a per-vehicle toll of $5 initially and $2 after the first 4 years, adding tolling to Alternative C3-4 would reduce the lifecycle cost to approximately $214 million.[14] [15]~~

The total life cost of this alternative would be approximately $~~391~~ 490 million. ~~With a toll, this alternative~~ Assuming a per-vehicle toll of $5 initially and $2 after the first 4 years, adding tolling to Alternative C3-4 would generate approximately $~~56~~ 63 million in total revenue, which would reduce the total life cost to approximately $~~335~~ 427 million.~~[16]~~ (See Appendix F for detailed cost information.)

[12] DOT&PF assumes the AMHS ferry trackline would be the same as the cruise ship trackline.

~~[13] DOT&PF, Gravina Access Project Supplemental EIS Cost Estimate Report, prepared by HDR Alaska, Inc., August 2012.~~

~~[14] DOT&PF, Gravina Access Project Supplemental EIS Cost Estimate Report, prepared by HDR Alaska, Inc., August 2012.~~

~~[15] The toll amounts are based on the revenue needed to cover annual expenses for maintaining and operating the bridge and road; i.e., $250,000 for Alternative C3-4. As traffic volumes increase, the toll amount can be reduced (see Section 2.1.2).~~

~~[16] DOT&PF, Gravina Access Project Supplemental EIS Cost Estimate Report, prepared by HDR Alaska, Inc., August 2012.~~

2.1.2.2 Alternative F3: Pennock Island Bridges

Alignment. Figure 2.6 shows the Alternative F3 alignment. This is the same Alternative F3 as was analyzed in the 2004 FEIS, with a slight modification to the alignment at the Gravina Island touchdown point to connect with the existing Gravina Island Highway. The East Channel bridge would connect directly to South Tongass Highway on Revillagigedo Island approximately 1.5 miles south of downtown Ketchikan between the USCG Station and the Forest Park subdivision. From this terminus, the bridge would cross the East Channel to Pennock Island. The roadway would cross Pennock Island, climbing in elevation to the West Channel bridge. The roadway on Pennock Island would be approximately 4,500 feet long between the East Channel and West Channel bridge abutments. From Pennock Island, the West Channel bridge would connect to the Gravina Island Highway, approximately 3 miles south of the airport on Gravina Island. The total road distance between Revillagigedo Island and the airport passenger terminal is 5.87 miles.

Simulation of Alternative F3 bridges and Pennock Island from mid-Tongass Narrows near the airport, looking south

The following improvements would be made to Gravina Island roadways under Alternative F3.

- Gravina Island Highway would be widened to 40 feet and paved along its entire length.
- The bridge over Gravina Creek would be widened to 40 feet and paved.
- The bridge over Government Creek would be widened to 40 feet and paved.
- Airport Access Road would be widened to 40 feet and paved along its entire length (the tunnel under runway safety area to remain unchanged).
- The Airport Access Road/Gravina Island Highway intersection would be reconstructed to eliminate the curve and create a straight T-intersection.
- The Airport Creek Bridge would be replaced with a new bridge constructed ~~reconstructed~~ to be 36 feet wide.
- Seley Road would be constructed as a 36-foot-wide, gravel surface road from Lewis Reef Road to approximately the end of the Airport Reserve.

Bridge Structures. Alternative F3 would have two bridges that cross the two channels of Tongass Narrows via Pennock Island. The East Channel bridge would be approximately 1,985 feet long and have a maximum height of approximately 115 feet. The bridge would have a vertical navigational clearance of 60 feet above MHHW and a horizontal navigational clearance of approximately 350 feet (see Figure 2.7). The main span of the bridge would be over water depths in excess of 40 feet (at low tide); however, the vertical and horizontal clearances would not accommodate cruise ships or ferries. The primary waterway users of the East Channel under Alternative F3 would be tugs and barges, USCG vessels, charter boats, and local private craft.

The West Channel bridge would be approximately 2,470 feet long and have a maximum height of approximately 270 feet. The bridge would have a vertical navigational clearance of 200 feet above MHHW and a horizontal navigational clearance of approximately 550 feet (see Figure 2.7). The main span would be located over water depths in excess of 40 feet (at low tide). These clearances would accommodate one-way passage of cruise ships and two-way passage of most other ships, including AMHS ferries, which typically use the West Channel. The bridge crossing of the West Channel would be perpendicular to the main navigational channel.

Channel Widening. To improve its navigational characteristics for cruise ships transiting the West Channel, the narrowest portion of the channel would be widened under Alternative F3. Currently, the navigable portion of the West Channel for large cruise ships is approximately 400 feet wide at its narrowest point, with a minimum depth of 40 feet below mean lower low water (MLLW). The proposed modifications would widen this portion of the channel to 750 feet—the center 550 feet would have a minimum depth of 40 feet at low tide and the 100 feet of channel on either side would have a minimum depth of 30 feet at low tide (see Figures 2.8 and 2.9). The deepest part of the widened channel would be centered on the navigational opening of the West Channel bridge. These modifications would require dredging approximately 213,000 cubic yards over 14.8 acres. The bridge would be located at the southern end of the widened channel, which would extend approximately 2,000 feet north of the bridge. South of the bridge crossing, and north of the channel modification area, the existing channel is already wider and deeper than the proposed modified channel.

Cost. The cost to construct this alternative is estimated to be $354~~276~~ million. Estimates indicate that the 75-year lifecycle cost of this alternative would be approximately $~~286~~ 385 million. The estimated average annual O&M cost is approximately $188,000. An electronic toll facility would add $85,000 in construction costs and approximately $150,000 in O&M costs. ~~Assuming a per vehicle toll of $5 initially and $2 after the first 2 to 3 years,[17] adding tolling to Alternative F3 would reduce the lifecycle cost to approximately $280 million.[18]~~

The total life cost of this alternative would be approximately $~~576~~ 675 million. Assuming a per vehicle toll of $5 initially and $2 after the first 2 to 3 years, adding tolling to Alternative F3 ~~With a toll, this alternative~~ would generate approximately $~~45~~ 51 million in total revenue, which would reduce the total life cost to approximately $~~531~~ 624 million.[19] (See Appendix F for detailed cost information.)

2.1.3 Ferry Alternatives

The FHWA and DOT&PF identified four reasonable ferry alternatives to evaluate in this ~~Draft~~ SEIS (see Figure 2.~~2~~1):

- Alternative G2 – Peninsula Point to Lewis Point Ferry
- Alternative G3 – Downtown to South of Airport Ferry
- Alternative G4 – New Ferry Adjacent to Existing Ferry
- Alternative G4v – Lower Cost Variant of Alternative G4 Ferry

~~Each ferry alternative includes purchase of two new ferry vessels and construction of a new ferry terminal on each side of Tongass Narrows, as well as continued operation and maintenance of the existing airport ferry service under its current schedule and along its existing route.~~ The ~~ferry~~ locations of ~~a~~Alternatives G2, G3, and G4 are shown in Figures 2.10, 2.11, and 2.12. These are the same ferry routes as those studied in the 2004 FEIS. Alternatives G2, G3, and G4 include purchase of two new ferry vessels and construction of a new ferry terminal on each side of Tongass Narrows, as well as continued operation and maintenance of the existing airport ferry service under its current schedule and along its existing route. The additional ferry service and road improvements associated with Alternatives G2 and G3 would open up access and accommodate traffic to developable lands on Gravina Island while the existing ferry

~~[17] The toll amounts are based on the revenue needed to cover annual expenses for maintaining and operating the bridge and road; i.e., $200,000 for Alternative F3. As traffic volumes increase, the toll amount can be reduced (see Section 2.1.2).~~

~~[18] DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.~~

~~[19] DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.~~

continues to provide direct access to the airport. Under Alternative G4, the two new ferries would run adjacent to the existing ferry, providing increased capacity at that location to service airport travelers, as well as travelers accessing other lands on Gravina Island. Alternative G4v was added as a lower cost variant of A~~an a~~lternative G4 during the development of the~~is~~ 2013 Draft SEIS to account for a potential slower increase in demand for access. Like Alternative G4, Alternative G4v would involve the continued operation and maintenance of the existing airport ferry service under its current schedule and along its existing route; however, ~~Under Alternative G4v, a~~ new ferries and ~~y and new~~ ferry ~~terminals~~ berths would be purchased and constructed for Alternative G4v ~~would be purchased and constructed adjacent to the existing ferry~~ only when ferry demand increases enough to warrant it in future years. Based on traffic projections prepared during the development of the 2013 Draft SEIS, ~~however,~~ such demand ~~this~~ would not occur within the 75-year lifecycle of the project.[20] Therefore, for purposes of this ~~Draft~~ SEIS, Alternative G4v does not include the addition of new ferries or ferry berths~~terminals or ferries~~.

Note that descriptions of the ferry alternatives have been revised in this SEIS to clarify terminology: "ferry terminal" refers to the site that includes all shoreside facilities at a given location, and "ferry berth" refers to the transfer bridge and ramp where a ferry vessel would moor to load and unload passengers.

The schedule of the new ferry service with ~~any of the ferry a~~Alternatives G2, G3, and G4 would be similar to that of the existing ferry service: ~~one vessel would operate during the winter (~~operating 16 hours per day, crossing every 30 minutes (on the quarter hour from the ferry terminal on Revillagigedo Island and on the hour and half hour from the airport ferry terminal)~~, and both vessels would operate during the summer (one ferry operating 8 hours per day from approximately 6:00 a.m. to 8:00 a.m. and from 4:00 p.m. to 10:00 p.m., crossing every 30 minutes; and two ferries operating 8 hours per day from approximately 8:00 a.m. to 4:00 p.m., crossing every 15 minutes)~~. The cost estimates assume that the ferry vessels would be replaced after 35 years.

Toll collection would continue at the existing rates for travel on all ferries under all ferry alternatives. Table 2-2 and Table 2-3 illustrate the 2016 tolls for pedestrians and vehicles using the existing ferry service.

Table 2-2: 2016 One-Way Airport Ferry Passenger Tolls [New]

Age	Toll
12 and Older	$6.00
6 to 11	$3.00
5 and Under	Free

Source: Ketchikan Gateway Borough Alaska website, "Airport Ferry." http://www.borough.ketchikan.ak.us/147/Airport-Ferry (accessed on: January 6, 2017).

Table 2-3: One-Way Airport Ferry Vehicle Tolls [New]

Vehicle Type	Toll
Cars, Light Trucks, Vans	$7.00
Motorcycles, Scooters	$3.00

[20] DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.

Vehicle Type	Toll
Box trucks, Box Vans, Buses up to 35 feet	$10.00
Oversized Vehicles – over 35 feet long or 8.5 feet wide	$38.00
Vehicles over 80 feet	Not Permitted

Source: Ketchikan Gateway Borough Alaska website, "Airport Ferry."
http://www.borough.ketchikan.ak.us/147/Airport-Ferry Accessed on: January 6, 2017.

All ferry alternatives include a ~~60~~ new passenger waiting facility with restrooms at the existing ferry terminal on Revillagigedo Island and other improvements to the terminal site, including:

- Expansion of paved parking areas[21]
- Lighting
- Security (including security cameras)
- Water
- Sewer
- Covered walkways
- Fencing, landscaping
- Parking meter system
- Sidewalks
- Tongass Highway access improvements

All ferry alternatives would require two shuttle vans to carry both pedestrians and their luggage from the existing ferry terminal on Revillagigedo Island to the airport terminal on Gravina Island, in addition to:

- A new heavy freight ~~dock~~ mooring facility ~~on a 2.5-acre site~~ near the airport, ~~just~~ to the south of the existing airport ferry layup ~~berth~~ dock to provide heavy freight access to Gravina Island for highway loads that cannot be accommodated by the shuttle ferry (see Figure 2.13). This facility would be capable of landing vessels and barges carrying large loads such as construction equipment and materials, transit mixers, fuel tankers, and fire trucks. The ~~dock~~ heavy freight mooring facility would also be capable of accommodating AMHS-class vessels needing temporary layup. Dock facilities that can accommodate the large loads are currently available on the Revillagigedo Island side of Tongass Narrows.
- Reconstruction of the existing airport ferry transfer bridges and ramps to meet current design standards (see Figures 2.14 and 2.15). These facilities are inspected regularly by DOT&PF and would need to be replaced twice during the 75-year lifecycle.
- Upgrades and improvements to all sidewalks and wheelchair ramps associated with the airport ferry facilities to meet applicable standards.
- Construction of new ~~and maintenance of existing~~ toll facilities. Toll collection would continue at the existing rate for all ferry routes and toll revenue would be used to offset the costs of operation and maintenance of the ferry system. The cost estimates assume annual revenue of $1.5 million per year from ferry tolls.
- Replacement of the existing ferry layup dock and transfer bridge[22] to support layup and maintenance of the airport ferry system (see Figure 2.13).

[21] DOT&PF does not assume property will be purchased and developed for parking facilities.

Figure 2.3 shows typical cross-sections of the proposed new roadways connecting the ferry terminal sites for Alternatives G2 and G3 on Gravina Island with the existing road network.

2.1.3.1 Alternative G2: Peninsula Point to Lewis Point Ferry

Alternative G2 entails continued operation of the existing airport ferry and new ferry service for vehicles and passengers between Peninsula Point on Revillagigedo Island and Lewis Point on Gravina Island (see Figure 2.10).

Simulation of Alternative G2 ferry from Gravina Island shoreline near the northern end of the airport runway, looking north

Ferry Facilities and Roadway Connections. This alternative would cross Tongass Narrows approximately 2.0 miles north of the airport passenger terminal from Peninsula Point to Lewis Point and would have a sailing distance of approximately 0.8 mile. Two new ferry vessels and construction of a new ferry terminal on each side of Tongass Narrows would be required for this alternative. Dredging may be required to provide adequate navigational depth for the ferry berth on Gravina Island: approximately 1,400 cubic yards of material would be removed from an area of approximately 0.3 acre.

A 0.8-mile-long, 40-foot-wide paved access road would be constructed on Gravina Island to connect the ferry terminal site to Seley Road. The following improvements would be made to Gravina Island roadways under Alternative G2:

- Seley Road would be constructed as a 36-foot-wide, gravel road north from the ferry terminal access road to approximately the Airport Reserve boundary.
- Seley Road would be constructed as a 40-foot-wide, paved road from the ferry terminal access road to Lewis Reef Road.
- The Airport Creek Bridge would be replaced with a new bridge constructed ~~reconstructed~~ to be 40 feet wide and paved.
- Lewis Reef Road would be widened to 40 feet and paved from Seley Road to Airport Access Road.
- The Airport Access Road/Gravina Island Highway intersection would be reconstructed to eliminate the curve and create a straight T-intersection.
- Airport Access Road would be widened to 40 feet and paved along its entire length (the tunnel under runway safety area to remain unchanged).

Cost. The cost to construct this alternative is estimated to be $122~~81~~ million. The estimated 75-year lifecycle cost of this alternative is approximately $~~331~~ 338 million, and its estimated average annual O&M cost is approximately $5.9 million.~~[23]~~

The total life cost of this alternative, which includes the cost to build and operate the new ferry facilities as well as continued operation of the existing airport ferry, would be approximately

[22] The existing layup dock was originally a segment of the State of Washington I-90 floating bridge. It was recycled for use as the Borough's dock. It has always had a slight list that cannot be corrected with ballasting, and it is not long enough to tie up the new ferries. The transfer bridge between the shore and dock has been regularly inspected by DOT&PF and is in such a state of disrepair that its load-carrying capabilities have been steadily downgraded and is now closed to public access.

~~[23] DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.~~

$~~1,330~~ 2,017 million. Over the life of the project, the total revenue would be approximately $505 ~~451~~ million, which would reduce the total life cost to approximately $~~879~~1,512 million.[24] (See Appendix F for detailed cost information.)

2.1.3.2 Alternative G3: Downtown to South of Airport Ferry

Alternative G3 entails continued operation of the existing airport ferry and new ferry service for vehicles and passengers between Ketchikan (near the Plaza Mall at Bar Point) on Revillagigedo Island and a location near Clump Cove on Gravina Island (see Figure 2.11).

Simulation of Alternative G3 ferry from the north parking area adjacent to Plaza Port West, looking northwest toward Gravina Island

Facilities and Roadway. This alternative would cross Tongass Narrows approximately 1.3 miles south of the airport passenger terminal and would have a crossing distance of approximately 1.3 miles. This alternative would require construction of a new ferry terminal on each side of Tongass Narrows and two new ferry vessels. ~~No~~ ~~d~~Dredging ~~would~~ may be required to provide adequate navigational depth for the ferry ~~terminal~~ berths on Revillagigedo Island and Gravina Island: approximately 18,600 cubic yards of material in total would be removed from an area of approximately 2.2 acres. The existing breakwater would be incorporated into the design of the ferry terminal parking lot and pier.

A 0.2-mile-long, 40-foot-wide paved access road would be constructed on Gravina Island to connect the ferry terminal site to the Gravina Island Highway. The following improvements would be made to Gravina Island roadways under Alternative G3:

- Gravina Island Highway would be widened to 40 feet and paved from the ferry access road to the intersection with the Airport Access Road.
- The bridge over Government Creek would be widened to 40 feet and paved.
- The Airport Access Road/Gravina Island Highway intersection would be reconstructed to eliminate the curve and create a straight T-intersection.
- Airport Access Road would be widened to 40 feet and paved along its entire length (the tunnel under runway safety area to remain unchanged).
- The Airport Creek Bridge would be replaced with a new bridge constructed ~~reconstructed~~ to be 36 feet wide.
- Seley Road would be constructed as a 36-foot-wide, gravel surface road from Lewis Reef Road to approximately the end of the Airport Reserve.

Cost. The cost to construct this alternative is estimated to be $107~~70~~ million. The estimated 75-year lifecycle cost of this alternative is approximately $~~314~~ 316 million, and its estimated average annual O&M cost is approximately $5.9 million.[25]

The total life cost of this alternative, which includes the cost to build and operate the new ferry facilities as well as continued operation of the existing airport ferry, would be approximately $1,942~~262~~ million. Over the life of the project, the total revenue would be approximately

[24] ~~DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.~~

[25] ~~DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.~~

$506~~451~~ million, which would reduce the total life cost to approximately $~~811~~1,436 million.[26] (See Appendix F for detailed cost information.)

2.1.3.3 Alternative G4: New Ferry Adjacent to Existing Ferry

Alternative G4 would include continued operation of the existing airport ferry for vehicles and passengers and new ferry service adjacent to that operation. New ferry ~~terminals~~ berths would be located at ~~djacent to~~ the existing airport ferry terminals adjacent to the existing ferry berths and new ferries would operate on an adjacent ferry route from Charcoal Point on Revillagigedo Island to the airport on Gravina Island (see Figure 2.12).

Facilities and Roadway. This alternative would cross Tongass Narrows approximately 2.8 miles north of downtown. The crossing distance is approximately 0.25 miles. This alternative would require two new ferry vessels and construction of a new ferry ~~terminal~~ berth on each side of Tongass Narrows adjacent to the existing airport ferry ~~terminals~~berths. No dredging would be needed for the ferry berths. The following improvements would be made to Gravina Island roadways under Alternative G4:

- The Airport Creek Bridge would be replaced with a new bridge constructed ~~reconstructed~~ to be 36 feet wide.
- Seley Road would be constructed as a 36-foot-wide, gravel surface road from Lewis Reef Road to approximately the end of the Airport Reserve.

Cost. The cost to construct this alternative is estimated to be $91~~62~~ million. The estimated 75-year lifecycle cost of this alternative is approximately $~~301~~ 294 million, and its estimated average annual O&M cost is approximately $5.9 million.[27]

The total life cost of this alternative, which includes the cost to build and operate the new ferry facilities as well as continued operation of the existing airport ferry, would be approximately $1,872~~207~~ million. Over the life of the project, the total revenue would be approximately $506~~451~~ million, which would reduce the total life cost to approximately $~~756~~ 1,633million.[28] (See Appendix F for detailed cost information.)

2.1.3.4 Alternative G4v (Preferred Alternative): Lower Cost Variant of Alternative G4

Alternative G4v was added as a lower cost alternative to Alternative G4 to address immediate needs for improved shoreside facilities for airport travelers and heavy freight movement. ~~With~~ Alternative G4v~~,~~ would include the continued operation of the existing airport ferry for vehicles and passengers with no additional ferry vessels providing service across Tongass Narrows and no new ferry berths~~however, additional ferry service and terminals adjacent to the existing ferry service and terminals would be provided only when increased demand warrants additional service~~.

Like the other ferry alternatives, Alternative G4v includes the passenger waiting facility, shuttle vans, new heavy freight ~~dock~~mooring facility, reconstructed airport ferry transfer bridges, upgraded sidewalks and ramps, continued toll collection, and replacement of the ferry layup dock. Improved access would only relate to the benefits provided by shoreside amenities.

Facilities and Roadway. This alternative would cross Tongass Narrows approximately 2.8 miles north of downtown. The crossing distance is approximately 0.25 mile. There would be no reduction in travel time.

~~[26] DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.~~

~~[27] DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.~~

~~[28] DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.~~

The following improvements would be made to Gravina Island roadways under Alternative G4v:

- The Airport Creek Bridge would be replaced with a new bridge constructed to be 36 feet wide.
- Seley Road would be constructed as a 36-foot-wide, gravel surface road from Lewis Reef Road to approximately the end of the Airport Reserve. DOT&PF might choose to construct this road in phases: the first phase would be construction of a 14-foot-wide gravel surface road and the second phase would widen the road to 36 feet. This SEIS discloses the impacts that would result from construction of the 36-foot-wide road.

Cost. The cost to construct facilities associated with this alternative is estimated to be $46~~23~~ million. According to estimates, the 75-year lifecycle cost of alternative G4v would be approximately $~~182~~ 171 million, and its average annual O&M cost would be approximately $3.6 million.[29]

The total life cost of this alternative would be approximately $1,163 ~~050~~ million. Over the life of the project, the total revenue would be approximately $~~338~~ 379 million, which would reduce the total life cost to approximately $~~712~~ 784 million.[30] (See Appendix F for detailed cost information.)

Figure 2.~~14~~ 16 compares total life costs of each of the alternatives over a 75-year period, following a 5-year construction period. Note that the ferry alternatives show sharp increases in cost every 35 years due to replacement of the ferry vessels.

2.1.4 DOT&PF's and FHWA's Preferred Alternative

All reasonable alternatives under consideration (including the No Action Alternative) have been developed to a similar level of detail in this SEIS and their comparative merits have been evaluated. Based on the analyses in the 2013 Draft SEIS and considering public and agency input, the DOT&PF and FHWA determined Alternative G4v to be the preferred alternative. Alternative G4v meets the immediate needs of improving access to Ketchikan International Airport and developable land on Gravina Island by improving shoreside facilities for travelers. It partially meets the need of promoting environmentally sound, planned long-term economic development on Gravina Island by providing and improving roads to developable lands (i.e., Gravina Island Highway as constructed and Seley Road/Airport Creek Bridge improvements). Alternative G4v would have the least impact to natural habitat as compared with other build alternatives, would not affect historic properties, and would not require relocation of any residences or businesses.

The bridge alternatives in this SEIS have the highest construction costs of all reasonable alternatives. In addition to cost, the findings of this SEIS show that the reasonable bridge alternatives would have adverse impacts to air navigation (Alternative C3-4) and marine navigation (Alternatives C3-4 and F3):

- In 2014, the Federal Aviation Administration (FAA) conducted an aeronautical study under the provisions of 14 CFR Part 77 concerning the potential hazard of the Alternative C3-4 bridge with respect to navigable airspace at Ketchikan International Airport. Based on that study, FAA determined that Alternative C3-4 would have substantial adverse effect on the safe and efficient utilization of the airport's navigable airspace.

[29] DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.

~~[30] DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.~~

- During development of the 2004 FEIS, the USCG indicated that closing East Channel to large vessel traffic with Alternative F3 would not meet the reasonable needs of navigation in Tongass Narrows.[31] With Alternative F3, vessels requiring more than 60 feet of vertical clearance would need to transit under the West Channel bridge or enter and exit Tongass Narrows from the north. Either option would have an adverse effect on cruise ship operations because it would require additional maneuvering and increased sailing time. Safety concerns for large ships navigating under either proposed bridge alternative (C3-4 or F3) were also noted by cruise ship lines and marine pilots in scoping comments and comments on the 2013 Draft SEIS. Longer ships would have an increased risk of allision with bridge piers and taller ships would have to schedule transiting under the bridge with lower tides to have clearance under the bridge deck.

In its comments on the 2013 Draft SEIS, the City of Ketchikan expressed concern for potential impacts to the local economy from changes to cruise ship travel patterns with the bridge alternatives (see City of Ketchikan comments on the 2013 Draft SEIS at Table 7-6 of this SEIS). The Southeast Alaska Pilots Association recommended against selection of Alternative C3-4 or F3, identifying safety of marine navigation and efficiency of maritime transportation as major concerns.

With identification of Alternative G4v as their preferred alternative, FHWA and DOT&PF meet the State of Alaska's objective "to identify the most fiscally responsible alternative" and would avoid impacts on the airspace of Ketchikan International Airport and marine navigation through Tongass Narrows.

2.2 Alternatives Previously Considered but Eliminated From Further Consideration

To identify alternatives to be considered in this ~~Draft~~ SEIS, FHWA and DOT&PF, with input from stakeholder agencies and the public, developed a screening process to examine all of the possible alternatives for ~~this~~ the 2013 Draft SEIS. The purpose of the screening process was to identify a range of reasonable alternatives and eliminate those that could not be considered reasonable based on cost, the manner in which they address the purpose and need for the project, or the possibility that they would cause unacceptable adverse impacts to the human and natural environment. This section describes the full range of alternatives initially considered in the process of developing this~~e~~ ~~Draft~~ SEIS and why some were eliminated from further consideration and detailed analysis in this ~~e Draft~~ SEIS.

2.2.1 Reasonable Alternatives Identified in the 2004 FEIS

In developing possible alternatives for consideration in ~~this~~ the 2013 Draft SEIS, FHWA and DOT&PF first considered the nine reasonable action alternatives from the 2004 FEIS: six bridge alternatives (C3a, C3b, C4, D1, F1, and F3) and three ferry alternatives (G2, G3, and G4). The nine reasonable action alternatives from the 2004 FEIS are described as follows:

2.2.1.1 Bridge Alternatives

Alternative C3a would consist of a bridge across Tongass Narrows approximately 2,500 feet north of the airport passenger terminal that connects to Signal Road on Revillagigedo Island. The alignment would be 2.2 miles long, including the 6,800-foot-long bridge and a 0.3-mile Airport Return Loop. The main bridge span would have a vertical navigational clearance of 200 feet above MHHW and a horizontal navigational clearance of at least 550 feet. These navigational clearances would accommodate one-

[31] Letter from J.N. Helfinstine, USCG Bridge Section Chief, to David Miller, FHWA Alaska Division Administrator, October 9, 2008.

way passage of cruise ships and two-way passage of most other ships including the largest AMHS ferries. The maximum height of the bridge would be approximately 265 feet above MHHW. The bridge would penetrate Part 77 airspace.

Alternative C3b would include a bridge across Tongass Narrows approximately 3,600 feet north of the airport passenger terminal that connects to Signal Road on Revillagigedo Island. The alignment would be about 2.2 miles long, with a bridge that would be approximately 4,250 feet long and a 0.3-mile Airport Return Loop. The main span of this bridge would have a vertical navigational clearance of 120 feet above MHHW and a horizontal navigational clearance of approximately 500 feet. These navigational clearances would accommodate passage of ships as large as AMHS ferries. The maximum height of the bridge would be approximately 175 feet above MHHW, which would not penetrate Part 77 airspace.

Alternative C4 would include a bridge across Tongass Narrows approximately 2,500 feet north of the airport passenger terminal. The bridge is generally on the same alignment as Alternative C3a, but the Revillagigedo Island approach connects near Cambria Drive. This alignment would be 2.1 miles long, with a bridge that would be approximately 5,000 feet long and a 0.4-mile Airport Return Loop. The main span of this bridge would have a vertical navigational clearance of 200 feet above MHHW and a horizontal navigational clearance of over 550 feet. These navigational clearances would accommodate one-way passage of cruise ships and two-way passage of most other ships, including AMHS ferries. The maximum height of the bridge would be approximately 260 feet above MHHW. The bridge would penetrate into Part 77 airspace.

Alternative D1 would include a bridge that would cross Tongass Narrows directly east of the airport passenger terminal. The alignment would be about 1.6 miles long, and the bridge would be approximately 3,600 feet long with a 0.4-mile Airport Return Loop. The main span of this bridge would have a vertical navigational clearance of 120 feet above MHHW and a horizontal navigational clearance of approximately 500 feet. These navigational clearances would accommodate passage of ships as large as the AMHS ferries. The maximum height of the bridge would be approximately 165 feet above MHHW, which would not penetrate Part 77 airspace.

Alternative F1 would be approximately 7.0 miles long and would cross Tongass Narrows with two bridges via Pennock Island. The access would begin along Stedman Street just to the south of Deermount Street and cross the East Channel to Pennock Island and the West Channel to Gravina Island. The East Channel bridge would be approximately 3,400 feet long, and have a maximum height of approximately 285 feet above MHHW. It would have a vertical navigational clearance of 200 feet above MHHW and a horizontal navigational clearance of approximately 550 feet, which would accommodate one-way passage of cruise ships and two-way passage of most other ships, including AMHS ferries. The West Channel bridge would be approximately 2,465 feet long and have a maximum height of approximately 160 feet above MHHW. The bridge would have a vertical navigational clearance of 120 feet above MHHW and a horizontal navigational clearance of approximately 500 feet, which would accommodate passage of ships as large as the AMHS ferries, but not the largest cruise ships.

Alternative F3 would be approximately 5.9 miles long and would cross Tongass Narrows with two bridges via Pennock Island. The access would begin at South Tongass Highway south of the USCG Station and cross the East Channel to Pennock Island and the West Channel to Gravina Island. The East Channel bridge would be approximately 1,985 feet long and have a maximum height of approximately 115 feet above MHHW.

The bridge would have a vertical navigational clearance of 60 feet above MHHW and a horizontal clearance of approximately 350 feet. These clearances would not accommodate cruise ship, AMHS ferries, or tall freight barges that currently use the East Channel as their primary navigational route. The primary users of the East Channel are anticipated to be smaller tugs and barges, and commercial and recreational vessels with air drafts less than 60 feet. The West Channel bridge would be approximately 2,470 feet long and have a maximum height of approximately 270 feet above MHHW. The bridge would have a vertical navigational clearance of 200 feet above MHHW and a horizontal navigational clearance of approximately 550 feet, which would accommodate one-way passage of cruise ships and two-way passage of most other ships, including AMHS ferries. This alternative requires dredging the West Channel to improve its navigational characteristics.

2.2.1.2 Ferry Alternatives

Alternative G2 would include a new ferry service that would complement the existing airport ferry for vehicles and passengers between Peninsula Point on Revillagigedo Island and Lewis Point on Gravina Island. This alternative would cross Tongass Narrows approximately 2.0 miles north of the airport passenger terminal and would have a sailing distance of approximately 0.8 mile~~s~~. Two new ferry vessels and construction of a new ferry terminal on each side of Tongass Narrows would be required for this alternative. A 0.8-mile long road would be constructed on Gravina Island to connect the ferry terminal at Lewis Point with Seley Road.

Alternative G3 would include new ferry service that would complement the existing airport ferry for vehicles and passengers between downtown Ketchikan at Jefferson Street (near the Plaza Mall at Bar Point) on Revillagigedo Island and a location approximately 1.3 miles south of the airport passenger terminal on Gravina Island near Clump Cove. The crossing distance would be approximately 1.3 miles. This alternative would require construction of a new ferry terminal on each side of Tongass Narrows and two new ferry vessels. Dredging may be required to provide adequate navigational depth for the ferry terminals on Revillagigedo Island and Gravina Island. The existing breakwater could also be widened and extended for use as the ferry terminal pier. A paved road would be constructed on Gravina Island from the ferry terminal past the new Runway 11/29 extension approximately 0.2 miles to the Gravina Island Highway.

Alternative G4 would consist of new ferry service for vehicles and passengers adjacent to the existing airport ferry route between Charcoal Point on Revillagigedo Island and the existing airport ferry lay-up berth on Gravina Island on a quarter-mile crossing of Tongass Narrows, approximately 2.6 miles north of downtown. This alternative would require two new ferry vessels and construction of a new ferry ~~terminal~~ berth on each side of Tongass Narrows adjacent to the existing airport ferry berths~~terminals~~.

2.2.2 Alternatives Identified During SEIS Scoping

During the scoping process for the SEIS,[32] several commenters suggested additional alternatives or features for FHWA and DOT&PF to consider in the Gravina Access Project. Additional comments regarding alternatives were received during the review of alternatives

32 FHWA and DOT&PF initiated agency scoping on July 1, 2008. Public scoping was initiated with the Notice of Intent published in the Federal Register (FR) on July 2, 2008. Public scoping meetings were held in Ketchikan on July 22, 2008.

proposed for screening.[33] These ideas were either incorporated into one or more of the alternatives for screening or dismissed because they did not meet the purpose of and satisfy the needs for the project. The alternatives and features that were dismissed from further consideration and the reasons for their dismissal are characterized below:

- Provide a baggage and/or passenger check-in terminal at the existing ferry terminal on Revillagigedo Island. Arrangements for baggage and passenger check-in are coordinated by the airlines under FAA regulations, and are not a surface transportation issue.[34] The difficulty for pedestrians with baggage using the ferry would be addressed with shuttle vans, as described above.
- Use aerial cable trams for access between Revillagigedo Island and Gravina Island. A tram would not provide vehicular access between the islands and would not promote long-term economic development on Gravina Island.
- Relocate AMHS operations to Ward Cove or Gravina Island. This option would not improve the linkage between Revillagigedo and Gravina islands.
- Construct additional roads on Pennock Island (6.5 miles) and Gravina Island (7.75.miles). This option would add substantial cost to the alternatives and would not improve the linkage between Revillagigedo and Gravina islands.
- Build four small boat harbors on Pennock and Gravina Islands. This option would add substantial cost to the alternatives and would not improve the linkage between Revillagigedo and Gravina islands.
- Build out the electrical system along the new road system. Utilities could be expanded along the existing and proposed road network; however, improved access between Revillagigedo and Gravina islands is not dependent on this feature.
- Develop a heavy freight terminal on Revillagigedo Island adjacent to the existing airport ferry terminal. Heavy freight facilities exist on Revillagigedo Island. There is no need for new heavy freight handling facilities.
- Pay outstanding debt for the motor vessel (MV) Oral Freeman and other Ketchikan International Airport improvements. This does not meet the purpose and need for the project because it is not an element that would improve surface transportation between Revillagigedo and Gravina islands.[35]
- Establish a "Gravina Access Permanent Fund" with monies provided by the State of Alaska to pay for operating costs of the airport ferry system. A fund to defray ferry operating costs is outside the scope of this project because it does not pertain to the purpose of and need for the project.[36]
- Remove I-90 Floating Bridge Dock and construct a new boat dock on Gravina Island to handle vessels up to 100 feet long. Replacement of the deficient existing ferry layup dock and transfer bridge (consisting of a section of the old I-90 floating bridge) to support future layup and maintenance of the airport ferry system is a reasonable component of the ferry alternatives. Each of the ferry alternatives will include a layup dock so that maintenance layup can occur without blocking use of a ferry terminal. Constructing an additional length of dock for public use would not address the purpose of improving surface transportation

[33] *Gravina Access Project Pre-screening Alternatives Memorandum*, dated February 6, 2009; distributed to cooperating, participating, and interested agencies on February 10, 2009, with a request for comments by March 9, 2009; distributed to the public on March 5, 2009, with a request for comments by April 6, 2009.

[34] Letter from David Miller, FHWA Alaska Division Administrator, to Dan Bockhorst, Ketchikan Gateway Borough Manager, July 23, 2009.

[35] Letter from David Miller, FHWA Alaska Division Administrator, to Dan Bockhorst, Ketchikan Gateway Borough Manager, July 23, 2009.

[36] Letter from David Miller, FHWA Alaska Division Administrator, to Dan Bockhorst, Ketchikan Gateway Borough Manager, July 23, 2009.

between Revillagigedo and Gravina islands for vehicles, bicycles, and pedestrians. In the past, joint use (ferry and public tie-up) docks have been built in other communities with the municipality providing funds for the public portion of the dock. ~~The Draft SEIS discusses the possibility of constructing a longer dock with a public use section if the Borough acquires the required funds.~~

- Relocate the existing seaplane pullout approximately 100 yards to the west. This is not an element that would improve surface transportation between Revillagigedo and Gravina islands for vehicles, bicycles, and pedestrians. Relocating the seaplane pullout to improve seaplane operations is an FAA airport layout issue. Seaplane pullout relocation would only be included in a Gravina Access Project alternative if the physical layout of the alternative required it.

DOT&PF explored potential cost savings by changing some of the design parameters of previously considered alternatives and incorporating alternatives and features identified in the SEIS scoping process to develop variations for consideration in the screening process. This led to DOT&PF's identification of the following six new or revised alternatives:

Alternative C3-4 is a variant of C3a and C4 that would remove a curve from the bridge main span and make use of existing roadway to the Rex Allen Drive/Don King Road intersection near Walmart, rather than requiring a large cut to Rex Allen Drive from the North Tongass Highway. This alternative is described in Section 2.1.2.1.

Alternative F3v is a variant of Alternative F3 that would reduce the length of the bridge structures by creating embankments with fill for the bridge approaches and would use a cable-stayed structure over East Channel. The intent was to achieve overall cost saving compared to Alternative F3.

Alternative G4v is a variant of Alternative G4 and was added as a lower cost alternative to Alternative G4 to address immediate needs for improved facilities for airport travelers and heavy freight movement, as described in Section 2.1.3.4.

Alternative M1 would include a moveable bridge over Tongass Narrows near the quarry on Tongass Avenue and the existing ferry terminal on Gravina Island. In the lowered position, the vertical clearance would be 20 feet above MHHW, allowing passage of very small commercial vessels and recreation craft. In the raised position, the lift span would accommodate one-way passage of cruise ships and two-way passage of most other ships, including AMHS ferries. The lift towers would penetrate Part 77 airspace.

Alternative M2 would include a moveable bridge over Tongass Narrows near the two existing ferry terminals on Revillagigedo and Gravina islands. In the lowered position, the vertical clearance would be approximately 60 feet above MHHW, which would allow passage of most barges, commercial vessels, and many recreational craft. In the raised position, the lift span would accommodate one-way passage of cruise ships and two-way passage of most other ships, including AMHS ferries. The lift towers would penetrate Part 77 airspace.

Alternative T1 is a modification of one of the tunnel alternatives presented in the 2004 FEIS. Alternative T1 would be a 3,200-foot submersed tunnel crossing between Peninsula Point on Revillagigedo Island and Lewis Point on Gravina Island at the location of Alternative G2. The crossing distance would be approximately 0.5 miles long. A 0.8-mile-long new road would be constructed on Gravina Island to connect the tunnel with Seley Road.

2.2.3 Screening of Alternatives

The alternatives evaluated in the 2004 EIS and the alternatives identified during scoping comprise the 15 action alternatives that DOT&PF, in consultation with FHWA, evaluated in the screening process to identify reasonable alternatives for the SEIS. This screening process is described in detail in the March 2010 *Alternatives Screening Report*, which can be viewed on the project website (http://dot.alaska.gov/sereg/projects/gravina_access/index.shtml).

2.2.3.1 Screening Criteria

The screening factors for alternatives include cost, purpose and need, Section 4(f) impacts, and environmental or social impacts that would be unacceptable or unpermittable as defined by agencies having regulatory authority over those resources. The screening criteria are described in Table 2-4.

Table 2-4: Screening Criteria for Gravina Access Project SEIS Alternatives

Criterion 1–Costs: Each alternative was screened on the basis of construction costs.[37] FHWA and DOT&PF have determined that an alternative with estimated construction costs in excess of $305 million is not reasonable, based on potentially available funds.[38]
Criterion 2–Purpose and Need: The purpose of the Gravina Access Project is to improve surface transportation between Revillagigedo Island and Gravina Island. Alternatives screened under Criterion 2 were examined in the following context: • Convenience and efficiency to users in the form of travel time to the airport and land that is or could be developed for residential, recreational, or commercial uses • Reliability of transit across Tongass Narrows; e.g., frequency of access closures for any reason • Ability to support Ketchikan Gateway Borough planned economic development on Gravina Island, expressed in terms of areas or road extensions likely to be developed, as conceived in the Borough's *Gravina Island Plan*
Criterion 3–Environmental or Socioeconomic Impacts Large Enough to Preclude Consideration: This criterion focuses on the environmental or social impacts that would be unacceptable or unpermittable as defined by agencies having regulatory authority over those resources. Three primary impact categories were considered: impacts to wildlife and/or habitat, impacts to marine navigation, and impacts to aviation.
Criterion 4–Section 4(f) Impacts: FHWA and other federal DOT agencies generally avoid the use of land from publicly owned parks, recreation areas, wildlife or waterfowl refuges, or historic sites unless: • There is no feasible and prudent alternative to the use of land. • The action includes all possible planning to minimize harm to the property resulting from use. If at least one otherwise reasonable alternative avoids all Section 4(f) properties, or can be modified to avoid such properties, an alternative that does use Section 4(f) property was eliminated as not reasonable.

2.2.3.2 Screening Process

A two-phased approach was used for the screening analysis. Alternatives were broadly screened for all criteria in the first phase. Alternatives that were clearly unreasonable based on the first phase of the screening were removed from further analysis. Alternatives that satisfied the first phase of screening were carried forward for consideration under a more detailed screening analysis. If an alternative did not satisfy one or more screening criteria in the second phase of the analysis, it was removed from further consideration. In this process, the alternatives that satisfied all four screening criteria were considered reasonable alternatives for evaluation in the SEIS.

Table 2-5 characterizes the 15 action alternatives relative to the screening criteria in the first phase. Shaded cells in the table indicate areas where an alternative did not pass the screen.

[37] Construction costs used in the screening process were derived from the July 2009 *Construction Cost Estimate Report of the Alternatives to be Considered in the SDEIS Screening Process*, which is available on the project website (http://dot.alaska.gov/sereg/projects/gravina_access/index.shtml).

[38] See Appendix A for letter from DOT&PF Commissioner dated September 17, 2009.

The paragraphs following the table provide further explanation of the first-phase screening results.

Table 2-5: First Phase Screening Summary

Alternative	Criterion 1 Costs *Cost (in $M) relative (+ or -) to $305 million threshold*	Criterion 2 Purpose and Need *Improved convenience, efficiency, and reliability of access to Gravina Island*	Criterion 3 Unreasonable Environmental or Socioeconomic Impacts	Criterion 4 Section 4(f) impacts
Bridge Alternatives				
C3a	**+158**	Achieved via unrestricted access	—	—
C3b	**+47**	Achieved via unrestricted access	**Impacts to marine navigation**	—
C4	**+136**	Achieved via unrestricted access	—	—
C3-4	-82	Achieved via unrestricted access	—	—
D1	-14	Achieved via unrestricted access	**Impacts to marine navigation**	—
F1	**+70**	Achieved via unrestricted access	—	—
F3	-29	Achieved via unrestricted access	—	—
F3v	**+44**	Achieved via unrestricted access	—	—
Ferry Alternatives				
G2	-224	Achieved via more frequent ferry service and alternative locations of access	—	—
G3	-235	Achieved via more frequent ferry service and alternative locations of access	—	—
G4	-243	Achieved via more frequent ferry service and new roads to developable lands	—	—
G4v	-282	Partially achieved via new roads to developable lands	—	—
Movable Bridge Alternatives				
M1	**+70**	Partially achieved; bridge raisings for marine traffic would cause unacceptable delays	—	—
M2	**+108**	Partially achieved; bridge raisings for marine traffic would cause unacceptable delays	—	—
Tunnel Alternative				
T1	**+112**	Achieved via unrestricted access	—	—

— = None identified

The results of the first phase of the screening process clearly indicate that Alternatives C3a, C3b, C4, F1, F3v, M1, M2, and T1 would have costs that are well beyond anticipated funding. In addition, Alternatives M1 and M2 also failed to meet the need for improved reliability of access because bridge raisings for marine traffic would cause unacceptable delays. In particular, scheduled bridge raises would be frequent in the summer and would severely inhibit traffic movement between Revillagigedo and Gravina islands with up to 30-minute delays, much longer than the delays in the No Action Alternative. Alternative C3b (in addition to exceeding the cost criterion) and Alternative D1 did not meet the reasonable needs of navigation because they would preclude the passage of large cruise ships through Tongass Narrows. Given these results, Alternatives C3a, C3b, C4, D1, F1, F3v, M1, M2, and T1 were eliminated from further consideration in the Gravina Access Project SEIS. The remaining alternatives (Alternatives C3-4, F3, G2, G3, G4, and G4v) were carried forward and examined in greater detail in the second phase of the screening analysis.

With the cost threshold and Section 4(f) criteria strictly applied in the first phase, no further analysis of these factors was needed in the second phase of screening. Rather, the second phase of the screening process looked more closely at the alternatives relative to the criteria for purpose and need and environmental and socioeconomic impacts.

In reviewing Alternatives C3-4, F3, G2, G3, G4, and G4v relative to Criterion 2, it is clear that Alternatives C3-4 and F3 fully meet the project's purpose and need because they would provide free-flowing access across Tongass Narrows, 24 hours a day, 7 days a week. Bridge alternatives near the airport would maximize convenience, reliability, travel time reduction, and development support. Alternatives G2, G3, and G4 provide some improvement to the reliability of access, but little or no improvement to efficiency in terms of reduced travel times. ~~Initially,~~ Alternative G4v would not provide more sailings to improve the reliability of access, but the facilities on Revillagigedo Island would address the need for improved convenience of access for airport users and the heavy freight mooring ~~dock~~ facility would address the need for improved freight transportation, as would the other ferry alternatives. Alternatives C3-4, F3, G2, G3, G4, and G4v would all support Ketchikan Gateway Borough planned economic development on Gravina Island with improved access provided to developable lands by the Gravina Island Highway and the Lewis Reef Road. Alternatives C3-4, F3, G2, G3, G4, and G4v would sufficiently address one or more parts of the project purpose and need, and none were eliminated in the second phase of the screening process under Criterion 2.

For Criterion 3, Alternatives C3-4, F3, G2, G3, G4, and G4v were evaluated relative to aviation and marine navigation impacts, since none of the alternatives were identified as being unacceptable or unpermittable based on impacts to fish, wildlife, and water resources in the first phase of the screening process. At the time of the screening analysis, c~~C~~onsultation with the FAA concerning the potential hazards associated with bridging Tongass Narrows revealed that, with appropriate marking and lighting, Alternative C3-4 would not be a hazard to air navigation and Alternative F3 would neither penetrate any airspace surfaces nor have any effect on approaches or departures from Ketchikan International Airport. While these bridge alternatives would affect seaplane operations, the impacts on seaplane operations would not preclude Alternatives C3-4 and F3 from consideration as reasonable alternatives.

Concerning marine navigation, Alternative C3-4 would be designed with navigational clearances that would support passage of all vessels currently transiting Tongass Narrows. DOT&PF modified Alternative F3 in response to USCG concerns over potentially hazardous navigation conditions in the West Channel for large cruise ships. With these modifications, DOT&PF considers Alternative F3 a reasonable alternative with respect to marine navigation through West Channel.

The ferry alternatives (Alternatives G2, G3, G4, and G4v) would have no effect on aviation or marine navigation other than adding a minor amount of cross-channel traffic in Tongass Narrows. Given the regular gaps in the ferry schedules, ferry maneuverability, and the past compatibility of the ferry service with seaplanes and other marine traffic in Tongass Narrows, these alternatives would not have unacceptable adverse effects on aviation or marine navigation.

Alternatives C3-4, F3, G2, G3, G4, and G4v satisfied Criterion 3 and passed the second phase of screening under Criterion 4.

2.2.3.3 Screening Results

Based on the results of this screening process, Alternatives C3a, C3b, C4, D1, F1, F3v, M1, M2, and T1 were eliminated from further consideration as reasonable alternatives for the Gravina Access Project. Alternatives C3-4, F3, G2, G3, G4, and G4v are reasonable alternatives and are evaluated in detail in this Gravina Access Project SEIS, along with the No Action Alternative.

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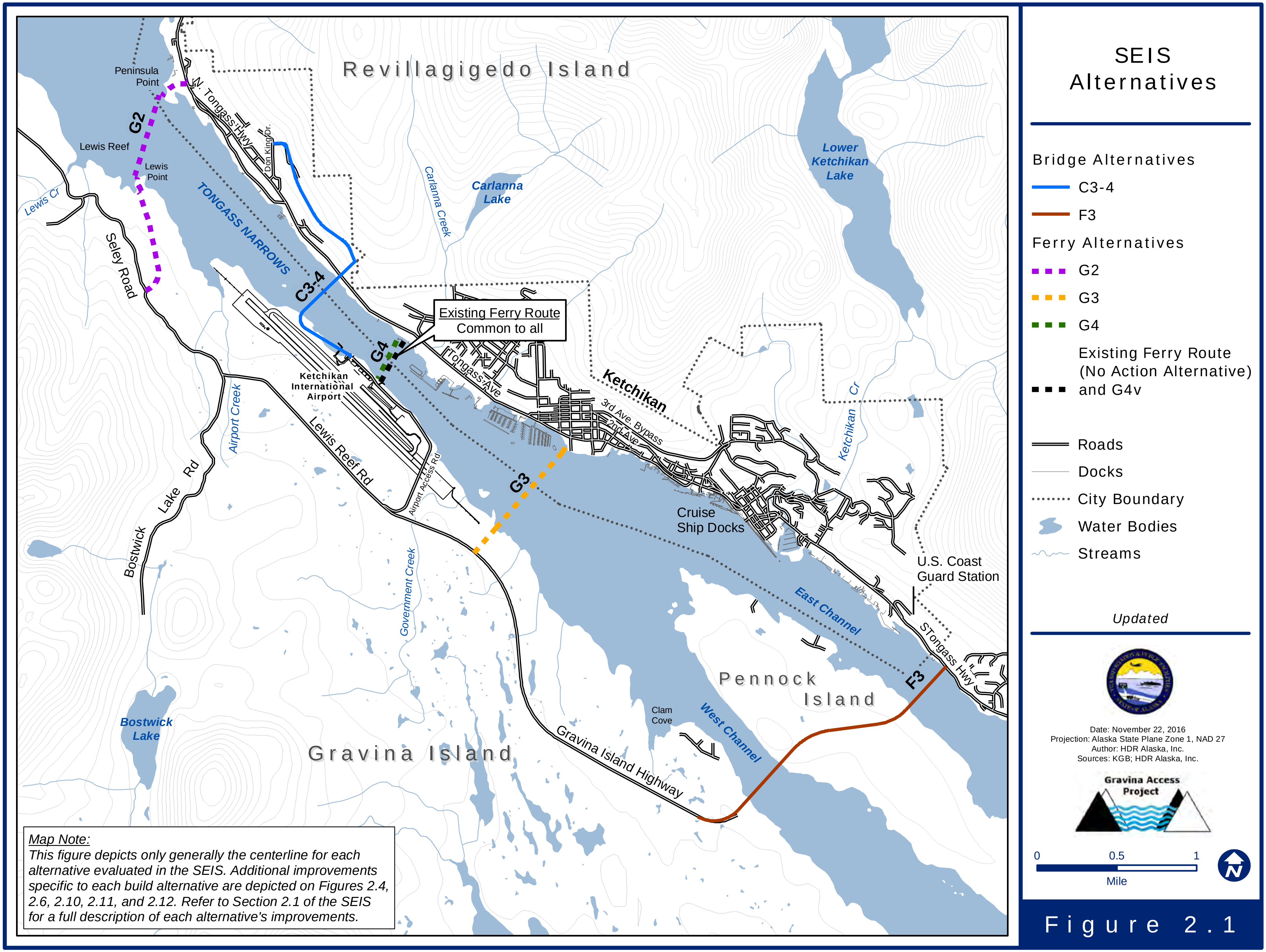
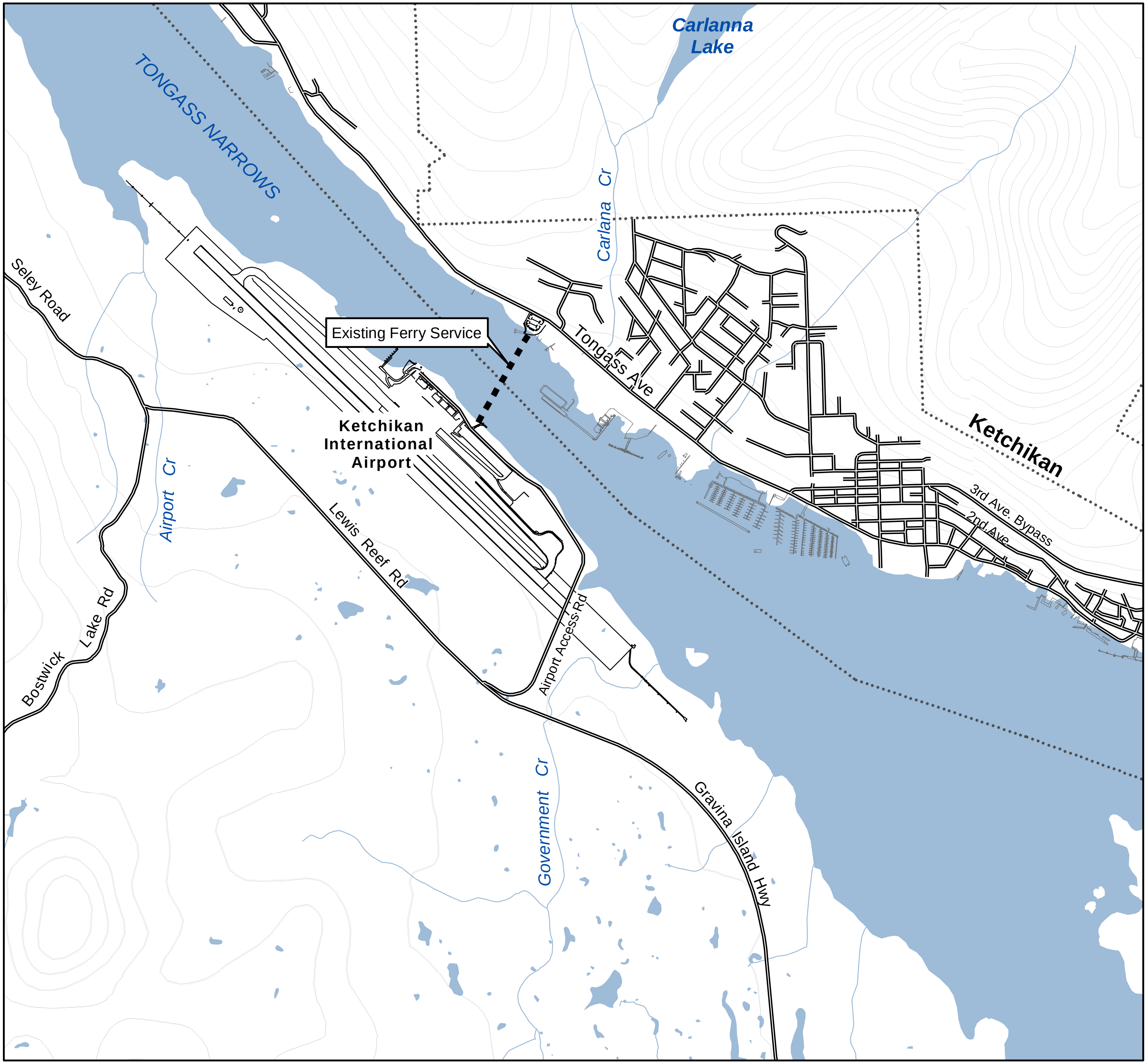


SEIS
Alternatives
Bridge Alternatives
C3-4
F3
Ferry Alternatives
G2
G3
G4
Existing Ferry Route
(No Action Alternative)
and G4v
Roads
Docks
City Boundary
Water Bodies
Streams
Updated
Date: November 22, 2016
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: KGB; HDR Alaska, Inc.
Gravina Access
Project
0
0.5
1
Mile
Revillagigedo Island
Gravina Island
Pennock Island
Ketchikan
Peninsula Point
Lewis Reef
Lewis Point
Lewis Cr
Seley Road
TONGASS NARROWS
N. Tongass Hwy
Don King Dr.
Carlanna Creek
Carlanna Lake
Lower Ketchikan Lake
Existing Ferry Route
Common to all
Ketchikan International Airport
Tongass Ave
3rd Ave. Bypass
2nd Ave
Ketchikan Cr
Airport Creek
Lewis Reef Rd
Airport Access Rd
Lake Rd
Bostwick
Government Creek
Cruise Ship Docks
U.S. Coast Guard Station
East Channel
S Tongass Hwy
West Channel
Clam Cove
Gravina Island Highway
Bostwick Lake
Map Note:
This figure depicts only generally the centerline for each alternative evaluated in the SEIS. Additional improvements specific to each build alternative are depicted on Figures 2.4, 2.6, 2.10, 2.11, and 2.12. Refer to Section 2.1 of the SEIS for a full description of each alternative's improvements.

Figure 2.1



No Action Alternative

Existing Ferry Service (No Action Alternative)

Roads

Docks

City Boundary

Water Bodies

Streams

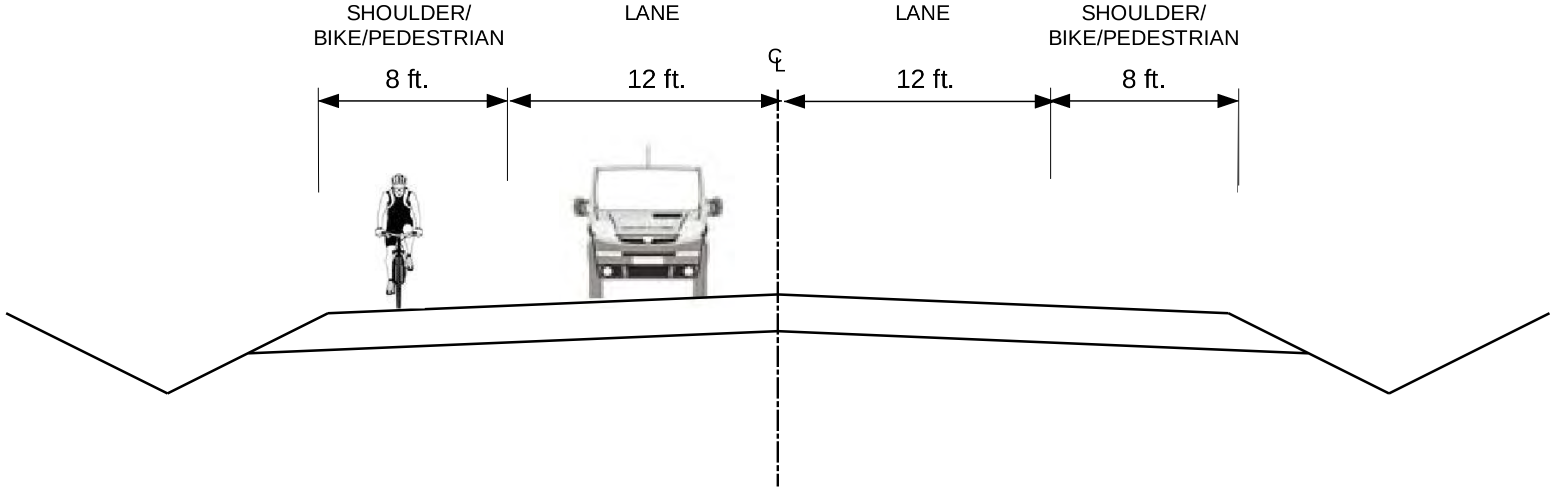
Updated

Date: January 9, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: KGB; HDR Alaska, Inc.

Gravina Access Project

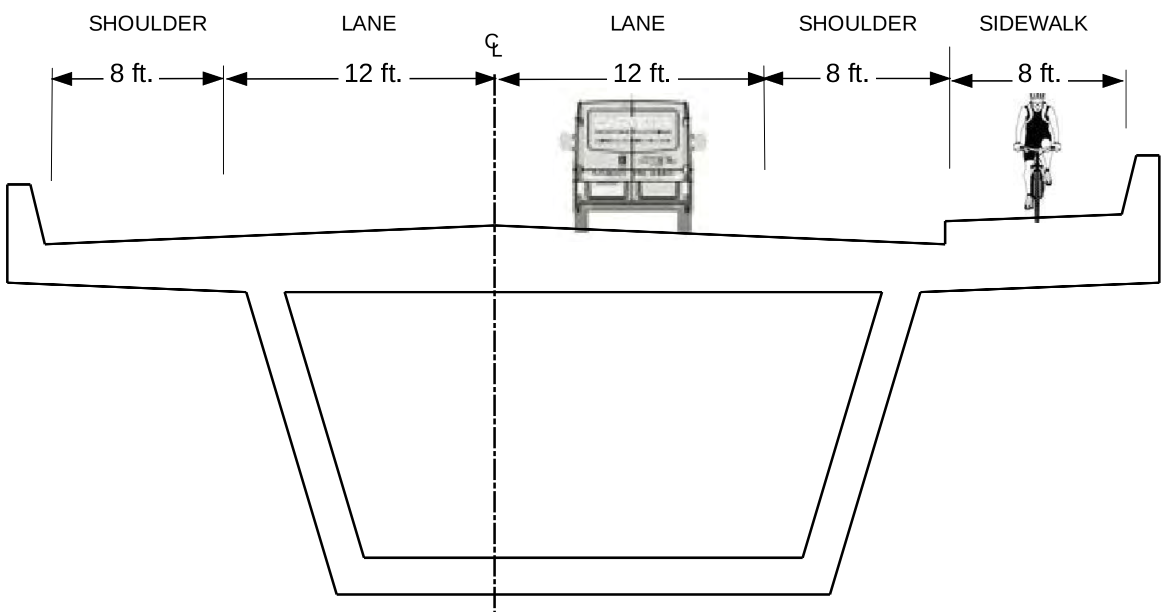
0 0.25 0.5
Mile

Figure 2.2



TYPICAL ROADWAY SECTION

NOT TO SCALE



TYPICAL BRIDGE SECTION

NOT TO SCALE

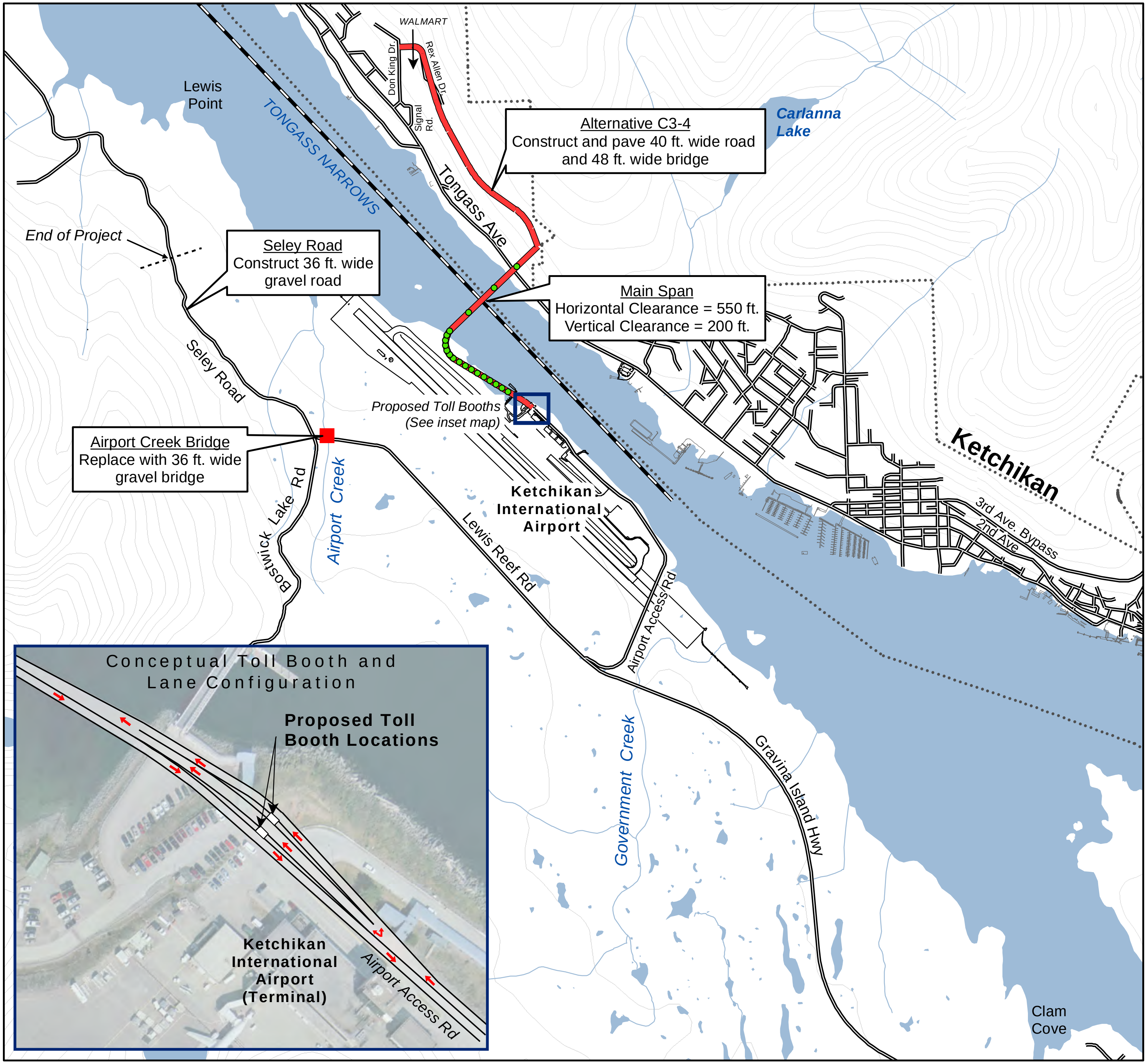
Typical Cross-Section Views of Proposed Roadways and Bridges

℄ = Centerline

Date: December 16, 2011
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: HDR Alaska, Inc.

Gravina Access Project

Figure 2.3



Alternative C3-4

- C3-4
- Proposed Cruise Ship Trackline
- C3-4 Pier Locations
- Roads
- City Boundary
- Water Bodies
- Streams

Updated

Date: December 28, 2016
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: KGB; HDR Alaska, Inc.

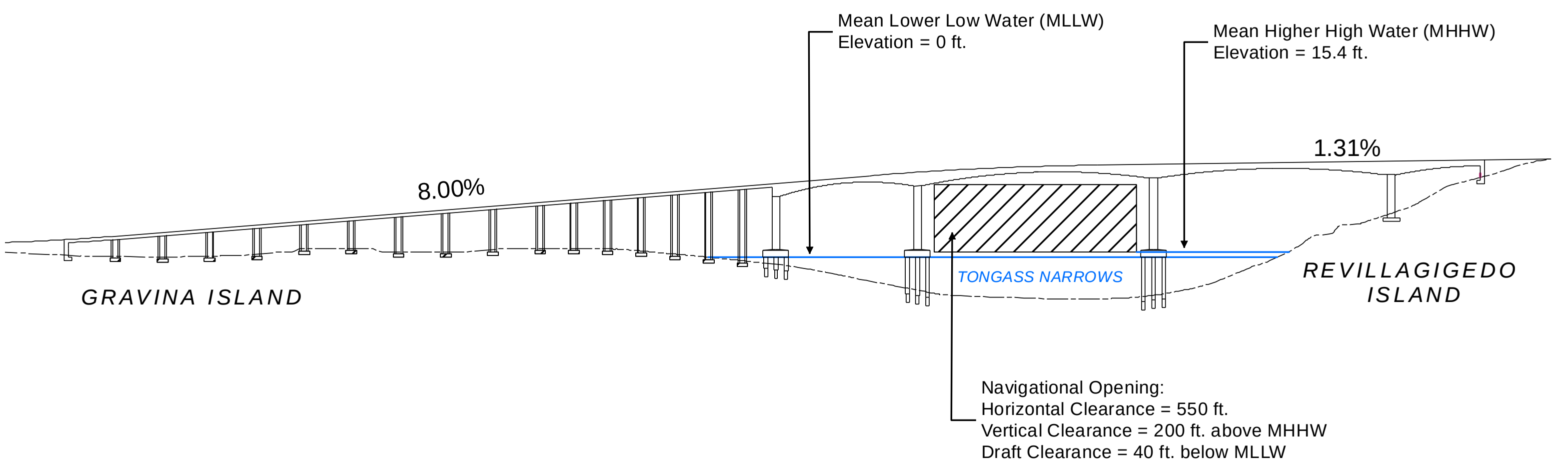
Gravina Access Project

0 0.25 0.5
Mile

Figure 2.4

Alternative C3-4: Bridge Profile

C3-4 PROFILE VIEW

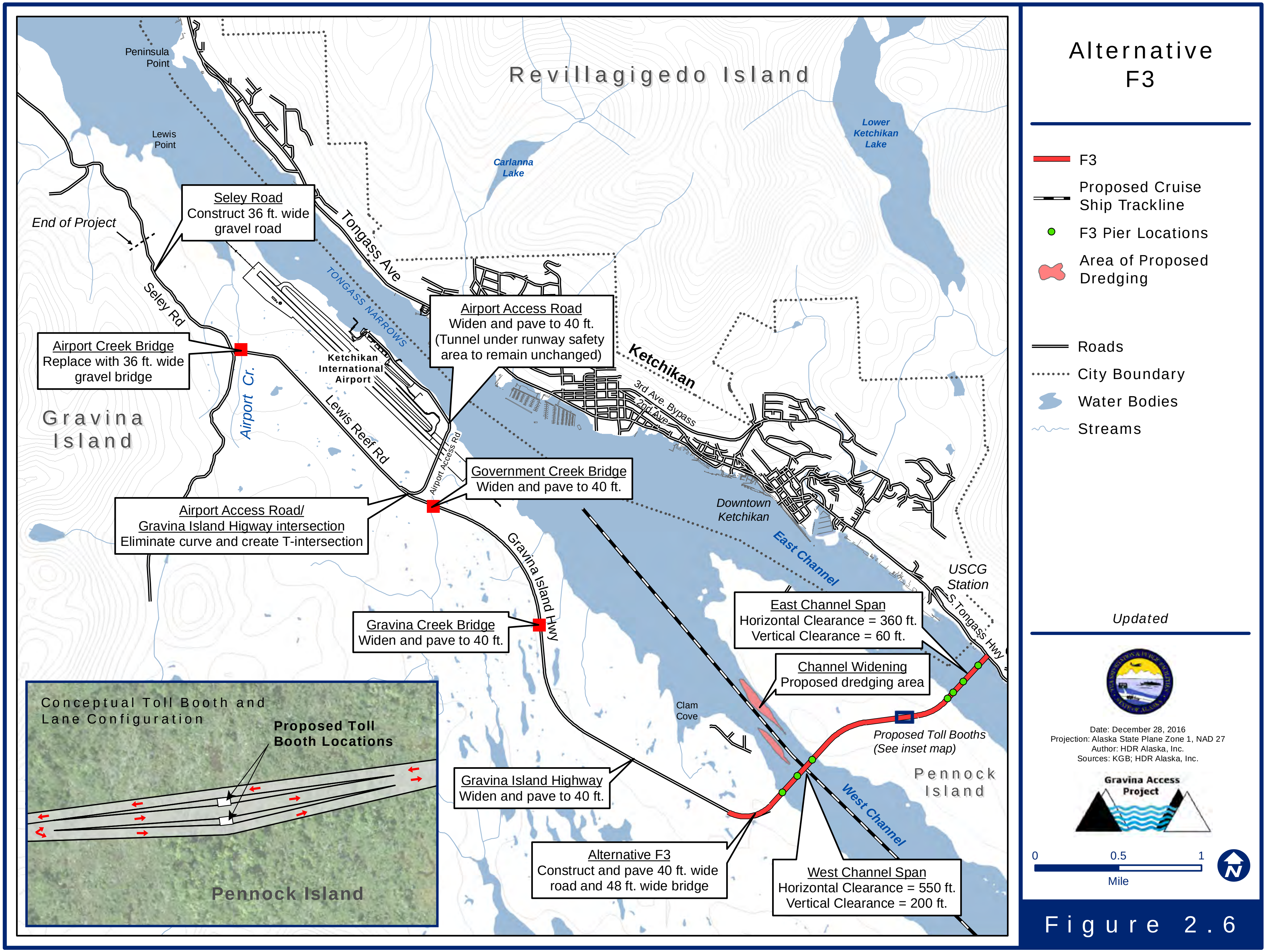


Date: December 16, 2011
Author: HDR Alaska, Inc.
Sources: KGB; HDR Alaska, Inc.

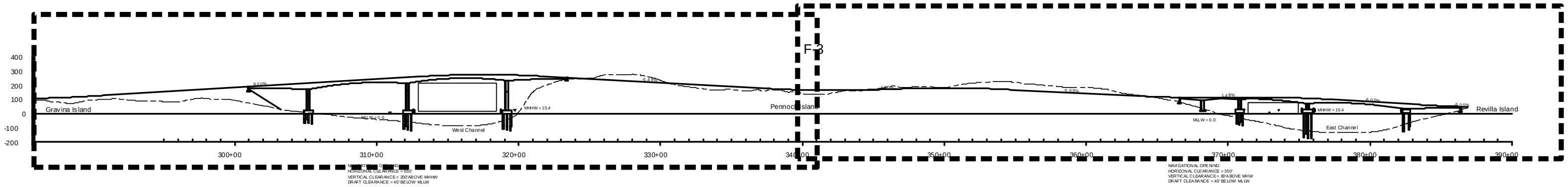
Gravina Access Project

Drawings not to scale

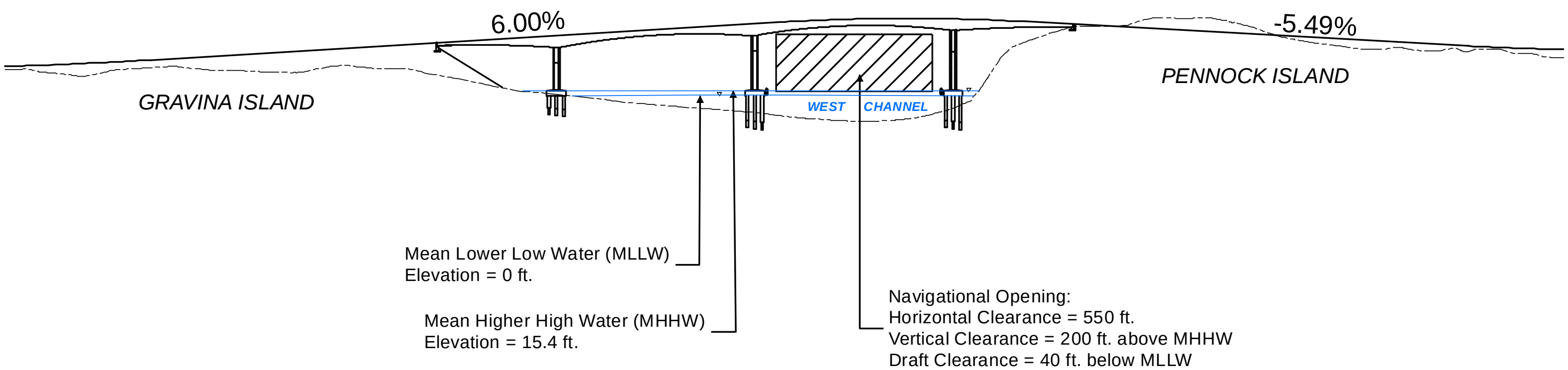
Figure 2.5


Alternative
F3
F3
Proposed Cruise Ship Trackline
F3 Pier Locations
Area of Proposed Dredging
Roads
City Boundary
Water Bodies
Streams
Updated
Date: December 28, 2016
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: KGB; HDR Alaska, Inc.
Gravina Access Project
0
0.5
1
Mile
Figure 2.6
Revillagigedo Island
Peninsula Point
Lewis Point
End of Project
Carlanna Lake
Lower Ketchikan Lake
Seley Road
Construct 36 ft. wide gravel road
Tongass Ave
TONGASS NARROWS
Seley Rd
Airport Creek Bridge
Replace with 36 ft. wide gravel bridge
Airport Access Road
Widen and pave to 40 ft.
(Tunnel under runway safety area to remain unchanged)
Ketchikan International Airport
Ketchikan
3rd Ave. Bypass
2nd Ave.
Gravina Island
Airport Cr.
Lewis Reef Rd
Airport Access Rd
Government Creek Bridge
Widen and pave to 40 ft.
Airport Access Road/
Gravina Island Higway intersection
Eliminate curve and create T-intersection
Downtown Ketchikan
East Channel
USCG Station
S. Tongass Hwy
Gravina Island Hwy
East Channel Span
Horizontal Clearance = 360 ft.
Vertical Clearance = 60 ft.
Gravina Creek Bridge
Widen and pave to 40 ft.
Channel Widening
Proposed dredging area
Clam Cove
Proposed Toll Booths
(See inset map)
Conceptual Toll Booth and Lane Configuration
Proposed Toll Booth Locations
Pennock Island
Gravina Island Highway
Widen and pave to 40 ft.
West Channel
Alternative F3
Construct and pave 40 ft. wide road and 48 ft. wide bridge
West Channel Span
Horizontal Clearance = 550 ft.
Vertical Clearance = 200 ft.
Pennock Island

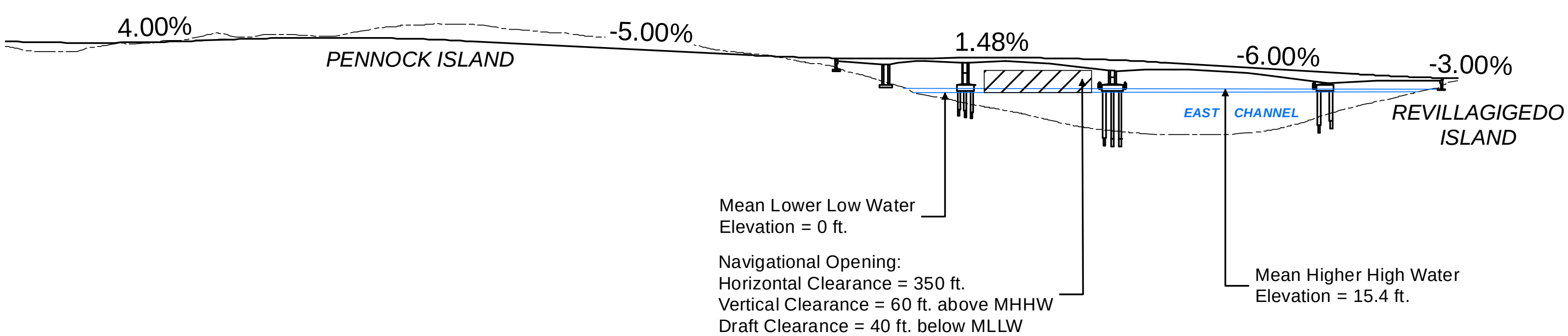
F3 PROFILE VIEW



WEST CHANNEL BRIDGE



EAST CHANNEL BRIDGE



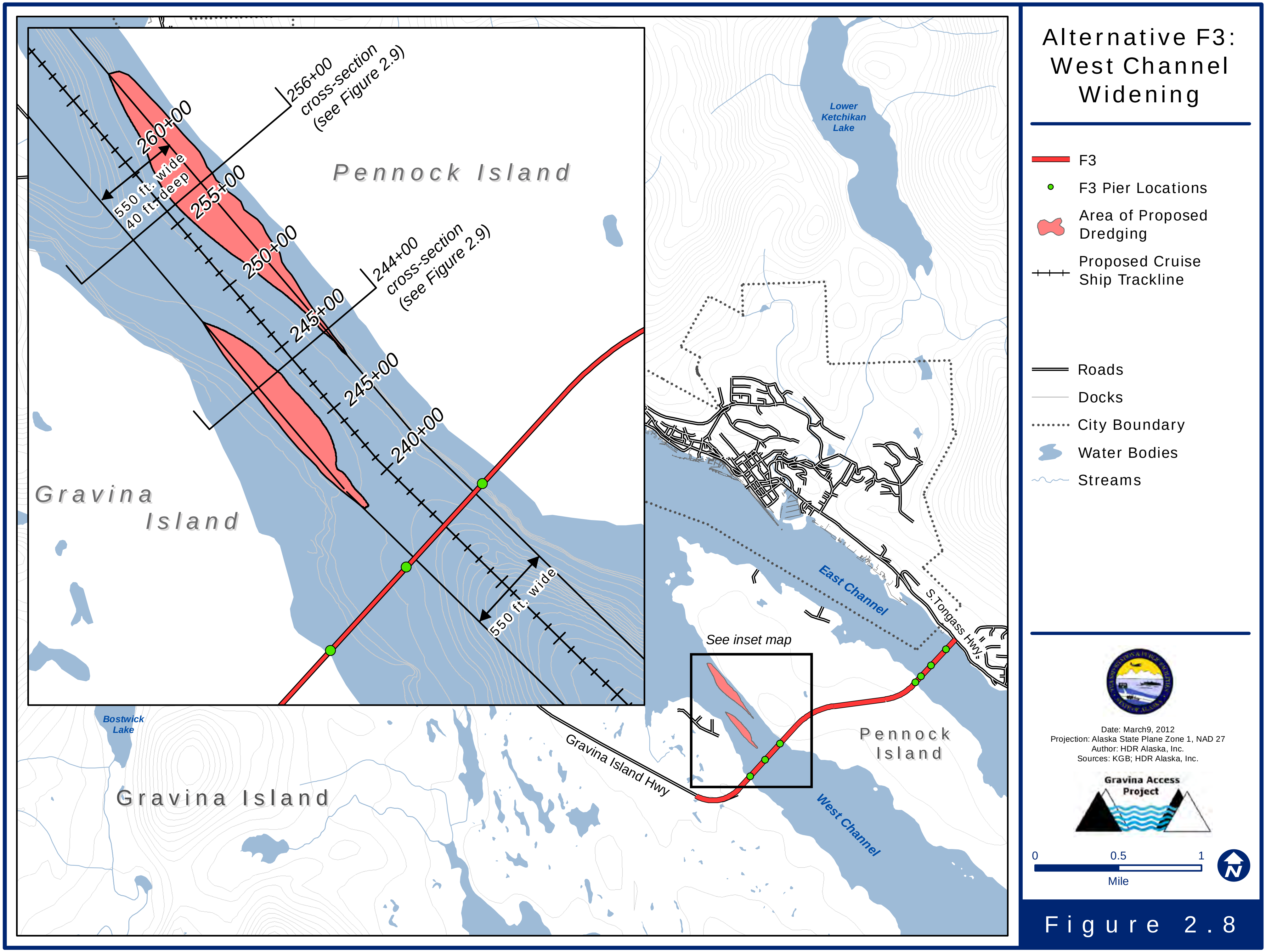
Alternative F3: Bridge Profiles

Date: December 16, 2011
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: KGB; HDR Alaska, Inc.

Gravina Access Project

Drawings not to scale

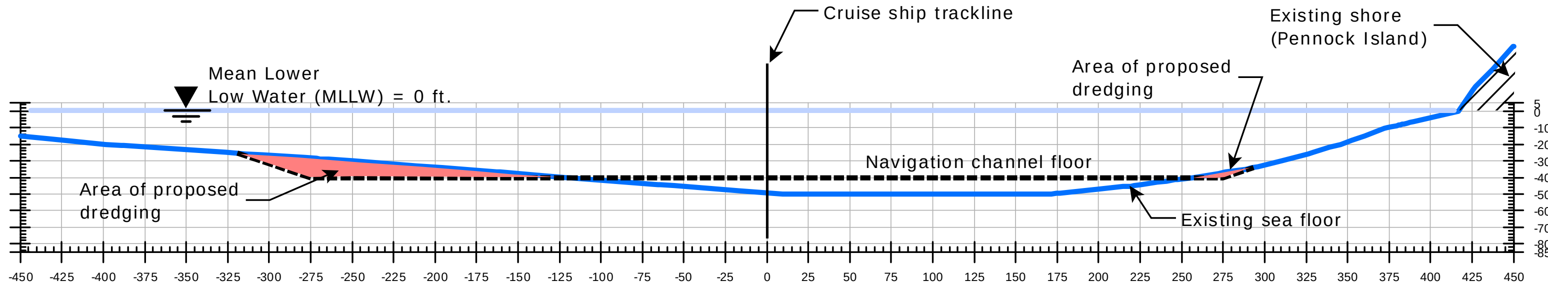
Figure 2.7



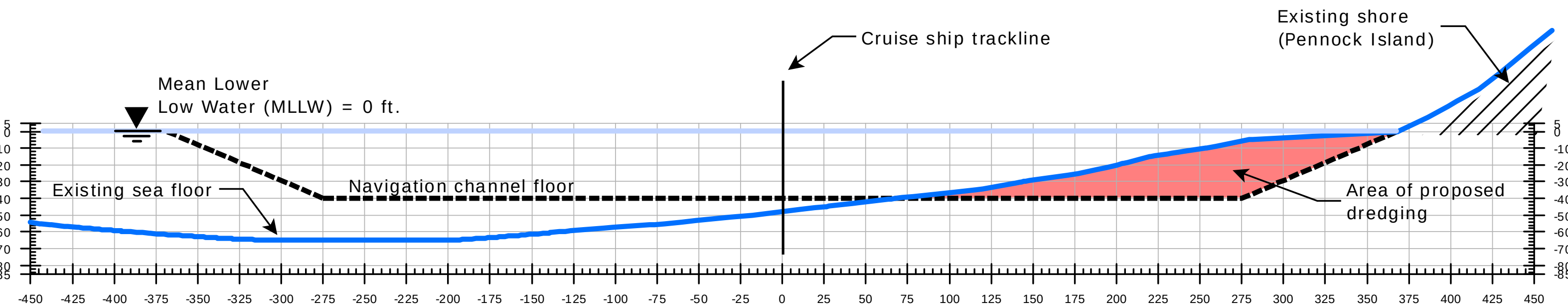
Alternative F3: West Channel Widening

Figure 2.8

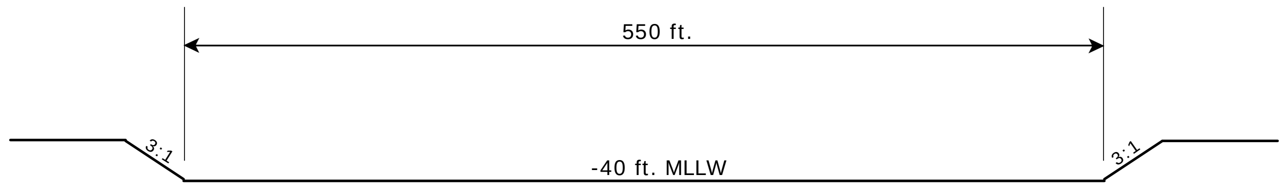
Alternative F3: West Channel Widening Cross-Sections



244+00



256+00



Navigation Channel Floor

* Navigation channel floor configuration is based on a modeled, minimum section which provides adequate draft for 2-way cruise ship traffic.

- Navigation Channel Floor
- Existing Sea Floor
- Mean Lower Low Water (MLLW; elev. = 0 ft.)
- Area of Proposed Dredging

Date: March 9, 2012
Author: HDR Alaska, Inc.
Sources: HDR Alaska, Inc.

Gravina Access Project

Drawings not to scale

Figure 2.9

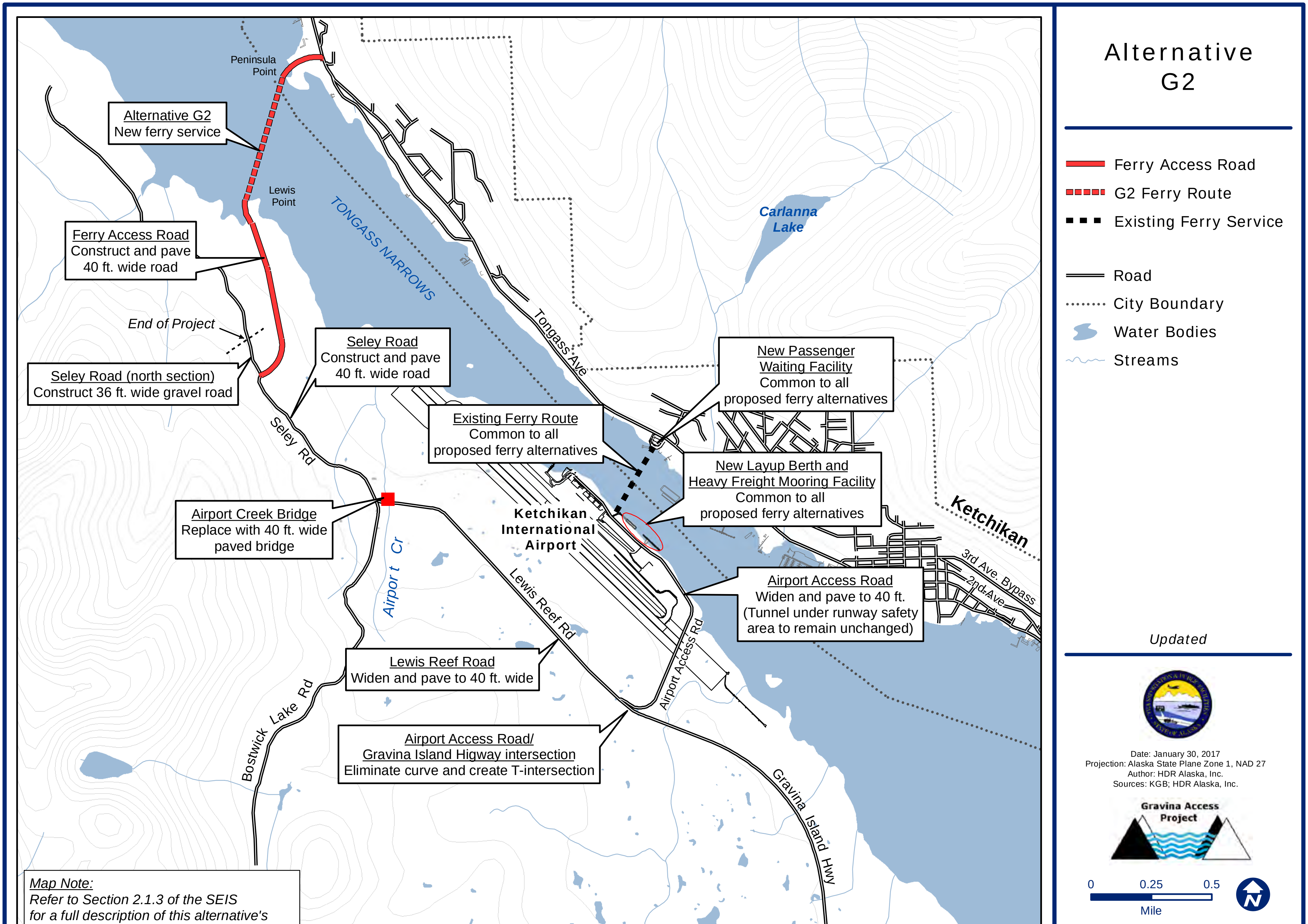
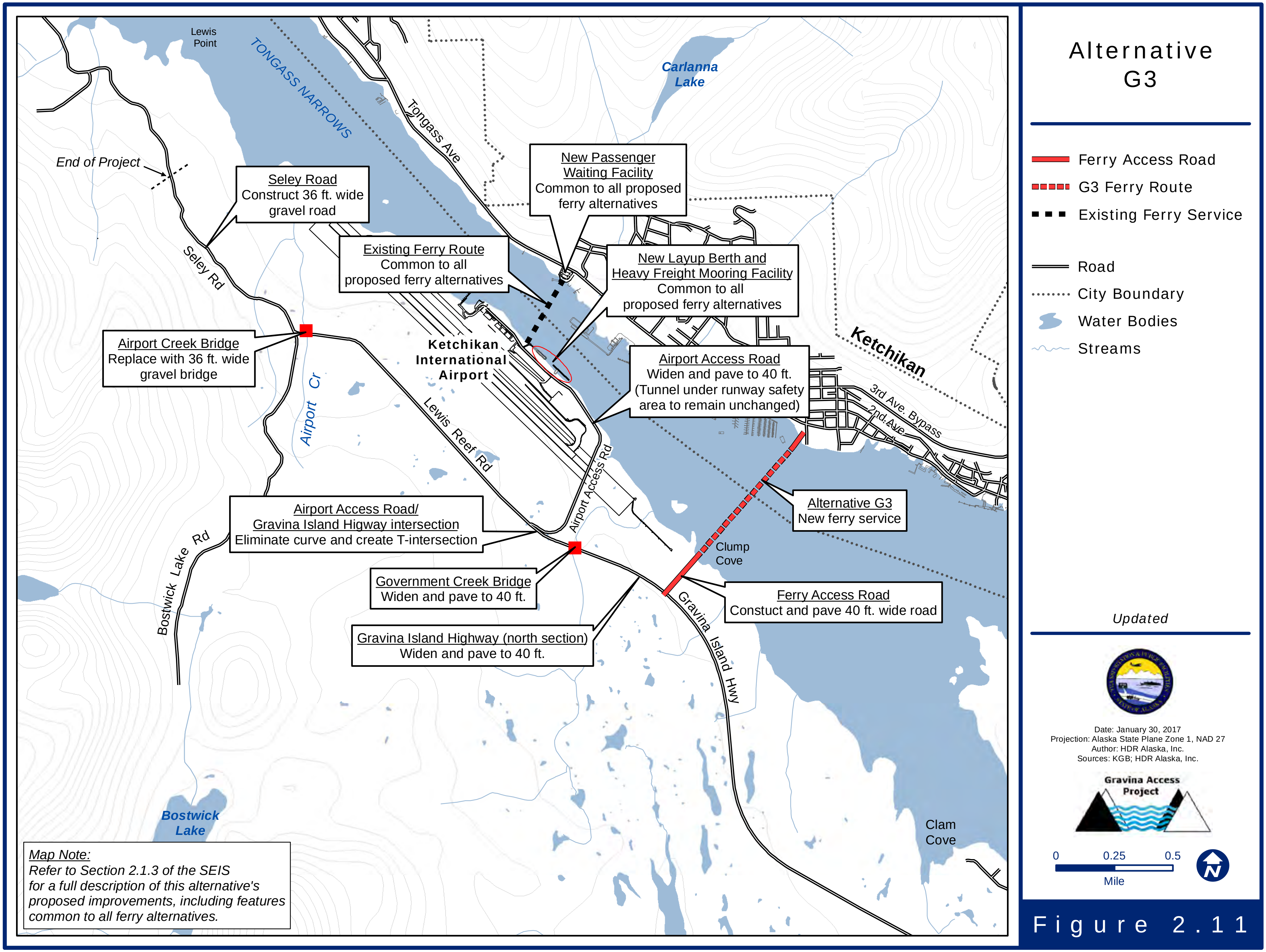

Alternative G2
Ferry Access Road
G2 Ferry Route
Existing Ferry Service
Road
City Boundary
Water Bodies
Streams
Updated
Date: January 30, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: KGB; HDR Alaska, Inc.
Gravina Access Project
0
0.25
0.5
Mile
Peninsula Point
Lewis Point
TONGASS NARROWS
Carlanna Lake
Tongass Ave
Ketchikan
3rd Ave. Bypass
2nd Ave
Ketchikan International Airport
Seley Rd
Lewis Reef Rd
Airport Access Rd
Airport Cr
Bostwick Lake Rd
Gravina Island Hwy
End of Project
Alternative G2
New ferry service
Ferry Access Road
Construct and pave
40 ft. wide road
Seley Road (north section)
Construct 36 ft. wide gravel road
Seley Road
Construct and pave
40 ft. wide road
Existing Ferry Route
Common to all
proposed ferry alternatives
New Passenger
Waiting Facility
Common to all
proposed ferry alternatives
New Layup Berth and
Heavy Freight Mooring Facility
Common to all
proposed ferry alternatives
Airport Creek Bridge
Replace with 40 ft. wide
paved bridge
Airport Access Road
Widen and pave to 40 ft.
(Tunnel under runway safety
area to remain unchanged)
Lewis Reef Road
Widen and pave to 40 ft. wide
Airport Access Road/
Gravina Island Higway intersection
Eliminate curve and create T-intersection
Map Note:
Refer to Section 2.1.3 of the SEIS
for a full description of this alternative's
proposed improvements, including features
common to all ferry alternatives.

Figure 2.10



Map Note:
Refer to Section 2.1.3 of the SEIS for a full description of this alternative's proposed improvements, including features common to all ferry alternatives.

Figure 2.11

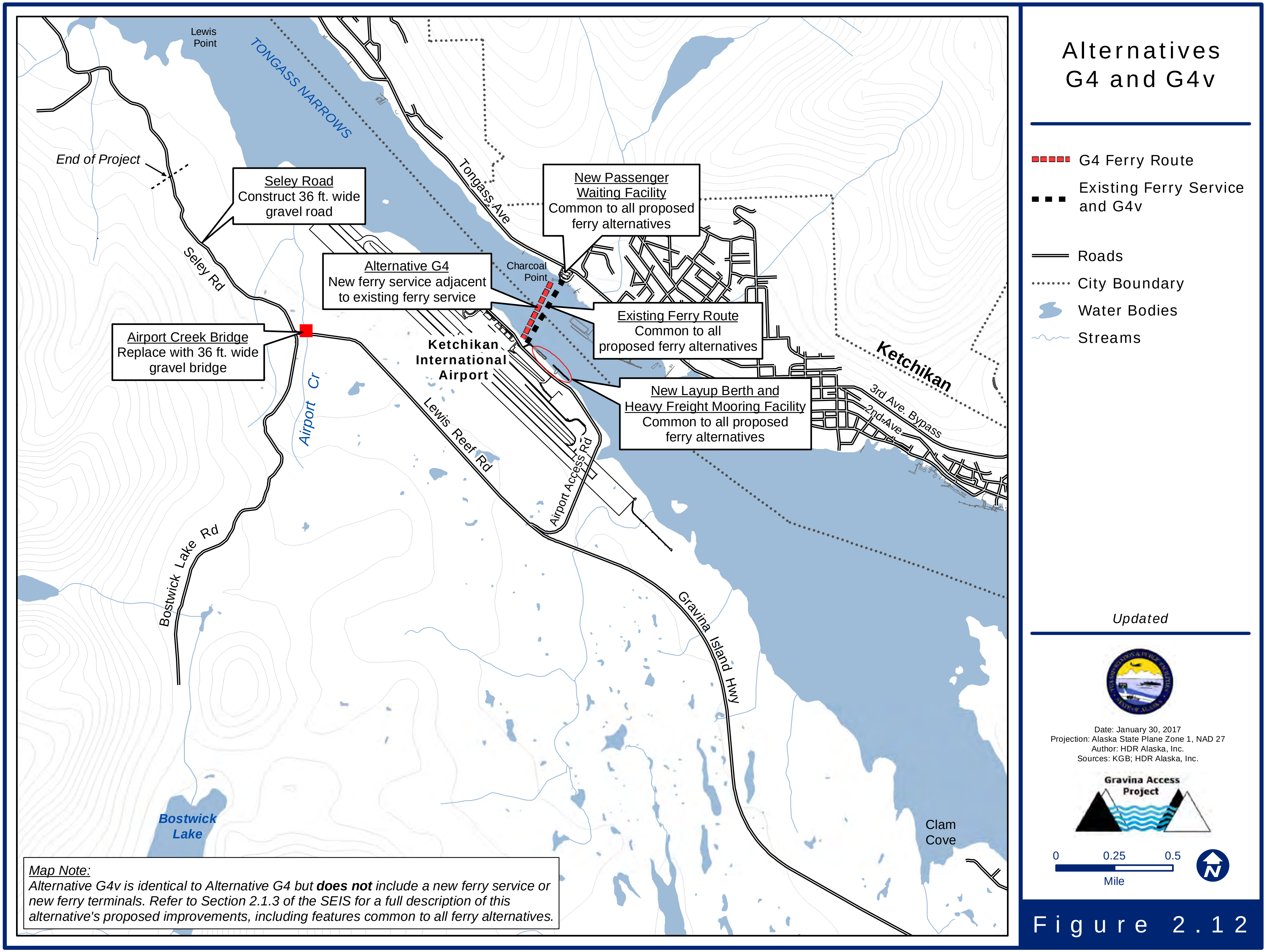
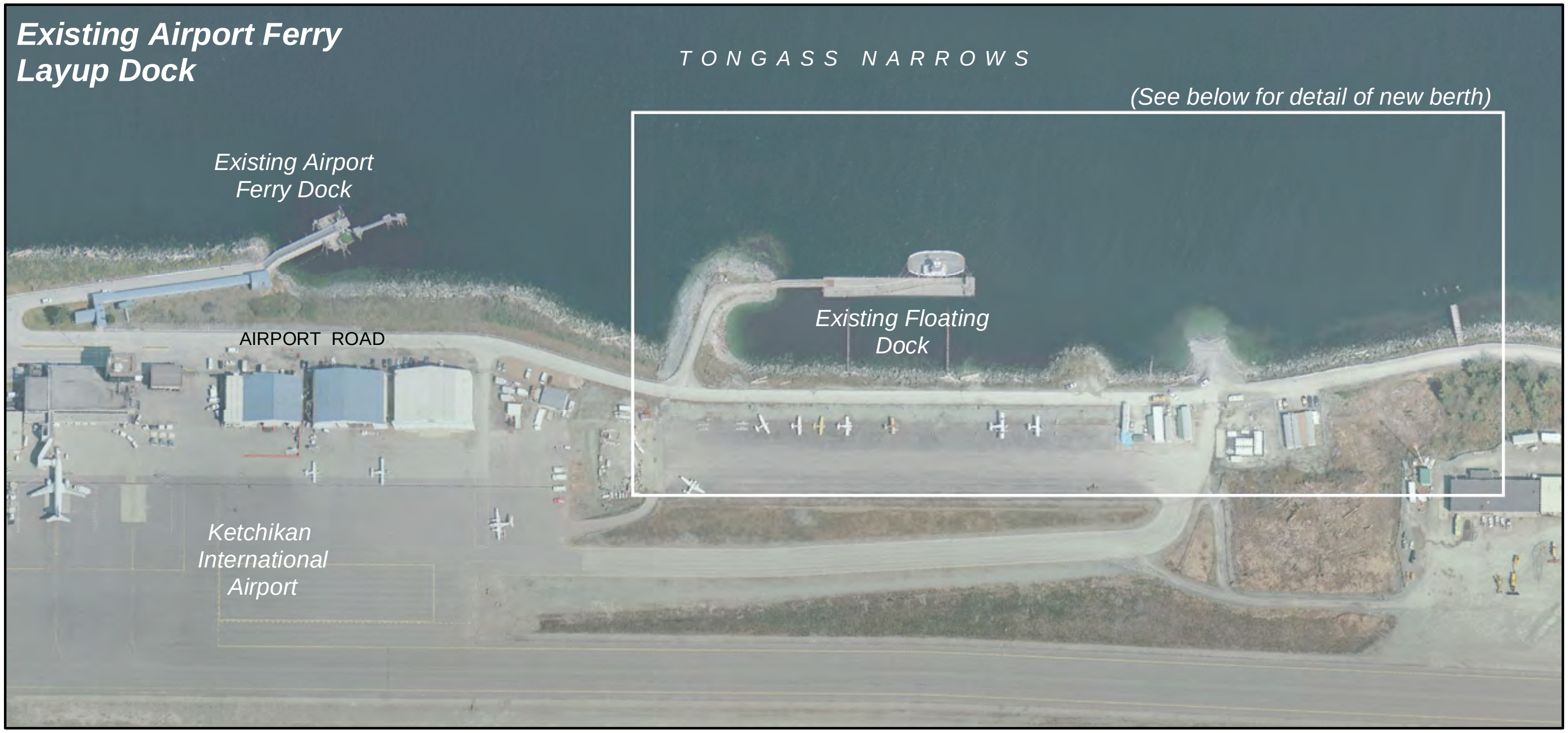
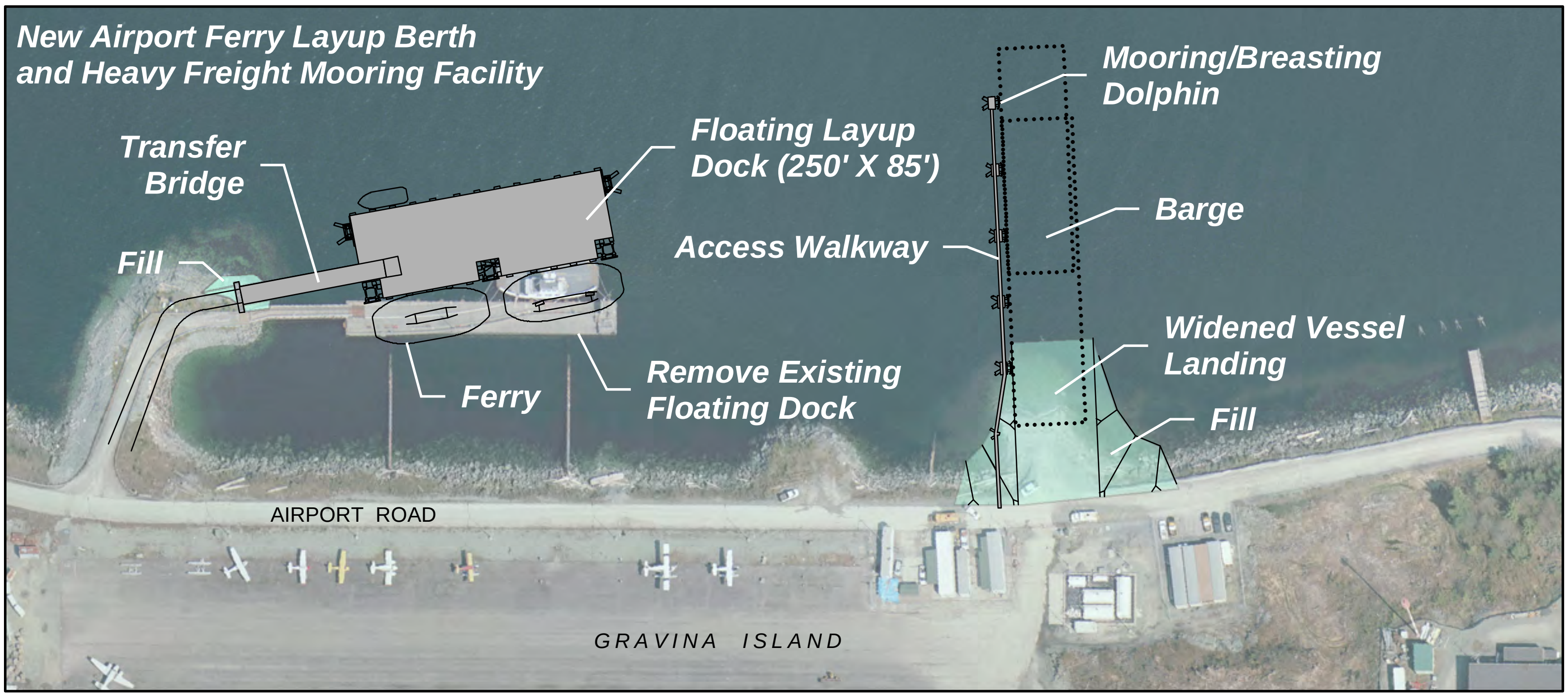

Alternatives G4 and G4v
G4 Ferry Route
Existing Ferry Service and G4v
Roads
City Boundary
Water Bodies
Streams
Lewis Point
TONGASS NARROWS
End of Project
Seley Road
Construct 36 ft. wide gravel road
Seley Rd
Tongass Ave
New Passenger Waiting Facility
Common to all proposed ferry alternatives
Charcoal Point
Alternative G4
New ferry service adjacent to existing ferry service
Existing Ferry Route
Common to all proposed ferry alternatives
Airport Creek Bridge
Replace with 36 ft. wide gravel bridge
Ketchikan International Airport
Airport Cr
Lewis Reef Rd
Airport Access Rd
New Layup Berth and Heavy Freight Mooring Facility
Common to all proposed ferry alternatives
Ketchikan
3rd Ave. Bypass
2nd Ave
Bostwick Lake Rd
Gravina Island Hwy
Bostwick Lake
Clam Cove
Map Note:
Alternative G4v is identical to Alternative G4 but does not include a new ferry service or new ferry terminals. Refer to Section 2.1.3 of the SEIS for a full description of this alternative's proposed improvements, including features common to all ferry alternatives.
Updated
Date: January 30, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: KGB; HDR Alaska, Inc.
Gravina Access Project
0
0.25
0.5
Mile
N

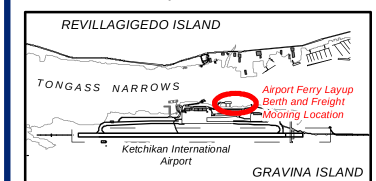
Figure 2.12

New Airport Ferry Layup Dock and Heavy Freight Mooring Facility





Updated



Date: February 17, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: KGB; HDR Alaska, Inc.

Gravina Access Project

Drawing Not to Scale

Figure 2.13

Reconstructed Airport Ferry Berth, Revillagigedo Island

Passenger Waiting Facility

Reconstructed Covered Walkway

New

Date: January 9, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: KGB; HDR Alaska, Inc.

Gravina Access Project

0 50 100
Feet

N

Figure 2.14

Reconstructed Airport Ferry Berth, Gravina Island

Covered Walkway
Ticket Booth
Passenger Waiting Facility

New

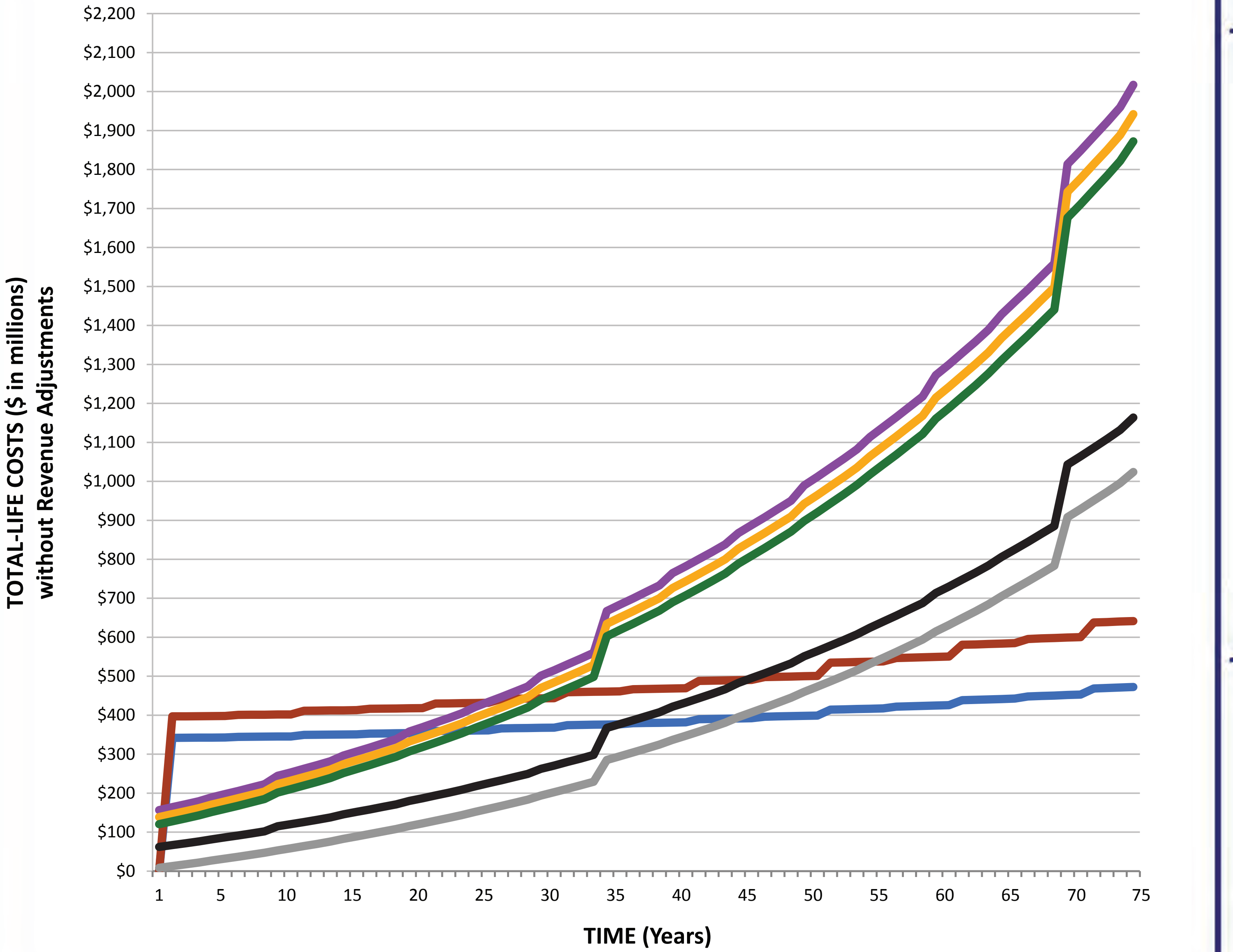
Date: February 17, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: KGB; HDR Alaska, Inc.

Gravina Access Project

0 50 100
Feet

Figure 2.15

Comparison of Total Life Costs of the Alternatives



New

Author: HDR Alaska, Inc.

Gravina Access Project

Figure 2.16

3.0 AFFECTED ENVIRONMENT

This chapter inventories and characterizes the economic, environmental, and cultural resources in the Gravina Access Project area that could be affected by the proposed project alternatives. This information is drawn from the data, documents, and plans published by a variety of local, state, and governmental agencies, and project-specific technical studies completed by HDR Alaska, Inc., and its affiliates on behalf of DOT&PF, as listed in the References section. All figures referenced in this chapter may be found at the end of the chapter.

3.1 Land Use

3.1.1 Current Land Use

This section describes the ~~current~~ land ownership, land uses, and zoning within the project area on Revillagigedo, Pennock, and Gravina islands. General land ownership within the project area is presented below in Table 3-1 and shown in Figure 3.1; land uses are listed in and shown in Figure 3.2; and project area zoning is summarized in Table 3-3 and shown in Figure 3.3.

Native lands in Alaska are typically held by regional and village Native corporations formed by the Alaska Native Claims Settlement Act and are considered to be privately owned. Native Village Corporations have been making selections from federal lands over several decades, and some of these selections are still underway in Southeast Alaska. Native Village Corporations have also purchased commercial properties and run businesses in many communities, including Ketchikan. Some of the privately owned land noted below is held by Cape Fox Corporation, which owns hotels and restaurants, among other holdings. No large land areas selected by Native corporations are in the mapped project area. There are no Indian Reservations in the project area.

3.1.1.1 Revillagigedo Island

Ownership. The majority of the land in the project area on Revillagigedo Island is privately owned, though there are many Borough- and city owned parcels and a few state and federal parcels interspersed with the private lands. Areas outside the city limits of both Ketchikan and Saxman are largely a mix of state and federal[1] ownership. In particular, large tracts of land located immediately outside Ketchikan city limits are owned by the Alaska Mental Health Trust Authority and the federal Bureau of Land Management (BLM).

Land Use. Ketchikan and Saxman are typical Southeast Alaska waterfront communities. Most of the developable land is densely clustered along the shoreline, with a mix of commercial, industrial, residential, and institutional[2] uses.

Zoning. Zoning on Revillagigedo Island is mixed similarly to land use on the island. The waterfront features a mix of general commercial and heavy industrial zones, with low-density residential zones scattered across the northern portion of the project area. In the downtown area, near the cruise ship docks, land is generally zoned as commercial. Upland of the downtown area, to the east of Tongass Avenue, zoning is a mix of medium- to high-density residential and public lands/institutional areas.

---

[1] Executive Order 1520 (April 20, 1912) officially reserves the USCG Integrated Support Command (ISC) property in Ketchikan for lighthouse purposes. According to USCG staff (personal communication from Robert Deering [USCG] to Jim Evensen [DOT&PF], November 14, 2003), this is what originally set aside the property for Coast Guard facility use.

[2] Institutional uses include publicly owned facilities such as libraries, hospitals, schools, fire and rescue stations, and municipal buildings.

Table 3-1: Land Ownership in the Project Area

Ownership	Acreage
Federal	8
USFS	704
USCG	58
BLM	3,389
State of Alaska (total)	4,345
DNR	*2,381*
DOT&PF	*28*
Leased land[a]	*1,936*
Alaska Mental Health Trust	3,984
University of Alaska	52
Native Corporation	23
Borough	1,787
City of Ketchikan	357
City of Saxman	2
Private	2,334
No Data	2,166
Total	**19,208**

[a]Includes airport property owned by DOT&PF and leased to the Borough (1,932 acres) and DNR tide lands (4 acres).

Source: Ketchikan Gateway Borough GIS, 2010.

Table 3-2: Land Uses in the Project Area

Land Use	Acreage
Residential	554
Commercial	146
Industrial	2,782
Institutional	94
Recreation/Park	45
Vacant*	15,589
Total	**19,210**

*Based on 2010 Borough Tax Assessment for parcels with appraised improvements equal to zero.

Source: Ketchikan Gateway Borough GIS, 2010.

Table 3-3: Zoning in the Project Area

Zoning Classification	Acreage
Central commercial	59
General commercial	188
Future development	12,516
Historic district	4
Light industrial	350
Heavy industrial	439
Public lands/institutional	340
Low-density residential	2,215
Medium-density residential	665
High-density residential	130
Rural residential	395
Suburban residential	-
Airport	325
Airport development	804
Airport reserve	328
Total	**18,758**

Source: Ketchikan Gateway Borough GIS, 2010.

3.1.1.2 Pennock Island

Ownership. Approximately 70 percent of the land on Pennock Island is owned by the Borough, while the remaining 30 percent, mostly along parts of the shoreline, is privately owned.

Land Use. Pennock Island is approximately 1,130 acres in size and is predominantly undeveloped, including much of the privately owned land. Developed residential land uses occur on the northern shoreline, along the East Channel, with some residences using small streams as a source of drinking water supply. A few privately owned parcels surrounding Whiskey Cove, also located along the East Channel, are being used for industrial purposes.

The island contains registered archeological sites (see Section 3.21~~3.20~~). Subsistence use of the island includes hunting and berry picking (see Section 3.3.7).

Zoning. Land on Pennock Island is zoned predominantly as low-density residential, though the land around Whiskey Cove is zoned as heavy industrial. There is also a large tract of land on the southeast corner of Pennock Island (outside of the project area) that is zoned as public lands/institutional.

3.1.1.3 Gravina Island

The project area on Gravina Island encompasses those areas that would be most easily accessed as a result of the project alternatives. Title 29 granted the Borough land on Gravina Island to provide areas for public or private settlement or development (see Section 1.3, Purpose and Need). Inadequate access to Gravina Island from the city of Ketchikan on Revillagigedo Island has precluded the development of Borough-owned land on Gravina Island. This lack of access is one of the needs that the proposed project aims to address, though the ~~recent~~ completion of the Gravina Island Highway, by improving intra-island accessibility, has brought the Borough closer to realizing the economic development potential on Gravina Island.

Gravina Island is the site of the Ketchikan International Airport, which serves as the transportation hub for the city of Ketchikan and surrounding area as well as for the neighboring communities of Saxman, Metlakatla, Klawock, and Craig.

Ownership. Most of the land on Gravina Island (62 percent) is owned by USFS. The remainder is owned by private interests (2 percent) and other public agencies, including the State of Alaska (18 percent), the Alaska Mental Health Trust Authority (7 percent), the Borough (5 percent), University of Alaska (3 percent), and BLM (3 percent).

Land Use. Most of Gravina Island is undeveloped. The existing development lies within the project area on the eastern side of the island. The principal developments include Ketchikan International Airport, a former timber processing plant (Pacific Log and Lumber) 2 miles north of the airport, and private residences in the Clam Cove area and at the northernmost portion of the island. Land uses are described by owner in the following paragraphs.

USFS. The USFS land on Gravina Island is a mixture of alpine ridges, wetlands, and various types of forest, managed for multiple uses under the 2008 *Tongass National Forest Land and Resource Management Plan*[3] and its 2016 Amendment.[4] The plan establishes management direction and provides a guideline for natural resource management for the Tongass National Forest. ~~for intensive development of timber in the central portion of the island, old-growth habitat along its eastern and south-central portions, semi-remote recreation around Bostwick Inlet, and moderate development (timber harvesting) with a focus on maintaining viewsheds in the southern portion of island.~~

DNR. Most of the DNR land on the island is in remote portions of the project area and near Bostwick Lake, Blank Inlet, and Vallenar Bay. The DNR-managed Southeast State Forest, which was designated by the State Legislature in 2010, includes three parcels on Gravina Island: two near Vallenar Bay and one northwest of Blank Inlet.[5] The DNR areas and recommended land uses on Gravina Island are:[6]

- *On the shoreline southeast of Clam Cove*: Reserved for state interests only.
- *On Vallenar Bay*: Commercial forestry, dispersed recreation areas, settlement, timber, ~~anadromous~~ fish streams, and important habitats and wildlife movement corridors
- *Adjacent to and west of California Ridge (including the area around Bostwick Lake*): Dispersed recreation, timber harvest, wetlands, and wildlife habitat
- *Small islands, beach, tidelands, and marine waters on the southern tip of Gravina Island*: Dispersed recreation, deer habitat, and scenic resources; recommended to be included in the state park system.

DOT&PF. DOT&PF owns 2,105 acres of land designated as an Airport Reserve on Gravina Island, including approximately 5.9 miles of waterfront land[7]. Ketchikan International Airport (including seaplane facilities) is ~~currently~~ leased to the Borough. The

[3] U.S. Forest Service. January 2008. *Tongass National Forest Land and Resource Management Plan.* United States Department of Agriculture, Region 10. Juneau, Alaska.

[4] U.S. Forest Service. December, 2016. *Tongass National Forest Land and Resource Management Plan Amendment 2016 Environmental Impact Statement Record of Decision.* United States Department of Agriculture, Forest Service Alaska Region. Juneau, Alaska.

[5] Alaska Department of Natural Resources, 2012. Division of Forestry Web site, <http://forestry.alaska.gov/stateforests.htm#sesf> Accessed on February 9, 2012.

[6] Alaska Department of Natural Resources, November 2000. Central and Southern Southeast Area Plan for State Lands.

[7] Ketchikan Gateway Borough Planning Department. 2005. *Gravina Island Plan Central Gravina and Airport Reserve Area.*

area immediately outside the developed airport site is the Airport Reserve zone, which is designated for future airport-related uses. Beyond the Airport Reserve zone is the Airport Development zone, which is designated for auxiliary airport facilities such as parking lots, hotels, rental car businesses, and other lands uses, although it remains largely undeveloped. Use of Airport Development land is subject to Borough and State of Alaska review and approval.[8]

Ketchikan Gateway Borough. Borough-owned lands are located along the east side of Gravina Island on the north, west, and south sides of the Ketchikan International Airport lands. These areas are included in the Borough's Ketchikan 2020 comprehensive planning effort (see Section 3.1.2.4). The Borough has developed specific development strategies for all of the east side of Gravina Island, exclusive of any USFS lands. These strategies are addressed in the three separate area plans comprising the *Gravina Island Plan* (see Section 3.1.2.3).

Alaska Mental Health Trust Authority. The Alaska Mental Health Trust Authority land within the project area is generally west of Airport Reserve land. Specific management plans have not been developed for this land, though Alaska Mental Health Trust Authority land is intended to generate revenue. A large portion of the Alaska Mental Health Trust Authority land is located inland, extending west to California Ridge and east to the Airport Reserve land. Alaska Mental Health Trust Authority land also includes smaller areas of land in the southern and northernmost portions of the project area on Gravina Island. The Borough has zoned the Alaska Mental Health Trust Authority land for "future development."[9]

University of Alaska. The University of Alaska lands are undeveloped parcels on the southwest side of Blank Inlet and on the west side of Vallenar Bay.[10]

Private. Small, privately owned parcels comprise much of the shoreline on the eastern side of Gravina Island immediately north and south of the Airport Development area. Some private lands at Clam Cove, Vallenar Bay on the northwestern part of the island, and Seal Cove in the southern portion of the island have been developed, though there are undeveloped parcels in each area and in the Long Lake area. Developed private lands on Gravina Island are generally residences or recreation cabins.

Zoning. The zoning map (Figure 3.3) shows the ~~currently~~ allowable (planned) uses for private, state, and Borough-owned properties within the project area on Gravina Island.[11] The Ketchikan International Airport property has been zoned by the Borough as industrial. The DOT&PF *Airport Master Plan* has more specific zoning recommendations for their property, and lists intended uses for Ketchikan International Airport lands as aviation, a reserve for future development, airport development, general commercial activities, and heavy and light industry. Immediately south of Ketchikan International Airport, lands are zoned for future development and rural residential. Outside of the project area, Gravina Island is zoned almost entirely as future development with the exception of a few small areas zoned for residences along Tongass Narrows, north of airport property, and within Vallenar Bay.

[8] Alaska Department of Transportation and Public Facilities. June 2003. Ketchikan International Airport Master Plan.

[9] Ketchikan Gateway Borough Planning Department. 2009. Ketchikan Gateway Borough Comprehensive Plan 2020.

[10] Ketchikan Gateway Borough GIS Department. 2008.

[11] Ketchikan Gateway Borough Planning Department. 2009. *Ketchikan Gateway Borough Comprehensive Plan 2020.*

3.1.1.4 Tidal and Submerged Lands

Tidal and submerged lands associated with Tongass Narrows are used for marine boat and seaplane operations. Tidelands and submerged lands are owned by DNR and the Borough, though many of the tidelands[12] have been leased for private development.

3.1.2 Land Use Plans and Policies

The Borough is the local planning authority for the project area. The adopted plans with authority to govern land use decisions within the project area include:

- *Pennock and Gravina Island Neighborhood Plan*, 1985
- *Ketchikan International Airport Master Plan*, 2003
- *Gravina Island Plan*, 2005
- *Coastal Zone Management Plan*, 2007
- *Ketchikan Gateway Borough Comprehensive Plan 2020,* 2009
- *Ketchikan's Coordinated Transportation Plan,* 2015

~~The Borough is currently engaged in a comprehensive planning effort known as *Ketchikan 2020*, which led to the development of the *Gravina Island Plan*, updates of the *Comprehensive Plan* and 2007 *Coastal Zone Management Plan*, and development of a *Wetland Development Plan*.~~ Descriptions of these plans and policies and their relevance to the Gravina Access Project are provided in the following sections.

3.1.2.1 Pennock and Gravina Island Neighborhood Plan

The *Pennock and Gravina Island Neighborhood Plan*, adopted by the Borough in 1985, is the most recently adopted plan specifically addressing land on Pennock Island. The 2005 *Gravina Island Plan* supersedes the Gravina Island portion of this plan. The plan was written at a time when considerable economic and population growth was anticipated in Ketchikan as a result of nearby mineral development. That mineral development did not occur, and the growth of Ketchikan was not consistent with the assumptions of the plan. According to the Ketchikan Planning Department, the intentions and purposes of this plan are accurate and the plan, although it requires updating to reflect current conditions, is still used by the planning department.[13]

One objective of the *Pennock and Gravina Island Neighborhood Plan* was to develop a transportation system that would provide access to interior land without compromising the qualities that attracted residents to the area. The plan clearly articulated a vision for future transportation access that would include a ferry. Regarding a bridge, the plan states:

> Hard access by bridge or tunnel from Pennock to Gravina Island is not envisioned in the foreseeable future and, in light of the rural characteristics, should not be pursued. Hard access and its possible location is of concern to the community as a whole and should be determined by a Borough-wide vote.[14]

[12] Tidelands are those between mean high and mean low water. They are State owned; however, some tidelands occupied or developed prior to Statehood (Jan. 3, 1959) are owned by local governments or privately. The State has programs where its tidelands and submerged lands may be leased for development or use.

[13] Williams, Tom. 2011. Personal communication with HDR.

[14] *Ketchikan Gateway Borough, 1985.* Pennock and Gravina Island Plan*: 26.*

3.1.2.2 Ketchikan International Airport Master Plan

The 2003 *Ketchikan International Airport Master Plan* addresses airport development plans intended to accommodate anticipated future growth, and outlines forecasted changes in operations over a 20-year period (through 2018). The components of the master plan that are most pertinent to the Gravina Access Project include:

- Renovation and expansion of the passenger terminal building
- Expansion of the apron area to include additional hangar space, tie-down space, and parking stalls

The two key projects in the plan call for construction of a parallel taxiway (now Taxiway A) along the north side of Runway 11 and an upgrade to the runway safety area, both now complete (see Section 3.7.1.1). The runway safety area expansion consisted of shifting the runway 750 feet east along the existing runway centerline, which resulted in 1,000 feet of safety area on either end of the runway.

3.1.2.3 Gravina Island Plan

The *Gravina Island Plan*, produced by the Borough in 2005, is a set of four documents focusing on the Borough's long-term plans for development on Gravina Island. Because the plan was issued after the Record of Decision on the 2004 FEIS, it identifies development opportunities relative to the selected alternative, Alternative F1. The plan consists of the *Gravina Island Plan "Citizen's Guide"*, which offers island-wide policies and background on the plan, and three separate subarea plans that identify economic opportunities and provide detailed guidance for development for Gravina Island's eastern shoreline. The three area plans are the *Central Gravina & Airport Reserve Area* plan, the *Clam Cove & Blank Inlet Area* plan, and the *North Gravina Area* plan.

The *Central Gravina & Airport Reserve Area* plan addresses future community development strategies for the area at and adjacent to the Ketchikan International Airport. The Central Gravina and Airport Reserve area totals 11,010 acres of lands owned by DOT&PF, the Alaska Mental Health Trust Authority, DNR, and private entities (see Figure 3.4). Lands within the Airport Reserve are ~~currently~~ zoned as Airport Development and all other lands are zoned for future development. The Borough does not own any land within this area, but proposes zoning changes to the area outside of the Airport Reserve to accommodate as-yet unimplemented recommendations for Alaska Mental Health Trust Authority and DNR-owned lands. This plan recognizes that future road infrastructure, including the potential development of a bridge, is necessary to open the area to industrial development, timber harvesting, recreation, and future airport-related expansion. Noting the uncertainty of financing for bridge construction, the plan references the necessity of airport area road infrastructure regardless of a bridge.

The *Clam Cove & Blank Inlet Area* plan lays the foundation for future development in the Clam Cove and Blank Inlet areas. The areas addressed in this plan total 4,851 acres of mostly Borough-owned (63 percent of total) land, as well as DNR (12 percent), University of Alaska (10 percent), Alaska Mental Health Trust Authority (4 percent), and private lands (11 percent) (see Figure 3.4). Due to the amount of Borough and Alaska Mental Health Trust Authority lands available for future private ownership, the Borough identified the Clam Cove area as one of the three residential growth centers on Gravina Island (along with North Gravina and Vallenar Bay, described in the following paragraph). This plan recognizes that a direct connection to the airport area via a Pennock Island bridge would encourage development and stimulate economic growth in the Clam Cove area and eventually at Blank Inlet. The plan also recognizes that without a bridge, the growth in this area would occur much more slowly than it would with a bridge in place. The plan indicates that development under either scenario will prefer waterfront and adjacent properties and Borough lands will be integral in meeting the future demand.

The *North Gravina Area* plan addresses the approximately 1,905 acres of mostly Borough-owned land (77 percent) along the Tongass Narrows north of the Airport Reserve area. The area is also comprised of Alaska Mental Health Trust Authority (10 percent) and privately owned lands (13 percent of total) (see Figure 3.4). This plan recommends the development of an industrial park and marina, as well as residential development along the eastern shoreline and at Vallenar Bay, as economic development initiatives for the area. According to the plan, the construction of the North Gravina Road to the Pacific Log and Lumber sawmill would encourage subdivision and sale of Borough lands and development of private lands along the shoreline, which would only be accelerated by construction of the bridge.

3.1.2.4 Coastal Management Plan

The *Coastal Management Plan* was originally prepared in 1984 and most recently amended in 2007. The plan is part of the Alaska Coastal Management Program (ACMP) and contains policy guidance regarding the use and protection of coastal resources. The plan provides specific guidance regarding Gravina Island access, discusses the need to improve that access, and recognizes that improved access between Gravina and Revillagigedo islands created by the Gravina Access Project is necessary to make available suitable lands to meet community growth needs. As of July 1, 2011, ACMP authorities were repealed and the regulations at 11 Alaska Administrative Code (AAC) 110, 11 AAC 112, and 11 AAC 114, as well as local coastal management plans, have no statutory authority and therefore are unenforceable. See section 3.19, Coastal Zone, for more information.

3.1.2.5 Ketchikan Gateway Borough Comprehensive Plan

In 2009, the Borough adopted its *Comprehensive Plan 2020*. The *Comprehensive Plan 2020* outlines goals, objectives, and policies intended to guide development in the Borough. The plan explains each plan element (e.g., land use, transportation, and recreation), the capital improvements implementation program, and monitoring and evaluation procedures. The plan also includes maps illustrating background conditions for the various elements, as well as a map series showing future land use and future transportation conditions.

Included in its economic development goals, the plan encourages the creation of a development plan for Gravina Island that "provides for new economic opportunities to diversify and strengthen Ketchikan's economic health." Objective 1110.1 of the plan states:

The Borough may develop strategies that provide access to Gravina Island from Revillagigedo Island that supports and fosters economic development. Access strategies should include, but are not limited to, a bridge, an enhanced ferry service, or other practical access solutions.

3.1.2.6 Ketchikan's Coordinated Transportation Plan 2015 Update

The *Ketchikan's Coordinated Transportation Plan 2015 Update* contains information on Ketchikan's existing community transportation conditions, provides an extensive inventory of available services, assesses current and future transportation needs, and identifies strategies to address the gaps in Ketchikan's transportation system[15]. Adequate airport accessibility is one system gap the plan recognizes in Ketchikan's transportation system.

[15] Alaska Department of Transportation and Public Facilities. *Ketchikan's Coordinated Transportation Plan 2015 Update*. <http://dot.alaska.gov/stwdplng/transit/pub/CoorPlan-Ketchikan.pdf>. Accessed on December 16, 2016.

The plan presents strategies that are consistent with the purpose and need of the Gravina Access Project. Strategy 6.2.3 of the Plan "seeks to provide fully accessible accommodations for passengers using the Borough-operated ferries to access the Ketchikan International Airport." Strategy 6.2.4 calls for development "of an airport/Gravina access plan that meets the needs of citizens and stakeholders." Additional recommendations to help with increased access between the airport on Gravina Island and the City of Ketchikan are the construction of an additional ferry transfer bridge and ramp on Gravina Island near the existing ramp and one additional ferry transfer bridge and ramp on Revillagigedo Island at the property that adjoins existing Airport property. These improvements provide for continued access and redundancy in cases where the existing single transfer bridge and ramp system is unavailable due to scheduled or unscheduled maintenance and repairs.

3.2 Farmland

There is no farmland in the project area that is considered prime or unique, or is of statewide or local importance.

3.3 Social Environment

3.3.1 Population and Social Groups

3.3.1.1 Population

In the past two decades, the Borough economy has undergone many changes that have affected growth and population in the community. Population increased annually from 1990 to a peak of 14,764 in 1995, and then decreased until 2004~~1999~~. From 1990 to 2000, the overall population increase of the Borough was 1.8 percent—from 13,828 people in 1990 to 14,070 people in 2000. The 2010 U.S. Census indicates a Borough population of 13,477 in 2010[16], which represents a decrease in the overall population by 4.2 percent between 2000 and 2010. Years 2010–2012 saw a population increase of 3.0 percent—from 13,477 to 13,884 people. Numbers declined by 0.8 percent to 13,778 in 2015[17] (see Figure 3.5).

3.3.1.2 Minority Populations

The demographic character of a region, including statistics related to minority populations, helps describe the social setting of the proposed project. The most recent available data on minority populations come from the 2011-2015 American Community Survey (ACS) 5-year estimates[18]. Based on the ~~2010~~2011-2015 ACS, ~~U.S. Census,~~ about 32 percent of the Borough population ~~in the Borough belongs to~~identifies as ~~a~~ minority (belonging to more than one race or a single race other than white). Minority populations in the Borough include Alaska Native, Asian, Black or African American, Native Hawaiian, and Hispanic.

The U.S. Census reports geographic data by census tract, block group (subdivided census tract), and block (subdivided block group). Blocks are the smallest census unit in geographic area and contain the most detailed information. ~~These data represent a 6 percent increase between 2000 and 2010 in the percent of the overall population that are minorities.~~ Table 3-4 and Figure 3.6 show the minority population ~~breakdown by areas of the Borough~~of the project

[16] Alaska Department of Labor & Workforce Development. 2011. PL 94-171 Redistricting Data for Boroughs and Census Areas. *Research and Analysis Section*. <http://live.laborstats.alaska.gov/cen/redistr.cfm/>. Accessed on October 11, 2011.

[17] Alaska State Department of Labor and Workforce Development, Research and Analysis. 2011-2015 American Community Survey. <http://live.laborstats.alaska.gov/cen/acsdetails.cfm#>. Accessed January 2017.

[18] American Community Survey 2011-2015 data represents average characteristics during that 5-year timeframe.

area based on the 2011–2015 ACS for ~~known as Census Block Groups~~ census tracts and block groups, and 2010 U.S. census blocks (the most recent available data at the block level of detail). Blocks where the population is greater than 50 percent non-white are listed in Table 3-4 and identified in Figure 3.6.

~~The block groups are comprised of two or more blocks, and cover small areas near Ketchikan and Saxman (where population density is greater) and quite large areas elsewhere in the Borough (where population is more sparsely distributed). Blocks where the population is greater than 50 percent non-white are identified in Figure 3.6. The block group with the greatest minority population is Block Group 3, Census Tract 3, with a nearly 50 percent minority population. Minority populations in the Borough include Alaska Native, Asian, Native Hawaiian, and Hispanic.~~

Table 3-4:~~2010 U.S. Census~~ Population and Minority Population in Alaska and the Ketchikan Gateway Borough [Updated]

Area[a]	Total Population	Minority or Mixed Race[b]	Percent (%) Minority or Mixed Race
Alaska	**~~7~~733,375~~10,231~~**	**249,125~~236,655~~**	**34.0~~33.3~~**
Ketchikan Gateway Borough	**13,699~~13,477~~**	**4,419 ~~4,301~~**	**32.3~~31.9~~**
Block Group 1, Census Tract 1	~~412~~ 357	22 ~~32~~	6.2~~7.8~~
Block Group 2, Census Tract 1	778 ~~837~~	80 ~~112~~	10.3~~13.4~~
Block Group 3, Census Tract 1	1,051 ~~975~~	215 ~~141~~	20.5~~14.5~~
Block Group 4, Census Tract 1	1,204 ~~976~~	184 ~~156~~	15.3~~15.9~~
Block Group 5, Census Tract 1	27~~284~~	0 ~~30~~	0.0~~010.6~~
Block 5329	2	2	100.0
Census Tract 1 Total	**3,417 ~~3,484~~**	**501 ~~471~~**	**14.7~~13.5~~**
Block Group 1, Census Tract 2	~~1,538~~ 1,668	703 ~~695~~	42.1~~45.2~~
Block 1003	15	13	86.7
Block 1014	32	19	59.4
Block 1017	211	183	86.7
Block 1018	17	14	82.4
Block 1022	27	15	55.6
Block 1024	25	21	84.0
Block 1026	57	39	68.4
Block 1027	39	21	53.8
Block 1030	47	29	61.7
Block Group 2, Census Tract 2	2,069 ~~2,414~~	759 ~~957~~	36.7~~39.6~~
Block 2003	113	78	69.0
Block 2025	24	14	58.3
Block 2030	117	70	59.8
Block Group 3, Census Tract 2	1,158 ~~932~~	566 ~~322~~	48.9~~34.6~~
Block 3006	23	15	65.2
Block 3016	200	121	60.5
Block 3018	33	25	75.8

Area[a]	Total Population	Minority or Mixed Race[b]	Percent (%) Minority or Mixed Race
Block 3019	2	2	100
Census Tract 2 Total	**~~4,884~~ 4,895**	**2,028 ~~1,974~~**	**41.4~~40.4~~**
Block Group 1, Census Tract 3	1,103 ~~1,110~~	486 ~~495~~	44.1~~44.6~~
Block 1002	63	35	55.6
Block Group 2, Census Tract 3	1,149 ~~940~~	424~~285~~	36.9~~30.3~~
Block 2001	3	3	100.0
Block 2006	10	6	60.0
Block 2011	7	6	85.7
Block 2016	1	1	100.0
Block Group 3, Census Tract 3	770 ~~791~~	342 ~~383~~	44.4~~48.4~~
Block 3006	2	2	100.0
Block 3012	302	176	58.3
Block 3016	9	5	55.6
Block 3022	2	2	100.0
Block 3025	17	9	52.9
Census Tract 3 Total	**3,022~~2,841~~**	**1,252 ~~1,163~~**	**41.4~~40.9~~**
Block Group 1, Census Tract 4	905 ~~973~~	418~~406~~	46.2~~41.7~~
Block 1008	31	25	80.6
Block 1009	189	134	70.9
Block 1010	81	78	96.3
Block 1011	31	25	80.6
Block Group 2, Census Tract 4	1,460~~1,295~~	220 ~~287~~	15.1~~22.2~~
Census Tract 4 Total	**2,365 ~~2,268~~**	**638 ~~693~~**	**27.0~~30.5~~**

[a] Only census blocks with percent minority or mixed race greater than 50 are included in this table.

[b]~~Note:~~ Minority or Mixed Race indicates census respondents who describe themselves as a race other than white, or indicating more than one race.

Sources: 2010 U.S. Census; ~~: U.S. Census. 2011. <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>,~~ Alaska State Department of Labor and Workforce Development, Research Analysis. 2011-2015 American Community Survey. <http://live.laborstats.alaska.gov/cen/acsdetails.cfm#> ~~Accessed October 11, 2011~~Accessed January 6, 2017.

3.3.1.3 Income

The 2011-2015 ~~2005–2009~~ ACS estimates the median household income in the Borough as $64,222~~57,500 in 2009~~,[19] up from $51,344 based on 2000 U.S. Census income data. Table 3-5 provides 2011-~~the~~ 2015~~2009~~ ACS estimated median household income~~s~~ by census tract and block group. ~~Data showing median household income and percent of population in poverty at the block group level are not available for 2009.~~ The data ~~presented~~ allow comparison of the median income of a particular census tract or block group to the median income in the Borough and Alaska. Figure 3.7 shows median household income by census block group for the project area.

[19] Alaska Department of Commerce, Community and Economic Development. Community and Regional Affairs. *Community Database Online*. < http://commerce.alaska.gov/cra/DCRAExternal >. Accessed November 15, 2016~~October 13, 2011~~.

~~Household income is generally used to determine poverty, and Table 3-5 also illustrates the percentage of persons below the poverty level as determined by the 2005-2009 American Community Survey. Figure 3.7 shows the 2009 median household income by census tract for the project area.~~

Percent poverty is defined as the ratio of total persons below the poverty threshold to the total population. This metric is calculated by the ACS at the census tract level of detail and is shown in Table 3-5. ACS 2011-2015 percent poverty data are not available at the block group level.

Table 3-5: ~~2009 U.S. Census~~ 2011-2015 ACS Median Houshold (HH) Income and Percent Below Poverty Level [Updated]

Area	Median ~~Household~~ HH Income ~~in 2009~~ (Average HH Size)	Percent whose income in the past 12 months is below the poverty level ~~in 2009~~ (%)
Alaska	**~~75,493~~ 72,515 (2.81)**	**10.2~~6.9~~**
Ketchikan Gateway Borough	**~~57,500~~ 64,222 (2.55)**	**12.1~~5.8~~**
DHHS Poverty Guideline HH size fewer than 2 person HH size 2-3 persons	** 19,920 25,120**	
Block Group 1, Census Tract 1	44,423 (1.8)	-
Block Group 5, Census Tract 1	No data	-
Census Tract 1	**~~67,469~~ 84,417 2.64**	**5.4~~1.2~~**
Block Group 1, Census Tract 2	64,327 (2.48)	-
Block Group 2, Census Tract 2	56,184 (2.54)	-
Block Group 3, Census Tract 2	50,493 (2.53)	-
Census Tract 2	**~~53,120~~ 57,008 (2.52)**	**14.9~~5.9~~**
Block Group 1, Census Tract 3	51,094 (2.59)	-
Block Group 2, Census Tract 3	51,181 (1.94)	-
Block Group 3, Census Tract 3	46,917 (2.44)	-
Census Tract 3	**~~47,780~~ 49,417 (2.27)**	**20.3~~13.3~~**
Block Group 1, Census Tract 4	65,795 (2.83)	-
Census Tract 4	**~~69,850~~ 86,818 (2.88)**	**6.1~~3.7~~**

The U.S. Department of Health and Human Services (DHHS) sets poverty guidelines based on annual household income and household size. According to DHHS poverty guidelines for Alaska, households are considered living in poverty if annual household incomes are at or below $19,920 for households with fewer than 2 persons and at or below $25,120 household with 2 to 3 persons.[20]

All block groups in the project area have median household incomes well above 2015 DHHS Alaska poverty thresholds ($19,920–$25,120). The block group with the lowest median household income in the project area is Census Tract 1, Block Group 1 with an income ($44,423) 2.2 times higher than the respective poverty threshold ($19,920).

~~Tthe lowest median household incomes and highest poverty rates occur in Census Tract 3, which includes the downtown area of Ketchikan.~~

3.3.2 Community Character

Community character is the embodiment of the natural environment and the human environment, which includes public and private space, infrastructure, and land use. The perceived quality of life in a community can shape that community's character. The Borough encourages responsible community and economic development to provide future growth that enhances residents' quality of life, ensures the health and safety of Borough residents and visitors, and protects valuable natural resources.[21]

3.3.2.1 Revillagigedo Island

The City of Ketchikan is the largest community on Revillagigedo Island. Residents of the City of Ketchikan value the quality of life their community provides, and many residents especially value the qualities that make their community and neighborhoods unique.[22] Ketchikan is a small city with close ties between residents, and in which residents value the intimate feel of their hometown.

Revillagigedo Island neighborhoods within the immediate vicinity of the project alternatives are:

- **Alternative C3-4 (Airport Bridge).** The alternative would begin in a commercial area at Rex Allen Drive and traverses the hillside above Walmart and the Baker Street/Bucey Avenue neighborhood. Alternative C3-4 would be approximately 500 feet uphill from the Baker Street/Bucey Avenue neighborhood, which is a small residential area comprised of fewer than 15 residences. The majority of the houses in this neighborhood were built in the 1980s, though one property, located at 38 Baker Street, was built in 1920. The Alternative C3-4 bridge would cross North Tongass Avenue in the 4600 block where two single family residences dating from the 1950s are located. Also in that block, just north of these residences, is a new senior housing complex. Opened in 2012, the Pioneer Heights Senior Housing facility is a 10-unit independent living senior housing complex owned by Ketchikan Senior Citizen Services.
- **Alternative F3 (Pennock Island Bridges).** This alternative would connect to South Tongass Highway north of the Forest Park neighborhood and south of the USCG Station.

[20] U.S. Department of Health and Human Services, *Alaska Poverty Guidelines*. <https://aspe.hhs.gov/2015-poverty-guidelines>, Accessed January 20, 2017.

[21] Ketchikan Gateway Borough Planning and Community Development Department. *2008 Draft Ketchikan Gateway Borough Comprehensive Plan 2020.* Available online at http://www.borough.ketchikan.ak.us/DocumentCenter/View/2000 ~~http://www.borough.ketchikan.ak.us/planning/ComprehensivePlan.htm~~ .

[22] Alaska Department of Transportation and Public Facilities, November 2001. *Gravina Access Project. Draft Social Environment Technical Memorandum*, Available online at http://dot.alaska.gov/sereg/projects/gravina_access/assets/Previous_docs/SocialEnvironment.pdf.

The Forest Park neighborhood consists of single and multifamily housing units. Access to the neighborhood would be approximately one half mile south of the Alternative F3 bridge.

- **Alternative G2 (Peninsula Point to Lewis Point Ferry).** The ferry terminal on Revillagigedo Island at Peninsula Point would be immediately across Tongass Avenue from the Densley Drive neighborhood. This neighborhood consists of approximately five houses, built between 1969 and 1981.
- **Alternative G3 (Downtown to South of Airport Ferry).** The ferry terminal on Revillagigedo Island would be constructed near the Plaza Mall at Bar Point, a primarily commercial district. The Cedar Point Condominiums (Buildings A and B), located at 21 and 25 Jefferson Way, are located immediately inland of the proposed traffic queuing area for the ferry terminal. Construction of the condominiums was completed in 2010. Each building has 5 to 10 luxury residential units.
- **Alternative G4 and G4v (New Ferry Adjacent to Existing Ferry).** The residences nearest to the proposed Alternatives G4 and G4v improvements on Revillagigedo Island are the 10 to 15 houses located along Vallenar Lane, more than 1,000 feet from the improvements. These houses were built between 1993 and 2001.

Saxman is an incorporated city on Revillagigedo Island located approximately 2 miles southeast of Ketchikan. It was settled by Tlingit people in 1894 and still has a large Alaska Native population. It functions as a part of greater Ketchikan but is also the seat of the Organized Village of Saxman, a tribal government, and is a designated rural community under federal subsistence management rules. Subsistence is an important socioeconomic element for Saxman. Among other community buildings, Saxman is home to a totem pole carving center which is culturally important and attractive to tourists.

3.3.2.2 Pennock and Gravina Islands

There are no residential neighborhoods within or adjacent to the alignments of the project alternatives on Pennock and Gravina islands. Residences on Pennock Island are primarily located along the northern tip and northeastern shorelines. On Gravina Island, homes are clustered at Clam Cove, where several families live year-round.[23] Existing residential areas on Pennock and Gravina islands are only accessible by boat. The *Pennock and Gravina Island Neighborhood Plan*[24] illustrates that residents of these areas value their sense of community and their way of life. Many residents of these islands are former residents of the City of Ketchikan who were attracted to the islands by their rural and more self-sufficient lifestyle.

A special workshop for Pennock and Gravina Island residents was held May 23 and 24, 2001, as part of the 2004 Final EIS public outreach effort. The workshop was intended to obtain input on the planning activities related to future development, particularly with respect to the Gravina Access Project alternatives. Comments offered by workshop participants are summarized below:

- Workshop participants offered comments both in opposition to and support of an alternative that would cross Pennock Island.
- Some residents said that they would like to have improved access (i.e., relatively quick, easy, and reliable access) from Pennock Island to Ketchikan and Gravina Island.
- Some participants were interested in bridge or ferry access to/from Clam Cove and the northern areas of Gravina Island.

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[23] Ketchikan Gateway Borough Planning Department. 2005. *Gravina Island Plan: Clam Cove & Blank Inlet Area*.

[24] Ketchikan Gateway Borough Planning Department. 1985. *Pennock and Gravina Island Neighborhood Plan.*

- Some residents expressed general opposition to a Pennock Island crossing. They felt that a bridge and associated roads would change the rural and isolated nature of the island.
- There was considerable discussion of how Pennock Island or Clam Cove residents would have access to a bridge or ferry alternative. Participants raised questions concerning the need for an expanded road network to connect the communities with the proposed alternative.

3.3.3 Community and Public Facilities

The Borough, City of Ketchikan, and City of Saxman provide an array of community services to the public,[25] summarized in the following paragraphs. Those facilities located within the project area are shown on Figure 3.8.

3.3.3.1 Libraries

The Borough has nine libraries: one public library, six school libraries, one college library, and one law library (for reference only). There are no libraries in Saxman.

3.3.3.2 Schools

The Borough school district consists of five elementary schools, one middle school, one junior/senior high school, one high school, the Ketchikan Charter School, and the Tongass School of Arts and Sciences. In fiscal year 2015~~2011~~, a total of 2,365~~2,247~~ students were enrolled in the school district, up~~down~~ from 2,321 students in 2008. The University of Alaska, Southeast has an academic campus and a technical center, both in Ketchikan. There are no schools located in Saxman.

3.3.3.3 Police Services

The City of Ketchikan and City of Saxman each operates a police department to serve residents within its own city limits. The Alaska State Troopers are based on Revillagigedo Island approximately 2 miles north of the airport ferry terminal and serve residents outside of the city limits.

3.3.3.4 Fire Protection and Emergency Response

Ketchikan staff and volunteers, along with local volunteer fire departments run by the Borough service areas, provide fire protection and emergency response services to businesses and residents living on the road-accessible portion of Revillagigedo Island. In addition, the City of Saxman has one fire unit. There are seven Borough fire stations located throughout the Borough; all are staffed by volunteers, except the fire station on Main Street in downtown Ketchikan. The average response time (for all service areas) by the city fire station and emergency medical service is approximately 4 minutes. The volunteer squads are used as needed.

Emergency services are not provided to residents living beyond the road system or on Pennock and Gravina islands, as they are outside the designated service areas. The airport has its own rescue and fire-fighting personnel. However, a cooperative emergency response system uses the ferry between Ketchikan and the airport (particularly for people medevaced to the Ketchikan hospital). Medevacs during normal hours of ferry operations interrupt the ferry schedule so that emergency responders can be ferried across Tongass Narrows as quickly as possible. After

[25] Alaska Department of Community and Economic Development (DCED). 2001. *Community Information Database Online*. <www.dced.state.ak.us/mra/CF_COMDB.htm>. Accessed in 2016~~2011~~.

normal ferry operations hours, the hospital or other emergency response team calls the ferry operator, and the ferry is put into operation to transport emergency responders across Tongass Narrows. Other emergency marine response in Alaska generally falls to the USCG and Alaska State Troopers.

3.3.3.5 Health Care Facilities

Local hospitals and health clinics are the Ketchikan General Hospital, the Southeast Alaska Regional Health Consortium Clinic, the Gateway Center for Human Services, and the USCG Ketchikan Dispensary. The hospital is a qualified acute care facility and medevac facility. The USCG facility provides emergency support only and is a qualified emergency care center. Saxman residents use the Ketchikan health care facilities.

3.3.4 Recreation Resources

The City of Ketchikan has numerous parks, trails, and recreation areas, as well as tennis courts, playing fields, and indoor recreation centers. Saxman has a gym in its community center. Fishing, hunting, hiking, and cycling are popular activities throughout Revillagigedo Island, and Tongass Narrows is popular for recreational boating and fishing (Figure 3.8).

Recreationists on Gravina Island can access fishing, hunting, shellfish gathering, and hiking along the shoreline and on primitive trails. ~~Hiking trails (Figure 3.8) and~~ USFS logging roads provide access to remote areas on Gravina Island, while boaters can access Dall Bay State Marine Park and Black Sands Beach State Marine Park at the southern end of Gravina Island. A USFS public use recreational cabin is also located on the southern end of the island.

~~Recreation areas at the north end of Gravina Island include the 49.4-acre Vallenar Bay Shoreline and Open Space boat-only access area, as well as the North Gravina Beaches and High Mountain Creek Beach. The Gravina Lake Country Natural Area is an approximately 740-acre area west of Clam Cove that includes trails/boardwalks to shorelines where boat access is possible. The Bostwick Lake Recreation Area is 1,750 acres of forested uplands with hiking, camping, fishing, hunting, bird and wildlife viewing, and winter sport uses.[26] Two trails on Gravina Island that are identified Designated Recreation Areas in the *Ketchikan Coastal Management Program* are within the project area for the Gravina Access Project alternatives (Figure 3.8):[27]~~

- ~~Gravina Shoreline Trail—a proposed 6-mile trail along the Gravina Island shoreline approximately from Clam Cove to Lewis Point~~
- ~~Bostwick Lake Loop Trail—a combination of existing and proposed 8-mile trail from the south end of the airport to Bostwick Lake, around Curve Mountain to Pass Creek, then along Government Creek to the airport~~

Pennock Island is accessible by boat and is used for hunting and fishing, but there are no developed recreation facilities on the island.

3.3.5 Accessibility

The principal modes of transportation between islands within the Borough are air and marine vessel; there is no "hard link" (surface) transportation between the islands. The primary public access to Gravina Island from Revillagigedo Island is the airport ferry that transports motor vehicles, bicyclists, and pedestrians from a terminal on Revillagigedo Island approximately

~~[26] Ketchikan Gateway Borough Planning Department. 2007. *Ketchikan Coastal Management Program*.~~

~~[27] Ketchikan Gateway Borough Planning Department. 2007. *Ketchikan Coastal Management Program*.~~

2.6 miles north of downtown Ketchikan across Tongass Narrows directly to the airport terminal on Gravina Island. Travelers may continue into the interior of Gravina Island by way of the Airport Access Road to exit the airport property and connect with the Gravina Island Highway or Lewis Reef Road.

One of the stated needs for the Gravina Access Project is to improve access to Ketchikan International Airport and to other lands on Gravina Island. One measure of accessibility is the amount of time required to travel from one point to another. Existing travel times were calculated for travel between nine origin points on Revillagigedo Island and the airport terminal on Gravina Island. All of the routes were analyzed for motor vehicle travel times, and three were analyzed for trips taken by pedestrians and bicyclists. Table 3-6 presents the travel times calculated for these nine routes under existing conditions.

Table 3-6: Travel Times from Revillagigedo Island to Ketchikan International Airport Terminal on Gravina Island

Origin	Travel Mode	Travel Time (in minutes)
Downtown Ketchikan (Mile Post 0)	Vehicles	30
	Pedestrians	76
	Bicycles	37
Ward Cove (Post Office)	Vehicles	28
	Pedestrians	111
	Bicycles	47
Carlanna Creek	Vehicles	23
	Pedestrians	21
	Bicycles	20

3.3.6 Environmental Justice

Executive Order 12898[28] 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.

FHWA order *FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*[29] contains the following definitions:

- Low-Income: A household income at or below the poverty guidelines of the U.S. Department of Health and Human Services
- Minorities:
    - Black (having origins in any of the black racial groups of Africa)

[28] Federal Register, February 11, 1994. Vol. 59 No. 32, p. 7629.

[29] Federal Highway Administration. December 2, 1980. Order on FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.

- o Hispanic (of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race)
- o Asian-American (having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands)
- o 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)

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.

For purposes of the environmental justice analysis, ~~low-income and~~ minority populations are areas in which greater than 50 percent of the population is ~~low-income or~~ non-white. Low-income populations are those where 50 percent of the populations is living below the DHHS poverty guidelines. These populations are also identified as "environmental justice populations." As noted in Section 3.3.1.2, there are numerous blocks in the project area that are environmental justice populations based on having greater than 50 percent of the population being non-white. Based on block group ~~census tract~~ data for income presented in Section 3.3.1.3, ~~because data are not reported at the block or block group levels, there are~~ no low-income populations are identified in the project study area.

Given the importance of the Native population in Alaska, the project team analyzed the demographics of the project area (the demographic information for the project area is described above in Section 3.3.1) and consulted Native groups to determine the impacts of the project to these groups. The project team met with representatives of the Metlakatla Indian Community (governing body for the only Indian reservation in Alaska: Annette Island Reserve, located 15 miles south of Ketchikan), the Ketchikan Indian Community Tribal Council (governing body for Natives living on Revillagigedo Island), the Organized Village of Saxman (organized under the Indian Reorganization Act), and Cape Fox Corporation (the local Native corporation established by the Alaska Native Claims Settlement Act). Several meetings were joint meetings of these organizations. The summary of meetings held is presented in Table 7-1 of Chapter 7.

Field visits, discussions with Borough planning staff,[30] and public meetings held for the project during development of the 2004 Final EIS did not identify pockets of predominantly minority or low-income populations in the immediate vicinity of any of the alternatives (i.e., within or adjacent to the footprint of an alternative). While there may have been some shifts in population since that time, the outreach effort for this Final SEIS (see Section 7.2.4) did not identify pockets of predominantly minority or low-income populations in the immediate vicinity of any of the SEIS alternatives. As shown in Figure 3.6, minority populations do occur within the study area (e.g., the Native population in the City of Saxman, and census blocks north and south of downtown Ketchikan), but are not within or adjacent to the footprint of an alternative.

[30] Hill, John. 2001. Personal communication between, Ketchikan Gateway Borough Planning Department and Kristen Maines, HDR.

3.3.7 Subsistence

Subsistence is defined in the Alaska National Interest Lands Conservation Act, Section 803, as “the customary and traditional uses by rural Alaska residents of wild, renewable resources” for non-commercial purposes. Hunting, fishing, trapping, and gathering natural resources are major elements of the cultural and economic life of many Ketchikan-area residents. Subsistence activities are also important to follow cultural customs and traditions (including handcrafts), and to supplement personal income. Federal law regulates subsistence on federal land, and defines rural and non-rural areas, and a person must be a rural Alaska resident to participate in subsistence on federally-owned lands under federal subsistence regulations[31]. Under state law however, and on state lands, all Alaska residents are eligible to participate in subsistence, but only in state-defined subsistence use areas[32].

Pennock Island and the Bostwick Bay, Inlet, and Creek areas on southeastern Gravina Island are popular subsistence areas, though they are not designated as such by either state or federal agencies. In 1999, 80 percent of the residents of Saxman engaged in subsistence harvesting in these areas and the surrounding region, and almost all residents (97 percent) used subsistence products. The per-capita subsistence harvest was estimated at 217 pounds per person, and included roughly 130 pounds of fish (84 pounds of salmon and 47 pounds of other fish), 29 pounds of land mammals, 12 pounds of marine mammals, 23 pounds of vegetation, and 23 pounds of marine invertebrates.[33] In 2003, the total estimated subsistence salmon harvest in Saxman was 885 salmon.[34]

The residents of Annette Island (see Figure 1.1) also depend on subsistence resources. The most recent data available indicate that in 1987, 77 percent of Metlakatla residents engaged in subsistence harvesting in these areas and the surrounding region, and all of them (100 percent) used subsistence products. The per-capita subsistence harvest was estimated at 70 pounds per person, and included roughly 37 pounds of fish (20 pounds of salmon and 17 pounds of other fish), 11 pounds of land mammals, 1 pound of marine mammals, 5 pounds of vegetation, 15 pounds of marine invertebrates, and 1 pound of birds and eggs.[35] In 2003, the total estimated subsistence salmon harvest in Metlakatla was 509 salmon.[36]

3.3.8 Utilities

3.3.8.1 <u>Water</u>

Ketchikan Public Utilities (KPU) provides potable water to almost all developed areas within the City of Ketchikan on Revillagigedo Island and to the airport on Gravina Island. The KPU’s main water distribution system for the City of Ketchikan delivers up to 500 gallons per person per day.

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[31] The following sub-areas are not considered rural: Clover Pass, Herring Cove, Ketchikan City, Ketchikan East, Mountain Point, North Tongass Highway, Pennock Island, Saxman East, and parts of Gravina Island. This encompasses residents of the entire east side of Tongass Narrows from Behm Canal to George Inlet, except for Saxman itself, according to public information posted by the U.S. Fish and Wildlife Service on its Web site in May 2003 (www.r7.fws.gov/asm/regs01/apply.pdf).

[32] The Ketchikan Nonsubsistence Area (as defined by the Joint Board of Fisheries and Game) includes: all drainages of the Cleveland Peninsula between Niblack Point and Bluff Point, Revillagigedo, Gravina, Pennock, Smeaton, Bold, Betton, and Hassler Islands…” (Turek, Mike. December 8, 2003. Fax from, ADF&G Division of Subsistence to Kristen Maines, HDR.)

[33] Alaska Department of Fish and Game, Division of Subsistence. 2000. *Household Survey.*

[34] Alaska Department of Fish and Game. 2004. *Alaska Subsistence Fisheries 2003 Annual Report*. Available online at http://www.subsistence.adfg.state.ak.us/download/asf2003.pdf.

[35] Alaska Department of Fish and Game, Division of Subsistence. 1988. *Household Survey*. Confirmed as most recent available data by Metlakatla Department of Fish and Wildlife Director, Jeff Moran. Personal communication between Jeff Moran and Carol Snead, HDR. 2012.

[36] Alaska Department of Fish and Game. 2004. *Alaska Subsistence Fisheries 2003 Annual Report*. Available online at http://www.subsistence.adfg.state.ak.us/download/asf2003.pdf.

The system consists of three tanks and more than 21 miles of pipe ranging in diameter from 2 inches to 16 inches. KPU provides water to the airport on Gravina Island through an underground and submarine main line.

The primary KPU water sources are Ketchikan and Carlanna Lakes; if additional water is needed, it is supplied from Whitman Lake and the Water Lake watershed. The KPU system has the capacity to provide water outside the city limits, but it does not have a distribution network to handle the volume and pressure loads that a regional system would require.

Saxman has a small piped water system, including a reservoir and treatment system, to supply for its residents.

Except for the airport, Borough property owners outside of the City of Ketchikan and City of Saxman are responsible for their own water systems. Most homes and small businesses, including those on Pennock and Gravina islands, depend on rooftop catchment systems for their water supply; during dry months, tanker trucks deliver water from KPU to customers in road-accessible areas. Some residents have wells on their property.

3.3.8.2 Sewer

Both the City of Ketchikan and the City of Saxman operate wastewater systems, including collector lines and treatment plants. Ketchikan's sewage treatment plant has a capacity of 7 million gallons per day, and ~~currently~~ treats about 1.5 million gallons in an average day and 4 million gallons per day during peak flows in wet weather. This kind of increased flow is not uncommon in Southeast Alaska. Saxman's treatment system has a capacity of 115,000 gallons per day. The Ketchikan International Airport is connected to the public sewer in Ketchikan via a submarine pipeline across Tongass Narrows.

Owners of properties on Pennock and Gravina Islands, and outside the service areas of Ketchikan and Saxman, are responsible for their own sewer systems. It is assumed that most owners have septic tanks and leach fields. In outlying areas, there may be some direct discharge to the ocean or use of pit toilets.

3.3.8.3 Electricity

In addition to water and wastewater services, the KPU provides electricity to the Ketchikan area, including the City of Ketchikan, the City of Saxman, Gravina Island, and Pennock Island. Portions of Gravina and Pennock islands are served by submarine cables. There are submarine fiber optic (communications) and copper (electric) cables crossing Tongass Narrows near the existing airport ferry terminal (see Figure 3-8). The KPU has an annual average energy generation of about 65 million kilowatt-hours (kWh) from several hydroelectric projects. It also purchases power produced at the Swan Lake Project, which produces about 76 million kWh per year. In addition, KPU owns diesel generators capable of generating an additional 100 million kWh per year.

The total power ~~currently~~ available to KPU is about 241 million kWh per year. Power usage from this system is ~~currently~~ about 55 percent of the generating capacity (about 133 million kWh per year).

3.3.8.4 Telephone

In the early 2000s, KPU Telecommunications (one of three divisions of KPU) provided 11,000 access lines to subscribers on Revillagigedo Island and Gravina Island and did not provide service to Pennock Island residents. GCI began providing wireline telecommunications in 2007. As of September 2011, KPU Telecommunications ~~has~~ had only 6,722 lines; as of

April/June 2011, GCI had 1,776 access lines in service.[37] KPU Telecommunications provides service to Ketchikan International Airport and Pennock Island both via submarine cable.

3.4 Relocation

As a means of providing uniform and equitable treatment for those persons displaced by federal or federal aid projects, the federal government passed the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970," and the "Uniform Relocation Act Amendments of 1987." This legislation provides for uniform and equitable treatment of persons displaced from their homes, businesses, or farms by federal and federally assisted programs. It also establishes uniform and equitable land acquisition policies for federal and federally assisted programs. When acquiring property for a program or project by a federal agency results in displacing anyone, that agency is required to reimburse the displaced persons and provide relocation planning, assistance coordination, and advisory services.

Residents displaced by a federal program generally are relocated to existing housing in the community, although they may have to locate elsewhere in the community. Businesses generally are relocated to similar business settings in the same community. The cost of relocating is covered as part of the relocation process. In accordance with the law, the federal agency compensates all owners of acquired property, without discrimination, for their loss of property at fair market value, and moves those displaced persons at no expense to them.

The potentially affected environment for relocation impacts encompasses the homes and businesses within the immediate vicinity of the construction limits for the alignments of the project alternatives, including airport facilities on Gravina Island. Section 4.4, Relocation Impacts, discusses impacts on housing and business relocations for each alternative. An estimate of the number of households to be displaced and a discussion of comparable replacement property is included. Refer to the *Conceptual Stage Relocation Study and Assessment of Right-of-Way Acquisition Costs* technical report in Appendix B for more information.

3.5 Economic Environment

The economic downturn~~s~~ experienced across the country ~~since~~ starting in 2008 ~~have~~ affected the local economy in Ketchikan. This section describes employment and earnings, which are indicators of the strength of an area's economy, and the major employment sectors in Ketchikan.

3.5.1 Employment and Earnings

The number of jobs in the Borough has fluctuated over the last 30 years in response to the decline in the forest products industry and the growth in the tourism industry, both of which have been influenced by national and regional economic conditions. Employment decreased in the late 1990s and early 2000s, but rose from 2002 through 2007. The 2008 recession is the likely cause of ~~the~~ a decline in employment, especially tourism-based employment during the latter years of the decade, although this has rebounded and has recovered along with the national economy. Average monthly employment (i.e., number of jobs) for the Borough increased ~~declined~~ from 7,313 in 2008 to 7,198 in 2010, and then rose to 7,461 in 2015. Table 3-7 provides the most recent annual data for employment and earnings in the Borough.

[37] Lichty, Linda. 2011. Personal communication between Ketchikan Public Utilities and Leslie Robbins, HDR.

Table 3-7: Employment and Earnings in the Ketchikan Gateway Borough, 2015~~0~~ [Updated]

Industrial Classification	Annual Average Monthly Employment (jobs)	Yearly Earnings ($)	Annual Average Monthly Earnings ($)
Natural resources and mining (includes forestry and logging)	129 ~~180~~	4,493,635 ~~9,710,173~~	4,733 ~~4,500~~
Construction	364 ~~246~~	25,339,915 ~~14,559,476~~	5,801 ~~4,942~~
Manufacturing (includes seafood processing)	531 ~~534~~	22,895,618~~20,244,926~~	3,593 ~~3,161~~
Trade, transportation, and utilities	1,649 ~~1,715~~	65,826,210~~56,881,906~~	3,327 ~~2,765~~
Wholesale trade (2010 data)	140	4,929,330	2,941
Retail trade	916 ~~975~~	29,568,883~~26,088,757~~	2,690 ~~2,231~~
Transportation and warehousing	611 ~~600~~	30,743,142~~25,863,819~~	4,193 ~~3,590~~
Information	86 ~~87~~	3,592,656~~3,328,888~~	3,481 ~~3,201~~
Financial activities	366 ~~375~~	2,059,936~~16,319,744~~	5,364 ~~3,630~~
Professional and business services	282 ~~224~~	14,155,520~~12,395,461~~	4,183 ~~4,610~~
Educational and health services	937 ~~787~~	44,130,873~~34,821,733~~	3,925 ~~3,689~~
Leisure and hospitality	882 ~~788~~	18,860,047~~15,748,083~~	1,782 ~~1,667~~
Other services	175 ~~184~~	3,714,759~~3,235,399~~	1,769 ~~1,467~~
Federal government	236 ~~273~~	18,068,592~~19,087,746~~	6,380 ~~5,832~~
State government	659 ~~711~~	37,870,378~~36,265,306~~	4,789 ~~4,250~~
Local government	1,158 ~~1,086~~	55,369,236~~50,351,114~~	3,985 ~~3,863~~
Total	**7,461 ~~7,198~~**	**334,006,574~~$293,281,293~~**	**3,731 ~~3,395~~**

Source: Alaska Department of Labor and Workforce Development 2015~~. 2011~~. *Research and Analysis.* <http://almis.labor.state.ak.us/>. Accessed November 15, 2016~~in 2011~~.

3.5.2 Major Employment Industries

The primary locations of major employers in the project area are illustrated on Figure 3.9. Government employment and spending are significant contributors to the Ketchikan area economy. In 2015~~0~~, government jobs represented approximately 27.5~~9~~ percent of Borough employment, providing more than 2,000 jobs in the project area.

The forestry, logging, and forest products industry historically have been very important to the Southeast Alaska (and Ketchikan) economy; however, these employment sectors have declined in recent years. Part of the decline was in response to the USFS's 1997 *Forest Plan*[38] that substantially reduced allowable harvest levels. Harvest levels from the Tongass National Forest went from 471 million board feet (MMBF) in 1990 to 46.3 MMBF in 2004.[39] Large reductions in harvest levels also occurred on private lands as owners converted their forests to second-growth forests. During the same time period, most Asian markets experienced downturns in price and demand for logs, cants, and woodchips. The reduced demand resulted in a large decline in employment overall in the forest products industry from its peak of 3,543 jobs in 1990 to ~~less than~~ 129~~200~~ jobs in 2015~~0~~. In June 2016~~08~~, the USFS approved the amended 2016~~08~~ *Forest Plan*,[40] which retains the same allowable harvest levels as the 2008~~1997~~ *Forest Plan*. The adaptive management strategy outlined in the plan is a three-phased program that initially restricts timber harvest areas to exclude more environmentally-sensitive roadless areas but allows for gradual increases in the levels of timber harvests and expansion into moderate-value roadless areas as dictated by current timber demands and market conditions.

Seafood processing employment in Ketchikan is largely seasonal, with the majority of employment occurring during the summer season, when millions of pounds of salmon are processed during a few months. Employment levels swelled from 361~~99~~ jobs in March 2015~~2010~~ to 1,166~~1,070~~ jobs in August 2015~~2010~~.[41] Gross annual earnings of the seafood processing industry (i.e., manufacturing of food and related products) in the Borough have increased~~declined in recent years~~ from approximately $12.3 million in 2000 to approximately $22.9~~11.5~~ million in 2015~~0~~.[42]

The tourism industry in Alaska generates substantial income for the state and generates employment in a variety of tourism-supporting industries such as transportation, retail trade, and services. In an analysis of job growth in Southeast Alaska in 2015~~06~~ by the Department of Labor, visitor-related jobs accounted for 11 percent of the region's summer economy in 2014, a much larger share compared to its 4 percent overall share at the state level.[43]

~~growth in 2005 was directly attributable to the tourism industry:~~ Transportation-related jobs accounted for the largest sector of tourism-related jobs. N~~n~~early 945~~8~~,000 cruise ship passengers passed through Ketchikan ~~Southeast~~ in 2015~~05~~. This represented a 72~~48~~ percent increase from the 549~~640~~,000 passengers who visited the region in 2000. Although visitor-related industries in Southeast Alaska were impacted by the national recession beginning in 2008, these industries have recovered to pre-recession levels for cruise ship and airline passenger bookings. This dramatic expansion seemed to account for much of the increased hiring in the leisure and hospitality industry and also contributed to gains in other industries.[44] More recent cruise ship and airline passenger numbers are presented in Table 3-8.

[38] U.S. Forest Service. 1997. *Tongass National Forest Land and Resource Management Plan Revision: Final Impact Statement*.

[39] U.S. Forest Service. January 2008. Tongass Land and Resource Management Plan: Final Environmental Impact Statement.

[40] The "allowable sale quantity" is the maximum amount of timber that can be sold on an average annual basis.

[41] Alaska Department of Labor and Workforce Development. 2015~~2011~~. *Research and Analysis*. http://almis.labor.state.ak.us/ Accessed in 2016~~2011~~.

[42] Alaska Department of Labor and Workforce Development. 2015~~2011~~. *Research and Analysis.* http://almis.labor.state.ak.us/ Accessed in 2016~~2011~~.

[43] Alaska Department of Labor and Workforce Development. August 2015. *Research and Analysis*. Alaska Economic Trends <http://laborstats.alaska.gov/trends/aug15art1.pdf>. Accessed in 2016.

[44] Alaska Department of Labor and Workforce Development. April 2006. *Alaska Economic Trends*. Available online at http://labor.state.ak.us/trends/apr06.pdf

Table 3-8: Cruise Ship and Airline Passenger Arrivals in Ketchikan 2006–2015~~2011~~ [Updated]

Year	Cruise Ship Passengers	Airline Passengers
2006	838,880	105,401
2007	899,638	111,658
2008	941,910	107,069
2009	937,419	95,294
2010	828,929	98,009
2011	844,412	99,072
2012	894,320~~839,610*~~	100,568
2013	954,685	102,390
2014	884,503	87,330
2015	944,500	94,241

~~* = Projected NA = Information not available~~

Sources: Ketchikan Visitors Bureau. 2016~~2012~~. ~~2012~~2016 Cruise Ship Calendar, Ketchikan Gateway Borough. 2016~~2012~~.

Airport Statistics. http://www.borough.ketchikan.ak.us/airport/Airport_stats.htm. Accessed~~-~~ November 16, 2016.~~May 1, 2013~~.

The cruise industry has been shown to be an important segment of the Ketchikan economy. In 1999, when there were fewer than 500,000 cruise ship passengers visiting Ketchikan, total spending by cruise passengers in Ketchikan ~~accounting for~~was approximately $54 million.~~,~~ ~~in spending by cruise passengers in Ketchikan,~~ M~~m~~ore than $3 million in direct spending was attributed to~~by~~ cruise ship crews~~,~~ and $8.5 million was attributed to ~~in~~ direct spending by cruise lines in 1999.[45] By 2007, with the number of cruise ship passengers approaching 900,000, total spending by cruise passengers in Ketchikan was approximately $115 million and total cruise line spending was approximately $35 million.[46] This is the most recent data available on cruise line and cruise passenger spending in Ketchikan. The state established the Commercial Passenger Vessel Tax (CPV) in 2006 for passengers on large vessels operating in Alaskan waters. Ketchikan has received approximately $12.8 million in CPV taxes from 2007–2012[47]. Tourism is the primary factor determining employment in the trade and services sectors in the area. Employment in these two industries depends largely on the number of visitors and their level of spending.

3.6 Joint Development

There is no joint development project associated with the Gravina Access Project.

3.7 Transportation

Because Ketchikan is on an island, transportation to and from the project area would be water- and air-based, rather than land-based. Once on the island within the developed greater

[45] The McDowell Group, Inc. 2000. *Cruise Industry Impacts on Local Governments in Southeast Alaska*.

[46] The McDowell Group, Inc. 2010. *Ketchikan Economic Indicators 2010, Volume II: Industry Profiles*. Prepared for Ketchikan Gateway Borough Planning and Community Development.

[47] The McDowell Group, Inc. 2013. *Economic Impacts of the Cruise Industry in Alaska*. <http://www.mcdowellgroup.net/wp-content/uploads/2015/12/CLIA-AK-Cruise-Impacts-7_15.pdf> Accessed December 20, 2016.

Ketchikan area, automobile and pedestrian facilities are important for normal daily transportation.

As part of the Inside Passage, Tongass Narrows provides a major northwest-southeast corridor for both boats and aircraft. Tongass Narrows is approximately 13 miles long and, at its narrowest point, is about one quarter mile wide. Tongass Narrows is bounded by the steep mountains of Revillagigedo Island on the northeast and by Gravina Island on the southwest. These natural features funnel aircraft and seagoing vessels into a narrow corridor, and require them to operate in close quarters.

The figures discussed in this section and included at the end of this chapter illustrate:

- **Figure 3.10.** Locations of facilities for wheeled airplanes, floatplanes (or seaplanes), and helicopters; the extent of the protected airspace around the airport
- **Figure 3.11.** The runway layout and facilities at the airport
- **Figure 3.12.** The docks and other facilities for boats, ferries, cruise ships, and other ships; the routes of the ferries and cruise ships; the surface transportation routes for vehicles, pedestrians, and bicyclists

3.7.1 Aviation

Aviation operations in the Ketchikan and Tongass Narrows area are noteworthy because the primary land-based aviation facility, Ketchikan International Airport, is on Gravina Island, across Tongass Narrows from the City of Ketchikan and the population base it serves. The generally steep topography of the islands bordering Tongass Narrows restricts aviation operations and facilities. When not restricted by low-ceiling, low-visibility weather, many aircraft (particularly seaplanes) operate concurrently in the relatively small and constrained airspace.

In addition to these conditions, federal aviation regulations specific to Ketchikan govern aviation operations in the project area. The following sections describe the facilities available for aviation operations and the regulations that control air traffic in the Ketchikan area.

3.7.1.1 Ketchikan International Airport

The Ketchikan International Airport opened in 1974. DOT&PF owns the airport, though a lease agreement grants the Borough authority to operate and maintain the airport.

3.7.1.1.1 Existing Airport Facilities and Operations

The airport has air and water access and access to other lands on Gravina Island via the Gravina Island Highway and Lewis Reef Road. The main public access from Gravina Island to Ketchikan is via the airport ferry, which the Borough operates. The airport ferry crosses Tongass Narrows directly east of the airport terminal.

The airport has regularly scheduled commercial jet service and supports many air taxi operators serving the surrounding communities. Emergency medical evacuation (medevac) flights also operate from the airport (e.g., Air Medical Flight Services). In 2011 the airport had 5,866 scheduled departures. In 2014, the number rose to 6,729 scheduled flights.[48] The airport also accommodates seaplanes, as described in Section 3.7.1.2.

Airport facilities for wheeled aircraft comprise one paved and lighted 7,500-foot runway (Runway 11/29), three paved taxiways (A, B, and C), and two aprons (one at the terminal area

[48] Research and Innovative Technology Administration, Bureau of Transportation Statistics. 2016~~2~~. *Airport Snapshots, Ketchikan International Airport Summary Data.* ~~December 2010–November 2011.~~ <http://www.transtats.bts.gov/airports.asp>. Accessed on December 7, 2016.~~March 6, 2012~~.

for commercial aircraft and another apron for general aviation aircraft). Taxiway A connects the terminal apron and Runway 11/29; Taxiway B connects the general aviation apron and the terminal apron. Taxiway C, constructed in 2003, parallels the northern section of Runway 11/29 and eliminates the need to back-taxi. The airport is constrained by mountains to the southwest and Tongass Narrows to the northeast. The northwest-southeast orientation of the runway is the only practical alignment, given the physical setting. There is no control tower; the Ketchikan Flight Service Station (FSS) staff monitors flight operations.

Airport support facilities include the airport terminal, an adjacent parking lot, and circulation roads. The airport parking lot, located adjacent to the terminal, has approximately 60 spaces and is often filled to capacity. There are also approximately 15 rental car spaces near the airport terminal and 15 vehicle parking spaces at the transient seaplane dock north of the airport terminal. The pedestrian access between the airport ferry landing and the terminal is partially enclosed.

3.7.1.1.2 Protected Airspace

Federal Aviation Regulations (FAR) Part 77 (*Objects Affecting Navigable Airspace*) describes protected airspace for aeronautical navigation. Part 77 also identifies objects that penetrate that airspace and could reduce the safety and efficiency of airport operations and the surrounding airspace. According to the 2003 Airport Obstruction Chart,[49] most of the objects that penetrate protected airspace near Ketchikan International Airport are natural features, such as trees and topographic high points. The Part 77 airspace surfaces at Ketchikan International Airport are shown on Figure 3.10 and described as follows:

Primary Surface. The primary surface is the surface longitudinally centered on the runway. The primary surface for Runway 11/29 extends 200 feet beyond each runway end and is 1,000 feet wide. There are several obstructions, mostly trees, located in the primary surface.

Transitional Surface. The transitional surface extends outward and upward at right angles to the runway centerline at a slope of 7 feet horizontally for each foot vertically (7:1) from the sides of the primary and approach surfaces. The transitional surfaces extend to intercept the horizontal surfaces at a height of 150 feet above the runway elevation. There are several obstructions, mostly trees, located in the airport's transitional surface.

Horizontal Surface. The horizontal surface is a horizontal plane located 150 feet above the established airport elevation, covering an area from the transitional surface to the conical surface. The perimeter of the horizontal surface is constructed by swinging arcs from the center of each end of the primary surface and connecting the adjacent arcs by lines tangent to those arcs. The radius of the arcs is 10,000 feet for all runway ends designated for approaches that serve larger than utility-type aircraft. There are several obstructions, mostly trees and ground, located in the airport's horizontal surface.

Conical Surface. The conical surface extends outward and upward from the periphery of the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000 feet. There are several obstructions, mostly trees, located in the conical surface.

Approach Surface. The approach surface is longitudinally centered on the extended runway centerline. The approach surface extends outward and upward from each end of the primary surface. The inner edge of the approach surface for Runway 29 is the same

[49] National Geodetic Survey. March 19, 2003. *Aeronautical Datasheet: Ketchikan International Airport. Airport Obstruction Charts.* National Oceanic and Atmospheric Administration National Ocean Service. Available online at http://www.ngs.noaa.gov/AERO/ads/6053_03.pdf.

width as the primary surface (1,000 feet) and it expands uniformly in width for 3,500 feet to an outer width of 4,000 feet with an approach slope of 34:1. The approach surface for Runway 11 extends for a horizontal distance of 10,000 feet at 50:1 and then an additional 40,000 feet at 40:1, to an outer width of 16,000 feet.

3.7.1.1.3 Airport Master Plan

The 2003 *Ketchikan International Airport Master Plan*[50] identifies development needs to accommodate future growth and anticipated changes in airport operations over a 20-year planning horizon. Planned development includes expansion of the terminal, aprons, taxiways, and parking capacity, as well as changes in traffic circulation on the airport roadway system. Some of the development identified in the plan, including the new taxiway parallel to and along the north side of Runway 11/29 and the runway safety area extension, have been completed.

3.7.1.2 <u>Seaplane Facilities and Operations</u>

Seaplanes normally arrive and depart Ketchikan airspace via Tongass Narrows. The project area has very high levels of seaplane activity, especially in the summer when tours are popular. This results in aircraft passing very closely in an area with limited maneuvering room.

Table 3-9 summarizes the approximate number of annual aviation operations of the major seaplane facilities in the project area.

Table 3-9: Operations at Ketchikan Seaplane Facilities

Facility	Annual Operations
Ketchikan Harbor Seaplane Base[a]	10,450
Ketchikan International Airport[b]	7,000
Murphy's Pullout Seaplane Base[a]	500
Peninsula Point Pullout Seaplane Base	3,030

Sources:

[a] AirportIQ 5010 Airport Master Records and Reports web site: http://www.gcr1.com/5010web/airport.cfm?Site=KTN accessed by HDR staff, May 27, 2009. Data from 2006.

[b] Ann Graham, Promech Airport Station Manager, personal communication with HDR staff. May 27, 2009. Confirmed that operations have not changed significantly from what was reported in the 2004 Final EIS (i.e., 7,000).

3.7.1.2.1 Ketchikan Harbor Seaplane Base

The Ketchikan Harbor Seaplane Base is located southeast of the airport, on the northeast side of Tongass Narrows and adjacent to downtown Ketchikan (see Figure 3.10). This base is open to public seaplane use. Although it has no mooring facilities for seaplane storage, the base is located near numerous privately owned air taxi seaplane docks with mooring facilities. The base features a 10,000-foot by 1,500-foot water runway that is oriented northwest-to-southeast and is generally referred to as the NW-SE Waterway. A 3,500-foot by 1,200-foot waterway oriented roughly west-northwest to east-southeast is also located adjacent to this seaplane base (see Figure 3.10). Approximately 85 percent of the annual operations are by air taxi.[51]

[50] Alaska Department of Transportation and Public Facilities. June 2003. Ketchikan International Airport Master Plan.

[51] Alaska Department of Transportation and Public Facilities, October 1999. *Tongass Narrows Aviation Conditions Summary.* Anchorage, AK: Prepared by HDR for the Gravina Access Project.

3.7.1.2.2 Ketchikan International Airport Seaplane Facilities

The airport accommodates seaplanes at two floating docks and a concrete ramp east of the runway and north of the airport terminal (see Figure 3.11). One dock, the Airport Seaplane Float, accommodates up to 12 Twin Otter aircraft and is used for loading and unloading passengers and freight. The other dock, known as the Transient Seaplane Float, accommodates up to three transient seaplanes. The nearby concrete ramp is used to remove seaplanes from the water for maintenance and onshore storage. A 9,500-foot by 1,500-foot water runway extends to the northwest from the airport, and is generally referred to as the NWW-SEE Waterway (see Figure 3.10).

3.7.1.2.3 Murphy's Pullout Seaplane Base

Murphy's Pullout Seaplane Base is located on Revillagigedo Island near Ward Cove, 5 miles northwest of Ketchikan. Compared to the other seaplane facilities, this base has few operations (see Table 3-9). There is no public seaplane parking available at Murphy's Pullout Seaplane Base. The 10,000-foot by 2,000-foot NE-SW Waterway, which extends across Tongass Narrows and into Ward Cove, is adjacent to Murphy's Pullout Seaplane Base (see Figure 3.10).

3.7.1.2.4 Peninsula Point Pullout Seaplane Base

Owned by the State of Alaska, Peninsula Point Pullout Seaplane Base is located on Revillagigedo Island, 4 miles northwest of Ketchikan and south of Murphy's Pullout Seaplane Base. It is associated with the NWW-SEE Waterway (see Figure 3.10).

3.7.1.2.5 Private Seaplane Facilities

Numerous private charter seaplane businesses lie along the northern shore of Tongass Narrows in Ketchikan. Some of these operators have built large docks to accommodate seaplanes. Taquan Air moved its operations from Water Street near the cruise ship berths to a new facility just south of the airport ferry terminal on Revillagigedo Island. It has a seaplane dock with 600 feet of seaplane dock space. Most private operators using their own docking facilities conduct seaplane operations from the Ketchikan Harbor Seaplane Base.

3.7.1.3 Helicopter Operations and Facilities

Several helicopter operators serve the project area, most of which are based north of Ketchikan. Generally, helicopters operate over land and avoid the congested airspace over Tongass Narrows. Helicopter operations are at their highest levels during the summer, when tour operations are at their peak. The Temsco Helicopters facilities, located at Peninsula Point near Ward Cove, ~~have~~ has as many as 50 operations a day during the summer season.[52] Guardian Flight, Inc. also operates helicopters from the Ward Cove area, providing medevac services to Ketchikan and Southeast Alaska. USCG provides medevac services from a ~~new~~ helicopter pad on Revillagigedo Island at Wolff Point (i.e., just north of the airport ferry terminal), as well as from the airport.

3.7.1.4 Ketchikan Airspace and Operating Regulations

The FAA's Anchorage Air Route Traffic Control Center (Anchorage Center) is the regional air traffic control center that separates and controls air traffic within its area of responsibility; that area includes Ketchikan. The Ketchikan FSS provides air traffic and weather advisories to aircraft pilots operating within Ketchikan airspace, and informs them of water vessel activities to facilitate takeoffs and landings.

[52] Fisher, Char. May 27, 2009. Personal communication between Temsco Helicopters and HDR staff.

3.7.1.4.1 Class E Airspace

Controlled airspace is that airspace within which all aircraft operators are subject to certain requirements regarding pilot qualifications, operating rules, and equipment specifications, as prescribed by 14 CFR Part 91. All aircraft departing from or arriving at Ketchikan International Airport and the Ketchikan area seaplane facilities, as well as all aircraft passing through Tongass Narrows airspace, are subject to the Class E airspace requirements of 14 CFR Part 91. The Class E requirements permit operations under both visual flight rules (VFR) and instrument flight rules (IFR). The Ketchikan Class E airspace ceiling is at 18,000 feet above mean sea level. The Ketchikan Class E airspace floor is divided into two subclasses: Class E (700), with an airspace floor at 700 feet above mean sea level, and Class E (surface), with an airspace floor at the ground surface.

3.7.1.4.2 Visual Flight Rules for Ketchikan

VFR operators in the project area are comprised of general aviation operators and commercial air taxi and commuter operators (classified in 14 CFR Parts 91 and 135, respectively). Due to the high volume of aircraft and the relatively narrow corridor within which they operate, FAA developed VFR specific to Ketchikan International Airport and Ketchikan Harbor (14 CFR 93.151-155 Subpart M–Ketchikan International Airport Traffic Rule):

- VFR operators in Class E (700) airspace must have a minimum flight visibility of 3 miles and must have a minimum distance of 500 feet below, 1,000 feet above, and 2,000 feet horizontally from clouds. An approaching aircraft must maintain a minimum altitude of 900 feet above mean sea level until it is within 3 miles of the airport, and a departing aircraft must maintain the runway heading until reaching an altitude of 900 feet above mean sea level.
- While operating within the Class E (surface) airspace, general aviation (Part 91) operators must maintain an altitude sufficient to allow a safe landing if the aircraft power unit fails (14 CFR Part 91 Section 119[a]); they must also maintain a distance of 500 feet from any person, vessel, vehicle, or inhabited structure (14 CFR Part 91 Section 119[c]). Commercial air taxi and commuter (Part 135) operators must maintain a minimum altitude of 500 feet above mean sea level during the day, except when taking off and landing (14 CFR Part 135 Section 203 [a]).

3.7.1.4.3 Special Visual Flight Rules

When visibility and ceiling conditions drop below VFR minimums, VFR operators are required to receive clearance under special visual flight rules (SVFR) from the Ketchikan FSS prior to entering Class E airspace. The purposes of these SVFR procedures are to ensure that pilots receive appropriate traffic advisories, to control the number of aircraft in the airspace when flying conditions are particularly challenging, and to separate IFR and VFR aircraft. The Ketchikan FSS manager estimates that five to six SVFR aircraft can operate within the Class E (surface) airspace under SVFR conditions while maintaining visual contact. Total SVFR operations for 2001 were estimated to be 1,984 operations,[53] which represents approximately 9 percent of the 20,980 total annual seaplane operations.

The Anchorage Center and Juneau Automated Flight Service Station have a Letter of Agreement that establishes SVFR operating procedures for four air taxi and commercial

[53] Alaska Department of Transportation and Public Facilities. December 2001. *Gravina Access Project Special Visual Flight Rules Analysis.* Prepared by HDR; Alaska Department of Transportation and Public Facilities. April 2003, Gravina Access Project Economic Impact Assessment. Prepared by Northern Economics.

operators within the Revilla Corridor.[54] The Revilla Corridor is defined as the airspace below 400 feet above mean sea level extending along Tongass Narrows from the northern tip of Pennock Island to the southern edge of Ward Cove. The four air taxi and commercial operators (Promech, Misty Fjords Air and Outfitting, Pacific Airways, and RDM Pilot/Guide) are granted an exemption from VFR minimum altitude requirements through the Ketchikan FSS and the Anchorage Center. The Letter of Agreement gives Ketchikan FSS the authority to issue SVFR clearances for the four operators in the Revilla Corridor upon request when IFR aircraft departing Ketchikan International Airport reach an altitude of 1,000 feet or higher.

The FAA implemented new instrument approach procedures in 2010 that allow IFR operators a minimum altitude of 288 feet with visibility at 2,400 feet. These new procedures supersede the SVFR exemptions and are intended to avoid conflict in the air.

3.7.2 Marine Navigation

Figure 3.12 shows the locations of the marine facilities discussed in this section.

According to the *United States Coast Pilot*,[55] both the East and West channels of Tongass Narrows around Pennock Island accommodate vessels of any draft. Marine vessels typically using Tongass Narrows include cruise ships, ferries, barges, USCG vessels, commercial and charter fishing boats, and small craft. The numerous seaplanes operating in the Ketchikan area use Tongass Narrows, as well.

Cruise ships bound for Ketchikan generally use East Channel because it aligns better with the cruise ship docks than West Channel. AMHS barges and vessels tend to use West Channel to avoid cruise ship traffic and because there is less shoreline development along West Channel to be affected by wake.

The following speed restriction for marine navigation in Tongass Narrows is prescribed in 33 CFR 162.240:

> No vessel, except for public law enforcement and emergency response vessels, floatplanes during landings and take-offs, and vessels of 23 feet registered length or less, shall exceed a speed of 7 knots in the region of Tongass Narrows bounded to the north by Tongass Narrows Buoy 9 and to the south by Tongass Narrows East Channel Regulatory marker at position 55 deg. 19' 22.0" N, 131 deg. 36' 40.5" W and Tongass Narrows West Channel Regulatory marker at position 55 deg. 19' 28.5" N, 131 deg. 39' 09.7" W, respectively.

Tongass Narrows experiences high levels of marine navigation activities within a relatively small area. The USCG issued the *Tongass Narrows Voluntary Waterway Guide* to provide guidelines for the safe operation of various craft in the area.[56] According to the *Tongass Narrows Voluntary Waterway Guide*,

> Tongass Narrows is home to a large variety of traffic ranging from some of the largest cruise ships in the world to kayaks. Types of vessels operating on the narrows include: recreational vessels, passenger vessels, commercial fishing vessels, commercial freight vessels/barges, commercial tank barges, kayaks, floatplanes, charter vessels and passenger ferries.[57]

[54] Anchorage Air Route Traffic Control Center (ZAN) and Juneau Automated Flight Service Station Letter of Agreement. Subject: Special VFR Revilla Corridor. Effective: December 7, 2009.

[55] U.S. Coast Pilot 8. 1999. *Pacific Coast Alaska: Dixon Entrance to Cape Spencer*, 23rd Edition.

[56] U.S. Coast Guard. 2012. *Tongass Narrows Voluntary Waterway Guide*. Available online at http://www.seaoa.com/waterway/

[57] U.S. Coast Guard. 2012. *Tongass Narrows Voluntary Waterway Guide*. Available online at http://www.seaoa.com/waterway/

Figure 3.13 illustrates the areas that the guide designates for cruise ship anchorage and lighterage, fishing vessel anchorage, kayak use, and sailboat races.

To illustrate the general levels of activity in Tongass Narrows, Table 3-10 presents the total numbers of annual commercial marine trips within Tongass Narrows for 2002 through 2014~~2009~~ by vessel type, as well as the maximum draft for each type of vessel.

Table 3-10: Tongass Narrows Total Trips and Maximum Drafts by Vessel Type and Year [Updated]

Year	Self-Propelled Passenger & Dry Cargo Trips	Self-Propelled Tanker Trips	Self-Propelled Tow or Tug Trips	Non-Self-Propelled Dry Cargo Trips[a]	Non-Self-Propelled Tanker Trips[a]	Total	
						Trips	Max Draft
2002	2,403	—	1,638	1,091	291	5,423	29
2003	2,404	—	841	929	263	4,437	30
2004	2,112	2	753	1,117	250	4,234	34
2005	7,650	—	669~~301~~	1,057~~501~~	223~~102~~	~~8,554~~ 9,599	30
2006	2,771	—	668	1,023	193	4,655	31
2007	2,273	—	600~~599~~	1,047~~6~~	219~~220~~	4,139~~8~~	29
2008	2,618	—	568	925	107	4,218	30~~32~~
2009	2,432	—	534	900	177	4,043	32
2010	1,930	61	350	893	155	3,389	31
2011	2,102	34	257	1,102	182	3,677	31
2012	1,952	6	170	896	204	3,228	31
2013	1,913	6	135	1,082	202	3,338	29
2014	1,722	4	281	578	156	2,741	30
Maximum	7,650	61~~2~~	1~~,~~,638	1,117	291	~~8,554~~ 9,599	34
Average	~~3,083~~2,637	~~<1~~9	~~738~~ 574	~~942~~ 974	~~200~~ 202	~~4,963~~ 4,394	~~31~~31

Source: U.S. Army Corps of Engineers, Waterborne Commerce Statistics Center, Domestic U.S. Waterborne Traffic: 2008 *Waterborne Commerce of the United States, Waterways and Harbors on the Pacific Coast, Alaska and Hawaii (Part 4)* *http://www.navigationdatacenter.us/wcsc/pdf/wcuspac14.pdf* ~~http://www.iwr.usace.army.mil/ndc/wcsc/wcsc.htm~~ and Calendar Year 2002-2014~~9~~ data at http://www.ndc.iwr.usace.army.mil//wcsc/webpub09/Part4_Ports_tonsbycommCY2009.HTM. Web site accessed December 7, 2016~~October 11, 2011~~.

[a] These categories refer to barges.

The following subsections describe the existing marine navigation conditions in Tongass Narrows in the Gravina Access Project area.

3.7.2.1 Cruise Ships

The largest vessels that routinely use Tongass Narrows are cruise ships that call seasonally at Ketchikan, primarily during the summer (May through September). Each summer, cruise ships make hundreds of port calls in Ketchikan. Cruise ship calls in Ketchikan generally increased through the 1990s and peaked in 2005 (see Table 3-11).[58] Cruise ships bound for Ketchikan or transiting through the area typically use East Channel. Figure 3.12 illustrates the location of marine routes used by cruise ships. The cruise ship docks (Berths 1, 2, 3, and 4) are located on Revillagigedo Island, at the north end of East Channel. Figure 3.13 illustrates the location of the cruise ship anchorage and tender operation areas in Tongass Narrows. At any given time during the summer, as many as five large cruise ships may be moored and/or at anchor in the Ketchikan Harbor area (i.e., four at the berths and one in the harbor).

During the summer cruise season, most of the large cruise ships operating in Alaska are home-ported in Vancouver, British Columbia; several are home-ported in Seattle. Many of these ~~As a result, nearly all~~ cruise ships pass under Lion's Gate Bridge in Vancouver Harbor and/or the Seymour Narrows cable crossing (north of Vancouver between Vancouver Island and the mainland). Vertical clearances of these structures are 200 feet and 180 feet, respectively. ~~The Lion's Gate 200-foot clearance has effectively limited the height of the cruise ships that serve Ketchikan.~~ Cruise ships can avoid passing under these structures by going around Vancouver Island and approaching Vancouver or Seattle from the Strait of Juan de Fuca.

[58] Ketchikan Visitors Bureau, 2009. Visitor Statistics. Ketchikan Visitors Bureau Web Site < www.visit-ketchikan.com/About/Cruise ShipStatistics.aspx >. Accessed in 2009.

Table 3-11: Cruise Ship Arrival Dates for Ketchikan (1990–2015~~1~~) [Updated]

Year	Calls	Ships	Passengers
2015	496	38	944,500
2014	492	39	884,503
2013	505	40	954,685
2012	470	36	894,320
2011	449~~26~~	30~~28~~	844,412
2010	429	26	828,929
2009	496	36	937,419
2008	502	37	941,910
2007	499	36	899,638
2006	503	36	838,880
2005	562	37	921,429
2004	535	37	848,969
2003	538	37	770,663
2002	503	34	700,993
2001	514	39	665,221
2000	461	34	549,114
1999	452	32	565,005
1998	488	35	531,108
1997	472	35	480,688
1996	437	36	426,232
1995	329	32	355,784
1994	453	30	379,645
1993	421	28	321,780
1992	364	23	263,046
1991	362	27	242,755
1990	314	23	236,325

Source: Ketchikan Visitors Bureau web site < http://www.visit-ketchikan.com/en/Getting-Here/Getting-Here-by-Sea> Accessed ~~June 29, 2012.~~August 9, 2016

Table 3-12 presents the characteristics of the large cruise ships calling at Ketchikan in 2016~~1~~. ~~The largest vessels currently operating in Tongass Narrows have an average air draft of approximately 165 feet, and an average gross tonnage of about 7~~0~~1,000 tons.~~ A small number of ships with air drafts in excess of 200 feet and registered gross tonnages exceeding 100,000 tons ~~have made~~ make port calls in Ketchikan~~ in the past, but no such vessels called at Ketchikan in 2011~~.[59] In 2016, two ships with an air draft above 200 feet and six ships exceeding 100,000 gross tons made port calls in Ketchikan. ~~In 2005, when Ketchikan port calls reached an historic peak, less than 8 percent of the port calls were ships with air drafts exceeding 200 feet and registered gross tonnages exceeding 110,000 tons.~~

[59] ~~Juneau Convention &~~Ketchikan Visitors Bureau. 2016~~1~~. 2016~~1~~ *Cruise Ship ~~Roster~~Calendar*. Available online at http://www.visit-ketchikan.com/en/Getting-Here/Getting-Here-by-Sea~~http://www.traveljuneau.com/downloads/ Cruise_Ship_Calendar.pdf~~.

Subsequent to a meeting with cruise ship pilots on June 14, 2010, DOT&PF considered raising the minimum vertical clearance to accommodate the new Panamax ships that will have an air draft of almost 210 feet, and a requested new minimum height of 215 feet. Further review of the preliminary structure designs for Alternatives C3-4 and F3 suggest that possibly after construction, there may be 210 feet of vertical clearance, but during construction~~,~~ there will only be 200 feet. A vessel height of 215 feet may be tidally constrained, or mandate transit around Gravina Island.

Table 3-12: Large Cruise Ships Operating in Southeast Alaska During the 2016~~1~~ Cruise Season [Updated]

Operator	Ship	Passenger Capacity[a]	Gross Tonnage	Length~~OA[b]~~ (feet)	Waterline Beam ~~Max~~ (feet)	Air Draft[~~c~~b] (feet)	Maximum Draft[c] (feet)
Carnival	~~*Carnival Spirit*~~	~~2,142~~	~~85,920~~	~~960~~	~~106~~	~~173~~	~~25.6~~
	Carnival Legend	2,142	85,942	963	106	173	26
Celebrity	~~*Century*~~	~~1,808~~	~~70,600~~	~~815~~	~~105~~	~~154~~	~~26.2~~
	Solstice	2,850	121,878	1,040	121	201	37
	Infinity	2,038	90,228	965	106	178	27~~26.9~~
	Millennium	1,950	90,228	964	105	178	26~~.0~~
Crystal	~~*Crystal Symphony*~~	~~922~~	~~51,000~~	~~781~~	~~105~~	~~150~~	~~26.2~~
	Crystal Serenity	1,080	68,870	821	106	NA	26
Disney	*Disney Wonder*	2,400	85,000	964	105	172	26~~.2~~
~~Hapag-Lloyd~~	~~*MS Bremen*~~	~~166~~	~~6,800~~	~~366~~	~~105~~	~~101~~	~~26.2~~
Holland America	*Amsterdam*	1,460	60,874	780	112	154	26~~25.6~~
	~~*Oosterdam*~~	~~1,848~~	~~85,920~~	~~959~~	~~105~~	~~164~~	~~25.0~~
	~~*Statendam*~~	~~1,266~~	~~55,451~~	~~720~~	~~112~~	~~153~~	~~24.6~~
	~~*Veendam*~~	~~1,266~~	~~55,451~~	~~720~~	~~112~~	~~153~~	~~24.6~~
	Volendam	1,440	60,906	781	106	154	26~~25.6~~
	Westerdam	1,848	85,000	951	106	164	25~~.0~~
	Zaandam	1,440	60,906	781	106	154	26~~25.6~~
	Maasdam	1,266	55,575	720	102	153	25
	Nieuw Amsterdam	2,100	86,273	936	106	166	25
	Noordam	1,924	82,897	936	106	166	25
	~~*Zuiderdam*~~	1,848	81,700	936	105	164	26~~.2~~
Norwegian Cruise Line	*Norwegian Pearl*	2,466	93,502	965	106	169	27~~.0~~
	~~*Norwegian Star*~~	~~2,240~~	~~91,740~~	~~965~~	~~105~~	~~167~~	~~27.0~~
	Norwegian Jewel	2,376	93,502	965	106	168	27
	Norwegian Sun	2,002	78,309	848	106	168	25
Oceana	*Regatta*	684	30,000	593	79	138	19~~18.7~~
Ponant	*Le Soleal*	260	10,944	465	60	99	15
~~P&O~~	~~*Arcadia*~~	~~1,460~~	~~86,800~~	~~951~~	~~105~~	~~164~~	~~25.6~~
Princess	*Coral Princess*	1,970	92,000	965	105	177	26~~.2~~
	~~*Diamond Princess*~~	~~2,670~~	~~115,875~~	~~952~~	~~123~~	~~187~~	~~26.2~~
	~~*Golden Princess*~~	~~2,600~~	~~109,000~~	~~951~~	~~118~~	~~186~~	~~26.2~~
	Island Princess	1,970	92,000	965	105	177	26~~.2~~

Operator	Ship	Passenger Capacity[a]	Gross Tonnage	Length~~OA~~~~[b]~~ (feet)	Waterline Beam ~~Max~~ (feet)	Air Draft~~[c]~~[b] (feet)	Maximum Draft[c] (feet)
	Crown Princess	3,082	113,561	952	123	195	26
	Grand Princess	2,600	107,517	951	118	178	26
	Star Princess	2,600	108,977	951	118	178	26
	Sun Princess	1,950	77,441	856	106	185	26
	Ruby Princess	3,082	113,561	952	123	195	26
	~~*Sapphire Princess*~~	~~2,670~~	~~116,000~~	~~952~~	~~123~~	~~187~~	~~26.2~~
	~~*Sea Princess*~~	~~1,950~~	~~77,000~~	~~856~~	~~105~~	~~165~~	~~27.2~~
Regent Seven Seas	*Seven Seas Navigator*	490	28,600	565	79	128	25~~24.6~~
Royal Caribbean Inc.	~~*Rhapsody of the Seas*~~	~~2,435~~	~~78,491~~	~~915~~	~~106~~	~~177~~	~~25.0~~
	Explorer of the Seas	3,100	137,308	1021	127	209	29
	Radiance of the Seas	2,100	90,090	961	131	173	27~~26.7~~
Silversea	*Silver Shadow*	382	28,300	610	82	129	~~—~~23

Source: Ketchikan Visitors Bureau. 2016. 2016 *Cruise Ship Calendar.* Available online at http://www.visit-ketchikan.com/en/Getting-Here/Getting-Here-by-Sea

[a] Passenger capacity lower berth

~~[b] LOA = length overall~~

[b]~~[c]~~ Air Draft = vertical height above the waterline

[c] Rounded to nearest foot

NA = data not available

Several of the cruise lines that ~~currently~~ serve Southeast Alaska ~~have~~ operate larger ships ~~on order~~, but the very large, newer cruise ships are generally regarded as ill-suited to cruising in Southeast Alaska. These newer cruise ships are better suited to other geographic markets (such as the Mediterranean) that are experiencing rapid growth[60] and are not as physically restricted as Southeast Alaska waterways.

In addition to the large cruise ships operating in Southeast Alaska and calling at Ketchikan, a growing number of small cruise ships offer adventure and/or natural history oriented cruising opportunities. Table 3-13 presents the characteristics of the small cruise ships that called at Ketchikan in 2016~~2008~~.

Table 3-13: Small Cruise Vessels Operating in Southeast Alaska in 2016~~08~~ [Updated]

Operator	Vessel	Passengers	LOA[a] (feet)	Tonnage
Clipper Cruise Lines	*Clipper Odyssey*	138	257	100
Cruise West	*Spirit of Discovery*	84	166	94
	Sheltered Seas	90	90	95
	Spirit of Glacier Bay	58	125	97
	Spirit of Alaska	82	143	97
	Spirit of Columbia	78	143	98
	Spirit of '98	101	192	96
	Spirit of Yorktown Clipper	138	257	NA[b]~~—~~
Hapag-Lloyd	*Hanseatic*	188	403	8,378
Lindblad Expeditions	*Sea Bird*	70	152	95
	Sea Lion	70	152	95
Silver Seas	*Silver Discoverer*	120	338	5,218

[a] LOA = length overall.

[b] NA = data not available

Source: John Kimmel, February 11, 2016. Personal email communication between Cruise Line Agencies of Alaska and Nikki Navio, HDR.

3.7.2.2 Alaska Marine Highway System and Inter-Island Ferry Authority Ferries

3.7.2.2.1 Alaska Marine Highway System Operations

The AMHS is a division of DOT&PF. The AMHS operates ~~five~~ four mainline and three feeder ferries for vehicles and passengers in Southeast Alaska, including Ketchikan. ~~Currently~~New AMHS vessels, known as~~, DOT&PF is conducting the~~ Alaska Class Ferries, are being developed ~~y Project to design and construct the next generation of ferries that will begin~~ to replace the aging AMHS fleet. These new ferries will be environmentally responsible, fuel-efficient, and versatile. They will enhance AMHS operations on current and future routes within inside-waters and enable AMHS to continue its tradition of providing safe, reliable service. These ferries will be 280 feet long, have capacity for up to 300 passengers and 53 standard-sized vehicles. Each ferry will feature bow and stern doors for more efficient loading and

[60] Medcruise Association. 2016. Cruise Activities in Medcruise Ports: Statistics 2015, p. 14. Available online at http://www.medcruise.com/sites/default/files/cruise_activities_in_medcruise_ports_statistics_2015_final_0.pdf

unloading, fully enclosed car decks, and a modified hull design for greater traveler comfort. Construction of two vessels began on October 2014 and is slated to finish by late 2018.[61]

AMHS port calls at Ketchikan have varied for the period of 2006~~2000~~ through 2015~~2009~~, ranging from a high of 1,014 in 2006 to a low of 805~~655~~ in 2010~~2004~~ and averaging approximately 894~~831~~ port calls per year over the 10-year period.[62] Although the overall number of port calls has diminished in the last 10 years, passenger traffic has maintained steady levels. July is the peak traffic month in the annual AMHS cycle.

The AMHS dock is located immediately south of the Vigor Alaska Ship and Drydock, Inc. (ASD) facility (Figure 3.12). AMHS vessels usually use the West Channel to avoid the cruise ship traffic and because there is less shoreline development and hence less need to control wakes.

3.7.2.2.2 Inter-Island Ferry Authority

The Inter-Island Ferry Authority (IFA) was formed in 1997 and provides regular service using two ferries, the *Prince of Wales* and *Stikine,* to improve transportation to island communities. Currently the IFA provides one daily round trip between Ketchikan and Hollis (www.interislandferry.com). The IFA ferry terminal is located adjacent to the AMHS terminal (see Figure 3.12), across Tongass Narrows from Ketchikan International Airport.

3.7.2.2.3 Southeast Alaska Transportation Plan

The DOT&PF is ~~currently~~ in the process of updating its 2004 *Southeast Alaska Transportation Plan* (SATP).[63] The 2004 SATP presents a 20-year transportation plan that calls for a shift from a surface transportation network based on long distance ferries to a surface network that connects communities through land highways. Among the proposed highway linkages in the 2004 SATP, DOT&PF envisioned a highway connection from Ketchikan to the Cassiar Highway in Canada that would also link the communities of Wrangell and Petersburg. In addition to the highway links, the 2004 SATP called for continuation and expansion of some ferry routes to service communities inaccessible by road.

3.7.2.3 Tugs and Barges

Tug and barge transportation is the principal mode of delivery for both dry and liquid cargoes throughout Southeast Alaska. The waterborne commerce statistics indicate an average of 974~~942~~ trips per year by dry cargo barges in Tongass Narrows (including Ketchikan) between 2002 and 2014~~2009~~, as shown in Table 3.9. Several major common carriers provide containerized barge service on a weekly basis to Ketchikan. Petroleum products are also delivered almost exclusively by barge. There was an average of 202~~200~~ petroleum barge trips in Tongass Narrows (including Ketchikan) from 2002 through 2014~~2009~~.

Barges represent a substantial contribution to the total of the overall Tongass Narrows marine traffic volume, though they do not necessarily use Tongass Narrows during peak traffic periods. Barge operators interviewed for the *Gravina Access Project Reconnaissance of Vessel Navigation Requirements Report*[64] expressed a preference to pass through Tongass Narrows in the winter months, even if they have no port call in Ketchikan, because Tongass Narrows'

[61] Alaska Marine Highway System. Alaska Class Ferry Project. <http://www.dot.state.ak.us/amhs/alaska_class/index.shtml> Accessed December 2016.

[62] Alaska Marine Highway System. ~~2009~~2015. *~~2009~~ 2015 Traffic Volume Report.* Prepared for the State of Alaska Department of Transportation and Public Facilities. Available online at http://www.dot.state.ak.us/amhs/doc/reports/atvr_15~~2009~~.pdf.

[63] Alaska Department of Transportation and Public Facilities. 2004. *Southeast Alaska Transportation Plan.*

[64] Alaska Department of Transportation and Public Facilities. 2003. *Gravina Access Project Reconnaissance of Vessel Navigation Requirements Report.*

conditions are preferable to other routes. In the summer months, the barge operators not calling at Ketchikan could use alternative routes to avoid the congestion in Tongass Narrows.

3.7.2.4 Airport Ferry Service

The airport ferry service is the primary mode of access for vehicles, bicyclists, and pedestrians to the airport on Gravina Island. The ferry service is supported by two ferry vessels and is provided ~~re are two ferries that operate~~ year-round, 7 days a week, 16 hours a day. Service starts at 6:15am from the Ketchikan side and the last ferry leaves the airport side of Tongass Narrows at 9:30pm. ~~The operating schedule is 7 days a week, 16 hours a day.~~ Departures on the Ketchikan side are on the quarter hour and departures on the airport side are on the hour and half hour~~In the winter, the two ferries operate every 30 minutes. In the summer (May through mid-August), the ferries operate every 15 minutes from approximately 8 a.m. to 4 p.m. on weekdays, and every 30 minutes at other times~~. When air carrier planes are active, usually during the summer, the ferry can exceed capacity.[65] The ferry terminal on Revillagigedo Island is located about 2.5 miles northwest of downtown Ketchikan, directly opposite the airport terminal on Gravina Island (see Figure 3.12). There are approximately 260~~160~~ parking spaces at the airport ferry terminal on Revillagigedo Island.

3.7.2.5 USCG Facilities and Operations

The USCG operates three cutters from ~~its s~~Station Ketchikan, located between the City Ketchikan and Saxman (see Figure 3.12). These cutters range in length from 110 to 213 feet, with beams of between 22 and 41 feet, drafts of between 7.3 and 13.9 feet, and air drafts of 60 to 100 feet.[66] There are also two 45-foot response boat-medium, one response boat-small, and a 47-foot motor lifeboat maintained at Station Ketchikan for search and rescue operations.

The USCG buoy tenders will also occasionally call at Ketchikan. The buoy tenders have a length of 225 feet, a beam of 43 feet, a draft of 13.5 feet, and an air draft of 90 feet. The largest USCG-operated vessels are its 378-foot Hamilton Class cutters and its ice breakers: *Polar Sea*, *Polar Star*, and *Healy*, which rarely call at Ketchikan.

~~The USCG is currently preparing an environmental assessment for the planned expansion of its Ketchikan facilities, which is intended to increase mooring space. Preliminary designs are not available but will include moving the wave attenuator to the south. Facility expansion will occur within the existing USCG property boundary.[67] The USCG anticipates two new Fast Response Cutter (FRC) patrol boats being stationed at the Ketchikan facility. The FRC has a length of 154 feet and a beam of 25.4 feet.[68] The FRC has an air draft of 48 feet, 6 inches.[69]~~

According to the USCG, there are no regular U.S. Navy operations in Tongass Narrows. However, the USCG Station is an emergency port for naval submarines using the Back Island acoustic range located in Behm Canal. U.S. Navy subsurface ballistic missile submarines have a reported air draft of 91 feet, and a surface-mode operating draft of 36.5 feet, making them the deepest draft vessel likely to call at Ketchikan.

[65] Alaska Department of Transportation and Public Facilities. June 2003*. Ketchikan International Airport Master Plan*.

[66] Martin, Lt. September 15, 1999. Personal communication between U.S. Coast Guard Lieutenant and Mark Dalton, HDR.

~~[67] Amundson, Dean. December 21, 2011. Personal communication between U.S. Coast Guard and Jon Schick, HDR.~~

~~[68] U.S. Coast Guard. 2011. *Fast Response Cutter – Sentinel Class*. Acquisition Directorate. < http://www.uscg.mil/acquisition/sentinel/default.asp>,. Accessed December 21, 2011.~~

~~[69] Olexy, Brian. July 12, 2012. Personal email communication between U.S. Coast Guard and Jon Schick, HDR.~~

3.7.2.6 National Oceanic and Atmospheric Administration Vessels

Survey vessels of the National Oceanic and Atmospheric Administration (NOAA) transit Tongass Narrows several times each year. NOAA began using Ketchikan as homeport for its survey vessel *Fairweather* in 2004, mooring it just south of the pier at the USCG Station. The *Fairweather* has a 100-foot air draft.[70] ~~NOAA is in the process of constructing its own base near the USCG Station in Ketchikan.[71]~~

3.7.2.7 Commercial Fishing and Charter Vessels and Small Craft

Commercial and charter fishing vessels and recreational craft, such as powerboats and sailboats, operate in Tongass Narrows. Figure 3.13 shows the fishing vessel anchorage areas designated in the *Tongass Narrows Voluntary Waterway Guide*.[72] The Ketchikan area has seven small boat harbors of varying capacities (see Table 3-14).

Table 3-14: Ketchikan Harbor Capacity

Harbor	Capacity by Boat Length							
	<21[a]	21–30	31–40	41–50	51–70	71–100	>100	Total
Bar Harbor North	53	109	61	34	7	2	0	266
Bar Harbor South	110	165	92	30	31	3	0	431
City Float	14	0	0	0	0	0	0	14
Thomas Basin	50	30	55	27	20	0	0	182
Ryus Dock	Transient and lighterage moorage only							
Hole-in-the-Wall	17	9	2	0	0	0	0	28
Knudsen Cove	29	20	0	0	0	0	0	49
Total	273	333	210	91	58	5	0	970

Source: Alaska Department of Transportation and Public Facilities. 1994. *Ports & Harbors, Alaska Harbor Management System, Operations & Management Report*.
[a] All boat lengths measured in feet

Table 3-15 provides the 1998 levels of boat usage in the Ketchikan area, as recorded by the City of Ketchikan Port and Harbors Department.

Table 3-15: 1998 Boat Use in Ketchikan

Transient boats	3,000 to 4,000
Boat-days of transient moorage	6,050
1-Month transient moorage permits	158
3-Month transient moorage permits	528
Charter boats in harbors	62
Commercial fishing boats in harbors	800
Reserved stalls billed out in July 1998	844

In addition to the recreational small craft, fishing charter boats, and commercial fishing boats in harbors, there are three very active boat-launching ramps in the Ketchikan area. These ramps

[70] Baird, Doug. February 6, 2011. Email from Lt. Cmdr. Doug Baird, National Oceanic and Atmospheric Administration to Mark Dalton, HDR. On file with HDR.

~~[71] National Oceanic and Atmospheric Administration. 2009. *NOAA Marine Operations*. <www.moc.noaa.gov/fa/website/pages/about.htm.>. Accessed in 2009.~~

[72] U.S. Coast Guard. 2012. *Tongass Narrows Voluntary Waterway Guide*. Available online at http://www.seaoa.com/waterway/

are at Bar Harbor, Mountain Point, and Knudsen Cove. Launching permits, issued by the City of Ketchikan Port and Harbors Department in 2002 appear in Table 3-16.

On summer weekends, the boat launches are in nearly continuous use for at least 12 hours per day. Estimating that an average launch or retrieval takes approximately 5 minutes, the total number of launches and retrievals on a summer weekend day is approximately 432 for the 3 launch ramps in the Ketchikan area.

Table 3-16: 2016~~2002~~ Ketchikan Moorage Permits and Reserved Stalls ~~Boat Launch Permits~~ [Updated]

Permit Type	Total
1-Month Transient Moorage Permits	257
3-Month Transient Moorage Permits	373
Reserved Stalls	**Total**
July 2016 (Peak Season)	754

Source: City of Ketchikan Ports and Harbors Department, 2016.

3.7.2.8 Kayaks

A large number of kayaks operate on the waters of Tongass Narrows. During the summer tourist season, several outfitter/guide operations offer kayak excursions originating in Ketchikan. Local residents also kayak in Tongass Narrows. Kayaks are not easily observed by sight or on radar, and are therefore at risk from other vessels. The *Tongass Narrows Voluntary Waterway Guide*[73] identifies one kayak traffic area. It extends from Thomas Basin to Pennock Island immediately north of Radenbough Cove (see Figure 3.13).

3.7.2.9 Personal Watercraft

Personal watercraft are small, motorized vessels, such as jet skis, that are usually ridden by a single individual and can achieve high speeds (approximately 50 knots). The *Tongass Narrows Voluntary Waterway Guide* states that, "[a]lthough these craft are not restricted in Tongass Narrows, due to the high volume and variety of traffic in Tongass Narrows, mariners wishing to operate personal watercraft should not operate them in Tongass Narrows."[74] Few personal watercraft operate in Tongass Narrows.

3.7.2.10 Seaplanes

Seaplanes taxiing, landing, and taking off from Tongass Narrows are ~~currently~~ subject to the operational guidelines contained in the *Tongass Narrows Voluntary Waterway Guide*.[75] The seaplane operating zones are limited to the waterways used for taxiing, landing, and taking off (see Figures 3.10 and 3.12). Seaplane aviation operations are discussed in Section 3.7.1.2.

3.7.2.11 Other Marine Navigation Issues

Wreck Buoy #6 marks the location of a 327-foot barge that sank in 1954, offshore from the Plaza Mall area. In May 2003, the U.S. Army planned to raise and resink the barge in deeper water; however, moving the barge proved problematic and the barge remains in the same location, still marked by Wreck Buoy #6.

[73] U.S. Coast Guard. 2012. *Tongass Narrows Voluntary Waterway Guide*. Available online at http://www.seaoa.com/waterway/

[74] U.S. Coast Guard. 2012. Tongass Narrows Voluntary Waterway Guide. Available online at http://www.seaoa.com/waterway/

[75] U.S. Coast Guard. 2012. *Tongass Narrows Voluntary Waterway Guide*. Available online at http://www.seaoa.com/waterway/

3.7.3 *Vehicular Travel*

3.7.3.1 Revillagigedo Island

The road system on Revillagigedo Island is limited to downtown Ketchikan and the more populated surrounding areas. Tongass Avenue, the primary thoroughfare and the most traveled road, provides primary access to most businesses, schools, shops, homes, and recreation facilities. North of the airport ferry terminal (in the area known as Charcoal Point), Tongass Avenue becomes North Tongass Highway as it extends north to North Point Higgins. Southward from Charcoal Point, Tongass Avenue merges with and becomes Water Street in downtown Ketchikan. It then becomes Main Street, then Dock Street, then Stedman Street. Moving southward from Ketchikan, Stedman Street becomes South Tongass Avenue to Saxman. Tongass Avenue is predominantly a two-lane road with on-street parking that runs from the northwest to the southeast along Tongass Narrows, though additional lanes have been added at the approaches to some intersections to accommodate increased traffic. Traffic signals are provided at the intersections with Don King Road, Carlanna Lake Road, Jefferson Street, Washington Street, and Dock Street. Stop signs control other intersections in the project area.

Third Avenue, which runs from Tongass Avenue to Schoenbar Road, provides cross-town access along the bench[76] above downtown Ketchikan.

Traffic volumes during the peak hour range from approximately 1,000 vehicles on South Tongass Avenue (e.g., south of downtown Ketchikan at the intersection with Deermount Street) to approximately 2,000 vehicles in the downtown area (i.e., at the intersection of Tongass Avenue with Jefferson Street).[77] Annual traffic volume to the airport, via ferry, was 89,809 vehicles in 2009. Many people, however, leave their cars in Ketchikan and access the airport as pedestrians. The total number of ferry passengers, including those with cars and those without, was 342,688 in 2009.

The project team identified 12 intersections on Tongass Avenue that could be affected by the Gravina Access Project alternatives (see Figure 3.14). These intersections are:

- Deermount Street
- Bawden Street
- Main Street
- Mission Street
- Dock Street
- Schoenbar Road
- Washington Street
- Jefferson Street
- Third Avenue
- Carlanna Lake Road
- Bryant Street
- Existing Ferry Access

Traffic conditions at these intersections were measured with respect to level of service (LOS). Intersection LOS analysis was conducted using methodologies described in the 2000 *Highway*

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[76] In topographical terms, a bench is a flat area on a steep hillside or mountain that can provide a level base for a road, as in the case of Third Avenue.

[77] Alaska Department of Transportation and Public Facilities. 2002. *Gravina Access Project Final Traffic Assessment Technical Memorandum.* Prepared by HDR, November 2002. Note: no new information related to traffic volumes was developed for this SEIS because DOT&PF considers the traffic data presented in the FEIS representative of current traffic conditions in the project area.

Capacity Manual.[78] The LOS describes the quality of traffic operations, ranging from A (least congested, least delay) to F (most congested, most delay). The relationship between LOS and delay is summarized in Table 3-17.

Table 3-17: LOS Criteria for Intersections

Level of Service	**Signalized Intersection Criteria** Average Total Delay (seconds per vehicle)	**Unsignalized Intersection Criteria** Average Total Delay (seconds per vehicle)
A	< 10.0	< 10.0
B	10.1 to 20.0	10.1 to 15.0
C	20.1 to 35.0	15.1 to 25.0
E	55.1 to 80.0	35.1 o 50.0
F	> 80.0	> 50.0

Source: Transportation Research Board, 2000. *Highway Capacity Manual*; Washington, DC.

The range of delay is lower for unsignalized intersections than for signalized intersections because drivers expect different performance levels for each type of intersection; i.e., motorists expect to stop at signalized intersections more often than at unsignalized intersections. Intersections with a LOS E or F are considered to have traffic impacts deemed unacceptable from a traffic engineering perspective.[79] Table 3-18 provides the LOS at the 12 project area intersections.

At Schoenbar Road, southbound left turns from Schoenbar Road, and northbound traffic from Taquan Air Drive ~~currently~~ operate at LOS F, although each move represents fewer than 10 peak hour vehicles. At Third Avenue, southbound left turns operate at LOS F. The remaining turning movements on Tongass Highway operate at LOS D or better.

Table 3-18: ~~Existing~~ LOS at Project Area Intersections (2002)

Intersection with Tongass Avenue (type of control)	Existing Conditions	
	LOS	Delay (seconds)
Deermount (stop)		
Eastbound left turn	A	2.9
Southbound left turn	C	21.5
Southbound right turn	B	11.3
Bawden (stop)		
Northbound left turn	A	8.0
Southbound left and right turns	A	8.3
Westbound left and right turns	C	22.3
Eastbound left turn	D	29.0
Eastbound right turn	B	14.7
Main (stop)		
Northbound left turn	A	8.2
Southbound left and right turns	A	8.0
Westbound left and right turns	B	14.8
Eastbound left and right turns	C	17.5

[78] Transportation Research Board. 2000. *Highway Capacity Manual.* Washington, DC.

[79] Transportation Research Board. 2000. *Highway Capacity Manual.* Washington, DC. The Highway Capacity Manual methodology provides a composite LOS for signalized intersections and the LOS for each minor movement (individual approaches) at unsignalized intersections.

Intersection with Tongass Avenue (type of control)	Existing Conditions	
	LOS	Delay (seconds)
Mission (stop)		
Northbound left turn	A	9.3
Dock (signal)	A	4.4
Schoenbar (stop)		
Eastbound left turn	B	11.4
Westbound left turn	A	9.4
Northbound left and right turns	F	288.8
Southbound left turn	F	140.9
Southbound right turn	D	25.3
Washington (signal)	A	5.3
Jefferson (signal)	B	11.1
Third (stop)		
Eastbound left turn	B	10.5
Southbound left turn	F	65.0
Southbound right turn	B	12.1
Carlanna (signal)	B	14.6
Bryant (stop)		
Eastbound left turn	A	8.8
Southbound left turn	D	33.9
Southbound right turn	B	12.8
Airport Ferry Access Drive (stop)		
Westbound left turn	A	9.2
Northbound left and right turns	C	23.0

Source: Alaska Department of Transportation and Public Facilities, November 2002. *Gravina Access Project Final Traffic Assessment Technical Memorandum*. Prepared by HDR Alaska, Inc.

Note: No new information related to traffic volumes was developed for this SEIS because DOT&PF considers the traffic data presented in the 2004 FEIS representative of current traffic conditions in the project area.

3.7.3.2 Gravina Island

Gravina Island has few roads that provide access to public and private lands. Vehicular access to the island is possible from the airport ferry terminal. Motorists using the ferry and traveling beyond the airport terminal use the Airport Access Road to get to the Gravina Island Highway, which runs southeastward from the airport approximately 3 miles to its terminus, or Lewis Reef Road, which runs northwestward to Bostwick Lake Road and Seley Road. Gravina Island Highway is a state facility that was developed as part of the selected alternative in the 2004 Record of Decision. Bostwick Lake Road is a USFS road that provides access to USFS lands. Seley Road is a State-owned, Borough-managed access road, originally constructed for a timber processing plant north of Lewis Creek that is no longer in operation. Travel times from various locations on Revillagigedo Island via ferry to the airport on Gravina Island are shown in Table 3-19. Further discussion of travel times between the islands appears in Section 3.3.5, Accessibility.

Table 3-19: Travel Distances and Estimated Vehicular Travel Times

Origin and Destination	Distance (miles)	Vehicular Travel Times (minutes)
From Downtown to Airport Terminal	3.3	29.8
From Ward Cove to Airport Terminal	4.2	27.8
From Carlanna Creek to Airport Terminal	1.0	23.4

3.8 Pedestrians and Bicyclists

3.8.1 Pedestrians

Downtown Ketchikan has the most pedestrian traffic in the Borough, based largely on the influx of cruise ship passengers during the summer months. Sidewalks and crosswalks accommodate the many tourists walking in the downtown area. Local residents and business people also walk in the downtown area, traveling between their parked car and their destination. Sidewalks extend beyond the downtown area along Tongass Avenue and into surrounding neighborhoods. There is relatively low pedestrian traffic on Tongass Highway north of Carlanna Creek and south of Deermount Street.

Pedestrians traveling to Gravina Island take the airport ferry and walk from the ferry terminal to the airport terminal along a pedestrian walkway. There are no pedestrian facilities beyond the airport terminal, and while pedestrians could walk along the Airport Access Road, pedestrian use of the road is unusual.

Deer Mountain Trail is a popular hiking trail on Revillagigedo Island, accessible from City Park in Ketchikan. Ward Creek and Perseverance trails are accessible from Ward Lake Road off of North Tongass Highway, approximately 5 miles north of Downtown Ketchikan.

3.8.2 Bicyclists

There are no designated bike lanes or bike paths in the Borough and City of Ketchikan. Bicyclists generally ride on the roads and highway shoulders. Mountain biking is popular on the trails outside of Ketchikan.

Bicyclists traveling to Gravina Island take the airport ferry and can ride from the ferry terminal to the airport terminal and Airport Access Road. From the Airport Access Road, bicyclists can connect with the Gravina Island Highway and other roads on the island. Use of bicycles on Gravina Island is rare.

3.9 Geology, Topography, and Wind

3.9.1 Geology and Topography

The landforms in the project area were developed and shaped by tectonic activity, glacial ice, and erosion. Bedrock is overlain by unconsolidated deposits such as marine deposits, beach and stream deposits (including alluvial fan and fan-delta deposits), and colluvium deposits. The alluvial fan and fan-delta deposits are present at the mouths of many streams that flow into Tongass Narrows, such as at the mouths of Ketchikan, Carlanna, and Hoadley Creeks and of many streams on Gravina Island.

A network of faults dissects Southeast Alaska. Known faults near the project area are:

- Queen Charlotte-Fairweather fault, an active northwest-southeast fault about 100 to 110 miles southwest of Ketchikan
- Chatham Strait fault, a north-northwest to south-southeast fault intersecting the Queen Charlotte-Fairweather fault southwest of Ketchikan; active 2 to 65 million years ago
- Clarence Strait fault, in Clarence Strait, just west of Gravina Island, which has about 9 miles of displacement

The area around Ketchikan on Revillagigedo Island is generally quite hilly, with steeply rising slopes starting at or near the shoreline. Pennock and Gravina islands within the project area exhibit more rolling terrain with some steep areas, particularly along the west side of Pennock Island. Tongass Narrows below sea level is a steep-sided, U-shaped valley with the smooth walls typical of a sediment-floored glaciated valley. Water depths rarely exceed 150 feet. At the south end of the study area, particularly in West Channel, the topography is rockier, with more submerged bedrock outcrops and water depths dropping to 400 feet and lower.

3.9.2 Soils and Submerged Material

With little seasonal variation, the heavy precipitation and cool temperatures of the Ketchikan area make climate the most influential factor in soil formation. The region's soils are typically saturated. Because of the cool, wet climate, organic matter decomposes slowly, and soils are highly acidic and generally low in available nutrients. Glacial till or bedrock is normally found beneath the soil, and is often responsible for the poorly drained soils on gentle slopes.

The region's soils are generally forested soils or muskegs high in organic matter. Forested soils occur in many areas, from lowlands to rocky side slopes to steep slopes; in most areas, these soils are moderately well drained, but in certain areas, they are well or poorly drained. Muskegs are commonly found on level or gently sloping landforms and have poor drainage. Muskegs consist of dead plants in various states of decomposition (as peat), ranging from fairly intact sphagnum moss, to sedge peat, to highly decomposed muck. The depth to bedrock in both forested soils and muskegs ranges from less than 1 foot to more than 15 feet. Gravina Island is mainly comprised of muskeg and poorly drained forested soils; the eastern portion of Gravina Island and most of Pennock Island are primarily muskeg. Revillagigedo Island soils in the project area are poorly drained forested soils.

A geophysical survey of Tongass Narrows[80] conducted in 2002 mapped the sea floor and described it in the context of the regional geology and topography. In general, Tongass Narrows below sea level is covered by coarse, unconsolidated sediments. More specifically, a layer of shell fragments, soft silt, and medium dense sand and gravel is up to 20 feet thick, mostly less than 10 feet thick and overlies most of the channel bottom, except at outcrops of bedrock and dense gravels. A layer of dense gravels, including boulders and fractured bedrock exists between the surface sediments and bedrock in most areas. It is deep is some locations (up to 100 feet thick off the mouth of Carlanna Creek) but much thinner over large areas. Generally, gravels and sediments are somewhat thicker in West Channel than in East Channel or the northern portion of the project area. Bedrock is at the surface along much of the shorelines but buried in sediments throughout most of the project area, except for occasional outcroppings.

[80] Fugro West, Inc. June 2002. *Final Tongass Narrows Geophysical Survey*. Prepared for DOT&PF and HDR Alaska, Inc.

3.9.3 Wind

Winds typically flow southeast to northwest through the project area, in the valley formed by the lines of hills on Revillagigedo and Gravina islands. There are no other large topographic features that significantly modify the winds in the project area.

The hourly meteorological data record for the period from 1999 to 2008 for Ketchikan International Airport was acquired from National Climate Data Center[81] and was used to characterize wind conditions in the project area. Wind speeds at the airport are measured within about 30 feet of the ground surface; speeds are higher at higher elevations. Table 3-20 provides 1-minute average wind speeds and gust wind speeds for 5-, 10-, 50-, and 100-year return periods.

Table 3-20: Ketchikan International Airport Wind Statistics[a]

Return Period	1-minute average (mph)	Gust wind speed (mph)
100-year	84	128
50-year	77	117
10-year	63	96
5-year return	57	87

[a] A Weibull Type II probability distribution was applied to Ketchikan International Airport wind statistics to yield return period frequencies for the data set.

Following the 2004 Record of Decision identifying Alternative F1 as the selected alternative for the Gravina Access Project, DOT&PF established a wind tower on Pennock Island to provide data to determine the wind speed design criteria used for the proposed bridges. Initial data from the Pennock Island wind tower were used to establish a relationship between that data and data collected at the airport over the same period of time. An analysis of the data revealed that, for extreme winds from the northwest or southeast, wind speeds at the airport were expected to be reasonably representative of those at Pennock Island.[82]

3.10 Air Quality

3.10.1 Project Area Status

The Ketchikan area generally has good air quality, with no recorded exceedances of National Ambient Air Quality Standards (NAAQS) in the area. Based on the NAAQS, the project area is classified as an attainment area (i.e., its air quality meets the standards).

3.10.2 Air Pollutants

Under the 1990 Clean Air Act, air pollutants are regulated by the Environmental Protection Agency (EPA) and Alaska Department of Environmental Conservation (ADEC). The EPA's Office of Air Quality Planning and Standards monitors and regulates the NAAQS for the following air pollutants: carbon monoxide, nitrogen oxides, lead, ground-level ozone,[83] particulate matter (PM_{10} and $PM_{2.5}$), and sulfur oxides. In Ketchikan, there are several sources of air pollutants including cruise ships, wood stoves and fireplaces, volcanic ash, dust, industrial sources (e.g., seafood processing plants), and motor vehicles.

[81] National Climate Data Center, Asheville, NC. June 2009.

[82] West Wind Laboratory, Inc. August 2005. *Wind Study, Gravina Island Access, Ketchikan, Alaska, Wind Design Study*. Prepared for the Alaska Department of Transportation and Public Facilities and HDR Alaska, Inc.

[83] Ground-level ozone is formed when nitrogen oxides (NOx) and volatile organic compounds (VOCs), such as xylene, react in the atmosphere in the presence of sunlight. Motor vehicle exhaust, industrial emissions, and chemical solvents are the major sources of these chemicals.

The Borough is in an attainment area[84] for NAAQS air quality standards. ADEC has conducted ambient air quality monitoring in Ketchikan for particulate matter during the “smoke season”—December and January—to characterize the effects of the use of wood for heating fuel on ambient air quality. These monitoring activities showed that particulate levels did not approach or exceed the NAAQS.[85] No studies or monitoring have occurred in the Ketchikan area since the 1996 Bear Valley study.[86]

Cruise ship boilers and generators produce a variety of air pollutants, including nitrogen oxides, sulfur dioxide, carbon monoxide, and particulates. The *Alaska Air Quality Control Plan* restricts the density of smoke (opacity) that any marine vessel can emit from its smokestacks. In general, if a ship is stationary at dock, its opacity level cannot exceed 20 percent for more than 3 minutes in any 1-hour period.[87]

3.10.3 Greenhouse Gases and Climate Change

Gases that trap heat in the atmosphere are often called greenhouse gases (GHGs). As the amount of GHGs in the atmosphere increases, more heat becomes trapped, contributing to climate change. The principal greenhouse gases that enter the atmosphere because of human activities are carbon dioxide, methane, nitrous oxide (NOx), and fluorinated gases. The Ketchikan area includes numerous industrial, residential, and transportation GHG emission sources, including seafood processing, aviation, marine, and vehicular emissions. An inventory of Alaska’s GHG emissions found that 35 percent of all GHG emissions were from the transportation sector.[88] Other contributors include industrial activities and the fossil fuel industry (50 percent), residential and commercial fuel use (8 percent), electricity (6 percent), and waste and agriculture (1 percent). There is no inventory of local GHG emissions for the Borough, although transportation and industrial activities are likely the major contributors, similar to the findings in the State of Alaska inventory.[89]

Climate change is an issue of national and global concern. While the earth has gone through many natural climatic changes in its history, there is general agreement that the earth’s climate is ~~currently~~ changing at an accelerated rate and will continue to do so for the foreseeable future. Anthropogenic (human-caused) GHG emissions contribute to this rapid change. Carbon dioxide makes up the largest component of these GHG emissions.

Many GHGs occur naturally. Water vapor is the most abundant GHG and makes up approximately two thirds of the natural greenhouse effect. However, the burning of fossil fuels and other human activities are adding to the concentration of GHGs in the atmosphere. Many GHGs remain in the atmosphere for time periods ranging from decades to centuries. Because atmospheric concentration of GHGs continues to climb, our planet will continue to experience climate change-related phenomena. For example, warmer global temperatures can cause changes in precipitation and sea levels.

[84] EPA. n.d. *Nonattainment Areas Map – Criteria Air Pollutants*. http://www.epa.gov/air/data/nonat.html?st~AK~Alaska. Accessed September 28, 2011.

[85] Alaska Department of Environmental Conservation, Division of Air and Water Quality. December 1996. *Air Quality Monitoring in Ketchikan’s Bear Valley*.

[86] Trost, Barbara. May 1, 2009. Personal communication between Alaska Department of Environmental Conservation, Air Quality Division, and Leandra Cleveland, HDR, regarding air quality monitoring in Ketchikan.

[87] 18 AAC 50.070 Alaska Air Quality Control Plan.

[79] Alaska Department of Transportation and Public Facilities, January 2013. *Gravina Access Project Supplemental EIS Traffic Noise Memorandum.* Prepared by HDR Alaska, Inc

[80] Alaska Department of Transportation and Public Facilities, January 2013. *Gravina Access Project Supplemental EIS Traffic Noise Memorandum.* Prepared by HDR Alaska, Inc.

To date, no national standards have been established regarding GHGs, nor has EPA established criteria or thresholds for ambient GHG emissions pursuant to its authority to establish motor vehicle emission standards for carbon dioxide under the Clean Air Act. However, there is a considerable body of scientific literature addressing the sources of GHG emissions and their adverse effects on climate, including reports from the Intergovernmental Panel on Climate Change, the US National Academy of Sciences, and EPA and other Federal agencies. GHGs are different from other air pollutants evaluated in Federal environmental reviews because their impacts are not localized or regional due to their rapid dispersion into the global atmosphere, which is characteristic of these gases. The affected environment for carbon dioxide and other GHG emissions is the entire planet.

3.11 Noise

Noise is defined as unwanted sound and is measured in decibels (dB) on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies of sound are given more "weight." This process is known as "weighting" the frequency. The A-weighted decibel scale (dB[A]) corresponds to the sensitivity range for human hearing. Therefore, environmental noise levels are measured and discussed in terms of dB(A). When noise levels change 3 dB(A), the change is considered to be barely perceptible to human hearing. However, a 5 dB(A), change in noise level is clearly noticeable.

The hourly equivalent noise level (L_{eq}[h]) is used to analyze traffic noise levels and identify noise impacts. The L_{eq}(h) is defined as the equivalent steady-state sound level which, in a given period of time (in this case, an hour), contains the same acoustic energy as the time-varying sound level during the same period.

3.11.1 Regulatory Overview

FHWA *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (23 CFR 772) defines a system of assigning land uses in the vicinity of each alternative to an activity category (labeled A through G), based on the type of activities occurring in each respective land use. FHWA established Noise Abatement Criteria (NAC) to help identify noise impacts associated with highway development projects. NAC are noise levels assigned to various land uses or activities (e.g., picnic areas, churches, commercial land, and undeveloped land) grouped by their sensitivity to traffic noise levels. NAC represent the maximum traffic noise levels that allow uninterrupted use within each activity category. Table 3-21 lists the land activity categories and the corresponding FHWA-established NAC.

Table 3-21: Noise Abatement Criteria

Activity Category	L_{eq} (h)	Description of Activity Category
A	57 dB(A) (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B[a]	67 dB(A) (Exterior)	Residential
C[a]	67 dB(A) (Exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	52 dB(A) (Interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E[a]	72 dB(A) (Exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A–D or F
F	None	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	None	Undeveloped lands that are not permitted

Sources: 23 CFR 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise*, Table 1- Noise Abatement Criteria; Alaska Department of Transportation and Public Facilities. April 2011. *Alaska Environmental Procedures Manual Noise Policy*.

[a] Includes undeveloped lands permitted for this activity category.

Under 23 CFR 772, noise impacts occur when traffic noise levels approach or exceed the FHWA NAC for specific land use types, or when the predicted traffic noise levels substantially exceed the existing noise levels. The DOT&PF is responsible for implementing the FHWA regulations in Alaska, and considers a traffic noise impact to occur if predicted noise levels approach within 1 dB(A) of the FHWA NAC. The DOT&PF considers a 15-dB(A) increase over existing noise levels to be a substantial exceedance. The NAC are applied to the peak noise impact hour. If an adverse noise impact is predicted, FHWA's regulations and DOT&PF policy require that noise abatement measures be considered.

3.11.2 Existing Noise Sources

Noise in the project area is generally attributable to transportation-related sources such as automobiles, airplanes, floatplanes, helicopters, ferries, and private and commercial boats. While these noise sources are present year-round, noise in the project area generally increases during the summer because these transportation activities increase with additional tourism and outdoor recreation activities that occur in the summer. Other noise sources include light industrial activities and residential activities (such as voices, dogs, and lawnmowers).

3.11.3 Noise Receptors

The noise receptors, or areas that would be affected by traffic noise on Revillagigedo Island, would be residences, churches, and commercial areas; i.e., Activity Categories B, C, and E in Table 3-22. Large parts of Gravina Island are undeveloped (Category G); there are also the developed areas of the airport (Category F), and the residential properties at Clam Cove (Category B).

In 2012, DOT&PF identified 122 noise receptors in proximity to the proposed alternatives during site visits and using aerial photographs (see Figure 3.15). The 122 noise receptors represent 243 individual properties in the vicinity of the project alternatives: 164 residential (Category B) properties, 2 churches (Category C), 72 commercial facilities (Category E), 3 USCG facility properties (Category F), and 2 airport sites (Category F). Receptors near Alternative C3-4 are located on Rex Allen Drive, Baker Street North, Bucey Avenue North, Larson Street, and North Tongass Highway. Noise receptors near the Alternative F3 alignment are located on South Tongass Highway, Forest Park Drive, Fireweed Lane, and Dogwood Place on Revillagigedo Island; on Pennock Island along East Channel; and in the Clam Cove neighborhood on Gravina Island. Receptors near Alternative G2 are on North Tongass Highway and Shoreline Drive. For Alternative G3, receptors are located on Tongass Avenue, Jefferson Street, 1st Avenue, and 2nd Avenue. With Alternatives G4 and G4v, receptors are located on Tongass Avenue, Cambria Drive, and Vallenar Drive.

3.11.4 Existing Noise Levels

DOT&PF measured noise levels at nine properties (monitoring sites) within the project study area (see Figure 3.15) for the purpose of providing a general indication of existing noise levels and for validating the FHWA's Traffic Noise Model (TNM Version 2.5) runs. The TNM computes highway traffic noise at nearby receptors and aids in the design of mitigation measures, where necessary. Table 3-22 presents ~~the~~ each monitoring site and its activity category and associated NAC, nearest alternative, and monitored noise levels. Two noise measurements were taken at each monitoring site (Period 1 and Period 2). Period 1 noise measurements were used to validate the TNM. The existing monitored and modeled noise levels do not exceed the noise impact thresholds.

Table 3-22: ~~Existing~~ Noise Levels (L_{eq}) at Monitoring Sites (2012) [Updated]

Monitoring Site	Activity Category (NAC [dB(A)])	Nearest Alternative	Monitored Noise Level Period 1/ Period 2 (dB[A])	Modeled Noise Level (dB[A])	Difference Between Period 1 Monitored and TNM Modeled Noise Levels
M1	B (66)	F3	56.5/57.3	58.0	1.5
M2	B (66)	G3	62.3/62.4	59.8	2.5
M3	B (66)	C3-4	63.8/63.5	62.5	1.3
M4	B (66)	C3-4	60.3/60.1	62.0	1.7
M5	B (66)	G2	64.8/65.0	63.6	1.2
M6	B (66)	G2	52.3/50.3	51.6	0.7
M7	B (66)	G4~~/~~ and G4v	56.0/54.8	53.3	2.7
M8	E (71)	C3-4	52.8/53.0	53.2	0.4
M9	B (66)	F3	39.8/54.4[1]	-	-

Monitoring Site	Activity Category (NAC [dB(A)])	Nearest Alternative	Monitored Noise Level Period 1/ Period 2 (dB[A])	Modeled Noise Level (dB[A])	Difference Between Period 1 Monitored and TNM Modeled Noise Levels

[1] Traffic noise is not a significant contributor to the noise levels at monitoring site M9; therefore, TNM validation was not conducted for this site.

Source: Alaska Department of Transportation and Public Facilities, January 2013. *Gravina Access Project Supplemental EIS Traffic Noise Memorandum*. Prepared by HDR Alaska, Inc.

Traffic noise is not a significant contributor to the noise levels at monitoring site M9; therefore, TNM validation was not conducted for this site. A comparison of the modeled noise levels using the TNM for the other eight sites shows that monitored and modeled results are within 3 dB(A), and therefore the model is considered to reasonably predict noise levels.

Using the TNM, DOT&PF modeled existing highway traffic noise levels for the 122 noise receptors (noise prediction sites) in the study area.[90] Under existing conditions, exterior noise levels range from 29 to 71 dB(A) at modeled properties in the project study. Nineteen noise prediction sites, representing 35 residential and four commercial properties are calculated to have existing exterior traffic noise levels greater than the DOT&PF NAC (see Figure 3.15).

3.12 Water Quality

Figure 3.16 shows the water resources in the project area. The water resources located in the project vicinity include Tongass Narrows, East Channel, West Channel, Carlanna Creek, Ketchikan Creek, Lewis Creek, Airport Creek, and Government Creek. None of these water resources are listed in the ~~CWA~~ Clean Water Act Section 303(d) list of impaired waters[91]. Marine water quality in the project area can be affected by discharges from seafood processing plants, timber industry activities, shipyard and other industrial activity, treated sewer system outflows, cruise ships and other vessels operating in marine waters, and sediment runoff from paved surfaces and disturbed areas. Logging activities and runoff from disturbed areas can affect the water quality of freshwater lakes, streams, and creeks.

Seafood processing facilities in Ketchikan discharge fish waste via outfalls into deep waters in Tongass Narrows under an Alaska Pollutant Discharge Elimination System (APDES) general permit[92] for Alaskan shore-based seafood processors. As required by the permit, the discharge outfalls are situated in underwater areas that are continually flushed by strong tides.[93]

Cruise ships discharge treated sewage; effluent from properly functioning marine engines; and laundry, shower, and galley sink wastes (“greywater”) into marine waters. The Commercial

[90] Alaska Department of Transportation and Public Facilities, January 2013. *Gravina Access Project Supplemental EIS Traffic Noise Memorandum*. Prepared by HDR Alaska, Inc.

[91] Alaska Department of Transportation and Public Facilities. Alaska Waterbodies Interactive Map. <http://dec.alaska.gov/water/index.htm>. Accessed January 3, 2017~~September 26, 2011~~.

[92] In 2008, the ADEC began a transition process to transfer issuance of National Pollutant Discharge Elimination System (NPDES) permits in Alaska from the EPA to ADEC. The state’s approved program is the APDES Program. Phase 1 Facilities are part of this initial transfer (effective October 2008) and include seafood processing facilities. Phase 1 Facilities include domestic discharges, log storage and transfer facilities, seafood processing facilities, and hatcheries.

[93] McKerney, Katy, and Brian Doyle. April 29, 2009. Personal communication between Alaska Department of Environmental Conservation Alaska Pollutant Discharge Elimination System Program representatives and Leandra Cleveland, HDR, regarding seafood processor outfall permits in the Ketchikan area.

Passenger Vessel Environmental Compliance Program[94] (Cruise Ship Program) under ADEC regulates cruise ship and ferry waste discharged to Alaska waters.

Airport ferry operations in Tongass Narrows can also affect water quality as a result of engine discharge, runoff from vehicles sitting on the deck of the ferries, and runoff from the ferry terminal parking lots. These discharges are unregulated, and the existing effect on water quality is not quantified.

3.13 Permits and Laws Related to the Project

Federal and state laws authorize agencies to issue permits, review plans, or provide consultation regarding potential project impacts. Table 3-23 identifies the most pertinent state and federal laws and executive orders that govern permits, consultation, and review requirements for the Gravina Access Project.

Table 3-23: Applicable Laws and Related Permits and Approvals for the Gravina Access Project [Updated]

Applicable Law or Order	Primary Agency(ies) -Citation-	Description and Requirements
Clean Water Act **Section 404**	**USACE and EPA** 33 U.S. Code (USC) 1344 et seq	The USACE requires a permit for discharge of dredged and fill material into waters of the U.S., including wetlands, at specified sites. Selection of sites must be in accordance with guidelines (404[b][1] guidelines) developed by EPA in conjunction with the USACE.
Clean Water Act **Section 402**	**~~EPA and~~ ADEC** 33 USC ~~1344~~1251	Projects disturbing 1 acre or more of land during construction will require an APDES permit from ADEC. The APDES permit requires that best management practices (BMPs) be in place during construction to avoid and minimize pollutant discharges that may affect water quality.
Clean Water Act **Section 401**	**EPA and ADEC** 33 USC 1341, 18 AAC 15	Section 401 requires state review and authorization for issuance of a Certificate of Reasonable Assurance regarding protection of water quality when discharging dredged or fill material into waters of the U.S. This permit must accompany the Rivers and Harbors Act Sections 9 and 10, and ~~is obtained concurrently with the~~ Clean Water Act Section 404 permits ~~process~~.
Rivers and Harbors Act **Section 10**	**USACE** 33 USC 401 et seq.(esp.403)	The Act prevents unauthorized obstruction or alteration of navigable waters of the U.S. Navigable waters are "those waters that are subject to the ebb and flow of the tide and/or…may…transport interstate or foreign commerce." USACE administers Section 10 permit for any structure in or over navigable waters of the U.S.; for any dredging, disposal, excavation, drilling, re-channeling, or modification of the water body; and for projects outside a water body if they affect the course, location, or condition of the water body.
Rivers and Harbors Act **Section 9**	**USCG** 33 USC 403	Section 9 authorizes the ~~Secretary of Transportation, through the~~ USCG~~,~~ to issue permits for bridges or structures that cross or could otherwise affect navigation on waters of the U.S.
Marine Protection, Research and Sanctuaries Act of 1972	**USACE** 33 USC 1413	Section 103 of the Act authorizes permits for the transportation of dredged material for the purpose of dumping it into ocean waters, where the dumping will not unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological system, or economic potentialities.

[94] AS 46.03.460—46.03.490; 18 AAC 69

Applicable Law or Order	Primary Agency(ies) -Citation-	Description and Requirements
Marine Mammal Protection Act	**National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS)** 16 USC 1361	Prohibits the "take" of any marine mammal species in U.S. waters. "Take" includes harassment or attempt to harass, or annoyance that has potential to injure or disrupt behavior patterns. Federal agencies must consult with both agencies to determine if any effects to marine mammals will result from the project.
Endangered Species Act	**USFWS and NMFS** 16 USC 1531-44~~6~~	Provides for the conservation of species that could become extinct through all or a substantial portion of their range. Prohibits any action that results in "taking" a listed species, adversely affecting habitat, or trading in listed species. Section 7 requires all federal agencies to consult with USFWS and/ or NMFS to determine if any effects to listed species will result from the project.
Magnuson-Stevens Fishery Conservation & Management Act / Sustainable Fisheries Act	**NMFS** 16 USC 1801 et seq.	These acts establish national standards for fishery conservation and management and establish regional councils to develop fisheries management plans. The act provides for enforcement. Guidelines were developed in accordance with the Sustainable Fisheries Act amendments. A key guideline is Essential Fish Habitat (EFH) delineation by NMFS. Federal agencies must assess the effects of their actions on EFH and consult with NMFS.
Migratory Bird Treaty Act	**USFWS** 16 USC 703 et seq.	Prohibits the taking of migratory birds, unless there is a specific exception or authorization to do so. "Taking" can include losses from habitat. A permit or consultation is not required but all federal agencies must comply with the Act. This typically includes performing nest clearances outside the breeding season, avoiding active nests, and minimizing loss of habitat through BMPs.
Bald and Golden Eagle Protection Act	**USFWS** 16 USC 668-68d, as amended	Provides protection of the bald eagle and golden eagle by prohibiting, except under specified conditions, the taking, possession, and commerce of such birds.
National Historic Preservation Act **Section 106 / Executive Order 11593 Protection & Enhancement of the Cultural Environment**	**Alaska State Historic Preservation Officer (SHPO)** 54 USC Subtitle III~~16 USC 470 et seq.~~	Provides for the identification and protection of historic properties. Requires federal agencies to avoid or minimize impacts to properties on or eligible for the National Register of Historic Places (NRHP) and requires federal agencies to check for sites that may be eligible and prepare a Determination of Eligibility. For both historic properties and archaeological resources, a Finding of Effect as a result of the project is prepared and submitted to SHPO for concurrence.
Alaska Historic Preservation Act	**Alaska Office of History and Archaeology (OHA)** AS 41.35	Contains a provision similar to Section 106 and mandates that any project with state involvement be reviewed in a similar manner to Section 106 consultation.
Executive Order 13175 Consultation/ Coordination with Tribes	**FHWA**	Requires agencies to consult with American Indian/Alaska Native tribes and organizations on projects that affect tribes.
~~**Clean Air Act**~~	~~**EPA & ADEC**~~ ~~23 USC 109(j)~~ ~~42 USC 7521(a)~~	~~Requires transportation plans, programs, and projects to conform to state air quality implementation plans. A determination of air quality conformity is required.~~

Applicable Law or Order	Primary Agency(ies) -Citation-	Description and Requirements
Executive Order 12898 Environmental Justice	**FHWA**	Requires that federal agencies ensure that there are no disproportionately high and adverse effects on minority and low-income populations for their agency actions. Requires an evaluation of potential effects and potential mitigation or avoidance measures.
Fish and Wildlife Coordination Act	**USFWS, NMFS, and FHWA** 16 USC 662	Requires federal agencies to consult with wildlife agencies regarding effects to fish and wildlife for any project that involves impoundment (surface area of 10 acres or more), diversion, channel deepening, or other modification of a stream or other body of water.
Alaska Fishway Act and Anadromous Fish Act	**Alaska Department of Fish and Game (ADF&G) Division of Habitat** AS 16.05.840 and .870	Requires individuals and agencies proposing work in fish streams to submit plans; requires fish passage in fish streams; and authorizes issuance of permits for work in a river, lake, or stream. Requires a Fish Habitat Permit for work occurring in streams (Title 16).
Alaska Land Act	**DNR Division of Mining, Land, and Water** AS 38.05.850	Provides oversight and allows uses on state land, including submerged lands. Will require an easement for any permanent structures in the Tongass Narrows sea bed.
Noxious Weeds Management	**DNR Division of Agriculture** 11 AAC 34	Intended to prevent the importation and spread of pests, diseases, or toxic substances that are injurious to the public interest, and for protection of the agriculture industry.
Executive Order 11990 Protection of Wetlands	**FHWA**	Prohibits federal agencies from participating in construction located in wetlands unless they find there is no practicable alternative and the action includes all practicable measures to minimize harm to wetlands. Compliance with the Act is demonstrated as part of the Final SEIS and Clean Water Act Section 404 permit process.
Executive Orders 11988 Floodplain Management and 13690 Federal Flood Risk Management Standard	**Federal Emergency Management Agency (FEMA)**	Requires federal agencies to evaluate the potential effects of their actions on floodplains with the aims of reducing the risk of floodplain loss and restoring and preserving "the natural and beneficial values" of floodplains. Provides standards to establish flood elevation and hazard areas. Requires a specific finding of effects in the Final SEIS for significant encroachments.
Executive Order 13112 Invasive Species	**FHWA**	Directs federal agencies to address actions that are likely to influence the presence of invasive species. Further directs agencies to develop programs and authorities to prevent the introduction of invasive species, monitor populations, and provide for restoration of native species and habitats that have been invaded.
Executive Order 13166 Improving Access to Services for Persons with Limited English Proficiency	**Federal Coordination and Compliance Section**	Directs that federal agencies provided meaningful access to federal processes to those individuals who are not proficient in the English language.

Applicable Law or Order	Primary Agency(ies) -Citation-	Description and Requirements
Executive Order 13186 Responsibilities of Federal Agencies to Protect Migratory Birds	**USFWS and FHWA**	Directs executive departments and agencies to take certain actions that promote the conservation of migratory bird populations
Uniform Relocation and Real Property Acquisition Act	**FHWA** 42 USC 4601	Requires agencies that must use private property to acquire it at fair market value and assist in relocation of residences or business.
Department of Transportation Act of 1966, Section 4(f)	**FHWA** 49 USC 303	Forbids FHWA from using public parks, recreation areas, wildlife/waterfowl refuges, or historic sites unless there is no “prudent and feasible” alternative and the agency employs “all possible planning to minimize harm.” Amendments to Section 4(f) in Section 6009(a) of SAFETEA-LU allow projects with *de minimis*[95] effects on historic properties to be approved.
Noise Standards	**FHWA** 23 USC 109(i)	Requires any highway that results in a new location, or physical alteration of an existing highway that significantly changes either the vertical or horizontal alignment or increases the number of through-traffic lanes to conduct a noise impact analysis. The project must incorporate reasonable and feasible noise abatement measures to reduce or eliminate noise impact. Existing noise levels and future design year noise levels must be predicted for all reasonable action alternatives carried forward in the National Environmental Policy Act (NEPA) document.
Coastal Zone Management[a]	**Borough**	The local coastal district defines the coastal zone and determines consistency of the project with enforceable policies of the local coastal management plans. The project will submit a Coastal Policy Questionnaire for consistency review to the Borough.
Zoning and Subdivision Code	**Borough**	Requires zoning permits to determine if project is compliant with allowed uses in the specific zoning designation within the Borough.
Local Standards	**City of Ketchikan**	Requires a Traffic Control Permit, Site Development Permit, and Excavation Permit for activities within the City of Ketchikan to determine if activities are consistent with the City code.

[a] As of July 1, 2011, Alaska Coastal Management Program (ACMP) authorities in AS 46.39, AS 46.40, and other uncodified laws relating to the ACMP were repealed. As of that date, the regulations at 11 AAC 110, 11 AAC 112, and 11 AAC 114, as well as local coastal management plans, are without statutory authority and therefore unenforceable.

EFH = Essential Fish Habitat

Interagency coordination is an important component of the permitting process. To facilitate the coordination effort, FHWA and DOT&PF have followed the guidance presented in SAFETEA-LU and *Applying the Section 404 Permit Process to Federal-Aid Highway Project*[96] (FHWA, 1988) for the Gravina Access Project. In addition, the USACE, FHWA, and DOT&PF operate under a 1992 permit process accord “to streamline the NEPA and permit review process.”[97] Based on

[95] *De minimis* in this case refers to those impacts resulting in no adverse effect or no historic properties affected (in compliance with Section 106 of the National Historic Preservation Act; FHWA. n.d. Questions and Answers on the Application of the Section 4(f) De Minimis Impact Criteria. www.fhwa.dot.gov/hep/qasdeminimus.htm (Accessed December 16, 2011).

[96] Federal Highway Administration. 1998. Applying the Section 404 Permit Process to Federal-Aid Highway Project.

[97] Permit Process Accord between FHWA, USACE, and DOT&PF signed December 17, 1992.

the accord, DOT&PF will include a preliminary jurisdictional determination, draft Section 404(b)(1) analysis, and Section 10/404 permit application ~~in the~~with this Final SEIS.

Borough zoning, conditional use, and/or site development permits may be required. Changes to existing land uses (even if temporary, such as development of construction staging areas), often require Borough review and approval of a zoning permit. Planned structures could also require a conditional use permit or variance, and modification of platted parcels would require a site development permit.

3.14 Wetlands and Vegetation

Figure 3.16~~7~~ shows the locations of the upland and wetland areas in the project area.

3.14.1 Wetlands

Executive Order 11990, *Protection of Wetlands*, and Section 404 of the Clean Water Act, as amended, require FHWA to avoid or minimize harm to wetlands. The project must avoid wetlands unless there is "no practicable alternative," and if the project cannot avoid affecting a wetland, it is required to consider all possible alternatives to limit and minimize potential damage to wetlands.

Southeast Alaska is a wet maritime climate, and wetlands are common even in forested areas. National Wetland Inventory (NWI) mapping completed across the state indicates that the areas that drain directly to Tongass Narrows (excluding the large upper watershed of Ward Creek, which extends well inland) amount to a total of 39,882 acres. This total includes west-facing lands on Revillagigedo Island, all of Pennock Island, and east-facing lands on Gravina Island. Of this total, 16,958 acres, or 43 percent, is vegetated wetland and another 1,014 acres is either lake or pond.[98] Most of the lower elevations of Gravina Island and virtually all of Pennock Island are wetland. There are also extensive wetlands on Revillagigedo Island.

Wetlands in the vicinity of proposed construction for each alternative were mapped following the NWI classification system based on Cowardin et al.[99] Project mapping, covering 2,200 acres, was based on field surveys conducted by the project team in January and June of 2000 and again in June 2008.[100] The project area has four types of wetlands: forested wetlands, shrub/scrub wetlands, open "muskeg"-type wetlands, and intertidal marshes and meadows. The mapping completed in the project vicinity was done at greater precision than the NWI mapping and indicated some differences from the NWI, most notably indicating scrub-shrub wetlands where the NWI mapping showed none, and indicating greater forested wetland than the NWI mapping. The relative proportions were similar, however, with muskegs most common, followed by forested wetlands, scrub-shrub wetlands, and intertidal meadows and marshes. Each type is described in detail below.

3.14.1.1 Forested Wetlands

Forested wetlands, which the NWI mapping indicated cover some 8,200 acres within the Tongass Narrows drainage basins, are prominent northwest of the airport and on the forested slopes of Revillagigedo Island. They are generally drier than other wetlands, either because they are on topographically higher or steeper sites, or because their substrates drain better

[98] U.S. Fish and Wildlife Service. Ketchikan. *National Wetland Inventory, Wetlands Mapper*. <http://www.fws.gov/wetlands/Data/Mapper.htm>l. Accessed May 4, 2009.

[99] 1979.

[100] HDR. 2009. Gravina Access Project Wetlands Reevaluation Technical Memorandum; HDR. 2003. Gravina Access Project Preliminary Jurisdictional Determination; HDR. 2002. Gravina Access Project Wetlands Evaluation Technical Memorandum.

internally. Forested wetlands are found on moderately sloping lands on Revillagigedo Island, along larger creeks, and as a fringe along the beaches of Gravina and Pennock Islands. They are also interspersed with the muskeg wetlands. A mix of conifer species (including shore pine, red and yellow cedar, western hemlock, and Sitka spruce) characterizes forested wetlands. The trees appear stunted relative to those that are found in a better-drained forest. The understory supports a dense growth of blueberry, huckleberry, rusty menziesia, salal, and an herb ground cover.

The functions of forested wetlands largely depend on their location. They serve as important wildlife habitat along beaches and streams, may help to moderate stream flows, and help sustain the habitat functions of streams. The NWI classifies these as palustrine, open forested wetlands with deciduous shrub understory, saturated (PFO4/SS1B); palustrine, open forested wetlands with evergreen shrub understory, saturated (PFO4/SS4B); and palustrine, needle-leaved evergreen forest, saturated (PFO4B). These are shown as forested wetlands on Figure 3.17.

3.14.1.2 Shrub/Scrub Wetlands

Shrub/scrub wetlands, which the NWI mapping indicated cover some 230 acres within the Tongass Narrows drainage basins, dominate areas adjacent to muskeg wetlands (described below) and other areas where tree growth is limited by soil saturation. The tree canopy is sparse enough to allow light to penetrate, promoting a dense shrub and scrub tree understory. Scrub/shrub wetlands often form slightly drier “islands” within the muskegs. They also tend to occur on the slightly better-drained (sloping) ground along the streams that run through muskegs. This wetland type has an open canopy of western or mountain hemlock. Shore pine, small Sitka spruce, and red and yellow cedar may also be present. Tall blueberry and rusty menziesia form a dense shrub layer, with a ground cover of bunchberry, deer cabbage, skunk cabbage, fernleaf goldthread, and sphagnum moss.

As with forested wetlands, shrub/scrub wetlands may moderate stream flows, stabilize stream banks, and provide important wildlife habitat. The NWI classifies these as palustrine, evergreen needle-leaved shrub/scrub dominated, saturated (PSS4B). These are shown as shrub-scrub wetlands on Figure 3.17.

3.14.1.3 Muskegs

Open, muskeg-type wetlands, which the NWI mapping indicated cover some 8,400 acres within the Tongass Narrows drainage basins, are the dominant wetland type on Pennock Island and in the areas west and south of the airport on Gravina Island. These open wetlands are intricately interspersed with small patches of forested or shrub wetland. Most of the open wetlands can be loosely described as short sedge fens, which are expected to be moderately nutrient rich and productive. Some richer, tall sedge-dominated wetlands also exist in limited areas, as do more acidic and nutrient-poor bog-type wetlands. The dominant low sedge fens are characterized by low shrub and herb vegetation, such as sweetgale, blueberry, crowberry, and short sedges, and by water pooled on the surface. Many of the wetlands are moderately sloped and have water flowing through them. Flowing water, as well as contact between that water and mineral soil, usually leads to a biological community that is more nutrient-rich and productive. Because they tend to have water flowing through them, muskegs may export organic material that supports downstream ecosystems and helps maintain natural chemistry and low flows in the creeks. The muskeg areas nearest creeks are important for maintaining base flows to those creeks.

Little is known about wildlife use of these extensive habitats. Deer and black bear feed in them seasonally, and some water birds, including sandhill cranes, passerine species, and blue grouse are known to use these areas. Waterfowl often use intermixed open freshwater ponds as resting and nesting habitat. Humans use these areas for berry harvesting. The NWI classifies these as palustrine, saturated herbaceous meadows (PEM1B) and palustrine, evergreen needle-leaved shrub/grass-like saturated herbaceous meadows (PSS4/EM1B). These are shown as muskeg wetlands on Figure 3.17.

3.14.1.4 Intertidal Marshes and Meadows

Although relatively scarce in Southeast Alaska, estuarine meadows exist along the shoreline of Gravina Island. The NWI mapping indicated that these intertidal meadows cover some 200 acres of shoreline along Tongass Narrows. At elevations near the highest tides, grasses dominate these meadows, and sedges and herbs are prominent near the more average high-tide elevations. These meadows may be supported by seepage of freshwater out of the beach gravels.

The meadows are highly productive habitats, and organic matter produced within them washes into the marine ecosystem, where it supports food webs. The beach meadows are important feeding areas for many terrestrial and aquatic species of wildlife, including deer, black bear, river otter, mink, shorebirds, waterfowl, and songbirds. They provide succulent forage in spring, when other habitat types may be snow-covered. They also serve as nurseries for young fish. The NWI classifies these as estuarine intertidal areas vegetated with erect shrubs and regularly flooded by tidal waters (E2EM1N). These are shown as intertidal marsh or meadows on Figure 3.17.

3.14.2 Vegetation

The project area uplands are dominated by coniferous forests and the major climax forest type is western hemlock and Sitka spruce. Other tree species in the forest include western red cedar, yellow cedar, mountain hemlock, red alder, and lodgepole pine. The understory includes skunk cabbage, salal, devil's club, rusty menziesia, Sitka alder, salmonberry, thimbleberry, blueberry, huckleberry, ferns, mosses, and lichens.~~[101]~~

3.15 Waterbodies and Wildlife

Figure 3.16 shows the lakes, creeks, and watersheds in the project area. Figure 3.18 shows the areas of particular importance to the wildlife in the project area, including eelgrass beds, ~~anadromous~~ ADF&G cataloged streams, herring spawning areas, and bald eagle nesting sites.

3.15.1 Major Water Bodies

Surface water in the project area flows into Tongass Narrows through streams, in direct sheetflow runoff, and as shallow subsurface flow. Major streams in the project area are Lewis Creek; Airport Creek and Government Creek on Gravina Island; and Hoadley Creek, Ketchikan Creek, and Carlanna Creek on Revillagigedo Island. There are no major water bodies on Pennock Island.

None of the project alternatives would traverse a major water body or watershed on Revillagigedo Island or Pennock Island. In the areas on Revillagigedo Island and Pennock Island where the alternatives would be located, creeks do not collect surface runoff; rather, it is likely to flow directly into Tongass Narrows as sheet flow, in small channels that discharge via the storm drain system, or as shallow subsurface flow. The major watersheds traversed by the

~~[101] Ketchikan Gateway Borough Planning Department. 19984. *Ketchikan District Coastal Management Program*. Prepared by Susan A. Dickinson.~~

proposed alternatives on Gravina Island are Airport Creek and Government Creek. There are no flow data available for any streams in the project area.[102]

3.15.1.1 Tongass Narrows

Tongass Narrows is characterized by shorelines of steep bedrock or coarse gravel, cobble, and boulders; strong tidal currents; and unusually large tidal ranges (25 feet or more).[103] Many of the lower intertidal and shallow subtidal areas are sandy or mixed gravel, sand, and shells, with varied amounts of silt. Several small natural coves and areas behind constructed breakwaters provide wave and current protection for anchorages and marine habitats.[104] Lewis Reef is the nearest of these coves, located a quarter mile north of the project area on Gravina Island at the confluence of Lewis Creek and Tongass Narrows. Lewis Reef is an important habitat area for aquatic species and eelgrass beds.[105]

3.15.1.2 Airport Creek

The Airport Creek watershed encompasses approximately 1,835 acres. The creek flows northward and discharges into a protected cove north of the airport. Lewis Reef Road ~~currently~~ crosses Airport Creek near the junction with Seley and Bostwick roads.

3.15.1.3 Government Creek

The Government Creek watershed encompasses approximately 1,870 acres. The creek flows northward and discharges into a protected cove south of Ketchikan International Airport. In conjunction with the extension of the runway safety area at the airport in 2007–2008, DOT&PF and FAA diverted Government Creek around the runway safety area extension. As part of the diversion, two small creeks, North Tributary and Boulder Creek were routed into the new Government Creek channel, which increased the available fish habitat.[106]

3.15.1.4 Clam Cove

The Clam Cove watershed encompasses approximately 3,533 acres. The watershed is characterized by numerous lakes and small streams, including Green Buoy Creek and Stensland Creek.

3.15.2 Ponds

There are many small ponds on Gravina Island. These ponds tend to have no outlets and therefore do not provide a source of nutrients to any downgradient water bodies; however, they do provide wildlife habitat.

[102] Slack, J.R., Alan M. Lumb, and Jurate Maciunas Landwehr. *USGS Water-Resources Investigations Report 93-4076*. HCDN: Streamflow Data Set, 1874 – 1988, Station 15072000 FISH C NR KETCHIKAN AK. http://pubs.usgs.gov/wri/wri934076/stations/15072000.html. Accessed April 11, 2009.

[103] Pentec Environmental. August 2001. Phase *II Marine Reconnaissance Technical Memorandum (Draft), Gravina Access Project.* Prepared by J. P. Houghton for HDR Alaska, Inc.

[104] HDR. April 2004. Gravina Access Project Essential Fish Habitat Assessment.

[105] Manillo, Mark. June 10, 2008. *Preliminary Agency Scoping Meeting Notes*. Alaska Department of Fish and Game; Hanson, Bill. June 12, 2008. *Preliminary Agency Scoping Meeting Notes.* U.S. Fish and Wildlife Service.

[106] Minnillo, Mark. June 10, 2008. *Preliminary Agency Scoping Meeting Notes*. Alaska Department of Fish and Game.

3.15.3 Marine Habitats

3.15.3.1 Intertidal Zone

Field investigations have identified 136 plant and 151 animal species in the intertidal zone in the project area.[107] In areas where natural coarse gravel/cobble/boulder shorelines occur, the dominant species are rockweed, barnacles, snails, and crab. In areas where sea stars are limited, the intertidal habitat areas support abundant mussel populations. Hard-shelled littleneck and butter clams are often abundant around somewhat sheltered beaches.

USFWS considers the Lewis Reef area to be particularly rich estuarine habitat. Such estuaries are biologically important and productive habitat in Southeast Alaska. The Lewis Cove-Lewis Point area (including Lewis Reef) is documented to have some of the richest infauna of any site surveyed in Tongass Narrows.[108] Field investigators observed the typical rockweed, barnacle, limpet, and littorines at the higher beach area, where there are more cobbles on the surface. Investigators also observed a large variety of littleneck clams, butter clams, and cockles in this area.

Lewis Point supports patches of eelgrass, kelp, and alga. The mixed-fine sandy areas have high densities of butter clams, horse clams, and soft-shell clams, three species of sea star, and a local moon snail. The rocks support rockweed, two types of barnacle, and green and red algae. Kelp provides a low-tide fringe around the rocky areas. Bald eagles, waterfowl and marine birds, deer and black bear, and marine mammals all depend on this intertidal area and other similar but smaller areas along the Gravina Island shoreline.

3.15.3.2 Subtidal Zone

The subtidal margins of Tongass Narrows are characterized by steeply sloping bedrock or coarse gravel/cobble bottoms extending from the lower intertidal zone to the deeper, flatter center of the channel at depths of -80 to -150 feet mean lower low water (MLLW).[109]

For the most part, these subtidal slopes are swept by strong tidal currents and support a number of kelp and other algal species down to depths of about -40 feet MLLW. In spring and summer, many of these rocky areas support a canopy of bull kelp. At depths below -40 feet MLLW, the bottom becomes nearly barren sand and gravel. The most abundant subtidal organism observed in the project area during the winter field investigation was sea cucumber.

Shallow subtidal areas that are protected from the direct impact of the currents, such as those areas in small coves or behind breakwaters, have gradually sloping sandy bottoms that sometimes support healthy eelgrass beds. The locations of known eelgrass beds are shown on Figure 3.18.

3.15.4 Wildlife—Aquatic Species

3.15.4.1 Marine Mammals

Eight species of marine mammals have been documented in the project area: harbor seals, Steller sea lions, humpback whales, killer whales, Dall's porpoises, Pacific white-sided dolphins,

[107] Pentec Environmental. August 2001. Phase *II Marine Reconnaissance Technical Memorandum (Draft), Gravina Access Project.* Prepared by J. P. Houghton for HDR Alaska, Inc.

[108] Pentec Environmental. August 2001. *Phase II Marine Reconnaissance Technical Memorandum (Draft*), Gravina Access Project. Prepared by J. P. Houghton for HDR Alaska, Inc.

[109] Pentec Environmental. August 2001. Phase *II Marine Reconnaissance Technical Memorandum (Draft), Gravina Access Project.* Prepared by J. P. Houghton for HDR Alaska, Inc.

minke whales, and harbor porpoises. Grey whales are sometimes observed in the area off Vallenar Point.

~~Steller sea lions are listed as "threatened" and h~~Some populations of humpback whales are listed as "endangered" under the Endangered Species Act (ESA) ~~and "depleted" under the Marine Mammal Protection Act~~ (see Section 3.20 for a discussion of threatened and endangered species). No~~ne of the~~ other marine mammals in the project area are included on the threatened and endangered list, but all are protected ~~or designated as "depleted"~~ under the Marine Mammal Protection Act.

Whales. The whales common to Tongass Narrows are the humpback, minke, and killer whales. Humpback and minke whales are rorqual whales that use baleen to feed. Their diet consists of plankton, krill, and small fish such as herring, mackerel, capelin, sardines, and anchovies. Killer whales are toothed whales and have a diverse diet of fish, squid, and other marine mammals including large whales such as the blue whale.[110] In 2004, the Eastern North Pacific—Alaska Resident Stock killer whale populations were estimated at 1,100 individuals with 117 residents in Southeast Alaska. Reliable data on trends in population abundance for the Alaska Resident Stock are unavailable.[111] No population data are available for the Alaska Stock of minke whales.[112]

Porpoises and Dolphins. The Dall's porpoise (Alaska Stock), harbor porpoise (Southeast Alaska Stock), and the Pacific white-sided dolphin (North Pacific Stock) are common in Southeast Alaska, although no reliable data ~~currently~~ exist concerning population trends.[113] Porpoises and dolphins have a varied diet consisting of hake, squid, lantern fish, anchovy, sardines, and small schooling fish. They are vulnerable to predation by killer whales and sharks.

Harbor Seals. ~~The State of Alaska lists the harbor seal (Southeast Alaska Stock) as a Species of Special Concern.~~ In the Gulf of Alaska and Prince William Sound, harbor seal numbers declined substantially from the late 1970s through the early 1990s. However, based on aerial surveys of terrestrial haulouts[114] near Ketchikan and Sitka, the overall population of harbor seals in Southeast Alaska appears to be increasing or stable in recent years. Slight decreases in population have been observed at Glacier Bay but these trends appear to be isolated to this area in Southeast Alaska.[115] The Ketchikan survey showed that from 1983 to 1996, harbor seal populations in the Ketchikan area increased at a rate of 9.3 percent annually.[116] Harbor seals are generally nonmigratory, inhabiting Tongass Narrows including the waterfront area adjacent to the City of Ketchikan year-round. Local movements of harbor seals are associated with tides, weather, season, food availability, and reproduction. They haul out on rocks, reefs, beaches, and drifting glacial ice, and feed in marine, estuarine, and occasionally fresh waters. Their diet consists of pelagic and bottom dwelling fishes, crustaceans, and octopi.

[110] National Marine Fisheries Service. 2009. Protected Species Information. Available online at http://www.nmfs.noaa.gov/pr/pdfs/esa_factsheet.pdf.

[111] National Marine Fisheries Service. 2008. *Alaska Marine Mammal Stock Assessments, 2007*. NOAA Technical Memorandum NMFS-AFSC-180.

[112] National Marine Fisheries Service. 2008. *Alaska Marine Mammal Stock Assessments, 2007*. NOAA Technical Memorandum NMFS-AFSC-180.

[113] National Marine Fisheries Service. 2008. *Alaska Marine Mammal Stock Assessments*, *2007*. NOAA Technical Memorandum NMFS-AFSC-180.

[114] Haulouts are areas where animals such as sea lions rest on shore for varying lengths of time. These sites are used to give birth, nurse pups, breed, or simply to rest and sleep.

[115] Mathews, Elizabeth A., and Grey W. Pendleton. January 2006. Declines in Harbor Seal (Phoca Vitulina) Numbers in Glacier Bay National Park, Alaska, 1992-2002. *Marine Mammal Science*, 22(1):167-189.

[116] National Marine Fisheries Service. 2008. Alaska Marine Mammal Stock Assessments, 2007. *NOAA Technical Memorandum NMFS-AFSC-180.*

Steller Sea Lions. A 2002 aerial survey counted 20,160 sea lions in Southeast Alaska.[117] In 2008, the first complete aerial survey since 2002 confirmed a population increase of roughly 3 percent for Southeast Alaska.[118] Steller sea lions feed on a wide variety of prey, such as pollock, mackerel, flounder, herring, crab, rockfish, cod, salmon, eulachon, capelin, squid, and octopus. Feeding occurs from the intertidal zone to the continental shelf.[119] There are no established haulout sites in Tongass Narrows. Grindall Island, 12 miles west of the northern tip of Gravina Island, is a year-round sea lion haulout but not a rookery, and appears to be the haulout area nearest the project area. The sea lions have been observed in Tongass Narrows around the fish hatchery, where large numbers of salmon congregate in late summer. In Ketchikan harbor itself, daily sightings of sea lions are not unusual in winter; fewer sightings occur in summer, when the harbor is busier.

3.15.4.2 Anadromous Fish

Anadromous fish (fish that return from salt water to fresh water to spawn) flourish in Southeast Alaska. The project area contains several streams that support anadromous fish: Airport Creek, Government Creek, Fiedler Creek, Gravina Creek, Rain Creek, Stensland Creek, and Clam Creek (Figure 3.18). In the project area, large populations of anadromous fish such as salmon (five species), cutthroat and steelhead trout, and Dolly Varden provide food for bears, wolves, bald eagles, and other animals, and are valuable to commercial and sport fishers.

3.15.4.3 Marine Fish

While Southeast Alaska rivers and streams have relatively few species of resident fish, marine waters contain hundreds of fish species. Flatfish, Pacific cod, rockfish, sculpin, halibut, skate, and sablefish are abundant, and huge schools of herring, smelt, capelin, and Pacific sand lance collectively provide the food base for salmon, trout, and char.[120] No site-specific surveys of fish likely to be present in the immediate vicinity of each alternative are available. However, fish types that are likely be present in Tongass Narrows include demersal (e.g., flatfish, cottids, rockfish, gadids) and pelagic (salmonids, clupeids, embiotocids, greenling) species. Of these, some fish have closed swim bladders (physoclistous species; e.g., rockfish, gadids), some have open swim bladders (physostomous species; e.g., salmonids), and some lack a swim bladder (e.g., cottids, flatfish). This distinction is important because some construction activities, such as blasting, could impact fish with closed swim bladders differently from those with open swim bladders.

Other fish species that live in the marine waters of the project area are yelloweye, shortraker, rougheye, and dusky rockfish, walleye pollock, lingcod, Pacific Ocean perch, and arrowtooth flounder.[121] DNR and NMFS have identified Pacific herring and Pacific halibut as important in the project area.

[117] National Marine Fisheries Service. March 2008. *Recovery Plan for the Stellar Sea Lion: Eastern and Western Distinct Population Segments (*Eumatopias jubatus*), Revised*. National Marine Fisheries Service, Silver Spring, MD.

[118] National Marine Fisheries Service. November 17, 2008. *Survey of Adult and Juvenile Stellar Sea Lions, June – July 2008.* Available online at http://www.afsc.noaa.gov/nmml/pdf/SSLNon-Pups2008memo.pdf. Accessed April 11, 2009.

[119] Alaska Department of Fish and Game September 5, 2002. *Wildlife Notebook Series: Steller Sea Lions.* Available online at http://www.state.ak.us/adfg/notebook/marine/sealion.htm.

[120] O'Clair, R.M., R.H. Armstrong, and R. Carstensen. *The Nature of Southeast Alaska: A Guide to Plants, Animals, and Habitats*. Seattle, WA: Alaska Northwest Books, 1997; HDR. Gravina Access Project Essential Fish Habitat Assessment. April 2004.

[121] Shaw, Linda. 1999. Personal communication between National Marine Fisheries Service, Juneau, and Darcy Richards, HDR, regarding essential fish habitat.

Pacific Herring. Pacific herring spawn during the spring in eelgrass or rockweed beds at the north end of Gravina Island.[122]

Pacific Halibut. Halibut eat a wide variety of fishes (including cod, turbot, and pollock) and some invertebrates such as crab and shrimp. They sometimes leave the ocean bottom to feed on pelagic fish, such as sand lance and herring. Halibut spawn in the winter months, and eggs and larvae float for up to 6 months until they are carried to shallower waters by prevailing currents to begin life as bottom-dwellers. Older fish often use both shallow and deep waters over the annual cycle.[123]

3.15.4.4 Essential Fish Habitat

The Magnuson-Stevens Fishery and Conservation Management Act requires federal agencies to analyze Essential Fish Habitat (EFH) prior to permitting a project that may affect such habitat. NMFS is responsible for delineating EFH. In the case of anadromous fish streams (principally salmon), NMFS has designated the ~~anadromous~~ "Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes" ~~fish maps~~ prepared by ADF&G as the definition of EFH in Alaska.~~[124]~~

In the project area, Tongass Narrows is designated EFH for 11 species of ground fish and 5 species of salmon. ~~Anadromous fish s~~Streams designated as EFH for salmon (i.e., cataloged streams) that could be affected by the project are Airport Creek, Government Creek, Fiedler Creek, Gravina Creek, Rain Creek, Stensland Creek and Clam Creek: all on Gravina Island, as shown in Figure 3.18. An EFH assessment was completed and submitted to NMFS in April 2004. NMFS provided concurrence with the publication of the 2004 Record of Decision. FHWA ~~does anticipate~~ reinitiated~~ing~~ the consultation process for this SEIS in March 2013 by providing NMFS an addendum to the EFH Assessment (see Appendix E – Part 1).

The shorelines of Tongass Narrows provide excellent rearing habitat for juvenile salmonids migrating out of area streams during the spring. Low gradient gravel and sand beaches produce an abundance of epibenthic zooplankton that provides a key prey base for juvenile pink, chum, and Chinook salmon.[125] At low tides, extensive eelgrass beds along the Narrows also produce large numbers of prey items and provide refuge for juvenile salmonids against predation by birds and larger fish. As they grow, young salmon tend to move offshore into deeper waters while remaining in the upper portion of the water column. Diets of subadult and adult salmon vary among species, but generally are dominated by forage fish (herring, smelt, and sand lance) and larger pelagic and planktonic invertebrates.

No specific surveys have been identified that document the use of project area waters by ground fish species. However, several species of salmonids are known to use the Narrows for all or most of their life stages. Unconsolidated bottom areas of silt, sand, and gravelly sand along the slopes of Tongass Narrows are expected to support a variety of ground fish such as arrowtooth flounder, skates, cottids, walleye pollock, and Pacific cod. Ground fish prey includes a variety of epibenthic crustaceans, especially amphipods and several crab and shrimp species, as well as infaunal clams, gastropods, and polychaete worms. Rocky outcrops along the shorelines of Tongass Narrows are likely to support several species of rockfish. Pelagic waters

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[122] Walker, Scott. April 4, 2000. Email from Alaska Department of Fish and Game Assistant Area Management Biologist and Robin Reich, HDR, regarding herring.

[123] Alaska Department of Fish and Game, Division of Wildlife Conservation. 1999. *Wildlife Notebook Series.*

~~[124] The Division of Habitat Restoration has been transferred from ADF&G to DNR and is now known as the Office of Habitat Management and Permitting.~~

[125] Groot and Margolis, Editors. 1991. *Pacific Salmon Life Histories*. UBC Press.

within the Narrows support subadult and adult salmon as well as sablefish. These species feed primarily on epibenthic[126] and pelagic small fish and invertebrates.[127]

Most fish occur in Tongass Narrows primarily as late juveniles and adults, and may use Tongass Narrows as a migratory corridor to other rearing areas in nearby bays and intertidal areas. Table 3-24 and Table 3-25 show the species (and their life stages) that occur in Tongass Narrows, Government Creek, Airport Creek, and two other unnamed ~~anadromous~~ fish streams.

Table 3-24: Essential Fish Habitat Groundfish Species in Project Area

Groundfish Species	Egg	Late Juvenile	Adult
Pacific Ocean perch		X	X
Yelloweye rockfish		X	X
Shortraker		X	X
Rougheye rockfish		X	X
Dusky rockfish		X	X
Walleye pollock	X		X
Sablefish		X	X
Pacific cod		X	X
Arrowtooth flounder		X	X
Sculpin spp.		X	X
Skates spp.		X	X

Table 3-25: Essential Fish Habitat Salmon Species in Project Area

Species	Egg and Larvae – fresh water	Juvenile – fresh water	Juvenile – estuarine	Juvenile – marine	Adult – marine waters	Spawning – fresh water only
Coho salmon	X	X	X	X	X	X
Chum salmon	X	X	X	X	X	X
Pink salmon	X	X	X	X	X	X
Chinook salmon[a]				X	X	
Sockeye salmon[a]				X	X	

[a] Only juveniles and adults of these species are found in Tongass Narrows within the project area.

3.15.5 Wildlife—Amphibians

Two amphibian species, the rough-skinned newt and the western toad, likely inhabit the project area.[128] Rough-skinned newt salamanders may inhabit creeks and wet areas.[129] Western toads breed in freshwater wetlands and move to terrestrial, nonforested areas to feed on insects and other small animals during adulthood.

[126] Organisms that live at the surface of a sea bed or lake floor.

[127] HDR. April 2004. Gravina Access Project Essential Fish Habitat Assessment.

[128] Brown, Mike. February 16, 2000. Personal communication between U.S. Forest Service, and Robin Reich, HDR; Reich, Robin. 2000. Amphibians in the Gravina Access Project Area. Memorandum to file. Prepared for HDR.

[129] Wake, D.B., E.J. Jockosch, and T.J. Papenfuss, T.J. "Does Batrachoseps Occur in Alaska? *Herpetological Review* 29(1): 12-14, 1998.

3.15.6 Wildlife—Birds

Approximately 160 species of birds nest in or near Ketchikan.[130] Around Revillagigedo, Pennock, and Gravina islands and the surrounding waters, local birdwatchers have observed approximately 225 species of birds.[131] Birds dwell in a variety of habitats in the project area, including marine waters, intertidal areas, freshwater wetlands, and forests. General consultation with USFWS and ADF&G during development of the 2004 FEIS and scoping for this ~~Final~~ SEIS identified few specific concerns related to birds, but some are noted in the following paragraphs.

Waterfowl, including long tailed duck, bufflehead, common goldeneye, Barrow's goldeneye, harlequin duck, white-winged scoter, surf scoter, common merganser, and red-breasted merganser, forage in the rocky intertidal zone of Tongass Narrows during high tide.[132] They feed primarily on invertebrates and small fish in the ice-free waters along the coastline during the winter and breed in more northern areas of Alaska during the summer. ADF&G considers the Lewis Reef and related estuary area is considered to be especially rich habitat for many species of wildlife, including birds.

Other bird species, primarily gulls, northwestern crows, and common ravens, feed on invertebrates and opportunistically scavenge in the rocky intertidal areas during low tide. In the early spring, surf scoters and gulls, along with other species, gather and feed upon herring spawn on eelgrass and rockweed. The Totem Bight area and the northern end of Gravina Island are popular feeding areas. Gulls follow herring as the fish move northward along the coastline.[133]

Some migratory waterfowl and summer seabirds concentrate just north of Pennock Island adjacent to downtown Ketchikan and at the head of Ward Cove.[134] Sandhill cranes have been observed on Gravina Island on airport property south of Government Creek. Near Lewis Reef, herons use the shoreline and estuarine areas and Canada geese use the beach grass. Shorebird species, including western sandpipers and red-necked phalarope, feed and stage in estuarine areas within the project area during the spring and fall migrations. However, larger estuaries outside the project area on Gravina Island provide more important habitat to birds migrating northward.[135] No seabird colonies exist within the project area.[136]

Rock doves, chestnut-backed chickadees, winter wrens, and varied thrushes breed and inhabit forests of the project area year-round. Other passerines, including Swainson's thrush, orange-crowned warbler, and Townsend's warbler, breed in the area forests in the summer. American robins, dark-eyed juncos, golden-crowned kinglets, Steller jays, and several warblers use beach-fringe forests and scrub-shrub communities. Greater yellowlegs may nest in the

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130 O'Clair, R.M., R.H. Armstrong, and R. Carstensen. 1997. *The Nature of Southeast Alaska: A Guide to Plants, Animals, and Habitats*, Alaska Northwest Books, Seattle, WA.

131 Heinl, Steve, and Teri Goucher. March 2000. Checklist of Birds of the Ketchikan Area, Alaska.

132 R.M. O'Clair, and C.E. O'Clair, 1998. Southeast Alaska's Rocky Shores: Animals. Plant Press, Auke Bay, Alaska; Heinl, Steve. 2000. Some Peak Seasonal Counts of Waterbirds on the Ketchikan Road System. Ketchikan, Alaska.

133 R.M. O'Clair, and C.E. O'Clair, 1998. *Southeast Alaska's Rocky Shores: Animals.* Plant Press, Auke Bay, Alaska; Heinl, Steve. 2000. *Some Peak Seasonal Counts of Waterbirds on the Ketchikan Road System*. Ketchikan, Alaska.

134 Ketchikan Gateway Borough Planning Department. *Coastal Management Plan.*

135 Heinl, Steve. 2000. Some Peak Seasonal Counts of Waterbirds on the Ketchikan Road System. Ketchikan, Alaska.

136 U.S. Fish and Wildlife Service. Beringian Seabird Colony Catalog web site, <*http://164.159.151.5/seabird/index.html*>; Brockman, Steve. January 13, 2000. Personal communication between U.S. Fish and Wildlife Service, Ketchikan, and Robin Reich, HDR; Brown, Mike. February 16, 2000. Personal communication between U.S. Forest Service, Ketchikan, and Robin Reich, HDR; Heinl, Steve. 2000. *Some Peak Seasonal Counts of Waterbirds on the Ketchikan Road System. Ketchikan, Alaska*.

freshwater fens.[137] Shorebirds, passerine species, and blue grouse are known to use muskeg habitats, while waterfowl often use freshwater ponds within the muskegs as resting and nesting habitat.

Northern Goshawk. The northern goshawk, listed as an Alaska Species of Special Concern, is an uncommon forest-dwelling raptor that is likely to occur on Gravina Island. Goshawks can be found foraging in dense deciduous and coniferous forests. They nest exclusively in old growth and mature forest habitat. Northern goshawks may use the project area as foraging habitat.

Bald Eagle. The Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act (MBTA) provide regulatory authority for the protection of bald eagles and any impact analysis of proposed project activities must consider impacts to eagles. The Bald and Golden Eagle Protection Act prohibits anyone from "taking" bald eagles, their eggs, nest, or any part of the birds without a permit[138]. It defines "taking" as "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." "Disturb'' means: "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." ~~Bald eagles are protected under the Bald and Golden Eagle Protection Act and any impact analysis of proposed project activities must consider impacts to eagles.~~

Breeding bald eagles occupy nesting territories that generally consist of an active nest and one or more alternate nests in any given year. The *National Bald Eagle Management Guidelines*[139] provides guidance on how to avoid and minimize impacts to active and alternate nests. The USFWS guidance is~~Bald eagle protection measures are~~ based on limiting visual and auditory disturbance in zones around nest trees throughout the year. The limits of each zone are based on the existing level of disturbance and whether topographic or vegetative buffers are present between the proposed activity and a nest. The primary zone extends 330 feet from the nest tree, and land clearing or construction in the primary zone is typically discouraged year round. Human disturbance is discouraged particularly during the spring-summer nesting season. A secondary zone ranges to a distance of 660 feet from the nest. Human disturbance in the secondary zone must be minimized during the breeding season to prevent impacts to nest productivity, but may be possible outside the nesting season. In a third zone that extends ~~one quarter~~up to ~~one- half~~0.5 mile from the nest, depending on topography and line of sight to nest, most activities (e.g., timber clearing, construction blasting, and similar major disturbances) are permitted outside the breeding season.

The bald eagle population in Southeast Alaska is stable.[140] Bald eagles and their nests are common along the shorelines of Tongass Narrows, where the eagles scavenge and prey on fish in the intertidal areas. A survey of bald eagle nests in the Gravina Access Project area was conducted in 2008 and identified 43 bald eagle nests in the survey area, many of which are shown on Figure 3.18. Nineteen of these nests were inactive nests that had been previously documented in the project area; 17 nests were active with young in the nest or adults nearby the nest, and the status at seven nests could not be determined for various reasons. The majority of nests were located along the shoreline of Tongass Narrows. A few nests were located less than

[137] Nickles, Jon. May 22, 1997. Letter from U.S. Fish and Wildlife Service, Anchorage, to Colonel Peter A. Topp regarding Tongass Narrows 504 2-9700001.

[138] The regulations governing eagle permits can be found in 50 CFR part 13 (General Permit Procedures) and 50 CFR part 22 (Eagle Permits).

[139] USFWS. 2007. National Bald Eagle Management Guidelines. https://www.fws.gov/northeast/ecologicalservices/pdf/NationalBaldEagleManagementGuidelines.pdf

[140] Ketchikan Gateway Borough Planning Department. *Coastal Management Plan.*

a quarter mile inland. The majority of the nest sites were documented during previous surveys by USFWS in the Ketchikan area, however, 16 nests were new.[141]

3.15.7 Wildlife—Land Mammals

The project area is home to approximately 50 species of land mammals. While much information exists on large land mammals, the distribution and numbers of many small mammals remain unknown. USFWS and ADF&G identify Sitka black-tailed deer, Alexander Archipelago wolf, and black bear as important species in the project area.

Sitka Black-Tailed Deer. The Sitka black-tailed deer is native to the coastal rain forests of Southeast Alaska. During the winter, deer inhabit dense timber stands and south- and west-facing slopes up to 800 feet in elevation.[142] In the project area, the old-growth forest and forested wetlands along the shoreline at and north of Lewis Point are important deer winter habitat (see Figure 3.18). Alaska deer populations are dynamic and usually fluctuate with the severity of the winters. However, the Ketchikan area rarely experiences severe winters and high winter deer mortality.[143] Hunting, predation, and habitat loss contribute to a continuing decline in deer populations. ADF&G predicts that deer populations in average winters may decline by nearly half by 2054 in the Ketchikan area.[144] The deer population on Gravina Island provides hunting opportunities and a food source for wolves and bear.

Alexander Archipelago Wolf. The Alexander Archipelago Wolf is a USFWS Species of Concern. In Southeast Alaska, the wolf population fluctuates relative to the deer population. According to ADF&G, one pack of Alexander Archipelago wolves with 10 to 12 individuals inhabited Gravina Island in the fall of 1999, and four wolves were shot or trapped during the following season.[145] In general, wolf populations are stable in the Ketchikan area.[146] The wolves hunt prey in a variety of habitats, including open wetlands and forests. Deer comprise 80 percent of their diet on Gravina Island and sufficient deer habitat, particularly low-elevation winter habitat such as the habitat in the Lewis Point to Vallenar Bay, is important to the stability of the wolf population. The wolves also feed on beaver and salmon, and occasionally scavenge or hunt marine mammals.[147]

Black Bear. Black bears inhabit most of forested Alaska. They feed on freshly sprouted green vegetation in the spring and on salmon during the summer and fall fish runs. Berries, especially blueberries, are an important food in the late summer and fall. Breeding occurs in June and July. The cubs, usually born in pairs, are born in winter or early spring while the bears hibernate in rock cavities, hollow trees, and self-made excavations located from sea level to alpine elevations.[148] The bear population is estimated to be 1,764 bears on Revillagigedo Island and

[141] HDR. 2008. Bald Eagle Nest Survey Technical Memorandum.

[142] Person, Dave. 2000. Personal communication between Alaska Department of Fish and Game, Division of Wildlife Conservation, Ketchikan, and Robin Reich, HDR, regarding wolves and deer on Gravina Island.

[143] Person, Dave. 2000. Personal communication between Alaska Department of Fish and Game, Division of Wildlife Conservation, Ketchikan, and Robin Reich, HDR, regarding wolves and deer on Gravina Island.

[144] Alaska Department of Fish and Game, Division of Wildlife Conservation. 2006. *Deer Management Report of survey-inventory activities: 1 July 2004 to 30 June 2005*.

[145] Person, Dave. 2000. Personal communication between Alaska Department of Fish and Game, Division of Wildlife Conservation, Ketchikan, and Robin Reich, HDR, regarding wolves and deer on Gravina Island.

[146] Alaska Department of Fish and Game, Division of Wildlife Conservation. *Wolf Management Report of survey-inventory activities: 1 July 2002 to 30 June 2006*.

[147] Alaska Department of Fish and Game, Division of Wildlife Conservation. *Wolf Management Report of survey-inventory activities: 1 July 2002 to 30 June 2006*.

[148] Alaska Department of Fish and Game, Division of Wildlife Conservation. 1999. *Wildlife Notebook Series*.

48 bears on Gravina Island.[149] The bear population overall has remained relatively low but stable. Gravina and Revillagigedo islands do not contain many salmon streams or berries to support large populations of black bears.[150] Salmon streams in the project area, such as Government Creek and Airport Creek and their associated productive estuaries and coastlines such as those near Lewis Point, likely are important for black bears.

Bear habitat in the Borough is influenced in large part by human garbage, pet food, and bird feeders. ADF&G commonly relocates black bears from the Borough to the southern part of Southeast Alaska to reduce the danger to residents.[151] Humans hunt black bear on Gravina and Revillagigedo Islands, and the 103 bears harvested in 2006 represented highest harvest since 1997.[152]

3.16 Floodplains

Executive Order (EO) 11988, *Floodplain Management*, requires FHWA to follow procedures for assessing and avoiding potential flood impacts. ~~The Federal Emergency Management Agency (~~FEMA~~)~~ maps Special Flood Hazard Areas (SFHAs), floodway, and other flood areas. The SFHAs represent the extent of a flood that, statistically, can be expected to occur once every 100 years (i.e., 100-year floodplain). EO 11988 directs federal agencies, and the activities undertaken or authorized by them, to reduce the risk of flood loss and to minimize flood impacts on human safety, health, and welfare.

Natural habitats within the floodplain can vary from contiguous wetlands to riparian areas to upland forests. Natural floodplain habitats are important because undeveloped areas within the floodplain provide recharge to groundwater, a link in the food chain and nutrient cycle, a filtering mechanism for pollutants that might otherwise reach water bodies, and protection from storm and flood waters. Encroachment on floodplains can reduce the normal overflow storage and conveyance area, or reduce stream flows that result in backing up floodwaters, either of which can impact adjacent areas by displacing floodwaters into areas that are not typically subject to flooding.

FEMA has mapped the expected flood areas for a small portion of the Borough (i.e., primary population areas).[153] The area included in the FEMA study extends from 0.5 mile north of Carlanna Creek to the USCG Station in Ketchikan. According to the FEMA maps, the Tongass Narrows and portions of the Ketchikan waterfront lie within SFHA Zone A, for which no base flood elevations have been determined (see Figure 3.16). According to the FEMA map, Ketchikan Creek, Schoenbar Creek, Carlanna Creek, and Hoadley Creek within the Borough contain 100-year floodplains along the channels. A general characterization of Tongass Narrows and other associated streams is summarized in Section 3.15.1.1.

In addition to the mapped floodplains, unmapped floodplains that are associated with streams may exist in the project area. These unmapped floodplains are generally small and located immediately adjacent to streams. Inundation of these floodplains is typically associated with

[149] Alaska Department of Fish and Game, Division of Wildlife Conservation. 2008. *Black Bear Management Report of survey-inventory activities: 1 July 2004 to 30 June 2007*.

[150] Porter, Boyd. April 30, 2003. Personal communication between Alaska Department of Fish and Game Ketchikan Area Biologist and Sirena Brownlee, HDR.

[151] Porter, Boyd. April 12, 2000. Meeting in Ketchikan between Alaska Department of Fish and Game, Division of Wildlife Conservation, and Robin Reich, HDR, regarding wildlife in the Ketchikan area.

[152] Alaska Department of Fish and Game, Division of Wildlife Conservation. 2008. *Black Bear Management Report of survey-inventory activities: 1 July 2004 to 30 June 2007.*

[153] Federal Emergency Management System. 1990. Flood Insurance Rate Maps for the City of Ketchikan, Ketchikan Gateway Borough, Community Panel Number 020003 0001 B and 020003 0002B. Note: No updates to the 1990 FEMA maps have occurred.

spring snowmelt or large precipitation events. Because the drainage basin of each stream is small, precipitation events that cause flooding are localized to the immediate area around the streams. Flooding adjacent to the streams has a short duration because the streams in the project area can drain quickly due to their size and topographic settings. A detailed flood study would be required to determine the actual possible flood extents, but it is likely that most of these unmapped areas are located along the stream bank.

3.17 Wild and Scenic Rivers

There are no national or state-designated Wild or Scenic rivers in the project area.

3.18 Coastal Barriers

There are no coastal barriers, as identified in the Coastal Barriers Resources Act of 1982, in the project area.

3.19 Coastal Zone

As of July 1, 2011, the ACMP authorities in Alaska Statute (AS) 46.39, AS 46.40, and other uncodified laws relating to the ACMP were repealed. As of that date, the regulations at 11 AAC 110, 11 AAC 112, and 11 AAC 114 as well as the local coastal management plans are without statutory authority and therefore unenforceable; however, some boroughs will still review projects for consistency with their district coastal management plans. Until further notice, the DNR Division of Coastal and Ocean Management will not conduct consistency reviews for projects located in previously designated coastal zones. The Borough Coastal Zone Management Program will continue to be implemented at the local level and will focus on the District Enforceable Policies within the Borough Coastal Zone Management Program identified below.

The Borough initiated its Coastal Management Plan in 1978 and approved its first plan in 1984.[154] A minor revision to the plan was made in 1989. In 2007, the Borough conducted a major update to the 1984 plan.[155] Several key advantages of participating in the program that remain unchanged include:

- An opportunity for increased local control; all federal and state agencies exercising authority within the local planning area must do so in a manner consistent with local coastal management policies
- Coordination of comprehensive resource planning and management with state and federal agencies
- The opportunity to form special agreements among various levels of government on issues regarding the management of coastal resources, such as permit simplification
- Funding for planning and implementation

The 2007 *Ketchikan Coastal Management Plan* (KCMP) established enforceable policies that recognized the limited and economically valuable waterfront resource in Ketchikan as well as the extensive natural resources present. These enforceable policies provide guidelines and requirements for developing in the Coastal Zone. The Borough is responsible for administering the KCMP. The following enforceable policies apply most relevant to this project:

[154] Ketchikan Gateway Borough Planning Department. 1984. *Ketchikan Coastal Management Plan*.

[155] Ketchikan Gateway Borough Planning Department. 2007. *Ketchikan Coastal Management ~~Program~~Plan*.

3.19.1 Coastal Development Enforceable Policies

The Coastal Development enforceable policies are intended to guide the type and locations of development along the waterfront by prioritizing the uses allowed in the Coastal Zone (Enforceable Policy CD-1) and limiting the scope and nature of the uses (Enforceable Policy CD-2 and CD-3).[156] Specific policies that apply to the Gravina Access Project are summarized as follows:

Prioritization of Waterfront Land Use (Enforceable Policy CD-1)

Under this policy, waterfront land uses would be prioritized for water dependent and water-related uses. Water-dependent uses include: fish hatcheries; fish processing; log storage and transfer; float plane bases, boat harbors, and freight docks; marine based tourism facilities; boat repair and haul out sites; remote recreational cabins dependent on water access; and facilities that serve as links between the marine transportation system and the road system. Water-related uses include marine retail stores and commercial activities such as hotels, restaurants, and other similar uses that provide views and access to the waterfront. Other uses that are not water-dependent or water-related can be located on waterfront land if there are no practicable inland sites and if the waterfront land is not suitable for use by water-dependent or water-related activities.

Structures Placed in Navigable Waters (Enforceable Policy CD-2)

This policy allows for the placement of piling-supported or floating structures in coastal waters if the intended use of the structures is consistent with the allowable uses on the adjacent uplands to the maximum extent practicable. The policy also stipulates that the structures shall not be treated with creosote preservative coatings.

Tideland Fill below Mean High Water (Enforceable Policy CD-3)

This policy sets forth the requirement for using piling supported or floating structures for construction below mean high water, unless certain conditions are clearly demonstrated. Those conditions include: a documented public need; no practicable inland alternatives; fill is needed for reasonable use of the property; the fill would be placed to minimize impacts on adjacent uses, public access easements along the shoreline and water views; a minimum amount of fill would be used; and development of the property would support a water dependent use.

3.19.2 Recreation and Coastal Access Enforceable Policies

The Recreation and Coastal Access enforceable policies are intended to provide recreational opportunities and access to the coastal areas while minimizing impacts and retaining the natural features of the area. Within the project area the following Designated Recreation Areas, as identified in the 2007 KCMP, are present ~~(Figure 3.8)~~:

- Gravina Shoreline Trail—A 6-mile trail along the Gravina Island shoreline along the length of Airport Reserve (approximately from Clam Cove to Lewis Point)
- Bostwick Lake Loop Trail—A 8-mile trail from the south end of the airport to Bostwick Lake, around Curve Mountain to Pass Creek, and along Government Creek to the airport

The Recreation and Coastal Access policies that apply to these two trails are summarized as follows:[157]

[156] Ketchikan Gateway Borough Planning Department. 2007. *Ketchikan Coastal Management ~~Program~~Plan*.

[157] Ketchikan Gateway Borough Planning Department. 2007. *Ketchikan Coastal Management Plan~~rogram~~*.

Management of Designated Recreational Areas (Enforceable Policy RCA-1)

This policy requires that proposed uses or activities avoid or minimize direct and significant impacts on the existing activities and the physical, biological, visual, or cultural features upon which the recreation depends.

Public Access to Coastal Water (Enforceable Policy RCA-5)

Under this policy, public access should be provided between the uplands and coastal water through easements, dedications, or other means of conveyance, except where human health or safety would be at risk.

Public Access in Designated Areas (Enforceable Policy RCA-6)

This policy states that public water access between lakeshores, streams, shorelines, tidelands, estuaries and saltwater wetlands for recreational use should be provided through easements, dedications, or other means of conveyance, except where human health or safety would be at risk.

Waterfront Access (Enforceable Policy RCA-7)

According to this policy, capital improvements on or adjacent to publicly owned waterfront property must be designed to maximize pedestrian access, views to and along coastal waters, and to facilitate public enjoyment of coastal waters.

3.20 Threatened or Endangered Species

~~Currently, the project area does not contain any species listed as threatened and endangered under the Endangered Species Act as enforced by USFWS.~~ At the time of the release of the 2013 Draft SEIS, ~~NMFS lists~~ two species ~~within the project area~~ listed as endangered or threatened under the ESA were identified as potentially occurring in the project area: the ~~Steller sea lion (~~Eastern Distinct Population Segment (DPS) of Steller sea lion and the humpback whale. Both species are under the management authority of the NMFS. A biological assessment for these species was completed and submitted to NMFS in January 2004. NMFS provided a letter of concurrence for a "not likely to adversely affect" listed species or their designated critical habitat on February 17, 2004.[158]

In December 2013, the Eastern DPS of Steller sea lion was delisted. The Western DPS of Steller sea lion remains listed as endangered; however, members of the Western DPS are rarely found in the marine waters around Ketchikan.[159] Therefore, no ESA-listed Steller sea lions are likely to occur in the project area. ~~,Both species are additionally protected under the Marine Mammal Protection Act of 1972 and Alaska Endangered Species Act.~~[~~160~~]

~~*3.20.1 Humpback Whale*~~

The humpback whale (*Megaptera novaeangliae*) was federally listed as endangered in ~~1966~~1970 under the Endangered Species Conservation Act and~~. Before the mechanization of commercial whaling, the population of humpback whales was about 15,000. The International Whaling Commission first protected humpback whales from commercial whaling in 1965, and~~

[159] NMFS (National Marine Fisheries Service). 2013. Occurrence of Western Distinct Population Segment Steller Sea Lions East of 144° W. Longitude. National Marine Fisheries Service, Alaska Region. 18 December 2013.

~~[160] In 2007, ADF&G established a unit to oversee state involvement in endangered and threatened species. ADF&G coordinates state participation under federal and state endangered species laws, which includes coordinating state comments on proposed listings and on recovery of listed species.~~

~~such whaling ceased in the North Pacific. The whales were listed as endangered under the Endangered Species Act~~ in 1973 under the ESA. On September 8, 2016, NMFS published a final decision that changed the status of humpback whales under the ESA (81 Federal Register [FR] 62259), effective October, 11 2016. The decision recognized the existence of 14 humpback whale DPSs based on distinct breeding areas in tropical and temperate waters: 5 DPSs were classified under the ESA (4 endangered and 1 threatened) and the other 9 DPSs were delisted. Humpback whales found in southeast Alaska are predominantly members of the Hawaii DPS, which are not listed under the ESA. However, based on a comprehensive photo-identification study, members of the Mexico DPS (ESA-listed as threatened) are known to occur in southeast Alaska. Members of different DPSs are known to intermix on feeding grounds; therefore, all waters off the coast of Alaska should be considered to have ESA-listed humpback whales.[161] According to Wade et al. (2016)[162], the probability of encountering a humpback whale from the Mexico DPS is 6.1 percent. The remaining 93.9 percent of individuals in southeast Alaska are likely members of the Hawaii DPS[163]. All 14 DPSs of humpback whale remain listed as "depleted" under the Marine Mammal Protection Act and are on the Alaska State Endangered Species List.[164] There is no designated critical habitat for humpback whales. ~~The humpback whale is listed as "depleted" under the Marine Mammal Protection Act and is listed an endangered under the Alaska Endangered Species Act.~~[~~165~~]

~~This project has the potential to impact the~~ Recent studies estimate the Hawaii DPS at 11,398 individuals and the Mexico DPS at 3,264 individuals.[166] Wade et al. (2016)[167] predict there are 6,137 humpback whales in the southeast Alaska feeding grounds during summer.~~Central North Pacific Stock, currently estimated at about 4,000 individuals. There is evidence to suggest some overlap between the Central North Pacific Stock and Western North Pacific Stock, but this overlap is most prevalent near Kodiak Island and relatively minor in Southeast Alaska. The Central North Pacific Stock of humpback whales generally winters in Hawaiian waters and summers along the North Pacific coast. Humpback whale distribution in summer is continuous from British Columbia to the Russian Far East, and humpbacks are present offshore in the Gulf of Alaska. The whales appear to return to the same feeding areas where their mothers first brought them as calves; while there is evidence of some crossover to other areas, it appears to occur only at a rate of approximately 1 percent.~~

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[161] NMFS (National Marine Fisheries Service). 2016. Occurrence of Endangered Species Act (ESA) Listed Humpback Whales off Alaska. National Marine Fisheries Service, Alaska Region. Revised 12 December 2016.

[162] Wade, P.R., T.J. Quinn II, J. Barlow, C.S. Baker, A.M. Burdin, J. Calambokidis, P.J. Clapham, E. Faclone, J.K.B. Ford, C.M. Gabriele, R. Leduc, D.K. Mattila, L. Rojas-Bracho, J. Straley, B.L. Taylor, J. Urban R., D. Weller, B.H. Witteveen, and M. Yamaguchi. 2016. Estimates of abundance and migratory destination for North Pacific humpback whales in both summer feeding areas and winter mating and calving areas. Paper SC/66b/IA21 submitted to the Scientific Committee of the International Whaling Commission, June 2016, Bled, Slovenia.

[163] NMFS 2016. Occurrence of Endangered Species Act (ESA) Listed Humpback Whales off Alaska. National Marine Fisheries Service, Alaska Region. Revised 12 December 2016.

[164] Alaska Department of Fish and Game. < http://www.adfg.alaska.gov/index.cfm?adfg=specialstatus.akendangered> Accessed December 29, 2016.

~~[165] Alaska Department of Fish and Game. <http://www.adfg.state.ak.us/special/esa/whale_humpback/humpback_whale.php.> Accessed April 11, 2009.~~

[166] Wade, P.R., T.J. Quinn II, J. Barlow, C.S. Baker, A.M. Burdin, J. Calambokidis, P.J. Clapham, E. Faclone, J.K.B. Ford, C.M. Gabriele, R. Leduc, D.K. Mattila, L. Rojas-Bracho, J. Straley, B.L. Taylor, J. Urban R., D. Weller, B.H. Witteveen, and M. Yamaguchi. 2016. Estimates of abundance and migratory destination for North Pacific humpback whales in both summer feeding areas and winter mating and calving areas. Paper SC/66b/IA21 submitted to the Scientific Committee of the International Whaling Commission, June 2016, Bled, Slovenia.

[167] Wade, P.R., T.J. Quinn II, J. Barlow, C.S. Baker, A.M. Burdin, J. Calambokidis, P.J. Clapham, E. Faclone, J.K.B. Ford, C.M. Gabriele, R. Leduc, D.K. Mattila, L. Rojas-Bracho, J. Straley, B.L. Taylor, J. Urban R., D. Weller, B.H. Witteveen, and M. Yamaguchi. 2016. Estimates of abundance and migratory destination for North Pacific humpback whales in both summer feeding areas and winter mating and calving areas. Paper SC/66b/IA21 submitted to the Scientific Committee of the International Whaling Commission, June 2016, Bled, Slovenia.

~~The Southeast Alaska feeding area, which includes Ketchikan, is being considered for formal designation as a recognized stock. Population estimates for Southeast Alaska indicate 868 individuals inhabit these waters; with trends between 1993 and 2000 indicating a 7 percent increase in population.[168] According to the NMFS Office of Protected Resources list of critical habitat for marine mammals, there is no designated critical habitat for humpback whales.[169]~~

According to the NMFS stock report, the ~~Central North Pacific Stock~~Hawaii DPS of humpback~~s~~ whales is the focus of a large whale-watching industry in Hawaii and a growing whale-watching industry in Alaska and British Columbia. In an attempt to minimize the impact of whale watching in Hawaiian waters, regulators have developed regulations concerning the minimum distance to keep from whales and how to operate vessels when in the vicinity of whales. In 2001, NMFS issued regulations to prohibit most approaches to humpback whales in Alaska to 100 yards (66 FR 29502; May 31, 2001). The growth of the whale-watching industry is a concern to NMFS because preferred habitats could be abandoned if disturbance levels become too high. Noise is a related concern, particularly ~~continual~~ noise from ~~an Acoustic Thermometry of Ocean Climate program~~marine construction, the U.S. Navy's Low Frequency Active sonar program, shipping, and whale watching~~ cited~~. ~~NMFS has not documented concerns about incidental or short-term noises.~~

Humpback whales commonly feed and breed over shallow banks, but traverse the open ocean during migration. They use bubbles that concentrate their prey of small, schooling fish such as herring and swarms of krill. They also feed in formation, herd prey, and practice lunge feeding as a group.[170] Most of the southeast Alaska summer whale population leaves for ~~Hawaii~~ breeding and calving grounds in Hawaii or Mexico by October or November, though a ~~few~~ small number of humpback whales stay in Alaska and may be seen in winter. ~~Calving takes place in the wintering grounds in Hawaii.~~

NMFS has documented human-caused injury or mortality to ~~this stock of~~humpback whales, primarily due to entanglement or other injury caused by fishing gear and nets. Two such incidents were noted in the general Ketchikan area. There is documentation of apparent injury to and death of humpback whale related to repeated underwater blasting in Newfoundland.[171]

There are no data about seasonal abundance and distribution of humpback whales specific to Tongass Narrows. However, there is informed anecdotal information from a member of the marine mammal stranding network,[172] an ADF&G biologist,[173] and a spotter pilot,[174] all based in Ketchikan, to indicate use of the area. Humpback whales may be found in Tongass Narrows year-round, although the numbers are small much of the year, and they are seen only perhaps once or twice per month. Activity peaks in April and May, corresponding to the herring spawning season, when daily sightings are common. Whales do not appear to use Tongass Narrows

~~[168] National Marine Fisheries Service. 2008. *Alaska Marine Mammal Stock Assessments, 2007*. NOAA Technical Memorandum NMFS-AFSC-180.~~

~~[169] NFMS. December 20, 2011. Critical Habitat. NOAA Fisheries Office of Protected Resources. http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm. Accessed December 20, 2011.~~

[170] Wynne, Kate. 1997. *Guide to Marine Mammals of Alaska*. University of Alaska Fairbanks.

[171] National Marine Fisheries Service. 2008. *Alaska Marine Mammal Stock Assessments, 2007.* NOAA Technical Memorandum NMFS-AFSC-180.

[172] Frietag, Gary. February 23, 2000. Personal communication between National Marine Fisheries Service and HDR,

[173] Porter, Boyd. November 20, 2003. Personal communication between Alaska Department of Fish and Game wildlife management biologist, Ketchikan, and John Wolfe, HDR. Prior to his current position, Boyd was a Steller sea lion research biologist for ADF&G at Forrester Island and other Southeast Alaska sea lion rookeries.

[174] Masden, Michelle. November 20, 2003. Personal communication between owner of Island Wings Air Service and John Wolfe, HDR.

specifically as a migration route, and there is no evidence that Tongass Narrows is a favored location for critical activities, although the whales presumably may feed in the Narrows.

~~*3.20.2 Steller Sea Lion*~~

~~Steller sea lions (*Eumetopias jubatus*) number between 100,000 and 140,000 worldwide.[175] Approximately half of the population lives in Alaska. The western Alaska population (Western DPS) of Steller sea lions, inhabiting the western Gulf of Alaska and Bering Sea, has declined substantially and is listed as endangered under the Endangered Species Act. The Eastern DPS is the population of interest for this project, extending through the eastern Gulf of Alaska and along the coastal areas of Alaska, Canada, Washington, Oregon, and California. This DPS was listed as federally threatened in 1990 and as depleted under the Marine Mammal Protection Act in 1988. Currently, Steller sea lions are a species of special concern under the Alaska Endangered Species Act.[176] According to NMFS,[177] the Eastern DPS is stable or increasing in the northern portion of its range (Southeast Alaska and British Columbia). A 2002 aerial survey counted 20,160 sea lions in Southeast Alaska.[178] In 2008, the first complete aerial survey since 2002 confirmed a population increase of roughly 3 percent for Southeast Alaska.[179]~~

~~Steller sea lions feed on a wide variety of prey, such as pollock, mackerel, flounder, herring, crab, rockfish, cod, salmon, eulachon, capelin, squid, and octopus. Feeding occurs from the intertidal zone to the continental shelf.[180] Critical habitat has been defined in Southeast Alaska within 3,000 feet of major haulouts and major rookeries[181] (50 CFR 226.202). The nearest rookery to Ketchikan is Forrester Island, and the nearest major haulouts (i.e., onshore areas where sea lions gather) are at Timbered Island and Cape Addington.[182] All three sites are about 80 miles west of Tongass Narrows.~~

~~There are no established haulout sites in Tongass Narrows. Grindall Island, 12 miles west of the northern tip of Gravina Island, is a year-round sea lion haulout but not a rookery, and appears to be the haulout area nearest the project area. ADF&G has done aerial surveys of this site over a number of years (1982 through 1996); while it has never recorded animals there in summer (June and July), it has counted more than 200 animals during winter counts conducted in March 1993 and December 1994.[183] The sea lions have been observed in Tongass Narrows around the fish hatchery, where large numbers of salmon congregate in late summer. In Ketchikan harbor itself, daily sightings of sea lions are not unusual in winter; fewer sightings occur in summer, when the harbor is busier.~~

~~Steller sea lions have not been specifically studied or counted in Tongass Narrows. There is, however, informed anecdotal information from a member of the marine mammal stranding~~

~~175 Masden, Michelle. November 20, 2003. Personal communication between owner of Island Wings Air Service and John Wolfe, HDR.~~

~~176 Alaska Department of Fish and Game. <http://www.adfg.state.ak.us/special/esa/sealion_steller/s_sealion.php.> Accessed April 11, 2009.~~

~~177 National Marine Fisheries Service. 2008. *Alaska Marine Mammal Stock Assessments, 2007*. NOAA Technical Memorandum NMFS-AFSC-180.~~

~~178 National Marine Fisheries Service. March 2008. *Recovery Plan for the Stellar Sea Lion: Eastern and Western Distinct Population Segments (*Eumatopias jubatus*), Revised*. National Marine Fisheries Service, Silver Spring, MD.~~

~~179 National Marine Fisheries Service. November 17, 2008. *Survey of Adult and Juvenile Stellar Sea Lions, June – July 2008.* Available online at http://www.afsc.noaa.gov/nmml/pdf/SSLNon-Pups2008memo.pdf. Accessed April 11, 2009.~~

~~180 Alaska Department of Fish and Game September 5, 2002. *Wildlife Notebook Series: Steller Sea Lions.* Available online at http://www.state.ak.us/adfg/notebook/marine/sealion.htm.~~

~~181 A rookery is a place where animals, such as sea lions, gather to breed and give birth.~~

~~182 National Marine Fisheries Service. 2005. *Designated Steller Sea Lion Critical Habitat in Southeast Alaska: Major haulouts and rookeries in Southeast Alaska.* Available online at http://www.fakr.noaa.gov/protectedresources/stellers/maps/se_ssl_ch.pdf. Accessed April 11, 2009.~~

~~183 Gerke, Brandee. November 19, 2003. Personal communication between National Marine Fisheries biologist, Juneau, and John Wolfe, HDR.~~

~~network,[184] an ADF&G biologist,[185] and a spotter pilot,[186] all based in Ketchikan, to indicate use of the area. Sea lions may be found in Tongass Narrows year round, although the numbers are small much of the year. There is a peak in activity between March and early May, corresponding to the herring spawning season. At this time, it is reported that large pods of sea lions may occur in the area (20 to 80 animals are possible). In summer, most sea lions move to large rookeries (such as Forrester Island) for pupping and the next mating cycle. Small numbers of non-mating animals remain in the Tongass Narrows area, but are seen infrequently. There is another small peak in activity in late summer, associated with salmon.~~

~~NMFS reports concerns about fishing-related injury and mortality, such as entanglement in fishing gear. Other causes of mortality are also reported (subsistence hunting, illegal shooting, elimination of sea lions to protect aquaculture in British Columbia, etc.). There is no indication of substantial problems related to construction.~~

3.21 Historic and Archeological Resources

3.21.1 Background and Identification of Historic Properties

Section 106 of the National Historic Preservation Act (as outlined in 36 CFR Part 800) and the Alaska Historic Preservation Act (AS 41.35.010-41.35.240) address the treatment of cultural resources in cases where effects to historic properties may occur as a result of proposed federal undertakings. The National Historic Preservation Act defines “historic properties” as prehistoric and historic districts, sites, buildings, structures, and objects listed in or eligible for listing in the ~~National Register of Historic Places (~~NRHP~~)~~, including artifacts, records, and material remains related to such properties (54 USC § 300308~~16 USC 470w, Sec. 301.5~~).

FHWA initiated the Section 106 process for the proposed project in 1999 to identify potential adverse impacts of proposed project alternatives on historic properties. This effort has included consultation with the SHPO; tribal governments and Native corporations, including the Organized Village of Saxman, Ketchikan Indian Community, Metlakatla Indian Community and the Cape Fox Corporation; the City of Ketchikan (the certified local government); and the Borough.

3.21.2 Overview: Prehistory and History

The following paragraphs are excerpts from the Archaeological Reconnaissance Survey for the Gravina Access Project,[187] which provide an overview of the historic context for the project area:

> **Prehistory**
>
> To date, archaeologists have recorded more than 2,100 sites in southeastern Alaska. A large percentage of these are shell middens, although numerous other types of prehistoric and historic resources are known (Autry 1992). A four-part cultural sequence for southeastern Alaska proposed by Davis (1990:197) includes a Paleomarine tradition (9000-4500 B.C), a Transitional stage (4500-3000 B.C.), a Developmental Northwest Coast stage (3000 B.C. to European contact), and a Historic period.
>
> The Paleomarine tradition is used to define the earliest cultural stage yet identified within coastal southeastern Alaska. It is characterized by a well-developed microblade industry

~~184 Frietag, Gary. February 23, 2000. Personal communication between National Marine Fisheries Service and HDR.~~

~~185 Porter, Boyd. November 20, 2003. Personal communication with HDR.~~

~~186 Masden, Michelle. November 19, 2003. Personal communication between owner and pilot for Island Wings Air Service, Ketchikan, and John Wolfe, HDR.~~

187 Yarborough. November 2001. Archaeological Reconnaissance Survey, Gravina Access Project, p.2-1–2-2.

with wedge-shaped microblade cores, few or no bifacial tools, and an economy based on coastal-marine subsistence (Davis 1990:197). The Paleomarine tradition is followed by a transitional stage. While this stage has not been well defined, its existence is inferred because of the appearance of a ground stone tool industry that became dominant over the microblade and unifacial stone tool industry by 5,000 years ago. The Developmental Northwest Coast stage is differentiated from the Paleomarine and Transitional stages by the presence of shell midden deposits, ground stone and bone technology, human burials, and the establishment of large settlements or winter villages, specialized camps, and fortification.

Ethnography

The early historic Native peoples of southeastern Alaska represent three broad groups: the Tlingit, the Alaska Haida (Kaigani), and the Tsetsuat (Tsimshian). Of these, the Tlingit are the most widespread and numerous within the region. Ethnographic Tlingit culture included an economy based upon fish (particularly anadromous fish); settled villages; a sophisticated wood working industry; a highly developed and distinctive art form; a social organization structured around lineages, clans and phratries; and a ritual life focused upon totemism, shamanism, and the attainment of status through potlatching. Traditionally, Tlingit villages were occupied in winter, but usually deserted in summer, when families dispersed to fishing and hunting camps. Village sites were preferably located on sheltered bays, with views of the approaches. A sandy beach was important for landing canoes and for access to salmon streams, fresh water, timber, and hunting, fishing, and gathering grounds.

At the time of historic contact, the Ketchikan area was situated within the territory of the Tongass (Tan-ta kwan) Tlingit. The last village of the Tongass before they moved to Ketchikan was south of Nakat Inlet on Tongass Island (Goldschmidt and Haas 1946:140) There was a Tongass summer fishing camp at Ketchikan Creek by 1881 (Welsh 1999:6) and the 1883 Coast Pilot noted three Tlingit Houses in the area. However, except for a totem pole, all evidence of this Native settlement has apparently been destroyed by modern construction (Sealaska Corporation 1975:90). On Gravina Island, at the head of Vallenar Bay, there were Tongass Wolf clan smokehouses. At Bostwick Inlet there was a large summer village that was used by the Tongass for drying fish and meat and gathering berries (Goldschmidt and Haas 1946:142). Saxman was founded in 1894 by Cape Fox Natives (Roppel 1998:10-11).

Euroamerican

Ketchikan began as a fishing town, although it quickly grew into a regional hub supplying surrounding communities and nearby mining and logging camps. Settlement began in the area around Ketchikan Creek, where a fish saltery was built in 1884. A second saltery was located at Ward Cove at about the same time. The Ketchikan Cannery was established in 1889 and a year later George Clark and Mike Martin opened a trading post at the mouth of Ketchikan Creek (Welsh 1999:6; Yarborough 2003).[188]

Following the establishment of salteries at Ketchikan Creek and Ward Cove, the area became a supply center for the 1890s gold rush. The resulting influx of settlers and gold miners increased the population to nearly 500 by 1900, the year Ketchikan was incorporated as a city. Increased demand for canned salmon in the 1910s brought cannery investors to the region and the cannery industry began in earnest. Around 1910, J.R. Heckmann invented the floating fish trap, which allowed canneries to take in enormous amounts of fish, holding them alive until they could

[188] Yarborough. November 2001. Archaeological Reconnaissance Survey, Gravina Access Project, p.2-1–2-2.

be processed. With the start of the First World War, demand for canned fish was further boosted, and by the 1920s, "fishing had made Ketchikan the most populous city in Alaska."[189]

Timber played an equally important role in the development of Ketchikan. The creation of the Tongass National Forest in 1907 spurred the creation of a thriving timber industry, which supplied the fishing industry with lumber for cannery crates, fishing boats, employee housing and more. By 1959, when fish traps were outlawed following passage of the Alaska Statehood Act, Ketchikan Spruce Mills was producing construction materials and exporting lumber to Japan, and the Ketchikan Pulp Mill had begun operating in Ward Cove. In the first half of the 1950s, construction and operation of the pulp mill resulted in 1,000 year-round full-time jobs. USFS, in response to the influx of workers and their families, developed new roads and opened areas north of town to housing development. Home sites were cleared in the hillsides above the town, and high-rise apartment complexes were built on the West end of town.[190]

3.21.3 Area of Potential Effect

Regulations implementing Section 106 of the National Historic Preservation Act define an Area of Potential Effect (APE) as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 Code of Federal Regulation [CFR] 800.16[d]). The APE for the proposed Gravina Access Project has been influenced by the scale and nature of the undertaking, and varies in size to accommodate different types of potential adverse impacts. For construction-related (temporary) impacts and permanent direct impacts, FHWA, in consultation with SHPO and Section 106 consulting parties, has determined that the APE for the project consists of the project footprint, extending to a 100-foot wide buffer zone around project facilities and to either side of road rights-of-way for each alternative.

The scenic setting of Ketchikan and Tongass Narrows influenced the determination of the APE for impacts related to alteration of historic viewsheds. The overall setting and visual quality of the project area juxtaposes urban and natural landscape elements. Potential effects may be most notable in proximity to bridge structures and ferry terminals, which to varying degrees would present new visual elements in most viewsheds.[191] Some action alternatives have the potential to introduce audible, atmospheric, or visual elements, and affect key viewpoints throughout the project area, in addition to the direct impacts of the construction footprint. Consequently, each action alternative will have a different APE for indirect effects, shown on Figure 3.19 and detailed below.

3.21.4 Resource Inventory

A literature review and primary field reconnaissance surveys were completed in the summers of 2001 and 2002 in support of the 2004 FEIS for the Gravina Access Project. Cultural resources reports were completed as project planning progressed.[192] Following consultation with SHPO for ~~this~~ the 2013 Draft SEIS, those studies were updated with a reconnaissance survey of the built environment in October 2011, an archaeological reconnaissance survey of the Alternative C3-4

[189] Historic Ketchikan Inc. 2003:58.

[190] Allen 1992.

[191] Alaska Department of Transportation and Public Facilities. 2001. *Gravina Access Project. Visual Impacts Assessment Technical Memorandum.* Prepared by Millard + Peters Architects, LLC. for HDR Alaska.

[192] Alaska Department of Transportation and Public Facilities. June and July 2002. *Gravina Access Project. Archeological Reconnaissance Survey (Draft)*. Prepared for HDR Alaska by Cultural Resource Consultants. Anchorage. Updated by memoranda from Mike Yarborough, Cultural Resource Consultants to Mark Dalton, HDR Alaska; Yarborough. November 2001. *Archaeological Reconnaissance Survey, Gravina Access Project* (Yarborough 2000 and 2003).

APE on Revillagigedo Island in January 2012, and additional reconnaissance of the built environment in May 2012. Reconnaissance surveys were also conducted in support of DOT&PF's Gravina Mill Access Road Project in 2014 and 2015: these consisted of a cultural resources inventory of approximately three miles along Gravina Mill Road, northwest of Ketchikan International Airport[193] and a supplemental cultural resources inventory to assess impacts to three bridges along the roadway[194] (Kell 2015). The literature review and results of field reconnaissance efforts are summarized below.

3.21.4.1 Research History

Prior to field reconnaissance surveys conducted for the proposed project in the 2000s, cultural resource investigations in the Ketchikan area had been limited. Archaeological investigations had been completed in localized archaeological surveys and evaluation of a prehistoric site at Refuge Cove on Revillagigedo Island.[195] Additionally, Douglas Reger and Robert Shaw of the Alaska Division of Geological & Geophysical Surveys examined reported grave locations on Pennock Island in the early 1980s,[196] and Charles Mobley inventoried facilities at the USCG Station and Point Higgins in 1995. Tongass National Forest archaeologists also conducted a survey in 2000 along the northeastern shore of Gravina Island in the vicinity of the airport. The reconnaissance surveys conducted along the Gravina Mill Road Project in 2014 and 2015 did not result in the identification of historic properties; therefore, DOT&PF recommended a finding of no adverse effect for that project[197].

Ethnographic accounts record a number of specific localities used by the Tlingit in the Ketchikan area. Numerous historic sites along the shores of Tongass Narrows are also mentioned in Roppel's geographical and historical guide to Revillagigedo and Gravina Islands.[198] Other sites are depicted on various federal surveys on the early settlement of Gravina and Pennock islands.[199]

On Pennock Island, there is a late nineteenth century and early twentieth century cemetery.[200] This cemetery was originally a burial ground of the Saxman Tlingit, although the general population of Ketchikan also later used it.[201] Tribal input received during consultation for this project raised the possibility of other graves being located on Pennock Island and additional consideration was given to the APE in identifying any other gravesite locations; however, none have been identified to date in the APE.

[193] Pollnow, Anne, and Peterson, Ryan. 2016. Gravina Mill Road Reconstruction Cultural Resources Inventory NRHP Evaluations of Historic Properties. Report prepared by Sea Level Consulting, Sitka, Alaska, and Amec Foster Wheeler, Bothell, Washington, under contract to LEI Engineering and Surveying, LLC, Anchorage, Alaska.

[194] Kell, Michael. 2015. Seley Mill Access Road Supplemental Cultural Resource Evaluation. Alaska Department of Transportation and Public Facilities, Juneau, Alaska.

[195] Yarborough 2003.

[196] Reger and Shaw 1982:3.

[197] Kell 2015

[198] Roppel, Patricia. 1998. Land of Mists, Revillagigedo & Gravina Islands, Misty Fiords National Monument. Farwest Research, Wrangell, Alaska.

[199] Crowther 1913, Crowther 1924, Dahlquist 1926; Dahlquist 1928, Pickering 1957.

[200] Sealaska Corporation. 1975. *Native Cemetery & Historic Sites of Southeast Alaska.* Submitted to Sealaska Corporation by Wilsey & Ham, Seattle, Washington.

[201] Roppel, Patricia. 1998. Land of Mists, Revillagigedo & Gravina Islands, Misty Fiords National Monument. Farwest Research, Wrangell, Alaska.

3.21.4.2 Resource Inventory

The Alaska Heritage Resources Survey (AHRS) has documented 87 resources located within the APE, of which the vast majority are historic buildings concentrated in Ketchikan (see Section 3.21.5). Of these 87 resources, ten have been declared eligible for listing in the NRHP, 72 have been determined not eligible, and the remaining five are unevaluated. Eligibility is based on meeting one or more National Register evaluation criteria, where:

- Criterion A refers to properties that are associated with events that have made a significant contribution to the broad patterns of our history.
- Criterion B refers to properties that are associated with the lives of persons significant in our past.
- Criterion C refers to properties that embody distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.
- Criterion D refers to properties that have yielded, or may be likely to yield, information important in prehistory or history.

Once an alternative is selected, any remaining unevaluated properties within that alternative will be evaluated further for NRHP eligibility. Details on identified historic properties in the APE are included in Table 3-26 and discussed by alternative below.

Table 3-26: List of Identified Historic Properties in the APE

AHRS No.	Type	NRHP Criterion
KET-279	USCG Headquarters Building	Criterion A
KET-542	USCG Buoy Shed	Criterion A
KET-546	USCG North Pyrotechnic Bunker	Criterion A
KET-548	USCG Machine Gun Emplacement	Criterion A
KET-774	Two Cabins Homestead	Criterion D
KET-775	Historic-era homestead	Criterion D
KET-974	USCG Cutter *Acushnet*	Criteria A, C
KET-1135	South Tongass Highway[a]	N/A
KET-1204	TEMSCO Quonset Hut	Criterion A
KET-1302	Hansen Homestead	Criterion A

[a] Considered eligible on a list of roads that FHWA, DOT&PF, and SHPO have agreed to manage as eligible until a context for roads in Alaska has been completed and listed roads can be formally evaluated within that context.

3.21.4.3 Culturally Modified Trees

Lewis Point and other areas along the Gravina Island shoreline contain small densities of culturally modified trees. Guidance from the ~~Alaska Office of History and Archaeology (~~OHA~~)~~ states that such trees are typically not eligible for listing in the NRHP or recorded in the AHRS unless they 1) are unique; 2) show process; or 3) are present in high densities in defined groves.[202] Based on this guidance, culturally modified trees at Lewis Point and elsewhere along Gravina Island and in the APE were not considered further as potential historic properties.

[202] OHA n.d.

3.21.5 Historic Properties within the APE

The following sections describe historic and archeological resources identified in the APE for each alternative. Eligibility status, if known, is included in the description.[203]

3.21.5.1 Alternative C3-4 APE

The APE for Alternative C3-4 includes the area of construction impacts, as well as an indirect APE for visual, audible, and atmospheric effects (see Figure 3.19). This indirect APE ~~currently~~ incorporates the Shoreline Drive neighborhood, Bucey Avenue, and Larson and Baker Streets, as well as the area around Don King Drive, including buildings along the North Tongass Highway between Don King Drive and the gravel quarry immediately north of Charcoal Point. Clam Cove on Gravina Island and the north end of Pennock Island also fall within the indirect APE.

A total of 53 AHRS sites are located within the Alternative C3-4 APE. Thirty-five of the sites are historic buildings located on Revillagigedo Island. The remaining 18 are located on Pennock Island (15 sites) and Gravina Island (3 sites).

Gravina Island. Three AHRS sites are located within the indirect APE for Alternative C3-4 on Gravina Island, at Clam Cove. All three sites have been evaluated and determined to be not eligible for listing in the NRHP.

Revillagigedo Island**.** A total of 35 recorded historic buildings are located within the indirect APE for Alternative C3-4, in the Shoreline Drive, North Tongass Highway and Baker-Bucey neighborhoods. Thirty-four of the buildings have been evaluated and determined to be not eligible for listing in the NRHP, and one building, KET-1204, the TEMSCO Quonset Hut, is eligible for listing in the NRHP under Criterion A for its association with aviation, particularly the introduction of the helicopter to the region.

Pennock Island**.** Fifteen AHRS sites fall within the indirect APE on Pennock Island. Of these sites, KET-801, the historic cemetery discussed previously is unevaluated, and KET-1302 is eligible for listing in the NRHP under Criterion A for its association with homesteading and Ketchikan's early development. The remaining 14 sites, all historic buildings, have been evaluated and determined to be not eligible.

3.21.5.2 Alternative F3 APE

The APE for Alternative F3 includes the area of construction impacts, as well as an indirect APE for visual, audible, and atmospheric effects (Figure 3.19). Based on reconnaissance viewshed analysis, the indirect APE on Revillagigedo Island encompasses the area around the USCG Station on South Tongass Highway, extending southward to the Forest Park Neighborhood. On Pennock Island, an additional APE for indirect effects was identified on the East Coast of Pennock Island from Whiskey Cove to approximately 1 mile south (see Figure 3.19). The northern portion of Clam Cove is also included within the APE for indirect effects.

A total of 29 AHRS sites are recorded in the APE for Alternative F3. Three of these sites are located on Gravina Island: KET-802, KET-775, and KET-1013; one is located on Pennock Island: KET-774; and the remaining 25 recorded AHRS sites are located on Revillagigedo Island.

Gravina Island**.** KET-1013, the historic USFS Marine Station has been determined to be not eligible, while KET-775, a historic homestead, has been determined eligible under Criterion D

[203] To protect these resources, the locations of historic properties are not shown, as outlined in FHWA Technical Advisory T6640.8A.

for its potential to contain information important in Ketchikan's community history.[204] KET-802, a historic archaeological site, will be evaluated if Alternative F3 is selected.

***Revillagigedo Island*.** Fifteen of the recorded AHRS sites located in the APE for Alternative F3 are situated at the USCG Station established in 1941. Of these 15, 10 sites have been evaluated and determined ineligible for listing in the NRHP, while four have been evaluated and determined eligible. The four eligible sites are: KET-279, the USCG Headquarters Building, eligible under Criterion A for its association with the development of transportation and commerce in Alaska; KET-549, the North Pyrotechnic Bunker, eligible under Criterion A for its association with Alaska's preparation for and involvement in World War II; KET-548, the Machine Gun Emplacement, eligible under Criterion A for its role in the defense of Base Ketchikan during World War II; and KET-974, the USCG Cutter *Acushnet,* eligible under both Criteria A and C, for its association with the maritime heritage of oceanographic research and search and rescue operations (A) and as the only extant cutter in its class in the USCG (C)[205]. Only one site at the base, KET-599 (the Buoy Tender Planetree) remains formally unevaluated.

Remaining recorded sites on Revillagigedo Island consist of eight historic houses along South Tongass Highway (KET-776, KET-1240 through KET-1246) which have been evaluated and determined not eligible for listing in the NRHP; and KET-435, an unevaluated historic-era trash dump.

The South Tongass Highway, KET-1135, is considered eligible for listing in the NRHP;[206] although the highway has not been formally evaluated, it is on a list of roads that FHWA, DOT&PF, and SHPO have agreed to treat as eligible until the historic context for roads in Alaska is completed and listed roads can be evaluated within that context.

***Pennock Island*.** Only one recorded site is located within the Alternative F3 APE on Pennock Island. The site, KET-774, has been determined eligible for listing in the NRHP under Criterion D for its potential to contain information important in Ketchikan's community history.[207]

3.21.5.3 Alternative G2 APE

The APE for Alternative G2 includes the area that would be directly affected by development of facilities at Peninsula Point and Lewis Point, the area affected by development of the ferry layup dock and heavy freight facility (applicable to all ferry alternatives), as well as an indirect APE incorporating the Shoreline Drive neighborhood (see Figure 3.19). Although development of the Peninsula Point terminal is consistent with existing development on Peninsula Point, ferry operation has the potential to introduce new audible and atmospheric elements to the Shoreline Drive neighborhood.

There are ~~27~~ 28[208] AHRS sites located in the Alternative G2 APE. Of these, ~~26~~ 27 sites have been determined not eligible for the listing in the NRHP (KET~~-~~-556, KET-670, KET-811, KET-1205 through KET-1227) and one site has been determined eligible (KET-1204).[209]

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[204] OHA 2011.

[205] USCG 2006.

[206] DOT&PF 2010.

[207] OHA 2011.

[208] KET-811 was added when the APE was expanded in 2016 to include previously omitted elements of the ferry alternatives.

[209] OHA 2011.

3.21.5.4 Alternative G3 APE

The ferry terminals, access routes, and related facilities associated with Alternative G3 are compatible with existing development and would introduce no new visual, atmospheric, or audible elements that would be inconsistent with existing development. Consequently, the APE is defined by the development footprint of Alternative G3 and the area affected by development of the ferry layup dock and heavy freight facility (applicable to all ferry alternatives). ~~(s~~See Figure 3.19~~)~~.

~~One~~ Two AHRS sites ~~is~~are recorded in the APE under Alternative G3, KET-800 (East Clump Homesteads) and KET-811 (Building 200)[210], and one AHRS site is near the APE, KET-956 (USCG and Geodetic Boat House and Boat Way Ruins). All three ~~Both~~ are located on Gravina Island. KET-956 and KET-811 have~~s~~ been evaluated and determined not eligible for listing in the NRHP.[211] KET-800 consists of numerous remains of early twentieth century homesteads and has not yet been formally evaluated for NRHP listing.

OHA archaeologists and historians evaluated two buildings in the Bar Point area—the Market Place and Union Oil Station—during a 1990 study of the potential effects of the Tongass Avenue Capacity Improvements Project. However, neither of these resources, dating from the 1970s and 1980s, met age criteria to be considered NRHP eligible. These sites are still less than 50 years old and therefore do not meet age thresholds for NRHP evaluation.

Field reconnaissance identified no additional historic buildings or sites within the APE for Alternative G3.[212]

3.21.5.5 Alternatives G4 and G4v APE

The ferry terminal and facilities associated with Alternative G4 and G4v are consistent with existing development at Charcoal Point and the airport; consequently, the APE is defined by the development footprint of this alternative, including the area affected by development of the ferry layup dock and heavy freight facility (applicable to all ferry alternatives). ~~(~~See Figure 3.19~~)~~.

~~Two~~ One recorded site is ~~are~~ located within the Alternative G4~~/~~ and G4v APE: KET-811~~ and KET-033~~. KET-811, located on Gravina Island, was evaluated in 2000 and determined not eligible for NRHP listing.[213] ~~KET-033 (Sunny Point Cannery), located on Revillagigedo Island, has been demolished.~~

3.22 Hazardous Waste Sites

Known and potential hazardous waste sites in the project area were identified through review of the following federal and state databases:

- Resource Conservation and Recovery Act (RCRA) Information System; identifies RCRA handlers, including generators, transporters, used oil handlers, and permitted treatment, storage, and disposal facilities
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Information System
- ADEC Contaminated Sites Database; includes state-listed spill sites, contaminated sites, and sites with leaking underground storage tanks (LUSTs).

[210] KET-811 was added when the APE was expanded in 2016 to include previously omitted elements of the ferry alternatives.

[211] OHA 2011.

[212] HDR 2011.

[213] OHA 2011.

Sites located in the project area were mapped by using coordinates available in the searchable databases as well as borough parcel address records. Sites within approximately one-quarter mile of the proposed alternatives were determined to have potential to impact the project alternatives. These sites were reported in the tables below and included in mapping and discussion of potential consequences.

No search of historical sources, such as aerial photographs, or city directories was conducted and no interviews were conducted. In addition, no review of regulatory files was conducted for this analysis.

The analysis did not identify any CERCLA sites within the project area. The database search for RCRA handlers[214] identified 18~~15~~ sites within approximately one-quarter mile of the proposed alternatives. RCRA handlers are listed in

Table 3-27 and are depicted on Figure 3.20. No RCRA-permitted treatment, storage, or disposal facilities are located within the project area. One transporter was identified. Of the remaining 17~~14~~ handlers in the RCRA Information System, all are either conditionally exempt small quantity generators (generating less than 100 kilograms per month of hazardous waste), or inactive, or are used oil handlers.

Based on review of the ADEC Statewide Contaminated Sites Database[215] and LUST Program Database,[216] there are five~~three~~ known contaminated properties and eleven~~eight~~ LUST sites within approximately one-quarter mile of the project alternatives (note that the DOT&PF Main Shop has two separate recorded incidents at the same location). The properties and sites are identified in Figure 3.20 and their locations and status of cleanup are provided in Table 3-28 and Table 3-29. Of these sites, none of the sites are open cases, and Harbor Point, Bailey Power Plant, and Westside Service Station are under institutional controls because soil contaminants remain above ADEC cleanup standards. The remainders are listed as cleanup complete by ADEC.

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[214] Environmental Protection Agency. 2012. *Envirofacts RCRAInfo Database.* < http://www.epa.gov/enviro/facts/rcrainfo/search.html>, September 26, 2012.

[215] Alaska Department of Environmental Conservation. 2012. *Contaminated Sites Database.* <http://dec.alaska.gov/spar/csp/db_search.htm>, September 25, 2012.

[216] Alaska Department of Environmental Conservation. 2012. *LUST Program Database.* <http://dec.alaska.gov/spar/csp/db_search.htm>, September 25, 2012.

Table 3-27: Handlers Identified in the RCRIS Database (2016) [Updated]

Facility Name and Location	RCRA Identification Number and Type	Potentially Affected Alternative
ADEC Ketchikan Public Works (3915 N. Tongass Ave; map ID 15)	AKD980983258 Conditionally Exempt Generator (CEG)	G4~~/~~ and G4v
Alaska Airlines Ketchikan (1200 Airport Terminal Building; map ID ~~10~~11)	AKD983069592 CEG	C3-4, G4,~~/~~ and G4v
South Coast, Inc. (4049 Tongass Avenue; map ID ~~13~~14)	AK0001005297 Transporter, Used Oil Program	G4~~/~~ and G4v
Temsco Helicopters (5411 North Tongass Hwy; map ID 3)	AKD983076407 CEG	G2
DOT&PF State Troopers Maintenance Facility (5158 N. Tongass Ave; map ID 5)	AKR000200972 CEG	C3-4
Ketchikan Marina (Seaborne Marine) (5497 Tongass Avenue; map ID 1)	AKR000200998 CEG	G2
Seaborne Marine Services (5459 N. Tongass Avenue; map ID 2)	AK0000968909 Used Oil Program~~oil handler~~	G2
Taquan Air Service, Inc. (Airport Way Hangar 1; map ID ~~11~~12)	AKR000004580 Listed as inactive since 2001	C3-4, G4, and ~~/~~G4v
Taquan Air Service, Inc. (Temsco Hangar) (Mi 5 N Tongass Hwy; map ID 4)	AKR000003756 Listed as inactive since 2001	G2
N C Machinery Co. (152 Eichner; map ID 7)	AKR000003905~~75812~~ Listed as inactive since 2001	C3-4
Ketchikan Autobody and Glass (4979 Rex Allen Dr.; map ID 9)	AKR000201012 CEG	C3-4
Highliner Dry Cleaner (2703 Tongass Avenue; map ID ~~16~~17)	AKD983068982 Listed as inactive since 2004	G3
Walmart #2710 (4230 Don King Rd; map ID 8)	AKR000004770 CEG	C3-4
Tyler Rental, Inc. (5216 Borch St.; map ID 6)	AKR000004242 CEG	C3-4
Petro Alaska, Inc. (4161 Tongass Avenue; map ID ~~12~~13)	AKR000202416 Used Oil Program~~oil handler~~	G4~~/~~ and G4v
Vigor Alaska Ship and Drydock, Inc. (3801 Tongass Avenue, map ID 16)	AKD98179821 CEG	G4~~/~~ and G4v
Karlson Motors (5010 N. Tongass Avenue, map ID 10)	AKR000206326 CEG	C3-4
Safeway Store #1818 (2417 Tongass Ave; map ID 18)	AKR000205708 CEG	G3

Source: Environmental Protection Agency, Region 10. *Enforcement and Compliance Online Database*: <http://www.epa.gov/enviro/facts/rcrainfo/search.html>; accessed ~~September 26, 2012~~December 30, 2016.

Table 3-28: Known Contaminated Sites from Statewide Contaminated Sites Database (2016) [Updated]

Site Name and Location	Problem	Potentially Affected Alternative	Spill Date ID # Status
Ketchikan Credit Union (2444 Hemlock Avenue; map ID 19)	DRO contaminated soil discovered during new construction from two historical heating oil tank spills from adjacent property; Contaminated soil removed and site closed in 2007	G3	11/14/2000 #3292 Cleanup complete
Harbor Point (formerly South Coast, Inc.) (4049 N. Tongass Avenue; map ID ~~17~~21)	Heating oil, gas, and diesel underground storage tanks (USTs) removed in 2006; subsurface soil contains diesel-range organics above ADEC soil cleanup standards. Institutional controls in place.	G4~~/~~ and G4v	6/21/2006 #4346 Cleanup complete with institutional controls
Bailey Power Plant (3935 Tongass Avenue, near airport ferry dock; map ID ~~18~~20)	Diesel contamination in soil from buried fuel line leak; unknown quantity; Contaminated soil removed to the extent practicable. Remaining soil above ADEC Cleanup standards near and under building.	G4~~/~~ and G4v	10/30/1996 #2555 Cleanup complete with institutional controls
Ketchikan Airport Hangar #3 HOT (Ketchikan Int'l Airport; map ID 22)	Diesel contamination from heating oil tank overfills. Method 1, Level C cleanup levels met.	C3-4, G4~~/~~ and G4v	#3285 Cleanup complete
North Residence (599 Salmonberry Circle; map ID 23)	Diesel contamination. Excavation is clean (Level A), 2000. Stockpiled soil treated at Petro Marine Ketchikan facility in 2006.	F3	#3138 Cleanup complete

Source: Alaska Department of Environmental Conservation. 2012. *Contaminated Sites Database*. <http://dec.alaska.gov/spar/csp/db_search.htm>, accessed January 3, 2017~~September 25, 2012~~.

Table 3-29: Known Contaminated Sites from Statewide LUST Program Database (2016) [Updated]

Site Name and Location	Problem	Potentially Affected Alternative	Spill Date; ID #; Status
76 Products Co. Service Station #6263 (2536 Tongass Avenue; map ID ~~24~~26)	Release of unknown volume of unidentified fuel in 1995. Site closure approved by ADEC in 1998.	G3	12/14/95 #24449 Cleanup complete
Westside Service Station (2425 Tongass Avenue; map ID 25)	Gasoline contamination discovered during UST closures on 6/5/97. UST closed in place. gasoline-range organics, benzene, toluene, ethylbenzene, and xylenes in soil remain above ADEC cleanup standards.	G3	7/8/1998 #24791 Cleanup complete with institutional controls
Madison Lumber & Hardware (2557 Tongass Avenue; map ID ~~23~~24)	Excavated soils sampled during UST removal found to be below cleanup levels; tanks removed; soils placed back in hole	G3	1/17/1996 #24934 Cleanup complete
Ketchikan International Airport Maintenance Building (1000 Airport Terminal Building; map ID 27)	DRO contaminated soil (2 cubic yards, ~13,000 parts per million) removed from beneath former diesel dispenser; no contamination identified in are of 5,500 gallon UST closed in place.	C3-4, G4~~/~~ and G4v	7/6/2001 #24498 Cleanup complete
City of Ketchikan	Diesel-range organics detected in soil during	C3-4, G4~~/~~ and	#26543

Charcoal Point Wastewater Plant (3921 Tongass Ave; map ID 28)	2016 removal of UST #1. Contamination was traced vertically and horizontally; soil shipped to Roosevelt Regional MSW Landfill for disposal. Post-excavation samples indicated no contamination remained above cleanup levels.	G4v	Cleanup complete
DOT&PF Ketchikan Airport Ferry Terminal (4233 Tongass Ave; map ID 30)	A 500-gallon UST was installed in 1998, removed in 2013. During removal activities, no visual or olfactory evidence of contamination were noted. Soil samples did not exceed Level A cleanup levels.	C3-4, G4~~/~~ and G4v	#26169 Cleanup complete
Taquan Air (formerly Ketchikan Air Service Temsco) (Area 2 blk 400 Ketchikan Airport; map ID 31)	Site contamination below cleanup Level A in evacuated soils and tank excavation. Site closure approved in 1998.	C3-4, G4~~/~~ and G4v	#24694 Cleanup complete
Alaska Airlines Ground Support Equipment Building (Ketchikan International Airport; map ID ~~26~~32)	Database reports 2000 tank closed in 1992, and 20,000 gallon UST closure reported in 2008. Concentrations of contaminants were below ADEC soil cleanup standards.	C3-4, G4~~/~~ and G4v	9/5/1992 #24506 Cleanup complete
DOT&PF DPS Ketchikan Shop (5148 and 5150 N. Tongass Avenue; map ID ~~20~~33)	Diesel-range organics detected in soil during 2003 tank removal. Contaminated soil and water removed and stockpiled. Stockpile later sampled in 2007 and found to be below instrument detected and soil release for unrestricted use. Groundwater monitoring later conducted at facility.	C3-4	8/25/2003 #3991 Cleanup complete
DOT&PF Main Shop (5150 N. Tongass Avenue; map ID ~~21~~34)	Five UST site closures. Petroleum contamination in mixed sand and gravel just above bedrock. Soil and groundwater concentrations of diesel-range organics were below ADEC cleanup standards in 2008. Site is in long term monitoring.	C3-4	11/3/1993 #24910 9/11/2000 #23177 Cleanup complete
Ketchikan Public Works Warehouse (3915 Tongass Avenue; map ID ~~22~~29)	Diesel-range organics contamination (28 milligrams/kilogram) found in soil during UST removal; piping closed in-place; follow up tightness test allowed site closure in 1999	G4~~/~~ and G4v	5/25/1999 #23309 Cleanup complete

Source: Alaska Department of Environmental Conservation. ~~2012~~2017. *LUST Program Database*. <http://dec.alaska.gov/spar/csp/db_search.htm>, accessed January 3, 2017.~~September 25, 2012.~~

3.23 Visual Environment

The visual environment of Ketchikan and Tongass Narrows is defined by the natural and built features of the area. Natural features dominating the view include open water, the steep topography of Gravina and Revillagigedo Islands, and the heavily forested hillsides. The built environment includes the urban and shoreline development of Ketchikan, Ketchikan International Airport on Gravina Island, and those visual elements associated with the developed areas of Ketchikan, such as ships and boats, aircraft, automobiles, and buses.

Overall, the natural scenic quality of the Ketchikan area, and the combination of urban and natural landscape elements, define the visual quality of the project area.

3.23.1 Tongass Narrows Area

The visual environment of the project area is dominated by the natural features of Tongass Narrows and the steep mountain slopes characterizing the surrounding landmasses. The lush forests, rivers, lakes, and marine habitat enhance the scenery and create recreation and sightseeing opportunities for tourists and residents of the area. Views from Ketchikan are primarily over-water views toward nearby forested, mountainous islands. Waterfront areas are popular for wildlife viewing, picnicking, hiking, and sightseeing. Scenery viewing is among the most popular activities for visitors in the Ketchikan region. During the summer tourist season, increases in shipping and floatplane activity in Tongass Narrows create a perception of human dominance in the viewshed.

3.23.2 City of Ketchikan

The City of Ketchikan’s visual environment is dominated by a commercial and industrial waterfront, a downtown area with small multistory buildings, and hillside homes. Most land structures are small- to medium-scale buildings. Cruise ships in the downtown harbor area add a large visual element to the environment in summer.

3.23.3 Gravina and Pennock Islands

Natural features dominate views of Gravina and Pennock Islands from Ketchikan. Except for the airport and the former timber processing plant just north of the airport, Gravina Island is mostly undeveloped along Tongass Narrows. Pennock Island is developed only along its waterfront, and this development primarily consists of small residential structures with docks and watercraft.

3.23.4 Key Views

The project team established “key views” representing the visual quality of the project area and views that could be changed by construction of one or more of the project alternatives (Figure 3.21). The locations and directions of key views are shown on the figure. Each key view comprises water, sky, vegetation, natural landscape features, town buildings and structures, as well as other elements of the built environment (e.g., roads, utilities, and ships). Photographs of these key views are provided below. The alternatives associated with each view are noted parenthetically.

Key View 1: On South Tongass Highway south of USCG Station (looking north; Alternative F3).

Key View 2: USCG Station on East Channel (looking south, Alternative F3).

Key View 3: From the north end of Pennock Island (looking north, Alternative C3-4).

Key View 4: From Knob Hill (looking south, Alternative F3).

Key View 5: Across Tongass Narrows toward Gravina Island from the north parking area adjacent to Plaza Port West (looking northwest; Alternative G3).

Key View 6: From mid-Tongass Narrows near airport toward Pennock Island (looking south; Alternatives F3 and G3).

Key View 7: From Gravina Island shoreline near northern end of airport runway (looking north; Alternative G2).

Key View 8: From Shoreline Drive neighborhood near Peninsula Point (looking south, Alternative C3-4).

Key View 9: Across Tongass Narrows toward Gravina Island from Pioneer Heights Senior Housing (looking south, Alternative C3-4).

3.24 Energy

Energy use related to this project consists of fossil fuels used for transportation. Currently, project area residents and visitors use a combination of automobiles and ferries to travel between Revillagigedo and Gravina islands. Ships and boats in Tongass Narrows, floatplanes using Tongass Narrows, and other aircraft using the airport also use fuel and could be affected by alternatives that cross Tongass Narrows (including the airspace above the Narrows). Fuel in the Ketchikan area is supplied to local suppliers by ship and local energy requirements are met by these suppliers. Some air and marine craft are fueled outside the Borough in other communities or other states.

Current energy use for transportation to Gravina Island is predominantly related to the consumption of fossil fuel needed to operate the ferry. The amount of fuel that the ferry consumes can vary depending on the amount of wind on a given day. During the period from September 2, 2011, through September 4, 2012, the ferry used 72,332 gallons of diesel fuel.[217] This includes year-round operation of a single ferry and operation of a second ferry June through August. Section 4.24 provides a comparison of estimated fuel consumption by alternative.

[217] Kinney, Robin. October 17, 2012. Personal communication between Ketchikan International Airport secretary, and John Galloway, HDR. Information based on fuel invoices, September 2, 2011 through September 4, 2012.

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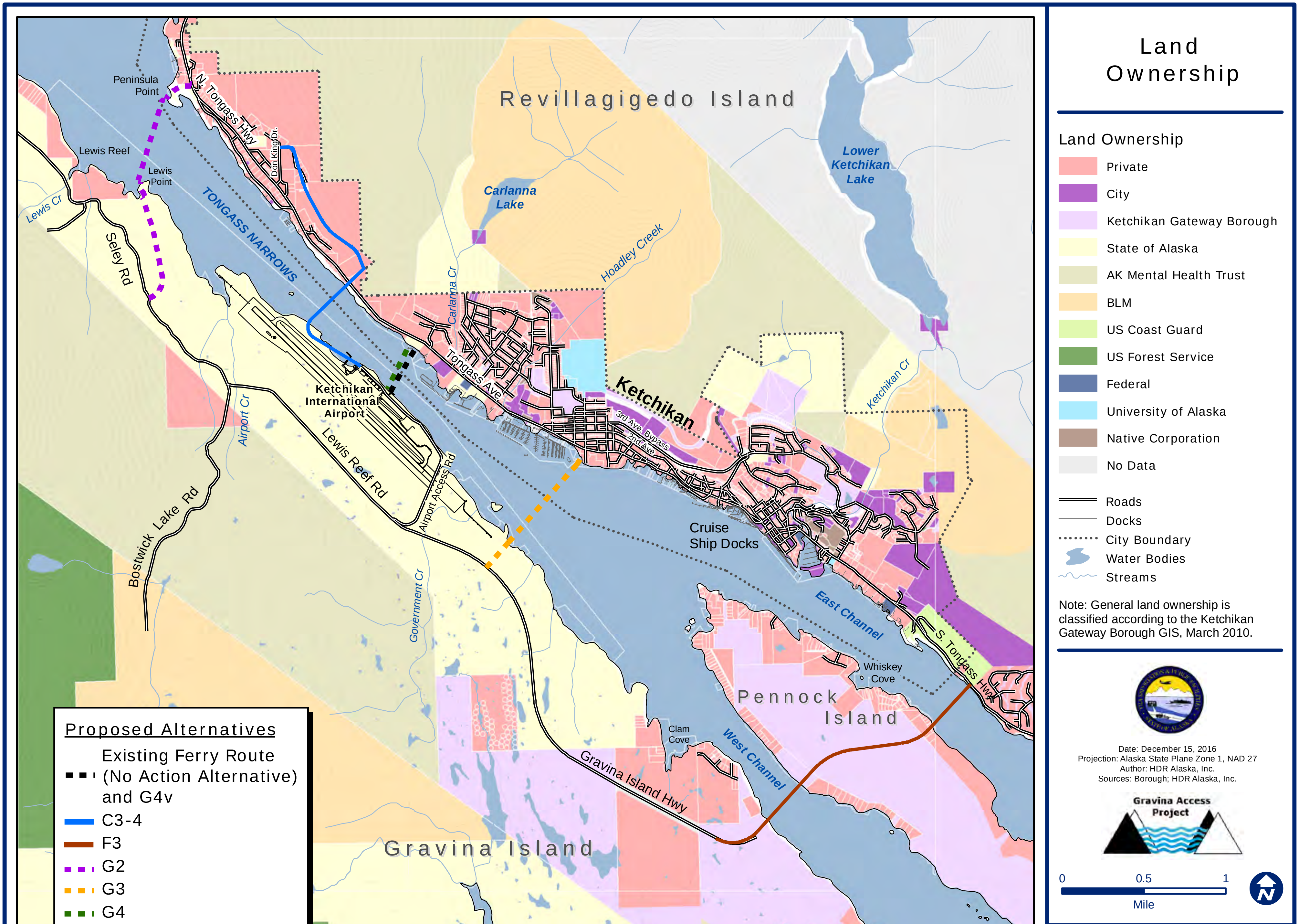
Land Ownership
Land Ownership
Private
City
Ketchikan Gateway Borough
State of Alaska
AK Mental Health Trust
BLM
US Coast Guard
US Forest Service
Federal
University of Alaska
Native Corporation
No Data
Roads
Docks
City Boundary
Water Bodies
Streams
Note: General land ownership is classified according to the Ketchikan Gateway Borough GIS, March 2010.
Date: December 15, 2016
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: Borough; HDR Alaska, Inc.
Gravina Access Project
0
0.5
1
Mile
Proposed Alternatives
Existing Ferry Route (No Action Alternative) and G4v
C3-4
F3
G2
G3
G4
Revillagigedo Island
Gravina Island
Pennock Island
Ketchikan
Ketchikan International Airport
Peninsula Point
Lewis Reef
Lewis Point
Lewis Cr
Seley Rd
TONGASS NARROWS
N. Tongass Hwy
Don King Dr.
Carlanna Lake
Carlanna Cr
Hoadley Creek
Lower Ketchikan Lake
Ketchikan Cr
Tongass Ave
3rd Ave. Bypass
2nd Ave
Airport Cr
Lewis Reef Rd
Airport Access Rd
Bostwick Lake Rd
Government Cr
Cruise Ship Docks
East Channel
West Channel
Whiskey Cove
Clam Cove
Gravina Island Hwy
S. Tongass Hwy

Figure 3.1

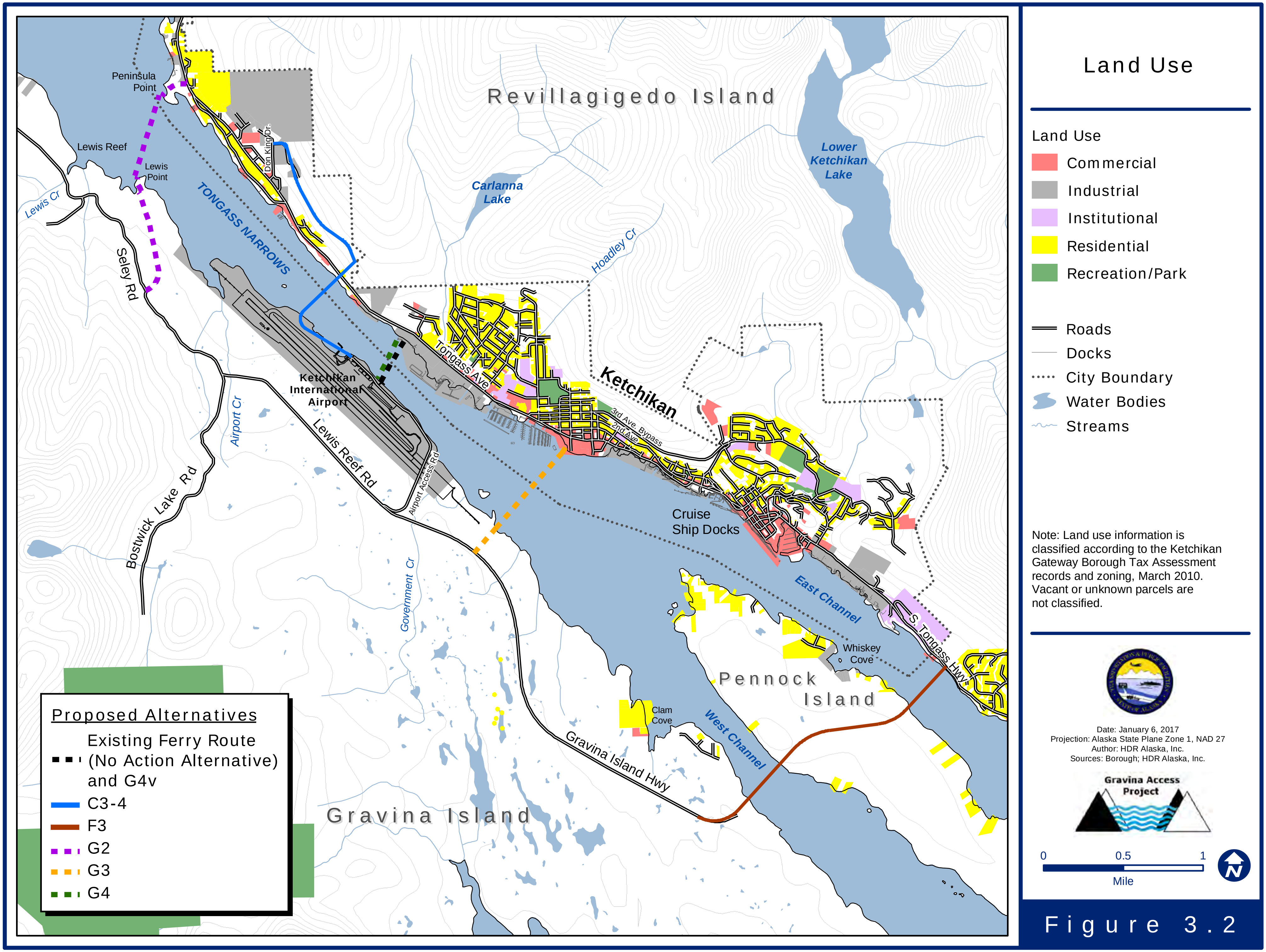
Revillagigedo Island
Peninsula Point
Lewis Reef
Lewis Point
Lewis Cr
Seley Rd
TONGASS NARROWS
Don King Dr.
Carlanna Lake
Hoadley Cr
Lower Ketchikan Lake
Tongass Ave
Ketchikan
Ketchikan International Airport
3rd Ave. Bypass
2nd Ave
Airport Cr
Lewis Reef Rd
Airport Access Rd
Bostwick Lake Rd
Cruise Ship Docks
East Channel
Government Cr
Whiskey Cove
S. Tongass Hwy
Pennock Island
Clam Cove
West Channel
Gravina Island Hwy
Gravina Island
Proposed Alternatives
Existing Ferry Route (No Action Alternative) and G4v
C3-4
F3
G2
G3
G4
Land Use
Land Use
Commercial
Industrial
Institutional
Residential
Recreation/Park
Roads
Docks
City Boundary
Water Bodies
Streams
Note: Land use information is classified according to the Ketchikan Gateway Borough Tax Assessment records and zoning, March 2010. Vacant or unknown parcels are not classified.
Date: January 6, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: Borough; HDR Alaska, Inc.
Gravina Access Project
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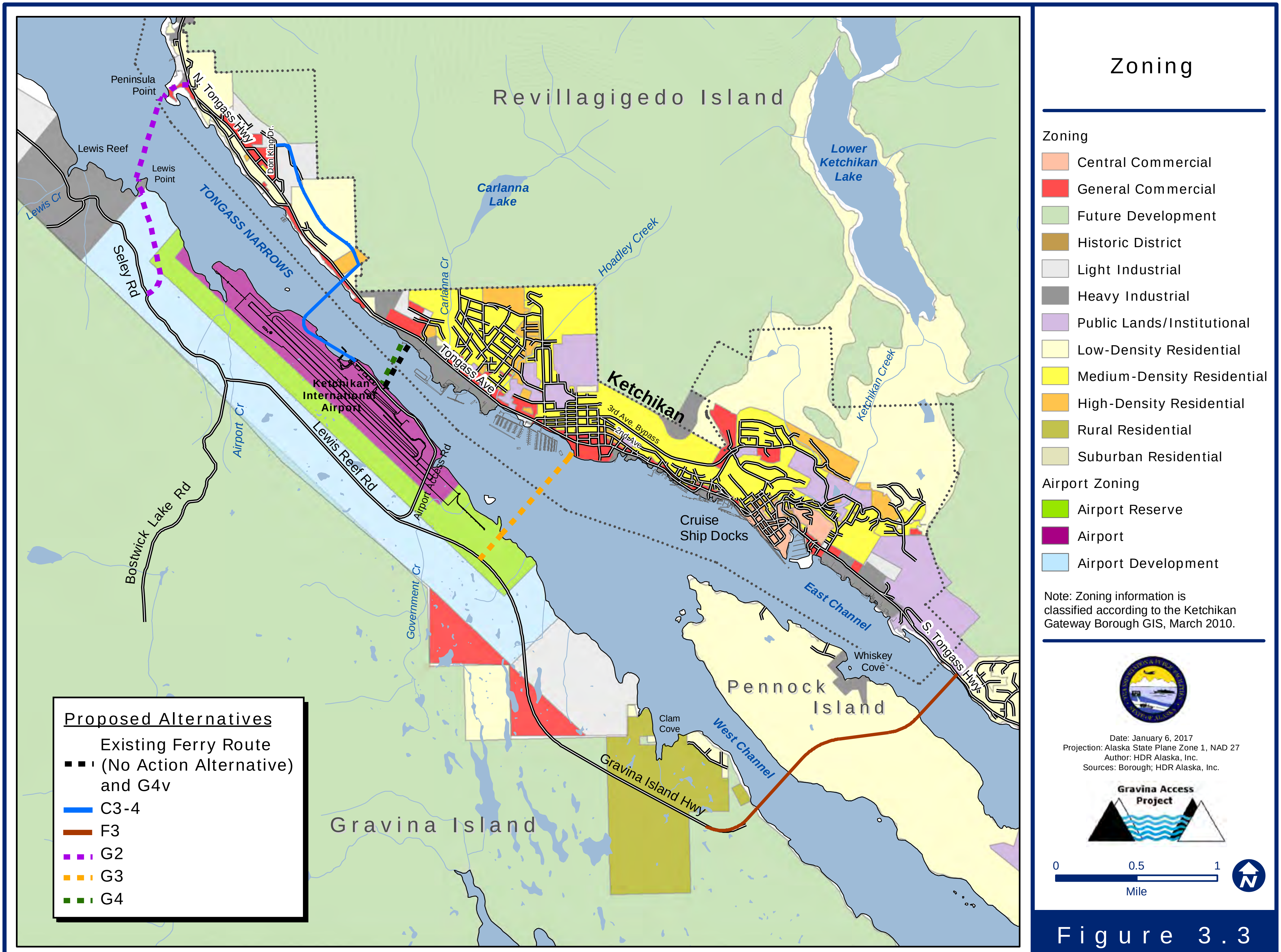
Figure 3.2



Revillagigedo Island
Peninsula Point
N. Tongass Hwy
Doni King Dr.
Lewis Reef
Lewis Point
Lewis Cr
TONGASS NARROWS
Seley Rd
Carlanna Lake
Hoadley Creek
Lower Ketchikan Lake
Carlanna Cr
Tongass Ave
Ketchikan
3rd Ave. Bypass
2nd Ave.
Ketchikan Creek
Ketchikan International Airport
Airport Cr
Lewis Reef Rd
Airport Access Rd
Bostwick Lake Rd
Government Cr
Cruise Ship Docks
East Channel
S. Tongass Hwy
Whiskey Cove
Pennock Island
Clam Cove
West Channel
Gravina Island Hwy
Gravina Island
Proposed Alternatives
Existing Ferry Route (No Action Alternative) and G4v
C3-4
F3
G2
G3
G4
Zoning
Zoning
Central Commercial
General Commercial
Future Development
Historic District
Light Industrial
Heavy Industrial
Public Lands/Institutional
Low-Density Residential
Medium-Density Residential
High-Density Residential
Rural Residential
Suburban Residential
Airport Zoning
Airport Reserve
Airport
Airport Development
Note: Zoning information is classified according to the Ketchikan Gateway Borough GIS, March 2010.
Date: January 6, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: Borough; HDR Alaska, Inc.
Gravina Access Project
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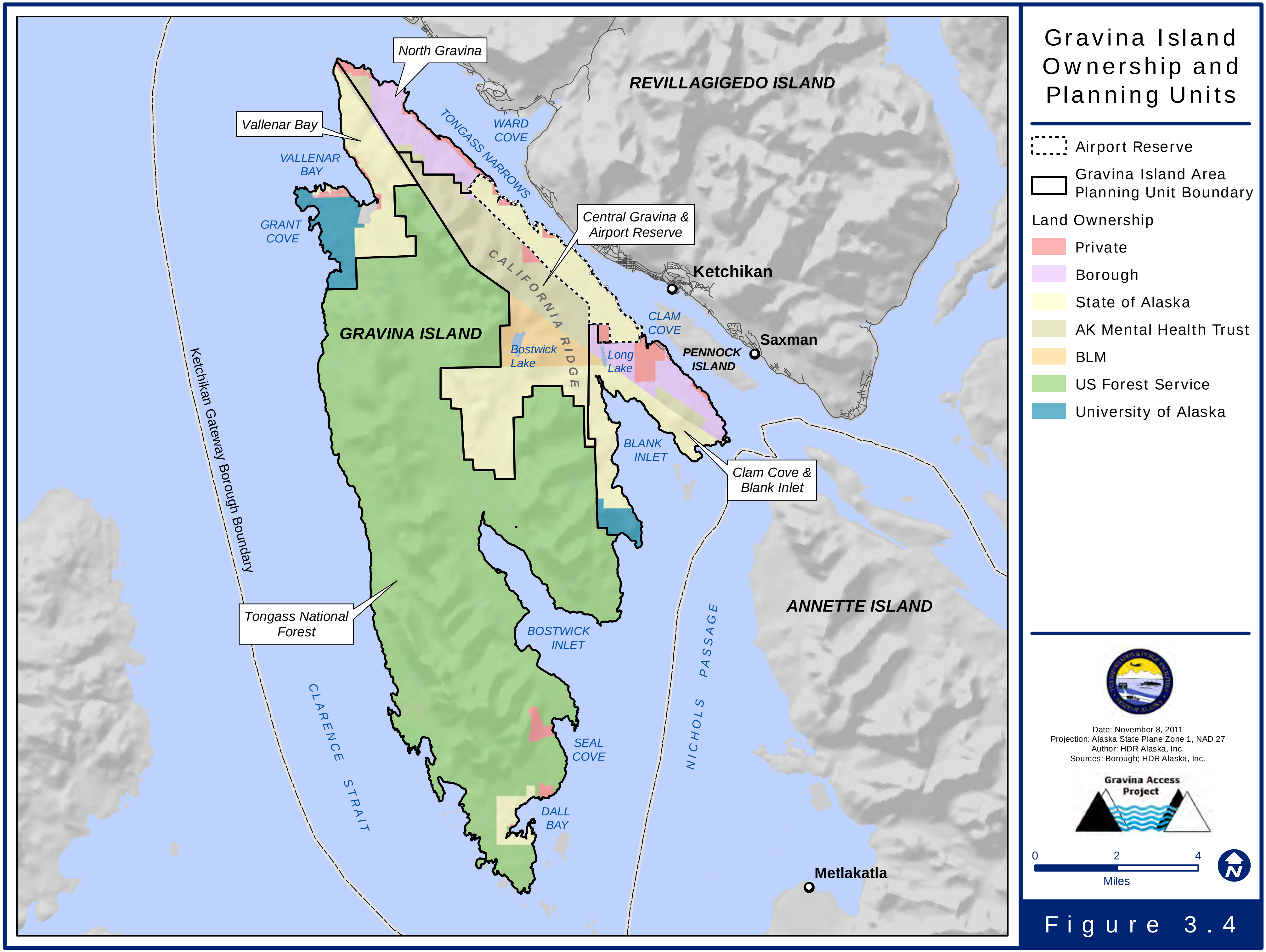
Figure 3.3



Gravina Island Ownership and Planning Units

Figure 3.4

Source: Alaska Department of Labor and Workforce Development: 2010 U.S. Census, 2011-2015 American Community Survey.

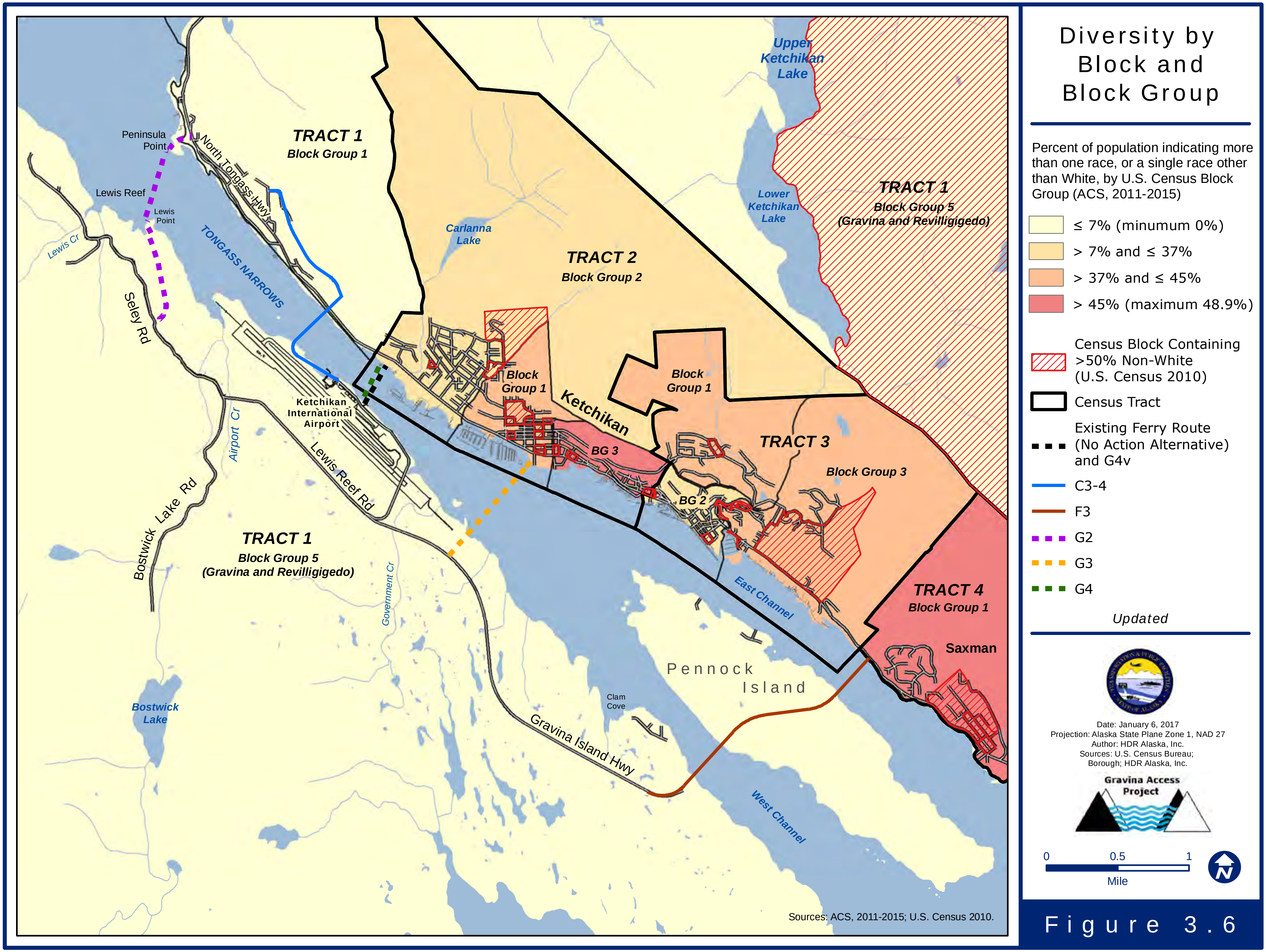
Population of the Ketchikan Gateway Borough, 1990 - 2015

Updated

Date: December 15, 2016
Author: HDR Alaska, Inc.
Sources: Alaska DOL&WD, 2012

Gravina Access Project

Figure 3.5



TRACT 1
Block Group 1
TRACT 2
Block Group 2
TRACT 1
Block Group 5
(Gravina and Revilligigedo)
TRACT 3
Block Group 3
TRACT 4
Block Group 1
Saxman
Ketchikan
Block Group 1
Block Group 1
BG 3
BG 2
Peninsula Point
Lewis Reef
Lewis Point
Lewis Cr
Seley Rd
North Tongass Hwy
TONGASS NARROWS
Ketchikan International Airport
Airport Cr
Lewis Reef Rd
Bostwick Lake Rd
TRACT 1
Block Group 5
(Gravina and Revilligigedo)
Government Cr
Bostwick Lake
Carlanna Lake
Upper Ketchikan Lake
Lower Ketchikan Lake
East Channel
Pennock Island
Clam Cove
Gravina Island Hwy
West Channel
Sources: ACS, 2011-2015; U.S. Census 2010.
Diversity by Block and Block Group
Percent of population indicating more than one race, or a single race other than White, by U.S. Census Block Group (ACS, 2011-2015)
≤ 7% (minumum 0%)
> 7% and ≤ 37%
> 37% and ≤ 45%
> 45% (maximum 48.9%)
Census Block Containing >50% Non-White (U.S. Census 2010)
Census Tract
Existing Ferry Route (No Action Alternative) and G4v
C3-4
F3
G2
G3
G4
Updated
Date: January 6, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: U.S. Census Bureau; Borough; HDR Alaska, Inc.
Gravina Access Project
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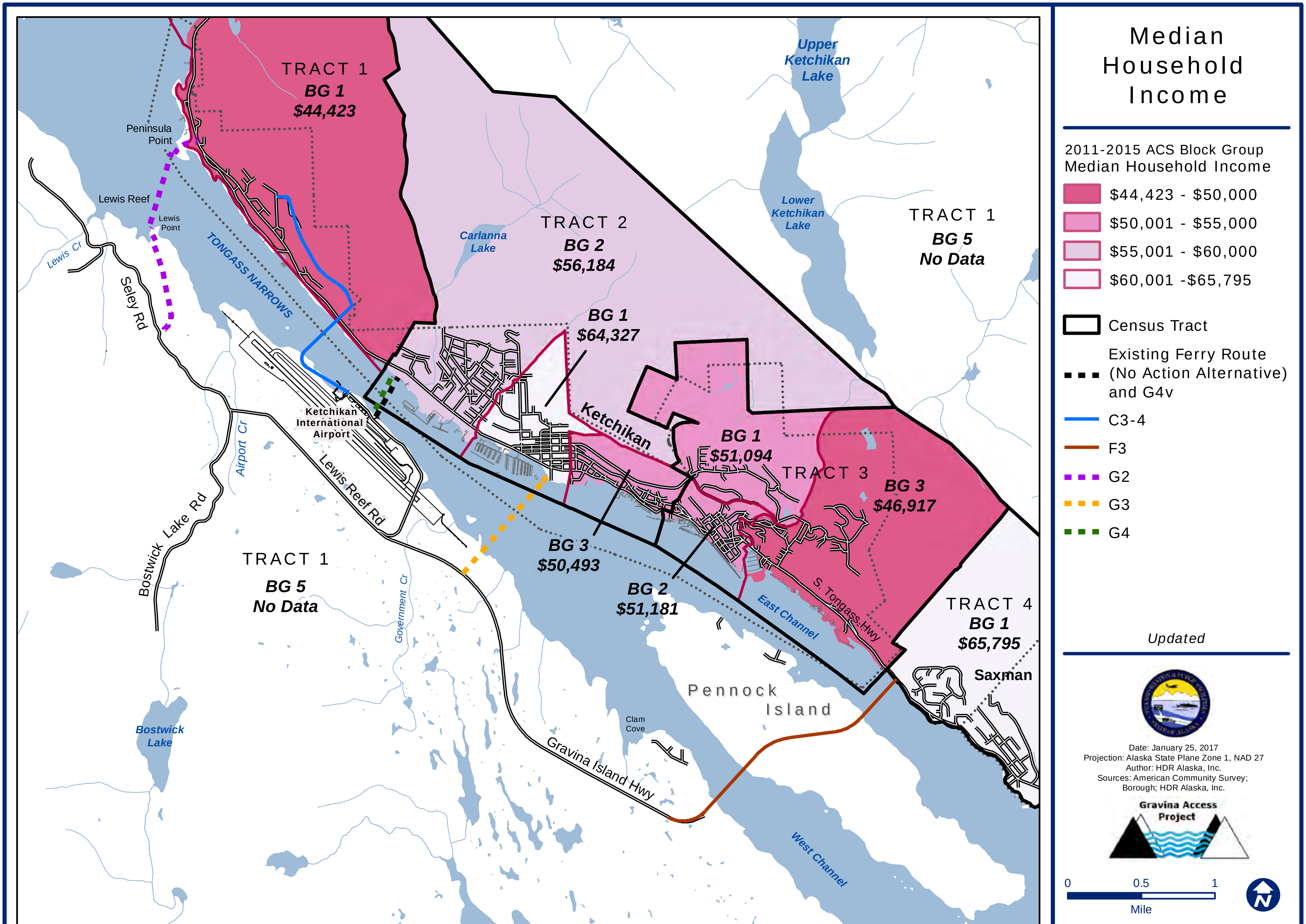
Figure 3.6


Median Household Income
2011-2015 ACS Block Group Median Household Income
$44,423 - $50,000
$50,001 - $55,000
$55,001 - $60,000
$60,001 -$65,795
Census Tract
Existing Ferry Route (No Action Alternative) and G4v
C3-4
F3
G2
G3
G4
Updated
Date: January 25, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: American Community Survey; Borough; HDR Alaska, Inc.
Gravina Access Project
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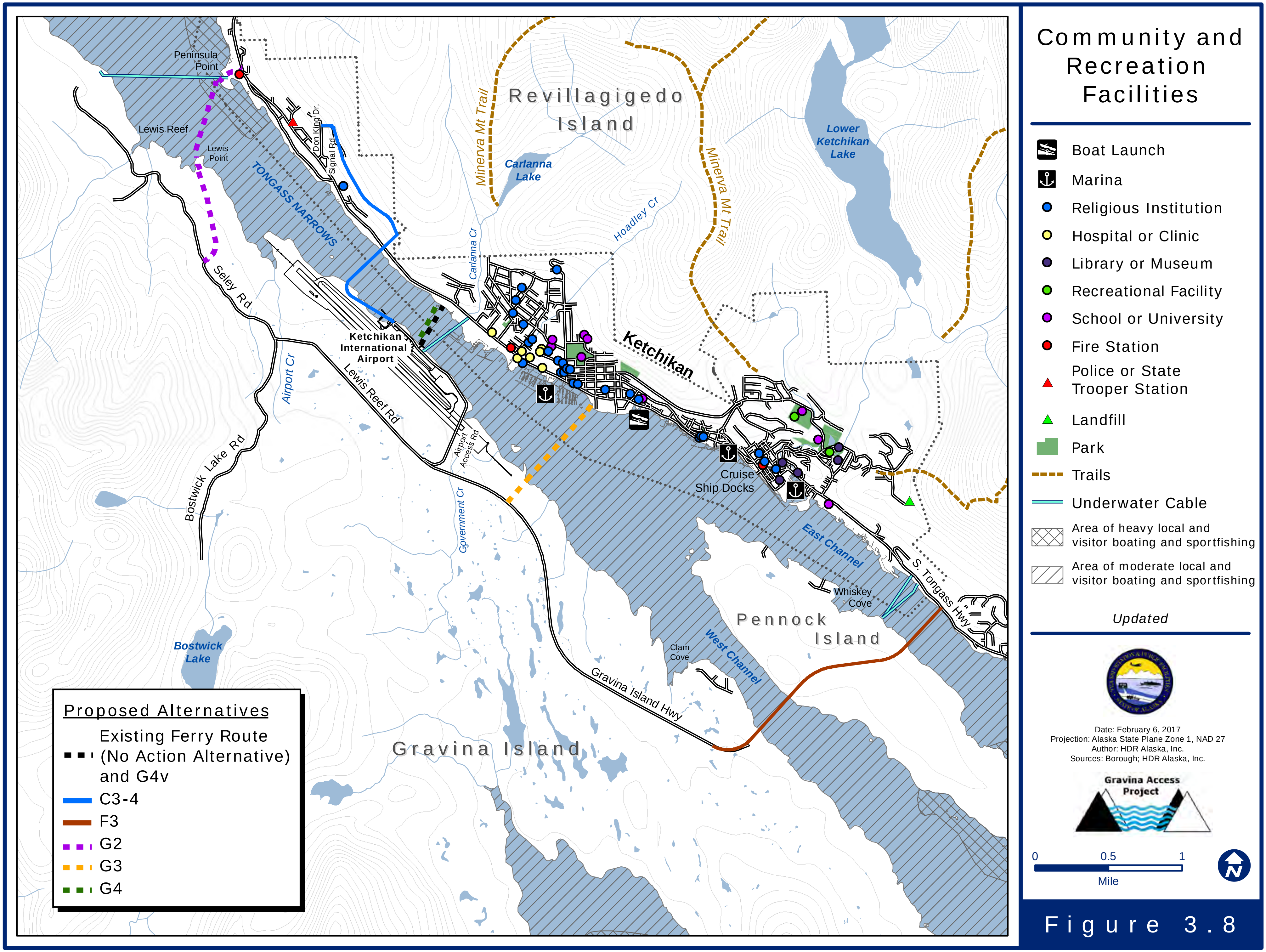
Mile
N
TRACT 1
BG 1
$44,423
TRACT 2
BG 2
$56,184
BG 1
$64,327
TRACT 1
BG 5
No Data
BG 1
$51,094
TRACT 3
BG 3
$46,917
BG 3
$50,493
BG 2
$51,181
TRACT 1
BG 5
No Data
TRACT 4
BG 1
$65,795
Saxman
Upper Ketchikan Lake
Lower Ketchikan Lake
Carlanna Lake
Ketchikan
Peninsula Point
Lewis Reef
Lewis Point
Lewis Cr
Seley Rd
TONGASS NARROWS
Ketchikan International Airport
Airport Cr
Lewis Reef Rd
Bostwick Lake Rd
Government Cr
Bostwick Lake
Gravina Island Hwy
Clam Cove
Pennock Island
East Channel
S. Tongass Hwy
West Channel
Sources: 2011-2015 ACS, 2010 U.S. Census

Figure 3.7


Revillagigedo Island
Gravina Island
Pennock Island
Ketchikan
Peninsula Point
Lewis Reef
Lewis Point
TONGASS NARROWS
Ketchikan International Airport
Lewis Reef Rd
Seley Rd
Bostwick Lake Rd
Airport Cr
Airport Access Rd
Government Cr
Carlanna Cr
Carlanna Lake
Minerva Mt Trail
Hoadley Cr
Lower Ketchikan Lake
Don King Dr.
Signal Rd
Cruise Ship Docks
East Channel
West Channel
Whiskey Cove
Clam Cove
S. Tongass Hwy
Gravina Island Hwy
Bostwick Lake
Proposed Alternatives
Existing Ferry Route (No Action Alternative) and G4v
C3-4
F3
G2
G3
G4
Community and Recreation Facilities
Boat Launch
Marina
Religious Institution
Hospital or Clinic
Library or Museum
Recreational Facility
School or University
Fire Station
Police or State Trooper Station
Landfill
Park
Trails
Underwater Cable
Area of heavy local and visitor boating and sportfishing
Area of moderate local and visitor boating and sportfishing
Updated
Date: February 6, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: Borough; HDR Alaska, Inc.
Gravina Access Project
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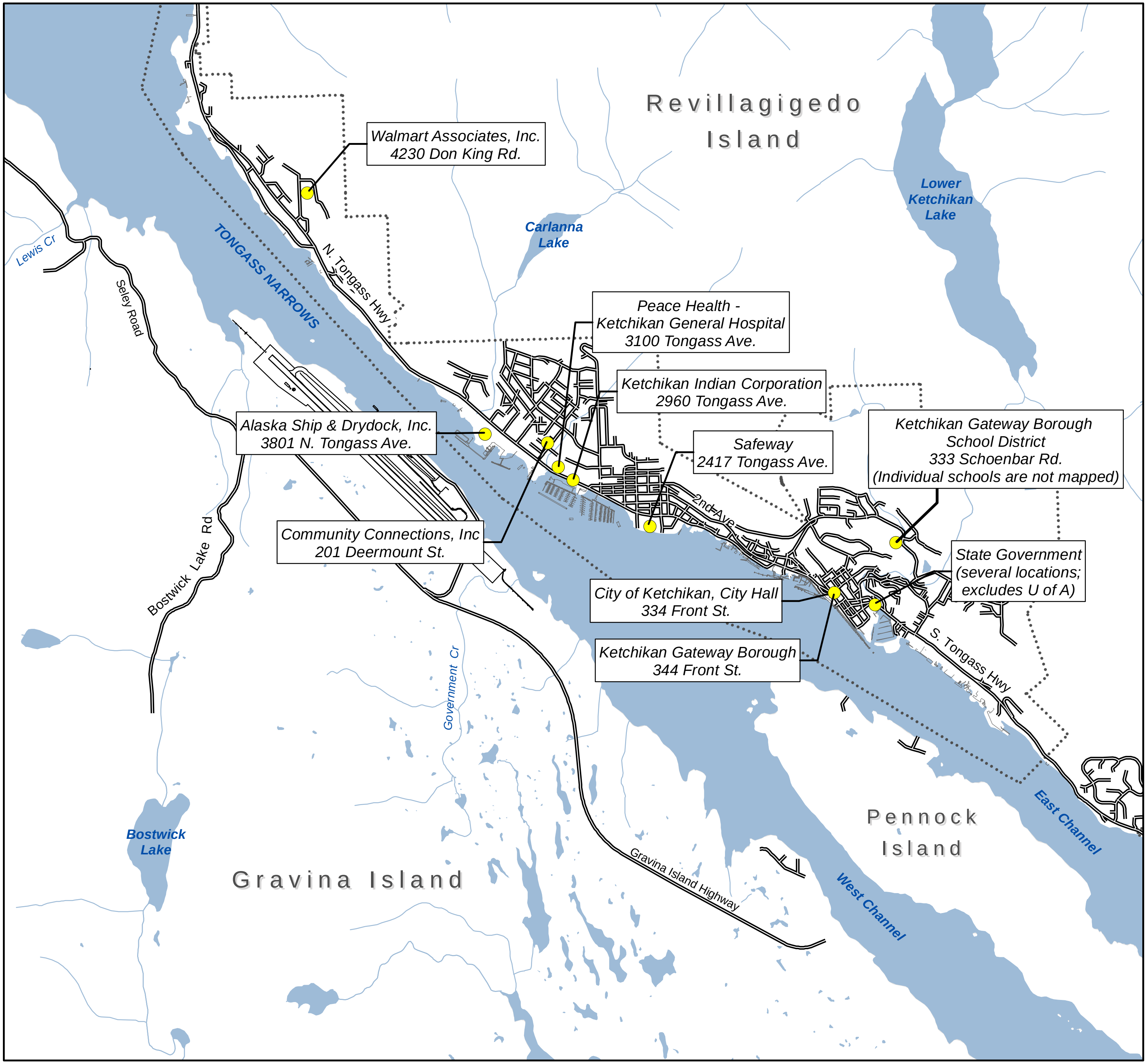
Mile
Figure 3.8

Major Employers in the Ketchikan Area (2010)



Roads

Docks

City Boundary

Water Bodies

Streams

Note: Several employers have more than one location. Locations are approximate.

Source: Alaska Department of Labor & Workforce Development, Research and Analysis, 2011.

Date: January 6, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: AKDLWD; KGB; HDR Alaska, Inc.

Gravina Access Project

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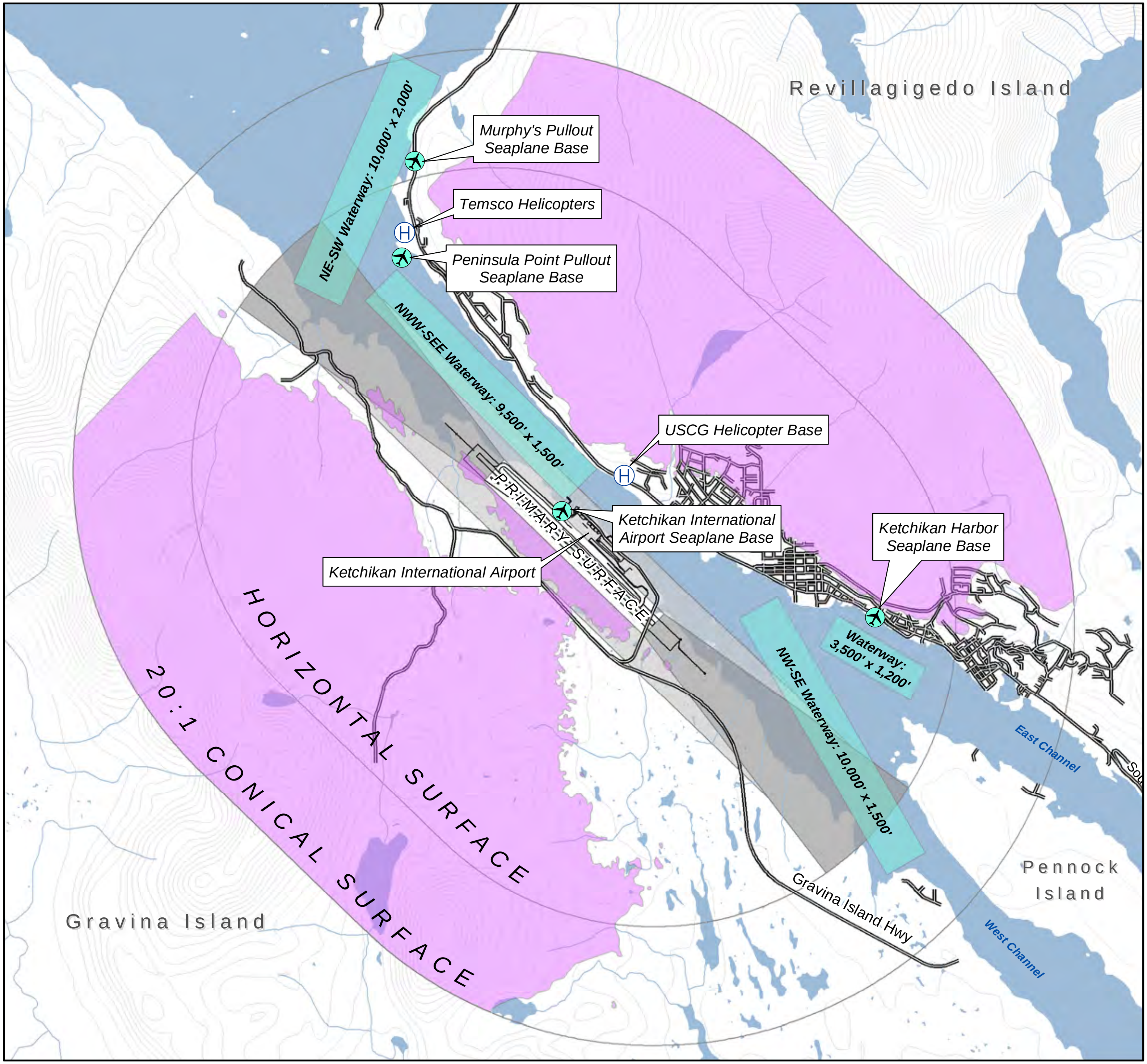
Mile

Figure 3.9



Aviation Transportation Facilities

Seaplane Base
Helicopter Base
Seaplane Waterway

Part 77 Airspace

Imaginary Surfaces
Approach Surface
Transitional Surface
Part 77 Airspace Encroachment Area

Date: January 6, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: Borough; HDR Alaska, Inc.

Gravina Access Project

0 0.55 1.1
Mile

Figure 3.10

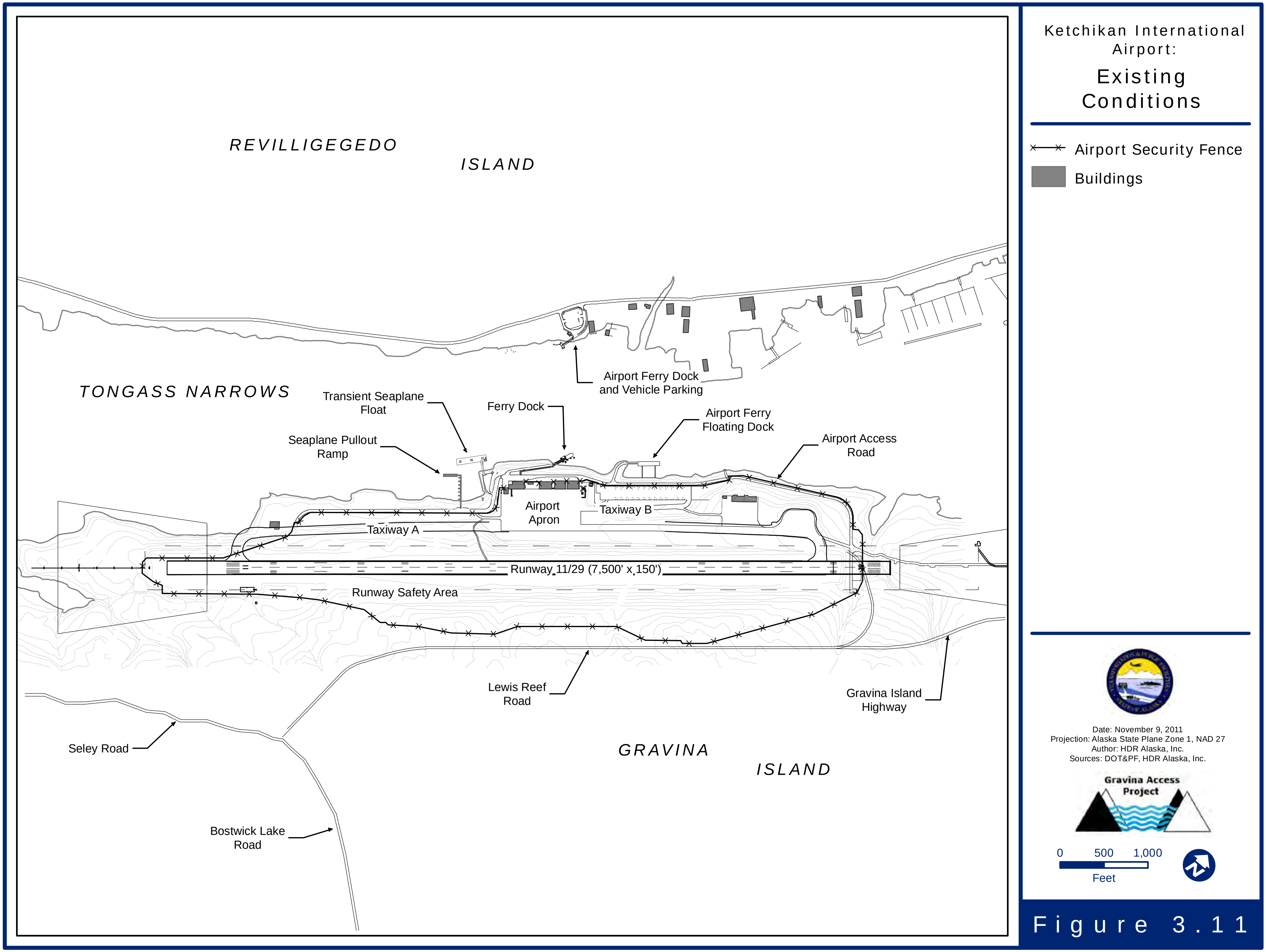
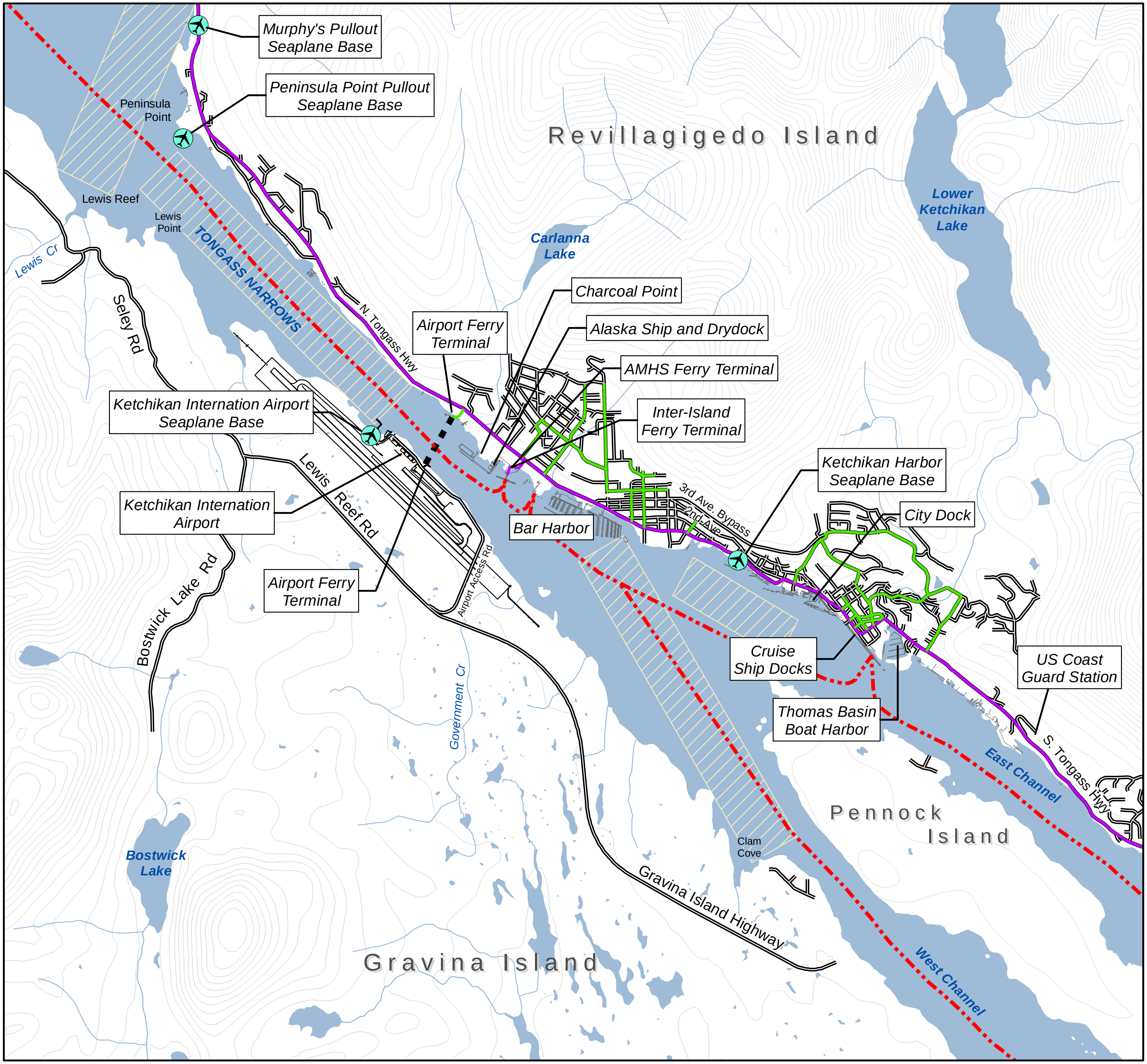

REVILLIGEGEDO ISLAND
TONGASS NARROWS
Airport Ferry Dock and Vehicle Parking
Transient Seaplane Float
Ferry Dock
Airport Ferry Floating Dock
Seaplane Pullout Ramp
Airport Access Road
Airport Apron
Taxiway B
Taxiway A
Runway 11/29 (7,500' x 150')
Runway Safety Area
Lewis Reef Road
Gravina Island Highway
Seley Road
GRAVINA ISLAND
Bostwick Lake Road
Ketchikan International Airport:
Existing Conditions
Airport Security Fence
Buildings
Date: November 9, 2011
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: DOT&PF, HDR Alaska, Inc.
Gravina Access Project
0 500 1,000
Feet

Figure 3.11



Marine and Land Transportation Facilities

Marine Transportation

- Seaplane Base
- Marine Route
- Docks
- Seaplane Waterway

Land Transportation

- Local Road
- Collector
- Minor Arterial

Date: November 8, 2011
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: Borough; HDR Alaska, Inc.

Gravina Access Project

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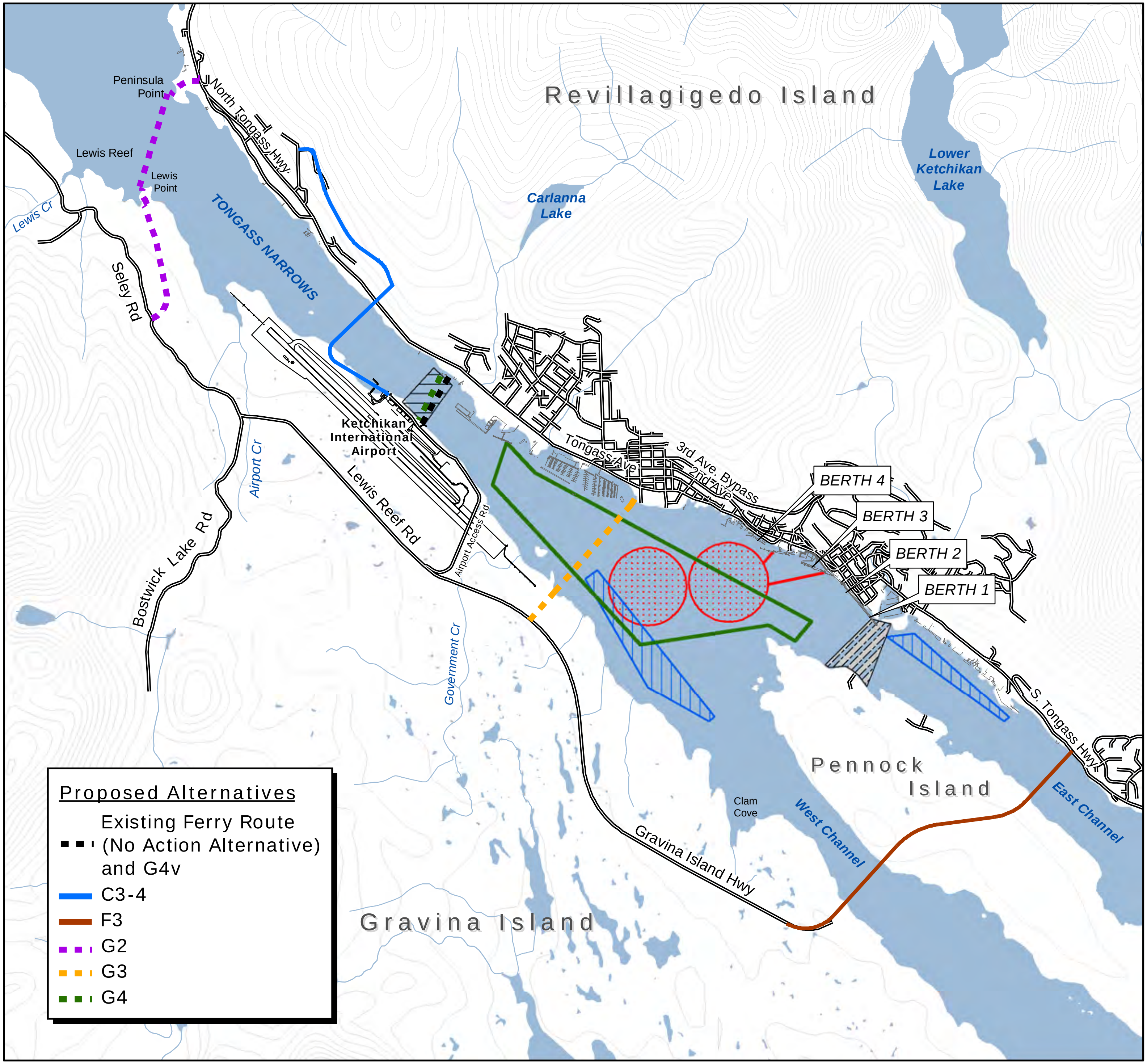
N

Figure 3.12



Tongass Narrows Primary Waterway Uses

Waterway Uses

- Cruise Ship Anchorage and Tender Operations
- Airport Ferry Crossing
- Fishing Vessel Anchorage
- Sailboat Regatta Zone
- Kayak Crossing Zone

- Roads
- Docks
- Water Bodies
- Streams

Note: Seaplane zones can be seen on Figure 3.10 and 3.12 .

Source: U.S. Coast Guard, *Tongass Narrows Voluntary Waterway Guide*, April 2012.

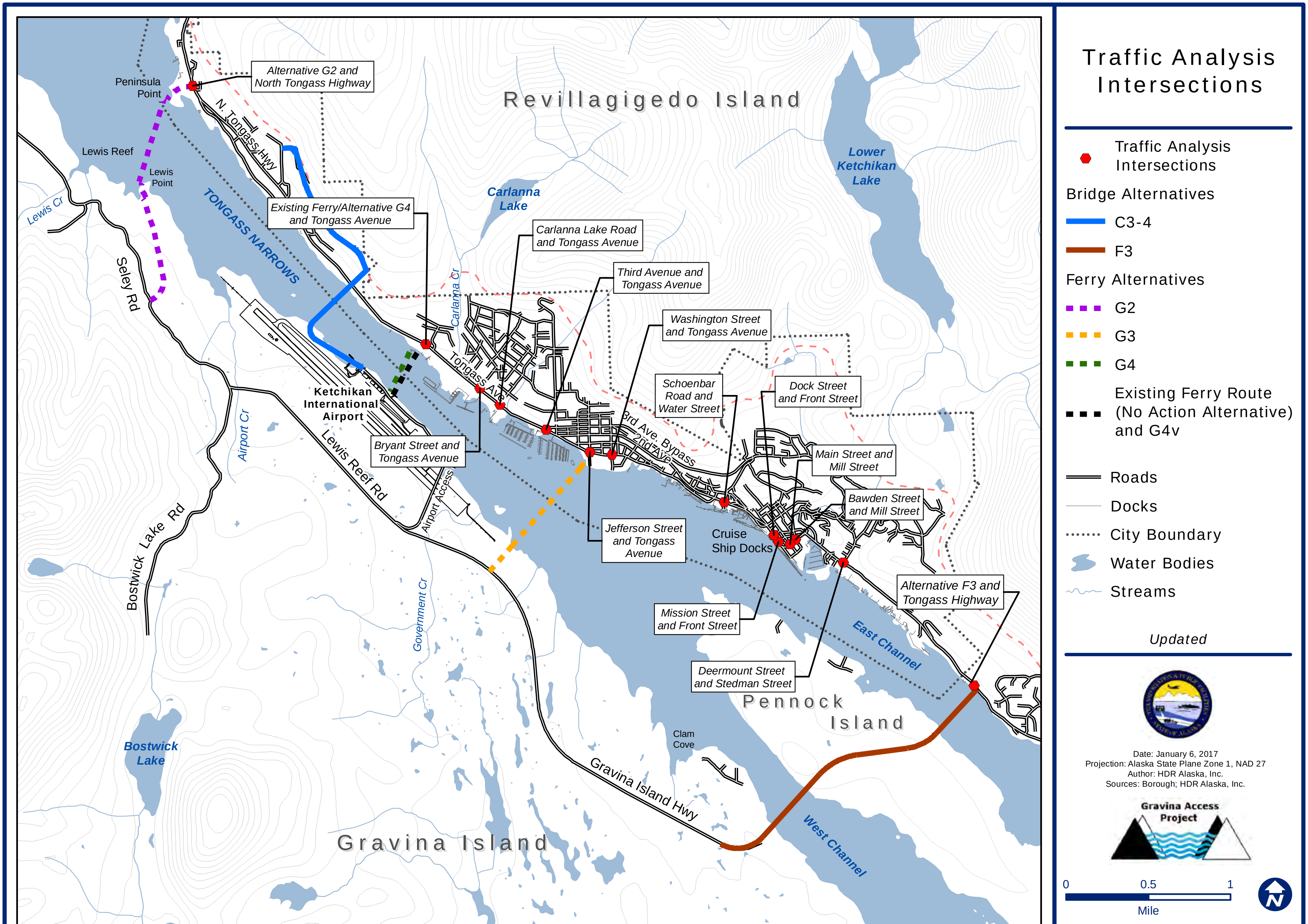
Updated

Date: January 6, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: USCG; Borough; HDR Alaska, Inc.

Gravina Access Project

0 0.5 1
Mile

Figure 3.13


Traffic Analysis Intersections
Traffic Analysis Intersections
Bridge Alternatives
C3-4
F3
Ferry Alternatives
G2
G3
G4
Existing Ferry Route (No Action Alternative) and G4v
Roads
Docks
City Boundary
Water Bodies
Streams
Updated
Date: January 6, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: Borough; HDR Alaska, Inc.
Gravina Access Project
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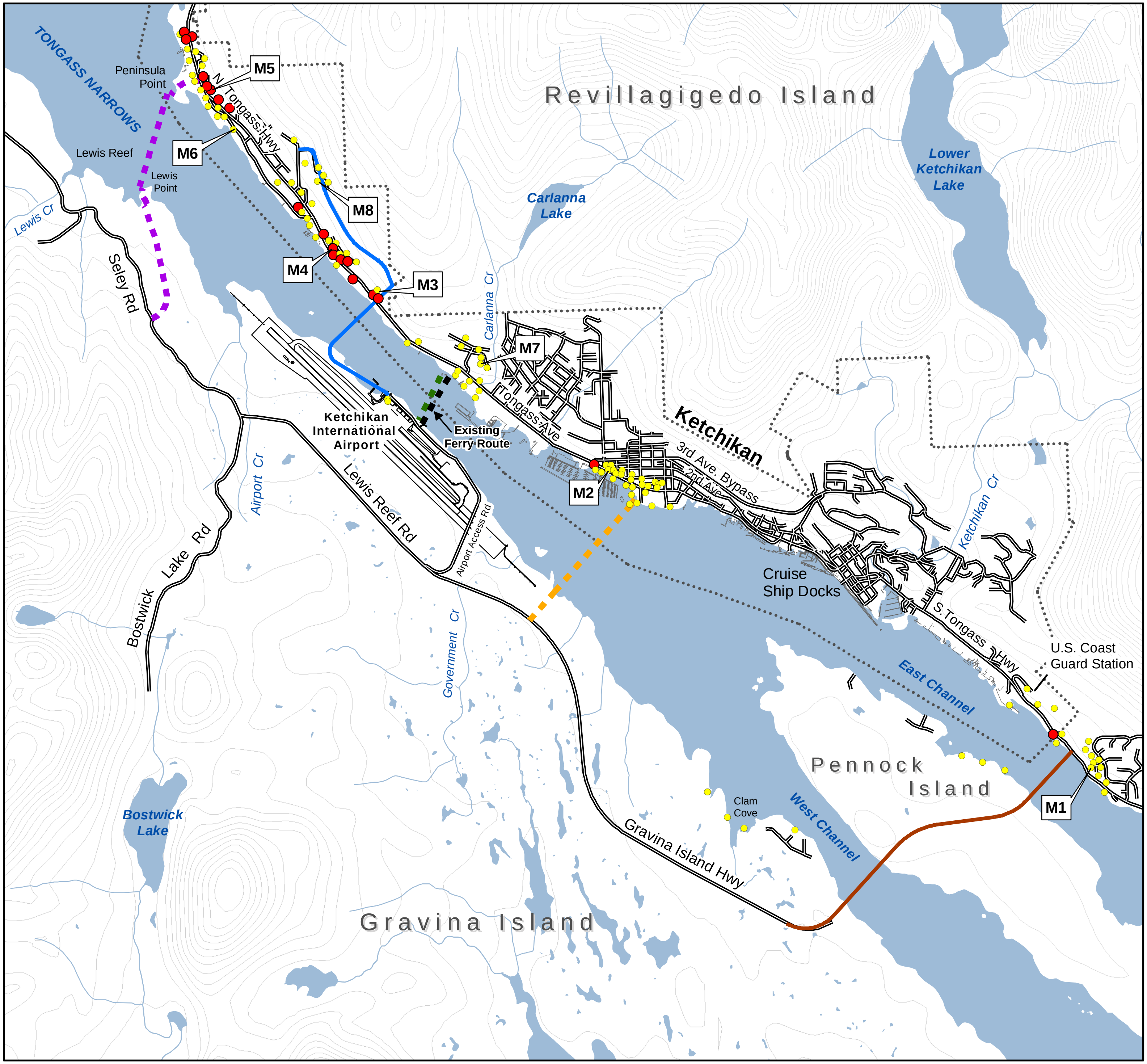
Mile
N
Revillagigedo Island
Gravina Island
Pennock Island
Peninsula Point
Lewis Reef
Lewis Point
Lewis Cr
Seley Rd
Bostwick Lake Rd
Bostwick Lake
TONGASS NARROWS
N. Tongass Hwy
Tongass Ave
Carlanna Lake
Carlanna Cr
Lower Ketchikan Lake
Ketchikan International Airport
Airport Cr
Airport Access
Lewis Reef Rd
Government Cr
Gravina Island Hwy
3rd Ave. Bypass
2nd Ave
Cruise Ship Docks
Clam Cove
East Channel
West Channel
Alternative G2 and North Tongass Highway
Existing Ferry/Alternative G4 and Tongass Avenue
Carlanna Lake Road and Tongass Avenue
Third Avenue and Tongass Avenue
Washington Street and Tongass Avenue
Schoenbar Road and Water Street
Dock Street and Front Street
Main Street and Mill Street
Bawden Street and Mill Street
Bryant Street and Tongass Avenue
Jefferson Street and Tongass Avenue
Mission Street and Front Street
Deermount Street and Stedman Street
Alternative F3 and Tongass Highway
Figure 3.14



Noise Receptors

- Noise Receptor
- Noise Receptor - Noise Level Exceeds NAC
- M# Monitoring Station (labeled M1-M8)

Bridge Alternatives

- C3-4
- F3

Ferry Alternatives

- G2
- G3
- G4
- Existing Ferry Route (No Action Alternative) and G4v

- Roads
- Docks
- City Boundary

Updated

Date: January 6, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: KGB; HDR Alaska, Inc.

Gravina Access Project

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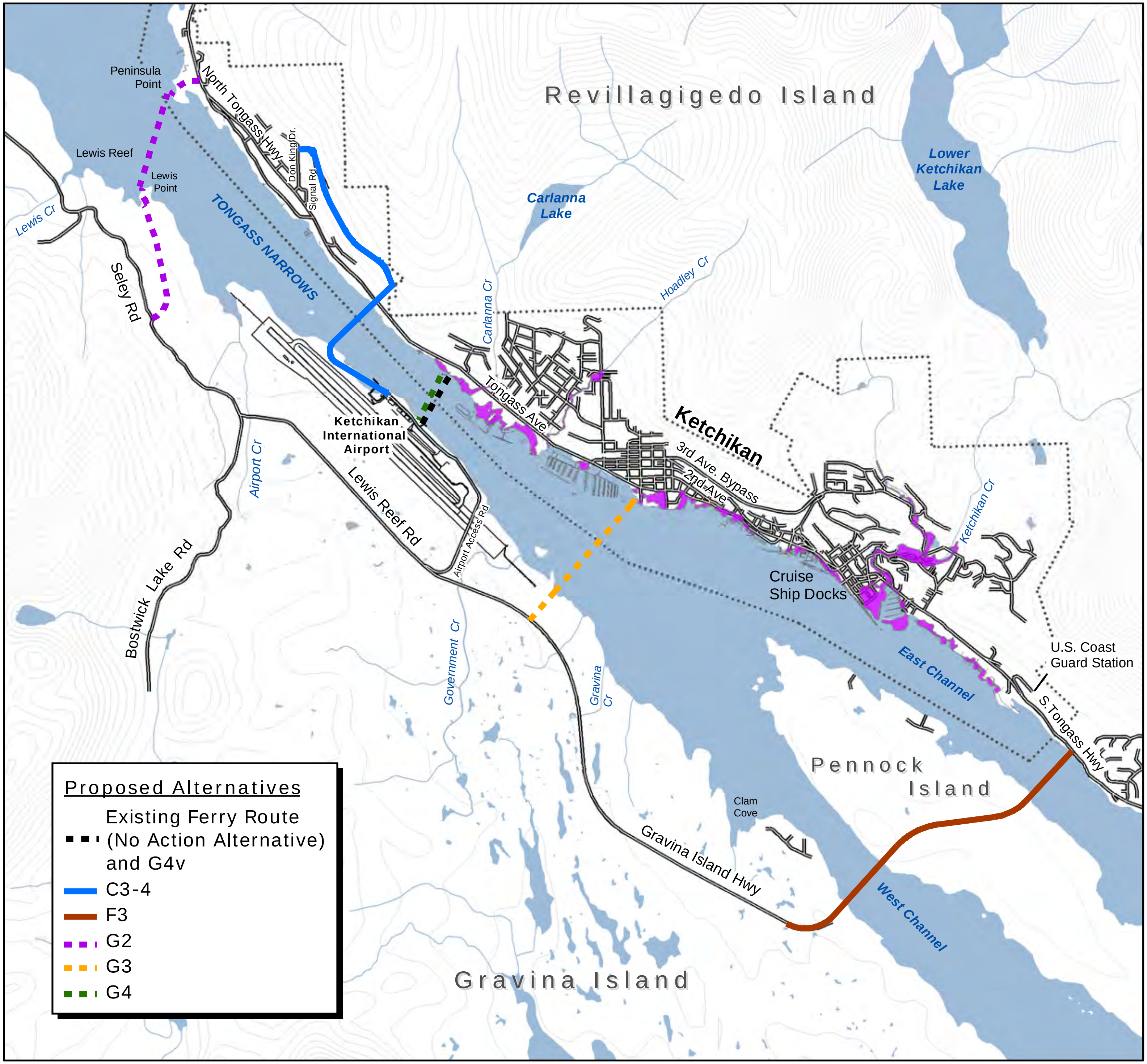
Figure 3.15

Water Resources



100-Year Floodplain
Water Bodies
Roads
Docks
City Boundary
Streams

Updated

Date: January 6, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: Borough; HDR Alaska, Inc.

Gravina Access Project

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Mile

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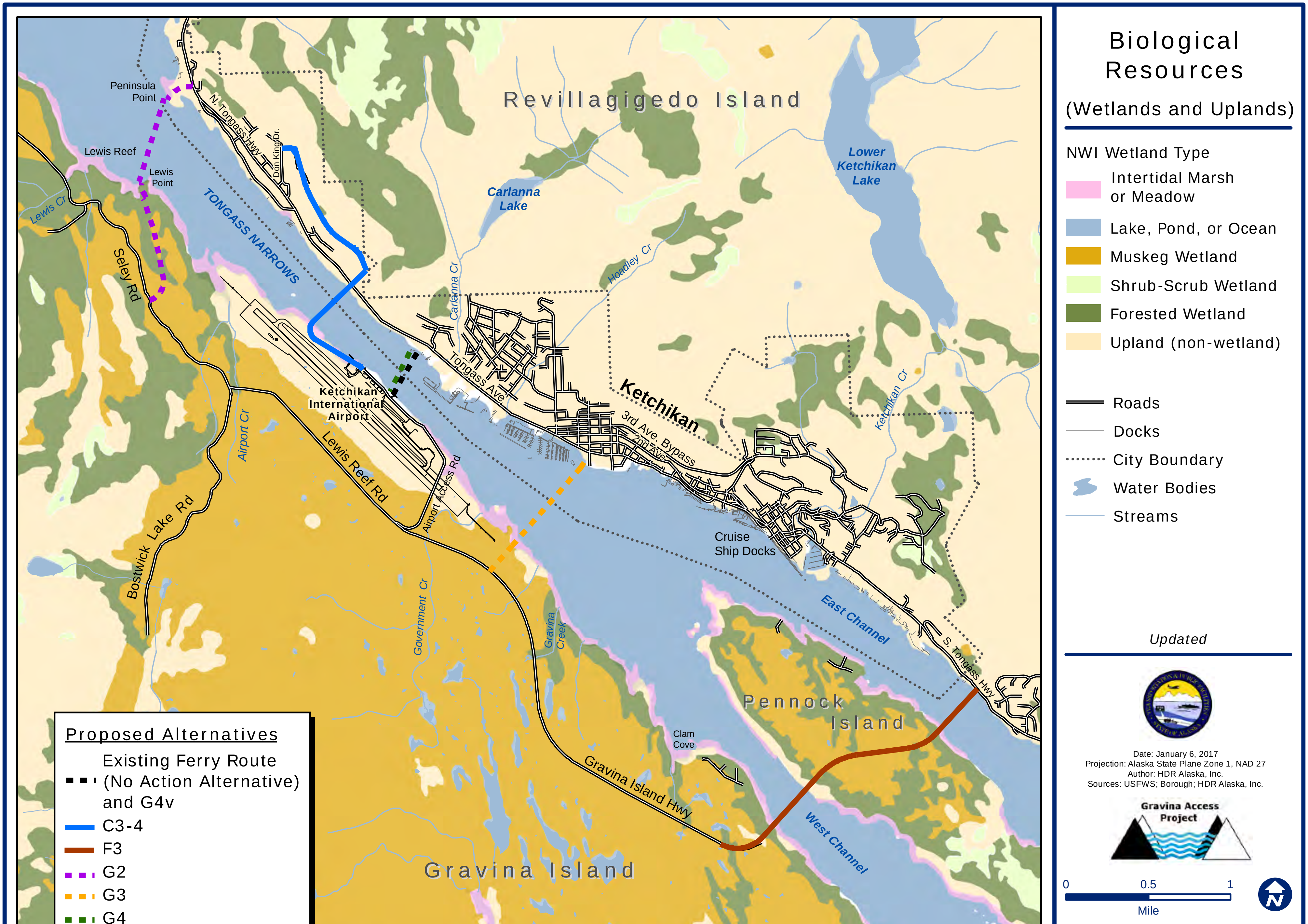
Figure 3.16


Biological Resources
(Wetlands and Uplands)
NWI Wetland Type
Intertidal Marsh or Meadow
Lake, Pond, or Ocean
Muskeg Wetland
Shrub-Scrub Wetland
Forested Wetland
Upland (non-wetland)
Roads
Docks
City Boundary
Water Bodies
Streams
Updated
Date: January 6, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: USFWS; Borough; HDR Alaska, Inc.
Gravina Access Project
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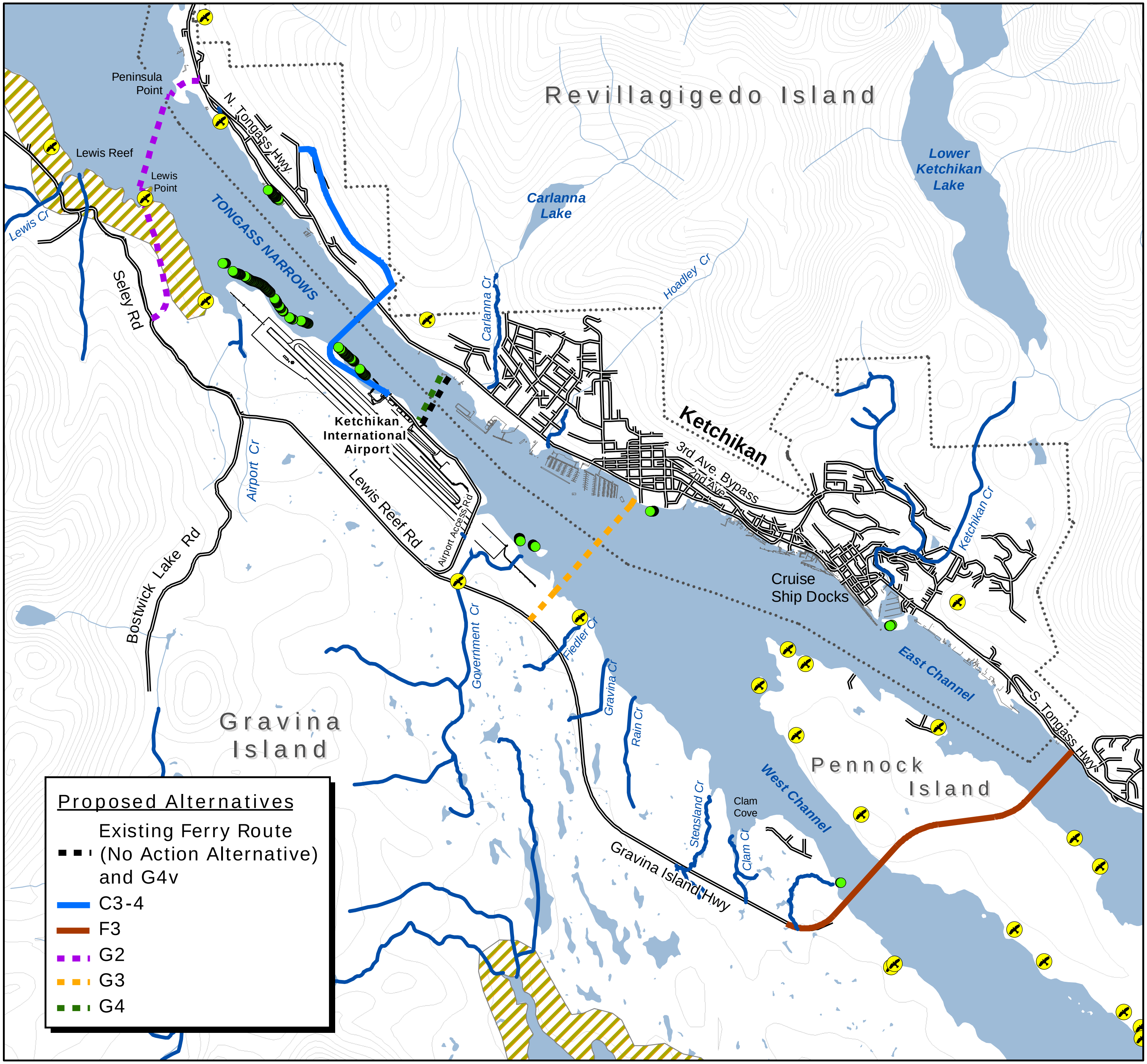
Mile
Proposed Alternatives
Existing Ferry Route (No Action Alternative) and G4v
C3-4
F3
G2
G3
G4
Revillagigedo Island
Gravina Island
Pennock Island
Ketchikan
Peninsula Point
Lewis Reef
Lewis Point
Lewis Cr
Seley Rd
TONGASS NARROWS
N. Tongass Hwy
Don King Dr.
Carlanna Lake
Lower Ketchikan Lake
Carlanna Cr
Hoadley Cr
Ketchikan Cr
Tongass Ave
3rd Ave. Bypass
2nd Ave
Ketchikan International Airport
Airport Cr
Lewis Reef Rd
Airport Access Rd
Bostwick Lake Rd
Government Cr
Gravina Creek
Cruise Ship Docks
East Channel
S. Tongass Hwy
Clam Cove
Gravina Island Hwy
West Channel
Figure 3.17



Other Biological Resources

- Bald Eagle Nests
- Eelgrass Beds
- ADF&G Catalogued Stream
- Sitka Deer Winter Range
- Roads
- Docks
- City Boundary
- Water Bodies
- Streams

Updated

Date: January 12, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: ADF&G 2016; USFWS; Borough; HDR Alaska, Inc.

Gravina Access Project

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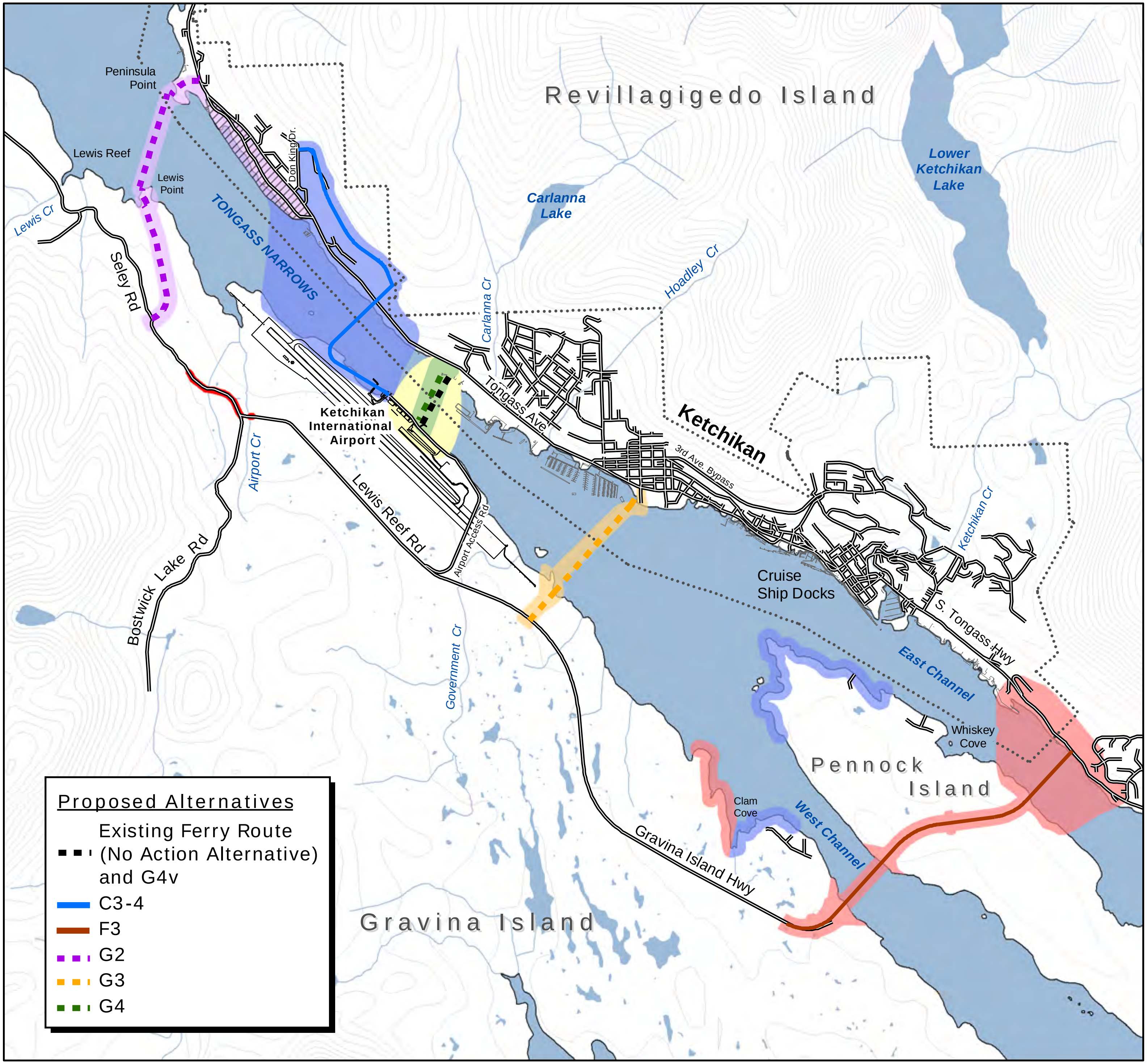
Figure 3.18



Area of Potential Effect

Area of Potential Effect (APE)

- C3-4
- F3
- G2
- G3
- G4/G4v
- C3-4/G2 Overlap
- All Ferry Alternatives
- All Alternatives

- Roads
- Docks
- City Boundary
- Water Bodies
- Streams

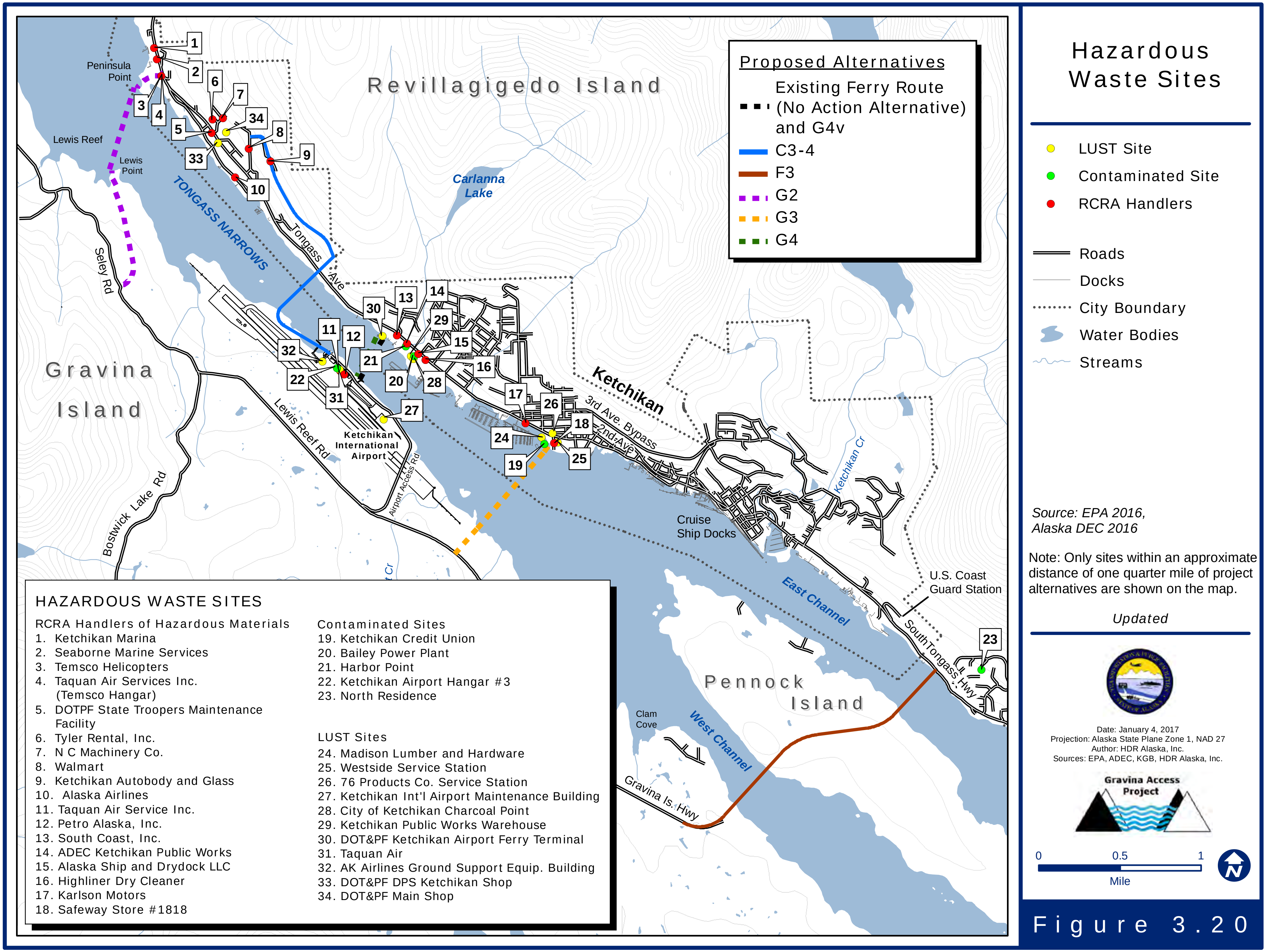
Updated

Date: January 6, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: Borough; HDR Alaska, Inc.

Gravina Access Project

0 0.5 1
Mile

Figure 3.19


Hazardous Waste Sites
LUST Site
Contaminated Site
RCRA Handlers
Roads
Docks
City Boundary
Water Bodies
Streams
Source: EPA 2016, Alaska DEC 2016
Note: Only sites within an approximate distance of one quarter mile of project alternatives are shown on the map.
Updated
Date: January 4, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: EPA, ADEC, KGB, HDR Alaska, Inc.
Gravina Access Project
0
0.5
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Mile
Figure 3.20
Proposed Alternatives
Existing Ferry Route (No Action Alternative) and G4v
C3-4
F3
G2
G3
G4
Revillagigedo Island
Gravina Island
Pennock Island
Ketchikan
Peninsula Point
Lewis Reef
Lewis Point
TONGASS NARROWS
Tongass Ave
Seley Rd
Carlanna Lake
Lewis Reef Rd
Ketchikan International Airport
Airport Access Rd
Bostwick Lake Rd
3rd Ave. Bypass
2nd Ave
Ketchikan Cr
Cruise Ship Docks
East Channel
West Channel
Clam Cove
Gravina Is. Hwy
U.S. Coast Guard Station
South Tongass Hwy
HAZARDOUS WASTE SITES
RCRA Handlers of Hazardous Materials
1. Ketchikan Marina
2. Seaborne Marine Services
3. Temsco Helicopters
4. Taquan Air Services Inc. (Temsco Hangar)
5. DOTPF State Troopers Maintenance Facility
6. Tyler Rental, Inc.
7. N C Machinery Co.
8. Walmart
9. Ketchikan Autobody and Glass
10. Alaska Airlines
11. Taquan Air Service Inc.
12. Petro Alaska, Inc.
13. South Coast, Inc.
14. ADEC Ketchikan Public Works
15. Alaska Ship and Drydock LLC
16. Highliner Dry Cleaner
17. Karlson Motors
18. Safeway Store #1818
Contaminated Sites
19. Ketchikan Credit Union
20. Bailey Power Plant
21. Harbor Point
22. Ketchikan Airport Hangar #3
23. North Residence
LUST Sites
24. Madison Lumber and Hardware
25. Westside Service Station
26. 76 Products Co. Service Station
27. Ketchikan Int'l Airport Maintenance Building
28. City of Ketchikan Charcoal Point
29. Ketchikan Public Works Warehouse
30. DOT&PF Ketchikan Airport Ferry Terminal
31. Taquan Air
32. AK Airlines Ground Support Equip. Building
33. DOT&PF DPS Ketchikan Shop
34. DOT&PF Main Shop

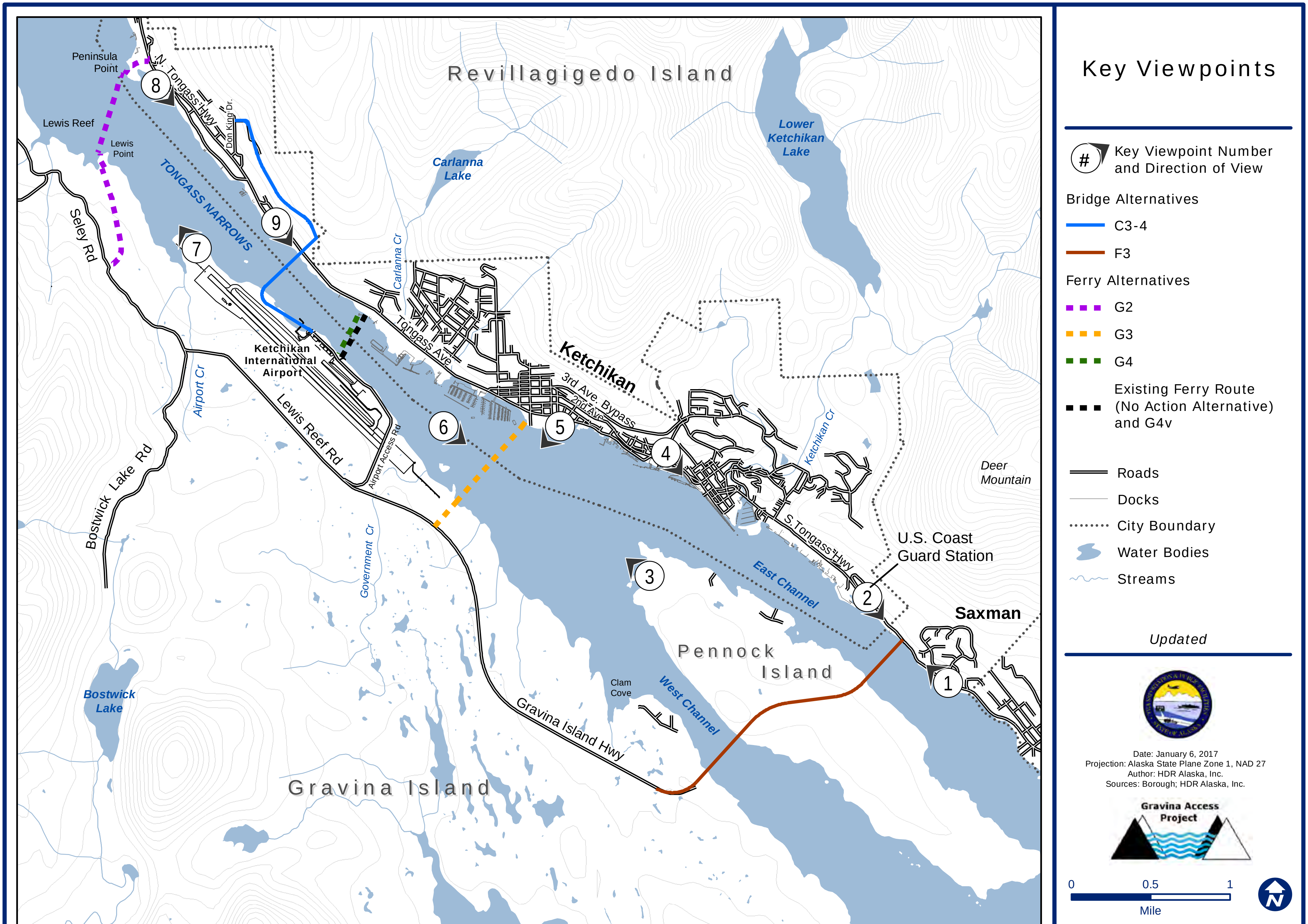
Key Viewpoints
Revillagigedo Island
Peninsula Point
Lewis Reef
Lewis Point
N. Tongass Hwy
Don King Dr.
Seley Rd
TONGASS NARROWS
Carlanna Lake
Lower Ketchikan Lake
Carlanna Cr
Tongass Ave
Ketchikan
3rd Ave. Bypass
2nd Ave
Ketchikan International Airport
Airport Cr
Lewis Reef Rd
Airport Access Rd
Bostwick Lake Rd
Ketchikan Cr
Deer Mountain
S. Tongass Hwy
U.S. Coast Guard Station
East Channel
Saxman
Government Cr
Pennock Island
Clam Cove
West Channel
Gravina Island Hwy
Bostwick Lake
Gravina Island
Key Viewpoint Number and Direction of View
Bridge Alternatives
C3-4
F3
Ferry Alternatives
G2
G3
G4
Existing Ferry Route (No Action Alternative) and G4v
Roads
Docks
City Boundary
Water Bodies
Streams
Updated
Date: January 6, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: Borough; HDR Alaska, Inc.
Gravina Access Project
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Figure 3.21

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4.0 ENVIRONMENTAL CONSEQUENCES

This chapter identifies and describes potential environmental consequences of the project alternatives (including the No Action Alternative), including both adverse and beneficial impacts. All elements of each alternative are evaluated in this section: the infrastructure required for crossing Tongass Narrow (e.g., bridge and bridge piers, ferry and ferry ramps), new road connections to the crossing, improvements to existing roads, and supporting facilities (e.g., construction staging areas, toll facilities, passenger waiting area). Sections of this chapter address direct, secondary, and cumulative impacts and related issues. All figures referenced in this chapter may be found at the end of the chapter.

Direct Impacts. Impacts that occur as a direct, immediate, and local result of a project are termed direct impacts. Direct impacts can be either permanent or temporary. Permanent impacts are direct, continuing impacts that result from the existence and operation of a project. Temporary impacts are direct impacts that result from project construction activities, and can include effects such as temporary disturbance of land and wildlife habitat, noise and air pollutants from operation of construction machinery and vehicles, traffic detours and congestion, degradation of the visual environment by large construction equipment, and the economic benefits of jobs in the construction sector.

The direct impacts of the Gravina Access Project are discussed in the first 25 sections of this Chapter 4.0.

Indirect Impacts. Indirect impacts are impacts related to the project that are reasonably foreseeable, yet (compared to direct impacts) occur later in time and farther in distance (40 CFR 1508.8). For instance, the construction of a road in an undeveloped area could have direct adverse impacts (such as removing wildlife habitat, disrupting bird nesting behavior, and forcing businesses to relocate) and direct benefits (such as providing access to developable land). However, any effects of the project that occur indirectly (such as land development that is induced because the land has become road accessible) would be indirect impacts. The indirect impacts of the project alternatives are discussed in Section 4.26.

Cumulative Impacts. The cumulative effects of a project are those effects that “result from the incremental consequences of an action when added to other past and reasonably foreseeable future actions” (40 CFR 1508.7). Such future actions are those projects that are far enough along in the planning process that their implementation is reasonably foreseeable. The cumulative impacts of the project alternatives are discussed in Section 4.27.

Short-Term Uses and Long-Term Productivity. The natural productivity of land is considered a long-term, renewable use of the land, whereas land development generally is short-term and has a relatively short economic life. The short-term uses and long-term productivity of the project are described in Section 4.28.

Irreversible and Irretrievable Commitments of Resources. Implementing any of the project action alternatives would use a range of natural, physical, human, and fiscal resources. The use of some of these resources could never be undone, and the resources themselves could never be recovered. The commitment of such resources by the project is discussed in Section 4.29.

Mitigation. Measures to minimize the potential adverse impacts associated with the project alternatives, where warranted, are provided following the individual sections describing impacts. These mitigation measures are compiled in Section 4.30.

4.1 Land Use Impacts

This section discusses the project's direct impact to ownership, land use, and zoning. Section 4.1.1 examines the impacts of the project based on ~~current~~ ownership, land uses, and zoning, and Section 4.1.2 assesses the consistency of project alternatives with relevant land use plans. See the *Conceptual Stage Relocation Study and Assessment of Right-of-Way Acquisition Costs* in Appendix B for additional information on project alternative impacts to land uses and individual properties.

4.1.1 Direct Impacts to Ownership, Land Use, and Zoning

Table 4-1 through Table 4-3 report the direct impacts of the project alternatives' proposed rights-of-way to project area land ownership, land use, and zoning. Within each table the total acreage of each land type is listed for the entire project area. The tables also list the right-of-way requirements for each alternative relative to the total project. More specific information can be found under each alternative.

Table 4-1: Land Ownership Impacts by Alternative

Ownership	Acreage[a] in project area	Right-of-Way Requirements									
		Bridge Alternatives				Ferry Alternatives					
		C3-4		F3		G2		G3		G4~~/~~ and G4v	
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
USCG	58	—	—	<1	<1	—	—	—	—	—	—
State of Alaska	4,345	194	4	174	4	205	5	188	4	174	4
DNR	*2,381*	*26*	*1*	*6*	*<1*	*10*	*<1*	*7*	*<1*	*6*	*<1*
DOT&PF	*1,964*	*168*	*9*	*168*	*9*	*195*	*10*	*181*	*9*	*168*	*9*
Alaska Mental Health Trust	3,984	<1	<1	—	—	—	—	—	—	—	—
Native Corporation	23	—	—	—	—	—	—	<1	<1	—	—
Borough	1,787	32	2	71	4	32	2	32	2	32	2
Private	2,334	42	2	4	<1	—	—	1	<1	—	—
Not classified/ no data[b]	10,171	32	<1	44	<1	24	<1	23	<1	22	<1
Total	**22,702**	**300**	**1**	**293**	**1**	**261**	**1**	**244**	**1**	**228**	**1**
Total number of parcels affected	—	24		14		5		10		5	
Total Number of private parcels affected	—	**19**		**7**		—		**6**		—	
Relocations	—	2 residences 6 businesses		—		2 businesses		—		—	

[a] All acreages are approximate and have been rounded to the nearest whole acre

[b] Not classified/no data represents spatial data lacking adequate attributes to accurately classify, e.g., existing ROW, ocean and other water bodies, or parcels with incomplete records.

Table 4-2: Land Use Impacts by Alternative

Land Use	Acreage[a] in project area	Right-of-Way Requirements									
		Bridge Alternatives				Ferry Alternatives					
		C3-4		F3		G2		G3		G4 and G4v	
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Residential	554	<1	<1	—	—	—	—	—	—	—	—
Commercial	146	—	—	—	—	—	—	1	<1	—	—
Industrial	2,782	198	7	174	6	202	7	187	7	173	6
Vacant	15,589	91	<1	96	<1	58	<1	54	<1	54	<1
Not classified/ no data[b]	3,631	11	<1	23	<1	1	<1	2	<1	1	<1
Total	**22,702**	**300**	**1**	**293**	**1**	**261**	**1**	**244**	**1**	**228**	**1**

[a] All acreages are approximate and have been rounded to the nearest whole acre

[b] Not classified/no data represents spatial data lacking adequate attributes to accurately classify, e.g., existing ROW, ocean and other water bodies, or parcels with incomplete records.

Table 4-3: Zoning Impacts by Alternative

Zoning	Acreage[a] in project area	Right-of-Way Requirements									
		Bridge Alternatives				Ferry Alternatives					
		C3-4		F3		G2		G3		G4 and G4v	
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
General commercial	188	1	<1	—	—	3	2	1	<1	—	—
Future development	12,516	33	<1	39	<1	32	<1	32	<1	32	<1
Light industrial	350	11	3	—	—	—	—	—	—	—	—
Heavy Industrial	439	—	—	—	—	0.1	<1	—	—	—	—
Public lands/ institutional	340	—	—	<1	<1	—	—	—	—	—	—
Low-density residential	2215	25	1	35	2	—	—	—	—	—	—
High-density residential	130	8	6	—	—	—	—	—	—	—	—
Rural residential	395	22	6	22	6	22	6	22	6	22	6
Airport[b]	1,457	181	12	173	12	200	14	183	13	173	12
Not classified/ no data[c]	4,672	19	<1	24	<1	4	<1	6	<1	1	<1
Total	**22,702**	**300**	**1**	**293**	**1**	**261**	**1**	**244**	**1**	**228**	**1**

[a] All acreages are approximate and have been rounded to the nearest whole acre

[b] Combines zoning classifications Airport, Airport Development, and Airport Reserve

[c] Not classified/no data represents spatial data lacking adequate attributes to accurately classify, e.g., existing ROW, ocean and other water bodies, or parcels with incomplete records.

4.1.1.1 No Action Alternative

Under the No Action Alternative, no bridge or additional ferry terminal would be constructed to improve access to Gravina Island, and access from Revillagigedo Island would continue to be via the existing airport ferry. No land would be acquired, developed, or directly affected as a result of the No Action Alternative. Construction of the Gravina Island Highway has allowed for better accessibility to developable lands, and land use patterns would likely change according to adopted local land use plans. However, the rate at which Gravina Island develops would likely be slower under the No Action Alternative than with any of the action alternatives (see Section 4.26.1 for a description of induced growth and indirect impacts to land use).

4.1.1.2 Bridge Alternatives

4.1.1.2.1 Alternative C3-4

Right-of-way requirements for Alternative C3-4 would affect a total of 24 parcels and require eight relocations. The impacts of Alternative C3-4's right-of-way requirements to land ownership, land use, and zoning can be found in Table 4-1, Table 4-2, and Table 4-3, respectively.

On Revillagigedo Island, Alternative C3-4 would require acquisition of right-of-way from two residential properties located along North Tongass Highway, 12 vacant privately owned properties, and six commercial properties located along Rex Allen Drive, converting either entire parcels or portions of these properties to transportation use. The two affected residential properties along the North Tongass Highway would be converted to transportation use, and the residents would be relocated. This acquisition and change in land use would not substantially affect the overall supply of residential land in Ketchikan. Land in this vicinity is zoned for residential uses.

Alternative C3-4 would affect six commercial properties along Rex Allen Drive (~~currently~~ zoned for industrial uses), including an auto body and glass business, a maintenance shop, a storage facility, an engine repair shop, a tourism business, and a warehouse. The project would acquire all of the properties along Rex Allen Drive, relocate the businesses, and convert the properties to transportation right-of-way. The relocation of these businesses would not substantially affect the overall availability of commercial properties in Ketchikan. The project would not require right-of-way from Walmart property and would not affect the existing Walmart parking area.

On Gravina Island, Alternative C3-4 would use DOT&PF lands in the vicinity of the Ketchikan International Airport. Alternative C3-4 would not adversely impact existing land uses at the airport, which would remain industrial and transportation-related under this alternative. Some temporary impacts to transportation facilities and airport circulation would occur during construction, including the relocation of existing seaplane floats where Alternative C3-4 enters the airport to accommodate fill placement for the bridge abutment (see Section 4.7 for more information). Outside the immediate terminal area, Alternative C3-4 would acquire vacant, state-owned land zoned by the Borough for industrial purposes. At the southern end of the Gravina Island Highway, rights-of-way would be acquired from two Borough-owned parcels. Other roads under Alternative C3-4 would remain as constructed except for the ~~reconstruction~~ replacement of Airport Creek Bridge, and no direct land use impacts would be anticipated elsewhere on Gravina Island.

Alternative C3-4 would require right-of-way on 26 acres of DNR land. DNR would need to issue an Interagency Land Management Assignment (ILMA) to DOT&PF, which would transfer management of those state-owned lands (inclusive of submerged lands and tidelands) to DOT&PF. ILMA lands must be returned to DNR when no longer needed for transportation purposes.

4.1.1.2.2 Alternative F3

Right-of-way requirements for Alternative F3 would affect a total of 14 parcels and would require no relocations. The impacts of Alternative F3's right-of-way requirements to land ownership, land use, and zoning can be found in Table 4-1, Table 4-2, and Table 4-3, respectively.

On Gravina Island, Alternative F3 would use DOT&PF lands in the vicinity of the Ketchikan International Airport as well as Borough property south of the airport. Alternative F3 would require a slight widening of the existing Gravina Island Highway from its current 36-foot-wide gravel surface to a 40-foot-wide paved surface. The highway would be widened along its entire length from the intersection with Airport Access Road to the Gravina Island Highway southern terminus. Alternative F3 would not adversely impact existing land uses at the airport, which would remain industrial and transportation-related under this alternative. Alternative F3 would have no direct impacts to existing land uses near the airport, and would be unlikely to directly impact land use elsewhere on Gravina Island.

On Pennock Island, this alternative would primarily affect Borough-owned land, converting undeveloped land to a 40-foot-wide roadway connecting the two bridges over the East and West channels. Approximately 4 acres of undeveloped private land on Pennock Island's eastern edge would be acquired under this alternative. Areas affected by the F3 Alternative have the general Borough zoning classification of low-density residential.

On Revillagigedo Island, Alternative F3 would intersect Tongass Avenue south of the USCG base in an area that is presently undeveloped and zoned as institutional by the Borough. This would affect approximately 0.25 acre of USCG property and less than 0.1 acre of a privately owned parcel.

Alternative F3 would require right-of-way on 6 acres of DNR land. DNR would need to issue an ILMA to DOT&PF, which would transfer management of those state-owned lands (inclusive of submerged lands and tidelands) to DOT&PF. ILMA lands must be returned to DNR when no longer needed for transportation purposes.

4.1.1.3 Ferry Alternatives

4.1.1.3.1 Alternative G2

Right-of-way requirements for Alternative G2 would affect a total of five parcels and require three relocations. The impacts of Alternative G2's right-of-way requirements to land ownership, land use, and zoning can be found in Table 4-1, Table 4-2, and Table 4-3, respectively.

On Revillagigedo Island, a single parcel at Peninsula Point would need to be acquired for transportation purposes. The buildings located on the Peninsula Point parcel would be removed and the commercial activities relocated to construct the ferry terminal and associated parking facilities. Commercial properties at Peninsula Point that would require relocation are an aviation maintenance company and a warehouse. Fire Station #3 is also located on Peninsula Point and would require relocation. The parcel shared by these three buildings is owned by the state and ~~currently~~ leased and zoned for commercial purposes.

On Gravina Island, Alternative G2 would use DOT&PF lands in the vicinity of the Ketchikan International Airport and Lewis Point for construction of the ferry terminal and connecting road. The ferry terminal would be constructed at Lewis Point along with a new road 40-foot-wide that would connect the terminal to Seley Road and the airport. The operation of an airport ferry terminal at Lewis Point on Gravina Island would not adversely affect existing land uses or zoning and would be compatible with planned land uses near the airport.

Alternative G2 would require right-of-way on 10 acres of DNR land. DNR would need to issue an ILMA to DOT&PF, which would transfer management of those state-owned lands (inclusive of submerged lands and tidelands) to DOT&PF. ILMA lands must be returned to DNR when no longer needed for transportation purposes.

4.1.1.3.2 Alternative G3

Right-of-way requirements for Alternative G3 would affect a total of 10 parcels and would require no relocations. The impacts of Alternative G3's right-of-way requirements to land ownership, land use, and zoning can be found in Table 4-1, Table 4-2, and Table 4-3, respectively.

On Revillagigedo Island, Alternative G3 would require the construction of a ferry terminal and parking facilities on Bar Point, just south of the Ketchikan boat harbor and the Cedar Point buildings and Movie Gallery on Jefferson Way. The ferry terminal and parking facilities would be constructed on fill placed into Tongass Narrows. This alternative would require acquisition of portions of the parking lots owned by the Movie Gallery, the Plaza Mall, and the Safeway gas station for right-of-way to construct the access road connecting to the ferry terminal. The remaining parking lot, however, would retain sufficient parking to serve the businesses that currently use it. The Revillagigedo Island ferry terminal site has surrounding land uses that are predominantly commercial, including retail at the Plaza Mall and other businesses along Jefferson Way. The area is ~~currently~~ zoned for commercial uses.

Alternative G3 would use DOT&PF lands on Gravina Island, south of the Ketchikan International Airport, for the ferry terminal and 40-foot-wide road connecting to the Gravina Island Highway. Construction of new facilities would occur on land that is currently vacant and within the airport reserve and development zones of KIA. The operation of a ferry terminal south of the airport terminal on Gravina Island would not adversely affect existing land uses or zoning and would be compatible with planned land uses near the airport.

Alternative G3 would require right-of-way on 7 acres of DNR land. DNR would need to issue an ILMA to DOT&PF, which would transfer management of those state-owned lands (inclusive of submerged lands and tidelands) to DOT&PF. ILMA lands must be returned to DNR when no longer needed for transportation purposes.

4.1.1.3.3 Alternatives G4 and G4v (Preferred Alternative)

Right-of-way requirements for Alternative G4 and G4v would affect a total of five parcels, all of which are either State or Borough owned. The impacts of Alternatives G4 and G4v's right-of-way requirements to land ownership, land use, and zoning can be found in Table 4-1, Table 4-2, and Table 4-3, respectively.

Under Alternative G4, a new ferry terminal and parking facility would be constructed on Revillagigedo Island, on DOT&PF land at the current site of the gravel parking lot adjacent to the existing ferry terminal. The new facilities for Alternative G4 would be constructed immediately adjacent the existing airport ferry terminals on both Revillagigedo and Gravina islands and therefore would not adversely affect existing land uses or zoning.

Under Alternative G4v, upland improvements on Revillagigedo Island would be made on land that is part of the existing ferry terminal. ~~entail the same improvements as Alternative G4, but without the addition of new ferry vessels or new ferry terminals.~~New facilities on Gravina Island would be constructed on airport property. Alternative G4v ~~See Sections 2.1.3.3 and 2.1.3.4 for a description of the G4 and G4v alternatives. The new facilities for Alternative G4v would be constructed immediately adjacent to the existing airport ferry terminal on Revillagigedo Island and therefore~~ would not adversely affect existing land uses or zoning.

Alternatives G4 and G4v would require right-of-way on 6 acres of DNR land. DNR would need to issue an ILMA to DOT&PF, which would transfer management of those state-owned lands (inclusive of submerged lands and tidelands) to DOT&PF. ILMA lands must be returned to DNR when no longer needed for transportation purposes.

4.1.2 Consistency with Land Use Plans and Policies

The Ketchikan Gateway Borough plans for land use are the 1985 *Pennock and Gravina Island Neighborhood Plan*, 2005 *Gravina Island Plan*, 2007 *Coastal Management Plan*, and 2009

Ketchikan Gateway Borough Comprehensive Plan 2020. DOT&PF's 2003 *Ketchikan International Airport Master Plan* also is relevant because all action alternatives affect airport property. Strategies presented in *Ketchikan's Coordinated Transportation Plan 2015 Update* are consistent with the purpose and need of the Gravina Access Project, providing recommendations to increase access between the airport on Gravina Island and the City of Ketchikan.

4.1.2.1 No Action Alternative

The No Action Alternative would be inconsistent with the Coastal Management Program, ~~and~~ the *Ketchikan Gateway Borough Comprehensive Plan 2020*,[1] and *Ketchikan's Coordinated Transportation Plan 2015 Update*, ~~both of~~ all of which discuss the need for improved access to Gravina Island. The Coastal Management Program identifies and supports the preferred alternative from the 2004 FEIS, Alternative F1. The *Ketchikan Gateway Borough Comprehensive Plan 2020* is less specific regarding the means of access to Gravina Island but states that access to Gravina Island from Revillagigedo Island is necessary to foster economic development within the Borough. As stated in the plan, "access strategies should include, but are not limited to, a bridge, enhanced ferry service, or other practical access solutions."[2] *Ketchikan's Coordinated Transportation Plan 2015 Update,* includes strategies to improve accommodations for people accessing the airport. The No Action Alternative would provide no such access improvement.

The *Gravina Island Plan* is also coordinated around Alternative F1, which would have provided a bridge crossing at Pennock Island. The goals and vision of the plan could only be recognized and implemented fully through improved access from Revillagigedo Island, which the No Action Alternative would not provide.

The *Ketchikan International Airport Master Plan* anticipates either a continuation of the existing ferry service or the creation of hard-link to Revillagigedo Island in its plans to meet future airport parking and circulation needs. Under the existing ferry service and without the construction of a hard-link, the plan recommends expansion of its long-term parking lot. Because the plan accommodates existing ferry service, the No Action Alternative appears to be consistent with the *Ketchikan International Airport Master Plan*.

4.1.2.2 Bridge Alternatives C3-4 and F3

Alternatives C3-4 and F3 appear consistent with the *Ketchikan International Airport Master Plan*, the *Gravina Island Plan*, the *Coastal Management Plan*, ~~and~~ the *Ketchikan Gateway Borough Comprehensive Plan 2020*, and *Ketchikan's Coordinated Transportation Plan 2015 Update*.

The forecasting chapter of the *Ketchikan International Airport Master Plan* examines bridge access as a possible future mode of access and identifies a location for a parking garage, should bridge access come to fruition. Alternatives C3-4 and F3 are consistent with the plan and would not affect planned airport facilities.

The *Gravina Island Plan* focuses on the Borough's long-term plans for development of Gravina Island by identifying key economic development opportunities. The plan states that road improvements (i.e., the ~~recently completed~~ Gravina Island Highway, which was completed, as well as additional future roads identified in the plan) are integral to provide the access needed for the community to grow. Alternatives C3-4 and F3 are consistent with the *Gravina Island Plan*

[1] Ketchikan Gateway Borough. 2009. *Ketchikan Gateway Borough Comprehensive Plan 2020.*

[2] Ketchikan Gateway Borough. 2009. *Ketchikan Gateway Borough Comprehensive Plan 2020*, p.57.

because each alternative would improve accessibility between the islands as compared to the existing airport ferry.

The Coastal Management Program identifies the need for improved access, specifically a bridge, between Gravina Island and Revillagigedo Island to access suitable developable lands and meet community growth needs. While this plan recognizes the 2004 FEIS preferred alternative (F1) road corridor, the language within its enforceable policies speaks more generally to the route, although it does call for a road corridor accommodating a bridge. As such, Alternatives C3-4 and F3 would be consistent with the plan. Both alternatives also would further the implementation of the key economic development and land supply strategy articulated in the Coastal Management Program by improving accessibility between the islands.

The *Ketchikan Gateway Borough Comprehensive Plan 2020* identifies development of Gravina Island as a goal to provide "new economic opportunities to diversify and strengthen Ketchikan's economic health."[3] The plan encourages Gravina Island access strategies that "include, but are not limited to, a bridge, and enhanced ferry service, or other practical access solution."[4] As such, both bridge Alternatives C3-4 and F3 would be consistent with the plan.

The *Ketchikan's Coordinated Transportation Plan 2015 Update* identifies strategies to address the gaps in Ketchikan's transportation system. Adequate airport accessibility is one system gap identified in the plan. Alternatives C3-4 and F3 would improve the transportation system by providing unrestricted access to Gravina Island.

4.1.2.3 Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

Improved access to Gravina Island by means of increased ferry service and/or facilities enhancements (e.g., passenger waiting area, upgraded sidewalks, reconstructed ferry transfer bridges and ramps) is consistent with the *Ketchikan International Airport Master Plan* and *Ketchikan's Coordinated Transportation Plan 2015 Update*, which anticipate~~s~~ that the ferry could continue to be the future mode of transport to the airport. All of the proposed ferry alternatives would be consistent and would not conflict with the policies and implementation strategies within these plans ~~*Gravina Island Plan*~~ because they would improve accessibility between the Revillagigedo and Gravina islands. Enhanced ferry access as provided by ~~any of the ferry a~~Alternatives G2, G3, and G4 would also be consistent with the goals and objectives of the Borough's Coastal Management Program. ~~The ferry a~~Alternatives G2, G3, and G4 are also consistent with the *Ketchikan Gateway Borough Comprehensive Plan 2020,* which encourages access strategies to Gravina Island that include enhanced ferry service.

4.1.3 Section 4(f) Lands

None of the proposed alternatives would require acquisition of Section 4(f) resources. There are 13 Borough-managed park facilities in the project area. These are shown on Figure 3.2 as recreational/park lands in relation to the alternatives. None of the alternatives would affect these parks.

There are many properties in Ketchikan and Saxman on the NRHP, particularly downtown and outside the project area. None of these sites is located within the APE of any of the project alternatives. Additional detail is provided in Sections 3.21 and 4.21.

[3] Ketchikan Gateway Borough. 2009. *Ketchikan Gateway Borough Comprehensive Plan 2020*, p.57.

[4] Ketchikan Gateway Borough. 2009. *Ketchikan Gateway Borough Comprehensive Plan 2020*, p.57.

In summary, FHWA has determined that no land from any park, recreation area, wildlife refuge, or historic site subject to Section 4(f) protection would be used for the project and that therefore, a Section 4(f) evaluation is not necessary.

4.2 Farmland Impacts

The alternatives would not impact farmland because there is no farmland in the project area that is considered prime, unique, or of statewide or local importance.

4.3 Social Impacts

4.3.1 Population and Social Groups

None of the alternatives (No Action Alternative, Alternatives C3-4, F3, G2, G3, G4, and G4v) would disproportionally affect minority or low-income populations in the Borough. The impacts of the alternatives on minority and low-income populations, relevant to the assessment of environmental justice, are described in Section 4.3.6.

4.3.2 Community Character

4.3.2.1 <u>No Action Alternative</u>

The No Action Alternative would not change existing neighborhoods and would not affect community character.

4.3.2.2 <u>Bridge Alternatives</u>

4.3.2.2.1 Alternative C3-4

The Baker Street/Bucey Avenue neighborhood, a neighborhood of fewer than 15 residences along the hillside between Signal Road and the Alternative C3-4 bridge, may be adversely affected by the proximity of traffic on the new alignment, which would diminish the sense of quiet and the suburban atmosphere. The alignment associated with this alternative would be uphill from the neighborhood and would not split the neighborhood affecting community cohesion. The Pioneer Heights Senior Housing complex also may be adversely affected by the proximity of traffic on the new alignment. The presence of the bridge immediately south of the complex and at a higher elevation would alter the setting from its current natural surroundings to a more developed environment. The bridge structure would dominate the community character at this location.

Roadway improvements on Gravina Island under this alternative would not affect existing neighborhoods. The hard-link connection would provide a greater sense of connection to Ketchikan for Gravina Island neighborhoods and the character of the communities on Gravina Island would be less isolated. Conversely, residents of Gravina Island who value the separation and remote aspects of life on the island could be affected adversely by the physical connection between the communities.

4.3.2.2.2 Alternative F3

This alternative would not bisect neighborhoods or adversely affect neighborhood cohesion on any of the islands, including on Pennock Island, where most of the land is undeveloped. There would not be any direct access off the new road and onto the lands on Pennock Island from Alternative F3, although such access could be provided by others in the future. Elsewhere, direct access to the new facility would be limited, and ~~current~~ neighborhood streets would not be used for cut-through access.

Some residents could view the hard link between Revillagigedo Island, Pennock Island, and Gravina Island as a benefit because it could improve the cohesion of the community by linking neighborhoods (existing and future) on all sides of Tongass Narrows. Conversely, residents of Gravina and Pennock islands who value the separation and remote aspects of life on those islands could be affected adversely by the physical connection between the communities.

4.3.2.3 Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

None of the ferry alternatives (Alternatives G2, G3, G4, and G4v) would directly affect residential areas. The alignments do not bisect any neighborhoods and would not adversely affect neighborhood cohesion (see Section 4.4 for more information). Residents of the Cedar Point Condominiums would experience an increase in activity related to the Alternative G3 ferry terminal. Since these condominium units are adjacent to other commercial and maritime activity, the change in activity would be unlikely to affect the character of that community.

The limited access provided by the ferry alternatives would not substantially change the separation and remote lifestyle of Gravina Island residents offered by the physical divide of Tongass Narrows.

4.3.3 Community and Public Facilities

4.3.3.1 No Action Alternative

Under the No Action Alternative, the problems and inconvenience identified and associated with the current ferry access between public facilities and developed land on Revillagigedo Island (police, fire stations, hospital) and Ketchikan International Airport would continue. The emergency response system would remain unchanged and therefore transporting emergency personnel and equipment between the airport and Ketchikan would remain inconvenient and limited, as described in the purpose and need (Section 1.4.2.3).

4.3.3.2 Bridge Alternatives C3-4 and F3

The bridge alternatives would not have a direct adverse impact to existing or planned community facilities or public service providers. Access to the Pioneer Heights Senior Housing complex would not be affected by either bridge alternative. Accessibility from Gravina Island to public services such as fire, police, and hospitals on Revillagigedo Island would improve considerably with the 24-hour access provided by a bridge. Travel for necessary medical services would be easier for residents of Gravina Island, and emergency personnel could travel to Gravina Island more easily than ~~current~~ existing infrastructure allows.

4.3.3.3 Ferry Alternatives G2, G3, and G4

Alternatives G2, G3, and G4 would include construction of a passenger waiting area that would create a public space for people waiting for the airport ferry. Accessibility to public services such as fire, police, and hospitals would improve with the additional ferry service, although travel time to the airport for emergency vehicles would be the same for Alternatives G2 and G3 (assuming use of the existing ferry) and improve slightly for Alternative G4. The increased capacity of an additional ferry service would make travel to Ketchikan for medical services more convenient for residents of Gravina Island and an additional ferry would make accessing Gravina Island easier for emergency personnel than it is now, but access (as with the existing ferry) would still be unavailable during non-operating hours or severe weather. ~~The emergency response system would be the same as the existing condition except that~~ Alternatives G2 and G3 would offer different access locations for emergency response, which could improve emergency response time (depending on the location of the emergency). The movement of emergency response equipment to Gravina Island would improve under Alternatives G2, G3, and G4 with the addition of the heavy freight mooring facility.

4.3.3.4 Ferry Alternative G4v (Preferred Alternative)

Alternative G4v would include a passenger waiting area that would create a public space for people waiting for the airport ferry. With no additional ferry service, access to public services such as fire, police, and hospitals would not improve using the existing ferry service; however, movement of emergency response equipment to Gravina Island would improve under Alternative G4v with the addition of the heavy freight mooring facility. ~~The emergency response system would be the same as the existing condition.~~

4.3.4 Recreation

4.3.4.1 No Action Alternative

With the No Action Alternative, access to recreational land on Gravina Island would not improve from the existing condition. Access to and development of the recreational opportunities on Gravina Island as detailed in the Borough Comprehensive Plan 2020 and the Gravina Island Plan would be limited under the No Action Alternative.

4.3.4.2 Bridge Alternatives C3-4 and F3, and Ferry Alternatives G2, G3, and G4

A direct benefit of improved access to Gravina Island associated with ~~all the action a~~Alternatives C3-4, F3, G2, G3, and G4 would be better accessibility to recreational areas, parks, and facilities. This applies to bidirectional access for residents on Gravina and Revillagigedo Islands, as well as visitors accessing recreational sites on either island. ~~Recent completion of~~ Improved access to the Gravina Island Highway under all alternatives ~~has~~ would provide~~d~~ some improvement to recreation access on Gravina Island. There are numerous recreational opportunities on Gravina Island as well as many proposed trails and recreation area improvements, and improved access with a bridge or additional ferry service would make those opportunities more accessible to Ketchikan residents and visitors. The improved access to recreational opportunities could have adverse indirect impacts by increasing demand for and use of recreational sites, requiring more frequent upkeep and repair of facilities. It would also lead to greater demand for public services, such as fire and police protection, at recreation sites. These indirect impacts are described in Section 4.26.

4.3.4.3 Ferry Alternative G4v (Preferred Alternative)

While the Gravina Island Highway has provided some improvement to recreation access on Gravina Island under all alternatives~~With Alternative G4v~~, access to recreational land on Gravina Island under Alternative G4v would not improve from the existing condition. Alternative G4v would not benefit or adversely affect recreational resources in the project area.

4.3.5 Accessibility

Changes to accessibility are reflected, in part, by changes to travel times for vehicles, pedestrians, and bicycles. Section 4.7.3 describes vehicle travel time impacts and Section 4.8 details pedestrian and bicycle travel time impacts.

4.3.5.1 No Action Alternative

The No Action Alternative would not change travel patterns or accessibility. Travel to the airport would continue on the existing ferry; other trips would continue to be made with private boats. Accessibility problems, as identified in Chapter 1.0, would continue.

Weather can be a factor in the reliability of ferry access, although instances of service interruption due to weather are rare. The airport ferry runs if the airport is open, and the airport ferry service was closed only once to a weather-related event in the last 15 years.[5] That closure occurred when the wind was blowing at approximately 90 miles per hour and there were no vehicles or other passengers waiting to cross.

While access to lands on Gravina Island has improved since the completion of the Gravina Island Highway in 2008, access to medical services and fire protection for Gravina residents would continue to be limited by ferry schedule and potential weather-related closures. Without improved access, residents would continue to make trips to and from Ketchikan in private skiffs across Tongass Narrows, and depending on the season, be required to navigate heavy boat and seaplane traffic.

4.3.5.2 Bridge Alternatives

4.3.5.2.1 Alternative C3-4

Alternative C3-4 would improve accessibility between Revillagigedo and Gravina islands. The alternative would improve accessibility to the airport and to developable lands on Gravina Island by providing 24-hour access. Development would increase due to more convenient access to Gravina Island. Vehicle travel patterns would change slightly because the location of this alternative on Revillagigedo Island is off of Signal Road (north of the existing airport ferry). Accessibility for pedestrians and bicyclists would improve as a result of 24 hours-per-day availability of access; however, the travel route would be longer for pedestrians and bicyclists originating from, or destined to, areas on Revillagigedo Island south of the existing airport ferry terminal, and require more physical exertion to overcome grade changes. The effects of this alternative on travel time are described in Sections 4.7.3 (vehicles) and 4.8 (pedestrians and bicyclists).

The bridge and additional road miles would increase the vehicle miles traveled in the Borough. Driving an automobile can be dangerous and, to the extent that traffic accidents are a function of vehicle miles traveled, the number of traffic accidents would also increase. The roads, bridges, and intersections in this alternative would be designed to current American Association of State Highway Transportation Officials (AASHTO) standards, minimizing the impact to traffic safety.

Accessibility between medical and other emergency services and Ketchikan International Airport for medevacs would improve, offering greater opportunity for sharing firefighting equipment and personnel between airport and community emergency services.

4.3.5.2.2 Alternative F3

Alternative F3, located south of downtown Ketchikan, would improve accessibility between Revillagigedo and Gravina islands, and would improve access to the airport and developable lands on Gravina Island by providing 24-hour access to the island. Development would increase due to more convenient access to Gravina Island. Vehicle travel patterns would change because the location of this alternatives on Revillagigedo Island would lie south of downtown Ketchikan. Pedestrian and bicycle access would improve as a result of a permanent, 24-hour-per-day link to between the islands, though the corridor would be longer and require more physical exertion to overcome grade changes than ~~current~~ existing conditions. Effects on travel time are described in Sections 4.7.3 (vehicles) and 4.8 (pedestrians and bicyclists).

[5] Carney, Mike. June 25, 2009. Personal communication between Airport Manager, Ketchikan International Airport, and Mike McMahon, HDR.

Alternative F3 would connect to Pennock Island, though road access from the Alternative F3 alignment to Pennock Island neighborhoods is not included in these alternatives. Alternative F3 would provide an opportunity for others to connect the Pennock Island neighborhoods to Gravina and Revillagigedo islands in the future. Section 4.26.1 describes the indirect impacts and Section 4.27.1 describes the cumulative impacts related to land use and access on Pennock Island.

The bridge and additional road miles provided in Alternative F3 would increase vehicle miles traveled and, consequently, would likely increase traffic accidents. The roads, bridges, and intersections would be designed to current AASHTO standards, minimizing the impact to traffic safety.

Accessibility between medical and other emergency services and Ketchikan International Airport for medevacs would improve as a result of this alternative, and the improvement would offer greater opportunity for sharing firefighting equipment and personnel between airport and community emergency services.

4.3.5.3 Ferry Alternatives

4.3.5.3.1 Alternatives G2, G3, and G4

Alternatives G2, G3, and G4 would increase the accessibility of Gravina Island from Revillagigedo Island. The alternatives would improve accessibility to the airport and developable lands on Gravina Island by providing another option for ferry access—Alternative G2 is located north of the existing ferry, Alternative G3 is located south of the existing ferry, and Alternative G4 is located next to the existing ferry. The island's development potential would increase due to more convenient access to Gravina Island. Vehicle travel patterns would change for Alternatives G2 and G3 because of the location of these alternatives on Revillagigedo Island (north or south of the existing airport ferry, respectively). Accessibility for pedestrians and bicyclists would improve as a result of having two location options for crossing Tongass Narrows. The effects of these alternatives on travel time are described in Sections 4.7.3 (vehicles) and 4.8 (pedestrians and bicyclists).

Ferry closures due to weather are not anticipated to occur more frequently under Alternatives G2, G3, or G4 than under the No Action Alternative (see Section 4.3.5.1).

Alternatives G2, G3, and G4 would provide greater accessibility to medical and other emergency services than the No Action Alternative as a result of the additional ferry connection to Revillagigedo Island. However, residents would continue to be adversely affected by the limitations on accessibility to medical services and fire protection as dictated by ferry scheduling. Residents would continue to rely on private water access (e.g., personal boats, skiffs, or water taxi) to cross Tongass Narrows outside of ferry operating hours. The movement of emergency response equipment to Gravina Island would improve under Alternatives G2, G3, and G4 with the addition of the heavy freight mooring facility.

4.3.5.3.2 Alternative G4v (Preferred Alternative)

~~There would be no change in t~~Travel patterns, accessibility to medical and other emergency services, and~~or~~ travel safety with Alternative G4v~~,~~ would be similar to the No Action Alternative. Travel to the airport would continue on the existing ferry; other trips would continue to be made with private boats. Because it does not include~~is unlikely that~~ additional ferry service~~ would be added~~, limitations to accessing medical services and fire protection would be more pronounced under Alternative G4v. Movement of emergency response equipment to Gravina Island would improve under Alternative G4v with the addition of the heavy freight mooring facility.

4.3.6 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs federal agencies to identify and address disproportionately high and adverse effects of federal projects on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law. Race and income data in the project area, to the most refined geographic subset available, were collected and compared to data for the State of Alaska and the Borough to identify minority or low-income populations in the project area.

As described in this chapter, all of the action alternatives would have some impact to the Ketchikan area and its residents. In accordance with EO 12898 (see Section 3.3), the project team set out to analyze whether any of the alternatives would have high and adverse environmental impacts that would be borne disproportionately by environmental justice populations.

As stated in Sections 3.3.1 and 3.3.6, demographic analysis indicates there are no low-income populations in the area (i.e., based on block group data on median household incomes and DHHS poverty guidelines) but that there are some minority populations (greater than 50 percent non-white) in the project area (see Figures 3.6 and 3.7). The minority populations closest to an action alternative are those near the Alternative G3 ferry terminal on Revillagigedo Island, within 0.1 mile. The Native population in the City of Saxman is approximately 0.5 mile from the terminus of Alternative F3 on Revillagigedo Island. These ~~area in which that community~~ populations ~~resides~~ would not experience disproportionately high and adverse impacts to the human or natural environment. In addition, as stated in Sections 3.3.1 and 3.3.6, no pockets of predominantly minority or low-income populations in the immediate vicinity of any of the alternatives were identified during public outreach for the project.

Adding a toll to a bridge alternative could adversely affect disadvantaged segments of the population, having a disproportionate adverse economic effect particularly on low-income populations. The existing airport ferry crossing of Tongass Narrows requires toll payment and any proposed toll associated with the action alternatives would be the same or less than the existing toll. This would result in no change or a benefit to low-income populations. ~~Further~~Although there are~~, since there are no predominantly~~ minority ~~or low-income~~ populations in the project area, none of the action alternatives would have a disproportionate adverse effect on environmental justice populations with respect to tolling.

Based on the above discussion and analysis, construction and operation, including tolling, of any of the action alternatives would not cause disproportionately high and adverse effects on any minority or low income populations in accordance with the provisions of EO 12898 and FHWA Order 6640.23.

4.3.7 Subsistence

During scoping for the 2004 EIS, the project team met with representatives of the Metlakatla Indian Community, the Ketchikan Indian Corporation Tribal Council, the Organized Village of Saxman, and Cape Fox Corporation. Discussions at these meetings identified subsistence as an issue of great concern in the Borough. In those scoping meetings, Gravina Island, in general, and the Bostwick Inlet area of the island, in particular, were noted as important subsistence areas for Alaska Natives by the tribal entities consulted. Tribal consultation included in the SEIS scoping effort did not indicate any new concerns related to subsistence resources. Improved access to more areas of Gravina Island created by the Gravina Island Highway has likely improved access for subsistence users, which in turn may increase competition for resources.

See Section 4.27.1 for a discussion of the cumulative impacts of the Gravina Access Project on subsistence resources on Gravina Island.

4.3.7.1 No Action Alternative

The No Action Alternative would not impact subsistence.

4.3.7.2 Bridge Alternative C3-4 and Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

The only direct impact to subsistence from Alternatives C3-4, G2, G3, G4, and G4v would be the loss of habitat that might support subsistence activity (see Section 4.14). Habitat loss is a direct function of the amount and location of land development. While it is impractical to determine the exact level of subsistence impact, such an impact level is implied from the amount of habitat lost. Alternative C3-4 would eliminate 6~~13~~ acres of wetlands and 9~~10~~ acres of uplands. Alternative G2 would eliminate 17~~24~~ acres of wetlands, 1 acre of ponds, and 3~~4~~ acres of uplands. Alternative G3 would eliminate 12~~18~~ acres of wetlands, 3 acres of ponds, and 2~~3~~ acres of uplands. Alternatives G4 and G4v would each eliminate 6~~13~~ acres of wetlands.~~ and 1 acre of uplands.~~

To characterize the direct loss of habitat from these action alternatives, it is important to note that the total area of Gravina Island is 61,404 acres. Seventy percent of the island (approximately 43,000 acres) is wetland. Approximately 3,276 acres of the wetlands, including estuaries, tall sedge fens, scrub-shrub alder/willow, and moss muskeg/sphagnum peat muskegs, were identified by the USFS as "high-value wetlands" because of their fish and wildlife habitat value, which is a relative rarity. Productive old-growth forest habitat, particularly at low elevations, is important for deer. There are 11,123 acres of productive old growth below 800 feet elevation on USFS lands of Gravina Island, and another 7,800 acres above that elevation. Additional deer habitat exists on non-USFS lands. Based on the small proportion of lands affected by the alternative relative to the total available lands, any direct loss of habitat from these action alternatives would have a negligible effect overall on subsistence practices in the area. Indirect impacts to subsistence are addressed in Section 4.26.

4.3.7.3 Bridge Alternative F3

As with the other action alternatives, impacts to habitat that might support subsistence activities (see Section 4.14) can imply an impact to subsistence. Alternative F3 would have direct impacts to 33 acres of wetlands, 1 acre of ponds, and 2 acres of uplands. Though there would not be any direct access off the road and onto the land on Pennock Island, the improved access to Pennock Island may result in increased subsistence use whereby people use the bridge/road to access inland areas on the island by foot. Alternative F3 would likely affect subsistence more than the other alternatives because it would provide access to both Pennock and Gravina Islands, but the effect will be indirect, or secondary, in nature. Indirect impacts to subsistence would result from habitat loss associated with future development on Gravina and Pennock islands. Section 4.26 addresses habitat loss associated with future development.

As noted in Section 4.3.7.2, the abundance of habitat for subsistence resources in the project area relative to the direct loss of habitat from Alternative F3 indicates that the alternative would have a negligible effect overall on subsistence practices in the area. Indirect impacts to subsistence are addressed in Section 4.26.

4.3.8 Utilities

4.3.8.1 Water

4.3.8.1.1 No Action Alternative

The No Action Alternative would not involve construction or additional utility usage; therefore, it would not affect the water utilities in the project area.

4.3.8.1.2 Bridge Alternative C3-4

In the Signal Road area, potable water systems consist of roof catchment systems or hauled water, and there is no water distribution system; consequently, Alternative C3-4 would not impact the existing water system on Revillagigedo Island. On Gravina Island, the water supply main to Ketchikan International Airport would not be affected by Alternative C3-4 because it is not in the area of potential disturbance.

4.3.8.1.3 Bridge Alternative F3

There is no water distribution in the vicinity of Alternative F3 on Revillagigedo, Pennock, and Gravina islands. Residences in these areas obtain potable water from roof catchment systems or hauled water. Any potential effects of Alternative F3 on surface water supplies would be minimized through a stormwater treatment system and BMPs implemented during construction and operation, as described in Section 4.12.2 and 4.25.10. Alternative F3 would not affect the water supply main to the airport because it is not in the area of potential disturbance. No other water distribution systems exist in the vicinity of this alternative, and there would be no expected impact to existing facilities.

4.3.8.1.4 Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

All project improvements for Alternatives G2, G3, G4, and G4v on Revillagigedo Island would be seaward of any water lines, and the project would not impact those lines. The new~~60-~~ passenger waiting facility at the airport ferry terminal on Revillagigedo Island would tie into the city water system but would not significantly affect the system's capacity. None of these alternatives would affect any water lines on Gravina Island.

4.3.8.2 Sewer

4.3.8.2.1 No Action Alternative

The No Action Alternative would not involve construction or additional utility usage; it would therefore have no effect on the sewer utilities in the project area.

4.3.8.2.2 Bridge Alternative C3-4

In the Signal Road area, sewage disposal typically consists of onsite disposal systems, and there is no sewage collection system. Consequently, Alternative C3-4 would not impact the existing sewer system. On Gravina Island, the airport is connected to the public sewer in Ketchikan via a submarine pipeline across Tongass Narrows. The connection is just north of the airport terminal building. Construction activity associated with Alternative C3-4 would be designed to avoid interfering with the pipeline.

4.3.8.2.3 Bridge Alternative F3

Sewage disposal in the project area of Revillagigedo Island and for residences on Pennock and Gravina Islands typically consists of onsite disposal systems, with no other sewage collection systems in the vicinity of the alternative. As a result of the self-contained nature of the sewage disposal systems on the islands, Alternative F3 would not impact existing sewer facilities or the airport wastewater treatment facilities.

4.3.8.2.4 Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

All project improvements for Alternatives G2, G3, G4, and G4v on Revillagigedo Island would be seaward of any sewer lines, so there would be no project-related impact to those lines. The ~~60~~ new passenger waiting facility at the airport ferry terminal on Revillagigedo Island would tie into the city sewer system but would not affect system capacity. None of these alternatives would affect sewer lines on Gravina Island.

4.3.8.3 Electricity and Telephone

The electrical and telephone lines on Revillagigedo Island are, in most instances, co-located and are discussed together in this impact analysis.

4.3.8.3.1 No Action Alternative

The No Action Alternative would not involve construction or additional utility usage, and therefore would have no effect on the electrical and telephone utilities in the project area.

4.3.8.3.2 Bridge Alternative C3-4

Along Tongass Avenue on Revillagigedo Island, the main electrical and telephone lines are located overhead on poles, but the proposed bridge overpass would be high enough to clear them. On Gravina Island, electric and telephone service to the airport would not be affected by Alternative C3-4.

In the Signal Road area, electric and telephone lines are overhead on poles. Construction of the bridge access corridor may require realignment of some of those facilities, which could cause temporary disruption of service, but should not cause any long-term effects.

4.3.8.3.3 Bridge Alternative F3

Alternative F3 would not affect electric and telephone service to the airport on Gravina Island because the submarine cables are not in the area of potential disturbance. On Tongass Avenue on Revillagigedo Island, the main electrical and telephone lines are located overhead on poles. The Alternative F3 bridge connection to Tongass Avenue would not require any changes to the poles and lines.

On Pennock Island, electric and telephone service is provided by overhead lines on poles. The bridge approaches and roadway would not interfere with the power poles or lines.

4.3.8.3.4 Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

All project improvements for Alternatives G2, G3, G4, and G4v on Revillagigedo Island would be seaward of any electrical and telephone lines, so there is no expected impact. Reconstruction of the airport ferry terminals would avoid the existing submarine cables crossing Tongass Narrows in the vicinity of the ferry crossing. The ~~60~~ new passenger waiting facility at the airport ferry terminal on Revillagigedo Island would tie into the electrical supply grid but would not affect system capacity. None of these alternatives would affect electrical or telephone lines on Gravina Island.

4.4 Relocation Impacts

This section discusses impacts to housing and businesses in the project area and the relocations required as a result of the C3-4 and G2 alternatives. Alternatives F3, G3, G4, and ~~G4/~~G4v would not require relocation of any residences or businesses and are not discussed in this section. Table 4-1 in Section 4.1 contains a summary of approximate acreages required for right-of-way and the anticipated residential and business relocations for each alternative. Because the project would result in relatively few displacements, information on race, ethnicity, and income levels is not included in the SEIS to protect the privacy of those affected. Sections 4.3 and 4.5 provide general information on social and economic impacts, respectively.

The 2010 *Conceptual Stage Relocation Study and Assessment of Right-of-Way Acquisition Costs* and its 2012 addendum (see Appendix B) provide detailed evaluations of each of the alignments with respect to property acquisition requirements, affected properties, and estimated number of displaced individuals and employees. The 2010 memorandum includes an estimate of the number of households that could be relocated; verification of available decent, safe, and sanitary housing in the area; an estimate of the businesses that may be displaced with each alternative; and the number of employees potentially affected. The 2012 addendum updates the 2010 memorandum with information about new development within the proposed right-of-way of Alternative C3-4 and related changes to the right-of-way requirements and acquisition costs. It also compares the assessed property values from 2010 and 2012 and finds the 2010 values to remain valid, with the exception of the properties in the Alternative C3-4 right-of-way that have new development. The community has sufficient existing housing to accommodate those residents who would be relocated, although those residents might have to move outside of their existing neighborhood. Businesses affected under Alternatives C3-4 and G2 would also be relocated to different areas of the community. Commercial space is available and the cost of the relocations would be covered as part of the relocation process. Relocations would be done according to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, and relocation resources would be made available to all relocated residents and businesses without discrimination.

4.4.1 No Action Alternative

The No Action Alternative would have no relocation impacts; no homes or businesses would have to be relocated.

4.4.2 Bridge Alternative C3-4

This alternative would acquire property from 20 parcels on Revillagigedo Island: 3 residential properties located along North Tongass Highway, 10 vacant privately owned properties, a small portion of an Alaska Mental Health Trust parcel, and 6 commercial properties located along Rex Allen Drive. The development of Alternative C3-4 would require the relocation of 2 houses along the North Tongass Highway and 6 businesses along Rex Allen Drive. Alternative C3-4 would require acquisition of a portion of the parcel on which the Pioneer Heights Senior Housing facility is located, but would not affect the residential building or related parking and ancillary facilities. The undeveloped portion of the parcel to be acquired is uphill from the housing facility.

Documented businesses along Rex Allen Drive that potentially could be affected by this alternative are as follows:

- Ketchikan Auto Body and Glass, 4979 Rex Allen Drive
- First Bank Emergency Operations Center and Maintenance Shop, 4987 Rex Allen Drive
- LK Storage, 4975 Rex Allen Drive
- SE Diesel and Electric, 3973A Rex Allen Drive
- Cape Fox Tours Shop, 3973B Rex Allen Drive
- Warehouse (unknown tenant), 4982 Rex Allen Drive

The residents of the two houses on Tongass Avenue and the commercial activities of the Rex Allen Drive businesses would be relocated. Appendix A of the *Conceptual Stage Relocation Study and Assessment of Right-of-Way Acquisition Costs* (see Appendix B) provides a comparison of available housing in the area for displaced individuals as well as comparable commercial real estate for the affected businesses. Replacement housing and commercial facilities are available and the cost of relocations would be covered as part of the relocation process.

On Gravina Island, Alternative C3-4 would require right-of-way from two State-owned parcels, including DNR tide land and DOT&PF land in the vicinity of Ketchikan International Airport. Outside the immediate terminal area at the southern terminus of the Gravina Island Highway, the project would acquire right-of-way from two Borough-owned parcels.

4.4.3 Ferry Alternative G2

The proposed Alternative G2 alignment would not require the relocation of any residences but would require acquisition of one parcel and construction on Peninsula Point at Revillagigedo Island, requiring the relocation of several businesses and services. Documented businesses that could be affected by this alternative include:

- Promech Air Aviation Maintenance, 5441 N. Tongass Highway
- Fire Station #3, 5401 N. Tongass Highway
- Warehouse (unknown tenant), 5403 N. Tongass Highway

Alternative G2 would require acquisition of the Peninsula Point parcel. The State of Alaska owns the Peninsula Point parcel and leases it to Peninsula Point, LLC. Because this parcel is a State-owned leased property, compensation would likely be required to acquire the property. Available commercial property exists in the Ketchikan area for relocation of the warehouse as well as several waterfront properties that may meet the needs of Promech Air. If Alternative G2 were selected for construction, the project team would need to pursue additional consultation with the City of Ketchikan to establish the specific requirements of relocating the fire station.

On Gravina Island, Alternative G2 would affect two State-owned properties (DNR tide land and DOT&PF land in the vicinity of Ketchikan International Airport) and two Borough-owned properties at the southern terminus of the Gravina Island Highway. Affected properties on Gravina Island would require no compensation because the land is government owned.

4.5 Economic Impacts

This section discusses the direct impacts of the project alternatives on the local economy; Section 4.25.4.1 discusses economic impacts from construction, and Section 4.26.3 discusses secondary economic impacts. Most of the economic impacts associated with the project alternatives would not be directly attributable to the action taken, rather they would be indirect effects, and are therefore described in Section 4.26.3.

Long-term direct impacts of the Gravina Access Project on the local economy would be largely related to O&M spending on labor. Operations and maintenance costs for materials would be more likely to benefit communities outside the local area. Operations and maintenance labor costs would benefit the local economy through employment spending.

4.5.1 No Action Alternative

The No Action Alternative would have employment impacts related to periodic replacement of facilities and equipment, in addition to the jobs associated with operating the existing ferry service. There would be approximately 13 annual O&M jobs associated with the No Action Alternative.

4.5.2 All Action Alternatives

Operations and maintenance of the action alternatives would either eliminate or create O&M jobs in the Borough over the No Action Alternative. Table 4-4 illustrates the total number of annual O&M jobs that would employ Borough residents for each alternative.

Table 4-4: Estimated Operations and Maintenance Jobs in the Borough By Alternative

Alternative	Annual O&M Jobs
No Action	13
Bridge Alternatives	
C3-4	2
C3-4 with toll	3
F3	3
F3 with toll	4
Ferry Alternatives	
G2	28
G3	28
G4	28
G4v	13

Operations and maintenance activities would also indirectly result in the creation of additional jobs in the region. Indirect impacts would include full- and part-time employment created as a result of the secondary round of spending by businesses, households, and local governments that support the project; these indirect impacts are discussed in Section 4.26.3.

4.6 Joint Development

There is no joint development project associated with the Gravina Access Project.

4.7 Transportation

4.7.1 Aviation

For each project alternative, direct effects on aviation are discussed under three aviation categories and related subcategories, as follows:

- Ketchikan International Airport, including airport property and facilities and protected airspace
- Seaplane Facilities and Operations
- Helicopter Facilities and Operations

4.7.1.1 No Action Alternative

4.7.1.1.1 Ketchikan International Airport

The No Action Alternative would not affect airport property, existing airport facilities, or Part 77 airspace associated with Ketchikan International Airport. Existing problems associated with convenience and reliability of access for passengers, airport tenants, emergency personnel and equipment, and freight shipment would continue. Congestion around the airport terminal also would continue.

4.7.1.1.2 Seaplane Facilities and Operations

The No Action Alternative would not change existing seaplane facilities or operations. Seaplane operators would continue to operate in conjunction with the airport ferries and other marine vehicles in Tongass Narrows as well as with other air traffic.

4.7.1.1.3 Helicopters Operations and Facilities

The No Action Alternative would not affect helicopter operations or facilities.

4.7.1.2 Bridge Alternative C3-4

4.7.1.2.1 Ketchikan International Airport

Alternative C3-4 would enhance access to Ketchikan International Airport from Ketchikan by providing a hard link (bridge). The bridge would touch down on Gravina Island just north of the airport terminal, connecting to the terminus of the Airport Access Road. The alternative may require modifications to the vehicle circulation system in the immediate vicinity of the terminal area to accommodate access from the bridge; i.e., the pavement may be restriped and marked to accommodate traffic flow to three destinations: the airport terminal, airport parking, and continuation on the Airport Access Road to other locations on Gravina Island (see Figure 4.1). The project would coordinate with airport management on these changes to the circulation patterns to ~~ensure~~ provide safe and efficient movement of vehicles and pedestrians outside the airport terminal.

The bridge would be on piers spaced at approximately 100- to 150-foot intervals, with the exception of the main span which has a navigational opening of 550 feet, and would span Tongass Narrows until its touchdown point on Gravina Island. The bridge structure would extend over a portion of the 24-foot-wide gravel airport service road, which parallels the runway between Tongass Narrows and Taxiway C. It would also span the seaplane base at Ketchikan International Airport. The service road would be realigned around the bridge piers. Potential effects on the seaplane base are described in the following section.

The height of the Alternative C3-4 bridge and its proximity to Ketchikan International Airport raised a ~~prompted~~ concern about intrusion into Part 77 protected airspace. FHWA and DOT&PF consulted FAA on this issue during initial development of the SEIS alternatives.~~, and i~~In July 2009, FAA issued a “determination of no hazard to air navigation” for Alternative C3-4 (Appendix C) stating that,~~.~~ a~~A~~lthough the bridge would penetrate 44 feet into the horizontal surface of Part 77 airspace and 59 feet into the transitional surface, “it would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities.” ~~these penetrations would not affect current instrument approach procedures for Ketchikan International Airport. Alternative C3-4 would have no direct adverse effect on standard approach and departure procedures for wheeled aircraft at Ketchikan International Airport.~~ FAA’s July 2009 determination expired in January 2011, prompting FHWA and DOT&PF to again consult with FAA in preparation of the SEIS. FAA issued a new decision in August 2014, a “determination of hazard to air navigation” due to substantial adverse effects (Appendix G). The basis for this determination was that, in addition to the penetration of the horizontal and transitional surfaces noted in the previous determination, Alternative C3-4 also would adversely affect the localizer navigational signal, which is a key component of the Instrument Landing System for Runway 11.

4.7.1.2.2 Seaplane Facilities and Operations

Alternative C3-4 would have no direct adverse effects on the existing seaplane facilities at Ketchikan Harbor Seaplane Base, Murphy’s Pullout Seaplane Base, Peninsula Point Pullout Seaplane Base, or other private facilities, including Taquan Air’s new facilities near the airport ferry terminal on Revillagigedo Island. As mentioned above, the bridge would span the seaplane base at Ketchikan International Airport. Access to the airport seaplane floats and removal ramp would be impaired during construction; therefore, the airport seaplane base may need to be temporarily relocated during construction (see Section 4.25.5.1.1). Following bridge construction, operations at the seaplane base would resume at the current location. Alternative C3-4 would present a new obstruction to seaplanes operating in Ketchikan Class E airspace (i.e., the restricted airspace around Ketchikan and Tongass Narrows). The presence of the bridge would reduce and constrain the area available for seaplane operations. The bridge would transect the southern portion of the waterway designated by USCG[6] for take-offs and landings from the airport seaplane base (the waterway oriented northwest of west-southeast of east and identified as the NWW-SEE Waterway on Figure 3-10; see Section 3.7.1.2.2), possibly requiring shortening the waterway from its current 9,500-foot length, or shifting the waterway to the north. The FAA would not permit aircraft to be airborne under the bridge, and the bridge would bisect the Revilla Corridor. Some operators would have to taxi longer distances to be appropriately aligned for takeoff, or to reach their bases after landing.

In addition, the FAA determined that Alternative C3-4 would adversely affect seaplane operations because it would bisect an established Visual Flight Rules (VFR) flyway and require VFR operations to change their regular flight courses or altitudes~~during those periods of inclement weather that require SVFR clearance (see Section 3.7.1.4.3). Although the FAA issued a "determination of no hazard to air navigation" for Alternative C3-4~~ (see Appendix ~~C~~G)~~, its analysis found that the Operation and Letter of Agreement for operations in the Revilla Corridor would be adversely affected~~. The Alternative C3-4 bridge would obstruct flight under normal VFR operations and could greatly reduce the effectiveness of Special Visual Flight Rules (SVFR) operations. SVFR operations on each side of the bridge would not be affected, but SVFR flights that needed to cross the bridge would be required to cross 500 feet above the obstruction (bridge), which means the minimum cloud ceiling to cross the bridge would be approximately 810 feet. It is most likely that seaplane pilots would move their operations (take-offs and landings) to avoid complications related to SVFR flights in the vicinity of the bridge.

With the ability of pilots to shift locations of takeoffs and landings within Tongass Narrows, the adverse effects of Alternative C3-4 on seaplane operations would be reduced. The FAA would evaluate, through a process separate from this SEIS, the need to adjust or eliminate the minimum altitudes allowed under SVFR as a result of Alternative C3-4. Proper lighting and marking of the bridge would reduce the risk of seaplanes colliding with the bridge.

4.7.1.2.3 Helicopter Operations and Facilities

Alternative C3-4 would have no effect on helicopter facilities, though the presence of the bridge would affect helicopter operations. Pilots would need to navigate around the bridge.

4.7.1.3 Bridge Alternative F3

4.7.1.3.1 Ketchikan International Airport

This alternative would enhance access to Ketchikan International Airport by providing a hard link (bridge) from Ketchikan. The two bridges would cross two channels of Tongass Narrows approximately 3 miles south of the airport, would not penetrate any airspace surfaces, and would have no effect on approaches or departures from Ketchikan International Airport (see Appendix C). Although the two bridges of Alternative F3 would not penetrate Part 77 airspace, marking and lighting on the bridge would still conform to FAA regulations and advisory circulars.

[6] U.S. Coast Guard. 2012. *Tongass Narrows Voluntary Waterway Guide.*

4.7.1.3.2 Seaplane Facilities and Operations

Alternative F3 would have no adverse effect on seaplane bases in the Ketchikan area.

The two bridges in Alternative F3 would adversely affect seaplane operations because pilots would have to fly over a bridge or taxi under it when traversing the East and West channels. Seaplane landings and take-offs would be displaced up or down channel, which may result in longer taxi distances. The bridges would be south of waterways designated for seaplane operations and no adjustments to the waterways would be needed. Proper lighting and marking of the bridge structures would help minimize the risk to seaplanes of collision with the bridge.

As with Alternative C3-4, the bridge structures associated with Alternative F3 would obstruct flight under normal VFR operations and could greatly reduce the effectiveness of SVFR operations. It is most likely that seaplane pilots would move their operations (take-offs and landings) to avoid complications related to SVFR flights in the vicinity of the bridges. Displaced take-off and landing activities would not affect the number of SVFR operations. With the ability of pilots to shift locations of takeoffs and landings within Tongass Narrows, the adverse effects of Alternative F3 on seaplane operations would be reduced.

4.7.1.3.3 Helicopters Operations and Facilities

Alternative F3 would not affect helicopter facilities. Helicopter operations would be affected by the presence of the bridges. Pilots would need to navigate around the bridges.

4.7.1.4 <u>Ferry Alternative G2</u>

4.7.1.4.1 Ketchikan International Airport

The Gravina Island terminus of Alternative G2 would be approximately 2 miles north of the airport. Alternative G2 would include roadway improvements between the ferry terminal and the airport on Gravina Island. These improvements would have no adverse effects on airport facilities or operations, and Alternative G2 would have no effect on Part 77 airspace or aviation operations at the airport.

4.7.1.4.2 Seaplane Facilities and Operations

Alternative G2 would introduce ferry traffic across the northern end of the NWW-SEE Waterway used for seaplane operations, affecting a relatively small portion of the waterway. This new ferry traffic could adversely affect seaplanes using that portion of the waterway for take-offs and landings by causing brief delays on a frequent basis. Alternative G2 would affect no other seaplane facilities. The FAA might deem it necessary to formally shift the boundaries of the NWW-SEE Waterway slightly to the south to lessen or eliminate any effects on seaplane take-offs and landings. Alternatively, seaplane operations would have to avoid that portion of the waterway affected by Alternative G2 during ferry transit.

4.7.1.4.3 Helicopters Operations and Facilities

Alternative G2 would not affect helicopter operations or facilities.

4.7.1.5 <u>Ferry Alternative G3</u>

4.7.1.5.1 Ketchikan International Airport

The Gravina Island terminus of Alternative G3 would be less than 1 mile south of the airport. Alternative G3 includes roadway improvements on Gravina Island. Neither the ferry terminal nor the roadway improvements would affect airport facilities or operations. Alternative G3 would not affect air space or aviation operations at the airport.

4.7.1.5.2 Seaplane Facilities and Operations

Alternative G3 would have no effect on seaplane facilities. This alternative would introduce ferry vessel traffic across the northern portion of the NW-SE Waterway, and could have a direct adverse effect on seaplane take-offs and landings in that waterway by causing brief but frequent delays; however, the portion of the waterway affected would be small relative to the size of the NW-SE Waterway. Alternative G3 would affect no other seaplane facilities or operations. The FAA may need to shift the boundaries of the NW-SE Waterway slightly to the south to lessen or eliminate any effects on seaplane take-offs and landings. Alternatively, seaplane operations could avoid that portion of the waterway affected by Alternative G3 during ferry transit.

4.7.1.5.3 Helicopters Operations and Facilities

Alternative G3 would not affect helicopter operations or facilities.

4.7.1.6 Ferry Alternative G4

4.7.1.6.1 Ketchikan International Airport

Alternative G4 would include development of a new ferry terminal adjacent to the existing terminal at Ketchikan International Airport. The alternative would require adjustments to circulation near the airport terminal to accommodate the new ferry access point. These adjustments would have no adverse effects on airport facilities because they would be specifically laid out to avoid effects on any facilities currently in use at the airport.

Alternative G4 would not affect air space or aviation operations at the airport.

4.7.1.6.2 Seaplane Facilities and Operations

Alternative G4 would have no effect on seaplane facilities or operations.

4.7.1.6.3 Helicopters Operations and Facilities

Alternative G4 would have no effect on helicopter operations or facilities.

4.7.1.7 Ferry Alternative G4v (Preferred Alternative)

4.7.1.7.1 Ketchikan International Airport

Alternative G4v would not affect airport property, existing airport facilities, or Part 77 airspace associated with Ketchikan International Airport. Existing problems associated with reliability of access for passengers, airport tenants, and emergency personnel and equipment would persist. Partial improvements to airport travel would be achieved by providing the passenger waiting area on Revillagigedo Island, shuttle van service, and upgraded sidewalks.

4.7.1.7.2 Seaplane Facilities and Operations

Alternative G4v would not affect existing seaplane facilities or operations.

4.7.1.7.3 Helicopters Operations and Facilities

Alternative G4v would not affect helicopter operations or facilities.

4.7.1.8 Mitigation of Aviation Impacts

4.7.1.8.1 No Action Alternative

No mitigation measures for aviation impacts are warranted for the No Action Alternative.

4.7.1.8.2 Bridge Alternatives

With FAA's "determination of hazard to air navigation" for Alternative C3-4, FHWA and DOT&PF would need additional consultation with FAA to identify appropriate mitigation if that alternative were selected as the preferred alternative. The FAA would require any bridge crossings of Tongass Narrows (including East and West channels, in the case of Alternative F3) to be lighted and marked in accordance with FAA regulations and advisory circulars to facilitate existing aviation operations in proximity to the bridge(s). The FAA also would require DOT&PF to complete and return FAA Form 7460-2, Notice of Actual Construction or Alteration, within 5 days after the construction reached its greatest height (7460-2, Part II).

4.7.1.8.3 Ferry Alternatives

No mitigation measures for aviation impacts are warranted under the ferry alternatives.

4.7.2 Marine Transportation

This section describes the potential effects on marine transportation. Considerable technical analyses were completed in support of the 2004 FEIS to characterize the effects of the Gravina Access Project alternatives on marine navigation. This SEIS references those analyses where appropriate.

With respect to cruise ships as an element of marine navigation, this section presents the direct effects of the project alternatives (i.e., how alternatives affect cruise ship access to Ketchikan, mobility within Tongass Narrows, and durations of travel and port calls). The indirect impacts of changes in cruise ship traffic and navigation are presented in Section 4.26.4. Effects related to cruise ship emissions are addressed in Section 4.10.

4.7.2.1 No Action Alternative and Ferry Alternative G4v (Preferred Alternative)

4.7.2.1.1 Cruise Ships

The No Action Alternative and Alternative G4v would have no effect on cruise ship operations or the Ketchikan docking and berthing areas and facilities used by the cruise ships. No new infrastructure or marine operations would be introduced to the project area.

4.7.2.1.2 Alaska Marine Highway System Ferry

The No Action Alternative and Alternative G4v would have no effect on AMHS ferry services or facilities.

4.7.2.1.3 Airport Ferry

The No Action Alternative and Alternative G4v would have no effect on the existing airport ferry service or facilities.

4.7.2.1.4 Tugs and Barges

The No Action Alternative and Alternative G4v would not affect tug and barge traffic in Tongass Narrows.

4.7.2.1.5 USCG Facilities and Operations and NOAA Vessels

The No Action Alternative and Alternative G4v would have no effect on the USCG Station or USCG operations. NOAA vessels would not be affected by these alternatives.

4.7.2.1.6 Small Boats and Other Watercraft

The No Action Alternative and Alternative G4v would have no effect on the facilities for or the use of small boats, kayaks, or other watercraft in Tongass Narrows.

4.7.2.2 Bridge Alternative C3-4

4.7.2.2.1 Cruise Ships

The bridge associated with Alternative C3-4 would have a navigational clearance of 200 feet (vertical) and 550 feet (horizontal), which would accommodate the passage of ~~all~~ most ships currently transiting Tongass Narrows. This finding is based on studies completed in support of the 2004 FEIS that modeled ships 142 feet wide, 894 feet long, and 200 feet tall based on surveys of all cruise ships sailing in Alaska at the time.[7] The introduction of piers in the deep navigable waters of Tongass Narrows would introduce new, permanent grounding and allision[8] risks and increase the imperative for the existing custom and practice of one-way traffic for large vessels operating in Tongass Narrows.[9]

There is no generally recognized and accepted standard for assessing the probability of ship allisions or groundings. A Monte Carlo navigation simulation study conducted for the Gravina Access Project[10] used the risk associated with ~~current~~ existing operations in Tongass Narrows as the basis for assessing the probable safety of navigating proposed bridges with a 550-foot horizontal clearance in the 2004 FEIS. Simulator tests were also run at the American Maritime Officers' Raymond T. McKay Simulator Training, Assessment, and Research Center (RTM STAR Center) in Dania Beach, Florida, with marine pilots from Southeast Alaska to identify safety and operational issues associated with bridge alternatives in the 2004 FEIS.[11] Because the proposed Alternative C3-4 bridge would have a horizontal clearance of 550 feet, the simulation results presented in the Monte Carlo study and RTM STAR Center report are applicable to this analysis of Alternative C3-4.

The Monte Carlo study evaluated the risks for single, maximum-width cross-sections, i.e., the area of greatest constriction. Based on the study results, a bridge with an effective horizontal clearance of 550 feet at the approximate location of Alternative C3-4 would present a theoretical passage hazard approximately three times greater than the existing operations passage near Charcoal Point (maximum width 687 feet). According to the Monte Carlo simulation, the statistically expected number of groundings or allisions of large cruise ships at Charcoal Point in a 50-year period would be 244, whereas the statistically expected number of groundings or allisions at the proposed bridge crossing in a 50-year period would be 746. The findings of the RTM STAR Center report upheld the findings of the Monte Carlo study.

As noted above, the simulation studies to determine the impacts of a bridge to cruise ship passage through Tongass Narrows considered ships sailing in Alaska at the time of the studies. A 2016 inquiry to the Cruise Line Agencies of Alaska[12] revealed that larger ships (e.g., 1,040 feet long; 121 feet wide; and 201 feet high) made stops in Ketchikan and are anticipated to continue to call in Ketchikan in the future.~~Recent inquiries to the North West and Canada Cruise Association[13] revealed that larger ships (e.g., *Freedom of the Seas*, which is 127 feet wide;~~

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[7] Alaska Department of Transportation and Public Facilities. May 2003. *Gravina Access Project Effects on Cruise Ship Operations*. Prepared by Northern Economics, Inc. and Klugherz and Associates.

[8] An allision is defined as a moving object colliding with a stationary object (e.g., a ship hitting a bridge pier).

[9] Alaska Department of Transportation and Public Facilities. January 2002. *Gravina Access Project Monte Carlo Navigation Simulation Technical Memorandum*. Prepared by The Glosten Associates.

[10] Alaska Department of Transportation and Public Facilities. January 2002 *Gravina Access Project Monte Carlo Navigation Simulation Technical Memorandum*. Prepared by The Glosten Associates.

[11] Raymond T. McCay Simulator Training, Assessment, and Research Center. April 2003. *Ketchikan Bridge Project Summary Report*.

[12] Cruise Line Agencies of Alaska. February 2016. Email communication from John Kimmel, Cruise Line Agencies of Alaska, to Nikki Navio, HDR. February 11, 2016.

~~[13] Spalding, Donna. September 14, 2010, Personal communication between North West and Canada Cruise Association representative and Carol Snead, HDR.~~

~~1,112 feet long; and 208 feet high) could operate in Alaska in the future, with stops in Ketchikan.~~ With a vertical clearance of 200 feet at mean higher high water (MHHW), pilots of ships taller than 200 feet ~~would have to~~could schedule their passage under the bridge with lower tides, assuming calm seas,~~, which would~~ to avoid ship allisions with the bridge deck and associated structures. Scheduling ship arrival and departure times around the tides could affect overall cruise schedule, including time in port and running time or running speed. Alternatively, taller ships could enter and exit Tongass Narrows from the south to avoid the bridge.

Under conditions of strong currents, t~~T~~he risk of allisions of ships with bridge piers would increase with ship length because the swe~~e~~pt path of the ship when approaching the bridge at an angle (referred to as "crab angle~~bing"~~") would be wider with a longer ship than with a shorter ship. For example, t~~T~~he swe~~e~~pt path of a ship 1,100~~894~~ feet long with a 141-foot beam ~~and 142 feet wide~~moving at ~~with~~ a ~~10~~4-degree crab~~bing~~ angle ~~(an extreme case; most crabbing angles are 7 or 8 degrees)~~[14] would be approximately ~~292~~ 217 feet wide; whereas, the same ship with a crab angle of 8 degrees would have a swept path approximately 293 feet wide.[15] ~~A ship 1,112 feet long and 127 feet wide with a 10-degree crabbing angle would create a sweep approximately 327 feet wide.~~ While these widths are ~~well~~ within the proposed horizontal navigational opening of 550 feet, ~~the greater sweep width of~~ longer ships navigating under the Alternative C3-4 bridge would have ~~represents~~ an increased risk of ~~in~~ allisions. The increased risk of allisions would likely cause operators of large cruise ships to change their operations to avoid transiting under the bridge. Entering and exiting Tongass Narrows from the south would increase running time for cruise ships and may cause operators to shorten port calls in Ketchikan to make up lost time. This could contribute to indirect economic impacts for the community (see Section 4.26.3.3).

4.7.2.2.2 AMHS Ferry

Alternative C3-4 would not affect AMHS ferry facilities or operations. The vertical clearance of the bridge would be significantly higher than is required for AMHS ferries. The introduction of piers in the deep navigable waters of Tongass Narrows would introduce new, permanent, grounding and allision risks;[16] but the horizontal spans would be substantially wider than the other navigational clearances on the AMHS system routes (e.g., Wrangell Narrows).

4.7.2.2.3 Airport Ferry

Airport ferry service would be discontinued under Alternative C3-4, thereby reducing overall marine operations crossing Tongass Narrows. The reduction in cross-pattern marine operations would increase the safety of ongoing long-channel transits of Tongass Narrows.

4.7.2.2.4 Tugs and Barges

The vertical and horizontal clearance of Alternative C3-4 would be sufficient to accommodate tug and barge traffic in Tongass Narrows and would not affect tug and barge operations. The

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~~14 Alaska Department of Transportation and Public Facilities. June 14, 2010. Notes from a meeting of the Southeast Alaska Pilots Association with DOT&PF. Ketchikan, Alaska.~~

15 Amos et al. 2012. American Association of Port Authorities 2012 Seminar Series. *Accommodating Larger Vessels: Ship Maneuverability and Channel Depth; A discussion of vessel motion in shallow water and future research needs*. http://aapa.files.cms-plus.com/SeminarPresentations/2012Seminars/12HNE/Amos%20Morris%20Jordan%20Daggett%20joint%20presentation1.pdf (accessed December 27, 2016). Paul Amos, President, Columbia River Pilots; Larry Daggett, Vice President, Waterway Simulation Technology; Dan Jordan, Columbia River Bar Pilot; and Mike Morris, Houston Ship Channel Pilot..

16 Alaska Department of Transportation and Public Facilities. January 2002.*Gravina Access Project Monte Carlo Navigation Simulation Technical Memorandum*. Prepared by The Glosten Associates.

introduction of piers in the deep navigable waters of Tongass Narrows would introduce new, permanent grounding and allision risks.[17]

4.7.2.2.5 USCG Facilities and Operations and NOAA Vessels

Alternative C3-4 would not affect USCG facilities, as the alternative alignments would be substantially north of the USCG Station. The introduction of piers in the deep navigable waters of Tongass Narrows would introduce new, permanent grounding and allision risks;[18] however, the 550-foot horizontal span would provide substantial clearance for USCG and NOAA vessels operating in Tongass Narrows.

4.7.2.2.6 Small Boats and Other Watercraft

Alternative C3-4 would have no effect on the facilities for or the use of small boats, kayaks, or other watercraft in Tongass Narrows. If these boats and watercraft were to navigate near the bridge, they should be able to maneuver around the piers and avoid allision.

4.7.2.3 Bridge Alternative F3

4.7.2.3.1 Cruise Ships

Alternative F3 includes a low (60-foot vertical clearance) bridge over East Channel and a higher bridge (200-foot vertical clearance) over West Channel. Similar to Alternative C3-4, the vertical and horizontal clearances of the West Channel bridge (200 feet and 550 feet, respectively) would accommodate the passage of ~~all~~ most ships currently transiting Tongass Narrows (see Section 4.7.2.2).

The Alternative F3 bridges would be south of the Ketchikan cruise ship dock. This alternative would require cruise ships calling at Ketchikan to use West Channel or enter and exit Tongass Narrows from the north. Either option would have an adverse effect on cruise ship operations because it would require additional maneuvering and increased sailing time.

Use of West Channel by large cruise ships is infrequent. Transiting West Channel rather than East Channel ~~adds approximately 1.8 nautical miles to~~increases the running distance by approximately 1.8 nautical miles, adding approximately 3 minutes to total cruise ship run-times for southbound voyages, and 18 minutes to northbound voyages (Table 4-5). These increases would consume more fuel, thereby increasing costs to ship operators (see Section 4.26.4). In addition, cruise ships would have to execute difficult maneuvers, consisting of either turns around Pennock Reef and/or a 180-degree turn in the berthing and swinging area. The two 180-degree turns would presumably be executed on that section of the voyage that is least time critical, or the maneuvers may be split between the northern and southern segments of the Ketchikan port call. Overall, these turns likely would add 30 to 40 minutes to the ships' harbor maneuvers. It is ~~anticipated~~ possible that cruise lines would recover the additional transit time needed to utilize West Channel by using faster running speeds between Ketchikan and Juneau to avoid~~; therefore, no~~ a reduction in port time~~ is expected~~.[19] This could, however, contribute to an increase in cost of operations for large vessels calling in Ketchikan[20].

[17] Alaska Department of Transportation and Public Facilities. January 2002. *Gravina Access Project Monte Carlo Navigation Simulation Technical Memorandum*. Prepared by The Glosten Associates.

[18] Alaska Department of Transportation and Public Facilities. January 2002. *Gravina Access Project Monte Carlo Navigation Simulation Technical Memorandum*. Prepared by The Glosten Associates.

~~[19] Alaska Department of Transportation and Public Facilities. May 2003. *Gravina Access Project Effects on Cruise Ship Operations*. Prepared by Northern Economics, Inc. and Klugherz and Associates.~~

[20] Alaska Department of Transportation and Public Facilities. February 2001. *Gravina Access Project Consequences of Various Channel Closures to Large Ships*. Prepared by The Glosten Associates, Inc.

The potential economic effects of changes in cruise ship operations are discussed in Section 4.26.3.

Table 4-5: Analysis of Sailing Time between Juneau and Ketchikan for Alternative F3-Pennock Island Crossing

2001 Cruise Season	Baseline Hours between Ketchikan and Juneau	Average Hours at Max Cruise	Average Time Lost (minutes)
Ketchikan to Juneau—95 trips	16.56	16.60	3
Juneau to Ketchikan—94 trips	16.49	16.79	18

Source: Glosten Associates. August 28, 2001. *Running Time and Other Impacts on Large Cruise Ships.* Fax Memo to HDR.

The Monte Carlo and STAR Center simulation studies prepared for the 2004 FEIS[21] evaluated the safety of cruise ships navigating West Channel with the Alternative F3 bridge. Safety concerns were identified by cruise ship lines and marine pilots in the STAR Center report.[22] As presented in the report, Ketchikan cruise ship pilots commented that West Channel with the Alternative F3 bridge would be too narrow to safely navigate large ships.

In response to these safety concerns, DOT&PF added modification of the West Channel to improve navigation in Alternative F3. A supplement to the Monte Carlo simulation study[23] determined that navigation through the widened West Channel under the Alternative F3 bridge would be 62 percent safer than existing navigation through East Channel.

In the RTM STAR Center report, marine pilots also expressed concern over the bridges' angled crossings of East and West channels.[24] For the SEIS, project engineers realigned the Alternative F3 bridges so that they would cross perpendicular to East and West channels to reduce the risk of allisions.

As noted for Alternative C3-4, the simulation studies conducted for the 2004 FEIS to assess effects of a bridge on cruise ship passage through Tongass Narrows considered ships sailing in Alaska at the time of the studies. Recent (2016) inquiries to the Cruise Line Agencies of Alaska ~~to the North West and Canada Cruise Association~~[25] ~~revealed that larger ships (e.g., 1,112 feet long; 127 feet wide; and 208 feet high)~~ revealed that larger ships (e.g., 1,040 feet long; 121 feet wide; and 201 feet high) made stops in Ketchikan and are anticipated to continue to call in Ketchikan in the future.[26] ~~are anticipated to operate in Alaska and stop in Ketchikan in the future.~~ With a vertical clearance of 200 feet at MHHW, pilots of taller ships ~~would have to~~could schedule their passage under the bridge with lower tides, assuming calm seas, to~~. This would~~ avoid ship allisions with the bridge deck. Scheduling ship arrival and departure times around the tides could affect overall cruise schedule, including time in port and running time or running

[21] Alaska Department of Transportation and Public Facilities. January 2002. *Gravina Access Project Monte Carlo Navigation Simulation Technical Memorandum*. Prepared by The Glosten Associates; April 2003; July 2003. *Gravina Access Project Supplemental Monte Carlo Navigation Simulation Study Technical Memorandum*. Prepared by The Glosten Associates; Raymond T. McCay Simulator Training, Assessment, and Research Center. April 2003. *Ketchikan Bridge Project Summary Report*.

[22] Raymond T. McCay Simulator Training, Assessment, and Research Center. April 2003. *Ketchikan Bridge Project Summary Report*.

[23] Alaska Department of Transportation and Public Facilities. July 2003. *Gravina Access Project Supplemental Monte Carlo Navigation Simulation Study Technical Memorandum*. Prepared by The Glosten Associates.

[24] Raymond T. McCay Simulator Training, Assessment, and Research Center. April 2003. *Ketchikan Bridge Project Summary Report*.

~~[25] Spalding, Donna. September 14, 2010. Personal communication between North West and Canada Cruise Association representative and Carol Snead, HDR.~~

[26] Cruise Line Agencies of Alaska. February 2016. Email communication from John Kimmel, Cruise Line Agencies of Alaska, to Nikki Navio, HDR. February 11, 2016.

speed. Alternatively, taller ships could enter and exit Tongass Narrows from the north to avoid the bridge.

As noted for Alternative C3-4 (see Section 4.7.2.2.1), ~~T~~the risk of allisions would increase with longer ships because the swept path~~ep~~ of the ship when approaching the bridge at an angle would be wider with a longer ship. ~~The sweep of a ship 894 feet long and 142 feet wide with a 10-degree crabbing angle would be approximately 292 feet. A ship 1,112 feet long and 127 feet wide with a 10-degree crabbing angle would create a sweep approximately 327 feet wide. While these widths are well within the proposed horizontal navigational opening of 550 feet, the greater sweep width of longer ships represents an increased risk in allisions.~~ The increase in risk of allisions would likely cause operators of large cruise ships to change their operations to avoid transiting under the bridge. Entering and exiting Tongass Narrows from the north would increase running time for cruise ships and may cause operators to shorten port calls in Ketchikan to make up lost time. This could contribute to indirect economic impacts for the community (see Section 4.26.3.3).

4.7.2.3.2 AMHS Ferry

As noted above, AMHS ferries usually use West Channel, and the high span over West Channel would allow continued use by the AMHS ferries. The AMHS ferries would not be able to transit East Channel because of the bridge's low (60-foot) navigational clearance. With cruise ships and AMHS ferries required to use West Channel, marine traffic in West Channel would increase. The added traffic could adversely affect AMHS ferry operations because the timing of AMHS transits through the West Channel would have to be coordinated with cruise ship transits. In addition, the introduction of piers in the deep navigable waters of Tongass Narrows would introduce new, permanent grounding and allision risks.[27] However, the horizontal spans are substantially wider than the other navigational clearances in the AMHS system routes (e.g., Wrangell Narrows).

4.7.2.3.3 Airport Ferry

Airport ferry service would be discontinued in Alternative F3, thereby reducing overall marine operations crossing Tongass Narrows. The reduction in cross-channel marine operations would increase the safety of ongoing long-channel transits of Tongass Narrows.

4.7.2.3.4 Tugs and Barges

The vertical and horizontal clearances of the Alternative F3 bridges would be sufficient to accommodate most tug and barge traffic in the East Channel and all other marine traffic in the West Channel of Tongass Narrows. The introduction of piers in the navigable waters of East and West channels would introduce new, permanent grounding and allision risks;[28] though the widths of the navigational clearances (200 feet wide for East Channel and 550 feet wide for West Channel) would present a relatively low risk of allision for barges passing through Tongass Narrows.

Barges have been known to transit Tongass Narrows with container stacks and cargo that require air drafts (i.e., height above the water surface) of 64 feet; however, this is the maximum air draft requirement and does not represent the majority of barges in Tongass Narrows. Since the East Channel bridge has a vertical clearance of 60 feet above high tide, tug masters could elect to wait for lower tides to navigate 64-foot-high barges through East Channel rather than

[27] Alaska Department of Transportation and Public Facilities. January 2002. *Gravina Access Project Monte Carlo Navigation Simulation Technical Memorandum.* Prepared by The Glosten Associates.

[28] Alaska Department of Transportation and Public Facilities. January 2002. *Gravina Access Project Monte Carlo Navigation Simulation Technical Memorandum.* Prepared by The Glosten Associates.

navigating these barges through West Channel. Barge operators may limit the height of their container stacks to avoid reliance on the tides, or may transit through West Channel. In summary, the operations of some barges may change as a result of Alternative F3, causing delay of shipment, which may adversely impact tug and barge operators.

4.7.2.3.5 USCG Facilities and Operations and NOAA Vessels

Alternative F3 would have no direct effect on USCG facilities; however, the 60-foot bridge over East Channel would adversely affect operations of USCG vessels with air drafts greater than 60 feet, including the USCG cutters and buoy tenders, as well as the NOAA Ship *Fairweather,* which has a mooring site just south of the pier at the USCG Station~~*Acushnet*, which has an air draft of 100 feet~~. Such vessels would have to use the northern section of East Channel to approach and depart from the USCG ~~pier~~Station. The taller vessels (greater than 60-foot air draft) departing from the USCG Station could continue northward through Tongass Narrows or cross into West Channel after passing the northern tip of Pennock Island. From there they could sail southward under the 200-foot West Channel Bridge. The need to transit via the West Channel Bridge would have an adverse effect on the proposed operations of USCG and NOAA vessels because it would require additional turning maneuvers for the ships to navigate around Pennock Island via the West Channel and under the West Channel Bridge when approaching from or departing to the south. The introduction of piers in the navigable waters of East and West channels would introduce new, permanent grounding and allision risks;[29] however, the 200-foot (East Channel) and 550-foot (West Channel) horizontal bridge spans provide sufficient clearance and low allision risk for USCG and NOAA vessels operating in those waters.

~~The NOAA Ship *Fairweather* would not be able to cross under the East Channel Bridge to reach its proposed mooring site south of the USCG pier, although it could cross under the West Channel Bridge.~~

The smaller response ~~new Fast Response Cutter (FRC) patrol~~ boats ~~being~~ stationed at the USCG Station in Ketchikan~~ facility~~, with air drafts less than 50 feet, would be able to transit the East Channel on approach and departure from the USCG~~ base~~ Station. Alternative F3 would not require land from the USCG base or interfere with existing or planned development there.

4.7.2.3.6 Small Boats and Other Watercraft

Alternative F3 would not affect the facilities for or the use of small boats, kayaks, or other watercraft in Tongass Narrows. If these boats and watercraft were to navigate near the bridge, they should be able to maneuver around the piers and avoid allision. Restriction of large vessel traffic to West Channel could improve safety for watercraft using East Channel, though small vessels in West Channel would have greater risk of collision with large vessels, as the number of large vessels in West Channel would increase under Alternative F3.

4.7.2.4 Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

4.7.2.4.1 Cruise Ships, AMHS Ferry, Tugs and Barges, USCG and NOAA Vessels

Alternatives G2, G3, and G4 would introduce a new perpendicular route of frequent regular ferry travel across Tongass Narrows, which is also used by in- and outbound cruise ships, AMHS ferries, tugs and barges, USCG vessels, and NOAA vessels. However, given the regularity of the ferry schedules and the current general compatibility of the airport ferry and other marine traffic at the existing airport ferry location, the new ferry operations would not substantially affect marine vessels transiting north-south through Tongass Narrows. These alternatives would not

[29] Alaska Department of Transportation and Public Facilities. January 2002. *Gravina Access Project Monte Carlo Navigation Simulation Technical Memorandum.* Prepared by The Glosten Associates.

adversely affect any shoreside facilities associated with cruise ships, AMHS ferries, tugs and barges, or USCG and NOAA vessels. The heavy freight mooring facility associated with all ferry alternatives would provide improved access for barges landing on Gravina Island.

Alternative G4v would not alter existing marine traffic and, therefore, would have no effect on marine navigation.

4.7.2.4.2 Airport Ferry

The existing airport ferry would continue operations from its current location. Alternatives G2, G3, and G4 would supplement this service, and would reduce crowding on the ferries during peak usage, providing a benefit for the ferry passengers. Alternative G4v would result in no change to existing ferry operations.

4.7.2.4.3 Small Boats and Other Watercraft

Although the additional ferry services of Alternatives G2, G3, and G4 would introduce more marine traffic into Tongass Narrows at a new location, they would not adversely affect the facilities for or use of boats, kayaks, and other watercraft in Tongass Narrows. Alternative G4v would not alter existing marine traffic and, therefore, would have no impact on boats, kayaks, and other watercraft in Tongass Narrows.

4.7.2.5 Mitigation of Marine Transportation Impacts

4.7.2.5.1 No Action Alternative

No mitigation measures for marine transportation impacts are warranted under the No Action Alternative.

4.7.2.5.2 Bridge Alternatives

The bridge piers would be design to withstand ship impact using AASHTO design standards and would be equipped with a fendering system to help protect the ships.

4.7.2.5.3 Ferry Alternatives

No mitigation measures for marine transportation impacts are warranted for any of the ferry alternatives.

4.7.3 Vehicles

The direct effects of the Gravina Access Project alternatives on vehicles would include effects related to traffic delays during construction and new traffic patterns. Section 4.25 describes construction-related effects, while Section 4.26 details the project's secondary effects, including traffic projections based on the growth that would be induced by new access opportunities and the effects of that traffic. Changes in Level of Service (LOS) at the study area intersections were modeled using traffic projections based on induced growth and are presented in Section 4.26.

The primary measure of the project alternatives' direct impacts to vehicle travel (not related to construction) is based on travel time. For this assessment, the time of travel was calculated for vehicles traveling to Ketchikan International Airport and the closest developable (Borough-owned) land on Gravina Island from three points of origin on Revillagigedo Island:

- The Ketchikan central business district (downtown)
- The U.S. Post Office at Ward Cove
- Carlanna Creek

Table 4-6 presents the travel times for each of the project alternatives. Analysis is based on travel speed of 5 miles per hour (mph) below the posted speed limit. In this table, the travel times to the airport that are shorter than existing conditions, or the No Action Alternative, are shown in boldface.

4.7.3.1 No Action Alternative

Under the No Action Alternative, there would be no traffic improvements that would change vehicle access to Ketchikan International Airport or developable lands on Gravina Island. Vehicles would continue to use the existing airport ferry to access the airport and access developable lands off of the Gravina Island Highway and Lewis Reef Road, and the travel time to the airport would be the same from any location in Ketchikan as under existing conditions. Travel would continue to be limited by the ferry schedule and hours of operation.

Table 4-6: Travel Distances and Estimated Vehicle Travel Times

Origin and Destination		Travel Distances and Estimated Vehicle Travel Times[a]						
		No Action	Bridge Alternatives		Ferry Alternatives			
			C3-4	F3	G2	G3	G4	G4v
From Downtown to Airport Terminal	Distance (miles)	***3.3***	6.3	7.4	10.6	5.5	3.3	***3.3***
	Vehicle travel time (minutes)	***28***	**14**	**13**	43[b]	35[b]	**25**	***28***
From Ward Cove to Airport Terminal	Distance (miles)	5.0	5.6	14.7	8.1	9.7	5.0	5.0
	Vehicle travel time (minutes)	25	**8**	28	34[b]	39[b]	**22**	25
From Carlanna Creek to Airport Terminal	Distance (miles)	0.5	3.5	10.2	7.8	5.2	0.5	0.5
	Vehicle travel time (minutes)	19	**6**	22	34[b]	33[b]	**16**	19
From Downtown to Developable Land	Distance (miles)	6.5	8.7	6.2	5.9	2.5	6.5	6.5
	Vehicle travel time (minutes)	32	**17**	**11**	35	**29**	**29**	32
From Ward Cove to Developable Land	Distance (miles)	8.2	8.0	13.5	3.4	6.7	8.2	8.2
	Vehicle travel time (minutes)	30	**11**	**25**	**26**	34	**27**	30
From Carlanna Creek to Developable Land	Distance (miles)	3.7	6.0	9.0	3.1	2.2	3.7	3.7
	Vehicle travel time (minutes)	24	**8**	**19**	26	28	**21**	24

[a] Travel times are rounded to the nearest minute. Numbers in **bold** type indicate travel times shorter than existing conditions (represented by the No Action Alternative).

[b] This travel time represents travel to the airport using a ferry at the new location. The existing airport ferry would remain in operation and would provide more efficient airport access, with the same travel times presented for the No Action Alternative.

4.7.3.2 Bridge Alternatives

4.7.3.2.1 Alternative C3-4

Alternative C3-4 would have a beneficial effect on vehicle travel by providing round-the-clock access between Revillagigedo and Gravina islands. Travel would no longer be limited by the ferry schedule and hours of operation. Travel time to the airport would be shorter with the bridge than with ferry access under existing conditions, requiring half the time or less from downtown Ketchikan, Ward Cove, and Carlanna Creek. The same would be true for access to developable land from those points of origin. Unrestricted and efficient access under Alternative C3-4 would represent a substantial benefit to vehicle travel across Tongass Narrows.

The intersection of the alternative alignment with the existing road network on Revillagigedo Island would be designed to accommodate all vehicle movements.

4.7.3.2.2 Alternative F3

Alternative F3 would have a beneficial effect on vehicle travel by providing round-the-clock access between Revillagigedo and Gravina islands. Travel time to the airport would be shorter than under existing conditions for vehicles originating from downtown Ketchikan. Vehicles originating from the Carlanna Creek area and points north, including Ward Cove, would have longer travel times compared to ferry access under existing conditions (assuming that the time of travel were occurring during the normal ferry hours of operations). However, unrestricted and efficient access under Alternative F3 would represent a substantial benefit to vehicle travel across Tongass Narrows. This alternative would require a new intersection with Tongass Avenue south of downtown Ketchikan, resulting in a new traffic pattern in that area.

While a new roadway would be constructed across Pennock Island, Alternative F3 would not provide vehicle access beyond the road alignment of Alternative F3 to other areas on Pennock Island. Residents of Pennock Island would likely need to continue using their current mode of water access. While the alternative would not preclude future development of a road network on Pennock Island, that development is not part of this project.

4.7.3.3 Ferry Alternatives

4.7.3.3.1 Alternative G2

By providing an additional access point to Gravina Island, Alternative G2 would benefit vehicle travel in general, and in particular would benefit travelers from Ward Cove to developable land on Gravina Island with shorter travel times as compared to existing conditions.

Alternative G2 would have no beneficial effect on travel time to the airport, because the existing airport ferry would still be operational. Because travel time to the airport from downtown Ketchikan, Ward Cove, and Carlanna Creek would be longer if the traveler were to use the Alternative G2 ferry rather than the existing airport ferry, it is likely that airport-bound traffic would continue to use the airport ferry. Travel time to developable land on Gravina Island for vehicles originating in downtown Ketchikan or Carlanna Creek would be shorter using the airport ferry, rather than the new ferry. This alternative would require intersection improvements to the point of access for Peninsula Point from Tongass Avenue, resulting in a new traffic pattern in that area.

4.7.3.3.2 Alternative G3

By providing an additional access point to Gravina Island, Alternative G3 would benefit vehicle travel, particularly for those travelers from downtown Ketchikan to developable land on Gravina Island, who would experience shorter travel times than they do under existing conditions.

Alternative G3 would have no beneficial effect on travel time to the airport, because the existing airport ferry would still be operational. Travel time to the airport from downtown Ketchikan, Ward Cove, and Carlanna Creek would be longer using the Alternative G3 ferry rather than the existing airport ferry; therefore, it is likely that airport-bound traffic would continue to use the airport ferry. Travel time to developable land on Gravina Island for vehicles originating in from Carlanna Creek or Ward Cove would be shorter using the airport ferry, rather than the new ferry. This alternative would require a new intersection with Tongass Avenue near the Plaza Mall, resulting in a new traffic pattern in that area.

4.7.3.3.3 Alternative G4

Alternative G4 would have a beneficial effect on travel time to the airport. Travel time for vehicles traveling to Gravina Island would be approximately 3 minutes shorter than the travel time under the No Action Alternative because the co-location of the two ferries would reduce the amount of time spent waiting for the transit across Tongass Narrows (see Table 4-6). This alternative would require improvements to the ferry terminal access point and its intersection with Tongass Avenue, but would not substantially change the traffic pattern in that area.

4.7.3.3.4 Alternative G4v (Preferred Alternative)

Alternative G4v would have no effect on travel time because, relative to existing conditions, no change in ferry operations would occur. ~~Improvement to travel time would occur only in the event that new ferry service is provided; however, new ferry service would not be provided in the reasonably foreseeable future.~~

4.7.3.4 Effects of Wind—All Alternatives

The effects of high winds and inclement weather on any crossing of Tongass Narrows can be considered a direct effect to vehicle transportation. The design of the bridge alternatives must accommodate the wind loading on the structure itself, as well as the safety implications of vehicles, bicycles, and pedestrians crossing during inclement weather. Ferries would also be affected by extreme weather conditions. The effects of wind, tide, or waves in Tongass Narrows could individually or in combination make the ferry crossing unsafe. The master of the ferry would be responsible for determining whether or not to delay ferry sailing until conditions improved. There is no record of suspended ferry service as a result of poor weather conditions that did not also close airport operations; i.e., airport and ferry closures have been concurrent and attributable to overall weather conditions, not just hazardous conditions for marine navigation.

The structural design of all bridge alternatives would include wind loadings as one of the design criteria. A wind study conducted for DOT&PF in support of the design of Alternative F1, the selected alternative in the 2004 Record of Decision for the Gravina Access Project, used historic records of wind speed at the airport correlated to wind data from a station on Pennock Island to determine appropriate design loading for the Alternative F1 bridges. The study included a wind tunnel model to account for the surrounding land shapes, prevailing wind direction and speed, and the proposed bridge height to obtain values of probable maximum design wind speed and resultant force on the bridge.[30] A review and update of the study may be needed to inform design~~ensure safety~~ of the structure if Alternative C3-4 or F3 were selected in the Record of Decision for this project.

As with other DOT&PF facilities, high winds (typically 80 miles per hour [mph] or higher) could cause local authorities to close the bridge or invoke restrictions on certain types of high-profile vehicles, such as panel trucks, empty truck-trailer combinations, or motor homes. If a bridge alternative were selected, the Tongass Narrows bridge(s) would be designed for wind loadings expected at the peak bridge elevation in accordance with DO&PF design parameters. Additional weather-induced travel restrictions would apply for high winds ~~to ensure the~~as a safety measure for~~of~~ the traveling public.

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[30] West Wind Laboratory, Inc. August 2005. *Wind Study, Gravina Island Access, Ketchikan, Alaska, Wind Design Study*. Prepared for DOT&PF and HDR.

4.8 Considerations Relating to Pedestrians and Bicyclists

Impacts to pedestrians and bicyclists were determined by assessing how each alternative would:

- Affect non-motorized mobility in the areas that pedestrians and cyclists currently use
- Affect access for pedestrians and cyclists to areas they do not currently use
- Affect pedestrian and cyclist travel times for purposes of assessing the alternatives relative to the need for "…more reliable, efficient, convenient, and cost effective access for vehicles, bicycles, and pedestrians to Borough lands and other developable or recreational lands on Gravina Island…" (Chapter 1.0).

Travel times to Ketchikan International Airport and developable land on Gravina Island were calculated from three points of origin on Revillagigedo Island: the Ketchikan central business district (downtown), the U.S. Post Office at Ward Cove, and Carlanna Creek. Analysis is based on a travel speed of 3 mph for pedestrians and 10 mph for bicyclists. The travel routes for pedestrians and bicyclists are the same as those used for vehicles in the analysis of vehicle travel time.

Table 4-7 presents the calculated travel times for each of the project alternatives. Travel times that are shorter than the existing condition are shown in boldface.

4.8.1 No Action Alternative

Under the No Action Alternative, there would be no improvements that would change pedestrian and bicycle transportation in and around Ketchikan. Pedestrian and bicyclist access to Ketchikan International Airport or developable lands on Gravina Island would be the same as existing conditions. Pedestrians and bicyclists would continue to use the existing airport ferry to access the airport and lands beyond the Airport Reserve Zone via Lewis Reef Road and the Gravina Island Highway. There would be no improvements to pedestrian and bicycle transportation routes. Travel time to the airport and developable lands for pedestrians and bicyclists would be the same from any location in Ketchikan as under existing conditions.

4.8.2 Bridge Alternatives C3-4 and F3

Alternatives C3-4 and F3 would not alter existing pedestrian or bicycle facilities on Revillagigedo Island and would not alter non-motorized mobility in the areas that pedestrians and cyclists currently use. Most pedestrian activities would continue to be concentrated in the Downtown Ketchikan area. Recreational cycling would continue on existing roads and trails on Revillagigedo and Gravina islands. Both bridge alternatives would include an 8-foot-wide walkway on one side of the bridge structures, intended for use by pedestrians and bicycles, in addition to 8-foot shoulders. This new link would improve access for pedestrians and cyclists to areas they do not currently use and could encourage more pedestrian and bicycle use in the area. Alternatives C3-4 and F3 would be unlikely to result in regular pedestrian and bicycle use of Gravina Island.

Table 4-7: Travel Distances and Estimated Pedestrian and Bicycle Travel Times

Origin and Destination	Travel Distance and Travel Time[b]	Alternative[a]						
		No Action	Bridge Alternatives		Ferry Alternatives			
			C3-4	F3	G2	G3	G4	G4v
From Downtown to Airport Terminal	Distance (miles)	***3.3***	6.3	7.4	10.6	5.5	3.3	***3.3***
	Pedestrian travel time (minutes)	***76***	126	149	217	116	**73**	***76***
	Bicycle travel time (minutes)[b]	***36***	38	45	81	52	**33**	***36***
From Ward Cove to Airport Terminal	Distance (miles)	5.0	5.6	14.7	8.1	9.7	5.0	5.0
	Pedestrian travel time (minutes)	111	112	294	168	200	**108**	111
	Bicycle travel time (minutes)	47	**34**	88	66	77	**44**	47
From Carlanna Creek to Airport Terminal	Distance (miles)	0.5	3.5	10.2	7.8	5.2	0.5	0.5
	Pedestrian travel time (minutes)	21	71	204	162	110	**18**	21
	Bicycle travel time (minutes)	20	21	61	65	50	**17**	20
From Downtown to Developable Land	Distance (miles)	6.4	8.7	6.2	5.9	2.5	6.4	6.4
	Pedestrian travel time (minutes)	139	174	**124**	**123**	**55**	**136**	139
	Bicycle travel time (minutes)	55	**52**	**37**	**53**	**33**	**52**	55
From Ward Cove to Developable Land	Distance (miles)	8.2	8.0	13.5	3.4	6.7	8.2	8.2
	Pedestrian travel time (minutes)	174	**160**	270	**73**	**139**	**171**	174
	Bicycle travel time (minutes)	66	**48**	81	**38**	**59**	**63**	66
From Carlanna Creek to Developable Land	Distance (miles)	3.7	6.0	9.0	3.1	2.2	3.7	3.7
	Pedestrian travel time (minutes)	84	119	180	**67**	**49**	**81**	84
	Bicycle travel time (minutes)	38	**36**	54	**36**	**32**	**35**	38

[a] Numbers in **bold** type indicate travel times shorter than existing conditions.

[b] Travel times are rounded to the nearest minute.

Alternative C3-4 would not reduce pedestrian or bicyclist travel times to the airport for travelers originating in the Carlanna Creek area or points south of that, compared to the No Action Alternative. Pedestrians travelling from the Ward Cove area to the airport and developable land would experience similar travel times or slight travel time benefits (9 percent shorter) with Alternative C3-4 relative to the No Action Alternative, whereas the benefit to bicyclists would more noticeable, with travel time reduced by 27 to 28 percent (see Table 4-8).

Bicyclists traveling to developable land on Gravina Island from the Carlanna Creek area and points south of that would benefit slightly with Alternative C3-4 compared to the No Action Alternative, with approximately 5 percent in time savings.

Under Alternative F3, pedestrian travel times to the airport would be approximately 1 to 3 hours longer than current times using the existing airport ferry. Bicyclists would also see a substantial increase in travel time to the airport under Alternative F3. As a result, Alternative F3 would have an adverse impact to pedestrian and bicycle travel times to the airport. Travel time for pedestrians and bicyclists destined for developable land on Gravina Island would be improved for travelers originating from downtown Ketchikan and points south (see Table 4-9).

Table 4-8: Alternative C3-4 Travel Time Benefit for Pedestrian and Bicycle Travel

Origin and Destination		*No Action* (*In minutes*[a])	C3-4 (*In minutes*[a])	Time savings (*In minutes*[a])	Percent(%) time savings
From Downtown to Airport Terminal	Pedestrian travel time	76	126	—	—
	Bicycle travel time	36	38	—	—
From Ward Cove to Airport Terminal	Pedestrian travel time	111	112	—	—
	Bicycle travel time	47	**34**	13	28
From Carlanna Creek to Airport Terminal	Pedestrian travel time	21	71	—	—
	Bicycle travel time	20	21	—	—
From Downtown to Developable Land	Pedestrian travel time	139	174	—	—
	Bicycle travel time	55	**52**	3	5
From Ward Cove to Developable Land	Pedestrian travel time	174	**160**	16	9
	Bicycle travel time	66	**48**	18	27
From Carlanna Creek to Developable Land	Pedestrian travel time	84	119	—	—
	Bicycle travel time	38	**36**	2	5

[a] Numbers in **bold** type indicate travel times shorter than existing conditions.

Table 4-9: Alternative F3 Travel Time Benefit for Pedestrian and Bicycle Travel

Origin and Destination		No Action (*In minutes*[a])	F3 (*In minutes*[a])	Time savings (*In minutes*[a])	Percent (%) time savings
From Downtown to Airport Terminal	Pedestrian travel time	76	149	—	—
	Bicycle travel time	36	45	—	—
From Ward Cove to Airport Terminal	Pedestrian travel time	111	294	—	—
	Bicycle travel time	47	88	—	—
From Carlanna Creek to Airport Terminal	Pedestrian travel time	21	204	—	—
	Bicycle travel time	20	61	—	—
From Downtown to Developable Land[a]	Pedestrian travel time	139	**124**	14	43
	Bicycle travel time	55	**37**	18	57
From Ward Cove to Developable Land	Pedestrian travel time	174	270	—	—
	Bicycle travel time	66	81	—	—
From Carlanna Creek to Developable Land	Pedestrian travel time	84	180	—	—
	Bicycle travel time	38	54	—	—

[a] Numbers in **bold** type indicate travel times shorter than existing conditions.

4.8.3 Ferry Alternatives G2 and G3

Alternatives G2 and G3 would include continued operation of the existing airport ferry and an additional access option for pedestrians and bicyclists traveling to Gravina Island. These alternatives would not alter non-motorized mobility in the areas that pedestrians and cyclists currently use. With continued operation of the airport ferry, these alternatives would not impact pedestrian and bicycle travel times to the airport. The passenger waiting facility and shuttle vans would provide comfort to travelers making the airport ferry crossing on foot. Improved sidewalks and covered walkways would also benefit pedestrians. Travel times for pedestrians and bicyclists to the airport using the new ferry (i.e., at a new location) would be longer under these alternatives than the travel time using the existing ferry. The new ferry locations associated with Alternatives G2 and G3 would improve access for pedestrians and cyclists to areas they do not currently use.

Alternatives G2 and G3 would have a beneficial impact to access to developable lands on Gravina Island by providing new opportunities for access at new locations and reducing the travel time (see Table 4-10 and Table 4-11). Access to developable land would be possible from both the existing and the new ferries, providing additional access options for pedestrians and bicycles.

Table 4-10: Alternative G2 Travel Time Benefit for Pedestrian and Bicycle Travel

Origin and Destination		No Action	G2	Time savings	Percent (%) time savings
		In minutes[a]			
From Downtown to Developable Land	Pedestrian travel time	139	**123**	15	11
	Bicycle travel time	55	**53**	2	4
From Ward Cove to Developable Land	Pedestrian travel time	174	**73**	101	58
	Bicycle travel time	66	**38**	29	44
From Carlanna Creek to Developable Land	Pedestrian travel time	84	**67**	16	19
	Bicycle travel time	38	**36**	2	5

[a] Numbers in **bold** type indicate travel times shorter than existing conditions.

Table 4-11: Alternatives G3 Travel Time Benefit for Pedestrian and Bicycle Travel

Origin and Destination		No Action	G3	Time savings	Percent (%) time savings
		In minutes[a]			
From Downtown to Developable Land	Pedestrian travel time	139	**55**	84	61
	Bicycle travel time	55	**33**	22	40
From Ward Cove to Developable Land	Pedestrian travel time	174	**139**	35	20
	Bicycle travel time	66	**59**	8	12
From Carlanna Creek to Developable Land	Pedestrian travel time	84	**49**	35	42
	Bicycle travel time	38	**32**	7	18

[a] Numbers in **bold** type indicate travel times shorter than existing conditions.

4.8.4 Ferry Alternative G4

Alternative G4 would include continued operation of the existing airport ferry; therefore, the new ferry would provide an additional access option for pedestrians and bicyclists. Alternative G4 would have a beneficial impact to pedestrian and bicycle travel time to the airport and other locations on Gravina Island. The passenger waiting facility and shuttle vans would provide comfort to travelers making the airport ferry crossing on foot. Improved sidewalks and covered walkways would also benefit pedestrians. For Alternative G4, travel times for pedestrians and bicyclists traveling to Gravina Island would be approximately 3 minutes shorter than the travel time under the No Action Alternative because the co-location of the two ferries would reduce the amount of time spent waiting for the transit across Tongass Narrows. Alternative G4 would improve access for pedestrians and cyclists to areas they do not currently use by shortening travel time, but no new access would be created.

4.8.5 Ferry Alternative G4v (Preferred Alternative)

Similar to the No Action Alternative, Alternative G4v would not affect pedestrian and bicycle transportation in and around Ketchikan. Under Alternative G4v, there would be no improvements in the foreseeable future that would change pedestrian and bicycle access to Ketchikan International Airport or developable lands on Gravina Island. Pedestrians and bicyclists would continue to use the existing airport ferry to access the airport and lands beyond the Airport Reserve Zone via Lewis Reef Road and the Gravina Island Highway. The passenger waiting facility and shuttle vans would provide comfort to travelers making the crossing on foot. Improved sidewalks and covered walkways would also benefit pedestrians. Travel time to the airport and developable lands for pedestrians and bicyclists would be the same from any location in Ketchikan as for existing conditions.

4.9 Geology, Topography, and Wind

4.9.1 Geology and Topography

None of the project alternatives would adversely affect any unique or significant geologic feature.

4.9.1.1 No Action Alternative

The No Action Alternative would not affect the topography in the project area. No excavation would be required, and no changes to the existing landforms would occur.

4.9.1.2 Bridge Alternatives

4.9.1.2.1 Alternative C3-4

Construction of Alternative C3-4 would require blasting to remove bedrock in some areas along the Revillagigedo Island alignment. Other areas would require fill (e.g., for the bridge abutment). Removed overburden material on Revillagigedo Island, which typically has a high organic content, would be used in slope flattening and for topsoil. Tight control of blasting would minimize the risk of slides; the nearby area would be closed immediately before the blast and remain closed until after the blasted area had been inspected. A geotechnical investigation would be conducted during final design of the selected alternative to identify any localized slope stability problems and devise an approach to removing material and placing fill that protect public safety.

The proposed improvements on Gravina Island would require minimal blasting to remove bedrock for pier foundation construction. Embankment construction at the bridge approach to the airport would require some fill placement on upland. On Gravina Island, borrow material would be obtained from existing sources on Gravina Island within the project area and, when possible, from construction cut areas. Materials removed during construction and determined to be unsuitable for reuse in the development of the road would be disposed of on an upland site that would be identified during final design and approved by the DOT&PF.

Removal of surface sediments, soils, and bedrock to accommodate roadway construction and grading on Revillagigedo Island and, to a lesser extent, roadway improvements on Gravina Island would alter the topography along the roadway corridor. DOT&PF would be responsible for developing an erosion and sediment control (ESCP) and the contractor would be responsible for developing a Stormwater Pollution Prevention Plan (SWPPP) based upon the ESCP ~~The construction contractor would be responsible for developing erosion and sediment control and stormwater pollution prevention plans~~ to meet ADEC and EPA requirements of the Clean Water Act.

4.9.1.2.2 Alternative F3

No blasting of bedrock on Revillagigedo Island would be needed to construct Alternative F3. On Pennock and Gravina Islands, the roadway would require minimal blasting to remove bedrock. In most areas, the road would be constructed using off road haul trucks, dozers, compactors and graders. On Pennock Island for Alternative F3, material from cut would be used in slope flattening and for topsoil, effectively balancing material. On Gravina Island, borrow material would be obtained from existing sources on Gravina Island within the project area and, when possible, from construction cut areas. Materials removed during construction and determined to be unsuitable for reuse in the development of the road would be disposed of on an upland site that would be identified during final design and approved by the DOT&PF. Removal of surface sediments, soils, and bedrock to accommodate roadway construction and grading for the Alternative F3 alignment would alter the topography along the roadway corridor. DOT&PF would be responsible for developing an ESCP and the contractor would be responsible for developing a SWPPP based upon the ESCP ~~The construction contractor would be responsible for developing erosion and sediment control and stormwater pollution prevention plans~~ to meet ADEC and EPA requirements of the Clean Water Act.

Blasting and dredging in West Channel would be required for the channel modification, resulting in the removal of approximately ~~184~~213,000 cubic yards of material (bedrock, gravel, silts) over ~~16~~ 14.8 acres. These actions would permanently alter the configuration of the channel bottom at that location. Dredging in Tongass Narrows would be subject to a Section 404 permit and USACE approval. Refer to Section 4.13 for more information on required permits.

4.9.1.3 Ferry Alternatives

4.9.1.3.1 Alternatives G2, G3, ~~and~~ G4, and G4v (Preferred Alternative)

Alternatives G2, G3, ~~and~~ G4, and G4v would not require bedrock blasting on Revillagigedo Island, though fill could be needed at the site of the new ferry terminals (Alternatives G2, G3, and G4) and at the new heavy freight mooring facility (all ferry alternatives). On Gravina Island, roadway improvements would require minimal blasting, if any, to remove bedrock. In most areas of Gravina Island, new road construction and widening of existing roads could be completed using off road haul trucks, dozers, compactors, and graders. Removal of surface sediments, soils, and bedrock to accommodate roadway construction and improvements, and grading under any of these alternatives would alter the topography at the ferry terminals and along the roadway corridor. Borrow material for fill areas would be obtained from existing sources on Gravina Island within the project area and, when possible, from construction cut areas. Materials removed during construction and determined to be unsuitable for reuse in the development of the road would be disposed of on an upland site that would be identified during final design and approved by the DOT&PF.

Dredging for Alternatives G2 and~~,~~ G3~~, and G4~~ would likely be required (estimated dredged material amounts of 1,400 and~~;~~ 18,600~~; and 15,200~~ cubic yards, respectively) to provide adequate navigation depths for the new ferry berths~~terminals~~. Such dredging would modify the configuration of the channel bottom at these locations. No dredging would be required for the new ferry berths of Alternative G4. Based on the current design, no dredging is proposed for the ferry layup dock or heavy freight ~~terminal~~mooring facility.

~~*4.9.1.3.2 Alternative G4v*~~

~~Improvements associated with Alternative G4v would require minimal earthmoving activities and likely would not impact geological resources or topography.~~

4.9.2 Soils

4.9.2.1 No Action Alternative

The No Action Alternative would not affect soils in the project area.

4.9.2.2 All Action Alternatives

The temporary adverse effects of construction on soils and surface sediments are described in Section 4.25. The action alternatives would require excavation of surface sediments and/or soils along the entire overland alignment. Removal of surface sediments and soils to accommodate roadway construction and grading under any of these alternatives would not adversely affect any unique or significant soil materials.

4.9.3 Wind

The Gravina Access Project would have no effect on wind. Bridge alternatives would be subject to wind forces, particularly at higher elevations and over water where wind is unimpeded by surface features and where the structure is elevated on piers. Ferry alternatives would be affected by wind and wind-driven waves.

The highest point of the deck elevation for the Alternative C3-4 bridge would be approximately 280 feet above the water surface and for the Alternative F3 bridges the bridge deck elevations would be approximately 275 feet and 115 feet above the water surface. Similar to designing for seismicity, traffic loads, bridge deck loads, and potential ship impact loading, the bridge foundations would be designed to handle any wind loading stemming from wind hitting the structure high above the water level. Wind speeds at a range of elevations were modeled from wind monitoring data at the airport and on Pennock Island,[31] and are provided in Table 4-12.

Table 4-12: Service Load Wind Speeds at Elevation

Return Period and Elevation	Averaged Wind Speed (mph)		
	3-second	10-minute	1-hour
25-year return period			
300 feet	142	108	103
280 feet	141	107	102
260 feet	140	106	101
120 feet	129	95	89
100 feet	127	92	87
100-year return period			
300 feet	161	122	116
280 feet	160	121	115
260 feet	159	119	112
120 feet	146	107	104
100 feet	143	104	101

[31] West Wind Laboratory, Inc. August 2005. *Gravina Island Access, Ketchikan, Alaska, Wind Design Study*. Prepared for DOT&PF and HDR Alaska, Inc.

4.10 Air Quality Impacts

Air pollutants of concern associated with the Gravina Access Project are elevated concentrations of:

- Carbon monoxide from vehicle emissions at intersections, interchanges, and other similar sites with high vehicle densities and slow speeds
- Particulate matter with a diameter equal to or less than 10 microns (PM_{10}) and 2.5 microns ($PM_{2.5}$), resulting primarily from construction activities that generate dust

4.10.1 Emissions

4.10.1.1 No Action Alternative

The No Action Alternative would not affect air quality in the Ketchikan area and would not cause increases in emissions of carbon monoxide, PM_{10}, or $PM_{2.5}$.

4.10.1.2 All Action Alternatives

Construction activities associated with the project would have direct impacts to air quality in the Ketchikan area. The effects of emissions from construction activities associated with the action alternatives are described in Section 4.25.

None of the action alternatives would increase traffic volumes immediately; consequently none of the alternatives would have a direct impact to air quality. Over time, all of the action alternatives may result in greater vehicle emissions as a result of increased road travel. The effects of projected traffic levels on air quality are described in Section 4.26.

The bridge alternatives would eliminate emissions from the airport ferry, resulting in an overall decrease in emissions compared to the No Action Alternative. The ferry alternatives, however, would increase ferry emissions, resulting in an overall increase in emissions. Emissions from marine vessels are regulated only for opacity levels (see Section 3.10.2), and no new violations of the regulated levels are expected to result from implementation of any of the project alternatives. As Ketchikan is located in an attainment area for air quality, no conformity analysis is required per the ADEC Division of Air Quality (Appendix D).[32]

4.10.2 Greenhouse Gases and Climate Change

From a quantitative perspective, global climate change is the cumulative result of numerous and varied GHG emissions sources (in terms of both absolute numbers and types), each of which makes a relatively small addition to global atmospheric GHG concentrations. In contrast to broad scale actions, such as actions involving an entire industry sector or very large geographic areas, it is difficult to isolate and understand the GHG emissions impacts for a particular transportation project. Furthermore, presently there is no scientific methodology for attributing specific climatological changes to a particular transportation project's actual or projected emissions. For purposes of this SEIS, climate change is addressed as a cumulative impact in Section 4.27.6.

[32] Alaska Department of Environmental Conservation. May 18, 2009. Concurrence Letter regarding air quality conformity. Division of Air Quality Air Non-Point and Mobile Sources.

4.10.2.1 Mitigation of Air Pollutant Emissions

4.10.2.1.1 No Action Alternative

There are no mitigation measures recommended for air pollutant emissions under the No Action Alternative.

4.10.2.1.2 All Action Alternatives

~~To reduce vehicle emissions during operation, the proposed project under all action alternatives would incorporate designs that are expected to reduce the use of single-occupancy vehicles and improve fuel efficiency compared to the No Action Alternative.~~ The Gravina Access Project would have minimal air quality impacts; therefore, no specific mitigation for air pollutant emissions is recommended. Long-term reductions in air pollutant emissions related to transportation would be brought about by policy decisions that improve emissions standards and promote clean energy technologies for vehicles.

To the extent practicable, a~~A~~ll action alternatives would be~~are~~ designed using materials with the longest available life. These choices would result in new facilities that have a longer life before needing to be replaced than those built without such considerations, which in turn would reduce overall emissions for reconstruction and replacing materials. Mitigation for global GHG emissions is described in Section 4.27.6.

4.11 Noise Impacts

The adverse effects of construction-related noise by the action alternatives are described in Section 4.25. The adverse effects of projected traffic levels on noise levels are described in Section 4.26.

4.11.1 No Action Alternative and Alternative G4v (Preferred Alternative)

Noise levels in the Ketchikan area would not increase as a result of the No Action Alternative or Alternative G4v.

4.11.2 ~~All Action~~ Alternatives C3-4, F3, G2, G3, and G4

Traffic volumes in the first few years after the project is built would be similar to existing traffic volumes on the airport ferry and would not affect noise levels in the vicinity of the alternative alignments.

Under Alternative C3-4, seaplanes taking off and landing in the vicinity of the bridge would need to alter their travel pattern for taxiing at takeoff and landing. This would not likely alter overall noise levels at receptors in the area.

Under Alternative F3, flight paths of seaplanes departing the Ketchikan Harbor Seaplane Base might be altered by the presence of a bridge over the East and West Channels, which could increase noise levels for Pennock Island residents. Typically, seaplanes taking off to the south but bound for points north make their northward turn at the south end of Pennock Island. With the Alternative F3 bridges in place, seaplanes might need to make their northward turn north of the bridge, which would involve flying over the northern end of Pennock Island, where many of the residences on Pennock Island are located. Residents of these areas could experience increased noise from seaplane traffic as a result of this altered flight pattern.

Under Alternatives G2, G3, and G4, new ferry service would add ferry noise at the ferry terminal locations on Revillagigedo Island. Ferry terminals themselves would be considered as Category F land uses, generating their own noises, and would not be considered noise-sensitive land uses.

4.12 Water Quality Impacts

None of the alternatives would cross major drainages on either Revillagigedo or Pennock islands. The action alternatives, however, could affect Government Creek, two branches of Airport Creek, and other lesser creeks on Gravina Island. There is no upstream development along these Gravina Island creeks aside from the Seley Road, Lewis Reef Road, and Gravina Island Highway crossings. The area these creeks drain consists primarily of wetlands. The creeks generally are not turbid and have good water quality.

The following sections describe the potential direct effects of the project alternatives on water quality in Tongass Narrows and in streams, wetlands, ponds, and other water bodies on the islands in the project area. Section 4.25.10 describes the temporary adverse effects of project construction activities, such as dredging, on water quality. Section 4.26.10 discusses the indirect impacts of the project on water quality.

4.12.1 No Action Alternative

Under the No Action Alternative, the ferry between Revillagigedo and Gravina Islands would continue to be operated. Pollutants would continue to be washed off the ferry terminals into Tongass Narrows and be produced by the ferry itself. Pollutants might include particulates, petroleum products, metals, and solvents.

4.12.2 Bridge Alternatives C3-4 and F3

Alternatives C3-4 and F3 could affect the water quality of water bodies crossed by the bridge and roadway alignment on Revillagigedo or Gravina islands. No major water bodies would be crossed on Pennock Island. Pollutants from runoff would include particulate matter, metals, and petroleum products from vehicle emissions and maintenance activities. With respect to Tongass Narrows, these impacts would be of similar character to those that occur today from ferry operations.

4.12.3 Ferry Alternatives G2, G3, ~~and~~ G4, and G4v (Preferred Alternative)

Alternatives G2, G3, ~~and~~ G4, and G4v could affect water quality of streams crossed by associated roadway development and improvement; i.e., both channels of Airport Creek, Government Creek, and several lesser creeks on Gravina Island. The water quality of Tongass Narrows and freshwater creeks could be adversely affected by pollutants in runoff from the ferry terminals and roadways, and by ferry vessel emissions. These pollutants could include petroleum products, metals, and particulate matter from ferry operations and maintenance, ferry terminals, and roads, similar to those that occur today from ferry terminals, the ferry deck, and the ferry engines. Four ferries instead of two (during peak summer season) with Alternatives G2, G3, and G4;~~,~~ more traffic on Gravina Island;~~,~~ and additional roads in the case of Alternatives G2 and G3 (i.e., ferry terminal access roads on Gravina Island connecting Alternative G2 with Seley Road and Alternative G3 with the Gravina Island Highway) would result in incrementally more of these pollutants and effects to new areas, but with mitigation, overall water quality in Tongass Narrows and streams crossed by the new and improved roadways would not be noticeably changed.

~~*4.12.4 Ferry Alternative G4v*~~

~~Alternative G4v could affect water quality of streams crossed by associated roadway development and improvement, including both channels of Airport Creek, Government Creek, and several lesser creeks on Gravina Island. Pollutants in runoff from the ferry docks, ramps, and roadways could adversely affect the water quality of Tongass Narrows and freshwater~~

~~creeks. These pollutants could include petroleum products, metals, and particulate matter from the operation and maintenance of the ferry docks and road links, similar to those that occur today from the ferry dock.~~

~~4.12.5~~4.12.4 Mitigation of Water Quality Impacts

~~4.12.5.1~~4.12.4.1 No Action Alternative

There are no mitigation measures recommended for water quality impacts under the No Action Alternative.

~~4.12.5.2~~4.12.4.2 Bridge Alternatives C3-4 and F3

All new and improved roads would be designed to maintain existing surface water courses (e.g., by using ditches) and stormwater drainage. Final roadway design would include culverts or bridges along existing drainages and across streams on Revillagigedo and Gravina islands: Alternative C3-4 would include 15 culverts and two bridges, and Alternative F3 would include 23 culverts and five bridges. DOT&PF would be responsible for developing an ESCP and the contractor would be responsible for developing a SWPPP based upon the ESCP ~~The construction contractor would be responsible for developing erosion and sediment control and stormwater pollution prevention plans~~ to meet requirements of the Clean Water Act. Ditches would be constructed along each side of the new and improved roads to capture stormwater runoff. The ditches would be seeded and act as filters for stormwater. The drainage would funnel to low spots or existing channels that would eventually flow to Tongass Narrows.

In the airport terminal area, some curb and gutter may be used to direct roadway runoff into the existing storm and roof drain system. The method of removing of stormwater from the bridge structure(s) would be determined in the final design phase. Typical DOT&PF bridge design would direct stormwater from the bridge deck to the railing curb and then to vertical pipes that discharge the stormwater to the waters or land below the bridge. The stormwater treatment system would need to be approved by ADEC under its plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit. Impacts to water quality would be minimized through the use of BMPs, most of which would be part of the ~~Stormwater Pollution Prevention Plan (~~SWPPP~~)~~. BMPs that would be employed to protect water quality include:

- Increasing, where practicable, the angle of fill slopes to reduce encroachment into adjacent wetlands
- Designing and constructing the roadway with a low-profile embankment to minimize the fill footprint
- Using rock to stabilize toes of slopes to limit the erosion of fine-grained material into adjacent waters and wetlands
- Using plant species indigenous to the area for vegetating road slopes wherever possible to protect the integrity of the natural plant communities
- Using non-native, non-invasive annual grasses (such as annual rye) to provide rapid, initial soil cover to prevent runoff of fine-grained material into adjacent wetlands
- Applying topsoil to the surface of road slopes to aid in the reseeding process
- Designing roadside swales to keep surface water within the natural drainage basins to allow sediment-laden water to clear before its discharge to adjacent wetlands and waters
- Recontouring stream banks at all stream crossings (both culverts and bridge crossings), to approximate original conditions

- Reseeding recontoured stream banks with native seed and annual rye to minimize erosion, as recommended in the DNR *Coastal Revegetation and Erosion Control Guide*[33]

Section 4.25.10 describes construction-related BMPs to protect water quality. All necessary permits and agency approvals would be obtained prior to construction, and any permit stipulations would be incorporated into the construction contract specifications.

~~4.12.5.3~~4.12.4.3 Ferry Alternatives G2, G3, ~~and~~ G4 and G4v (Preferred Alternative)

New roads for Alternatives G2 and G3 would be designed to maintain existing surface water courses and stormwater drainage. Final roadway design would include culverts or bridges along existing drainages and across streams on Gravina Island: Alternative G2 would include 13 culverts and one bridge, Alternative G3 would include 13 culverts and two bridges, and Alternatives G4 and G4v would include 12 culverts and one bridge. DOT&PF would be responsible for developing an ESCP and the contractor would be responsible for developing a SWPPP based upon the ESCP ~~The construction contractor would be responsible for developing erosion and sediment control and SWPPP~~ to meet requirements of the Clean Water Act. The roadway and ferry terminal designs would incorporate a stormwater ~~treatment~~ management system to minimize the effects of runoff. ~~The stormwater treatment system would be approved by ADEC under its plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit.~~ BMPs would further reduce adverse effects on water quality (see Sections 4.12.2 and 4.25.10).

~~4.12.5.4 Ferry Alternative G4v~~

~~Final roadway design would include culverts or bridges along existing drainages and across streams on Gravina Island. The construction contractor would be responsible for developing erosion and sediment control and SWPPP to meet requirements of the Clean Water Act. The roadway design would incorporate a stormwater treatment system to minimize the effects of runoff. The stormwater treatment system would be approved by ADEC under its plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit. BMPs would further reduce adverse effects on water quality (see Sections 4.12.2 and 4.25.10).~~

4.13 Permits

All the permits and coordination activities that may be required for this project are listed in Section 3.13. The following section summarizes and describes major permits that would be required for each alternative.

4.13.1 No Action Alternative

The No Action Alternative would not require any permits or certifications.

4.13.2 All Action Alternatives

USACE, EPA, ADEC, USCG, NMFS, DNR, SHPO, ADF&G, the Borough, and City of Ketchikan would require permits or approvals to implement any of the Gravina Access Project action alternatives. Permits and approvals for temporary construction activities would also be necessary from the USACE, DNR, NMFS, and EPA. Major federal, state, and local permits common to all the action alternatives would be:

[33] Wright, Stoney J., and Philip K. Czapla. 2011. *Alaska Coastal Revegetation and Erosion Control Guide*. Palmer, Alaska: Alaska Department of Natural Resources, Division of Agriculture, Plant Materials Center.

- USACE, Clean Water Act Section 404 Permit for placement of dredged or fill material in waters of the United States, including wetlands, and Section 10 permit for work in, on, and over navigable waters
- Ketchikan Gateway Borough *Coastal Management Plan* review
- ADF&G, Title 16 Fish Habitat Permit for crossings of fish bearing streams
- ADEC, Alaska Pollutant Discharge Elimination System (APDES) General Permit for Stormwater Discharges from Construction Activities
- ADEC Section 401 Certification (Certificate of Reasonable Assurance)
- ADEC plan review for non-domestic wastewater treatment system
- ADEC non-domestic wastewater disposal permit
- Borough and City of Ketchikan zoning, conditional use, and/or site development permits and approvals, as required

Construction impacts that have the potential to result in harassment of marine mammals (as defined at 50 CFR 216.3) would be mitigated as described in Sections 4.25.12.3 and 4.25.15. Consequently, no Incidental Harassment Permit or Letter or Authorization from NMFS would be necessary. If plans changed during final design or prior to construction of any of these alternatives such that marine mammal harassment could not be avoided or mitigated, FHWA and DOT&PF would apply for a permit in accordance with Section 101(a)5 of the Marine Mammal Protection Act.

Alternatives C3-4 and F3 would require permits common to all alternatives, described above, plus a USCG Bridge Permit issued under the authority of Section 9 of the Rivers and Harbors Act of 1899. Alternative F3 could also require USACE permitting under Sections 102 and 103 of the Marine Protection, Research, and Sanctuaries Act (i.e., Ocean Dumping Act) for ocean disposal of dredged material removed from West Channel. Section 404 of the Clean Water Act would also apply to ocean disposal.

4.14 Wetland and Vegetation Impacts

Table 4-13 provides the number of acres of wetlands (by type) that would be directly affected by each project alternative, as well as the approximate amount of fill to be placed in wetlands (given in cubic yards). Figure 3.17 shows the locations of alternatives relative to wetlands, ponds, and uplands.

Section 4.25.11 describes the additional temporary effects of project construction on wetlands and vegetation. Section 4.26.9 provides a discussion of the indirect impacts of the project on wetlands and vegetation.

Table 4-13: Impacts to Wetlands, Ponds, and Uplands (acres) [Updated]

Wetland Type [a]	*No Action*	*Bridge Alternatives*		*Ferry Alternatives*			
		C3-4	**F3**	**G2**	**G3**	**G4**	**G4v**
Forested wetlands	0	~~5~~2.2	~~14~~11.2	~~11~~8.2	~~7~~4.2	~~5~~2.2	~~5~~2.2
Shrub/scrub wetlands [a]	0	~~6~~0	~~16~~10.0	3.0~~9~~	~~7~~1.0	~~6~~0	~~6~~0
Muskegs	0	~~2~~3.8	~~3~~4.8	~~3~~4.8	~~2~~3.8	~~2~~3.8	~~2~~3.8
Intertidal marshes and meadows [b]	0	0	0	1.2	2.9	0	0
Below the high tide line (HTL)	*0*	*0*	*0*	*0.6*	*1.1*	*0*	*0*
Below the Mean High Water (MHW) mark	*0*	*0*	*0*	*0.6*	*1.8*	*0*	*0*
Below the ordinary high water mark (OHWM)	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Total Wetland Impacts	**0**	**~~13~~6.0**	**~~33~~26.0**	**~~24.2~~17.2**	**~~18.9~~11.9**	**~~13~~6.0**	**~~13~~6.0**
Ponds	0	0	1	1	3	0	0
Uplands (Non-wetlands)	0	10	2	4	3	1	1
Piers in wetlands (number) [c]	0	12	6	0	0	0	0
Approximate amount of fill placed in wetlands (thousand cubic yards)	0	623	880	91	85	56	56

[a] Total wetland acreage in Tongass Narrows Watershed is based on NWI mapping. NWI showed no shrub/scrub, but shrub/scrub type does exist (see discussion in Section 3.14).

[b] Impacts to marine waters other than mapped intertidal marshes and meadows are discussed in Section 4.15.4.4.

[c] This indicates the number of bridge piers and abutments in the wetland types listed above. Table 4-14 lists piers in Tongass Narrows.

4.14.1 Wetlands

Direct impacts to wetlands would primarily be permanent loss resulting from placing roadway, ferry, or bridge facilities in wetland areas. The project design would avoid and minimize such use of wetlands to the extent practicable. The following characterization of wetland impacts is based on the best available design information at this stage of the project.

4.14.1.1 No Action Alternative

The No Action Alternative would not affect wetlands.

4.14.1.2 All Action Alternatives

As indicated in Section 3.14, the wetlands in the project area are extensive. There are nearly 17,000 acres of wetlands in the watersheds that drain to Tongass Narrows, an area of just under 40,000 acres total. The proportion of wetlands that would be converted to transportation facilities under any of the action alternatives would be greatest under Alternative F3, which would result in a loss of 0.~~08~~ 0.15 percent of the total wetlands in the area.

4.14.1.2.1 Forested Wetlands

All action alternatives would result in the elimination and alteration of forested wetlands, principally along the road alignments for the proposed widening. Overall, Alternative F3 would have the greatest acreage of impacts to forested wetlands (see Table 4-13). Areas that support adjacent stream habitat (e.g., woody debris and invertebrates from overhanging vegetation) would be eliminated. Impacts to forested wetlands would occur primarily north and west of the airport and on Revillagigedo Island.

The elimination of forested wetlands would result in increased runoff, altered surface and subsurface drainage patterns, loss of wildlife habitat, and slight changes in plant community composition in forested wetlands adjacent to the road due to increased sunlight in the understory. Impacts to wetland-~~dependant~~dependent wildlife from human activity (motion, noise, and people leaving the roadway) would extend beyond the project footprint and would be permanent (see also Section 4.15.3 regarding impacts to wetland-dependent wildlife species).

4.14.1.2.2 Shrub/Scrub Wetlands

Impacts to shrub/scrub wetlands for all the action alternatives would be the same as those described for forested wetlands. Specific acreages of impact are summarized in Table 4-13.

4.14.1.2.3 Muskegs

All action alternatives would result in the loss and alteration of muskegs resulting from placement of road embankment fill. Impacts to muskegs would occur primarily along road routes west and south of the airport on Gravina Island. Alternatives F3 and G2 would have the greatest impacts because they have the longest roads (see Table 4-13). A road across muskeg wetlands would eliminate a ribbon of wildlife habitat and could alter the flow patterns of both surface and subsurface water. Altering flow patterns could reduce the amount of organic material exported to downstream ecosystems. It could also cause slight changes in plant community composition as a result of altered drainage patterns and runoff of pollutants to the wetlands. Mitigation, addressed below, would be designed to minimize or eliminate these effects. Impacts to wetland-~~dependant~~dependent wildlife from human activity would extend beyond the project footprint and would be permanent.

4.14.1.2.4 Intertidal Marshes and Meadows

Alternatives G2 and G3 would eliminate 1.2 and 2.9 acres, respectively, of intertidal marshes and meadows at their terminal areas (Lewis Point and south of the airport, respectively—see Table 4-13). Potential direct impacts resulting from removal of this highly productive habitat include loss of important feeding areas for terrestrial and aquatic species, loss of nurseries for young fish, and loss of organic matter produced in these marshes and exported to deeper marine waters. Impacts to wetland-~~dependant~~dependent wildlife from human activity would extend beyond the project footprint and would be permanent (see also Section 4.15.3 and Table 4-14, below, regarding impacts to other marine vegetated shallows, including eelgrass and kelp in Tongass Narrows).

4.14.1.3 <u>Mitigation of Impacts to Wetlands</u>

4.14.1.3.1 No Action Alternative

No mitigation measures for wetlands impacts are warranted under the No Action Alternative.

4.14.1.3.2 All Action Alternatives

Final mitigation would be based on discussions among ~~DNR~~ADF&G, FHWA, USACE, and other resource management agencies. Detailed mitigation measures would be developed and implemented as a condition of federal permits for the project. In addition to the BMPs listed in Section 4.12.2, culverts would be installed through fill slopes in appropriate locations to maintain natural flow patterns for surface water courses and to maintain~~ensure that~~ the existing timing and amounts of inflow to adjacent wetlands and waters~~ were retained~~.

Impacts to wetlands were avoided wherever practicable in the preliminary design phase of the project alternatives. Avoidance measures include designing roadways with a minimum-width fill footprint, maximizing use of the existing roadway, increasing the angle of fill slopes, maintaining natural flow patterns by installing culverts through the fill, minimizing the use of wetlands for staging and storage areas, minimizing the area of allowable disturbance during construction, minimizing all temporary fill in wetlands, and restoring wetlands that are temporarily disturbed. Using appropriate erosion control practices (including the installation of sediment barriers and sedimentation traps, and seeding and stabilizing road slopes) and implementing a storm water pollution prevention plan would minimize water quality impacts to wetlands.

DOT&PF proposes to compensate for unavoidable adverse impacts to wetlands through the creation of a Compensatory Mitigation Plan developed during the Section 404/10 permitting process in coordination with the USACE. The Compensatory Mitigation Plan will likely involve payment of an in-lieu fee and/or permittee-responsible enhancement, restoration, and preservation mitigation projects developed using a watershed approach.~~by paying a fee in lieu of onsite wetland restoration, enhancement, or preservation. This compensatory mitigation would be calculated and applied to the preferred alternative identified in the Final SEIS. This fee would be provided to a land trust acceptable to the USACE. The proposed fee would be directed toward activities relating to wetland creation, restoration, enhancement, and preservation or land acquisition in the region.~~

4.14.2 Vegetation

4.14.2.1 No Action Alternative

The No Action Alternative would have no adverse impact to upland vegetation.

4.14.2.2 Bridge Alternatives C3-4 and F3

Alternatives C3-4 and F3 would require the permanent removal of upland vegetation on some steep slopes and high knobs on Revillagigedo Island and, for Alternative F3, on Pennock Island. The upland vegetation affected by these alternatives would be primarily western hemlock/Sitka spruce forest in the relatively undisturbed areas and alder thickets in more disturbed areas. Vegetation loss would reduce wildlife habitat, and would increase surface runoff volume. Table 4-13 provides the total amount of upland and wetland vegetation affected by each of these alternatives.

4.14.2.3 Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

Alternative G2 would require removal of upland forest in undisturbed areas at Lewis Point on Gravina Island, as well as upland forest vegetation in previously disturbed areas of the island. The vegetation affected by this alternative would be primarily western hemlock/Sitka spruce forest in the relatively undisturbed areas and alder thickets in more disturbed areas. Alternatives G3, G4, and G4v would result in the removal of relatively undisturbed areas of western hemlock/Sitka spruce forest, and alder thickets in more disturbed areas. Vegetation removal would contribute to loss of wildlife habitat and increases in surface runoff. The total amounts of upland and wetland vegetation affected by these alternatives are listed in Table 4-13.

4.14.2.4 Mitigation of Impacts to Vegetation

4.14.2.4.1 No Action Alternative

There are no mitigation measures recommended for vegetation impacts under the No Action Alternative.

4.14.2.4.2 All Action Alternatives

Final project design would avoid and minimize direct impacts to vegetation by reducing clearing limits and using previously disturbed areas for staging wherever feasible. Temporary disturbed areas would also be planted or reseeded to ~~with native woody vegetation that would~~ provide forage value for wildlife~~ and a net gain in stormwater quality~~.

4.15 Water Body and Wildlife Impacts

Direct adverse impacts to water bodies and wildlife would result from roadway stream crossings, roadway placement within terrestrial areas that serve as wildlife habitat, placement of bridge piers in Tongass Narrows, placement of pilings for ferry terminals on the shoreline of Tongass Narrows, and placement of fill on the margins of Tongass Narrows. Table 4-14 tabulates the expected impacts to water bodies. The same numbers are important indicators of effects on fish and marine mammal habitats.

Section 4.25.12 discusses the temporary impacts to water bodies and wildlife during project construction. Section 4.26.10 details the indirect impacts of the project on water bodies and wildlife.

Table 4-14: Quantities of Fill and Dredging in Tongass Narrows, and Numbers of Piers

	Alternative					
	Bridge Alternatives		Ferry Alternatives			
	C3-4	F3	G2	G3	G4	G4v
Number of crossings of anadromous fish streams [a]	~~2~~0	~~7~~6	~~2~~0	~~3~~1	~~2~~0	~~2~~0
Piers in Tongass Narrows (number)	12	6	0	0	0	0
Fill in Tongass Narrows (acres)[b]	0	0	~~1.2~~1.9	~~2.9~~3.6	0.7	0.7
Dredging quantities (cubic yards)	0	213,000	1,400	18,600	~~15,200~~0	0

[a] Number of crossings does not include Tongass Narrows. No permanent loss of EFH would occur because bridge and culvert design would preserve EFH.

[b] For the bridge alternative, fill quantities shown do not include the bridge piers themselves.

4.15.1 Water Bodies

4.15.1.1 No Action Alternative

The No Action Alternative would not modify water bodies in the project area.

4.15.1.2 Bridge Alternatives C3-4 and F3

The bridge alternatives would require the placement of piers in Tongass Narrows, which would affect water flow locally but would not alter general flow patterns in Tongass Narrows (see Table 4-14). These alternatives would include roadway crossings of several creeks on Gravina Island. Both alternatives would require ~~reconstruction~~ replacement of the bridge over Airport Creek using a bridge with no midstream supports, known as a clear-span bridge. Alternative F3 would require widening of the clear-span bridges over Government Creek and Gravina Creek, which would not require modification of these water bodies. Smaller unnamed creeks would also be crossed for both alternatives using culverts.

Alternative F3 would require the removal of approximately 213,000 cubic yards of material (bedrock, gravel, silts) from West Channel to create adequate navigation clearance. This loss of material would widen the channel and modify the localized flow regime, but would not substantially affect overall flow through the channel.

4.15.1.3 Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

The ferry ~~A~~alternatives ~~G2, G3, and G4~~ would require building pile-supported docks (Alternatives G2, G3, G4, and G4v) and floating ferry berthing facilities (Alternatives G2, G3, and G4) in intertidal and subtidal areas of Tongass Narrows to accommodate ferry ~~docking~~ berthing and loading areas at the ferry terminals. As shown in Table 4-14, ~~all ferry a~~Alternatives G2 and G3~~except G4v~~ would require ~~minor~~ dredging in Tongass Narrows to produce adequate water depths for ferry ~~docking~~ berthing at all tidal stages. Alternative G2 would require the removal of approximately 1,400 cubic yards of material in Tongass Narrows near the proposed Gravina Island terminal. Alternative G3 would require the removal of approximately 18,600 cubic yards of material near both the Revillagigedo and Gravina island terminals. ~~Alternative G4 would require the removal of approximately 15,200 cubic yards of material near both the Revillagigedo and Gravina island terminals~~. The structures, fill, and dredging associated with the ferry alternatives would have localized impacts to water flow but would not substantially alter general flow patterns in Tongass Narrows.

The roadway on Gravina Island associated with the ferry alternatives would require crossings at Airport Creek and several unnamed streams. Alternative G3 would also require widening of the bridge at Government Creek. In-water work and structure placement in streams at these crossings could alter stream flow and water quality and affect aquatic species and their habitat.

4.15.1.4 Mitigation of Impacts to Water Bodies

4.15.1.4.1 No Action Alternative

There are no mitigation measures recommended for water bodies under the No Action Alternative.

4.15.1.4.2 Bridge Alternatives C3-4 and F3

The project design would maintain natural water flow conditions under the Airport Creek bridge for Alternative C3-4. Potential adverse impacts of the crossing at Airport Creek would be avoided by using a clear-span bridge at the crossing. Changes to the hydrology of smaller creeks would be minimized by designing culverts that are appropriately sized and placed, would allow fish passage, would accommodate stormwater flow, and would not cause scour.

All construction in and around anadromous fish streams would occur when stream disturbances would have the least impact to anadromous fish species (see Section 4.25.12.3, subsection on EFH, for related detail regarding mitigation of construction impact). In accordance with the memorandum of agreement between DOT&PF and ADF&G,[34] the culvert crossing would use a Tier 1 stream simulation design, which means that it would maintain natural stream conditions such as flow, substrate, and existing fish passage efficiency for the fish in the stream. In-water work areas would be limited to the stream crossing areas and isolated from flowing waters in all anadromous fish streams. Additionally, gravels and streambed material would be used in the bottoms of culverts to simulate the natural streambed.

To reduce impacts of runoff on water bodies, roadway improvements would be designed to collect and filter stormwater in ditches before it is conveyed to surface waters. Bridge runoff likely would be collected in the railing curb and then directed through vertical pipes to the land or

[34] Alaska Department of Fish and Game and Alaska Department of Transportation and Public Facilities. August 3, 2001. *Memorandum of Agreement Between the ADF&G and DOT&PF for the Design, Permitting, and Construction of Culverts for Fish Passage*. Juneau, Alaska.

waters below the bridge. The stormwater treatment system would be submitted to ADEC under its plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit. DOT&PF would be responsible for developing an ESCP and the contractor would be responsible for developing a SWPPP based upon the ESCP ~~The construction contractor would be responsible for developing erosion and sediment control and stormwater pollution prevention plans~~ to meet ADEC, EPA, and USACE requirements of the Clean Water Act.

4.15.1.4.3 Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

The design of the ferry alternatives would maintain natural water flow conditions, and bridge or culvert design would accommodate stormwater flow, not result in scour, and allow fish passage. All construction in and around anadromous fish streams would occur when stream disturbances would have the least impact to anadromous fish species. In-water work areas, except for stream crossings by construction equipment, would be isolated from flowing waters in all anadromous fish streams. In addition, gravels and streambed material would be used in the bottoms of culverts. Potential adverse impacts of the ~~reconstructed~~ new Airport Creek crossing would be avoided by using a clear-span bridge. The roadway and ferry terminal designs would incorporate a stormwater ~~treatment~~ management system to minimize the effects of runoff. ~~The stormwater treatment system would be approved by ADEC under its plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit.~~

Section 4.25.12.3, subsection on EFH, details mitigation of construction impact to EFH.

4.15.2 Ponds

4.15.2.1 No Action Alternative

There would be no adverse impact to ponds as a result of the No Action Alternative.

4.15.2.2 All Action Alternatives

The action alternatives likely would not impact ponds on Pennock and Revillagigedo islands.

There would be no impacts to large ponds, but all action alternatives might eliminate very small ponds within muskeg areas on Gravina Island and, in the case of Alternative F3, Pennock ~~i~~Island~~s~~. Filling ponds for roadway construction would result in a permanent loss of pond habitat. Section 4.14.1 describes acreages of pond loss.

4.15.3 Marine Habitat

4.15.3.1 No Action Alternative

The No Action Alternative would have continued noise, water pollution, and propeller scour effects on marine habitat, with no change from current conditions.

4.15.3.2 Bridge Alternatives

4.15.3.2.1 Alternative C3-4

Alternative C3-4 would require a pier in nearshore waters on the eastern side of Tongass Narrows that could affect bull kelp beds. However, these beds would likely reestablish on the lower intertidal rock or concrete structure of the pier. Deep-water piers in mid-channel would foster a rich community of marine organisms.

On the western side of Tongass Narrows, the required bridge piers would be located in an area that currently supports part of a near-continuous eelgrass bed that is interspersed with beds of kelp and an area of bull kelp (see Figure 4.2). In the area where the bridge would extend southward, parallel to the airport runway, the bridge would likely create shade due to the elevation of the proposed design. The proposed bridge would also require pier placement in an area near eelgrass or kelp beds but would not directly affect these resources (Figure 4.2).

4.15.3.2.2 Alternative F3

The bridge construction associated with Alternative F3 would likely have few direct impacts to eelgrass and kelp beds. The eastern take-off of Alternative F3 from Revillagigedo Island for the East Channel bridge would require an abutment along the shoreline in the vicinity of the south dump. This shoreline contains mixed gravel-sand beaches scattered with much debris, such as broken glass and metal. The East Channel bridge of Alternative F3 would cross kelp beds on both the eastern and western shores at approximately 60 feet above the water. Shading by this bridge would likely reduce the productivity of those kelp beds. Piers on both sides would avoid productive shallower nearshore waters.

The West Channel bridge crossings of Alternative F3 would require three piers in Tongass Narrows. These piers would likely avoid direct impacts to marine vegetation because they would be placed in deeper waters. The West Channel bridge of Alternative F3 would be 200 feet above the water surface over these beds and over the mid- and upper intertidal vegetation along Gravina and Pennock islands. Because the bridge is high, little reduction in productivity is expected because shading impacts would be minimal.

Blasting and dredging associated with modification of West Channel would remove materials over approximately 15 acres of subtidal habitat from areas between Gravina and Pennock islands. This action would eliminate approximately 0.0.9 acre of eelgrass located in the area, though the vegetation may reestablish itself after project completion (Figure 4.3). The channel widening could also adversely affect the densities of hard-shell clams (littleneck and butter clams) located within the project impact area, although populations may reestablish to levels approximating existing conditions. There would be no noticeable effect on net flow through West Channel, and therefore, no measurable impacts to marine communities adjacent to the channel entrances.

4.15.3.3 Ferry Alternatives

4.15.3.3.1 All Ferry Alternatives

All ferry alternatives would affect marine habitat with replacement of the ferry layup dock and the new heavy freight mooring facility. These facilities, which are common to all ferry alternatives, would require some fill and cause some shading in marine waters, which could result in localized adverse effects to kelp and sea cucumber.

~~4.15.3.3.1~~4.15.3.3.2 Alternative G2

Construction of a ferry terminal at Peninsula Point on Revillagigedo Island would fill a portion of the point's rich rocky intertidal face. However, because of the steepness of this face, the net area affected would be relatively small, and similar organisms would reestablish on the new hard structures placed for the terminal.

Construction of the ferry terminal at Lewis Point on the western side of Tongass Narrows would likely eliminate some of the areas of eelgrass and some of the kelp beds that lie offshore of the rocky point and in silty-sand pocket beaches at the base of the rocky intertidal outcrops (Figure 4.4). These same pocket beaches and those lying to the south on the shore have very high densities of butter and littleneck clams, cockles, mussels, and soft-shell clams, three types of sea star, and lesser amounts of horse clams. Alternative G2 would eliminate a portion of this diverse community of organisms.

~~Ferry alternatives could result in s~~Substantial scour could occur at~~of~~ the bottom of the channel in areas under and near the new loading ramps. Propeller scour caused by power reversal during ~~docking~~ berthing would eliminate existing unconsolidated surficial sediments and associated biota over a small area (assumed 0.1 acre for each new ferry ~~docking~~ berthing area) shoreward of the berth.

~~4.15.3.3.2~~4.15.3.3.3 Alternative G3

Under this alternative, placement of a ferry terminal at Bar Point on Revillagigedo Island would disrupt a portion of the intertidal area at this site. Beds of eelgrass, kelp, and other algae offshore of Bar Point could be eliminated by project-related dredging and/or filling to extend the existing pier.

A band of kelp and other algae likely would be eliminated by dredging at the proposed western ferry terminal near East Clump on Gravina Island. The ferry terminal would also be located partially on a relatively broad intertidal bench that has a mix of habitat types, with bedrock outcrops in a mixed-soft (cobble/gravel/silt) lower beach and a mixed gravel/cobble upper beach. This mix of habitat types supports a diverse community of organisms (including hard-shell clams, which are abundant on the lower beach), and Alternative G3 would eliminate a portion of this diverse habitat (Figure 4.4).

~~Ferry alternatives could result in s~~Substantial scour could occur at ~~of~~ the bottom of the channel in areas under and near the new loading ramps. Propeller scour caused by power reversal during ~~dock~~berthing would eliminate existing unconsolidated surficial sediments and associated biota over a small area (assumed 0.1 acre for each new ferry berth~~dock~~ing area) shoreward of the berth.

~~4.15.3.3.3~~4.15.3.3.4 Alternative G4

This alternative would require construction of new ferry terminals near the existing terminals on each side of Tongass Narrows. Both terminals would be close to deep water and would not require ~~little~~ dredging. Also, both would be constructed in areas that are already riprapped, and thus would avoid impacts to natural intertidal areas. Narrow bands of bull kelp lie offshore of the proposed eastern terminal and would be eliminated in the area of construction (Figure 4.4).

Alternative G4 could result in substantial scour of the bottom of the channel in areas under and near the new loading ramps. Propeller scour caused by power reversal during ~~dock~~berthing would eliminate existing unconsolidated surficial sediments and associated biota over a small area (assumed 0.1 acre for each new ferry berth~~dock~~ing area) shoreward of the berth.

~~4.15.3.3.4~~4.15.3.3.5 Alternative G4v (Preferred Alternative)

~~This alternative would require construction of new ferry docks near the existing terminals on each side of Tongass Narrows. Docks would be close to deep water and would not require dredging. Also, both would be constructed in areas that are already riprapped, and thus would avoid impacts to natural intertidal areas. Narrow bands of bull kelp lie offshore of the proposed eastern terminal and would be eliminated in the area of construction (Figure 4.4).~~

~~Ferry~~ Alternative G4v ~~c~~would have no additional impacts on marine habitat, other than the impacts identified for all ferry alternatives (see Section 4.15.3.3.1). ~~result in substantial scour of the bottom of the channel in areas under and near the loading ramps. Propeller scour caused by power reversal during docking would eliminate existing unconsolidated surficial sediments and associated biota over a small area (assumed 0.1 acre for each ferry docking area) shoreward of the berth.~~

4.15.3.4 Mitigation of Impacts to Marine Habitat

4.15.3.4.1 No Action Alternative

No mitigation measures for marine habitat impacts are warranted under the No Action Alternative.

4.15.3.4.2 All Action Alternatives

Marine habitat mitigation is included in the description of mitigation for EFH at the end of Section 4.15.4.4. Further mitigation for adversely affected marine habitat may be determined at the time of project permitting with input from ~~DNR~~ADF&G, NMFS, USACE, and USFWS.

4.15.4 Wildlife—Aquatic Species

4.15.4.1 Marine Mammals

Eight species of marine mammals have been documented in the project area: harbor seals, Steller sea lions, humpback whales, killer whales, Dall's porpoises, Pacific white-sided dolphins, minke whales, and harbor porpoises. Marine mammals are protected under ~~Section 4.20 describes potential adverse impacts to Steller sea lions and humpback whales. Section 4.25.15 addresses construction impacts to these species. All project-related activities for the action alternatives would conform to~~ the ~~pertinent~~ provisions of the Marine Mammal Protection Act and five DPSs of humpback whales are also protected under the Endangered Species Act. Sections 4.20 and 4.25.15 describe potential adverse impacts to listed humpback whales.

4.15.4.1.1 No Action Alternative and Alternative G4v (Preferred Alternative)

The No Action Alternative and Alternative G4v would involve continued slight disturbance of marine mammals in the project area by the existing ferry service's engine noise and occasional in-water construction in Tongass Narrows associated with routine maintenance.

4.15.4.1.2 Bridge Alternatives C3-4 and F3

Neither of the bridge alternatives, once constructed, would increase impacts to marine mammals compared to the No Action Alternative. Marine mammal habitat and food sources would not be substantially affected.

4.15.4.1.3 Ferry Alternatives G2, G3, and G4 ~~and G4v~~

~~The ferry a~~Alternatives G2, G3, and G4 likely would not substantially affect marine mammal habitat and food sources. Marine mammals could be exposed to slightly increased noise levels from an approximate doubling in ferry operations, but this would be of the same character of noise already present in Tongass Narrows shipping lanes. Such noise likely would not be distinguishable from daily and annual variations in noise level or character. Collision with vessels is not likely, because marine mammals in general tend to avoid collisions by using their excellent auditory capabilities, but may occur rarely.

4.15.4.2 Anadromous Fish

4.15.4.2.1 No Action Alternative

The No Action Alternative would not adversely affect anadromous fish in the project area.

4.15.4.2.2 Bridge Alternative C3-4

Alternative C3-4 would not adversely affect anadromous fish streams.~~require crossings of anadromous fish streams. The alternative would employ a clear-span bridge crossing at Airport Creek and would not cause a loss of EFH. No fill would be required in Airport Creek because bridge abutments would be above stream floodplains.~~ Placing concrete, rock, and other fill materials for bridge piers in Tongass Narrows in intertidal and subtidal areas adjacent to the airport, however, would displace fish and permanently eliminate foraging habitat and cover.[35]

Communities of small organisms typical of natural hard-bottom areas would develop on bridge piers and provide cover to small fish. Placing bridge piers in Tongass Narrows would have a slight effect on the movements of juvenile anadromous fish in nearshore areas, particularly where the bridge structure parallels the shore, because the fish would need to swim around the structures.

Partial shading by a small portion of the bridge structure could slow the growth of the eelgrass beds that provide an important habitat for juvenile salmon during their migration and an area of refuge for salmon and other small fish. Less robust eelgrass beds would provide less eelgrass blade area to support aquatic insects and zooplankton, which are an important food source for juvenile salmon.

4.15.4.2.3 Bridge Alternative F3

Alternative F3 ~~would employ a clear-span bridge crossing at Airport Creek and~~ requires widening of the bridges at Government Creek and Gravina Creek. No loss of EFH would occur by the placement of bridges over the creeks. No fill would be required in ~~Airport Creek,~~ Government Creek~~,~~ and Gravina Creek because bridge abutments would be outside stream floodplains.

Placing bridge piers in Tongass Narrows would have a slight effect on the movements of juvenile anadromous fish in nearshore areas because the fish would need to swim around the structures. As with Alternative C3-4, bridge piers would replace a small area of ocean bottom habitat with a community of organisms that would establish on the piers. Placing piers in intertidal and subtidal areas would displace fish and permanently eliminate small amounts of bottom foraging habitat and cover.

4.15.4.2.4 Ferry Alternatives G2, G3, G4 and G4v (Preferred Alternative)

The roadways associated with Alternatives G2,~~ G3,~~ G4 and G4v would not require crossings of ADF&G cataloged ~~anadromous~~ fish streams. ~~These alternatives would use clear-span bridge crossings at Airport Creek. In addition,~~ Alternative G3 would require widening of the bridge at Government Creek, an anadromous fish stream. Direct impacts from Alternatives G2, G3, and G4 would result from placement of pilings for ferry terminals in Tongass Narrows. Alternatives G2 and G3 would require ~~and~~ dredging to produce adequate water depths for ferry terminal ~~docking~~ berthing at all tidal stages.

All of the ferry alternatives would result in construction of the ferry layup berth and heavy freight mooring facility in Tongass Narrows. New ferry berths would be constructed for Alternatives G2, G3, and G4~~docks~~. Placing new ferry ~~docks~~ berths and related structures in Tongass Narrows would have a slight effect on the movements of juvenile anadromous fish in nearshore areas because the fish would need to swim around the structures. Placing pilings in intertidal and subtidal areas and shading these areas would displace fish and permanently eliminate foraging habitat and cover (see Table 4-13, at the beginning of Section 4.14).

4.15.4.2.5 Mitigation of Anadromous Fish Impacts

No Action Alternative

No mitigation measures for anadromous fish impacts are warranted under the No Action Alternative.

35 Alaska Department of Transportation and Public Facilities. October 2001. *Gravina Access Project Biology Report.* Prepared by HDR and Pentec Environmental.

Action Alternatives

All anadromous stream crossings would be designed to minimize impacts to proper stream function and, at fish streams, to provide passage to both anadromous and resident fish. At all stream crossings (both culverts and bridge crossings), stream banks would be recontoured to approximate original conditions and reseeded with native vegetation to minimize erosion. All road structures crossing other fish habitat would be designed to provide passage for resident fish. To mitigate the effects of placing bridge piers in nearshore areas, structures would be located in a manner that would leave a nearshore migration corridor (down to at least -5 feet MLLW) clear of obstruction to the extent practicable.

4.15.4.3 Marine Fish

4.15.4.3.1 No Action Alternative

The No Action Alternative would continue to affect marine fish in the project area with the noise and activity of regular ferry crossings.

4.15.4.3.2 All Action Alternatives

The effects of the action alternatives on marine fish would be similar to the impacts to anadromous fish in Tongass Narrows, discussed in Section 4.15.4.2. In particular, impacts to eelgrass beds could reduce the availability of spawning sites for Pacific herring and other marine fish (refer to Table 4-15 for impacts to eelgrass and kelp). Herring, herring eggs, and larvae are an important food source for a wide variety of fish, mammals, and birds. In addition, the loss of soft-bottom substrate to bridge pier foundations would reduce habitat for halibut and other bottom-dwelling species.

Placing concrete, rock, and other fill materials or removing materials in intertidal and subtidal areas would displace fish (such as Pacific herring, surf smelt, and Pacific sand lance) and result in long term effects by eliminating small percentages of spawning, rearing, and foraging habitat.

4.15.4.4 Essential Fish Habitat

An EFH Assessment was completed in 2004 to satisfy Federal agency consultation and response requirements with NMFS. The EFH Assessment concluded that the proposed Gravina Access Project action alternatives have the potential for adverse impacts to EFH in the project area. Adverse impacts to EFH would include direct, indirect, site-specific, and cumulative impacts. The impacts likely would be localized and minimal. Extensive interagency discussion and negotiation have resulted in mitigation measures to address and minimize these impacts. NMFS concurred with the EFH findings and mitigation with issuance of the Record of Decision in September 2004 for the FEIS. DOT&PF prepared an addendum to the EFH Assessment in 2011 for the alternatives evaluated in this SEIS and reinitiated consultation with NMFS for EFH (see Appendix E). Based on the 2011 addendum, NMFS recommended Alternative G4v as the least damaging alternative to the aquatic environment. Since that time, FHWA and DOT&PF have modified the bridge design for Alternative C3-4, substantially reducing impacts to EFH by eliminating fill in marine waters near the airport seaplane basin. Where the 2011 EFH addendum indicates 42,000 cubic yards of fill in marine waters for Alternative C3-4, current design places the bridge structure on piers, requiring no fill in Tongass Narrows. Similarly, the EFH addendum reported that 15,200 cubic yards of material would need to be removed from Tongass Narrows for the new ferry berths proposed under Alternative G4 on Gravina and Revillagigedo islands; however, recent site-specific (2016) bathymetric data at the existing airport ferry berths indicate there would be no need for dredging in those areas. ~~FHWA and DOT&PF will provide NMFS with a revised addendum to the EFH Assessment and continue to consult on EFH impacts through the Draft SEIS review process.~~

All action alternatives would require placement of either pier footings (for the bridge alternatives) or pilings (for ferry facilities) in shallower waters (e.g., shallower than -50 feet MLLW) near the shoreline of Tongass Narrows. Table 4-14 at the beginning of Section 4.15 shows the required number of piers, anadromous water body crossings, amount of roadway fill for Tongass Narrows, and the dredging quantity for each alternative. Relatively small areas of EFH would be permanently lost in all cases, although the alternatives would have varying impacts, as described in the subsections below. Construction impacts to aquatic animals and EFH are addressed in Section 4.25.12.3, and mitigation of construction impacts to aquatic animals and EFH is discussed in Section 4.25.12.4.

Table 4-15 characterizes the acreage loss of EFH for each alternative.

Table 4-15: Potential Adverse Impacts to Essential Fish Habitat [Updated]

Type of EFH	No-Action	Bridge Alternatives		Ferry Alternatives			
		C3-4	F3	G2	G3	G4	G4v
Marine EFH (Impacts measured in acres)							
Dredging	0.0	0.0	~~15.0~~14.8	0.~~25~~3	2.2	0.04	0.0
Shading [a]	0.0	1.2	0.1	~~0.2~~0.6	~~0.2~~0.6	~~0.3~~0.7	~~0.1~~0.4
Filling	0.0	0	0.1	~~0.5~~1.2	~~1.6~~2.3	~~0.0~~0.7	~~0.0~~0.7
Pier Area [b]	0.0	0.7	0.7	0.0	0.0	0.0	0.0
Total [c]	**0.0**	**1.9**	**15.~~9~~7**	**~~1.0~~2.1**	**~~4.0~~5.1**	**~~0.7~~1.4**	**~~0.1~~1.1**
The following three rows indicate subsets of the marine total shown above							
Eelgrass	0.0	0.0	0.9	0.0	0.7	0.0	0.0
Kelp	0.0	0.0	0.0	0.0	0.5	0.1	0.0
Saltmarsh	0.0	0.~~2~~0	0.~~1~~0	1.2~~0~~	2.9~~0~~	0.0	0.0
Freshwater EFH (number of crossings)							
Streams [d]	0	~~2~~0	~~7~~6	~~2~~0	~~3~~1	~~2~~0	~~2~~0

[a] Area that is covered by over-water structures fewer than 30 feet above MHHW~~, both for~~ applies to ferry berth~~dock~~s, layup dock, heavy freight mooring facility, and the low portions of bridge alternatives. Ferry loading and layup facility transfer bridges ~~was~~ were assumed to be 24 feet wide by 140 feet long; ferry floats were assumed to be 40 feet wide by 60 feet long; the layup dock was assumed to be 85 feet wide by 250 feet long; the heavy freight mooring facility access walkway was assumed to be 4 feet wide by 400 feet long~~floating barge was assumed to be 24 feet wide by 60 feet long; apron was assumed to be 24 feet wide by 24 feet long~~.

[b] Pilings for the ferry alternatives would be of small diameter and were not calculated. The area of EFH impact for the ferry pilings is included with the impact area for shading.

[c] The total of the first four rows of the table. Impacts include loss of habitat and change in habitat function. Eelgrass, kelp, and saltmarsh impacts are a subset of this total. Total is rounded up to the next tenth acre.

[d] Number of ~~anadromous~~ cataloged fish streams shaded by bridge or covered with culvert. No permanent loss of EFH is anticipated at these locations.

4.15.4.4.1 No Action Alternative

The No Action Alternative would not adversely affect EFH in the project area.

4.15.4.4.2 Bridge Alternative C3-4

Table 4-14 at the beginning of Section 4.15 shows the required number of piers in Tongass Narrows and anadromous water body crossings for Alternative C3-4. The placement of piers in Tongass Narrows for the Alternative C3-4 bridge would cause minor loss of spawning areas and food sources, and minor permanent displacement of fish species, adversely impacting EFH through loss and alteration. This alternative would involve ~~crossing~~ replacing the bridge over Airport Creek~~ and modifying the crossing at Government Creek, both are anadromous fish streams~~; Airport Creek is not designated as EFH at this location. The crossing~~s~~ would be by clear-span bridge, therefore avoiding loss of EFH.

4.15.4.4.3 Bridge Alternative F3

The placement of piers in East and West channels for the Alternative F3 bridges would cause minor loss of spawning areas and food sources, and minor permanent displacement of fish species, adversely impacting EFH through loss and alteration.

Additionally, the widening of West Channel to improve navigation clearances would modify the localized nearshore tidal flow regime slightly, though it would not affect overall flow through West Channel. Altered hydrology in the channel would not substantially impact benthic assemblages or productivity outside of the modified area. Channel modification would require the removal of approximately 213,000 cubic yards of fractured rock and solid bedrock. Dredging in West Channel would remove ~~approximately 15~~ 14.8 acres of subtidal habitat between Gravina and Pennock Islands (Table 4-15). This action would eliminate ~~approximately~~ 1.8 acres of existing kelp beds and 0.5 acre of eelgrass beds (see Table 4-15).

Newly exposed soil and rock surfaces would be recolonized over a period of several years. Newly exposed lower rock at depths from the lower intertidal zone to about –20 feet MLLW would be recolonized by epibenthic biota similar to that seen at low tide levels on the existing west shore, including red algae, kelp, and a variety of other small species. Subtidal rock would be colonized by a wide variety of invertebrates such as coral, erect bryozoan, scallop, gastropods, white limpet, sea peach, and several other hydroids and bryozoans. A variety of red algae would form an understory, and large kelp species would form an overstory. Bull kelp would recolonize at depths down to about –20 to –25 feet MLLW. Red algae would form the deepest zone and may extend to –50 feet MLLW. Pockets of newly exposed sediment and sediment that accumulates in rock crevices will be colonized by an infauna composed of a variety of polychaetes, crustaceans, bivalves, echinoderms, and other taxa.[36] Because of the loss of some shallow water habitats, especially on the southwest side of the channel, overall productivity in the area would be less than current productivity in the existing shallower areas.

Alternative F3 would cross ~~seven~~six anadromous fish streams: ~~Airport Creek,~~ Government Creek, Gravina Creek, Fiedler Creek, Stensland Creek, ~~Rain Creek, and~~ Clam Creek, and New Gravina Creek. ~~A clear-span bridge would be used at Airport Creek to avoid EFH loss.~~ The existing bridges at Government Creek and Gravina Creek are clear-span bridges and would be widened. The remaining anadromous fish stream crossings would require lengthening of the culverts. Changes in the hydrology of smaller creeks would be minimized by designing culverts that are appropriately sized and placed, would accommodate stormwater flow, and would not cause scour. This alternative would involve replacing the bridge over Airport Creek; Airport Creek is not designated as EFH at this location.

DOT&PF would be responsible for developing an ESCP and the contractor would be responsible for developing a SWPPP based upon the ESCP ~~The construction contractor would~~

[36] Wright, Stoney J., and Philip K. Czapla. 2011. *Alaska Coastal Revegetation and Erosion Control Guide*. Palmer, Alaska: Alaska Department of Natural Resources, Division of Agriculture, Plant Materials Center.

~~be responsible for developing erosion and sediment control and stormwater pollution prevention plans~~ to meet ADEC and EPA requirements of the Clean Water Act. The road and bridge would be designed to minimize the effects of runoff. Ditches would be constructed along each side of the new and improved roads to capture stormwater runoff and filter it before it flows to low spots or existing channels that would eventually flow to Tongass Narrows. The method of removing stormwater from the bridge structures would be determined in the final design phase. Typical DOT&PF bridge design would direct stormwater from the bridge deck to the railing curb and then to vertical pipes that discharge the stormwater to the waters or land below the bridge. The stormwater treatment system would be submitted to ADEC under its plan review authority for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit. Any impacts to EFH would be temporary and would be related to the installation of the culverts (see Section 4.25.12.1 for construction and temporary impacts). There would be no permanent loss of EFH resulting from the culverts or bridge crossings. EFH mitigation for all alternatives is discussed under Construction Impacts below and in Sections 4.25.12.1 and 4.25.12.3.

4.15.4.4.4 Ferry Alternatives G2, G3, and G4

The ferry alternatives would cause EFH loss and alteration, which could result in the loss of spawning areas, food sources, and cover, and permanent displacement of fish species. Alternative G2 would require the removal of approximately 1,400 cubic yards of material near the proposed Gravina Island terminal (Table 4-14). Alternative G3 would require the removal of approximately 18,600 cubic yards of material combined from the proposed Gravina and Revillagigedo terminals (Table 4-14). Based on current design, Alternative G4 would not require dredging ~~the removal of approximately 15,200 cubic yards) of material combined from the Gravina and Revillagigedo terminals~~ (Table 4-14). New ferry berths and the ferry layup dock would result in EFH loss and alteration from shading, which could cause loss of spawning areas, food sources, and cover, and permanent displacement of fish species (Table 4-15). The roadway portions of the ferry alternatives ~~would require~~include replacement of a clear-span bridge at the crossing of Airport Creek~~,~~; Airport Creek is not designated as EFH at this location~~to avoid EFH loss~~. ~~Additionally,~~ Alternative G3 would require widening of the clear-span bridge at Government Creek. Section 4.25.12.5 discusses construction impacts.

4.15.4.4.5 Ferry Alternative G4v (Preferred Alternative)

Based on current design, Alternative G4v would require no ~~require~~ dredging, but following construction ~~construction of~~ the proposed ferry layup dock~~s~~ would result in EFH loss and alteration from shading, which could cause loss of spawning areas, food sources, and cover, and permanent displacement of fish species (Table 4-15). The roadway portions of Alternative G4v would include replacement of a clear-span bridge at the crossing of Airport Creek; Airport Creek is not designated as EFH at this location ~~to avoid EFH loss~~. Section 4.25.12.5 discusses construction impacts.

4.15.4.4.6 Mitigation of EFH Impacts

No Action Alternative

No mitigation measures for EFH impacts are warranted under the No Action Alternative.

All Action Alternatives

Construction of this project would require an ~~DNR~~ ADF&G Title 16 Fish Habitat Permit and a USACE Permit for fill in waters of the United States. As a result of the coordination with NMFS during development of the 2004 FEIS and ongoing coordination through development of this SEIS, the following conservation measures would be incorporated to avoid, minimize, and mitigate impacts to EFH:

- Recontour stream banks at all stream crossings (both culverts and bridge crossings) to approximate original conditions
- Reseed streambanks at all stream crossings (both culverts and bridge crossings) with native seed and annual rye to minimize erosion as recommended in the DNR *Coastal Revegetation and Erosion Control Guide*[37]
- Employ BMPs consistent with the ~~Alaska Pollutant Discharge Elimination System~~APDES Permit to minimize the introduction of sediment and siltation of ponds and streams during adjacent fill placement and during culvert placement; related BMPs are listed in Sections 4.12; 4.14.1; 4.15.1 through 4.15.4; 4.25.10; and 4.25.11
- Design all anadromous fish stream crossings to provide passage for the salmon present in any given stream, per DOT&PF's memorandum of agreement with the ADF&G

These are general measures that would be modified during design to address specific details of the preferred alternative, Alternative G4v, through further coordination with the agencies.

4.15.5 Wildlife—Amphibians

4.15.5.1 No Action Alternative

There would be no effect on amphibian species as a result of the No Action Alternative.

4.15.5.2 All Action Alternatives

Roadways associated with all of the action alternatives would eliminate some habitat potentially used by the rough-skinned newt and the western toad, though neither species has been documented as inhabiting the project area. Direct impacts would include filling wetlands and uplands, clearing of habitat adjacent to roadways, and amphibian losses due to vehicle strikes.

4.15.6 Wildlife—Birds

4.15.6.1 No Action Alternative

The No Action Alternative would not affect birds.

4.15.6.2 All Action Alternatives

All action alternatives would result in ~~a~~ some permanent loss of resident and migratory bird habitat. This loss would include a variety of habitats (including marine waters, freshwater wetlands, and forests) that together support approximately 160 bird species. All action alternatives would require construction of new roads, which would eliminate habitat within the road footprint (including the loss of food sources, cover, breeding grounds, and roosting sites), reduce habitat quality adjacent to the road, and increase disturbance of avian species by human activity. Some migratory waterfowl have been observed at locations of proposed alternatives; e.g., sandhill cranes south of Government Creek (Alternative G3), herons and Canada geese near the shoreline and estuarine areas of Lewis Reef (Alternative G2). Other shorebird species feed and stage in estuarine areas within the project area during the spring and fall migrations. As noted in Section 3.15.6, larger estuaries outside the project area on Gravina Island provide more important habitat for migratory birds. While each of the action alternatives result in loss of bird habitat, the total loss in the project area relative to the availability of similar habitat in the project area and the preferred habitat outside the project area would result in minor overall

[37] Wright, Stoney J., and Philip K. Czapla. 2011. *Alaska Coastal Revegetation and Erosion Control Guide*. Palmer, Alaska: Alaska Department of Natural Resources, Division of Agriculture, Plant Materials Center.

impact to migratory birds. All actions would comply with the USFWS construction advisory for protection of migratory birds.[38]

Northern Goshawk. ~~Northern goshawks use old growth and mature forest habitat, which is limited in the project area.~~ No documented goshawk nesting occurs on Gravina Island or Revillagigedo Island. The minor amounts of road widening are in already disturbed areas where human activity occurs. The action alternatives likely would not impact goshawks.

Bald Eagles. All proposed action alternatives could disturb breeding eagles due to the proximity of the alternatives to known nests (see Section 3.15.6 for information on eagle distribution). No bald eagle nest trees would need to be removed; however, nesting eagles could become disturbed and stressed from project construction and operation, possibly to the point of nest abandonment. Of the potential adverse impacts to bald eagles, the ~~roadway~~ construction phase would be the most disturbing. If blasting to construct the new portions of the roadway, or pile driving to construct the marine facilities were to occur within 0.5 mile of a nest, DOT&PF would be required to obtain a Bald Eagle Take Permit for construction.[39] Additionally, if the selected alternative were to come within 660 feet of a bald eagle nest, DOT&PF would be required to obtain a Bald Eagle Take Permit for construction-related disturbance. This permit would require development of mitigation measures with USFWS, such as limiting certain construction activities (e.g., blasting and pile driving) during the nesting season (typically February through August). Construction impacts to bald eagles are discussed in Section 4.25.12.7.

The new roads and ~~ferry docks~~marine facilities or bridges proposed in the action alternatives would reduce eagle perching and feeding areas along the shoreline and inland. Other possible direct impacts could include bald eagles being struck by vehicles while foraging for carrion on or along the new roadway. Given the activity of the airport and existing roads, it is unlikely that the eagles using nearby nest sites ~~will~~ would be disturbed by long-term use of any of the proposed roads, ferries, or bridges.

4.15.7 Wildlife—Land Mammals

Roads fragment habitat and act as barriers to land mammal movement. Some animals will avoid roads altogether, which might be detrimental to those animals' fitness. Some animals would choose to use the new road as an easy ground travel corridor, which could aid the survival of some animals but lead to other animals' deaths due to collisions with vehicles.

4.15.7.1 No Action Alternative

The No Action Alternative would not affect Sitka black-tailed deer, Alexander Archipelago wolf, and black bear.

4.15.7.2 All Action Alternatives

Sitka Black-Tailed Deer. All action alternatives would result in the loss and alteration of deer habitat, which is primarily associated with loss of wetland and non-wetland vegetation (see Section 4.14). Direct impacts to Sitka black-tailed deer habitat would include loss of food sources and cover, loss of winter habitat, habitat fragmentation, permanent displacement from habitats within and adjacent to the project footprint, and occasional incidental deaths from vehicle collisions.

[38] Titled *Land Clearing Timing Guidance for Alaska*, the document is available at https://www.fws.gov/alaska/fisheries/fieldoffice/anchorage/pdf/vegetation_clearing.pdf and was accessed January 24, 2017.

[39] The regulations governing eagle permits can be found in 50 CFR part 13 (General Permit Procedures) and 50 CFR part 22 (Eagle Permits).

Because the proposed road in Alternative G2 would bisect winter foraging habitat, effectively fragmenting it, the alternative could interfere with the access or migration of deer to winter foraging habitat immediately north of the airport.

Alexander Archipelago Wolf. Because Sitka black-tailed deer comprise 80 percent of the diet of the wolf on Gravina Island, the direct impacts of the action alternatives on the Alexander Archipelago wolf would be similar to the impacts of the action alternatives to deer. All action alternatives would eliminate wolf habitat and could affect Sitka black-tailed deer, and therefore could affect the wolf by reducing its primary prey.

Black Bear. The direct impacts to black bears would mainly consist of habitat loss within the road footprint and displacement of bears from habitat adjacent to the road due to increased human disturbance.

4.16 Floodplain Impacts

Mapped floodplains exist for only a small portion of the Borough (see Figure 3.16). The proposed action alternatives have been examined in relation to the FEMA-mapped floodplains and potential effects are described below.

The proposed designs for all the alternatives would maintain existing surface water courses and would incorporate swales or a stormwater treatment or management system, where appropriate, to minimize the effects of runoff. Additionally, all action alternatives would avoid or minimize alterations to surface drainage and hydrology that could adversely affect nearby water bodies through incorporation of appropriately sized and placed culverts in the roadway design.

Although the proposed project is within or adjacent to tidally influenced coastal waters, as defined in E.O. 11988, elements of the project alternatives that encroach into the coastal flood zone will not reduce or increase the elevation of the landward-defined 100-year base flood flow. It should be noted that wave velocity and height, together with storm surge and an extremely high tide, may produce water surface elevations that exceed the landward 100-year base flood at the tidewater/landward interface. This extreme condition has been incorporated into the design elements of the proposed project.

4.16.1 No Action Alternative

The No Action Alternative would have no effect on FEMA mapped floodplains, the Tongass Narrows, or SFHAs in the project area.

4.16.2 Bridge Alternatives C3-4 and F3

The bridge alternatives would avoid impacts to FEMA-mapped floodplains within the Borough, including those associated with Ketchikan Creek, Schoenbar Creek, Carlanna Creek, and Hoadley Creek. Both Alternative C3-4 and F3 would require construction within the SFHA Zone A associated with Tongass Narrows; however, the alternatives likely would not have a measurable impact to Tongass Narrows since no increase in base flood elevation would occur as a result of this project. Sections 4.14.1, 4.15.1, 4.15.3, and 4.15.4 describe the potential effects of bridge pier placement on natural resources in the floodplain and intertidal areas. Impacts to natural and beneficial floodplain values would occur only in the area of the bridge pier footprint, as described in those sections. The natural and beneficial floodplain values associated with all of Tongass Narrows would not be affected by development of Alternative C3-4 or F3.

4.16.3 Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

All ferry alternatives would avoid impacts to FEMA-mapped floodplains associated with Ketchikan Creek, Schoenbar Creek, Carlanna Creek, and Hoadley Creek within the Borough. New marine facilities ~~Ferry terminals~~ would be placed at the shoreline, which is influenced by tides as well as tidal flooding. All ~~ferry terminal~~ new marine facilities would require construction within the SFHA Zone A associated with Tongass Narrows. No impacts to the natural hydraulics of Tongass Narrows, including tides and flooding, are expected to result from development of any of the ferry alternatives. Sections 4.14.1, 4.15.1, 4.15.3, and 4.15.4 describe the potential effects of ferry terminal development on the shoreline to natural resources in the floodplain and intertidal areas. Impacts to natural and beneficial floodplain values would occur only in the area of the ferry terminal footprint, as described in those sections. Development of a ferry alternative would not affect the natural and beneficial floodplain values associated with Tongass Narrows.

4.17 Wild and Scenic Rivers

There are no national or state-designated wild or scenic rivers in the project area; therefore, no impacts to these resources would result from this project.

4.18 Coastal Barriers

There are no coastal barriers in the project area; therefore, no impacts to these resources would result from this project.

4.19 Coastal Zone Management

4.19.1 No Action Alternative

The No Action Alternative would not adversely ~~effect~~affect coastal zone management.

4.19.2 All Action Alternatives

The ACMP expired ~~by operation~~as a result of AS 44.66.020 and 44.66.030 on June 30, 2011. Consequently, the ACMP was withdrawn from the National Coastal Management Program on July 1, 2011, and Alaska no longer has a Coastal Zone Management Act program. Because a federally approved coastal management program must be administered by a state agency, no other entity may develop or implement a federally approved coastal management program for the state.

As of July 1, 2011, the Coastal Zone Management Act federal consistency provision no longer applies to Alaska. Federal agencies no longer provide Consistency Determinations or Negative Determinations under the State of Alaska Coastal Zone Management Act as required by 16 USC 1456(c)(1) and (2), and 15 CFR part 930, subpart C. Persons or applicant agencies for federal authorizations or funding no longer provide Consistency Certifications to the State of Alaska Coastal Zone Management Act as required by 16 U.S.C. 1456(c)(3)(A), (B) and (d), and 15 CFR part 930, subparts D, E and F.

Although there is no state coastal consistency review process in place, the Borough still reviews projects to ~~ensure~~ promote compliance with its district plan. The following evaluation is based upon district enforceable policies in the *Ketchikan Coastal Management Plan*.

4.19.2.1 Coastal Development Enforceable Policies

The Coastal Development enforceable policies described in Section 3.19 are intended to guide the type and locations of development along the waterfront.

CD-1: Prioritization of Waterfront Land Use

The ferry terminals and bridges serve as intermodal transportation links for the transfer of goods and services between the marine transportation system and the road system and are water dependent uses. All action alternatives would be consistent with this policy.

CD-2: Structures Placed in Navigable Waters

Placement of piling-supported or floating structures for the bridge and ferry terminals would be consistent with the allowable uses on the adjacent uplands and would not be treated with creosote preservative coatings applied to the exterior. All action alternatives would be consistent with this policy.

CD-3: Tideland Fill below Mean High Water

The need to improve access to Gravina Island is documented in the SATP[40] and is described in Chapter 1.0 of this SEIS; the project is consistent with local plans. The action alternatives propose a minimum amount of fill, and the fill would be placed in a manner that would minimize impacts to adjacent uses, public access easements along the shoreline, and water views. All action alternatives would be consistent with this policy.

4.19.2.2 Recreation and Coastal Access Enforceable Policies

The Recreation and Coastal Access enforceable policies described in Section 3.19.2 are intended to provide recreational opportunities and access to the coastal areas while minimizing impacts and retaining the natural features of the area. The Gravina Shoreline Trail and Bostwick Lake Loop Trail are the only Designated Recreational Areas identified in the 2007 *Ketchikan Coastal Management Plan* within the project area.

RCA-1: Management of Designated Recreational Areas

Under this policy, proposed uses or activities in the Designated Recreational Areas shall avoid or minimize direct and significant impacts upon the existing activities and the physical, biological, visual, or cultural features upon which the recreation depends. All action alternatives would add new structures and roads to the visual environment. The bridge (in Alternatives C3-4 and F3) would be the most substantial new visual element. ~~If an action alternative were selected, d~~Design quality, art, and architecture would be taken into consideration during final project design and planning and the Alaska State Council on the Arts and the Ketchikan Area Arts and Humanities Council would be consulted during the final design phase (see Section 4.23). In addition, the alternatives would minimize impacts to the physical, biological, and cultural features of the Designated Recreational Areas to the extent practicable. All of the alternatives, including the No Action Alternative, would be consistent with this policy.

RCA-5: Public Access to Coastal Water

This policy encourages increased public access from the uplands to coastal water within Designated Recreational Areas and along coastal waters through easements, dedications, or other means of conveyance, except where human health or safety would be at risk. The action alternatives are meant to provide transportation to and from Gravina Island. While access to coastal water would not be the primary intention of any of the action alternatives, increased access to Gravina Island would make shoreline

[40] DOT&PF. 2004. *Southeast Alaska Transportation Plan*.

recreational opportunities more accessible to greater numbers of residents. All of the alternatives, including the No Action Alternative, would be consistent with this policy.

RCA-6: Public Access in Designated Areas

This policy encourages increase water access for recreational use within Designated Recreational Areas, except where human health or safety would be at risk. The action alternatives would provide transportation to and from Gravina Island, and while they would not be designed specifically to encourage recreational use, increasing access to Gravina Island would make recreational opportunities more accessible to greater numbers of residents. All of the alternatives, including the No Action Alternative, would be consistent with this policy.

RCA-7: Waterfront Access

Under this policy, capital improvements on or adjacent to publicly owned waterfront property shall be designed to maximize pedestrian access, views to and along coastal waters, and to facilitate public enjoyment of coastal waters. The action alternatives incorporate improvements to facilitate public enjoyment (e.g., providing views along the water, shelters, and adequate roadway shoulders to accommodate bicycles and pedestrians). The action alternatives would be consistent with this policy.

4.20 Threatened and Endangered Species

A Biological Assessment for the Steller sea lion and humpback whale was prepared in accordance with Section 7 of the Endangered Species Act and sent to NMFS during preparation of the 2004 FEIS. The Biological Assessment addressed the potential adverse impacts of all of the reasonable alternatives to these species and concluded that "the proposed action will not likely affect listed [threatened and endangered] species or designated critical habitat." NMFS agreed with the "not likely to adversely affect" determination and provided a letter of concurrence on February 17, 2004.[41] In June 2012, FHWA and DOT&PF requested NMFS concurrence with the determination that the revised project "may effect, but is not likely to adversely affect" ESA-listed species under NMFS jurisdiction, namely humpback whales and Steller sea lion. NMFS provided concurrence with this determination on September 14, 2012 (see Appendix E).

As discussed in Section 3.20, the Eastern DPS of Steller sea lions was removed from ESA listing in December 2013. While the Western DPS remains listed, its members would rarely occur in the project area. Potential impacts to Steller sea lions are included in the discussion of marine mammals impacts in Section 3.15.4.1. Impacts to listed DPS of humpback whales are described in the following sections.

~~*4.20.1 Humpback Whales*~~

~~*4.20.2*~~*4.20.1 No Action Alternative and Alternative G4v (Preferred Alternative)*

Movements of humpback whales would continue to be slightly altered by ferry operations associated with the No Action Alternative and Alternative G4v.

[41] Balsinger, James. February 17, 2004. Letter from NOAA Fisheries to Bill Ballard, Environmental Coordinator, Statewide Design and Engineering Services Division, DOT&PF.

~~4.20.3~~4.20.2 All Action Alternatives

The completed project likely would not have ~~population-level~~an effect~~s~~ on listed humpback whales in Tongass Narrows distinguishable from natural variations in population. Occasional individual passing whales could be exposed to increased noise from project operation (principally the approximate doubling of ferry engine/propeller operations); however, whales hear such noise in the area under existing conditions because Tongass Narrows is a busy shipping lane. The whales likely would move away from areas of excessive noise and disturbance. Because the whales do not stay in Tongass Narrows for extended periods, these disturbances would be temporary and would not have measurable impacts ~~to the humpback whale population~~on individual whales. With listed humpback whales (i.e., from the Mexico DPS) comprising approximately 6 percent of the whales in the area, the potential for these disturbances to impact listed whales is very small. Section 4.25.15 details potential impacts to humpback whales from construction activities.

~~4.20.4 Steller Sea Lions~~

~~4.20.4.1 No Action Alternative~~

~~There would be no new impacts to Steller sea lions under the No Action Alternative.~~

~~4.20.4.2 All Action Alternatives~~

~~No additional impact to the Steller sea lion population would occur due to operation of any of the action alternatives. The habitat and population of sea lion prey, principally off-bottom fish, would not be substantially affected. Sea lions could be exposed to increased noise from project operation (principally ferry engines) under Alternatives G2, G3, and G4, but this would be of the same character of noise already present in the Tongass Narrows shipping lanes and likely would not be distinguishable from daily and annual variations of activity to a degree that would affect Steller sea lions. Collision with vessels would be unlikely because marine mammals in general tend to move away from areas of excessive noise and disturbance and avoid collisions. Construction impacts are discussed in Section 4.25.15.~~

4.21 Historical and Archeological Preservation

Under Section 106 of the National Historic Preservation Act,[42] any impact, direct or indirect, "that alters any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity, location, design, setting, materials, workmanship, feeling, or association" of the property is an adverse effect. Cultural resources that have been evaluated and determined ineligible for inclusion in the NRHP were not considered in this analysis of project impacts.

The presence of historic properties within the APE for each alternative was established through background research, consultation, and field investigation (as discussed in Section 3.21). The level of effort to date has been completed in consultation with tribal governments and Native corporations, SHPO, and other Section 106 consulting parties.

The following paragraphs describe potential adverse impacts to those cultural sites that have been determined eligible for listing in the NRHP or that have not yet been formally evaluated for NRHP eligibility that are located within the APE for the proposed alternatives. All sites and their NRHP significance criteria are described in Section 3.21.4.

[42] National Historic Preservation Act, as amended (Executive Order 11593; 23 CFR 771; 36 CFR 60, 63, and 800).

4.21.1 No Action Alternative

The No Action Alternative would have no effect on historic properties.

4.21.2 Bridge Alternatives

4.21.2.1 Alternative C3-4

Physical changes caused by Alternative C3-4 would not affect any historic properties in that alternative's APE. One historic property, KET-1302, a historic building eligible under Criterion A for its association with homesteading and Ketchikan's early development, is located on the northern end of Pennock Island, and may be affected visually by the bridge. Visual simulations rendered to model visual effects to this property indicate that effects to the property's viewshed would be minor in scope and scale and would not affect the integrity or significance of the historic property.

Alternative C3-4 bridge as simulated in a view from the north end of Pennock Island, looking north.

4.21.2.2 Alternative F3

There are seven eligible or as yet unevaluated recorded resources that may be affected by Alternative F3.

On Revillagigedo Island, four historic properties and one unevaluated resource, KET-599, the USCG Buoy Tender Planetree, may be affected by the introduction of the Alternative F3 bridge to the viewshed. The four historic properties are: KET-279, the USCG Headquarters Building, eligible under Criterion A for its association with the development of transportation and commerce in Alaska; KET-549, the North Pyrotechnic Bunker, eligible under Criterion A for its association with Alaska's preparation for and involvement in World War II; KET-548, the Machine Gun Emplacement, eligible under Criterion A for its role in the defense of Base Ketchikan during World War II; and KET-974, the USCG Cutter *Acushnet,* eligible under Criteria A and C for its association with the maritime heritage of oceanographic research and search and rescue operations (A) and as the only extant cutter in its class in the USCG (C). The East

Channel bridge may result in positive impacts to potential historic properties through the elimination of cruise ship traffic in the East Channel.

Alternative F3 bridge over East Channel as simulated in a view from USCG Station, looking south.

On Pennock Island, KET-774, a historic homestead eligible under Criterion D for its information potential, is located on the East Channel near the Alternative F3 alignment. This property would not be physically disturbed by Alternative F3, as the bridge alignment is located 300 feet away and overhead from KET-774. On Gravina Island, KET-775, which consists of archeologically historic remains eligible under Criterion D for their information potential, is located near the West Channel bridge alignment and the Gravina Island Highway south of Clam Cove and may be physically disturbed by construction of the bridge. Construction impacts are described in Section 4.25.16.

Improved access to Gravina Island with Alternative F3 would induce growth and development on the island. The effects of induced growth are described in Section 4.26.14, Indirect Impacts. During consultation and earlier project development, concern for the locations of potential historic grave sites on the eastern side of Pennock Island were raised by the public and tribal entities;[43] however, further research and cultural resource surveys identified no graves located in the APE for any of the proposed alternatives. Increased access to Pennock Island under Alternative F3 could result in indirect impacts to grave sites and cemeteries on Pennock Island in the vicinity of the project. Indirect impacts of the project alternatives on cultural resources are discussed in Section 4.26.14.

[43] Cultural Resource Consultants and HDR Alaska, Inc. July 2003. Gravina Access Project, Cultural Sites and the Gravina Access Project, Summary and Compilation of Data, along with Proposed Determinations of Eligibility and Effect. Prepared for DOT&PF.

4.21.3 Ferry Alternatives

4.21.3.1 Alternative G2

One historic property is located in the Alternative G2 APE (Figure 3.21): KET-1204, the Temsco Quonset Hut. KET-1204, which is eligible for listing in the NRHP under Criterion A for its association with aviation, is located adjacent to the proposed ferry terminal at Peninsula Point, and could be affected by improvements to the Peninsula Point access road and traffic pattern changes at its intersection with the North Tongass Highway. If selected, Alternative G2 would be designed to avoid direct physical impacts to KET-1204. Audible and visual impacts to the setting of KET-1204 could occur as a result of increased traffic as well as lighting, signage, and associated intersection improvements for Alternative G2. In consultation with SHPO and Section 106 consulting parties, minimization measures, such as vegetation buffers, would be identified during final design to reduce visual and audible impacts to KET-1204.

4.21.3.2 Alternative G3

There are no identified historic properties within the APE on Revillagigedo Island for Alternative G3. On Gravina Island, only KET-800, the unevaluated arch~~a~~eological remains of numerous historic homesteads, may be affected. Preliminary design indicates KET-800 is located 300 feet from the alignment of the access road to the ferry terminal on Gravina Island. KET-800 may be directly affected through equipment operation and material stockpiling and storage during construction of the alignment and by induced foot traffic in the area due to increased access during construction and operation. Construction impacts are described in Section 4.25.16. If Alternative G3 ~~is~~ were selected, final alignment would be designed to avoid construction impacts to KET-800.

4.21.3.3 Alternatives G4 and G4v (Preferred Alternative)

No historic properties are located within the APE on Gravina Island or Revillagigedo Island for Alternatives G4 and G4v. Therefore, this alternative would have no effect on historic properties.

4.21.4 Mitigation of Impacts to Historical and Archeological Resources

With the exception of Alternative G2, none of the alternatives would have a direct impact on historical and archeological resources. If selected, Alternative G2 would be designed to avoid direct physical impacts to KET-1204. Audible and visual impacts to the setting of KET-1204 may occur as a result of increased traffic as well as lighting, signage, and associated intersection improvements for Alternative G2. In consultation with SHPO and Section 106 consulting parties, minimization measures, such as vegetation buffers, would be identified during final design to reduce visual and audible impacts to KET-1204.

4.22 Hazardous Waste Sites

A preliminary analysis of hazardous waste sites that could affect project development was conducted for each of the project alternatives through review of federal and state databases. Known and potential hazardous waste sites within an approximate 0.25 mile distance of each project alternative are documented in Section 3.22 and displayed on Figure 3.19.

~~*4.22.1 Known Sites*~~

~~*4.22.2*~~*4.22.1 No Action Alternative*

No new construction or ground-disturbing activities would occur under the No Action Alternative, and therefore no known hazardous waste site would be affected by the No Action Alternative.

~~*4.22.3*~~*4.22.2 All Action Alternatives*

Refer to Section 3.22, Table 3-27, Table 3-28, ~~and~~ Table 3-29, and Figure 3.20 for more information on the status of known hazardous waste sites and handlers of hazardous materials and the nearest potentially affect action alternative. The preliminary investigation identified ~~15~~ 18 RCRA handlers of hazardous materials as being within approximately 0.25 mile of one or more action alternatives. The sites are listed in Table 3-27. Of these, ~~12~~ 11 handlers ~~we~~are conditionally exempt generators, four have been inactive for more than a decade, three are used oil handlers, and one of those ~~wa~~is a transporter of hazardous waste~~, and two were used oil handlers~~. Typically, conditionally exempt generators generate such small quantities of hazardous waste that they do not cause concern, unless the site has been identified by other means (recorded spill, site reconnaissance identifying potential releases) to be of concern. Likewise, the transporter and used oil handlers would not cause concern unless they were identified as contaminated sites. Thus, none of the RCRA handlers would have an impact to public health or the environment related to any of the action alternatives.

Within the same project area, ~~three~~ five contaminated sites ~~we~~are listed in~~identified from~~ the statewide contaminated sites database, and ~~eight~~ 11 are listed in~~were identified from~~ the statewide LUST program database. The sites are listed in ~~Table 3-27,~~ Table 3-28~~,~~ and Table 3-29 (see also Figure 3.~~19~~20). Of these sites, none are listed as an open case, and three sites are listed as “cleanup complete with institutional controls”: Westside Service Station, (Alternative G3), Bailey Power Plant (Alternatives G4 and~~/~~ G4v), and Harbor Point (Alternatives G4~~/~~ and G4v). All of these sites have soil and/or groundwater with concentrations of fuel constituents above ADEC cleanup standards. ~~Once an alternative is chosen, additional analysis will be required to determine whether these sites and associated contamination poses property acquisition or construction-related risks.~~

~~Three sites identified in Section 3.22 and shown in Figure 3.19 would be located within the action alternatives’ proposed right-of-way. Temsco Helicopters, map ID 3 on Figure 3.19, is documented as a RCRA handler and located within the proposed Alterative G2 right-of-way. It is worth noting that the ADEC location coordinates are approximate; the Temsco property is located adjacent to the north of Peninsula Point and would not be affected by Alternative G2 right-of-way. Ketchikan Autobody and Glass, map ID 9, is also a RCRA handler and is located within the proposed Alternative C3-4 right-of-way. As noted above, neither of these sites poses a concern to public health or the environment. ADEC has documented the third site, Ketchikan Credit Union, map ID 19, as a known contaminated site, and it is located within the proposed Alternative G3 right-of-way. This site is listed as “cleanup complete” and does not pose a significant risk to human health or the environment.~~

~~Upon selection of a preferred alternative, further investigation into known and suspected contaminated sites would be necessary, including a~~A Phase I Environmental Site Assessment would be conducted for the selected alternative prior to construction in accordance with American Society for Testing and Materials Standard E1527-~~05~~ 13 (most recent edition). ~~The~~ Phase I Environmental Site Assessments ~~would~~ include interviews with property owners, a review of historical sources, regulatory agency file reviews and consultation, and site reconnaissance to~~. It would~~ identify recognized environmental conditions that could affect the ~~preferred~~ selected alternative. If the Phase I Environmental Site Assessment were to identify a release of hazardous materials, a Phase II Site Investigation would be recommended. The investigation would determine the extent of the release, establish an approach to site design and construction to avoid contaminated environmental media to the extent possible, and recommend management strategies for unavoidable contaminated media.

4.23 Visual Impacts

The visual impacts of each project alternative were identified relative to the key views described in Section 3.23. The photographs in this section show a simulation of each of the project alternatives superimposed on a key view in the project area. The assessment of visual impacts resulting from the project alternatives has been based largely on these visual simulations.

The aesthetics and scenic qualities of an area—and any project-related impacts to those resources—are subjective, and based on the interests and values of the viewers. For this SEIS, an adverse impact to visual quality would result if a project alternative were to introduce a substantial new visual element into a predominantly undeveloped existing view, or if a new visual element would substantially change an existing view (such as the introduction of a major new structure in a landscape or view featuring urban development).

In general, the bridge alternatives (Alternatives C3-4 and F3) would introduce a major new visual element into key views by adding a large structure across Tongass Narrows and adding roadways and/or structures to Revillagigedo and Gravina Islands. The ferry alternatives (Alternatives G2, G3, G4, and G4v) would add a minor new visual element to several key views in the form of added shoreline development and roadways to support ferry operations. None of the action alternatives would result in the removal of existing substantial structures that contribute to the visual environment.

Construction activities associated with the action alternatives would adversely affect the visual environment due to land clearing and the presence of construction equipment. These impacts are addressed in Section 4.25.18.

All action alternatives except Alternative G4 and G4v would provide new views of the landscape and Tongass Narrows to vehicles, pedestrians, and bicyclists using the new crossing.

~~If an action alternative were selected, d~~Design quality, art, and architecture would be considered during final project design and planning. The Alaska State Council on the Arts and the Ketchikan Area Arts and Humanities Council would be consulted during the final design phase. ~~if an action alternative were selected~~. ~~Both entities are on the distribution list of this SEIS and invited to comment.~~

4.23.1 No Action

The No Action Alternative would not impact the visual environment in the project area.

4.23.2 Bridge Alternatives

4.23.2.1 Alternative C3-4

Alternative C3-4 would introduce a major new visual element to the project area—a high bridge across Tongass Narrows—and would adversely affect the scenic quality of the views from the Ketchikan area. The bridge would be visible from several key viewpoints: Pennock Island, the Shoreline Drive neighborhood, and Pioneer Heights Senior Housing complex (Key Views 3, 8, and 9, respectively, in Section 3.23.4 and shown below with simulated Alternative C3-4 Tongass

Narrows bridge). The Alternative C3-4 bridge would present only a minor obstruction to views westward from Key View 3 on Pennock Island. Key Views 8 and 9 toward Tongass Narrows and Gravina Island would be partially obstructed by the presence of the bridge. In addition, this alternative includes 5,000 feet of new roadway along the hillside on Ketchikan that would require clearing and grading over approximately 15 acres, which would have adverse impacts to the visual environment.

Alternative C3-4 bridge as simulated in a view from the north end of Pennock Island, looking north (Key View 3).

Alternative C3-4 bridge as simulated in a view from Shoreline Drive neighborhood near Peninsula Point, looking south (Key View 8).

Alternative C3-4 bridge and a cruise ship as simulated in a view from Shoreline Drive neighborhood near Peninsula Point, looking south (Key View 8).

Alternative C3-4 bridge as simulated in a view from from Pioneer Heights Senior Housing toward Gravina Island , looking south (Key View 9).

Alternative C3-4 bridge and curise ship as simulated in a view from Pioneer Heights Senior Housing toward Gravina Island, looking south (Key View 9).

4.23.2.2 <u>Alternative F3</u>

The East Channel bridge across Tongass Narrows proposed under Alternative F3 would be approximately 60 feet above the water and would partially obstruct the views toward Tongass Narrows from Saxman, the USCG Station, and Knob Hill (Key View 1, 2, and 4 in Section 3.23.4; Key View 1, 2, and 4 shown below with a simulated Alternative F3 East Channel bridge). The bridge would partially obstruct views toward Tongass Narrows, Pennock Island, and Gravina Island from the key viewpoints.

Alternative F3 bridge over East Channel as simulated in a view from South Tongass Highway south of the USCG Station, looking north (Key View 1).

Alternative F3 bridge over East Channel as simulated in a view from USCG Station, looking south (Key View 2).

Alternative F3 bridge over East Channel as simulated in a view from Knob Hill, looking south (Key View 4).

The West Channel bridge would rise 200 feet above the water. Both bridges would be visible from mid-Tongass Narrows near the airport (Key View 6, shown below with simulated Alternative F3 East Channel and West Channel bridges). Because the bridges would be distant from this mid-Tongass Narrows location, they present only a minor obstruction to views southward from this viewpoint. Alternative F3 would also include a roadway on Pennock and Gravina Islands that would adversely affect the existing, generally undeveloped visual environment of these islands.

Alternative F3 bridges and Pennock Island as simulated in a view from mid-Tongass Narrows near the airport, looking south (Key View 6).

4.23.3 Ferry Alternatives

4.23.3.1 Alternative G2

The ferry terminals for this Alternative G2 would include new parking areas, and a new roadway would be built from Lewis Point to Seley Road. The proposed new ferry terminal on Gravina Island would adversely affect the visual environment by introducing new built elements into a generally undeveloped area. The ferry terminal would be visible from the Gravina Island shoreline near the airport, as shown in the simulation at Key View 7 (below). A new waiting area would be developed at the existing airport ferry terminal on Revillagigedo Island but would not detract from scenic views because the waterfront at this location is built up with shipping infrastructure. A new heavy freight ~~dock~~ mooring facility would be built within the existing airport complex and would not affect the visual quality of the area. Ferry operation on the water would not affect the visual environment of Tongass Narrows.

Alternative G2 ferry as simulated in a view from Gravina Island shoreline near the northern end of the airport runway, looking north (Key View 7).

4.23.3.2 Alternative G3

The ferry terminal facilities in Ketchikan would involve redevelopment of an area with existing urban development and would not affect the visual quality of the terminal area (see Key View 5, shown below with simulated Alternative G3 ferry terminal on Revillagigedo Island). The addition of a ferry terminal and roadway on Gravina Island in this alternative would adversely affect the visual environment. A new heavy freight ~~dock~~ mooring facility would be built within the existing airport complex and would not affect the visual quality of the area. A new waiting area would be developed at the existing airport ferry terminal on Revillagigedo Island but would not detract from scenic views because the waterfront at this location is built up with shipping infrastructure.

Alternative G3 ferry from the north parking area adjacent to Plaza Port West, looking northwest toward Gravina Island (Key View 5).

4.23.3.3 Alternative G4

Alternative G4 would add a new ferry terminal, a new waiting area at the airport ferry terminal, and a new heavy freight ~~dock~~mooring facility. It would also involve development of a ferry terminal, an access roadway in the vicinity of the airport, and a new waiting area at the existing airport ferry terminal on Revillagigedo Island. This alternative would not affect the visual environment of the project area because it would not introduce substantial new visual elements into the landscape. It would likewise not provide new viewing opportunities.

4.23.3.4 Alternative G4v (Preferred Alternative)

Alternative G4v would include a new waiting area at the airport ferry terminal and a new heavy freight ~~dock~~mooring facility. This alternative would not affect the visual environment of the project area, since it would neither introduce substantial new visual elements into the landscape, nor provide new viewing opportunities.

4.24 Energy

The transportation systems in this analysis rely on energy consumption for their function and mobility. This section estimates fuel consumption for cars and ferries resulting directly from implementation of the action alternatives. The availability of energy in the form of fuel (petroleum products) for motor vehicles, cruise ships, and ferry vessels would not change as a result of the Gravina Access Project alternatives.

The fuel consumption resulting from transportation activities would vary by alternative, vehicle type, and origin and destination points. Table 4-16 provides a general estimate by alternative of the amount of fuel that would be consumed annually in transportation between Revillagigedo and Gravina islands during the first years following the project opening (i.e., no growth in traffic). The estimates are based on several assumptions, which are explained in the table notes. Based on the estimates in this analysis, Alternative C3-4 would use the least amount of fuel annually, and Alternative G2 would use the greatest amount. Refer to Section 4.10 for information on emissions and other potential adverse impacts to air quality.

Table 4-16: Estimated Annual Fuel Consumption by Alternative

Alternative	Mode of Transportation	Approximate Distance Traveled per Trip (miles)	Estimated Annual Fuel Consumption (gallons)
No Action/G4v	Ferry	0.5	72,300
Bridge Alternatives			
C3-4	Vehicle	4.0	13,022
F3	Vehicle	10.0	37,949
Ferry Alternatives			
G2	Ferry	0.8	180,750
	Vehicle	7.0	26,044
	Total		206,794
G3	Ferry	0.8	180,750
	Vehicle	4.4	16,370
	Total		197,120
G4	Ferry	0.5	180,750

Notes:

- The number of annual vehicle trips is assumed to be the same for each alternative. In the early years following project opening, the airport would continue to be the primary destination on Gravina Island, although development of other lands on Gravina Island would begin to occur and draw traffic. The number of vehicle trips is based on a 10-year refined average (2000 through 2009) of vehicles that crossed Tongass Narrows on the airport ferry, which is documented in the 2012 *Traffic Forecast Report* prepared for the Gravina Access Project (Alaska Department of Transportation and Public Facilities, August 2012. *Gravina Access Project Supplemental EIS Traffic Forecast*. Prepared by HDR Alaska, Inc.).
- The distance of travel is based on the distance from the existing ferry terminal parking area on Revillagigedo Island to the existing ferry berth~~dock~~/airport terminal on Gravina Island.
- The ferry alternatives do not account for vehicles idling on board the ferry because vehicles are assumed to be turned off during transit. Fuel used by vehicles idling while waiting at the ferry terminal also is not included.
- Vehicle fuel consumption assumes uniform fleet average efficiency of 22.8 mpg (*source: Light-duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 through 2011," USEPA, Document EPA-420-R-12-001a, March 2012*).
- Annual ferry fuel consumption is based on airport ferry fuel receipts for September 2, 2011, through September 4, 2012: approximately 72,300 gallons/year (*source: pers.com. with Robin Kinney, Ketchikan International Airport secretary, October 17, 2012*).

4.25 Construction Impacts

Construction impacts are the temporary impacts on environmental resources in the project area that are caused by the activities associated with the construction of the project. These impacts are examined separately from the permanent impacts of a project from its ongoing existence and operation.

The major potential construction activities considered in the evaluation of construction impacts in this section for all action alternatives are:

- Preparing foundations for bridge piers and abutments at major stream crossings
- Pile driving
- Demolishing structures and disposing of debris
- Mining gravel and other borrow material (for aggregate fill)
- Material waste disposal and construction equipment staging
- Preparing roadway foundations (grading, filling, and compacting)/constructing roadways
- Temporarily rerouting traffic

- Temporary navigational restrictions

In addition, the bridge alternatives, Alternatives C3-4 and F3, would include the following construction activities:

- Drilling through rock and sediment
- Erecting shoring and framework to temporarily support structures during construction
- Installing piers and abutments to bridge Tongass Narrows
- Constructing bridge(s) and bridge approaches over Tongass Narrows
- Dredging in Tongass Narrows (Alternative F3 only)

The ferry terminal and facilities associated with the ferry alternatives, Alternatives G2, G3, G4, and G4v, would include the following construction activities:

- Constructing ferry terminals (Alternatives G2, G3, and G4 only)
- Dredging in Tongass Narrows (Alternatives G2 and~~,~~ G3~~, and G4~~ only)
- Constructing parking lots, passenger facilities, and docks

The following sections describe the impacts of construction of the Gravina Access Project alternatives on the project area. There would be no construction impacts associated with the No Action Alternative; therefore, that alternative is omitted from this discussion.

4.25.1 Land Use

The existing land use of some parcels could be changed temporarily to stage construction equipment and supplies in all action alternatives. The locations of staging areas for each alternative have not been determined, and consequently specific parcels potentially affected by construction staging are not yet known. Where possible, Gravina Island and vacant land on existing construction yards likely would be used for staging areas to minimize disruption of businesses, residences, and the community. Any land affected during construction would be restored to approximate original condition after the completion of construction.

4.25.1.1 Bridge Alternatives

4.25.1.1.1 Alternative C3-4

Construction equipment movement adjacent to the Walmart parking lot would temporarily affect access to the parking lot. The movement of construction vehicles and equipment would also disrupt some commercial properties along Rex Allen Drive. On Gravina Island, the movement of construction vehicles and equipment would temporarily interrupt access to adjacent open space areas along the alignment that are used or provide access to subsistence activity, recreation, and hunting. These effects would be limited to a small corridor immediately adjacent to the construction activity.

4.25.1.1.2 Alternative F3

No land uses on Revillagigedo Island would be directly affected by construction vehicles and equipment. On Gravina and Pennock islands, the movement of construction vehicles and equipment would temporarily interrupt access to adjacent open space areas along the proposed alignment that are used for or provide access to subsistence activity, recreation, and hunting. These effects would be limited to a small corridor immediately adjacent to the construction activity.

4.25.1.2 Ferry Alternatives

4.25.1.2.1 Alternative G2

Construction would disrupt use commercial properties along the Peninsula Point access road on Revillagigedo Island through the movement of vehicles and equipment adjacent to and across the properties. Movement of construction equipment adjacent to the properties would affect access. On Gravina Island, the movement of construction vehicles and equipment would temporarily interrupt access to adjacent open space areas along the proposed alignment that are used for or provide access to subsistence activity, recreation, and hunting. These effects would be limited to a small corridor immediately adjacent to the construction activity.

4.25.1.2.2 Alternative G3

Under Alternative G3, construction would affect a residential condominium building and commercial shopping property near the proposed terminal on Revillagigedo Island. Use of these properties during construction would be disrupted by the movement of vehicles and equipment adjacent to and across the properties, which would also affect access. On Gravina Island, the movement of construction vehicles and equipment would temporarily interrupt access to adjacent open space areas along the proposed alignment that are used or provide access to subsistence activity, recreation, and hunting. These effects would be limited to a small corridor immediately adjacent to the construction activity.

4.25.1.2.3 Alternatives G4 and G4v (Preferred Alternative)

No land uses on Revillagigedo Island would be affected by movement of construction vehicles and equipment. On Gravina Island, the movement of construction vehicles and equipment would temporarily interrupt access to adjacent open space areas along the proposed alignment that are used or provide access to subsistence activity, recreation, and hunting. These effects would be limited to a small corridor immediately adjacent to the construction activity.

4.25.1.3 Mitigation of Construction Impacts to Land Use

4.25.1.3.1 Bridge Alternative C3-4

DOT&PF would work with the businesses and local residents to maintain property access throughout the construction phase using signs, temporary entrances, and traffic controls, as appropriate. Construction easements would be acquired and would be selected in a fashion that minimizes disturbance. Properties and land uses would be returned to preconstruction conditions to the maximum extent practicable. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

4.25.1.3.2 Bridge Alternative F3

DOT&PF would work with the property owners to maintain property access throughout construction using signs, temporary entrances, and traffic controls, as appropriate. Construction staging and movement would be constrained within construction easements. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

4.25.1.3.3 Ferry Alternative G2

DOT&PF would work with the commercial properties near Peninsula Point to maintain property access throughout construction using signs, temporary entrances, and traffic controls, as appropriate. Construction easements would be acquired and selected in a fashion that would minimize disturbance, and properties, and land uses would be returned to preconstruction conditions to the maximum extent practicable. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

4.25.1.3.4 Ferry Alternative G3

DOT&PF would work with the commercial and residential properties near the Revillagigedo Island terminal to maintain property access throughout construction using signs, temporary entrances, and traffic controls, as appropriate. Construction easements would be selected in a fashion that would minimize disturbance. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

4.25.1.3.5 Ferry Alternatives G4 and G4v (Preferred Alternative)

Construction easements would be selected in a fashion that would minimize disturbance. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

4.25.2 Social Environment

4.25.2.1 Population and Social Groups

None of the action alternatives would have an adverse construction impact on the size or composition of the general population, or on any distinct population group (i.e., minority, low-income, elderly, or handicapped).

4.25.2.2 Neighborhoods and Community Cohesion

Construction would have temporary and intermittent adverse impacts on travel patterns in neighborhoods near the action alternatives. Construction-related noise, vibration, and traffic would disrupt normal activities in these neighborhoods. Depending on the alternative, traffic might have to be diverted during construction, and travel patterns and community access might have to be altered to accommodate construction activities and heavy equipment. Noise and vibration impacts are specifically addressed in Section 4.25.9. Traffic impacts are specifically addressed in Section 4.25.5.3.

4.25.2.3 Community and Public Safety Facilities

Construction of the action alternatives could affect traffic patterns temporarily near schools, medical facilities, fire stations, or the provision of public safety services in the Borough.

Construction of any of the action alternatives would adversely affect traffic on Tongass Avenue near the alternative's intersection with and/or crossing of Tongass Avenue and at the airport, which could result in delays for emergency vehicles, depending on the location of the emergency and the routes available. Traffic impacts are specifically addressed in Section 4.25.5.3.

4.25.2.4 Recreation

Construction of the action alternatives would not affect the use of recreational areas, parks, and facilities in Ketchikan. Construction could affect fishing, hunting, hiking, and bicycling activities that might otherwise occur within or immediately adjacent to construction areas on Revillagigedo, Gravina, and Pennock islands.

Recreational boating in the immediate in-water and shorefront construction zones of the project action alternatives would be prohibited by the construction contractor as a safety precaution for the general public. However, the overall opportunity for such recreation activities would not be affected during construction. Similarly, recreational fishing, hunting, hiking, and bicycling on Revillagigedo, Gravina, and Pennock islands would be prohibited in construction zones, though the overall opportunity for such recreation activities would not be affected during construction.

4.25.2.5 Accessibility

Construction activities could alter access to properties in and near construction zones under all action alternatives.

4.25.2.6 Mitigation of Construction Impacts to the Social Environment

4.25.2.6.1 Community and Public Safety Facilities—All Action Alternatives

Vehicle access to all community and public safety facilities would be maintained throughout construction.

4.25.2.6.2 Accessibility—All Action Alternatives

DOT&PF contractors would be required to work with the businesses and local residents to maintain property access throughout the construction phase, using signs, temporary entrances, and traffic controls, as appropriate. Construction easements would be acquired and selected in a fashion that would minimize disturbance, and properties, and land uses would be returned to preconstruction conditions to the maximum extent practicable. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

4.25.3 Relocation Impacts

Project construction activities would not require any temporary relocation of homes or businesses.

4.25.4 Economy and Economic Resources

4.25.4.1 Construction Effects on the Economy

Table 4-17 shows the estimated total construction spending for each action alternative, and the number of direct jobs related to that spending. The spending and jobs shown in this table include jobs that may be held by local residents, as well as persons who migrate to the community on a temporary basis for employment during construction. In the following discussions and tables, the total number of jobs is by year; e.g., if a job lasts three years, the analysis considers it to be three jobs.

A substantial portion of the materials for construction would be purchased outside of the Borough, and a number of the skills required for construction may not be available within the local Ketchikan labor force. As a result, only a portion of the spending and jobs would directly accrue to local businesses and residents (see Table 4-18). Alternative F3 would have the highest local construction spending, although the ferry alternatives (Alternatives G2, G3, and G4) would retain a higher percentage of overall construction spending in the local economy.

Table 4-17: Estimated Construction Spending and Construction Jobs[a] [Updated]

Alternatives	Construction Spending (Millions of 201~~1~~6$)				Construction Jobs	
	Labor	Materials	Equipment	Total	Total	Annual
Bridge Alternatives						
C3-4	126.4 ~~92.5~~	88.5 ~~64.8~~	37.9 ~~27.7~~	**252.8~~185.0~~**	**1,560**	520
F3	149.7 ~~116.8~~	105.0 ~~81.8~~	44.9 ~~35.0~~	**299.6~~233.6~~**	**1,780**	590
Ferry Alternatives						
G2	50.4~~33.5~~	35.3~~23.4~~	15.1~~10.0~~	**100.8~~66.9~~**	**470**	160
G3	44.0~~28.8~~	30.9~~20.2~~	13.1~~8.6~~	**88.0~~57.6~~**	**510**	170
G4	37.9~~25.8~~	26.4~~18.0~~	11.3~~7.7~~	**75.6~~51.5~~**	**470**	160
G4v	18.0 ~~9.0~~	12.6 ~~6.3~~	5.4 ~~2.7~~	**36.0~~18.0~~**	**120**	40

[a] Based on *Gravina Access Project Economic Impact Assessment*, prepared by Northern Economics, Inc., April 2003 with modification to represent revised and new alternatives, updated alternative costs, and 201~~1~~6 dollars.

Table 4-18: Estimated Local Construction Spending and Construction Jobs in the Ketchikan Gateway Borough[a] [Updated]

Alternatives	Construction Spending (Millions of 2016~~1~~$)			Construction Jobs	
	Labor	Materials and Equipment	Total	Total	Annual
Bridge Alternatives					
C3-4	39.8 ~~29.1~~	20.1 ~~14.7~~	59.9 ~~43.8~~	**390**	130
F3	55.2 ~~43.0~~	28.3 ~~22.1~~	83.5 ~~65.1~~	**460**	150
Ferry Alternatives					
G2	48.9 ~~32.3~~	13.5 ~~9.1~~	62.4 ~~41.4~~	**250**	80
G3	40.6 ~~26.6~~	12.4 ~~8.1~~	53.0 ~~34.7~~	**270**	90
G4	37.2 ~~25.3~~	10.4 ~~7.1~~	47.6 ~~32.4~~	**250**	80
G4v	17.6 ~~8.8~~	5.6 ~~2.8~~	23.2 ~~11.6~~	**75**	25

[a] Based on *Gravina Access Project Economic Impact Assessment* prepared by Northern Economics, Inc., April 2003 with modification to represent revised and new alternatives, updated alternative costs, and 2016~~1~~ dollars.

Construction spending associated with any action alternative would directly benefit the Ketchikan economy. The spending discussed here is money that would be spent within the Borough and does not include any indirect or multiplier effects of the spending in the local area. These indirect effects (including the economic development that could result because of improved access) are discussed in Section 4.26.

4.25.4.2 Acquisition and Relocation Effects on the Economy

Technically, the acquisition of real estate for project right-of-way is a mitigation measure. It is required by federal and state law. The money spent on property acquisition would benefit the Ketchikan economy, although the amount of private land and associated property tax revenues within the Borough and the City of Ketchikan would decrease as the rights-of-way are converted to public lands. However property values on Gravina Island (and on Pennock island, if Alternative F3 were selected) likely would increase with improved access and infrastructure, causing property taxes assessed on those lands to increase (see Section 4.26.3.5). This assessment of the acquisition and relocation effects is based on acquisition of rights-of-way for the proposed routes in the action alternatives. A summary of the cost of land and buildings that would need to be acquired is shown in Table 4-19.

The estimated acquisition costs in Table 4-19 include the cost of land and buildings that would need to be acquired for right-of-way under each alternative.[44] Most public lands (state and Borough) are assumed to be available at no cost to the project; this assumption applies to all airport land needed for the project, including the airport seaplane facility.[45] Mental Health Trust Authority lands would have to be purchased. All property owners would be compensated in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.[46]

Table 4-19: Estimated Acquisition Costs [Updated]

Alternative	Amount of Land Acquired (acres)	Tax Assessor's Database/Unmodified Acquisition Value ($2010)	Market Value ($2010)[a]
Bridge Alternatives			
C3-4	~~99.9~~100.2	4,241,000	4,666,100
F3	79.9	84,526	92,979
Ferry Alternatives			
G2	42.8	1,143,400	0
G3	40.1	871,772	958,949
G4	38	0	0
G4v	38	0	0

[a] Market Value equals 1.1X the Unmodified Acquisition Value.

4.25.4.3 Employment

Construction of any of the Gravina Access Project action alternatives would have a positive economic impact on employment. Construction of the project would require a total of roughly 40 to 590 additional workers annually (i.e., over a 3-year construction period) and 25 to 150 from the Ketchikan labor force, depending on the action alternative selected (see Table 4-17 and Table 4-18). Many of the construction jobs would require skilled specialists to be brought in from outside of the Ketchikan area. For Alternatives G2, G3, and G4, the analysis assumes new ferries would be constructed at Alaska Ship and Drydock, Inc., in Ketchikan, which would result in a higher percentage of local jobs (e.g., approximately 25 percent of the construction jobs for Alternative F3 would be local, whereas approximately 53 percent of the construction jobs for Alternative G4 would be local).

Construction activity would increase the need for support industries (e.g., retail, trade, hospitality), which would create some additional local jobs in the retail and service sectors. This

[44] To determine private land values, the fraction of each parcel of land to be acquired for the right-of-way is multiplied by the assessed value of the unimproved land. Once the land value is determined, maps of the rights-of-way are consulted to determine if structures would be affected by the rights-of-way. The values of any affected structure are then added to the land value. For property with structures within a right-of-way, it is always assumed either none or all of the structure would be acquired. In cases where the right-of-way acquisition would take a large portion of the parcel, an attempt is made to determine whether the remaining section(s) has usefulness to the original owner. If the remaining portion is determined not to be useful to the owner, then it is assumed that DOT&PF would acquire the entire property.

[45] The value of the public lands is included in benefit-cost analyses in consideration of the opportunity cost for using the lands for transportation instead of some other use.

[46] The Uniform Relocation Assistance and Real Property Acquisition Policies Act ~~ensures~~ provides for the fair and equitable treatment of persons whose real property would be acquired or who would be displaced as a result of a federal or federally assisted project. Government-wide regulations provide procedural and other requirements (appraisals, payment of fair market value, notice to owners, etc.) in the acquisition of real property and provide for relocation payments and advisory assistance in the relocation of persons and businesses.

would result in additional positive economic effects for the area. The actual number of support jobs created as a result of construction would depend on which action alternative was selected, what supplies would be needed for its construction, the number of construction workers, and the personal preferences of the workers (i.e., where they decide to spend their money). These indirect impacts are discussed in Section 4.26.3.1.

4.25.5 Transportation

4.25.5.1 Aviation

4.25.5.1.1 Bridge Alternative C3-4

Fixed-wing aircraft operating from Ketchikan International Airport runways would not be affected during construction of Alternative C3-4, though construction would affect seaplane operations. During construction of the bridge, large cranes and other heavy equipment in the channel would present a physical obstruction to seaplanes operating in the Tongass Narrows airspace and on the water.

As noted in Section 4.7.1.2, construction of the bridge approach to Gravina Island would impair access to the airport seaplane base and may require that the base facilities be temporarily relocated. The need to temporarily relocate the airport seaplane facilities would be determined during final design of Alternative C3-4, if it were selected. A possible temporary location would be the small cove at the end of the airport service road. Any relocation effort would be coordinated with seaplane operators and would be planned to minimize disruption of operations. The relocation activities would occur concurrently with bridge construction and would likely be contained within the same disturbance area, creating no or very few additional environmental effects.

4.25.5.1.2 Bridge Alternative F3

Fixed-wing aircraft operating from Ketchikan International Airport would not be affected during construction of Alternative F3. During construction of the bridge, large cranes and other heavy equipment in the channel could interfere with aircraft operations because of the physical obstruction they would present to aircraft operating in the Tongass Narrows airspace and to seaplanes on the water. Because the bridges associated with this alternative would be south of most seaplane facilities, including existing seaplane waterways, construction would affect few seaplane operations.

4.25.5.1.3 Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

The operations of fixed-wing aircraft, including seaplanes in the project area, would not be affected by construction of any the ferry alternatives.

Temsco Helicopters, Inc., and Alpine Helicopters, Inc., operate from Peninsula Point, the site of the Alternative G2 ferry terminal on Revillagigedo Island. Construction of the ferry terminal on Peninsula Point could temporarily disrupt helicopter operations at these facilities, primarily due to constrained access to the site and not a restriction on airspace affecting actual helicopter operations.

4.25.5.1.4 Mitigation of Construction Impacts to Aviation

Bridge Alternative C3-4

DOT&PF would work with helicopter and seaplane operators to minimize disruption of service to the maximum extent practicable during the construction period. Airport access would be maintained to the terminal during construction. The ramps and floats at the airport seaplane base would need to be relocated during construction, and may need to be permanently relocated. Throughout construction, DOT&PF would provide continued access to seaplane service for seaplane customers at the airport. The need to temporarily or permanently relocate the airport seaplane facilities would be determined during final design of Alternative C3-4, if it were selected. A possible future location would be the small cove at the end of the airport perimeter road.

Bridge Alternative F3 and Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

DOT&PF would work with helicopter and seaplane operators to minimize disruption of service to the maximum extent practicable during the construction period.

4.25.5.2 Marine Navigation

4.25.5.2.1 Bridge Alternative C3-4

The mooring buoys and construction equipment would be present in Tongass Narrows around and under bridge piers and spans as the bridge was constructed. During bridge construction in Tongass Narrows, cruise ships and other vessels traveling through the construction area likely would be required to decrease their speed near the construction area, adjust their routes, and possibly adjust their schedules to avoid construction equipment. During bridge construction, ship passage under the bridge would be prohibited during the 24-hour period in which bridge segments were being lifted from barges on the water into position on the bridge.

4.25.5.2.2 Bridge Alternative F3

The Tongass Narrows main channel would remain open to marine traffic throughout construction of Alternative F3. Construction of the bridges over the East and West channels would limit ship passage at various phases of the construction. Vessels traveling through West Channel during construction of that bridge would likely be required to decrease their speed near the construction area, and adjust their routes and possibly schedules to avoid mooring buoys and construction equipment. During West Channel bridge construction, ship passage under the bridge would be prohibited for the 24 hours in which bridge segments were being lifted from barges on the water into position on the bridge. Once construction of the bridge piers adjacent to the main shipping channel in East Channel began, ships requiring a vertical clearance greater than 60 feet would permanently be routed around the west side of Pennock Island. Vessels requiring 60 feet of vertical clearance or less would either move temporarily to West Channel or likely be required to decrease their speed near, and adjust their routes and possibly schedules to avoid construction equipment in East Channel.

Modification of the West Channel subsurface would require the placement of a working barge in the channel for drilling, blasting, and dredging activities. The channel modification work would be scheduled to occur prior to bridge construction in the East and West channels, and marine traffic would be routed through East Channel while the channel modification work was underway. Disposal of the dredged material would require the use of tugs and tows to transport dredged materials into and out of Tongass Narrows to an ocean disposal site, which would create additional marine traffic in the area.

4.25.5.2.3 Ferry Alternatives G2, G3, G4 and G4v (Preferred Alternative)

Construction of Alternatives G2, G3, G4, and G4v would have little or no effect on marine navigation. Small boats and watercraft using nearshore areas would be diverted around construction areas. Construction areas would be relatively small, and the diversion would not materially add to the travel time of small boats.

4.25.5.2.4 Mitigation of Construction Impacts to Marine Navigation

Bridge Alternative C3-4

Impacts to ships transiting Tongass Narrows would be minimized by scheduling bridge construction activity, to the extent practicable, during times of the year when the marine traffic in Tongass Narrows is low (i.e., outside of the tourist and cruise ship season). DOT&PF would work with cruise ship and other marine vessel operators to facilitate marine navigation during construction. When bridge segment placement requires limiting vessel traffic, DOT&PF would issue notification of such closures to reduce conflicts with marine navigation activities.

Bridge Alternative F3

For this alternative, impacts to navigation could be minimized by constructing each bridge in a separate phase so that one of the two channels would always be unaffected by construction activities, including channel dredging in Alternative F3. DOT&PF would work with cruise ship and marine vessel operators to facilitate marine navigation during construction. During bridge segment placement DOT&PF would issue notification to residents and vessel operators of such closures to reduce conflicts with marine navigation.

4.25.5.3 Vehicle Traffic

4.25.5.3.1 Bridge Alternative C3-4

Construction activities (i.e., vehicle and equipment movement) could temporarily disrupt traffic patterns and cause delays where this alternative would connect to Rex Allen Drive, and at the intersection of Signal Road and Rex Allen Drive. Construction of the bridge over Tongass Avenue could also cause short-term road closures and traffic delays in that corridor.

Construction in the vicinity of the airport could require temporary changes to the airport circulation road and permanent elimination of the adjacent parking to accommodate construction vehicles and the new ramp location.

4.25.5.3.2 Bridge Alternative F3

Construction could delay traffic on South Tongass Highway where the alternative would intersect the highway south of the USCG Station. South Tongass Highway would have to be slightly elevated to accommodate construction of Alternative F3. This elevation could require that the project reduce the South Tongass Highway to one lane and close the highway for short periods of time during construction.

Construction of the airport access road near the airport terminal could require temporary changes to the airport circulation road and temporary elimination of adjacent parking to accommodate construction vehicles.

4.25.5.3.3 Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

Movement of construction vehicles and equipment in and out of the ferry terminal construction sites on Revillagigedo Island could affect traffic movement along Tongass Avenue and cause delays.

Construction of the terminal for Alternative G3 would affect access, circulation, and parking in the vicinity of the Jefferson Street right-of-way north of the Plaza Mall.

Construction in the vicinity of the airport could require temporary changes to the airport circulation road and temporary elimination of adjacent parking to accommodate construction vehicles.

4.25.5.3.4 Mitigation of Construction Impacts to Vehicle Traffic—All Action Alternatives

Under any action alternative, the construction contractor would develop a Traffic Control Plan (TCP) to describe how traffic would be maintained ~~maintenance~~ and parking would be managed ~~plan~~ to minimize impacts to vehicle travel on Ketchikan roadways and at the airport. Construction that might cause lane closures would be timed for low-traffic periods. Temporary roads and driveways would be employed where necessary to ~~ensure~~ provide continued mobility during construction. Construction of temporary roadways might be required to maintain access to the airport facilities. For Alternative F3, construction to elevate a portion of South Tongass Highway, which would include road closure and restricting traffic to one lane, would be done during off-peak hours to the extent possible to minimize the impacts on vehicle traffic. Access to the USCG Station and other affected property would be accommodated during construction through temporary driveways.

4.25.6 Pedestrians and Bicyclists

4.25.6.1 Bridge Alternative C3-4

Construction activities near the airport and Tongass Avenue could temporarily disrupt pedestrian and bicycle travel patterns. Overhead construction on Tongass Avenue, during which temporary closures of the roads, sidewalks, or bike paths would be necessary, would impede pedestrian and bicycle access. Construction at the airport would require rerouting pedestrian pathways between the ferry terminal, airport terminal, and seaplane dock.

4.25.6.2 Bridge Alternative F3 and Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

Alternatives F3, G2, G3, G4, and G4v would temporarily disrupt pedestrian and bicycle travel patterns. Construction activities associated with Alternatives F3, G2, G3, G4, and G4v would require rerouting of pedestrians and bicyclists where the alternatives intersect Tongass Avenue. Construction at the airport would require rerouting pedestrian and bicycle pathways between the ferry terminal, airport terminal, and seaplane dock.

4.25.6.3 Mitigation of Construction Impacts to Pedestrians and Bicyclists—All Action Alternatives

The ~~traffic maintenance and parking plan~~TCP would include provisions for maintaining pedestrian and bicycle traffic and safety through construction areas. The project would avoid obstructing or affecting roads, sidewalks, and bike paths whenever possible to maintain access. If obstructing access was unavoidable, the project would establish temporary detour routes.

4.25.7 Geological Resources

Construction-related soil disturbance could include compaction and/or erosion in temporary staging areas and permanent and construction right-of-way areas as a result of movement of construction equipment. The total area of temporary soil disturbance would be between ~~5~~0.1 and ~~18~~13.1 acres, depending on the alternative (see Table 4-20). The estimates for upland soil disturbance are conservative estimates and may include areas that have been previously disturbed (i.e., areas where previous disturbance has adversely affected the upland soil and where construction activity associated with this project would have little or no additional effect to soils).

Table 4-20: Areas of Potential Temporary Soil Disturbance (acres) [Updated]

Disturbance Type	Bridge Alternatives		Ferry Alternatives			
	C3-4	F3	G2	G3	G4	G4v
Upland soil disturbance (acres)	~~3~~2.0	~~2~~1.0	~~1~~0.0	~~1~~0.0	~~1~~0.0	~~1~~0.0
Wetland soil disturbance (acres)	~~5~~1.1	~~16~~12.1	~~13~~9.1	~~9~~5.1	~~4~~0.1	~~4~~0.1
Total soil disturbance	**~~8~~3.1**	**~~18~~13.1**	**~~14~~9.1**	**~~10~~5.1**	**~~5~~0.1**	**~~5~~0.1**

4.25.7.1 Mitigation of Construction Impacts to Geological Resources—All Action Alternatives

Impacts to wetland soils would be minimized by placing geotextile mats or equivalent on top of wetland soils in areas that would be temporarily disturbed by construction equipment (see Section 4.25.11).

The construction contractor would be responsible for developing an erosion and sediment control plan associated with upland and wetland areas to meet ADEC and EPA requirements of the Clean Water Act. A registered engineer would prepare the erosion and sediment control plan, and the construction contractor would implement it to minimize soil disturbance during construction. The erosion and sediment control plan would provide guidance to construction contractors to reduce construction impacts, particularly those that would result in the destabilization of adjacent slopes. Disturbed areas within the construction easement would be restored to preconstruction conditions to the extent possible.

4.25.8 Air Quality

Construction of any action alternative would not noticeably affect regional air quality. Emissions of carbon monoxide and nitrogen oxides from the operation of construction equipment and vehicles would temporarily increase overall concentrations of these pollutants at construction sites but would not affect the attainment status of the area with respect to the NAAQS. The amount of airborne particulate matter (dust) up to 10 microns in size (PM_{10}) could be temporarily increased in the immediate vicinity of the construction sites by construction activities such as grading, placement of fill, hauling of materials, and cutting through rock. Because of the frequency of rain in the Ketchikan area, weather conditions likely would limit the amount of dust raised by construction to negligible amounts.

GHG emissions would result from manufacture of paving materials, exhaust from construction equipment and vehicles, and temporary traffic delays that reduce travel speeds. Traffic delays would occur intermittently on some roads during construction and potentially along detour or construction haul routes. Traffic delays would increase idling times and reduce travel speeds, which would result in decreased fuel efficiency and increased vehicle emissions during the construction period. These construction sources would result in a temporary increase in GHG emissions for the area.

4.25.8.1 Mitigation of Construction Impacts to Air Quality—All Action Alternatives

The project would implement measures to control dust (PM_{10}) at construction sites. Measures, as needed, would include use of a water truck within construction areas, covering of soil and material stockpiles, and adhering to a designated construction speed limit to reduce generation of dust. The construction contractor would implement measures to minimize emissions from construction equipment and minimize construction-related traffic delays to reduce GHG emissions.

- To reduce impacts associated with construction delays and changes in traffic flow, the construction contractor would be required to create and execute a ~~Transportation Management Plan (~~TCP~~)~~, which would minimize construction-related congestion and would maintain traffic flow throughout the construction site.
- To reduce impacts associated with construction equipment, unnecessary idling of construction vehicles, trucks, and heavy equipment would be prohibited.
- The construction contractor would be required to routinely maintain and service all construction vehicles, trucks, and equipment to ~~ensure~~ confirm they are in proper working condition, and therefore running as efficiently as possible.
- To reduce energy use to retrieve construction materials, construction equipment and material would be located as close to project construction sites as possible to reduce hauling distances and energy consumption.

4.25.9 Noise and Vibration

The majority of the potential construction area is primarily open space on Gravina and Pennock islands. On Revillagigedo Island, the construction area would be adjacent to existing industrial, residential, and commercial properties. Residential areas are considered the receptors most sensitive to noise. Under all alternatives, construction would generate noise from equipment such as chain saws, front-end loaders, cranes, pile drivers, power generators, and trucks, including engine noise and backup bells. Vibrations can also be disruptive to people, structures, fish, and wildlife.

4.25.9.1 Construction Noise

Temporary construction noise would result from the construction activities anticipated under each project alternative. Noise levels for these activities can be expected to range from approximately 70 to 100 dBA at sites 50 feet from the activities (see Table 4-21).

Table 4-21: Typical Construction Noise Levels (dBA)

Types of Activities	Types of Equipment	Range of Noise Levels at 50 Feet (dBA)
Materials Handling	Concrete mixers	75-87
	Concrete pumps	81-83
	Cranes (movable)	76-87
	Cranes (derrick)	86-88
Stationary Equipment	Pumps	69-71
	Generators	71-82
	Compressors	74-87
Impact Equipment	Pneumatic wrenches	83-88
	Rock drills	81-98
	Blasting[1]	94-100
	Pile Driver[1]	95-101
Land Clearing	Bulldozer	77-96
	Dump truck	82-94
Grading	Scraper	80-93
	Bulldozer	77-96
Paving	Paver	86-88
	Dump truck	82-94

Source: U. S. Environmental Protection Agency, 1971 unless otherwise noted.
[1] Source: FHWA, 2006. Roadway Construction Noise Model User's Guide.

4.25.9.1.1 Bridge Alternatives C3-4 and F3

Bridge construction would generate noise from equipment. The effects of construction noise would be most noticeable in the area immediately surrounding the construction site. Under Alternative C3-4, the project would require construction activity in the vicinity of residential neighborhoods near Baker Street North, Bucey Avenue North, Larson Street, and North Tongass Highway. Construction of Alternative C3-4 would require blasting to remove bedrock in some areas on Revillagigedo Island. Noise from blasting would be of short duration, but may be in the 75 to 80 dBA range during blasting operations at the nearest residences. Blasting would be restricted to daytime hours only.

Under Alternative F3, construction would occur in the vicinity of residential neighborhoods along South Tongass Highway near the USCG Station, Forest Park Drive, Fireweed Lane, and Dogwood Place on Revillagigedo Island; near residences on Pennock Island in the vicinity of the East Channel bridge touchdown; and residences in the Clam Cove neighborhood on Gravina Island in the vicinity of the West Channel bridge touchdown. Construction noise in these areas could cause annoyance, but would be minimized by adherence to the City of Ketchikan's noise regulations.

4.25.9.1.2 Ferry Alternatives G2, G3, ~~G4~~ and G4~~v~~)

Construction of new ferry facilities under Alternatives G2, G3, and G4~~/G4v~~ would generate noise from equipment. The construction activities on Revillagigedo Island would be confined to the new ferry terminal site and the site of the existing airport ferry where site improvements would be made.

Construction noise in the vicinity of the project alternatives could disrupt residential activities in these areas during the construction period, but would be minimized by adherence to the City of Ketchikan's noise regulations.

4.25.9.1.3 Ferry Alternative G4v (Preferred Alternative)

Construction of new and replacement facilities under Alternative G4v would generate noise from equipment. The construction activities on Revillagigedo Island would be confined to the site of the existing airport ferry terminal and could disrupt residential activities nearby during the construction period. Construction noise impacts would be minimized by adherence to the City of Ketchikan's noise regulations.

~~4.25.9.1.3~~4.25.9.1.4 Mitigation of Construction Impacts from Noise

In accordance with City of Ketchikan noise regulations (City of Ketchikan Municipal Code, Title 19, Section 05, *Construction and Excavation Activities – Noise Restrictions*), construction activities would be prohibited between the hours of 10:00 p.m. and 6:00 a.m. to minimize disruption to residents. The project may request some exceptions to the noise regulations during special construction activities.

4.25.9.2 Construction Vibration

The effects of ground-borne vibration include perceptible movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. Building damage is not a factor for normal transportation projects, with the occasional exception of blasting and pile-driving during construction. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by only a small margin. A vibration level that causes annoyance will be well below the damage threshold for normal buildings.

Blasting and pile driving can be a major source of vibration on land and in the water. Less substantial sources of vibration are movements of heavy equipment on land and large boats in the water, and dredging operations in water. The effects of construction vibration associated with each alternative are described in the following sections.

4.25.9.2.1 Bridge Alternative C3-4

Construction of Alternative C3-4 would require blasting to remove bedrock in some areas on Revillagigedo Island. Tight control of blasting would minimize the risk of slides; the nearby area would be closed immediately before the blast and remain closed until after the blasted area had been inspected. Short-duration vibration may be perceptible at the closest properties to the blasting location; however, blasting-related vibration is not expected to be sufficient to cause structural damage.

In Tongass Narrows, pile driving would generate vibration, which would affect aquatic resources. Vibration impacts to these resources from pile driving are described in Sections 4.25.12.3 and 4.25.15.

4.25.9.2.2 Bridge Alternative F3

No blasting on Revillagigedo Island would be expected for Alternative F3. On Gravina and Pennock islands, the roadway would require minimal blasting to remove bedrock. Residents of Gravina and Pennock islands may feel the vibration associated with the blasting, as might wildlife in the area of the blasting, but the vibration would not have long-term, adverse effects on residents or wildlife resources.

In Tongass Narrows, underwater blasting and pile driving during pier construction and channel widening would generate vibration, which would affect aquatic resources. These impacts are described in Sections 4.25.12.3 and 4.25.15.

4.25.9.2.3 Ferry Alternatives G2, G3, G4, and~~/~~ G4v (Preferred Alternative)

No blasting on Revillagigedo Island would be expected under any of the ferry alternatives. On Gravina Island, roadway widening and improvements would require minimal blasting to remove bedrock. Gravina Island residents may feel vibration associated with the blasting, as might wildlife in the area of the blasting, but the vibration would not have long-term adverse effects on these resources.

In Tongass Narrows, pile driving during ~~ferry terminal pier~~ construction of the heavy freight mooring facility and layup dock, reconstruction of the existing ferry berths, and construction of new ferry berths (Alternatives G2, G3, and G4) would generate vibration, which would affect aquatic resources. These impacts are described in Sections 4.25.12.3 and 4.25.15.

4.25.9.2.4 Mitigation for Construction Impacts from Vibration

Blasting would be controlled to avoid damage of nearby structures and to meet the requirements of the local noise ordinance. In-water blasting, pile driving, and/or drilling would be controlled to avoid generating ~~ensure that the~~ pressure waves ~~generated~~ that would ~~not~~ pose a consistent, adverse threat to fish and other marine resources. The construction contractors would adhere to permit conditions for in-water work during construction.

4.25.10 Water Quality

All action alternatives would affect water quality through in-water and on-land construction activities that remove vegetation and expose soils; disturb creek and marine sediments; divert short segments of creeks; and release fuels, chemicals, construction debris, and other pollutants to the ground surface and water bodies. Runoff from construction sites could transport sediment and pollutants to Tongass Narrows, its tributaries, and lands adjacent to work sites. The potential for water quality impacts would be proportional to the time spent constructing close to and within water bodies and wetlands and the amount of surface runoff that occurs during construction. Disturbance of creek and marine sediments during in-water work, such as blasting or dredging, would suspend these sediments within water bodies. Similarly, disposal of dredged materials associated with channel widening (Alternative F3) would cause temporary suspension of sediments at the disposal location. These construction impacts would be avoided and minimized with the use of BMPs discussed below.

4.25.10.1 Mitigation for the Construction Impacts to Water Quality from All Action Alternatives

Construction of all water body and wetland crossings would adhere to applicable state and federal permit conditions. DOT&PF would be responsible for developing an ESCP and the contractor would be responsible for developing a SWPPP based upon the ESCP ~~The construction contractor would be responsible for developing erosion and sediment control and stormwater pollution prevention plans~~ to meet ADEC and EPA requirements of the Clean Water Act and minimize impacts to water quality. BMPs would be used to control runoff from the construction area to minimize erosion and transport of sediment, to prevent any accidental leaks of oil or fuel from equipment from contaminating creeks or Tongass Narrows, and to contain any such leaks.

Construction-related BMPs would include:

- Staking the planned outside limits of disturbance prior to construction to ~~ensure~~ confine~~that~~ impacts ~~are limited~~ to that area
- Limiting clearing and grubbing outside of the fill footprint to the extent practicable to control physical disturbance of wetlands and habitats
- Installing sediment barriers adjacent to waterways just beyond the estimated toe of fill to capture fine-grained material contained in runoff
- Installing ditch checks to reduce bank erosion
- Employing sedimentation ~~basins~~traps, as necessary (based on the potential volume of stormwater runoff), to limit sedimentation of adjacent wetlands and other waters and habitats
- Locating all staging, fueling, and equipment-servicing operations at least 100 feet away from all streams and wetlands
- Having spill response equipment readily available and ensuring that construction personnel are trained in spill response to contain accidental leaks of oil or fuel from construction equipment

Sections 4.12, 4.14.1, 4.15.1 through 4.15.4, 4.25.11, and 4.25.12 contain additional BMP-related discussion. DOT&PF would hold meetings at the beginning of construction with the construction contractor and agencies to ~~ensure~~ discuss implementation of BMPs and other mitigation commitments.

4.25.11 Wetlands

Each action alternative's construction-related impacts on fresh water wetlands could include temporary fill, vegetation removal, and degraded water quality. Such impacts would occur at staging areas (i.e., areas used for temporary storage and maneuvering of construction equipment) and in the area approximately 20 feet beyond the cut and fill prism of the new facilities (i.e., areas where ~~construction equipment would need to operate~~vegetation clearing would occur outside of the permanent area of impact). All alternatives would require approximately 0.1 acre of temporary fill in wetlands to remove the existing Airport Creek bridge. For Alternatives C3-4 and F3, temporary impacts likely would occur within a circular area with a radius of approximately 150 feet around bridge piers or abutments that occur on land. There would be no temporary impacts on marine wetlands. Table 4-22 identifies the estimated volume and acreage of fresh water wetlands expected to be temporarily affected by construction of each of the action alternatives.

Table 4-22: Estimated Temporary Construction Impacts on Fresh Water Wetlands [Updated]

	Bridge Alternatives		Ferry Alternatives			
Disturbance Type	**C3-4**	**F3**	**G2**	**G3**	**G4**	**G4v**
Volume of temporary fill (cubic yards)	~~27,000~~29,550	~~57,000~~59,550	~~9,000~~11,550	~~9,000~~11,550	2,550~~12,000~~	~~12,000~~2,550
Temporary disturbance of wetland vegetation (acres)	5.3	16.3	13.3	9.3	4.3	4.3
Temporary fill (acres)	~~5~~1.0	~~16~~12.1~~0~~	~~13~~9.1	~~9~~5.1	~~4~~0.1	~~4~~0.1

At present, the locations and extent of construction staging areas have not been determined, though each action alternative likely would require one staging area on Revillagigedo Island and one to two staging areas on Gravina Island. Each of these staging areas would cover an area of

3 to 5 acres. In addition, Alternative F3 would require two 1.5-acre staging areas on Pennock Island. The staging areas on Revillagigedo Islands would likely be located on uplands and would have no effect on wetlands. The staging areas on Pennock Island for Alternative F3 likely would be located in wetlands. Staging areas on Gravina Island would be located in both uplands and wetlands. A staging area near Airport Creek for the bridge replacement associated with all alternatives would be within wetlands. The other staging area on Gravina Island would differ slightly in each alternative but would take advantage of the upland areas near the airport for Alternatives C3-4, G2, G3, G4, and G4v. Alternative F3 would use the Gravina Island Highway to the extent practicable but the staging area on Gravina Island near the bridge approaches likely would require placement within a wetland.

Alternatives C3-4 and F3 would also require the construction of temporary access roads in wetlands. Temporary access roads would be required to move construction equipment from the shoreline to the interior of the islands where new road or bridge construction would take place. The footprint of temporary access roads would be approximately 55 feet wide and would vary in length for each action alternative. Temporary access roads would require temporary fill in wetlands. Temporary fill for access roads under Alternatives C3-4 and F3 might be in place for up to 3 years and without mitigation measures would have long-term effects on wetlands as a result of erosion and/or compaction, depending on the activities undertaken in the staging areas.

Most of the temporary impacts to wetlands in the action alternatives would involve vegetation removal only. These impacts would occur in the area approximately 20 feet beyond the cut and fill prism of new roadway and other facilities. Such disturbance would occur in increments along the roadway as it was being constructed (i.e., over an anticipated 3-year construction period for the bridge alternatives). Removal of wetland vegetation would expose soils to erosive forces and/or compaction, which could limit their ability to recover from the disturbance without mitigation measures in place.

The contractor would be required to dispose of waste in an approved location and would be responsible for securing all permits and approvals. The contractor will set the location for disposal of waste material to meet the following conditions of approval by DOT&PF: the site must be an upland location resulting in no fill placement in wetlands, and measures to reduce impacts to water quality and adjacent wetlands from potential runoff associated with waste material disposal sites must be addressed in the SWPPP. Waste disposal would occur in uplands with the exception of the staging areas in wetlands on Pennock Island for Alternative F3.

Specific impacts to wetlands relative to each action alternative are described in the following sections.

4.25.11.1.1Bridge Alternative C3-4

Construction of Alternative C3-4 would require the temporary disturbance of wetland vegetation 20 feet beyond the fill prism for the new and improved roadways on Gravina Island and 0.1 acre of temporary fill in wetlands to remove the existing Airport Creek bridge (see Table 4-22). Additionally, Alternative C3-4 would require the placement of temporary fill into wetlands that exist around the proposed on-land bridge piers (see Table 4-22). Alternative C3-4 would require temporary construction roads in wetlands on portions of Revillagigedo and Gravina islands.

4.25.11.1.2Bridge Alternative F3

Construction of Alternative F3 would require the temporary disturbance of wetland vegetation 20 feet beyond the cut and fill prism on Revillagigedo, Pennock, and Gravina islands, and 0.1 acre of temporary fill in wetlands to remove the existing Airport Creek bridge (see Table 4-22).

In addition, Alternative F3 would require the placement of temporary fill into wetlands that exist around the proposed on-land bridge piers and in staging areas on Pennock Island (see Table 4-22). The total size of staging areas on Pennock Island would be approximately 3 acres (all of which would be located in wetlands). Alternative F3 would require temporary construction roads in wetlands on portions of Pennock and Gravina islands.

4.25.11.1.3 Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

Construction of Alternatives G2, G3, G4, and G4v would require the temporary disturbance of wetland vegetation 20 feet beyond the fill prism for new roadway on Gravina Island (see Table 4-22). ~~None of the ferry alternatives would require the placement of temporary fill into wetlands~~The ferry alternatives would require approximately 0.1 acre of temporary fill in wetlands to remove the existing Airport Creek bridge.

4.25.11.1.4 Mitigation of Construction Impacts to Wetlands—All Action Alternatives

Use of wetlands for construction activities would be minimized to the extent practicable. DOT&PF requirements to operate construction equipment on geotextile mats would allow complete removal of the mat without further soil disturbance upon completion of construction, which would protect wetland soils in the construction easement (including staging areas for Alternative F3, construction access roads, and temporary access areas). After construction activities, shrubs and herbs likely would recover naturally, but the disturbed areas would be reseeded after construction to minimize erosion. Seeding of the disturbed areas would conform to Section 618 of the DOT&PF Standard Specifications for Seeding. Materials used for seeding would conform to DOT&PF Standard Specification Section 724 (Seed), Section 725 (Fertilizer), and Subsection 712-2.01 (Water).[47]

DOT&PF also would require the construction contractor to place temporary fill on geotextile mats or other suitable materials of sufficient thickness to facilitate the removal of the fill and the materials to the maximum extent practicable when they are no longer needed for construction. No natural earthen material would be removed from under the geotextile mat (or equivalent materials) when the temporary fill was removed. Wetlands would be stabilized against erosion once construction equipment and protective mats were removed. DOT&PF would restore wetlands that had been temporarily filled by reseeding and revegetating the disturbed areas.

Detailed mitigation measures would be developed and followed as conditions of the required federal permits.

4.25.12 Water Body Modification and Wildlife

4.25.12.1 Water Body Modification

Construction activities associated with any of the action alternatives within and along Tongass Narrows would not modify the channel or its shoreline to such an extent that water flow or overall channel hydrology would be affected. For all action alternatives, roadway development or improvements would require crossings of streams on Gravina Island. Temporary diversions of these water bodies may be required during culvert and possibly bridge placement, which would temporarily alter the configurations of creek banks and beds. Diversion structures might include cofferdams, dams and pumps, pipes, and flumes. Temporary work in streams would be addressed in the USACE Section 404 permit and the ADF&G Title 16 Fish Habitat permit and subject to permit stipulations. The draft USACE Section 404 permit application for Alternative G4v, the preferred alternative, is provided in Appendix H.

[47] Alaska Department of Transportation and Public Facilities. 2004. *Alaska Department of Transportation and Public Facilities Standard Specifications for Highway Construction*. <http://www.dot.state.ak.us/stwddes/dcsspecs/assets/pdf/hwyspecs> Accessed December 29, 2011.

4.25.12.1.1 Mitigation of Construction Impacts to Water Bodies—All Action Alternatives

Construction activity in any water body would adhere to applicable state and federal permit conditions. Temporary diversions would be designed so that the flow of the water body was not impeded. Any creek banks or beds affected by diversion structure placement would be restored to preconstruction conditions to the maximum extent practicable.

4.25.12.2 Marine Habitat

Without implementation of minimization and mitigation measures, bridge pier placement (Alternatives C3-4 and F3), channel modification (Alternative F3), dredging (Alternatives G2 and~~,~~ G3~~, and G4~~), or ferry berth ~~dock~~ construction (Alternatives G2, G3, and G4) in Tongass Narrows could degrade marine habitat outside the project footprint by causing increased erosion, suspension of sediments, and turbidity.

Construction disturbance (blasting and dredging) in West Channel associated with the channel widening for Alternative F3 would reduce the primary and secondary productivity of West Channel during construction for 1 to 2 years following channel dredging. Plants and algae produced in the West Channel are food for fish that, in turn, are prey for larger organisms on either end of the channel, and Alternative F3 channel modification would temporarily reduce the food source for those prey species. This effect would be short-term and likely would be immeasurable, since few organisms would depend solely on prey produced in the affected area.

Eelgrass beds (which occur in subtidal areas) likely would not be affected by erosion and turbidity because the currents would flush out finer-grained sediments. Turbidity and sedimentation from erosion are part of the natural cycle in marine systems, and most marine plants and animals would adapt to short-term changes in these parameters. If, however, sediment loads under Alternatives F3 or G3 were unusually high, lasted for extended periods of time, or occurred at unusual times of the year, adverse impacts to marine habitats could occur. The maximum potential area that would be directly affected by construction required for each of these alternatives is provided in Section 4.15.4.4 (Table 4-17).

4.25.12.2.1 Mitigation of Construction Impacts to Marine Habitat—All Action Alternatives

The construction contractor would be required to adhere to all applicable state and federal permit conditions throughout the construction phase of any action alternative. To minimize these potential adverse impacts, the DOT&PF would verify with the construction contractor~~ensure~~ that construction BMPs, an erosion and sedimentation control plan, and a spill prevention plan were all implemented during project construction. DOT&PF would be responsible for developing an ESCP and the contractor would be responsible for developing a SWPPP based upon the ESCP ~~The construction contractor would be responsible for developing erosion and sediment control and stormwater pollution prevention plans~~ to meet ADEC and EPA requirements of the Clean Water Act.

4.25.12.3 Wildlife—Marine Mammals, Anadromous Fish, Marine Fish, and Essential Fish Habitat

Construction during any of the action alternatives would affect aquatic animals as a result of increased erosion and sediment suspension, noise, vibration, and direct displacement during construction activities unless mitigation and minimization measures were followed during construction. The discussion below applies to marine mammals, fish, and essential fish habitat. Section 4.25.15 presents further information on potential construction impacts specific to marine mammals protected under the Endangered Species Act and proposed mitigation measures.

4.25.12.3.1Bridge Alternative C3-4

Erosion and the movement of sediment and rock to install in-water piers would cause turbidity in Tongass Narrows. The distance the turbidity plume moved from the point of origin would be dependent on tides, currents, nature of the substrate, and other factors. The strong tidal current would quickly carry turbidity plumes away, dissipating them quickly with minimal effect on biota. Although sediment samples have not been collected, underwater video and side scan sonar surveys in the areas of proposed drilling indicate that sediments to be disturbed would range from silts and silty sand to coarse gravel and sand.

The proposed road improvements associated with this alternative could also result in potential erosion and sedimentation during construction that may cause turbidity in streams on Revillagigedo and Gravina islands. Placement of culverts in fish-bearing streams could temporarily impact anadromous fish by directly eliminating eggs incubating in the streambed, or by creating highly turbid water. Without mitigation or appropriate construction techniques, deposition of material downstream on incubating eggs could destroy them, and turbid water could interfere particularly with juvenile salmon. Therefore, any kind of in-stream work would be undertaken during work windows (June 15 to August 7) to avoid critical times in the salmon life cycle.

Bridge construction would transmit in-water noise and vibration generated by pile driving, drilling, and movement of construction barges. While blasting is not anticipated for this alternative, minor blasting to properly seat the pier casings might be necessary. Bridge foundation construction would require four to six shafts to be drilled to support each pier. Each shaft would take approximately 1 week to complete. Drilling activities for bridge foundations could last 9 to 12 months. Construction noise generated above the water could also be transmitted into the water through steel or concrete structures. All of these noise sources would temporarily elevate noise levels above the existing background noise levels. To minimize the effects to fish and aquatic species, the construction contractor would use a reverse rotary drill or vibratory hammer instead of an impact hammer. A vibratory hammer would be used to advance the steel pile or casing through the existing sediment until it reached bedrock; drilling then would be employed to penetrate the rock and/or install the piling or rock anchors in the rock formation. Construction noise and vibration from drilling likely would not have long-term or permanent effects on marine and anadromous fish or marine mammals. Effects would be short-term and localized.

In-water work would cause the temporary displacement of marine wildlife from the area around the construction activities. Because of the abundance of similar habitat in Tongass Narrows, it is unlikely that the temporary impacts of construction on fish habitat would have a lasting effect on these species. Construction activities in Tongass Narrows would last for approximately 2 to 3 years. During this time, construction barges would be present in Tongass Narrows.

4.25.12.3.2Bridge Alternative F3

Dredging and blasting associated with Alternative F3 would cause turbidity by the movement of sediments and rock in the East and West channels. These activities would suspend fine silts in the water column, and tides, currents, the nature of the substrate, and other factors would determine the distance the turbidity plume moved from the point of origin. The strong tidal current would carry turbidity plumes quickly away, dissipating plumes quickly with minimal effect on biota. Although sediment samples have not been collected, underwater video and side scan sonar surveys in the areas of proposed dredging and/or blasting indicate that sediments to be dredged would range from silts and silty sand to coarse gravel and sand.

The proposed road improvements associated with this alternative could also result in erosion and sedimentation during construction that may cause turbidity in streams on Revillagigedo and

Gravina islands. Culvert placement in fish-bearing streams could impact anadromous fish temporarily by directly eliminating eggs incubating in the streambed, or by creating highly turbid water. Without mitigation or appropriate construction techniques, deposition of material downstream on incubating eggs could destroy them, and turbid water could interfere particularly with juvenile salmon. Therefore, any kind of in-stream work would be undertaken during work windows (June 15 to August 7) to avoid critical times in the salmon life cycle.

Bridge construction would transmit in-water noise and vibration generated by dredging, fill placement, pile driving, drilling, blasting, and movement of construction barges. Construction of bridge foundations would require four to six shafts to be drilled to support each pier. Each shaft would take approximately 1 week to complete. Drilling activities for bridge foundations could last 9 to 12 months. Construction noise and vibration from blasting for Alternative F3 could last 1 to 3 months. Construction noise generated above the water could also be transmitted into the water through steel or concrete structures. All of these noise sources would temporarily elevate noise levels above the existing background noise levels. To minimize the ~~affects~~effects to fish and aquatic species, the construction contractor would use a reverse rotary drill or vibratory hammer instead of an impact hammer. Geophysical surveys suggest that soil sediment in Tongass Narrows might be 20 feet thick in some locations. A vibratory hammer would be used to advance the steel pile or casing through the existing sediment until it reached bedrock; drilling then would be employed to penetrate the rock and/or install the piling or rock anchors in the rock formation. Pile driving for ferry alternatives would occur during low tide to further minimize noise impacts to aquatic species. Construction noise from drilling likely would not have long-term or permanent effects on marine and anadromous fish or marine mammals. Effects would be short-term and localized.

Blasting, dredging, and pile driving would occur during fall and winter months based on allowed in-water work windows. Humpback whales have generally migrated south to wintering grounds by the fall and likely would not be present during blasting activities. Steller sea lions, which are present year round in the project area, are unlikely to be affected by underwater noise associated with project construction activities because they have higher thresholds for noise disturbance and are able to raise their heads out of the water to avoid noise transmission. Nonetheless, blasting, dredging, and pile driving would be scheduled for fall and winter, between late summer salmon runs and spring herring runs that attract sea lions.

In-water work would cause the temporary displacement of marine wildlife from the area around the construction activities. Drilling would last 9 to 12 months, and blasting in the West Channel would last 1 to 3 months. Channel modification work would occur up to 7 days a week with almost daily disturbance from dredging and intermittent disturbance from blasting. Construction activities in eelgrass beds could eliminate important feeding and refuge areas for several species of fish and shellfish, thereby displacing these species. Because of the abundance of similar habitat in Tongass Narrows, it is unlikely that the temporary impacts of construction on fish habitat would have a lasting effect on these species.

Construction activities in Tongass Narrows would last for 2 to 3 years. During this time, construction barges would be present in Tongass Narrows. It is expected that construction disturbance (blasting and dredging) would reduce the productivity of the West Channel for 1 to 2 years following construction. Plants and algae produced in the West Channel are food for fish that, in turn, are prey for larger organisms on either end of the channel, and Alternative F3 channel modification would temporarily reduce the food source for those prey species,. This effect would be short-term and likely would be immeasurable, since few organisms would depend solely on prey produced in the impacted area. Dredging would be completed using a clamshell dredge. It is generally accepted that clamshell dredges do not have the potential to capture (entrap) fish, including salmon.

4.25.12.3.3Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

Alternatives G2 and G3 would require minor dredging in Tongass Narrows to produce adequate water depths for ferry berthing at all tidal stages. Use of a clamshell dredge is the most likely method of dredging for these two alternatives. It is generally accepted that clamshell dredges do not have the potential to capture (entrap) fish, including salmon. Dredging for Alternatives G2 and G3 might require a small amount of blasting.

Dredging would cause turbidity by the movement of sediments and rock in Tongass Narrows. Dredging activities would suspend fine silts in the water column, and tides, currents, the nature of the substrate, and other factors would determine the distance the turbidity plume moved from the point of origin. The strong tidal current would quickly carry turbidity plumes away, dissipating them quickly with minimal effect on biota. Although sediment samples have not been collected, underwater video and side scan sonar surveys in the areas of proposed dredging and blasting indicate that sediments to be dredged would range from silts and silty sand to coarse gravel and sand.

The proposed road improvements associated with the ferry~~is~~ alternatives would also result in potential erosion and sedimentation during construction that may cause turbidity in streams on ~~Revillagigedo and~~ Gravina ~~i~~Island~~s~~. Culvert placement in fish-bearing streams could temporarily impact anadromous fish by directly eliminating eggs incubating in the streambed, or by creating highly turbid water. Without mitigation or appropriate construction techniques, deposition of material downstream on incubating eggs could destroy them, and turbid water could interfere particularly with juvenile salmon. Therefore, any kind of in-stream work would be undertaken during work windows (June 15 to August 7) to avoid critical times in the salmon life cycle.

Construction of the ferry ~~terminals~~ alternatives would transmit in-water noise and vibration generated by dredging, fill placement, pile driving, drilling, and movement of construction barges. Construction noise generated above the water could also be transmitted into the water through steel or concrete structures. All of these noise sources would temporarily elevate noise levels above the existing background noise levels. To minimize the ~~a~~effects ~~to~~ on fish and aquatic species, the construction contractor would use a reverse rotary drill or vibratory hammer instead of an impact hammer. Geophysical surveys suggest that soil sediment in Tongass Narrows might be 20 feet thick in some locations. A vibratory hammer would be used to advance the steel pile or casing through the existing sediment until it reached bedrock; drilling then would be employed to penetrate the rock and/or install the piling or rock anchors in the rock formation. Construction noise from drilling likely would not have long-term or permanent effects on marine and anadromous fish or marine mammals. Effects would be short-term and localized. If blasting were necessary for the ferry alternatives, it would last 2 to 3 days and would have relatively small, localized impacts in relation to the large areas of similar habitats available in Tongass Narrows.

~~With the exception of Alternative G4v, the remaining ferry alternatives would require minor dredging in Tongass Narrows to produce adequate water depths for ferry docking at all tidal stages. Use of a clamshell dredge is the most likely method of dredging for the ferry alternatives. It is generally accepted that clamshell dredges do not have the potential to capture (entrap) fish, including salmon. Dredging for the ferry alternatives might require a small amount of blasting.~~

4.25.12.4 Mitigation of Construction Impacts to Marine Mammals, Anadromous Fish, Marine Fish, and Essential Fish Habitat—All Action Alternatives

Construction of this project would require a Title ~~41~~ 16 Fish Habitat Permit and a USACE Permit for fill in waters of the United States. Coordination with NMFS has been ongoing during the planning of this project. The following conservation measures would be incorporated to avoid, minimize, and mitigate impacts to marine species and EFH:

- Recontour stream banks at all stream crossings (both culverts and bridge crossings) to approximate original conditions, using native seed and annual rye as recommended in the DNR *Alaska Coastal Revegetation and Erosion Control Guide*[48] to minimize erosion
- Employ BMPs to minimize the introduction of sediment to ponds and streams during adjacent fill placement and during culvert placement
- Design all anadromous fish stream crossings to provide passage for the salmon present in any given stream, per DOT&PF's memorandum of agreement with ADF&G
- Restrict in-water work in Tongass Narrows as follows:
    - General use of boats and barges could occur year round for general survey and work on bridge structures above water
    - Except for blasting, dredging, and pile driving, other work in marine waters could occur between July 1 and February 28
    - As further described below, blasting, dredging, and pile driving could occur only November 1 through February 28, with the possible exception of mid-channel locations, based on further consultation with the ~~DNR~~ADF&G, NMFS, USACE, and USFWS
- When pile driving in Tongass Narrows, use a vibratory hammer to drive steel pilings instead of an impact hammer, and drive pilings during low tide when in intertidal and subtidal areas
- Conduct all construction in and around anadromous fish streams when stream disturbances would have the least impact on anadromous fish species:
    - In-stream construction work in the Ketchikan area is generally between mid-June and early August
    - Isolate in-water work areas, except for stream crossings by construction equipment, from flowing waters of all anadromous fish streams
- Require the contractor to prepare a blasting plan prior to any blasting activities, to include:
    - Submit the blasting plan to be reviewed by NMFS for both EFH and marine mammal impacts
    - Implement a fish and invertebrate monitoring program for any proposed blasting activities
    - Conduct any blasting during typical daylight hours (i.e., generally 7:00 a.m. to 7:00 p.m.)
    - Conduct a pre-blasting survey to ~~ensure~~ confirm that no fish schools are in the vicinity of the blasting area; if fish schools are detected, delay blasting until they leave
    - Employ a biologist to record any kills within 100 feet up-current and 300 feet down-current of the blast area after blasting is completed

[48] Wright, Stoney J., and Philip K. Czapla. 2011. *Alaska Coastal Revegetation and Erosion Control Guide*. Palmer, Alaska: Alaska Department of Natural Resources, Division of Agriculture, Plant Materials Center.

  - o Consider monitoring the dredge materials as a method for documenting organisms injured or killed in the blasting
  - o Consider measures such as covering the rock to be blasted with sand to dampen blast impact
  - o Conduct in-water blasting between November 1 and February 28 to avoid juvenile and adult salmon
- Except for Alternative F3, place dredged debris onto a barge where it would enter a settling basin and be disposed of on land. Alternative F3, which could require substantial removal of sediment and rock, would require ocean disposal. Ocean disposal would require permitting by USACE under Section 404 of the Clean Water Act and may require a USACE permit under Section 102 and 103 of the Marine Protection, Research, and Sanctuaries Act (see Section 4.13).
- Conduct fueling and servicing operations at least 100 feet away from all streams and water bodies, and store fuel at least 100 feet away from all wetlands and water bodies
- Obtain all necessary permits and agency approvals prior to construction
- Incorporate any permit stipulations into the construction contract specifications
- Require that the perimeter of the disturbance area be staked prior to construction to ~~ensure~~ avoid~~that there is no~~ additional impact from construction activities
- Use sediment control barriers adjacent to EFH stream channels, just beyond the estimated toe of fill
- Use gravels and streambed material in the bottoms of fish passage culverts to emulate natural streambed conditions
- Provide stream bank stabilization as necessary to maintain stream bank integrity, and include the use of bioengineering techniques to improve habitat value of the riprap, by incorporation of willow stakes or other locally available vegetation

These are general measures that would be refined to specifically address details of the selected alternative through further coordination with the agencies during design.

4.25.12.5 Wildlife—Amphibians, Birds, and Land Mammals

Construction activities would have a temporary effect on terrestrial wildlife for all action alternatives. Noise associated with construction activities (e.g., clearing and grading, excavation) and construction equipment moving to and from project sites would affect wildlife under each action alternative.

The sound produced by conventional construction equipment ranges from about 80 to 90 dB, pile driving between 95 and 115 dB, and blasting averaging 98 dB.[49] Ambient noise levels in the project area would be typical of a rural area (35 to 40 dB) for Gravina Island with levels greater than 88 dB during landing and ~~take off~~takeoff of jet aircraft at the airport. The noise levels in the urban areas on Revillagigedo Island likely range from 60 to 65 dB.[50] While sound does attenuate over distance, a bulldozer operating at the construction site could be heard above ambient noise as much as 1.2 miles away on Gravina Island and 400 feet away on Revillagigedo Island. Pile driving would be heard for several miles on Gravina and Revillagigedo islands.

[49] Washington Department of Transportation. 2010. *Advanced Training Manual: Biological Assessment Preparation*. Version 02-2010. Olympia, Washington.

[50] Washington Department of Transportation. 2010. *Advanced Training Manual: Biological Assessment Preparation*. Version 02-2010. Olympia, Washington.

The increased sound levels due to construction would be temporary, and would be minimally higher than ambient levels. Animals likely would either avoid a noisy construction area or would have already adapted to the increased noise levels from existing development.

Vegetation clearing as part of construction would also displace wildlife species and habitat. Habitat features that could experience impacts include wildlife foraging, cover, nesting, and migratory species staging. Temporary vegetation removal would be similar among the varying action alternatives with the greatest removal occurring with Alternative F3 (18 acres) and the least with Alternative G4 and G4v (5 acres). Wildlife displaced during construction would likely use the project area upon completion of the project as vegetation reestablished itself on disturbed soils. Mobile animals (such as deer and birds) likely would avoid the immediate area temporarily, while localized species that are less mobile (such as mice) may be injured or killed as a result of clearing, grading, excavation, and disposal of excavated materials.

Construction traffic may result in wildlife mortality from vehicle impact, though construction vehicles would generally travel at relatively low speeds to the work areas. Use of lighting at night during construction may disturb wildlife feeding and movement, particularly among nocturnal birds and mammals. Impacts from these activities would be limited to the vicinity of staging and construction limits.

4.25.12.6 Mitigation of Construction Impacts to Amphibians, Birds, and Land Mammals —All Action Alternatives

To mitigate for construction impacts to wildlife, temporary areas of vegetation removal would be minimized to the extent practical. Prior to construction, specific trees and vegetation to be preserved would be identified. Throughout construction, BMPs would be used to minimize sedimentation, erosion, or other impacts to wildlife. Clearing of nests for species protected under the Migratory Bird Treaty Act will be conducted prior to construction and outside of the nesting season (typically March through July).

4.25.12.7 Bald Eagles

All proposed action alternatives have the potential to disturb eagles during the breeding season due to the proximity of the alternatives to known nests (see Section 3.15.6 for information on eagle distribution). No bald eagle nest trees would need to be removed as part of construction activities for any alternative. Under the National Bald Eagle Management Guidelines,[51] nest sites require a 660-foot buffer from road construction and clearing activities, whether the activities would be visible or not visible from the nest. Within this buffer, no construction or clearing activities can occur during the breeding season without an Eagle Take Permit. In addition, no blasting can occur within 0.5 mile of nest sites during the breeding season (typically February through August in Southeast Alaska) without an Eagle Take Permit.

Alternative G2 would be located 175 feet from an inactive bald eagle nest at the proposed terminal on Gravina Island, and 685 feet from an active nest near Lewis Point. Because of topography, the Alternative G2 alignment could not be relocated to create a 660-foot buffer between the road and nest at the proposed terminal. Construction activities could disrupt nesting activities associated with this nest site, which likely would result in displacement of nesting eagles, although eagles have nested close to human activity elsewhere in Alaska.

The ferry terminal on Gravina Island for Alternative G3 would be located within 835 feet of a bald eagle nest. This nest was noted as inactive during the 2008 surveys and would be outside

[51] U.S. Fish and Wildlife Service. May 2007. *National Bald Eagle Management Guidelines.* Available online at http://www.fws.gov/pacific/eagle/National Bald Eagle Management Guidelines.pdf.

the recommended buffer of 660 feet. Given the activity of the airport nearby, construction activities likely would not disturb the eagles using this nest site.

Common to Alternatives G2, G3, and F3, improvements at the intersection of the Airport Access Road, Lewis Reef Road, and Gravina Island Highway would occur within 200 feet of a bald eagle nest, which would be within the 660-foot buffer for each of these alternatives. Construction activities could disrupt nesting activities associated with this nest site. In addition, blasting during construction of Alternative F3 would occur within 0.5 mile of the West Channel, with potential to disturb several nests.

Without mitigation, construction activity under all alternatives likely would result in displacement of nesting eagles as a result of construction activities including blasting associated with Alternative F3. However, bald eagles would likely resume using nests within 0.5 mile of any blasting after the conclusion of the construction phase of the project.

4.25.12.8 Mitigation of Construction Impacts to Bald Eagles—All Action Alternatives

If the selected alternative were to come within 660 feet of a bald eagle nest, DOT&PF would be required to obtain a Bald Eagle Take Permit for construction. This permit ~~would~~ may require development of mitigation measures with USFWS. Mitigation measures ~~may~~ could require biologists to monitor construction activities around the area that would potentially affect eagle nests, and ~~would~~ could limit certain construction activities, such as blasting, during the nesting season (typically February through August). Topography would constrain Alternative G2, and it may not be practical to shift the alignments to more than 660 feet away to create a buffer between the road and nest. In addition, improvements common to all build alternatives at the intersection of the Airport Access Road, Lewis Reef Road, and Gravina Island Highway could not be moved to create an adequate buffer between the road construction activities and nest.

4.25.13 Floodplains

Construction activities would have no adverse effect on mapped floodplains.

4.25.14 Coastal Zone Management

Temporary construction activities related to any of the action alternatives would not affect coastal zone management. Impacts to the resources protected by the Borough *Coastal Management Plan would* be minimized through erosion and sediment control and other BMPs for reducing impacts to water quality, wetlands and other water bodies, marine habitat and biota, and threatened and endangered species (see Sections 4.25.10, 4.25.11, 4.25.12, and 4.25.15).

4.25.15 Threatened and Endangered Species

Construction of the project under any action alternative would create noise and vibration that could disturb ~~Steller sea lions or~~ humpback whales if the noise and vibration were to occur while ~~these mammals were~~whales are present. Activities that would disturb ~~sea lions or~~ humpback whales include:

- Reverse rotary drilling in submerged rock and pile driving with a vibratory hammer in substrate for placement of pier foundations for all action alternatives
- Underwater blasting and dredging in West Channel (Alternative F3)
- Nearshore underwater ~~blasting~~ dredging for ferry terminal construction (Alternatives G2 and~~,~~ G3~~, and G4~~)
- Minor in-water blasting (possible for any of the action alternatives)

~~Steller sea lions would be less likely to be affected by underwater noise and vibration associated with project construction activities because they have higher thresholds for disturbance and are able to raise their heads out of the water to avoid noise transmission.[52] See Section 4.25.12.3 for additional information regarding construction impacts to marine habitat and species.~~

4.25.15.1.1 Mitigation of Construction Impacts to Threatened and Endangered Species—All Action Alternatives

To ~~ensure~~ avoid ~~no~~ injury to or harassment of ~~Steller sea lions,~~ humpback whales~~,~~ or other marine mammals, DOT&PF and FHWA are committed to the measures listed below:

- Conducting dredging and in-water blasting only in the period from November 1 to February 28, unless pre-approved by NMFS,~~ to avoid runs of salmon and herring, on which humpback whales and Steller sea lions feed, and~~ so that dredging and blasting occur~~red~~ after most humpback whales ~~had left~~leave Southeast Alaska for wintering grounds.~~ near Hawaii~~
- Requiring, via the construction contract, a blasting plan for Alternative F3, approved by NMFS (if blasting amounts are minor, and if agreed by the agencies, monitoring may not be required)
- Obtaining NMFS ~~approval~~ concurrence for a dredging plan for Alternatives F3, G2, and G3~~, and G4~~ and ensuring that, during blasting and dredging, the project would use trained and NMFS-approved observers to indicate when marine mammals were within a 164-foot (50-meter) zone around pier work or other in-water work, and delaying or ceasing work until the animals moved out of the area
- Issuing an in-water warning sound prior to blasting to allow any marine mammals to voluntarily move to a comfortable distance
- Acquiring all necessary permits and agency ~~approvals~~ concurrences prior to construction, and incorporating stipulations into contract specifications
- Obtaining any necessary incidental harassment authorization from NMFS
- Finalizing mitigation measures during the permitting process with input from ~~DNR~~ADF&G, NMFS, USACE, and USFWS

These mitigations are designed to be compatible with EFH mitigation measures for the project (see Section 4.25.12.3). ~~All project-related activities would conform to the pertinent provisions of the Marine Mammal Protection Act and the Endangered Species Act.~~

4.25.16 Historic and Archeological Preservation

Historic properties are extant within the APEs of Alternatives F3, G2, and G3 (see Section 4.21.3). Historic properties will be considered and avoided during final design of the selected alternative. For Alternative F3, archeological historic remains located near the West Channel bridge alignment and the Gravina Island Highway south of Clam Cove (site KET- 774) may be physically disturbed by construction of the bridge. For Alternative G3, the remains of historic homesteads near the Gravina Island ferry terminal (site KET-800) may be directly affected by equipment operation and material stockpiling and storage during construction of the ferry access road. Other archeological sites are known to exist in the Tongass Narrows area, and previously unknown subsurface sites could be discovered during construction of any alternative.

~~[52] Ballard, Bill. January 26, 2004. Letter from DOT&PF to Kaja Brix, NOAA Fisheries; Balsinger, James. February 17, 2004. Letter from NOAA Fisheries to Bill Ballard, DOT&PF.~~

4.25.16.1 Mitigation of Construction Impacts to Historic and Archeological Preservation—All Action Alternatives

~~Once an alternative is selected, h~~Historic and arch~~a~~eological sites in the vicinity of construction areas of the selected alternative will be identified for the construction contractor to avoid.

In general, under all alternatives, FHWA and DOT&PF would continue coordination with the SHPO through design. ~~Once the alignment was staked during design and prior to construction, a qualified archaeologist would be sent into the field to ensure that no cultural sites were present that might have been missed in previous field surveys.~~ If cultural resources were discovered during construction, construction at that location would halt for site evaluation. DOT&PF would consult with the SHPO about the appropriate course of action. Protocol and contact information for construction contractors in the event of an inadvertent cultural resource or human remains discovery will be developed by DOT&PF in coordination with FHWA and the Alaska SHPO and NHPA Section 106 consulting parties prior to commencement of construction.

4.25.17 Hazardous Waste Sites

Construction activities associated with any of the action alternatives would not affect any known hazardous waste sites. Sites recognized as potential hazardous waste sites within the construction right-of-way (see Section 4.22) would be investigated prior to construction and any waste found would be removed in accordance with state and federal regulations.

Hazardous materials that would be used, transported, or stored within the project right-of-way as part of the construction activities could adversely affect the environment if they were not properly handled and contained. Materials would include asphalt, concrete, cable lubricants, and fuel and lubricants for vehicles and other equipment.

4.25.17.1 Mitigation of Construction Impacts to Hazardous Waste Sites—All Action Alternatives

Construction contractors would be required to meet all federal, state, and local regulatory requirements regarding the discovery and use of hazardous materials. These regulatory requirements include worker right-to-know and safety training for the discovery and use of hazardous materials. Construction contractors on site must be trained to meet federal, state, and local regulatory requirements in recognizing and reporting discovery of unknown contamination, and proper use and handling of hazardous materials during construction. If unknown hazardous materials were encountered during construction, the contractor would be expected to isolate the area and prevent migration of any contaminants. A spill prevention and response plan would be developed for the selected alternative. Cleanup would occur in accordance with state and federal regulation and in consultation with ADEC. Hazardous materials used during project construction would be stored and handled according to state and federal regulations. Material Safety Data Sheets would be available for all hazardous materials on the site. Construction vehicles will contain spill prevention kits in case of minor hazardous materials or chemical spills during construction.

4.25.18 Visual Environment

4.25.18.1 Bridge Alternatives C3-4 and F3

Temporary visual impacts resulting from the construction process could include the presence and use of equipment (e.g. trucks, barges, cranes) and materials (e.g. spoil piles, cones). Construction of the bridge alternatives would temporarily vary the current views of natural features with the introduction of large cranes, barges, and other operating equipment in the channel. Because of the industrial character of the Ketchikan waterfront, the impact to the visual environment of that shoreline would be minor. As the bridge construction work progressed into Tongass Narrows (Alternative C3-4) or the East and West channels (Alternative F3), construction equipment would intrude upon views of predominantly natural features.

Construction of roadways and bridge approaches would adversely affect the visual character of the area immediately surrounding the construction zones. This visual effect would be temporary and therefore minor in the long term. Construction of roadways and bridge approaches on Gravina and Pennock islands would not be visible from most areas of Ketchikan.

4.25.18.2 Ferry Alternatives G2 and G3

Construction of the new ferry terminals, access road, and ancillary facilities for Alternatives G2 or G3 on Gravina Island, amid the existing natural features, would have impact views of the shoreline. An uninterrupted natural shoreline view would be temporarily converted to a view of a segmented shoreline with construction equipment.

Construction of a ferry terminal and ancillary facilities for Alternatives G2 and G3 on Revillagigedo Island would not dramatically change the visual setting due to the industrial and commercial character, respectively, of the terminal sites.

Construction of roadways and bridge approaches on Gravina Island would not be visible from most areas of Ketchikan.

4.25.18.3 Ferry Alternatives G4 and G4v (Preferred Alternative)

The construction of ~~these ferry terminals and ancillary~~ facilities on Gravina and Revillagigedo islands would occur in industrial areas. Construction of roadways ~~and bridge approaches~~ on Gravina Island would not be visible from most areas of Ketchikan. Construction equipment and activity, therefore, would not have a substantial visual impact ~~in~~ with Alternatives G4 and G4v.

4.25.18.4 Mitigation of Construction Impacts to the Visual Environment—All Action Alternatives

All construction equipment and debris would be removed after construction was completed. Reseeding would repair bare soil areas. These efforts would repair the visual impacts of construction after the construction process was finished but would not affect

4.25.19 Energy

Energy consumption related to each of the action alternatives would depend on the duration of construction and the types of construction equipment required by that alternative. A temporary increase in energy consumption would occur during construction of the project. Energy would be consumed by diesel-fueled heavy machinery, electrical- or gas-powered hand tools, and electrical lighting and safety signals. Fuel for vehicles and handheld tools would be replenished with local supplies. Electricity and diesel fuel are available to meet temporary energy needs, and no substantial impact to energy supplies seems likely.

4.25.20 Utilities

Construction of any of the project alternatives might result in short-term temporary interruption of existing utility services. Specific need for service interruptions would be identified and characterized during the design phase.

4.25.20.1 Mitigation of Construction Impacts to Utilities—All Action Alternatives

Affected customers would be given advance notice of any service interruptions. For longer outages, temporary facilities would be provided to ~~ensure~~ maintain~~enance~~ ~~of~~ service to affected customers.

4.26 Indirect Impacts

In addition to the direct and construction impacts described above, this analysis identifies indirect impacts of the Gravina Access Project. NEPA defines indirect effects as,

> [effects that are] caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. (40 CFR 1508.8)

An important component of secondary impact analysis for the Gravina Access Project is the estimate of the potential development that would be induced by the improved access to Gravina Island within a foreseeable planning horizon. According to the FHWA position paper on *Secondary and Cumulative Impact Assessment in the Highway Project Development Process*:[53]

> New access to undeveloped locations can contribute to subsequent development activity. In some instances, the stated purpose for proposed projects may be to promote economic development in depressed areas needing overall infrastructure improvement. In cases like these, a discussion of the indirect effects should be included in the project environmental analysis. Without it the project purpose and need will be difficult to defend and any decisions to proceed with the project may likely be challenged.

Part of the stated purpose and need of the Gravina Access Project (in Chapter 2.0) is to improve access to Borough land and other developable or recreation lands on Gravina Island to support the adopted land use plans of the Borough, and to promote environmentally sound, planned long-term economic development on Gravina Island. The degree of development that could occur on Gravina Island is based on projections for population growth in the Borough as well as Gravina Island land ownership patterns; the plans of federal, state, and Borough landowners; economic growth potential for the region; and current development patterns. Economists and planners have analyzed each Gravina Access Project Alternative for its level of convenience, user cost, and location to determine how it might influence development on Gravina Island. They have worked with the Borough planners who developed the *Gravina Island Plan* to characterize potential development patterns on Gravina Island.

Table 4-23 presents development scenarios that could occur under each project alternative. The Gravina Island development forecasts have been projected through 2033.[54] These forecasts are largely based on assumptions made in the 2002 Traffic Model, which also formed the basis of the 2011 Updated Traffic Model used in the *Gravina Access Project SEIS Traffic Forecast;*[55] background information from the *Gravina Island Plan*; population forecasts developed by the State of Alaska,[56] and input from Borough representatives.

[53] Federal Highway Administration. April 1992. *Secondary and Cumulative Impact Assessment in the Highway Project Development Process*.

[54] The forecast to 2033 represents a 15-year planning horizon from the date an action alternative c~~w~~ould become operational.

[55] Alaska Department of Transportation and Public Facilities. 2012. *Gravina Access Project SEIS Traffic Forecast.* Prepared by HDR.

[56] Alaska Department of Labor and Workforce Development, Research and Analysis Section. February 2011. *Alaska Population Projections 2010–2034*.

For the bridge alternatives, the addition of a toll would reduce the desirability of living or doing business on Gravina Island, when compared to free passage across the bridge, and in turn would reduce the amount of development on that island. The *Gravina Access Project SEIS Traffic Forecast*[57] examined three toll options for each of the two bridge alternatives. Toll Option 1 represents a high toll that would be approximately equivalent to the existing ferry crossing fee of $16 round trip ($6 for one car and $5 each for two passengers), Toll Option 2 would be a toll of $5 per vehicle round trip, and Toll Option 3 would be a toll of $2 per vehicle round trip. All tolls were assumed to be collected electronically: rather than drivers stopping to pay the toll, vehicle information would be collected via a transponder or license plate scan and then used to bill the driver directly.

A bridge toll would reduce residential development on Gravina Island, compared to a bridge with no toll, because the cost of living on the island would increase. Tolls also would also affect retail development on Gravina Island: retail developments that may depend on a Borough-wide customer base are unlikely to locate on Gravina Island if a substantial toll were in place. The analysis for Gravina Island development forecasts assumes that a toll of $5 or more would be incompatible with any retail development on Gravina Island. Industrial development would be reduced with a toll, but would not be incompatible. Table 4-24 presents the 2033 development scenarios associated with the three toll options for the bridge alternatives.

As indicated in Table 4-24, implementing a toll would reduce the amount of development on Gravina Island compared to a toll-free bridge. The cost of the toll would be inversely proportional to the amount of development; i.e., the higher the toll, the lower the amount of development.

[57] Alaska Department of Transportation and Public Facilities. 2012. *Gravina Access Project SEIS Traffic Forecast.* Prepared by HDR.

Table 4-23: Development by 2033 Assumed for Gravina and Pennock Islands in the Secondary Impact Analysis

Project Alternatives	Type and Location of New Development by 2033
No Action Alternative and Alternative G4v	Gravina Island 3 acres developed for industrial use 13 acres developed for residential use Pennock Island No additional development anticipated
Alternative C3-4 – Airport Bridge	Gravina Island 7 acres developed for limited retail 16 acres developed for industrial use 306 acres developed for residential use 2 acres dedicated to community use Pennock Island No additional development anticipated
Alternative F3 – Pennock Island Bridges	Gravina Island 7 acres developed for limited retail 16 acres developed for industrial use 306 acres developed for residential use 2 acres dedicated to community use Pennock Island 12 acres developed for residential use
Ferry Alternatives G2, G3, and G4	Gravina Island 3 acres developed for industrial use 40 acres developed for residential use Pennock Island No additional development anticipated

Source: DOT&PF. 2012. *Gravina Access Project SEIS Traffic Forecast*. Prepared by HDR.

Table 4-24: Development by 2033 for Gravina and Pennock Islands for Bridge Alternatives with Tolls

Bridge Alternatives	Type and Location of New Development by 2033		
	Toll Option 1: $16 toll	**Toll Option 2: $5 toll**	**Toll Option 3: $2 toll**
Alternative C3-4	Gravina Island No retail development 12 acres industrial development 236 acres residential development 1 acre community use Pennock Island No additional development anticipated	Gravina Island No retail development 14 acres industrial development 274 acres residential development 1 acre community use Pennock Island No additional development anticipated	Gravina Island 7 acres retail development 15 acres industrial development 284 acres residential development 2 acres community use Pennock Island No additional development anticipated
Alternative F3	Gravina Island No retail development 12 acres industrial development 223 acres residential development 2 acres community use Pennock Island 8 acres for residential use	Gravina Island No retail development 14 acres industrial development 268 acres residential development 2 acres community use Pennock Island 11 acres for residential use	Gravina Island No retail development 15 acres industrial development 280 acres residential development 2 acres community use Pennock Island 11 acres for residential use

Source: DOT&PF. 2012. *Gravina Access Project SEIS Traffic Forecast*. Prepared by HDR.

For purposes of assessing indirect impacts of the project alternatives on most resources, the higher projected development level (i.e., no toll) was used. The tolling options have a more notable impact on indirect impacts to land use (Section 4.26.1), economics (Section 4.26.3), and vehicle traffic (Section 4.26.4.3), and the analysis of impacts related to these resources takes tolling into account.

4.26.1 Land Use Impacts

The development scenarios, in combination with the Borough's *Gravina Island Plan*, were used to determine where the land use changes would likely occur. The *Gravina Island Plan* identifies five areas for planning purposes: North Gravina (which includes Rosa Reef), Central Gravina and Airport Reserve, Clam Cove and Blank Inlet, Vallenar Bay, and Tongass National Forest (see Figure 3.4). The Borough completed detailed area plans of three of these areas: North Gravina, Central Gravina and Airport Reserve, and Clam Cove and Blank Inlet. These area plans outline proposed future development on Gravina Island—including residential, commercial, industrial, and recreational development. Key elements of these area plans as they relate to the Gravina Access Project alternatives are illustrated on Figure 4.5. The locations of future development on Gravina Island described below are based on the Borough plans for these five areas relative to the location of the alternative under consideration. The Borough will likely update the Gravina Island Plan once an alternative has been selected.[58]

[58] Williams, Tom. December 6, 2011. Personal communication between Ketchikan Gateway Borough Planning Director and HDR.

4.26.1.1 No Action Alternative and Alternative G4v (Preferred Alternative)

Overall development in the Borough would continue under the No Action Alternative and Alternative G4v in response to needs for new housing and new commercial, industrial, or public facilities. Gravina Island, without improved access, would experience a small portion of the region's future development. By 2033, Gravina Island would add 3 acres of industrial development and 13 acres of residential development. Industrial development likely would occur within the Central Gravina and Airport Reserve area, whereas residential development could occur in the North Gravina or the Clam Cove areas. Water-based industrial facilities would potentially be developed in the Conceptual North Gravina Industrial Park or Conceptual South Gravina Fisheries Industrial Park (see Figure 4.5). The land use in any of these areas would be converted from open space and forested areas to developed land.

Considering the projected decline in Borough population, the rate of development on Revillagigedo and Pennock Islands would decline compared with the past 10 years. On Pennock Island, no new development is anticipated through 2033. On Revillagigedo Island, any new residential development likely would occur in existing residential developments. Industrial and commercial lands along the waterfront would continue to be areas of potential development.

Land development would continue to be constrained on Revillagigedo Island, where mostly marginal lands (steep or wet) remain available for development. Access to Borough, Airport Reserve, and Mental Health Trust lands on Gravina Island has been enhanced by development of the Gravina Island Highway. Under the No Action Alternative, however, development on Gravina Island would continue to be constrained by the airport ferry schedule and load restrictions. Alternative G4v would include a heavy freight mooring ~~dock~~facility, which would reduce the constraint presented by load restrictions, but general transportation using the airport ferry would remain a constraint.

4.26.1.2 Bridge Alternatives C3-4 and F3

With improved access to Gravina Island under Alternatives C3-4 and F3, future industrial and commercial development is projected to occupy approximately 23 acres of Gravina Island land, currently open space and forested areas along the Tongass Narrows waterfront, that is zoned for industrial/commercial development. The commercial and industrial development likely would be distributed between the conceptual industrial parks north and south of the airport (shown on Figure 4.5). The Conceptual South Gravina Fisheries Industrial Park might see more development than the Conceptual North Gravina Industrial Park because it would be closer to the bridge access of Alternatives C3-4 and F3.

By 2033, Alternatives C3-4 and F3 is projected to lead to the conversion of approximately 306 acres of open space and forested land on Gravina Island for use as residential or community development and 2 acres for community use. The new residential development likely would be in the North Gravina and Clam Cove and Blank Inlet areas, accessible via gravel roads connecting to the Gravina Island Highway, Lewis Reef Road, and Seley Road. Most residential development likely would occur in the Conceptual Clam Cove Community Development area (see Figure 4.5) because it would be closer to the bridge access of Alternatives C3-4 and F3 than other residential areas identified in the *Gravina Island Plan*.

The change in land use on Gravina Island associated with this level of development would be consistent with the planned and existing land uses (i.e., existing residential development north of the airport and at Clam Cove; industrial development on the Airport Reserve property and north of the airport) on the island.

Forecasts indicate that Alternative F3 would spur 12 additional acres of residential development on Pennock Island. Most development likely would occur along the waterfront in areas that are currently undeveloped and used as open space and forested land. The *Pennock and Gravina Island Neighborhood Plan*, adopted May 6, 1985, anticipated much more development on Pennock Island.

Owners of land on Gravina Island with significant timber resources were contacted to determine how improved access associated with the project alternatives would affect their plans for future timber harvests.[59] The transportation improvements under Alternative C3-4 would not affect timber harvests on USFS, DNR, or Alaska Mental Health Land Trust lands. Facilities associated with Alternative C3-4 would not be adjacent to areas of commercial-quality timber. Improved access via a bridge could make timber sale opportunities available to more parties, allowing transport of harvested timber by truck to processing or shipping facilities on Revillagigedo Island. Currently, there are no timber processing facilities on Revillagigedo Island; however, there was a wood products industry at Ward Cove as recent as 2002.

Adding a toll to Alternative C3-4 or F3 would reduce development on Gravina Island relative to having no toll, as noted in Table 4-23 and Table 4-24. This reduced development likely would reduce land use benefits to the Ketchikan community. Toll Option 1, having the highest toll rate would have the least land use benefit to Ketchikan because it would deter travelers from crossing Tongass Narrows.

4.26.1.3 Ferry Alternatives G2, G3, and G4

Improved ferry service in Alternatives G2, G3, and G4 would not induce industrial development on Gravina Island; i.e., the amount of industrial development would be the same as for No Action and Alternative G4v. Industrial development (3 acres) would likely occur within the Central Gravina and Airport Reserve areas on land currently used for open space and forest land.

An improved ferry alternative would induce approximately 40 acres of residential development. Alternative G2 could lead to more residential development in the North Gravina area, whereas Alternative G3 could lead to more residential development in the Clam Cove and Blank Inlet area. Most of the new land development would be accessed via gravel roads connecting to the Gravina Island Highway, Lewis Reef Road, and Seley Road. The change in land use on Gravina Island associated with this level of development would be consistent with the planned and existing land uses (i.e., existing residential development north and south of the airport; industrial development on the Airport Reserve property, and north of the airport) on the island.

As noted above, owners of land on Gravina Island with significant timber resources were contacted to determine how improved access associated with the project alternatives would affect their plans for future timber harvests.[60] The transportation improvements under the ferry alternatives would not affect timber harvests on USFS, DNR, or Alaska Mental Health Land Trust lands. No facilities associated with these alternatives would be adjacent to areas of commercial quality timber. With a heavy freight ~~dock~~mooring facility, timber could be shuttled to Revillagigedo Island for processing and shipment, although there are currently no timber processing facilities on Revillagigedo Island.

[59] Palkovic, Pat. November 3, 2010. Personal communication between DNR Area Forester and Carol Snead, HDR; Tlachac, Adam. November 4, 2010. Personal communication between USFS Tongass National Forest Forester and Carol Snead, HDR; Montgomery, Mari. November 11, 2010. Personal communication between Director of Alaska Mental Health Land Trust and Carol Snead, HDR.

[60] Palkovic, Pat. November 3, 2010. Personal communication between DNR Area Forester and Carol Snead, HDR; Tlachac, Adam. November 4, 2010. Personal communication between USFS Tongass National Forest Forester and Carol Snead, HDR; Montgomery, Mari. November 11, 2010. Personal communication between Director of Mental Health Land Trust and Carol Snead, HDR.

4.26.2 Social Impacts

The indirect impacts on the social environment would result primarily from changes in access to and new development on Gravina Island. The State of Alaska projects that the Borough population most likely will decrease over the projection period, from 12,984 residents in 2009 to 9,878 residents in 2033.[61] In addition, the population is aging. By 2033, the number of people over 65 is expected to double. It is expected that the age group from 45 to 60 will decrease beyond other age groups. With population growth in the age group that include those over 65 and a decline in the 45-to-60 age group, the working population will likely decrease. These population and employment forecasts were used to assess the effects of the Gravina Access Project alternatives on socioeconomic conditions. The population values reported in this section were incorporated into the model used to generate the development scenarios that form the basis of the indirect impacts analysis (see Table 4-23).

4.26.2.1 No Action Alternative and Alternative G4v (Preferred Alternative)

The No Action Alternative and Alternative G4v would not change the social environment of Ketchikan because neither alternative would improve access to developable lands or affect neighborhoods or social groups. Continued restrictions on access to available developable land with the existing ferry service would adversely impact the Ketchikan community by limiting development primarily to Revillagigedo Island. Constraints on access to industrial land would limit the types of industry that could be developed in the Ketchikan region, which could limit the availability of employment opportunities to those available today or similar opportunities.

The restricted access to Gravina Island (via the existing airport ferry) also would continue to limit recreational use of the island.

On Gravina Island, any new residential development could result in the formation of one or more new small neighborhoods. New industrial/commercial and residential developments on Gravina Island would rely on existing community services and facilities available from Revillagigedo Island.

Competition for subsistence resources on Gravina and Pennock Islands would not be affected by the No Action Alternative or Alternative G4v.

4.26.2.2 Bridge Alternatives

4.26.2.2.1 Alternative C3-4

By providing round-the-clock access to Gravina Island, Alternative C3-4 would promote growth and development on the island. The accessibility of developable land in more areas across the Borough would increase, with fewer constraints than under the No Action Alternative. Some industrial development could shift to Gravina Island, leaving more opportunities for other types of development (e.g., residential and commercial/retail) on Revillagigedo Island, particularly along the waterfront. The residential development on Gravina Island could occur in cluster areas, such as Clam Cove, which could lead to neighborhood structure and cohesiveness. Improved access to Gravina Island would also increase recreational opportunities in the Ketchikan area.

Competition for Gravina Island subsistence resources could increase as a result Alternative C3-4, adversely affecting current users of these resources. Residents of Saxman and Metlakatla harvest salmon and non-salmon fish (halibut, rockfish), deer, seal, birds and

[61] Alaska Department of Labor and Workforce Development, Research and Analysis Section. February 2011. *Alaska Population Projections.2010–2034.* The population projections for the Borough are based on historical data regarding the Borough's population size, and rates of fertility, mortality, and migration.

eggs (ducks, geese, and seabirds), marine invertebrates (Dungeness crab, clams, octopus, and cockles), plants and berries (seaweed, kelp. and various berries) in substantial quantities. Bridge access could attract more subsistence users to the island, benefitting the new users but increasing competition for resources and potentially lowering takes for existing users.

The projected development on Gravina Island would increase the need for community services and facilities. Revillagigedo Island would continue to provide most services (e.g., those provided by schools, libraries, and medical facilities), though emergency response services on Gravina Island (e.g., fire protection and ambulance service) would likely be enhanced as the amount of development increases.

With a toll, Alternative C3-4 would generate less traffic and less development on Gravina Island and fewer visitors than without a toll. The overall effect of this alternative on the social environment, however, would be relatively the same with or without a toll.

4.26.2.2.2 Alternative F3

By providing round-the-clock access to Gravina and Pennock islands, Alternative F3 would promote growth and development on those islands. The accessibility of developable land in the Borough would increase, with fewer location constraints than under the No Action Alternative. Some industrial development could shift to Gravina Island, leaving more opportunities for other types of development (e.g., residential and commercial/retail) on Revillagigedo Island, particularly along the waterfront. The residential development on Gravina Island could occur in cluster areas, such as Clam Cove, which could lead to neighborhood structure and cohesiveness. Improved access to Gravina Island would also increase recreational opportunities in the Borough.

Bridge access to Pennock Island could substantially change its neighborhood character. The Borough would likely revise the *Pennock and Gravina Island Neighborhood Plan*[62] to respond to the change in access to Pennock Island and ~~ensure~~ promote ~~that the~~ future development of the island ~~would occur~~ within an appropriately planned framework.

Competition for subsistence resources on Gravina and Pennock islands could increase as a result of the implementation of Alternative F3 and have an adverse effect on users of these resources. Similar to Alternative C3-4, bridge access under Alternative F3 could attract more subsistence users to the islands, increase competition for resources, and result in benefits to new users but lower takes for existing users.

The projected development on Gravina and Pennock islands would increase the need for community services and facilities. Revillagigedo Island would continue to provide most services (e.g., those provided by schools, libraries, and medical facilities), but emergency response services on Gravina and Pennock Islands (e.g., fire protection and ambulance service) likely would be enhanced as the amount of development increases.

With a toll, Alternative F3 would generate less traffic and development on Gravina and Pennock Islands and fewer visitors than without a toll. The overall effect of this alternative on the social environment, however, would be relatively the same with or without a toll.

4.26.2.3 Ferry Alternatives G2, G3, and G4

The new ferry access to Gravina Island associated with these alternatives would promote modest amounts of growth and development on the island (30 additional acres of residential development compared with No Action and Alternative G4v). The improved access offered by the additional ferry would not significantly relieve the development constraints on Revillagigedo

[62] Ketchikan Gateway Borough Planning Department. May 6, 1985. *Pennock and Gravina Island Neighborhood Plan.*

Island because some of the community would still perceive access to Gravina Island as inconvenient.

No new industrial or commercial development would occur on Gravina Island, compared to development under the No Action Alternative or Alternative G4v.

While Alternatives G2, G3, and G4 would benefit recreational users by making access to Gravina Island more convenient than the existing ferry, the benefit would not be as great as with any of the hard link (bridge) options.

On Gravina Island, any new residential growth could result in the formation of one or more new small neighborhoods. New industrial and residential developments on Gravina Island would primarily rely on existing community services and facilities available from Revillagigedo Island, but would not adversely affect these facilities given the relatively low level of projected development.

As noted for the bridge alternatives, competition for Gravina Island subsistence resources could increase as a result of Alternatives G2, G3, and G4, and result in benefits to new users but lower takes for existing users.

4.26.3 Economic Impacts

The project's indirect impacts on the economy and economic development would be related to:

- The ability of the construction industry in the Borough to participate in constructing the alternatives
- Changes in spending associated with project operations
- The effect of regional economic activity on development on Gravina and Pennock islands
- Fiscal impacts on the local economy and government services

While construction income and construction jobs would create a direct impact on the economy (discussed in Section 4.25.4), the spending by construction workers in the community would have a secondary or indirect effect on the economy. Construction workers' spending on goods and services could also induce growth in jobs and income in the local economy. Another factor that could affect the local economy would be the potential reduction in cost associated with accessing Gravina Island: both the cost of a toll and the cost associated with time spent in transit from one island to the other. These impacts are addressed in the following sections.

The Gravina Access Project would not substantially affect the amount of timber harvested from Gravina Island. Specifically, reducing the cost of accessing the island would not necessarily increase the likelihood of a timber harvest, or the volume of timber harvested from timber land owned by USFS, DNR, or Alaska Mental Health Trust on Gravina Island.

4.26.3.1 Indirect and Induced Construction Spending

When a construction firm is contracted for a project, it buys supplies and hires workers to complete the work. Suppliers and project workers then make additional purchases with this income. Purchases made with construction income are referred to as "induced construction spending." These purchases increase revenues for the suppliers, create jobs, and increase revenue for the local government through taxes and other fees. Indirect employment effects are measured relative to full-time and part-time jobs created as a result of spending by businesses, households, and local governments that directly support the project. Government revenues include taxes paid by businesses, such as excise taxes, property taxes, fees, licenses, and sales taxes; payments by households to state and local governments for estate and gift taxes, motor vehicle licenses, property taxes, fishing and hunting fees; and unemployment taxes from both businesses and households.

If Alaska-based firms were unable to supply material for the project, project funds would be transferred out of the state economy. In areas without a mature construction industry, a large share of purchases might “leak out” of the local economy through out-of-state purchases. These additional rounds of spending caused by construction firm expenditures are part of the subsequent indirect and induced effects and are collectively referred to as secondary effects.

4.26.3.1.1 No Action Alternative

There would be no construction directly associated with the No Action Alternative. A new ferry, however, would be needed every 35 years to replace the existing ferry. Assuming the replacement ferry would be constructed at Alaska Ship and Drydock, Inc., there would be an indirect benefit to the company and to the local community from construction spending in the future. The level of induced construction spending would be slightly above existing levels because ship building is an ongoing industry in the community.

4.26.3.1.2 Bridge Alternatives C3-4 and F3

The bridge alternatives would have a greater capital cost and employ about three times more construction workers than the ferry alternatives (see Section 4.25.4.1). The greater capital cost and construction requirements would generate greater supplier spending and have a greater benefit to the regional economy. With more construction workers, the bridge alternatives would generate more secondary jobs than the ferry alternatives, though many of the construction jobs created by the bridge alternatives would employ skilled laborers from outside the Ketchikan Gateway Borough. Induced construction spending by outside workers would include lodging and meal purchases, as well as other goods and services purchased within the local community. Local service providers, restaurants, hotels, grocers, and retailers would benefit from the influx of employed individuals. Government revenues would be higher under the bridge alternatives than the ferry alternatives as a result of taxes and fees on increased purchases and service providers.

4.26.3.1.3 Ferry Alternatives G2, G3, and G4

The ferry alternatives would have a lower capital cost and, therefore, lower induced construction spending than the bridge alternatives. Assuming that two new ferry vessels would be built at the Alaska Ship and Drydock, Inc., much of the direct construction spending would occur in the local economy and most of the induced construction spending would be local. The improved ferry alternatives also would include replacement of an existing ferry vessel every 35 years, which would create some induced construction spending, as noted for the No Action Alternative. With ferry construction in Ketchikan, the local industrial base would be strengthened, which could induce additional jobs and spending.

4.26.3.1.4 Ferry Alternative G4v (Preferred Alternative)

Similar to the No Action Alternative and ferry alternatives, Alternative G4v would require a replacement ferry built in Ketchikan every 35 years, which would create some induced construction spending in the future. Construction spending associated with the other improvements associated with Alternative G4v (e.g., passenger waiting facility, heavy freight ~~dock~~mooring facility) would have a more immediate impact on induced construction spending; however, the overall benefit would be relatively minor given the very low capital cost associated with this alternative.

4.26.3.2 Changes in Spending Associated with Project Operations

Secondary spending associated with long-term operations and maintenance of the project alternatives would result from employment, product purchases, property-type income (such as rents), and indirect business taxes, and could affect the local and regional economy. Changes in discretionary spending due to the presence or absence of tolls for the various alternatives could also have secondary effects on the local economy. Effects on state and local revenues from long-term use of the project are described in Section 4.26.3.3.

The action alternatives would have minimal effects on secondary spending associated with employment, product purchases, property-type income, and taxes. Tolls, in the case of bridge alternatives with tolls, and ferry fees, in the case of the No Action and ferry alternatives, would somewhat offset the O&M costs of each of those alternatives. Tolls would reduce the discretionary spending available to users and reduce the amount that can be spent elsewhere in the local economy.

4.26.3.3 Fiscal Impact on the Ketchikan Gateway Borough, City of Ketchikan, and City of Saxman

4.26.3.3.1 No Action Alternative and Alternative G4v (Preferred Alternative)

The No Action Alternative and Alternative G4v would have no impact on property tax revenues or business and sales tax revenues for the Borough, City of Ketchikan, or City of Saxman.

4.26.3.3.2 Bridge Alternatives C3-4 and F3, and Ferry Alternatives G2, G3, and G4

Improved access to Gravina Island (and, with Alternative F3, Pennock Island) would result in increased property values on those two islands, thus generating greater property tax revenue for the Borough. This would be particularly true for the more convenient and toll-free bridge options. Offsetting this effect, at least to some extent, would be probable decreases in property values on Revillagigedo Island as the availability of additional land on Gravina and Pennock islands reduced demand for Revillagigedo Island land. The net effect on property tax revenue from this change in land value is uncertain.

Private lands would be acquired for Alternatives C3-4, F3, and G3 (see Section 4.25.4 and Table 4-19). When private property is acquired for public right-of-way, it is removed from the tax rolls for the Borough and the City of Ketchikan, if located within the city limits. None of the action alternatives would require lands located within the City of Saxman. The conversion of private lands to public rights-of-way for Alternative C3-4, F3, or G3 would reduce the associated property tax revenues in the Borough and in the City of Ketchikan by less than 1 percent.

Studies for the 2004 FEIS determined that the bridge alternatives with 200-foot vertical clearance and 550-foot horizontal clearance, similar to Alternatives C3-4 and F3 in this SEIS, have sufficient clearance to permit the passage of larger cruise ships and, therefore, would not change cruise ship operations or cruise-related spending[63,64]. FHWA and DOT&PF concluded that Alternatives C3-4 and F3 would have no effect on cruise ship operations or cruise-related spending and no indirect effect on the local economy.

Some comments on the 2013 Draft SEIS disagreed with FHWA's and DOT&PF's conclusion that Alternatives C3-4 and F3 would have no effect on cruise ship operations or cruise-related spending. They expressed concern that cruise lines would reduce the length and/or number of port calls in Ketchikan to avoid transiting under a bridge, which would indirectly affect cruise-

[63] Alaska Department of Transportation and Public Facilities. May 2003. *Gravina Access Project Effects on Cruise Ship Operations.* Prepared for DOT&PF and HDR by Northern Economics Inc. and Kugherz and Associates.

[64] Alaska Department of Transportation and Public Facilities. April 2003. *Gravina Access Project Economic Impact Assessment.* Prepared for DOT&PF and HDR by Northern Economics Inc.

related spending and have an adverse effect on the local economy. Specifically, in its comments on the 2013 Draft SEIS, the City of Ketchikan stated it receives over $25,000 in port fees per port call (see Table 7-1) and a reduction in the number port calls from larger cruise lines (i.e., those avoiding transiting around or under the bridge over Tongass Narrows) would result in a decrease of port fee revenue for the City of Ketchikan.

The 2003 *Gravina Access Project Economic Impact Assessment* reported that closing off Tongass Narrows to cruise ships by constructing a bridge with a vertical navigational clearance of 120 feet could result in a reduction in the number of cruise ship port calls and an estimated 0 to 4 percent reduction in visitor spending.[65] While Alternatives C3-4 and F3, with vertical navigational clearances of 200 feet, would not preclude most cruise ships from transiting through Tongass Narrows, some reduction in cruise ship port calls could occur. If any reduction in cruise ship port calls were realized under Alternatives C3-4 or F3, FHWA and DOT&PF assume the reduction in visitor spending would be in the lower end of the 0 to 4 percent range determined for bridges with much lower vertical clearances.

Business and sales tax revenues for the Borough, City of Ketchikan, and City of Saxman would not be substantially affected by Alternatives ~~C3-4, F3,~~ G2, G3, and G4.

4.26.3.4 Additional Infrastructure and Government Services

4.26.3.4.1 No Action Alternative and Alternative G4v (Preferred Alternative)

With the No Action Alternative and Alternative G4v, a greater portion of regional economic development likely would occur on Revillagigedo Island. Current development on the periphery of Ketchikan would likely continue. Such development would also require additional government services and infrastructure. Limited development would be expected on Gravina Island in the future under the No Action Alternative and Alternative G4v, so infrastructure requirements and needs for government services on the island would be limited.

4.26.3.4.2 Bridge Alternatives C3-4 and F3, and Ferry Alternatives G2, G3, and G4

Development on Gravina or Pennock islands would primarily be a transfer of growth that would have otherwise occurred on Revillagigedo Island. As a result, the location of additional infrastructure and where government services are provided within the Borough would change, but the total amount of such infrastructure and services would not be substantially affected.

With any of the action alternatives, development on Gravina Island would require infrastructure and government services. Again, these effects would depend on the nature and scale of the development. For example, a high-density residential development would probably require street lighting and sewage services, whereas a low-density development probably would not. However, an expansion of police, fire, and other emergency services would almost certainly be necessary after a sufficient amount of residential and commercial development occurred. Since the bridge alternatives would result in higher levels of development than the ferry alternatives, the provision of infrastructure and government services on Gravina Island would be required sooner with the bridge alternatives than with the ferry alternatives. The City of Ketchikan and the Borough would determine when those services would be provided in the future.

[65] Alaska Department of Transportation and Public Facilities. April 2003. *Gravina Access Project Economic Impact Assessment.* Prepared for DOT&PF and HDR by Northern Economics Inc.

4.26.3.5 Regional Economic Development

4.26.3.5.1 No Action Alternative and Alternative G4v (Preferred Alternative)

Based on the medium economic growth forecast for the Borough summarized in *Ketchikan Gateway Borough Economic Forecasts,*[66] prepared for this project, the sectors of highest growth in the foreseeable future likely would be in the trade and services sector, which is driven primarily by tourism activity. Tourism is expected to continue to be a major component of the regional economy, with Ketchikan being a frequent port of call for cruise ships.

4.26.3.5.2 Bridge Alternatives C3-4 and F3, and Ferry Alternatives G2, G3, and G4

Development of one of the action alternatives could shift some economic activity to Gravina Island from Revillagigedo Island. According to the development scenarios presented in Table 4-23, a bridge alternative would result in more interest in Gravina Island housing than improved ferry service because of the greater convenience that a bridge would offer. However, development of additional roads and other infrastructure by the Borough would be necessary to achieve more than very modest levels of economic development on Gravina Island by 2033. Without the Borough support for expansion of the road and utilities networks on the island, development would be constrained.

Anticipated population decline could lower regional land prices and housing costs in the Borough, a trend that could be exacerbated by improved access to developable land on Gravina Island.[67] Lower housing costs might expand the pool of qualified buyers at all price levels and stimulate some purchases that would not otherwise be made. This effect on housing costs would benefit potential buyers. However, each market transaction requires a seller, too, and landowners may receive lower prices when selling their properties. As noted previously, much of the growth on Gravina or Pennock islands would represent a transfer of development that would have occurred on Revillagigedo Island.

As noted in Section 4.26.3.3.2, Alternatives C3-4 and F3 could ~~None of these alternatives would~~ affect cruise ship port calls in Ketchikan. The number of cruise ships passengers stopping in Ketchikan would decline if port calls were reduced, causing a dip in the tourism economy. Cruise ship port calls would not change as a result of implementation of a ~~bridge or~~ ferry alternative; therefore, ~~there would be~~ no change to the tourism economy associated with cruise ship operations would occur with Alternative G2, G3, G4, or G4v.

4.26.3.6 Economic Benefits to Users of the Bridge or Ferry

The benefits to users of the Gravina Access Project alternatives would arise in two principal categories: those associated with existing trips, and those associated with new demand for trips.

The first category includes potential time savings for existing trips (representing the current level of travel across Tongass Narrows, primarily trips to the airport) and the improved standard of living and productivity gains associated with those savings. The benefit to existing users also considers the change in out-of-pocket costs such as tolls (also addressed in Sections 4.5 and 4.26.3.2) and vehicle operating costs, and, statistically, a change in accident probability rates due to a shift from one transportation mode or LOS to another.

[66] Alaska Department of Transportation and Public Facilities. August 2002. *Gravina Access Project*, *Ketchikan Gateway Borough Economic Forecasts Technical Memorandum*. Prepared for HDR by Northern Economics.

[67] The magnitude of the effect on land prices would depend, in part, on how much additional land becomes available. Although, overall, regional land prices are likely to fall, initially, land prices on Gravina Island would be expected to rise. At present, there are no clear indications how Gravina Island property owners might react to higher prices, thus there are no indications of the amount of land that might be made available.

Benefits in the second principal category would arise in the form of additional trips to and from Gravina Island by travelers for whom the costs and inconvenience of access under the existing ferry system were outweighed by the value of opportunities on Revillagigedo Island, such as access to shops, work places, and social and recreational activities. With potential development induced by the Gravina Access Project, opportunities such as new retail outlets would emerge in response to the new cost-to-value travel equation, leading to additional demand for travel between Gravina and Revillagigedo islands. The new opportunities could be followed by or led by new residential and workplace development.

Table 4-25 provides a summary of the user benefits associated with bridge alternatives, and Table 4-26 provides the same summary for ferry alternatives. The benefits are shown in 2012 dollars and are a compilation of savings over 75 years (2012 to 2086), and these are further explained for each alternative following the tables. The environmental impacts of each alternative affect the overall benefit to users. For purposes of this analysis, environmental costs (shown as negative environmental benefits) are based on annual emissions calculated per vehicle mile traveled for each of the alternatives.

Table 4-25: User Economic Benefits of Bridge Alternatives Relative to the No Action Alternative 2012—2086 (2012 $Million)

	Bridge Alternatives							
	Alternative C3-4 (by toll rate)				Alternative F3 (by toll rate)			
	None	$2	$5	$16	None	$2	$5	$16
Existing Trips[a]								
Travel time savings	15.3	15.3	15.3	15.3	6.4	6.4	6.4	6.4
Operating cost savings	35.5	33.8	33.8	33.8	33.4	33.4	33.4	33.4
Accident cost savings	1.1	1.1	1.1	1.1	0.3	0.3	0.3	0.3
Emissions costs	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0
Existing trip benefits	***53.0***	***51.4***	***51.4***	***51.4***	***41.4***	***41.4***	***41.4***	***41.4***
New Trips[b]								
Travel time savings	20.8	18.9	11.2	9.2	20.0	18.0	10.0	8.0
Emissions costs	(1.2)	(1.2)	(0.7)	(0.6)	(1.3)	(1.3)	(0.9)	(0.8)
New trip benefits	***19.6***	***17.7***	***10.5***	***8.6***	***18.9***	***16.8***	***9.2***	***7.4***
Environmental costs (habitat losses)	***(2.3)***	***(2.3)***	***(2.3)***	***(2.3)***	***(2.7)***	***(2.7)***	***(2.7)***	***(2.7)***
Total project benefits	**70.3**	**66.7**	**59.5**	**57.7**	**57.6**	**53.8**	**46.3**	**44.5**

Note: Numbers in parentheses represent negative values. Rounding affects total values; total benefits may not equal column totals.

Source: HDR. 2012. *Cost-Benefit Analysis of Gravina Access Project Alternatives*

[a] Existing trips are based on forecasts of passenger trips under the No Action Alternative.

[b] New trips are trips induced by improved access; i.e., trips that occur as a result of growth and development associated with the action alternative.

Table 4-26: User Economic Benefits of Ferry Alternatives Relative to the No Action Alternative 2012—2086 (2012 $Million)

	Ferry Alternatives			
	G2	G3	G4	G4v
Existing Trips[a]				
Travel time savings	0.1	0.1	2.3	0.0
Vehicle operating cost savings	(25.3)	(25.1)	(25.2)	(0.2)
Accident cost savings	0.0	0.0	0.0	0.0
Emissions costs	0.0	0.0	0.0	0.0
Existing trip benefits	***(25.2)***	***(25.0)***	***(22.9)***	***(0.2)***
New Trips[b]				
Travel time savings	0.2	0.2	0.0	0.0
Emissions costs	(2.3)	(2.4)	(1.1)	0.0
New trip benefits	***(2.1)***	***(2.2)***	***(1.1)***	***0.0***
Environmental costs (habitat losses)	***(2.1)***	***(1.9)***	***(1.2)***	***(1.2)***
Total project benefits	**(29.5)**	**(29.2)**	**(25.2)**	**(1.5)**

Note: Numbers in parentheses represent negative values. Rounding affects total values; total benefits may not equal column totals.

Source: HDR. 2012. *Cost-Benefit Analysis of Gravina Access Project Alternatives*

[1] Existing trips are based on forecasts of passenger trips under the No Action Alternative.

[2] New trips are trips induced by improved access; i.e., trips that occur as a result of growth and development associated with the action alternative.

4.26.3.6.1 No Action Alternative

User benefits are calculated as the change from the No Action Alternative, so by definition, the No Action Alternative would not have any impacts.

4.26.3.6.2 Bridge Alternative C3-4

For the bridge alternative located near the airport, the majority of user benefits would be realized from existing trips, because this alternative would provide for shorter trip times to the airport. Bridge tolls would not greatly affect existing trips because users pay a toll, in the form of a fare, for the ferry now.[68] The benefits realized from new demand also could be substantial for similar reasons, but would be influenced by a toll. The increased vehicle operating costs, accident costs, and emission costs due to increased roadway vehicle use (access by driving on a roadway and bridge rather than crossing by ferry) would offset these user benefits. Compared with the other action alternatives, Alternative C3-4 would provide the greatest user benefits, with total benefits in the range of $51 million to $63 million over 75 years.

4.26.3.6.3 Bridge Alternative F3

Like Alternative C3-4, the user benefits from Alternative F3 would be derived primarily from existing trips to Gravina Island, although the benefits related to existing trips would be smaller because more roadway travel would be required and the time savings would be less. As with Alternative C3-4, benefits associated with existing trips would be about the same with or without a toll, though a toll would influence new trip benefits. Also similar to Alternative C3-4, offsets to user benefits with Alternative F3 would be the increased vehicle operating costs, accident costs,

[68] Alaska Department of Transportation and Public Facilities. November 2002. *Gravina Access Project, Quantification of User Economic Benefits Technical Memorandum*. Prepared for HDR by HLB Decision Economics, Inc.

and emission costs due to increased roadway vehicle use. Overall, Alternative F3 would provide total benefits in the range of $40 million to $51 million over 75 years.

4.26.3.6.4 Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

The ferry alternatives maintain use of the existing airport ferry with additional service at other locations (Alternatives G2 and G3), additional service at an adjacent location (Alternative G4) or no additional service. For Alternatives G2, G3, and G4, substantial economic impacts associated with existing trips would result from operations and maintenance costs of the new ferry. Emissions costs would be the same as No Action, and other environmental costs would be smaller than those of the bridge alternatives. Travel time savings from existing and new trips for the ferry alternatives would not offset the O&M costs or environmental costs. More frequent service at the existing airport ferry location under Alternative G4 would result in benefits greater than the other improved ferry alternatives because of the travel time savings for airport travelers, but much less than the bridge alternatives.

The new facilities associated with Alternative G4v do not provide enough of an economic benefit to differentiate it from the No Action Alternative.

4.26.4 Transportation Impacts

4.26.4.1 Aviation Impacts

4.26.4.1.1 No Action Alternative and Alternative G4v (Preferred Alternative)

Neither ~~T~~the No Action Alternative nor Alternative G4v would have ~~no~~ indirect impacts to aviation.

4.26.4.1.2 Bridge Alternatives C3-4 and F3, and Ferry Alternatives G2, G3, and G4

~~With the exception of Alternative G4v, t~~The traffic projections associated with ~~the action a~~Alternatives C3-4 and F3, and Ferry Alternatives G2, G3, and G4 (Table 4-27) indicate a secondary impact could be a lack of sufficient parking at the airport by 2033. In the 2004 FEIS, all alternatives (bridges and ferries) included a parking structure adjacent to the airport terminal to accommodate anticipated future needs for airport travelers. This feature was removed from the alternatives evaluated in this SEIS because FHWA and DOT&PF determined that future development of parking facilities would occur when warranted and when funding became available. The type and extent of parking facilities at the airport would be determined based on future demand, which is unknown at this time. The funding source likely would be the FAA rather than FHWA because parking is an airport function. DOT&PF considers the future expansion of parking facilities on Gravina Island at the airport as a reasonably foreseeable future action and provides an assessment of impacts in Section 4.27, Cumulative Impacts.

4.26.4.2 Marine Navigation Impacts

4.26.4.2.1 No Action Alternative and Alternative G4v (Preferred Alternative)

Neither the No Action Alternative nor Alternative G4v would have indirect impacts to marine navigation. Any water-based facilities developed on Gravina Island under these two alternatives likely would not create enough marine traffic to affect marine navigation in Tongass Narrows.

4.26.4.2.2 Bridge Alternatives C3-4 and F3

These bridge alternatives could have long-term secondary effects on marine navigation because of increased risk and the requirement for one-way passage of ships transiting under a bridge could require schedule changes and/or speed adjustments for cruise ship operators.

These changes could be made within a reasonable range of modifications to operations similar to those that occur now to account for tide and weather changes.

For both bridge alternatives, the potential development of water-based facilities in the North Gravina Industrial Park (see Figure 4.5) likely would not affect marine navigation in Tongass Narrows because the width of Tongass Narrows at this location could accommodate higher volumes of marine traffic. For Alternative F3, the potential development of water-based facilities in the South Gravina Fisheries Industrial Park and Clam Cove Community Development (see Figure 4.5) could affect marine navigation by adding congestion to West Channel of Tongass Narrows, which would be the primary travel corridor for all ships in excess of 60 feet in height.

4.26.4.2.3 Ferry Alternatives G2, G3, and G4

Alternatives G2, G3, and G4 would have negligible indirect impacts to marine transportation. The potential development of water-based facilities in the North Gravina or South Gravina Fisheries industrial parks (see Figure 4.5) likely would not affect marine navigation in Tongass Narrows because the width of Tongass Narrows at these locations could accommodate higher volumes of marine traffic.

4.26.4.3 Vehicle Traffic Impacts

The secondary effects of the Gravina Access Project on vehicle traffic are based on traffic projections developed for the 2004 FEIS and updated projections developed in the 2011 Traffic Model, which was used in the *Gravina Access Project SEIS Traffic Forecast*. The 2004 FEIS (based on a 2002 traffic model) presented traffic volumes projected to 2025, and the 2011 Traffic Model presented traffic volumes projected to 2033. The 2011 model was based on a 20-year forecast starting in 2013, assuming construction would be complete by then. These projections are shown in Table 4-27. Table 4-27 also shows traffic projections for the bridge alternatives with the three toll options. The values in Table 4-27 show how tolls affect traffic volumes, with decreasing traffic corresponding to increasing tolls. Table 4-27 also shows lower traffic volumes overall in the 2011 Traffic Model results relative to 2002 Traffic Model results. This can be attributed in part to the use of more current (2010 Census) population data in the Gravina Island development projections. In both cases (2002 and 2011 model results), the analysis indicates the bridge alternatives would induce greater development on Gravina Island, which would create a demand much greater than the projected demand under the No Action or ferry alternatives. Based on a revised project schedule, construction may not be completed until 2019, or 2022 in the case of the bridge alternatives, in which case the 20-year planning horizon would shift to 2038 or 2042. Based on population forecasts, growth in the Ketchikan Gateway Borough is likely to slow and remain stagnant by 2033. There is no evidence to indicate population in the Borough would grow after 2033. Because population is expected to remain stagnant after 2033 and for purposes of this analysis, the traffic forecast for 2033 is considered representative of anticipated traffic in 2038 and 2042.

Table 4-27: Traffic Projections For Project Alternatives

Alternative	2025 Average Daily One-way Trips Across Tongass Narrows based on 2002 Traffic Model[a]	2033 Average Daily One-way Trips Across Tongass Narrows based on 2011 Traffic Model [b]	
	Vehicles	People	Vehicles
No Action and Alternative G4v	1,350	865	208
Bridge Alternatives			
Alternative C3-4, no toll	4,300	3,930	2,611
Toll Option 1 ($16)	NA	2,190	1,369
Toll Option 2 ($5)	NA	2,514	1,606
Toll Option 3 ($2)	NA	3,618	2,388
Alternative F3, no toll	5,100	4,092	2,730
Toll Option 1 ($16)	NA	2,323	1,471
Toll Option 2 ($5)	NA	2,699	1,749
Toll Option 3 ($2)	NA	3,756	2,495
Ferry Alternatives			
Alternatives G2, G3, and G4	1,600	1,060	282

[a] 2004 FEIS
[b] DOT&PF. 2012. *Gravina Access Project SEIS Traffic Forecast.* Prepared by HDR.

Level of Service (LOS)[69] estimates for the 12 study area intersections and the approaches to the alternatives presented in the 2004 FEIS can be applied to the SEIS alternatives. Alternatives F3, G2, G3, and G4 are in identical locations as those presented in the 2004 FEIS and would affect the same study area intersections. Alternative C3-4 would affect the same intersections as FEIS Alternative C3(a). The traffic volumes presented in the 2004 FEIS, which relied on the 2002 Traffic Model, are much higher than those determined in the updated 2011 Traffic Model; therefore, using the LOS estimates from the 2004 FEIS provides a conservative estimate of LOS impacts for the SEIS alternatives. Note that the LOS analysis in the 2004 FEIS used projections to 2025. Those results are presented here for the SEIS alternatives.

The analysis was conducted for the afternoon peak hour, as this time period places the greatest demands on the roadway system. Intersections with a LOS E or F are considered to have traffic impacts deemed “unacceptable” from a traffic engineering perspective.

Traffic projections and the LOS analysis for the No Action Alternative represent baseline traffic conditions. Alternative G4v would not measurably affect traffic volumes; therefore LOS under Alternative G4v is the same as the No Action Alternative. Based on traffic projections associated with the improved ferry alternatives (Alternatives G2, G3, and G4), these alternatives would not significantly affect the background traffic conditions on the local roadway system; therefore, LOS was calculated only for the intersections associated with the new and existing ferry terminal access points for these alternatives. Table 4-28 provides the projected LOS for the No Action Alternatives and the bridge alternatives (Alternatives C3-4 and F3) at the analyzed intersections. Table 4-29 provides the projected LOS for the ferry alternatives where the ferry terminal access points intersect Tongass Avenue. Note that the *Highway Capacity Manual* methodology provides a composite LOS for signalized intersections and for the LOS for each minor move (individual approaches) at unsignalized intersections.

[64]The LOS describes the quality of traffic operations, ranging from A (least congested, least delay) to F (most congested, most delay).

Table 4-28: Level of Service at Project Area Intersections—No Action and Bridge Alternatives (Projections for 2025)

Intersection with Tongass Avenue (existing type of control)	Alternatives					
	No Action Alternative		Bridge Alternatives			
			C3-4		F3	
	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)
Deermount (stop sign)						
Eastbound left turn	A	9.1	A	9.2	A	9.7
Southbound left turn	F	55.5	F	72.3	F	142.4
Southbound right turn	B	14.2	C	15.0	C	17.1
Bawden (stop sign)						
Northbound left turn	A	8.5	A	8.6	A	8.9
Southbound left and right turns	A	9.1	A	9.4	A	9.6
Westbound left and right turns	F	209.1	F	344.1	F	557.4
Eastbound left turn	F	112.4	F	172.0	F	327.0
Eastbound right turn	C	24.7	D	28.7	E	37.0
Main (stop sign)						
Northbound left turn	A	8.8	A	9.0	A	9.3
Southbound left and right turns	A	8.4	A	8.6	A	8.7
Westbound left and right turns	D	26.7	D	34.6	E	45.1
Eastbound left and right turns	E	40.1	F	54.3	F	87.0
Mission (stop sign)						
Northbound left turn	B	11.5	B	12.1	B	12.8
Dock (signal sign)	A	5.1	A	5.2	A	5.4
Schoenbar (stop sign)						
Eastbound left turn	C	18.5	C	20.2	C	21.4
Westbound left turn	B	11.0	B	11.4	B	11.5
Northbound left and right turns	F	**	F	**	F	**
Southbound left turn	F	**	F	**	F	**
Southbound right turn	F	169.2	F	224.8	F	249.1
Washington (signal)	A	9.4	B	10.3	B	11.1
Jefferson (signal)	B	16.8	B	18.2	B	18.5
Third (stop sign)						
Eastbound left turn	B	13.7	B	14.8	B	14.3
Southbound left turn	F	261.5	F	401.7	F	330.7
Southbound right turn	C	15.3	C	16.5	C	15.9

Intersection with Tongass Avenue (existing type of control)	Alternatives					
	No Action Alternative		Bridge Alternatives			
			C3-4		F3	
	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)
Carlanna (signal)	E	57.3	E	68.7	E	68.7
Bryant (stop sign)						
Eastbound left turn	A	10.0	B	10.5	B	10.2
Southbound left turn	F	168.5	F	326.9	F	305.2
Southbound right turn	C	17.5	C	20.4	C	18.4
Airport Ferry Access Point (stop sign)						
Westbound left turn	B	10.8	—	—	—	—
Northbound left and right turns	F	91.6	—	—	—	—
Alternative C3-4 Access (Tongass Avenue at Signal Road)						
Eastbound left turn	—	—	B	10.6	—	—
Southbound left turn	—	—	F	986.0	—	—
Alternative F3 Access						
Westbound left turn	—	—	—	—	A	9.9
Northbound left turn	—	—	—	—	A	321.2

** Delay greater than 1,000 seconds per vehicle.
— Intersection does not exist in this alternative.

Table 4-29: Level of Service at Project Area Intersections—Ferry Alternatives (Projections for 2025)

Intersection with Tongass Avenue (type of control)	Ferry Alternative							
	G2		*G3*		*G4*		*G4v*	
	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)
Jefferson Street (signal)								
Alternative G3 Access	—	—	C	22.9	—	—	—	—
Existing Airport Ferry Access Point (stop sign)								
Westbound left turn	B	10.6	B	10.3	B	10.9	B	10.8
Northbound left and right turns	D	26.1	E	38.5	F	125.9	F	91.6
Alternative G2 Access (stop sign)								
Westbound left turn	B	10.3	—	—	—	—	—	—
Northbound left and right turns	D	29.5	—	—	—	—	—	—

— Intersection does not exist in this alternative.

4.26.4.3.1 No Action Alternative

Traffic projections show that, under the No Action Alternative, the LOS would decrease from existing acceptable levels to unacceptable levels (i.e., E or F), resulting in corresponding traffic congestion and vehicle delays, for one or more turning movements at the following seven project area intersections:

- Deermount Street and Stedman Street/Tongass Avenue

- Bawden Street and Front Street/Tongass Avenue
- Main Street and Front Street/Tongass Avenue
- Schoenbar Road and Tongass Avenue
- Carlanna Lake Road and Tongass Avenue
- Bryant Street and Tongass Avenue
- Airport ferry access point and Tongass Avenue

These intersections would require traffic signal operation to attain acceptable traffic conditions in the future, regardless of the project. With the exception of the Third Avenue southbound left turn movement, traffic at the remaining five intersections included in the analysis would not be affected by future (2025) traffic conditions because the length of delay would not increase by more than a few seconds and the intersections would continue to operate at LOS C or better. The Third Avenue southbound left turn movement would continue to operate at LOS F, and the delay would increase from 65 seconds (existing, see Table 3-17) to approximately 262 seconds (2025).[70]

4.26.4.3.2 Bridge Alternative C3-4

With Alternative C3-4, the intersection of North Tongass Highway and Signal Road would operate at unacceptable levels (i.e., LOS F) for turning movements from Signal Road onto Tongass Avenue. Vehicle travel between the bridge and Tongass Avenue would be adversely affected by long delays at that intersection. Most traffic from the bridge to Tongass Avenue likely would use the signalized Don King Road/Tongass Avenue intersection. The timing of this signal could be adjusted to accommodate hours of peak traffic flow to ~~ensure~~ meet acceptable LOS.

The LOS at the intersections of Tongass Avenue with Deermount Street, Bawden Street, Main Street, Washington Street, and Bryant Street would be adversely affected for certain turning motions by 2025.

Mitigation

DOT&PF would closely monitor the intersections of Tongass Avenue with Deermount Street, Bawden Street, Main Street, Washington Street, and Bryant Street, and a corrective action (e.g., installation of traffic signals) would be taken to avoid any LOS reduction.

4.26.4.3.3 Bridge Alternative F3

The intersection of Alternative F3 with South Tongass Highway would operate at unacceptable levels (i.e., LOS F). Long delays would adversely affect vehicle travel between the F3 alignment and South Tongass Highway.

A traffic signal would be installed at the Alternative F3 access to South Tongass Highway to reduce traffic congestion and vehicle delays, and to restore operating conditions to acceptable levels of service. Pedestrian signals would be included as part of the signal installation. The traffic signal itself would cause some off-peak traffic delays. However, if no signal were installed, the additional peak hour traffic expected by 2025 would delay traffic even more and exacerbate LOS problems.

The LOS for certain turning motions at the intersections of Tongass Avenue with Bawden Street, Main Street, Washington Street, and Bryant Street would be adversely affected by 2025.

[70] The amount of delay is exaggerated; however, due to an anomaly in the analysis methodology that allows a single left turn to disproportionately affect delay. The projected number of left turns is limited to one for all analysis cases. As such, improvements were not investigated at this location.

Alternative F3 would affect traffic entering and exiting the USCG Station because most Alternative F3 traffic would have to pass the entrance to the station. Vehicles entering and exiting the USCG Station would likely experience delays during the peak hours.

Mitigation

DOT&PF would closely monitor the intersections of Tongass Avenue with Bawden Street, Main Street, Washington Street, and Bryant Street and a corrective action (e.g., installation of traffic signals) would be taken to avoid any reduction in LOS.

4.26.4.3.4 Ferry Alternative G2

Under Alternative G2, LOS at project area intersections would be no worse than under the No Action Alternative. Both the existing airport ferry access point and the Peninsula Point ferry access point would operate at LOS D. Background traffic levels resulting in unacceptable LOS at the intersections of Tongass Avenue with Deermount Street, Bawden Street, Main Street, Schoenbar Road, Carlanna Lake Road, and Bryant Street would not be affected by Alternative G2. The new ferry terminal at Peninsula Point would reduce traffic at the existing airport ferry access point, and improve the LOS to D as compared with the background LOS of F. This alternative would therefore have a slight beneficial effect on traffic.

4.26.4.3.5 Ferry Alternative G3

Under Alternative G3, LOS at project area intersections would be no worse than under the No Action Alternative. Turning movements onto Tongass Avenue from the existing airport ferry access point would experience delay at LOS E, which would be an improvement compared with the background level (F), but would still be unacceptable. The new ferry access point at Jefferson Street would operate at LOS C. Background traffic levels resulting in unacceptable LOS at the intersections of Tongass Avenue with Deermount Street, Bawden Street, Main Street, Schoenbar Road, Carlanna Lake Road, and Bryant Street would not be affected by Alternative G3.

Mitigation

DOT&PF would closely monitor the intersection of Tongass Avenue with the existing airport ferry access point and take corrective action (e.g., installation of traffic signals, pedestrian signals) should LOS become unacceptable.

4.26.4.3.6 Ferry Alternatives G4 and G4v (Preferred Alternative)

Under Alternatives G4 and G4v, LOS at project area intersections would be no worse than under the No Action Alternative. Turning movements onto Tongass Avenue from the existing airport ferry access point would experience delay at LOS F, the same LOS anticipated for future background levels. The LOS at this intersection would be unacceptable. Alternatives G4 and G4v would not affect background traffic levels resulting in unacceptable LOS at the intersections of Tongass Avenue with Deermount Street, Bawden Street, Main Street, Schoenbar Road, Carlanna Lake Road, and Bryant Street.

Mitigation

DOT&PF would closely monitor the intersection of Tongass Avenue with the existing airport ferry access point and take corrective action (e.g., installation of traffic signals, pedestrian signals) should LOS become unacceptable.

4.26.5 Pedestrians and Bicyclists

4.26.5.1 No Action Alternative

Based on the LOS traffic analysis for the 12 study area intersections described in Section 4.26.4.3, seven project area intersections would have acceptable traffic conditions in the future. These intersections are:

- Deermount Street and Stedman Street/Tongass Avenue
- Bawden Street and Front Street/Tongass Avenue
- Main Street and Front Street/Tongass Avenue
- Schoenbar Road and Tongass Avenue
- Carlanna Lake Road and Tongass Avenue
- Bryant Street and Tongass Avenue
- Existing ferry terminal and Tongass Avenue

Under future conditions, with no new traffic control measures, pedestrian and bicyclist safety would be compromised. If new signals were added to these intersections, they would likely include pedestrian phasing to improve pedestrian and bicyclist safety.

4.26.5.2 Bridge Alternative C3-4

Improvements or changes to the signal at the Don King Road/Tongass Avenue intersection would include accommodations for pedestrians and bicycles, including pedestrian signals and cross walks. Pedestrian and bicycle safety would be maintained.

4.26.5.3 Bridge Alternative F3

Based on the projected traffic levels, the new intersection formed by the bridge intersection with Tongass Avenue would require traffic signal operation to achieve acceptable conditions. In addition to the other intersections requiring traffic signals for the No Action Alternative, the new intersection would be equipped with pedestrian signals, providing another safe crossing of Tongass Avenue for pedestrians and bicyclists. Pedestrian and bicycle safety would be maintained.

4.26.5.4 Ferry Alternatives G2 and G3

The new intersection formed by the intersection of the new ferry terminal access point with Tongass Avenue would operate at acceptable levels under projected traffic conditions; therefore, no new traffic signal on Tongass Avenue would be required. There would be no pedestrian signals and no additional safe crossing of Tongass Avenue for pedestrians and bicyclists. Pedestrian and bicycle turning movements may conflict with vehicles, creating a safety concern near the new ferry terminals.

4.26.5.5 Ferry Alternatives G4 and G4v (Preferred Alternative)

The existing intersection formed by the ferry terminal access point with Tongass Avenue would operate at unacceptable levels under projected traffic conditions, and could require a new traffic signal on Tongass Avenue to reduce pedestrian and bicyclist impacts. A new traffic signal at this intersection would be expected to include pedestrian phasing, which would increase pedestrian and bicyclist safety over existing conditions with no traffic signals.

4.26.6 Air Quality Impacts

Increased vehicle traffic associated with the projected development would increase emissions of air pollutants of concern that includes carbon monoxide, PM_{10}, and $PM_{2.5}$.; however, because the project area has always been in attainment with respect to the NAAQS and because the projections for increased traffic volumes associated with the Gravina Access Project alternatives would be fewer than 3,000 vehicles per hour, no air quality conformity analysis or detailed modeling is required.

Based on the air quality analysis presented in the 2004 FEIS, the PM_{10} and $PM_{2.5}$ concentrations associated with projected 2025 traffic levels would each be less than half of both the NAAQS 24-hour and annual averages. Traffic volumes projected in the 2004 FEIS are greater than the updated traffic volumes presented in this SEIS (see Table 4-27). Consequently, PM_{10} and $PM_{2.5}$ concentrations would be lower than calculated in the 2004 FEIS. In addition, paved roads generally contribute to only a small fraction of the total particulate matter concentration at any location (the majority is anticipated to be caused by other sources such as fuel combustion and sea salt in this coastal region), and an increase in traffic on paved roads would not mean a proportionate increase in PM_{10} and $PM_{2.5}$ concentrations. Therefore, none of the project alternatives would cause or contribute to violations of the NAAQS for PM_{10} and $PM_{2.5}$.

Based on a comparison to air quality in Juneau, Alaska, the traffic projections associated with the project alternatives would not exceed NAAQS for carbon monoxide in the Ketchikan area. With continued improvement in automobile engineering to reduce carbon monoxide emissions, carbon monoxide concentrations per vehicle likely would continue to decline. Traffic projections associated with the Gravina Access Project would not substantially affect ambient concentrations of carbon monoxide.

4.26.7 Noise Impacts

Secondary noise impacts would result from new residential, commercial, and industrial developments that would occur because of improved access to Gravina Island (i.e., induced growth); long-term operations at the new industrial and commercial sites; and vehicular travel associated with the new land uses on Gravina Island. Noise from commercial and industrial sources would be limited to development zones specifically intended for such uses; therefore, the nearby land uses would not be expected to be sensitive to noise emanating from these sources.

In accordance with FHWA noise regulations (23 CFR Part 772) and the DOT&PF *Noise Policy*[71] ~~(DOT&PF, 2011)~~, noise impacts were determined using traffic forecasts associated with the proposed bridge and ferry alternatives. Existing and future noise levels were modeled using the FHWA Traffic Noise Model (TNM, Version 2.5). The model inputs include:

- Afternoon peak hour traffic volumes for 2025, assuming medium economic growth and development ~~(DOT&PF, 2002)~~;[72]
- A proposed fleet mix for vehicle travel north of Dock Street of 92.0 percent Autos, 6.2 percent Medium Trucks, 0.4 percent Heavy Trucks, 1.3 percent Buses, and 0.13 percent Motorcycles ~~(Purves, 2003)~~;[73]

[71] DOT&PF. 2011. Alaska Environmental Procedures Manual - Noise Policy. http://www.dot.state.ak.us/stwddes/desenviron/assets/pdf/resources/aknoisepolicy.pdf

[72] DOT&PF. 2002. Gravina Access Project Traffic Assessment Technical Memorandum, Prepared by HDR Alaska, Inc. November 2002.

[73] Purves, Rick. 2003. Personal communication between Rick Purves (DOT&PF Traffic Engineer) and C. Snead (HDR Engineering, Inc.), May 21, 2003.

- A proposed fleet mix for vehicle travel south of Dock Street of 93.7 percent Autos, 4.0 percent Medium Trucks, 0.4 percent Heavy Trucks, 1.8 percent Buses, and 0.1 percent Motorcycles ~~(Purves, 2003)~~;[74]
- Operational speed on Tongass Avenue of 50 mph north of the existing airport ferry terminal, 25 mph from the ferry terminal to Schoenbar Road, 20 mph from Schoenbar Road to Deermount Avenue (a.k.a. Mill Street and Stedman Street), 30 mph from Deermount Avenue to the USCG station, and 45 mph south of the USCG station;
- Operational speed of 45 mph along the alternative roadway and on proposed bridges, where applicable.

The TNM modeling used default options for meteorological conditions and pavement type (i.e., 50 percent humidity, 68°F, average pavement type).

Future (2025) noise levels were modeled at the 122 receptors (noise prediction sites) within the study area (see Figure 3.15). Modeled future noise levels at noise prediction sites described in the sections below.[75] A traffic noise impact would occur if predicted noise levels approach within 1 dBA of the DOT&PF Noise Abatement Criteria (NAC) or if noise levels would substantially increase, which according to DOT&PF *Noise Policy*[76] would be an increase 15 dBA over existing noise levels.

4.26.7.1 No Action Alternative

Under the No Action Alternative, modeled noise levels are expected to increase by 1 to 2 dBA over existing conditions because of traffic volume growth over time. Thirty-nine residential and 10 commercial properties within the study area are predicted to have exterior traffic noise levels equal to or above the applicable DOT&PF NAC under the No Action Alternative. Compared with existing conditions, this represents impacts at 4 additional residential and 6 additional commercial properties. See Table 4-30.

Table 4-30: Properties that Would Experience Noise Impacts under the No Action Alternative

Land Use/ Category	Number of Receptors	Total Number of Properties	Noise Abatement Criteria (dBA)	Number of Properties With Noise Levels Equal to or in Exceedance of the NAC, or Having Substantial Increase in Noise	
				Existing Condition	Future (2025) with No Action Alternative
Residential/B	69	164	66	35	39
Commercial/E	46	72	71	4	10
Church/B	1	2	66	0	0
Motel/B	1	1	66	0	0
Airport/F	2	2	-	0	0
USCG/E, F	3	3	71	0	0

Source: Alaska Department of Transportation and Public Facilities, January 2013. *Gravina Access Project Supplemental EIS Traffic Noise Memorandum*. Prepared by HDR Alaska, Inc.

[74] Purves, Rick. 2003. Personal communication between Rick Purves (DOT&PF Traffic Engineer) and C. Snead (HDR Engineering, Inc.), May 21, 2003.

[75] Alaska Department of Transportation and Public Facilities, January 2013. *Gravina Access Project Supplemental EIS Traffic Noise Memorandum*. Prepared by HDR Alaska, Inc.

[76] DOT&PF. 2011. Alaska Environmental Procedures Manual - Noise Policy. http://www.dot.state.ak.us/stwddes/desenviron/assets/pdf/resources/aknoisepolicy.pdf

4.26.7.2 Bridge Alternative C3-4

The TNM model was used to predict traffic noise levels at receptors potentially affected by traffic noise on the new road and bridge associated with Alternative C3-4 (Table 4-31). Under Alternative C3-4, increases in noise levels are predicted to range from 2 to 18 dBA over existing conditions; and from 0 dBA to an increase of 16 dBA over the No Action Alternative. Changes in noise levels are due to changes in roadway alignment, changes in shielding, and decibel rounding.

There are 31 receptors associated with Alternative C3-4 representing 56 properties: 33 residences, 21 commercial properties, one motel, and the airport. Under Alternative C3-4, 22 residential properties, 10 commercial properties, and 1 airport property are predicted to experience noise impacts. The 22 residential properties and 9 of the commercial properties are predicted to experience noise levels greater than or equal to the DOT&PF NAC, compared to 10 residential and 9 commercial properties under the future No Action Alternative. The other two affected properties are predicted to experience substantial increases over the existing condition: Ketchikan International Airport (Receptor C3/4-31), which is predicted to have peak hour L_{eq} noise levels 18 dBA above existing conditions; and a commercial property (Receptor C3/4-6) close to the Alternative C3-4 alignment on Rex Allen Drive, which is predicted to have peak hour L_{eq} noise levels 15 dBA over existing conditions. In both cases, substantial increases are expected because of very low existing traffic volumes and the proximity of these receptors to the proposed roadway alignments. See Table 4-31.

Table 4-31: Properties that Would Experience Noise Impacts under Alternative C3-4

Land Use/ Category	Number of Receptors	Total Number of Properties	Noise Abatement Criteria (dBA)	Number of Properties With Noise Levels Equal to or in Exceedance of the NAC, or Having Substantial Increase in Noise	
				No Action Alternative	Alternative C3-4
Residential/B	17	33	66	10	22
Commercial/E	12	21	71	9	10
Motel/B	1	1	66	0	0
Airport/F	1	1	-	0	1

Source: Alaska Department of Transportation and Public Facilities, January 2013. *Gravina Access Project Supplemental EIS Traffic Noise Memorandum*. Prepared by HDR Alaska, Inc.

4.26.7.3 Bridge Alternative F3

The TNM model was used to predict traffic noise levels at receptors potentially affected by traffic noise on the new road and bridge associated with Alternative F3. Increases in traffic-related noise under Alternative F3 range from 2 to 9 dBA over existing conditions and from 0 to 7 dBA over the future No Action Alternative. Changes in noise levels are due to changes in travel pattern, new roadway alignment, changes in shielding, and decibel rounding.

There are 24 receptors associated with Alternative F3 representing 55 properties: 51 residences, 1 commercial property, and 3 USCG properties. Under Alternative F3, 6 residential properties are predicted to experience noise levels greater than or equal to the DOT&PF NAC. No substantial noise increases are predicted under this alternative. See Table 4-32.

Table 4-32: Properties that Would Experience Noise Impacts under Alternative F3

Land Use/ Category	Number of Receptors	Total Number of Properties	Noise Abatement Criteria (dBA)	Number of Properties With Noise Levels Equal to or in Exceedance of the NAC, or Having Substantial Increase in Noise	
				No Action Alternative	Alternative F3
Residential/B	20	51	66	3	6
Commercial/E	1	1	71	0	0
USCG/E, F	3	3	66	0	0

Source: Alaska Department of Transportation and Public Facilities, January 2013. *Gravina Access Project Supplemental EIS Traffic Noise Memorandum*. Prepared by HDR Alaska, Inc.

4.26.7.4 Ferry Alternative G2

The TNM model was used to predict ferry and traffic noise levels at receptors potentially affected by traffic noise in the vicinity of the new ferry terminal on Revillagigedo Island associated with Alternative G2. Noise levels under Alternative G2 are predicted to increase by 1 to 6 dBA over existing conditions; and from no change (0 dBA change) to an increase of 4 dBA over the future No Action Alternative noise levels. Changes in noise levels are due to changes in travel pattern, additional ferry noise, and decibel rounding.

There are 23 receptors associated with Alternative G2 representing 51 properties: 40 residential and 11 commercial properties. Under Alternative G2, 22 residential properties are predicted to experience noise levels equal to or above the DOT&PF NAC. The same 22 residential properties are predicted to experience noise levels equal to or above the DOT&PF NAC under the No Action Alternative. No commercial properties would experience noise impacts. No substantial noise increase impacts are predicted as a result of Alternative G2.

4.26.7.5 Ferry Alternative G3

The TNM model was used to predict ferry and traffic noise levels at receptors potentially affected by traffic noise in the vicinity of the new ferry terminal on Revillagigedo Island associated with Alternative G3. Under Alternative G3, increases in noise levels are predicted to range from 2 to 20 dBA over existing conditions; and from no change (0 dBA change) to an increase of 18 dBA over the future No Action Alternative noise levels. Changes in noise levels are due to changes in travel pattern, additional ferry noise, and decibel rounding.

There are 28 receptors associated with Alternative G3, representing 55 properties: 28 residences, 25 commercial properties, and 2 churches. Under Alternative G3, 7 residential properties and 1 commercial property are predicted to experience noise impacts. Six of the residential properties are predicted to experience noise levels equal to or above the DOT&PF NAC. The same six residential properties are predicted to experience noise levels equal to or above the DOT&PF NAC under the No Action Alternative. The other two affected properties are predicted to experience substantial increases over the existing condition: The Point residential apartment building on the waterfront adjacent to the proposed ferry terminal near the south end of Jefferson Street, (Receptor G3-17) which is predicted to have peak hour outdoor L_{eq} noise levels 20 dBA above existing conditions; and a nearby commercial property (Receptor G3-18), which is predicted to have peak hour L_{eq} noise levels 17 dBA over existing conditions. In both cases, substantial increases are expected because of very low existing traffic volumes and the proximity of these receptors to the proposed ferry route alignments. See Table 4-33.

Table 4-33: Properties that Would Experience Noise Impacts under Alternative G3

Land Use/ Category	Number of Receptors	Total Number of Properties	Noise Abatement Criteria (dBA)	Number of Properties With Noise Levels Equal to or in Exceedance of the NAC, or Having Substantial Increase in Noise	
				No Action Alternative	Alternative G3
Residential/B	11	28	66	6	7
Commercial/E	16	25	71	0	1
Church/B	1	2	66	0	0

Source: Alaska Department of Transportation and Public Facilities, January 2013. *Gravina Access Project Supplemental EIS Traffic Noise Memorandum*. Prepared by HDR Alaska, Inc.

4.26.7.6 Ferry Alternatives G4 and G4v (Preferred Alternative)

The TNM model was used to predict ferry and traffic noise levels at receptors potentially affected by traffic noise in the vicinity of the ~~new and~~ existing and proposed ferry ~~terminals~~ berths on Revillagigedo Island associated with Alternative G4. Under Alternative G4, noise levels increase by 1 to 12 dBA over existing conditions; and by 0 to 11 dBA over the No Action Alternative. Changes in noise levels are due to changes in roadway alignment, the addition of ferry noise, and decibel rounding.

No properties potentially affected by traffic noise in the vicinity of the existing and proposed ferry berths on Revillagigedo Island are predicted to experience noise levels greater than or equal to the DOT&PF NAC under Alternative G4. No substantial noise increase impacts are predicted as a result of this alternative.

Alternative G4v would not add new ferry service on this alignment, and so the noise levels at nearby receptors would be the same for Alternative G4v as under the No Action Alternative.

4.26.7.7 Mitigation of Noise Impacts

Noise abatement measures are considered in areas where predicted traffic noise levels approach or exceed the noise abatement criteria, or when the predicted traffic noise levels substantially exceed the existing noise levels. DOT&PF policy is that abatement measures for Activity Category A, B, C, D, or E land uses needs to be feasible and reasonable on their own merits. Land uses not sensitive to highway traffic noise, and undeveloped lands will not be provided noise abatement.

Acoustic feasibility criteria deal primarily with physics and engineering considerations (i.e., can a substantial noise reduction be achieved given the conditions of a specific location; is the ability to achieve noise reduction limited by factors such as topography, access requirements for driveways or ramps, the presence of cross streets, or other noise sources in the area).

Reasonableness is a more subjective criterion than feasibility. Reasonableness is based on a number of factors, not just one criterion. FHWA noise regulations and DOT&PF policy define three mandatory reasonableness factors that must be evaluated for a noise abatement measure to be considered reasonable:

1. Viewpoints of the property owners and residents that benefit from noise abatement measures. At least 60 percent of benefited households and property owners surveyed must want the noise abatement measure.
2. Cost effectiveness. The DOT&PF policy requires that the noise abatement measure cost no more than $32,000 per benefited receptor, based upon the design engineer's estimate. A benefited receptor is defined as the recipient of an abatement measure that receives a noise reduction of 5 dBA or more.

3. Noise Reduction Design Goal. Fifty percent or more of the benefitted receptors in the first row of structures must achieve noise reduction by a minimum of 7 dBA for the noise abatement to be considered reasonable.

The following reasonableness factors are also used by DOT&PF to evaluate mitigation on state-funded projects:

1. Development vs. Highway Timing. More consideration is given to developments that were built before the highway was built.
2. Development Existence. More consideration is given to residents who have experienced traffic noise impacts for long periods of time.
3. Absolute Predicted Build Noise Level. More consideration should be given to areas with higher absolute traffic noise levels.
4. Relative Predicted Build Noise Level. More consideration is given to areas with larger increases (at least 10 dBA) over existing noise levels.
5. Action vs. No Action Noise Levels. More consideration is given to areas where larger changes in traffic noise levels (at least 5 dBA increase) are expected to occur if the project is constructed than if it is not.

No single DOT&PF reasonableness factor is used to determine that a noise abatement measure is unreasonable.

Noise abatement, in the form of noise barriers, was considered for all receptors predicted to be affected under the project action alternatives.

It should be noted that noise barriers could have their own negative impacts. Barriers may interfere with the passage of air, interrupt scenic views, create objectionable shadows, contribute to increased road icing, and reduce or eliminate visibility of a business from the roadway. Barriers could also create snow removal problems, cause maintenance access problems, make it difficult to maintain landscaping, create drainage problems, and provide pockets for trash and garbage to accumulate. Depending on location, noise barriers could also compromise traffic safety by reducing stopping or merging sight distance, or by reducing errant vehicle recovery room.

4.26.7.7.1 Bridge Alternative C3-4

Under Alternative C3-4, noise barriers were considered for the 22 residential and 10 commercial properties where noise levels would substantially increase or meet or exceed the NAC.

For six of the residences, barriers would not be effective at mitigating highway noise because of the need to maintain direct access onto North Tongass Highway (i.e., the wall would require breaks to allow access to the properties). For four of the residential properties, a barrier would not be effective at mitigating highway noise because of a combination of direct access points onto North Tongass Highway and the elevation of the residences relative to the highway. To mitigate noise levels at elevated residences, walls need to be very tall to break the line of sight between the roadway and the residence. Very large walls often have constructability issues and are not cost effective.

For the 12 residences at Pioneer Heights Senior Housing, a barrier would not be able to provide the minimum noise reduction at these properties and comply with the cost-effectiveness criterion. A barrier was not effective in this location because the residences are elevated approximately 55 feet above the roadway. A wall could not be designed to effectively break the line of sight between the roadway and the residences.

For the affected commercial properties, a combination of direct access points and proximity to the roadway precludes effective siting of a noise barrier for these commercial properties.

Based on this analysis, noise mitigation is not recommended under Alternative C3-4.

4.26.7.7.2 Bridge Alternative F3

Under Alternative F3, noise barriers were considered for the six residential properties where noise levels would be equal to or exceed the NAC.

For three of the residences, a barrier would not be able to provide the minimum noise reduction at these properties and comply with the cost-effectiveness criterion. A barrier would not be effective in this location because of the need to maintain direct access onto Tongass Highway (i.e., the wall would require breaks to allow access to the properties), and because the residences represented are elevated approximately 20 feet above the roadway.

A barrier for the other three residences would not provide the minimum noise reduction at these properties comply with the cost-effectiveness criterion. A barrier would not be effective in this location because the residences are elevated approximately 40 feet above the roadway. A wall could not be designed to effectively break the line of sight between the roadway and the residences.

Based on this analysis, noise mitigation is not recommended under Alternative F3.

4.26.7.7.3 Ferry Alternative G2

Under Alternative G2, 22 residential properties are predicted to experience noise levels equal to or above the DOT&PF NAC. In all cases, barriers would not be effective at mitigating highway noise because of the need to maintain direct access onto North Tongass Highway (i.e., the wall would require breaks to allow access to the properties). In addition, the result of the combined ferry and highway noise analysis show that the project does not cause any noise impacts that would not already occur under the No Action Alternative.

Based on this analysis, noise mitigation is not recommended under Alternative G2.

4.26.7.7.4 Ferry Alternative G3

Noise barriers were considered for the seven residential properties and one commercial property predicted to experience either noise levels equal to or above the DOT&PF NAC, or substantial increases over existing noise levels under Alternative G3. A barrier to mitigate highway noise at four of the properties would not be effective because of the need to maintain direct access onto Tongass Highway (i.e., the wall would require breaks to allow access to the properties). Barriers for another two residential properties were determined not be to feasible because the residences abut directly onto the sidewalk and construction of a noise barrier would result in the loss of the sidewalk, or a barrier that is placed directly onto the side of the structure, which would preclude normal maintenance activities.

Barriers for the two properties that are predicted to experience substantial increases over existing noise levels were determined not be to feasible because much of the noise contribution comes from the ferry activity on the water and constructing a noise wall on the shoreline to mitigate noise from the water side would require acquisition of new right-of-way, and would block scenic views from the waterfront. In addition, placement of noise barriers on the Jefferson Street side of these properties would create access issues and would block the view of the commercial property from the public.

Based on this analysis, noise mitigation is not recommended under Alternative G3.

4.26.8 Water Quality Impacts

The secondary effects of project-induced development on water quality in both fresh water and marine environments would be primarily caused by land-clearing activities that would increase the potential for surface water runoff and erosion, which could lead to increased sedimentation in streams and nearshore areas, as well as increased water turbidity (cloudiness). Runoff also would increase as a result of the increase in impervious area associated with new structures and the access roads extended from main roads to the new development. Increased human activity on Gravina Island could increase the potential for pollutants (e.g., trash, petroleum products from cars, and household and industrial wastes) to enter streams on Gravina Island. Industrial development along the Gravina Island shoreline would introduce a greater risk of pollutant releases to the marine environment than currently exists.

4.26.8.1 No Action Alternative and Alternative G4v (Preferred Alternative)

The No Action Alternative and Alternative G4v could have adverse effects on water quality in the North Gravina and Clam Cove areas from residential development, which could occur adjacent to wetlands, small streams, and the marine environment of Tongass Narrows. Because development in these areas would be limited (e.g., 13 acres total) and would not involve the creation of extensive impervious surfaces, the impacts would be minor. Water-based industrial facilities in the North Gravina or Conceptual South Gravina Fisheries industrial parks could have an adverse effect on water quality in those areas of Tongass Narrows. Industrial use in the Central Gravina and Airport Reserve area could adversely affect the nearshore marine environment as a result of potential accidental industrial releases and an increase in impervious area, which would result in increased runoff.

4.26.8.2 Bridge Alternative C3-4 and Ferry Alternatives G2, G3, and G4

Under Alternatives C3-4, G2, G3, and G4, adverse effects on water quality would occur on Gravina Island in the North Gravina and Clam Cove areas from potential residential development adjacent to wetlands, small streams, and the marine environment of Tongass Narrows. Industrial use in Central Gravina and the Airport Reserve area could adversely affect water quality in the nearshore marine environment as a result of potential accidental industrial releases and an increase in impervious area, which would result in increased runoff. Water-based industrial facilities in the North Gravina or Conceptual South Gravina Fisheries industrial parks could have an adverse effect on water quality in those areas of Tongass Narrows.

4.26.8.3 Bridge Alternative F3

Alternative F3 would adversely affect water quality due to residential development on Pennock Island and on Gravina Island in the North Gravina, Clam Cove, and Blank Inlet areas. Residential development in these areas could occur adjacent to wetlands, small streams, and the marine environment of Tongass Narrows. Human activity in these areas could adversely affect water quality. Industrial development and use in the Central Gravina and Airport Reserve area could have an adverse effect on water quality in the nearshore marine environment as a result of potential accidental industrial releases and an increase in impervious area, which would result in increased runoff. Water-based industrial facilities in the Conceptual South Gravina Fisheries and North Gravina industrial parks and development in the Clam Cove and Blank Inlet Area (i.e., Conceptual Clam Cove Community Development) could have an adverse effect on water quality in local areas of Tongass Narrows.

4.26.9 Wetland and Vegetation Impacts

Development in the Ketchikan area would inevitably result in loss of wetlands because so much of the developable land is wet. As wetlands were cleared and filled to provide foundations for roads, homes, and businesses, the functions of the wetlands would be permanently lost. These functions include:

- Maintaining natural hydrologic regimes and moderating stream flows
- Producing plant material that supports onsite and offsite ecosystems
- Providing wildlife habitat and travel corridors
- Supporting fish habitat by providing stream cover and structure and food sources
- Providing subsistence and recreational areas for humans

In addition to function loss from clearing and filling, wetlands adjacent to development are affected by increased and polluted runoff, by channelized runoff, and by the human activity. Runoff from roads, yards, and gardens likely would carry with it nutrients (e.g., phosphorous and nitrogen) and sediments that alter the types of plants and animals that occupy the wetlands. Impervious surfaces created by building pads and roads would result in increased runoff, which may alter the remaining hydrologic regimes of adjacent wetlands and streams and cause erosion. Human and pet activity would degrade the quality of habitat on adjacent lands and displace sensitive animals.

Development entails vegetation removal in uplands as well as wetlands, which results in a loss of wildlife habitat and increased runoff and potential for erosion.

The discussion below for each alternative provides a projected acreage of secondary impact to wetlands on each island. The context for these impacts, based on the NWI mapping of wetlands, includes approximately 10,000 acres of wetlands on the portion of Gravina Island that drains to Tongass Narrows and just under 1,000 acres of wetlands on Pennock Island.

4.26.9.1 No Action Alternative and Alternative G4v (Preferred Alternative)

The No Action Alternative would have adverse effects on wetlands on Gravina Island in the North Gravina, Central Gravina and Airport Reserve, and Clam Cove areas from industrial and residential development; almost all lands that would be developed are wetlands. Development in these areas would be relatively limited in extent (16 acres total; see Table 4-23 at the beginning of Section 4.26, Indirect Impacts), so the effects would not likely be substantial.

4.26.9.2 Bridge Alternative C3-4

Under Alternative C3-4, wetlands would be replaced by human developments on Gravina Island: in the North Gravina and Clam Cove and Blank Inlet areas by residential development, and in the Central Gravina and Airport Reserve area by industrial and commercial development. Most of the 331 acres of anticipated development (see Table 4-23) would occur in wetlands because relatively little upland exists in those areas. The adverse effects of the wetland loss and increase of human activity within wetlands are as described at the beginning of this section.

4.26.9.3 Bridge Alternative F3

Under Alternative F3, adverse effects on wetlands would occur on Pennock Island and on Gravina Island in the North Gravina, Clam Cove, and Blank Inlet areas from residential development. Almost all of the expected development—331 acres on Gravina Island and 12 acres on Pennock Island (see Table 4-23)—would occur in wetlands because those areas lack sufficient uplands to support development. The adverse effects of the wetland loss and increase of human activity within wetlands are as described at the beginning of this section.

4.26.9.4 Ferry Alternatives G2, G3, and G4

Under these alternatives, adverse effects on wetlands are anticipated on Gravina Island in the North Gravina and Clam Cove areas from residential development and in the Central Gravina and Airport Reserve area from industrial and commercial development. The 43 acres of anticipated development (see Table 4-23) would mostly occur in wetlands because those areas lack sufficient uplands to support development. The adverse effects of the wetland loss and increase of human activity within wetlands are as described at the beginning of this section.

4.26.10 Water Body Modification and Wildlife Impacts

4.26.10.1 Water Body Modification

Stream and wetland hydrology could be adversely affected by changes in the hydrologic regime as a result of increased sedimentation, increased impervious area, channelization, and soil compaction. The type, amount, and specific location of development relative to water bodies would dictate the magnitude of adverse indirect impacts on these resources.

4.26.10.1.1 No Action Alternative and Alternative G4v (Preferred Alternative)

Projected development associated with the No Action Alternative and Alternative G4v would be relatively limited (16 acres; see Table 4-23 at the beginning of Section 4.26, Indirect Impacts) and would not involve the creation of extensive impervious surfaces.

4.26.10.1.2 Bridge Alternative C3-4

Under Alternative C3-4, modifications of water bodies could occur on Gravina Island in the North Gravina, Central Gravina and Airport Reserve, and Clam Cove areas from residential development (306 acres) and from industrial/commercial/community use (25 acres; see Table 4-23).

4.26.10.1.3 Bridge Alternative F3

Under Alternative F3, modifications of water bodies could occur on Pennock Island from residential/community development (12 acres) and on Gravina Island in the North Gravina, Central Gravina, Airport Reserve, Clam Cove, and Blank Inlet areas from residential development (306 acres) and from industrial/commercial/ community use (25 acres; see Table 4-23).

4.26.10.1.4 Ferry Alternatives G2, G3, and G4

Under these alternatives, modifications of water bodies could occur on Gravina Island in the North Gravina, Vallenar Bay, and Central Gravina and Airport Reserve areas from residential development (40 acres) and from industrial/commercial/community use (3 acres; see Table 4-23).

4.26.10.2 Wildlife Impacts

Adverse indirect impacts on fish and wildlife would occur as a result of loss or disruption of habitat associated with development. Aquatic habitat would be adversely affected by in-water construction and development, and by activities that affect water quality. Increased human access might also increase risk of harassment of spawning salmon. Terrestrial species would be adversely affected by habitat losses associated with future development, as well as increased human activity and noise that would disturb wildlife. Increased wildlife losses on Gravina Island likely would result from improved access for hunters.

4.26.10.2.1No Action Alternative and Alternative G4v (Preferred Alternative)

Adverse indirect impacts of the No Action Alternative and Alternative G4v on fish and wildlife habitat would be limited to small areas of development and human activity that are primarily accessible by gravel road. Animals displaced by human activity, especially larger animals, could relocate to nearby similar habitat with negligible loss of life.

4.26.10.2.2Bridge Alternatives C3-4 and F3, and Ferry Alternatives G2, G3, and G4

The predominant habitat type potentially affected by development associated with the bridge and improved ferry alternatives would be wetlands, which could adversely affect animals that use wetlands for feeding and shelter. With commercial and industrial development of the shoreline, animal use of the area would be reduced further. Loss of habitat would lead to reduced populations of game and non-game species, and long-term wildlife loss resulting from reduced carrying capacity.

Hunters, trappers, fishermen, and other recreationists would have improved access that would affect wildlife resources on Gravina Island and, in the case of Alternative F3, on Pennock Island. Some animals would change their routes and foraging areas to avoid areas of increased human activity. Some animals, mainly bears and other scavengers, might be attracted to areas frequented by humans if people were to leave garbage and other attractants behind. Increases in bear-human encounters would likely increase bear mortality.

The increase in human activity in the area could also lead to increased harvest or over harvest of certain species. Small populations, such as the wolf pack on Gravina Island, might be especially vulnerable to decline because of improved access for hunters who kill wolves and their prey, the deer. The Alaska Board of Game and ADF&G have the authority and responsibility to set hunting regulations to manage wildlife populations, and such increased hunting pressure would affect the management needs in this area.

Habitat fragmentation and barriers to wildlife movement would occur as a result of road construction and the associated development activities. Possible adverse impacts could include the isolation of smaller, less mobile species; loss of genetic integrity within species or populations; and a decrease in usable ranges.

Alternatives C3-4 and F3

The bridge alternatives could have adverse indirect impacts on fish and wildlife habitat on Gravina Island. The combination of residential and industrial development in the North Gravina, Central Gravina and Airport Reserve, and Clam Cove and Blank Inlet areas (i.e., as much as 306 acres residential/community and 25 acres industrial/commercial by 2033) would alter animal activity in those areas and potentially result in population declines due to increased harvest, habitat loss, and unwanted human encounters (e.g., vehicle collisions). There are also several EFH streams, including Airport Creek, Government Creek, and the unnamed creek in the Clam Cove watershed, which could be affected by development in those areas. The development areas identified in the *North Gravina Area Plan* are within high-density deer wintering habitat and important upland habitats identified by the Borough.[77]

[77] Ketchikan Gateway Borough Department of Planning and Community Development. December 2003. *Gravina Island Plan.* Final Public Review Draft.

Alternatives G2, G3, and G4

The ferry alternatives could have adverse indirect impacts to fish and wildlife habitat on Gravina Island. Development in the North Gravina Area could reduce the amount and quality of important upland habitat and high-density deer wintering habitat.[78] The development areas identified in the *North Gravina Area Plan* are within high-density deer wintering habitat and important upland habitats identified by the Borough. There are also several EFH streams north of the airport that could be affected by roadway, residential, and industrial development in that area. The combination of residential and industrial development under these alternatives (i.e., as much as 40 acres residential and 3 acres industrial by 2033) would alter animal activity in relatively small areas and would not likely result in population declines.

4.26.11 Floodplain Impacts

None of the project-induced development is expected to occur within stream floodplains. Other than waterfront facilities, most new development would likely be located above the 100-year flood elevation. No alteration to the hydraulic regime of floodplains is expected to occur as an indirect result of any of the project alternatives; therefore, no adverse impacts to floodplains would be expected.

4.26.12 Coastal Zone Impacts

Indirect impacts to resources described in other sections would occur within the coastal zone for the Borough and would be subject to review under the Borough's coastal management program. Reviews should ~~ensure~~ support consistency with the coastal management plan, but this is outside the purview of this project.

4.26.13 Threatened or Endangered Species Impacts

4.26.13.1 No Action Alternative and Alternative G4v (Preferred Alternative)

No adverse indirect impacts on ~~Steller sea lions and~~ humpback whales would occur as a result of the No Action Alternative or Alternative G4v because most development and human activity would be within the range of existing conditions.

4.26.13.2 Bridge Alternatives C3-4 and F3, and Ferry Alternatives G2, G3, and G4

The action alternatives likely would not have adverse indirect impacts on ~~Steller sea lions and~~ humpback whales because most development and human activity induced by these alternatives would be limited to small areas on land, primarily accessible by gravel road. Increased disturbance from manmade noise, increased development and access along shorelines, and pollution carried in runoff from development on land are possible with or without the project. The limited amount of shoreside development projected under any of the alternatives likely would not have a material effect on ~~sea lions or~~ whales.

4.26.14 Historic and Archeological Preservation

Indirect impacts to cultural resources could result from development of residential, commercial, or industrial properties along the shorelines of Gravina and Pennock islands under the No Action Alternative or any of the action alternatives. There is no current or immediate plan to develop specific areas if one of the alternatives were built. Some development of properties along the Gravina Island and Pennock Island shorelines likely would occur regardless of the

[78] Ketchikan Gateway Borough Department of Planning and Community Development. December 2003. *Gravina Island Plan.* Final Public Review Draft.

outcome of this project (i.e., under the No Action Alternative). To the extent that the alternatives improve accessibility to and development of shoreline areas, known and as-yet-undiscovered historic and archaeological sites could be affected. Additionally, improved public access to areas that have cultural resources could result in the destruction of these resources or their removal by visitors. The exact locations of possible secondary development are not known. In certain areas, not known at this time, it is possible that greater development could lead to better cataloging and preservation of cultural features than would otherwise occur under the No Action Alternative.

4.26.14.1 No Action Alternative and Alternative G4v (Preferred Alternative)

Under the No Action Alternative or Alternative G4v, development along the Tongass Narrows shoreline of Revillagigedo Island and Gravina Island in the North Gravina Area, the Central Gravina and Airport Reserve Area, and the Clam Cove and Blank Inlet Area could affect archaeological and historic resources in those areas, if construction occurred at or near cultural sites. Early homesteading occurred north of the airport and in the vicinity of Clam Cove, indicating a likelihood of historic sites in those areas. Because the amount of development on Gravina Island would be approximately 16 acres (see Table 4-23) and the access would be inconvenient, the potential effects on cultural resources would be relatively low.

4.26.14.2 Bridge Alternative C3-4

Development along the shorelines of Gravina Island in the North Gravina, Central Gravina and Airport Reserve, and Clam Cove and Blank Inlet areas could result in the physical destruction of cultural resources from induced construction activities and from increased access that generated increased human activity, if construction occurred at or near cultural sites. With about 331 acres of development projected by 2033 (see Table 4-23 at the beginning of Section 4.26, Indirect Impacts), the secondary impact potential is greater than under the No Action Alternative.

4.26.14.3 Bridge Alternative F3

Development along the shorelines of North Gravina, Central Gravina and Airport Reserve, and Clam Cove and Blank Inlet areas, as well as on Pennock Island, could result in the physical destruction of cultural resources from induced construction activities and from increased access that generated increased human activity, if they were to occur at or near cultural sites. With approximately 331 acres of development projected on Gravina Island and 12 acres on Pennock Island (see Table 4-23), the potential to affect cultural sites is greater than under the No Action Alternative. Pennock Island was used as a burial site for tribal communities on Revillagigedo and Annette islands in the late nineteenth and early twentieth centuries. Disturbance of these sites would be of concern to tribal communities and could affect their cultural practices.

Recorded resources on Pennock Island, and particularly the two historic cemeteries (KET-055 and KET-801), may be affected through disturbance resulting from improved access to the island. Recorded resources on Gravina Island may also be affected through disturbance resulting from improved access to the island.

4.26.14.4 Ferry Alternatives G2, G3, and G4

Development along the shoreline of Gravina Island in the North Gravina and Central Gravina and Airport Reserve areas, and in the Clam Cove and Blank Inlet area, could result in the physical destruction of cultural resources from construction activities and from increased access that generated increased human activity, if construction occurred at or near cultural sites. Because the amount of development projected is only 43 acres (see Table 4-23) and the convenience of access would not be as improved as much as it would be under a bridge alternative, the potential adverse impacts to cultural resources would be only slightly greater than with the No Action Alternative.

4.26.15 Visual Impacts

4.26.15.1 No Action Alternative and Alternative G4v (Preferred Alternative)

Development on Gravina Island is projected to occur on 16 acres of land (see Table 4-23 at the beginning of Section 4.26, Indirect Impacts), and this development would occur in areas that are not dominant in views from the populated areas of Revillagigedo Island (i.e., North Gravina, and Central Gravina and Airport Reserve areas). Therefore, minimal visual impact would be expected under the No Action Alternative.

4.26.15.2 Bridge Alternatives C3-4 and F3

Induced development on Gravina Island could affect views from Revillagigedo Island; however, most of the development (i.e., 306 acres of the 331 total acres; see Table 4-23) would be residential, small in scale, and in isolation or small clusters, which would not create a substantial change in the viewshed. Development in the North Gravina Areas would not be dominant in views from the populated areas of Revillagigedo Island. Clam Cove and the Central Gravina and Airport Reserve areas are within the viewshed of populated areas of Revillagigedo Island. Small scale residential development in these areas would not likely create a visual impact.

Development on Pennock Island under Alternative F3 would be visible from downtown Ketchikan and Saxman because of the relative proximity of Pennock Island to these populated areas. Most of the development on Pennock Island would be residential and would occur along the shoreline. The predominantly natural viewsheds from downtown Ketchikan and Saxman would not be substantially altered.

4.26.15.3 Ferry Alternatives G2, G3, and G4

Induced development on Gravina Island is projected to occur on 43 acres under the ferry alternatives (see Table 4-23) and would occur in areas that are not dominant in views from the populated areas of Revillagigedo Island (i.e., the North Gravina and Central Gravina and Airport Reserve areas) or within the Clam Cove area, which can be viewed from Ketchikan. Most of the development (i.e., 40 acres) would be residential, small in scale, and in isolation or small clusters, which would not create a noticeable change in the viewshed. Industrial development (3 acres) would likely occur within the Central Gravina and Airport Reserve areas on land currently used for open space and forest land, but adjacent to existing industrial facilities. Therefore, no substantial visual impact is expected under the ferry alternatives.

4.26.16 Energy Impacts

Although all of the project alternatives would result in additional development in the Borough, and although this development would require more energy to operate, none of the additional energy need is expected to be beyond the current capacity of the Borough and other suppliers.

4.26.17 Utility Impacts

New development in outlying areas of Ketchikan could spur the extension of existing utility services to reach areas north and south of the existing service areas.

Future development on Gravina Island and, for Alternative F3, Pennock Island, would likely include provision of water, sewer, electric, and telephone facilities. The existing utility systems have adequate capacity to supply these utilities to development areas on Gravina and Pennock islands under any of the alternatives. Impacts to the utilities would be related primarily to the cost of construction and maintenance of new utility transmission line corridors.

4.26.17.1 No Action Alternative and Alternative G4v (Preferred Alternative)

It is unlikely that KPU would construct new water transmission lines and new water storage facilities on Gravina Island for the 16 acres of development expected to occur there under the No Action Alternative and Alternative G4v (see Table 4-23). Wastewater would likely be handled by "on-lot" disposal systems for low-density residential and industrial development, having no adverse effect on the utility system.

Electricity would likely be obtained by onsite generators, having no impact on the electrical utility system. Telephone connection for the new development would be unlikely.

4.26.17.2 Bridge Alternatives C3-4 and F3, and Ferry Alternatives G2, G3, and G4

With the anticipated development on Gravina Island under the action alternatives, new transmission lines may be needed to transport water to Gravina Island, and water storage facilities on the island would be needed to meet fire flow needs. These facilities would require additional land clearing, which could affect fish and wildlife habitat. The transmission line corridors likely would follow roadway corridors where practicable to reduce the amount of construction in pristine habitat and reduce cost of construction. In areas where the water transmission corridor would not follow the roadway, the transmission corridor would be maintained in low vegetation coverage. This routing would not preclude animal use of the transmission corridor, but would alter the habitat type. It is unlikely that the 12 acres of development on Pennock Island under Alternative F3 (see Table 4-23) would warrant construction of water distribution lines. Pennock Island residents would likely continue to obtain water from cisterns on individual properties.

Although the existing wastewater treatment plant would have the capacity to treat wastewater from Gravina and Pennock islands under the action alternatives, it might be more cost-effective to establish "on-lot" disposal systems for low-density residential development and, for core area developments of commercial and/or industrial facilities, a small "package" wastewater treatment plant and outfall. Such systems constructed by city or borough governments are established within the requirements of the Clean Water Act to mitigate the potential adverse effects of discharge from the outfall.

The electrical system would have sufficient capacity to support the additional development on Gravina and Pennock islands under any of the action alternatives. Bridge designs would include provisions for attaching cables to the bridge(s). The ferry alternatives, however, would have no such provision and connection to the grid would likely be made through a submarine cable across Tongass Narrows. If a submarine cable were placed along the channel bottom, it would affect a very small area and its location could be selected to avoid sensitive resources. When development on Gravina Island reaches a level that makes development of an electrical connection reasonable, a new substation in Ketchikan and a new substation on Gravina Island would be required for proper distribution from the feeder cable. Substations could be mounted on 8-foot square cement pads adjacent to a roadway to minimize additional impact on environmental resources. New transmission lines on Gravina and Pennock islands would require additional clearing of wildlife habitat. The electric transmission line corridors would likely follow roadway corridors where practicable to reduce the amount of construction in pristine habitat. In areas where the transmission corridor would not follow the roadway, the transmission corridor would be maintained in low vegetation coverage, which would provide an alternate habitat type.

The connection to the existing telephone system on Revillagigedo Island from Gravina Island and Pennock Island would entail a new fiber optic cable across Tongass Narrows (likely a submarine cable) and a cable line system connecting to new areas of development. As in the case of other new utility lines, development of the telephone lines would likely entail additional clearing of wildlife habitat. Where practicable, the telephone line corridors would likely be co-located with electric transmission lines and likely would follow roadway corridors. In areas where the transmission corridor would not follow a road, the transmission corridor would be maintained in low vegetation coverage, which would provide an alternate habitat type. Placement of the submarine cable could have minor short-term impacts on marine habitat and water quality.

4.27 Cumulative Impacts

Cumulative effects are defined as effects to the environment resulting from the incremental effect of a proposed action when added to other past, present, and reasonably foreseeable future action regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

A cumulative effects analysis broadens the scope of analysis to include effects beyond those attributable solely to the implementation of the alternatives. The purpose of the cumulative effects analysis, as stated by the CEQ, "is to ensure that federal decisions consider the full range of consequences."[79] The process of analyzing cumulative effects, or impacts, requires consideration of cumulative effects issues in each of the traditional components of the EIS, including scoping, describing the affected environment, and determining environmental consequences. The incorporation of cumulative effects analysis also aids in the development of alternatives and appropriate mitigation measures.

The analysis of cumulative effects is centered on four key elements:

- Critical resources likely to experience cumulative effects
- Geographic (spatial) boundaries of the affected area
- Temporal (time frame) of the analysis
- Relevant past, present, and future actions that could affect the critical resources

The critical resources identified for the cumulative impact analysis are land use, the recreation and subsistence elements of the social environment, local economic conditions, transportation, air quality with respect to GHG emissions, water quality, wetlands, wildlife, historic and archeological resources, and visual resources.

The geographic boundaries for evaluating potential cumulative effects were identified for each critical resource based on the distribution of the resource relative to the area in which substantial cumulative effects could occur and beyond which the resource would not be substantially affected. For water quality, wetlands, wildlife, and historic and archeological resources, the geographic area comprises Gravina and Pennock islands. For water quality, the area also includes Tongass Narrows and East and West channels. For land use, the social environment, economics, transportation, and visual resources, the area is broader, encompassing the Borough and including the cities of Ketchikan and Saxman.

The temporal boundaries for determining cumulative impacts of the project were based on the rise in settlement and development in the area during the past 100 years and a planning horizon extending out to 2033. The gold rush of the early twentieth century spurred the rapid growth and

[79] Council on Environmental Quality. 1997. *Considering Cumulative Effects Under the National Environmental Policy Act*. Washington, DC: Council on Environmental Quality. Available online at http://ceq.hss.doe.gov/publications/cumulative_effects.html.

development of Southeast Alaska, including Ketchikan. Growth in the timber industry in the area also contributed to development of Ketchikan. The relatively recent changes in the area due to development of natural resources help establish the temporal boundary of past actions. The future temporal boundary of 2033 is considered as a reasonable horizon for community planning, based upon the opening year of an action alternative ~~in~~ as early as 201~~8~~9.

Each resource potentially affected by the project was individually examined to identify all past, present, and future activities and factors affecting that resource.

Past Actions. For purposes of this analysis, past actions are:

- Logging
- Mining
- Hunting, fishing, and trapping
- Industrial, commercial, and residential development
- Ketchikan International Airport improvements: extension of the runway safety area
- Development of the Gravina Island Highway

Future Actions. Reasonably foreseeable future projects are:

- Additional parking facilities at the Ketchikan International Airport consistent with the master plan[80]
- Development of the North Gravina Road, a 1.3-mile extension of Seley Road, to serve residential parcels (potentially 30 units) in the North Gravina area
- Development of a 33.3-acre marine park on Gravina Island's West Channel shoreline, approximately 1.5 miles south of the Gravina Island Highway terminus
- Development of a new harbor in the City of Saxman, near the Totem Row Street/South Tongass Highway intersection
- Trail access to Black Sand Beach State Park, southwest of the airport, near Blank Inlet
- Development of a mill to process ore concentrate from Niblack mine located on Prince of Wales Island at the Seley Mill site and an associated Tailings Disposal Facility (TDF) on Gravina Island.
- Development of road improvements between Bostwick and Vallenar Bay.
- Timber sales on Gravina Island: two to three small/mid-size sales (500,000 board feet) and one to two larger sales (2 to 4 million board feet).
- Development of new ferry berths immediately adjacent to the existing berths on Revillagigedo and Gravina islands to maintain traffic during maintenance, repair, or reconstruction activities at the existing ferry berths (included in the 2016 Statewide Transportation Improvement Program, Amendment 2).

The future actions listed above have been identified by the Borough Planning Department, ~~and~~ Alaska Department of Natural Resources, and DOT&PF as actions that are likely to occur, independent of the Gravina Access Project. Although it is possible that, in the case of Alternative F3, a road would be constructed on Pennock Island to provide a connection between the project roadway and homes on the island, the Borough has no plan for infrastructure on Pennock Island independent of the Gravina Access Project. Therefore, new road construction on Pennock Island is not considered a reasonably foreseeable future action in this cumulative impact analysis.

[80] Ketchikan Gateway Borough Department of Planning and Community Development. November 2003. *Gravina Island Plan.*

The cumulative impact assessment considered the direct and indirect (secondary) impacts of the Gravina Access Project alternatives, together with the impacts of past, present, and reasonably foreseeable future actions on the critical resources within the appropriate geographic and temporal boundaries.

4.27.1 Land Use Impacts

The Borough Department of Planning and Community Development has been reviewing the existing land uses and planning for future growth and development on Gravina Island. The Borough's goal is to assist the Ketchikan community in making decisions regarding future development of Gravina Island. This planning activity is being conducted in conjunction with the Gravina Access Project, as well as with the other reasonably foreseeable future projects. Including all of these projects in the planning process ~~ensures~~ promotes consistency in land use goals and development trends. Because of this coordinated planning activity, the Gravina Access Project, considered with the reasonable foreseeable actions, would have no adverse cumulative effect on the land use plans, policies, and goals of the Borough.

On Gravina Island, the cumulative effects of past, present, proposed, and reasonably foreseeable future actions on land use would be the gradual change from undeveloped land to developed land along the eastern shorelines of the island, which would occur under the No Action Alternative and all of the action alternatives. With most of the land owned by the USFS and DNR, it is likely that most of the island would be maintained as undeveloped lands. The addition of parking facilities at the airport would be consistent with airport development and the *Ketchikan International Airport Master Plan*. Therefore, the changes in overall land use on Gravina Island would be very limited.

On Pennock Island, there is no reasonably foreseeable action that would contribute to land use changes. If Alternative F3 were selected, the direct and indirect impacts of the Pennock Island crossing would not contribute to a greater cumulative effect because there are no other independent actions that would affect land use on the island.

4.27.2 Social Impacts

Two elements comprising the social environment would experience cumulative impacts as a result of the project alternatives: recreation and subsistence on Gravina and Pennock islands. These resources are identified as potentially experiencing cumulative impacts because they have been affected by past actions and would also be affected by reasonably foreseeable future actions. Recreational and subsistence uses of natural resources on Gravina Island currently rely on access to the shoreline by private boat, the airport ferry, or floatplane, and access to interior lands by the Gravina Island Highway and logging roads. Reasonably foreseeable actions that would affect recreation and subsistence use on Gravina Island are development of a marine park, road extensions, and a trail to Black Sand Beach State Park Future development of a marine park would encourage recreational use of the island, as would trail development to state park lands.

Recreational and subsistence uses of natural resources on Pennock Island are limited because access is possible only by private boat or floatplane and, once on the shoreline, access to the interior and most other areas of the island is limited to foot traffic. There are no reasonably foreseeable future actions on Pennock Island that would contribute to a cumulative effect on recreation or subsistence resources there.

4.27.2.1 Bridge Alternative C3-4

The cumulative effect of improved access to Gravina Island on recreation would be the attraction of more tourists and visitors to the area. Recreational drivers would have more convenient access the once-remote interior areas of Gravina Island. Development of a marine park and trails on Gravina Island, combined with bridge access to the island, would increase demand for access to these recreational resources and may spur development of more trails and recreational amenities.

While primitive recreational experiences would still be available on Gravina Island, more travelers to the island and the increase in human activity, combined with more recreational amenities, could deter those seeking a primitive experience.

With greater accessibility to Gravina Island, more residents would be using its subsistence resources, and competition for these resources would increase. Impacts on subsistence could also be compounded by logging roads, some of which have remained open after the timber harvest was complete. Increased use of the logging roads could be expected with improved access from Alternative C3-4, which would create an even greater impact on subsistence practices.

4.27.2.2 Bridge Alternative F3

Alternative F3 would have the same benefits and adverse impacts as those described for Alternative C3-4. Additionally, Alternative F3 could contribute to growth in recreational and subsistence uses of Pennock Island by improving access to the area. However, because there are no reasonably foreseeable future actions on Pennock Island independent of Alternative F3, the cumulative effects on recreation and subsistence resources there would be negligible.

4.27.2.3 Ferry Alternatives G2, G3, and G4

Without hard-link access (such as a bridge) to Gravina Island, the cumulative effect on recreational and subsistence uses of Gravina Island would be limited. With modest increases in visitors associated with improved ferry service, the cumulative effect of any of these alternatives with other actions would be greater use of recreational and subsistence resources compared to the No Action Alternative, but not as great an impact as with a bridge alternative.

4.27.2.4 Ferry Alternative G4v (Preferred Alternative)

Implementation of Alternative G4v would not change recreational or subsistence uses on Gravina Island and therefore would not contribute to a cumulative impact on these resources.

4.27.3 Economic Impacts

Ketchikan and the surrounding area has grown in population and economic activity since the late nineteenth century as a mining, fishing, timber, and tourist area, and before that, as a fishing area for Alaska Natives. The most pertinent past actions have been development of a timber and pulp industry and fishing industry around which the City of Ketchikan grew to be the fifth-largest city in Alaska in 2000. Tourism has boomed in Southeast Alaska in the past two decades, primarily with steadily expanding cruise ship activity. Growth of the tourism industry and the decline of the forest products industry have accounted for most of the changes in Ketchikan's economy in recent years.

Improvements to the road network on Gravina Island in recent years have not independently spurred growth on the island. The USFS Gravina Island timber sale is indefinitely on hold as a result of the 2001 Roadless Area Conservation Rule (36 CFR Part 294). As a result, the local timber industry is unlikely to change in the foreseeable future, providing a relatively small contribution to cumulative effects on the local economy. Development of an ore processing facility at the Seley Mill site would bring approximately 80 jobs to the community for a 10 to 15-year period, which would contribute to a positive cumulative effect on the economic activity in Ketchikan.[81]

The improved access of the action alternatives, combined with efforts to increase recreational opportunities on Gravina Island, would enhance the tourism economy. This cumulative effect would be greatest with a no-toll bridge alternative because the improved access would be more convenient, offering free access all year, around the clock. The toll associated with the ferry alternatives and the bridge alternatives with a toll would present a partial deterrent to access and recreational use.

4.27.4 Transportation Impacts

4.27.4.1 <u>Aviation</u>

No cumulative impacts on aviation are expected as a result of the Gravina Access Project. No other reasonably foreseeable action would affect aviation.

4.27.4.2 <u>Marine Navigation</u>

Development of a new harbor in Saxman would affect marine navigation by providing a new location for moorage in the East Channel. The harbor may draw more ship traffic to this section of Tongass Narrows. Alternative F3 is the only alternative under investigation in this SEIS that would affect marine navigation in the East Channel. The other action alternatives would allow marine navigation conditions in East Channel to persist with no cumulative effects, as under the No Action Alternative. Alternative F3 would reduce the number of large vessels (i.e., air draft greater than 60 feet) transiting East Channel. If the harbor and Alternative F3 were developed, the cumulative effect on marine navigation in East Channel would be smaller than in the No Action Alternative because Alternative F3 would eliminate a large portion of the marine traffic from East Channel, which would reduce potential conflict with boats entering and exiting the new harbor at Saxman.

Development of the ore processing facility at the Seley Mill site would result in more marine freight traffic in Tongass Narrow with shipments of materials to and from the facility. Workers accessing the mill site might choose private marine transportation (e.g., skiff) from Revillagigedo Island or use the new bridge (Alternative C3-4 or F3) or ferry (i.e., the new ferry under Alternative G2, G3, or G4, or existing airport ferry). Additional marine traffic for freight or personnel would contribute to a cumulative effect on marine traffic with the ferry alternatives, but would not create congestion or affect overall safety of marine navigation in Tongass Narrows.

The marine park on Gravina Island would add some marine traffic to West Channel, increasing congestions there. Under Alternative F3, the marine park would contribute to a cumulative effect on marine navigation.

No other reasonably foreseeable future actions would contribute to a cumulative effect on marine navigation.

[81] Memorandum of Understanding between the Ketchikan Gateway Borough and Niblack Project LLC regarding the Gravina Island Industrial Complex, signed August 8, 2012.

4.27.4.3 Vehicles

4.27.4.3.1 No Action Alternative

The cumulative impacts associated with the No Action Alternative relate to the inconvenience associated with continued reliance on the airport ferry for access to the airport and other lands on Gravina Island, which would limit the amount of development on Gravina Island. Traffic to Gravina Island generated by the No Action Alternative may not be enough to warrant construction of additional parking facilities at the airport, as identified in the *Ketchikan International Airport Master Plan*.[82]

4.27.4.3.2 All Action Alternatives

The addition of new ferry berths adjacent to the existing airport ferry berths per the 2016 Statewide Transportation Improvement Program, Amendment 2, will provide redundancy in the existing system and improve reliability of access for vehicles to Gravina Island. All action alternatives would further enhance access to Gravina Island, resulting in a cumulative benefit to vehicular transportation. ~~None of the reasonably foreseeable future actions would impact vehicle transportation such that the actions would contribute to a cumulative impact on traffic or roadways with any of the actions alternatives.~~ Demand for parking at the airport might increase with a bridge alternative, resulting in development of such facilities sooner than under other alternatives, but no other cumulative impacts on vehicle transportation would be expected. Development of the ore processing facility would result in higher use of the roads on Gravina Island and access provided by either a bridge or ferry. The additional traffic would be within the range of anticipated future traffic levels and is therefore not anticipated to result in an adverse cumulative effect.

4.27.5 Pedestrian and Bicyclist Impacts

The addition of new ferry berths adjacent to the existing airport ferry berths per the 2016 Statewide Transportation Improvement Program, Amendment 2, will provide redundancy in the existing system and improve reliability of access for ~~There would be no cumulative effects on~~ pedestrians and bicyclists to Gravina Island. ~~as a result of the No Action Alternative.~~ With improved reliability of the ferry service ~~a greater network of roads on Gravina Island~~ and improved access to Gravina Island under an action alternative, pedestrians and bicyclists would have more opportunities to walk and ride.

4.27.6 Air Quality Impacts: Climate Change

4.27.6.1 Cumulative Effects from GHG Emissions

Under NEPA, detailed environmental analysis should be focused on issues that are significant and meaningful to decision-making. FHWA has concluded, based on the nature of GHG emissions and the exceedingly small potential GHG impacts of the reasonable alternatives, as discussed below and shown in Table 4-34, that the GHG emissions from the reasonable alternatives would not result in “reasonably foreseeable significant adverse impacts on the human environment” (40 CFR 1502.22(b)). The GHG emissions from the action alternatives would be insignificant, and ~~would~~ did not play a meaningful role in a determination of the environmentally preferable alternative or the ~~selection~~ identification of the preferred alternative. More detailed information on GHG emissions “is not essential to a reasoned choice among reasonable alternatives” (40 CFR 1502.22(a)) or to making a decision in the best overall public

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[82] Ketchikan Gateway Borough Department of Planning and Community Development. December 2003. *Gravina Island Plan.* Final Public Review Draft.

interest based on a balanced consideration of transportation, economic, social, and environmental needs and impacts (23 CFR 771.105(b)). For these reasons, no alternatives-level GHG analysis has been performed for this project.

The context in which the emissions from the proposed project would occur, together with the expected GHG emissions contribution from the project, illustrate why the project's GHG emissions would not be significant and would not be a substantial factor in the decision-making. The transportation sector is the second largest source of total GHG emissions in the U.S., behind electricity generation. The transportation sector was responsible for approximately 27 percent of all anthropogenic (human caused) GHG emissions in the U.S. in 2010. The majority of transportation GHG emissions are the result of fossil fuel combustion. Carbon dioxide makes up the largest component of these GHG emissions. U.S. carbon dioxide emissions from energy sources accounted for about 18 percent of worldwide energy consumption carbon dioxide emissions in 2010. U.S. transportation carbon dioxide emissions accounted for about 6 percent of worldwide carbon dioxide emissions.

While the contribution of GHGs from transportation in the U.S. as a whole is a large component of U.S. GHG emissions, as the scale of analysis is reduced the GHG contributions become quite small. Using carbon dioxide because of its predominant role in GHG emissions, Table 4-34 below presents the relationship between current and projected Alaska roadway-derived carbon dioxide emissions and total global carbon dioxide emissions, as well as information on the scale of the project relative to statewide travel activity.

Based on emissions estimates from EPA's Motor Vehicle Emissions Simulator (MOVES) model, and global carbon dioxide estimates and projections from the Energy Information Administration, carbon dioxide emissions from motor vehicles in the entire State of Alaska contributed less than one hundredth of one percent of global emissions in 2010 (0.0095 percent). These emissions are projected to contribute an even smaller fraction (0.0072 percent) in 2040. Vehicle miles traveled (VMT) in the project study area represents 2.10 percent of total Alaska travel activity; and the project itself would increase statewide VMT by 0.39 percent. (Note that the project study area includes travel on other roadways in Ketchikan in addition to the proposed project.) As a result, based on the build alternative with the highest VMT, FHWA estimates that the proposed project could result in a potential increase in global carbon dioxide emissions in 2040 of 0.000022 percent (less than one thousandth of one percent), and a corresponding increase in Alaska's share of global emissions in 2040 of 0.3 percent. This very small change in global emissions is well within the range of uncertainty associated with future emissions estimates.

Table 4-34: Statewide and Project Emissions Potential, Relative to Global Trends

	Global carbon dioxide emissions, MMT[a]	Alaska motor vehicle Carbon dioxide emissions, MMT[b]	Alaska motor vehicle emissions, Percent of global total	Project study area VMT, Percent of statewide VMT	Percent change in statewide VMT due to project
Current Conditions (2010)	29,670	2.81	0.0095%	2.10	(None)
Future Projection (2040)	45,500	3.25	0.0072%	2.49	0.39

MMT = million metric tons. Global emissions estimates are from International Energy Outlook 2010, data for Figure 104, projected to 2040. Alaska emissions and statewide VMT estimates are from MOVES2010b.

[a] These estimates are from the EIA's *International Energy Outlook 2010*, and are considered the best-available projections of emissions from fossil fuel combustion. These totals do not include other sources of emissions, such as cement production, deforestation, or natural sources; however, reliable future projections for these emissions sources are not available.
[b] MOVES projections suggest that Alaska motor vehicle CO_2 emissions may increase by 15.9% between 2010 and 2040; more stringent fuel economy/GHG emissions standards will not be sufficient to offset projected growth in VMT.

4.27.6.2 Mitigation for Global GHG Emissions

To help address the global issue of climate change, the U.S. Department of Transportation (USDOT) is committed to reducing GHG emissions from vehicles traveling on our nation's highways. USDOT and EPA are working together to reduce these emissions by substantially improving vehicle efficiency and shifting toward lower carbon intensive fuels. The agencies have jointly established new, more stringent fuel economy and first ever GHG emissions standards for model year 2012-2025 cars and light trucks, with an ultimate fuel economy standard of 54.5 miles per gallon for cars and light trucks by model year 2025. Further, on September 15, 2011, the agencies jointly published the first ever fuel economy and GHG emissions standards for heavy-duty trucks and buses. Increasing use of technological innovations that can improve fuel economy, such as gasoline- and diesel-electric hybrid vehicles, will improve air quality and reduce carbon dioxide emissions future years.

Consistent with its view that broad-scale efforts hold the greatest promise for meaningfully addressing the global climate change problem, FHWA is engaged in developing strategies to reduce transportation's contribution to GHGs—particularly carbon dioxide emissions—and to assess the risks to transportation systems and services from climate change. In an effort to assist States and metropolitan planning organizations (MPOs) in performing GHG analyses, FHWA has developed a Handbook for Estimating Transportation GHG Emissions for Integration into the Planning Process. The Handbook presents methodologies reflecting good practices for the evaluation of GHG emissions at the transportation program level, and will demonstrate how such evaluation may be integrated into the transportation planning process. FHWA has also developed a tool for use at the statewide level to model a large number of GHG reduction scenarios and alternatives for use in transportation planning, climate action plans, scenario planning exercises, and in meeting state GHG reduction targets and goals. To assist states and MPOs in assessing climate change vulnerabilities to their transportation networks, FHWA has developed a draft vulnerability and risk assessment conceptual model and has piloted it in several locations.

At the State level, project planning activities are key to reducing GHGs from highway projects, and mitigation of GHGs. To this end, the State of Alaska created the Alaska Climate Change Sub-Cabinet in 2007 under Administrative Order 238. This resulted in the formation of the Climate Change Mitigation Advisory Group. The Mitigation Advisory Group, tasked with analyzing mitigation options to reduce GHG emissions in Alaska, submitted its *Mitigation Advisory Group Final Report* in 2009. Chapter 7 of the report identified measures to mitigate emissions resulting from transportation and land use patterns. Suggested measures included, but were not limited to: reducing idling times for diesel and gasoline vehicles, requiring DOT&PF-approved congestion management plans for all high-traffic-volume construction projects, and promoting the use of alternative-fuel vehicles. Alaska has also initiated activities to prepare infrastructure in the state for current and future impacts of climate change.

Even though project-level mitigation measures will not have a substantial impact on global GHG emissions because of the exceedingly small amount of GHG emissions involved, the following measures taken during construction will have the effect of reducing GHG emissions:

- To reduce impacts associated with construction delays and changes in traffic flow, the constructor would be required to create and execute a ~~Transportation Management Plan~~

~~(~~TCP~~)~~, which would minimize construction-related congestion and would maintain traffic flow throughout the construction site.

- To reduce impacts associated with construction equipment, unnecessary idling of construction vehicles, trucks, and heavy equipment would be prohibited.
- The construction contractor would be required to routinely maintain and service all construction vehicles, trucks, and equipment to ~~ensure~~ confirm they are in proper working condition, and therefore running as efficiently as possible.
- To reduce energy use to retrieve construction materials, construction equipment and material would be located as close to project construction sites as possible to reduce hauling distances and energy consumption.

These activities are part of a program-wide effort by FHWA to adopt practical means to avoid and minimize environmental impacts in accordance with 40 CFR 1505.2(c).

4.27.6.3 Summary of Climate Change Impacts

This document does not incorporate an analysis of the GHG emissions or climate change effects of each of the alternatives because the potential change in GHG emissions is very small in the context of the affected environment. Because of the insignificance of the GHG impacts, those impacts ~~a~~were not meaningful to a decision on the environmentally preferable alternative or ~~to choosing among~~ identification of a preferred alternative~~s~~. As outlined above, FHWA is working to develop strategies to reduce transportation's contribution to GHGs—particularly carbon dioxide emissions—and to assess the risks to transportation systems and services from climate change. FHWA will continue to pursue these efforts as productive steps to address this important issue. Finally, the construction best practices described above represent practicable project-level measures that, while not substantially reducing global GHG emissions, may help reduce GHG emissions on an incremental basis and could contribute in the long term to meaningful cumulative reduction when considered across the Federal-aid highway program.

4.27.7 Water Quality Impacts

The project would adversely affect, both directly and indirectly, Tongass Narrows and several streams and water bodies on Gravina Island (Airport Creek, Government Creek, Clam Cove, and Blank Inlet and its tributaries).

The major past and ongoing activities affecting water quality in Tongass Narrows are emissions from boats and ships, discharges from seafood processing plants (permitted under NPDES), logging and timber processing, and discharge from cruise ships. Although these activities can degrade water quality, the strong tidal currents help flush pollutants out of Tongass Narrows and maintain its overall good water quality. Logging and mining activities, construction of the runway safety area extension, and construction of the Gravina Island Highway may have affected the freshwater streams and marine waters of Gravina Island in the past, but these water bodies have no known water quality problems at present. Future development of an ore processing facility and its associated TDF could result in increased pollutant loading in surface waters. These facilities would need to comply with state and federal water quality regulations and the Niblack Mine LLC would need to obtain permits for all discharges.

Land-clearing and grading for the future improvements to the airport, logging, extension of the road north of the airport, the ore processing facility and TDF, and marine park development could have short-term adverse impacts on water quality during construction (from exposing sediments and debris to erosion), as well as long-term adverse impacts (from runoff and a larger impermeable area). Increased human activity—and the potential for pollutants—near streams and lakes is anticipated from increased recreational opportunities and improved access. A new harbor in Saxman could result in long-term impacts to Tongass Narrows' water quality from boat emissions.

4.27.7.1 No Action Alternative

Indirect impacts to water quality on Gravina Island as a result of the No Action Alternative would contribute to the cumulative adverse effects of past and future actions on water resources. However, with no bridge access to Gravina Island, the incremental impact would be negligible.

4.27.7.2 All Action Alternatives

The action alternatives of the Gravina Access Project would contribute a slight incremental adverse impact on the water quality of Tongass Narrows and streams throughout Gravina Island when considered with all past, present, and reasonably foreseeable actions that have affected or could affect water quality. Pollutant sources associated with foreseeable development include untreated runoff from bridges, ferry emissions, roadway runoff, runoff and pollutant spills associated with industrial and commercial development, permitted discharges from industrial sites, runoff and pollutants produced by residential development, erosion resulting from land clearing and altered stream hydrology, and increased human activity on currently inaccessible lands.

4.27.8 Wetland Impacts

Wetlands on Gravina Island were lost during development of the Ketchikan International Airport, extension of the runway safety area, and in the development of the Gravina Island Highway. Approximately 42 acres of wetlands were converted to uplands with the extension of the runway safety area in 2007. Approximately 69 acres were filled with the development of the Gravina Island Highway and associated improvements to Lewis Reef and Airport Access roads. Table 4-35 provides the permitted and actual wetland fill areas associated with Gravina Island Highway development.

Table 4-35: Section 404 Permits Associated with Gravina Island Highway Development

Section 404 Permit No.	Acres of Fill Permitted	Permitted Action	Description	Actual Fill Area
POA-2000-0307-N and -O Date: 8-17-05	14.66	Airport Access Road and Lewis Reef Road Realignment	An existing permit was modified for the new 24-foot Lewis Reef Road alignment and its crossing of Airport Creek.	14.66 acres
POA-2000-152-2 Date: 6-23-06	77.2	Gravina Access Project/Alternative F1: Gravina Island Highway (35.9 acres); Lewis Reef and Airport Access roads (13.4 acres); Pennock Island (8.5 acres); Revillagigedo Island (16.5 acres); bridge piers (2.9 acres)	Permit for the construction of the 40-foot Gravina Island Highway and additional acreage to widen Lewis Reef Road and Airport Access Road to 40-feet; and construct access across Pennock and Revillagigedo islands.	49.3 acres
POA-2000-152-2 Date: 6-23-06	5.0	Minor modifications to Gravina Island Highway	Under Special Condition 22d, the minor project modifications did not require additional mitigation.	5 acres

Most other development on Gravina Island has been small in scale, having relatively little effect on wetlands; however, some wetlands were no doubt filled to construct the timber processing plant north of the airport. Continued growth in the region under any of the Gravina Access Project alternatives would require the filling of wetlands.

4.27.8.1 No Action Alternative

Indirect impacts on wetlands on Gravina Island as a result of the No Action Alternative would contribute to the cumulative effects of past and future actions on wetland resources. However, with no bridge access to Gravina Island, the incremental impact would be negligible.

4.27.8.2 All Action Alternatives

The roadway development associated with the action alternatives of the Gravina Access Project, when considered with all past, present, and reasonably foreseeable actions, would have a cumulative effect on wetlands. Continued loss of wetland resources to induced development would reduce the function provided by these resources, including provision of wildlife habitat and moderation of surface runoff. The loss of wetland functions would be minor within the context of the Gravina Island and Pennock Island ecosystems and their extensive wetland resources.

4.27.9 Water Body Modification and Wildlife Impacts

4.27.9.1 Water Body Modification

With the exception of development associated with the airport and the Gravina Island Highway, there has likely been little modification of water bodies to date on Gravina and Pennock islands. Airport development led to alteration of the Gravina Island shoreline by fill and rock-armoring. Extension of the airport's runway safety area in 2007 required diversion of Government Creek to the south. Two smaller creeks now flow into the diverted Government Creek, creating a larger river and estuary, which provides more salmon habitat than was previously available at the mouth of Government Creek.

4.27.9.1.1 No Action Alternative

The No Action Alternative would not contribute to cumulative impacts on water bodies.

4.27.9.1.2 All Action Alternatives

The Gravina Access Project action alternatives, when considered with past, present, and other future actions, would contribute to the trend of modifying the Gravina Island waterfront along the airport and would induce development that could have a measurable cumulative effect on streams and estuaries. Roadways, and clearing and filling for residential, commercial, and other development would result in directing small streams into culverts, channelization of flows, and increased runoff intensity that could alter natural stream hydrology.

4.27.9.2 Wildlife Impacts

Fish and wildlife resources on Gravina and Pennock islands have been affected by historic development of the shoreline, past logging activities, airport development, and hunting. These human activities have reduced habitat availability and quality, and affected the populations of some species.

4.27.9.2.1 No Action Alternative

The No Action Alternative would contribute to cumulative impacts on wildlife only by continuing these types of impacts for a small amount of additional development and additional access via new roads for hunting.

4.27.9.2.2 All Action Alternatives

The Gravina Access Project action alternatives, when considered with past, present, and future actions, would add to existing cumulative effects on fish and wildlife species. Existing development, coupled with future actions (improvements to the airport, logging, development of an ore processing facility and TDF, roadway and park development, and widely dispersed residential and commercial development) would further impact fish and wildlife species and habitat on Gravina and Pennock islands as a result of direct disturbance during construction and long-term use of the lands. Loss of habitat, particularly higher value habitats such as estuaries, would lead to reduced populations of game and nongame species, and long-term wildlife loss resulting from reduced carrying capacity.

Particularly important would be the improved access to and increased human activity in the interior of Gravina Island. The combination of improved access from the Gravina Access Project and new recreational opportunities, and residential and commercial development, would result in increased human activity in the interior of Gravina Island. This could affect EFH associated with tributaries to Vallenar Bay and Bostwick Inlet, deer winter habitat around Bostwick Inlet and Lewis Cove, important upland habitats in the valley of Vallenar and Bostwick Creeks, and important marine habitat at Vallenar Bay and Bostwick Inlet. The Alexander Archipelago wolf is particularly sensitive to human presence and could experience population declines as a result of increased human activity in these areas of Gravina Island. Roads may increase both legal harvest and illegal poaching of wolves, and increased human presence along the project corridor would also increase the frequency of bear-human interactions, some resulting in "defense of life and property" kills.

Hunters in Southeast Alaska actively pursue wolf and deer. With improved access to their habitat, it is likely that human harvest of these species would increase. Because deer are the primary food source for wolves, an increase in deer harvest would reduce deer numbers, potentially to levels inadequate to support the wolf population, adding to its decline. The Alexander Archipelago wolves are dependent on long-term deer habitat viability. The loss of long-term carrying capacity for deer due to increased hunting and habitat degradation would be detrimental to wolf population. Regardless of alternative, increased hunting pressure and reduction of habitat viability could lead to a reduction in population viability of both wolves and deer on Gravina Island. The Alaska Board of Game may choose to implement more restrictive hunting regulations to reduce the potential for overall declines in game species populations.

4.27.10 Historic and Archaeological Resources

Historically, the use and development of Gravina and Pennock islands have occurred primarily along their shorelines, and have contributed to their cultural richness. Some development within the past 50 years, including the development of Ketchikan International Airport, could have resulted in the removal and/or destruction of cultural properties, but documentation of such losses is limited.

Continued growth along the shorelines would be anticipated under all of the alternatives evaluated for the Gravina Access Project, and this growth could have indirect impacts on cultural resources, as described in Section 4.26.14. Future development of airport parking facilities would occur mostly in areas that have been previously disturbed, and so would likely have little potential to affect cultural resources. The proposed road north of the airport is expected to have no effect on cultural resources.

When considering past actions that could have resulted in adverse impacts on cultural resources with the project's indirect impacts and the impacts on cultural resources expected from reasonably foreseeable actions, cumulative impacts on cultural resources are not expected.

4.27.11 Visual Impacts

Historically, the incremental changes to the visual environment of the Ketchikan area have been primarily related to human development along the western shoreline of Revillagigedo Island, the eastern shoreline of Gravina Island, and the northern shoreline of Pennock Island. The most substantial adverse effects on the visual environment occurred through the development of commercial and industrial facilities along the shoreline of Revillagigedo Island and the development of the airport and related facilities on Gravina Island. All of these facilities introduced large-scale, manmade features into a predominantly natural viewshed. Logging activities on Gravina Island have historically been limited in scale, resulting in minor adverse impacts on visual resources. Similarly, mining activities have been limited and generally have occurred in areas outside of the viewshed of most populated areas.

4.27.11.1 No Action Alternative

The No Action Alternative would have no adverse cumulative effect on the visual environment.

4.27.11.2 Bridge Alternative C3-4

The proposed development of the bridge near the airport would contribute substantially to the influence of manmade structures on the viewshed in that area. With future development planned for the airport area, the elements contributing to the adverse cumulative impact on the visual environment would be concentrated in this section of the Borough. No other reasonably foreseeable actions would contribute substantially to the visual impacts near the airport. North of the airport, the ore processing facility and TDF would expand the current industrial development at the Seley Mill site, contributing to a cumulative visual impact on the Gravina Island shoreline in that broader context. The bridge would dominate views from marine vessels and aircraft in the area, particularly for vessels and aircraft transiting under or over the bridge.

4.27.11.3 Bridge Alternative F3

The Alternative F3 bridges would be visible from downtown Ketchikan, but because they would be 1.5 miles distant from major viewpoints in Ketchikan, the visual intrusion of the structures would be limited. Reasonably foreseeable future development associated with the airport would affect the visual environment in that area, but would not be perceived as a cumulative visual impact given its distance from the Alternative F3 bridges. The adverse cumulative effect on visual resources would be the incremental increase in manmade structures in predominantly natural viewsheds.

4.27.11.4 Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

The ferry alternatives would have a low profile within any of the viewsheds to which they contribute. When considered with past or reasonably foreseeable future actions in the area, the adverse cumulative impacts of these alternatives on the visual environment would be negligible.

4.28 Short-Term Uses and Long-Term Productivity

This section discusses in general terms the relationship of local, short-term impacts and use of resources, and the maintenance and enhancement of long-term productivity for the project alternatives. In the assessment of environmental impacts under NEPA, the natural productivity of land is viewed as a long-term, renewable resource, whereas a developed use of the land is considered a short-term use with a relatively short economic life.

4.28.1 No Action Alternative

Under the No Action Alternative, some productive land would be developed to some extent for transportation. These short-term uses of the environment likely would be consistent with local land use and comprehensive planning documents. Within the project area and the region there is an abundant supply of naturally productive land. The No Action Alternative would have no adverse effect on the long-term productivity of resources that dominate the area. For more information, see the land use discussion in Section 4.1.

4.28.2 All Action Alternatives

For the action alternatives, the long-term productivity that would be lost is the current productivity of wetlands and habitat within the proposed right-of-way of the action alternatives. The amount of natural productivity lost through road widening and the construction of new facilities would vary by alternative; more information can be found in wetlands and vegetation discussion in Section 4.14. This natural productivity would be replaced by the use of the land for transportation for the life of the proposed project. These losses are similar to, but of greater magnitude than, those that would occur under the No Action Alternative. All of the projected impacts or effects of implementation of the action alternatives have been analyzed. These impacts are fully described in other sections of this ~~Draft~~ SEIS. The potentially beneficial and adverse impacts would include those to the social, natural, physical, and cultural environments, as well as the projected economic impacts of implementation of the proposed alternatives.

Short-term uses of the environment by implementation of the action alternatives would be consistent with local land use plans. Comprehensive planning for the region recognizes the long-term benefit of improvements, and improving surface transportation between Revillagigedo Island and Gravina Island would be consistent with these plans. The long-term productivity of the Borough would be enhanced by construction and operation of the alternatives as described in the Purpose and Need Statement (see Section 1.3).

Considering the overall abundance of naturally productive land in the project area, the project's consistency with local land use plans, and the benefits of the project's short-term use of the land, the project would not be detrimental to maintaining and enhancing the long-term productivity of the resources in the project area.

4.29 Irreversible and Irretrievable Commitments of Resources

4.29.1 No Action Alternative

The No Action Alternative would require a commitment of resources the same as that required of the existing ferry service. The No Action Alternative would primarily require an irreversible and irretrievable commitment of fiscal resources involving the expenditures of labor and a commitment of fossil fuels for operations of the existing ferry service. This alternative would involve no construction and would have no effect on other available natural resources (i.e., conversion of wetlands) or undeveloped land.

4.29.2 All Action Alternatives

Implementation of any of the action alternatives would irreversibly and irretrievably commit a broad range of natural, physical, human, and financial resources. Land converted to transportation use during the construction and operation of the proposed facility is considered an irreversible commitment. The quality and amount of the converted land in terms of habitat and wetlands varies by alternative and is described in detail in Section 4.14. Although mitigation measures would be implemented during project construction, re-creation or restoration of some of these areas would not be possible.

Modest to substantial amounts of cement, aggregate, and fill materials would be expended, depending on the alternative. Table 4-36 provides an estimate of the amount of materials and financial resources required by action alternative. Human labor and physical resources would be used to fabricate and prepare construction materials. These materials are generally not retrievable; however, these resources are not in short supply, and their use would not have an adverse effect upon their continued availability, and construction is not predicted to exhaust known sources of these materials.

Table 4-36: Estimated Materials Required by Action Alternative [Updated]

Resources/Materials	Alternative					
	Bridge Alternatives		Ferry Alternatives			
	C3-4	F3	G2	G3	G4	G4v
Embankment select material, cubic yards	213,697	396,201	241,885	62,870	35,745	35,745
Select material type A, cubic yards	43,853	48,314	89,378	22,873	21,708	21,708
6-inch Aggregate base course grading D-1, cubic yards	8,196	24,991	12,382	3,207	2,448	2,448
Asphalt concrete pavement, type II class A, tons	5,000	50,000	29,232	7,464	2,000	2,000
Financial resources, $Hundreds	304,910 ~~223,265~~	354,107 ~~275,966~~	121,699 ~~81,004~~	106,505 ~~70,046~~	90,797 ~~62,339~~	45,887 ~~22,792~~

Construction of any action alternative will also require a substantial one-time expenditure of state and federal funds which are not retrievable. The ferry alternatives would require less commitment of financial resources for construction as compared to the bridge alternatives (see Table 4-36). Life cycle costs for the ferry alternatives range from approximately $168 million (Alternative G4v) to $245 million (Alternative G2) and the bridge alternatives from approximately $222 million (Alternative C3-4) to $286 million (Alternative F3).[83] Refer to Chapter 2.0 for additional information on the costs and funding of the project.

A commitment of resources is inherent and unavoidable when constructing large-scale transportation improvements. The information outlined in the project Purpose and Need (see Chapter 1.0) validates that residents in the region will benefit from the improved quality of the transportation system. The benefit provided by the project—improved access to Gravina Island—is anticipated to outweigh the impacts of these commitments of resources.

[83] Alaska Department of Transportation and Public Facilities, August 2012. *Gravina Access Project Supplemental EIS Cost Estimate Report*. Prepared by HDR Alaska, Inc.

4.30 Mitigation Compilation

This section compiles all the individual mitigation sections from Sections 4.1 through 4.29, above, into one section for easy reference. The text is the same as in the sections above.

4.30.1 Mitigation of Direct Impacts

4.30.1.1 Mitigation of Transportation Impacts

4.30.1.1.1 Aviation: Mitigation for Bridge Alternatives C3-4 and F3

With FAA's "determination of hazard to air navigation" for Alternative C3-4, FHWA and DOT&PF would need additional consultation with FAA to identify appropriate mitigation if that alternative were selected as the preferred. The FAA would require the bridge to be lighted and marked in accordance with FAA regulations and advisory circulars to facilitate existing aviation operations in proximity to Alternatives C3-4 and F3. The FAA also would require DOT&PF to complete and return FAA Form 7460-2, Notice of Actual Construction or Alteration, within five days after the construction reached its greatest height (7460-2, Part II).

4.30.1.1.2 Marine Transportation: Mitigation for Bridge Alternatives C3-4 and F3

The piers would be design to withstand ship impact using AASHTO design standards and would be equipped with a fendering system to help protect the ships.

4.30.1.2 Mitigation of Air Quality Impacts

4.30.1.2.1 Mitigation for All Action Alternatives

The Gravina Access Project would have minimal air quality impacts; therefore, no specific mitigation for air pollutant emissions is recommended. Long-term reductions in air pollutant emissions related to transportation would be brought about by policy decisions that improve emissions standards and promote clean energy technologies for vehicles.~~To reduce vehicle emissions during operation, the proposed project under all action alternatives would incorporate designs that are expected to reduce the use of single-occupancy vehicles and improve fuel efficiency compared to the No Action Alternative. In addition, the alternative designs would include improvements to bicycle and pedestrian infrastructure.~~

To the extent practicable ~~A~~all action alternatives ~~are~~ would be designed using materials with the longest available life. This includes using bridges rather than highway fill at several of the stream crossings. These choices would result in new facilities that have a longer life before needing to be replaced than those built without such considerations, which in turn would reduce overall emissions for reconstruction and replacing materials. Mitigation for global GHG emissions is described in Section 4.27.6.

4.30.1.3 Mitigation of Water Quality Impacts

4.30.1.3.1 Mitigation for Bridge Alternatives C3-4 and F3

All new and improved roads would be designed to maintain existing surface water courses (e.g., by using ditches) and stormwater drainage. Final roadway design would include culverts or bridges along existing drainages and across streams on Revillagigedo and Gravina islands. DOT&PF would be responsible for developing an ESCP and the contractor would be responsible for developing a SWPPP based upon the ESCP ~~The construction contractor would be responsible for developing erosion and sediment control and stormwater pollution prevention plans~~ to meet requirements of the Clean Water Act. Bridge runoff likely would be collected in the railing curb and then directed through vertical pipes to the land or waters below the bridge. ~~The roadway and bridge designs would incorporate a stormwater treatment system to minimize the~~

~~effects of runoff.~~ The stormwater treatment system would need to be approved by ADEC under its plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit. Impacts to water quality would be minimized through the use of BMPs, most of which would be part of the SWPPP. The plan will follow DOT&PF's SWPPP Guide. BMPs that would be employed to protect water quality include:

- Increasing, where practicable, the angle of fill slopes to reduce encroachment into adjacent wetlands
- Designing and constructing the roadway with a low-profile embankment to minimize the fill footprint
- Using rock to stabilize toes of slopes to limit the erosion of fine-grained material into adjacent waters and wetlands
- Using plant species indigenous to the area for vegetating road slopes wherever possible to protect the integrity of the natural plant communities
- Using non-native, non-invasive annual grasses (such as annual rye) to provide rapid, initial soil cover to prevent runoff of fine-grained material into adjacent wetlands
- Applying topsoil to the surface of road slopes to aid in the reseeding process
- Designing roadside swales to keep surface water within the natural drainage basins to allow sediment-laden water to clear before its discharge to adjacent wetlands and waters
- Recontouring stream banks at all stream crossings (both culverts and bridge crossings), to approximate original conditions
- Reseeding recontoured stream banks with native seed and annual rye to minimize erosion, as recommended in the DNR *Coastal Revegetation and Erosion Control Guide*[84]

~~Section 4.25.10 describes construction-related BMPs to protect water quality.~~ All necessary permits and agency approvals would be obtained prior to construction, and any permit stipulations would be incorporated into the construction contract specifications.

4.30.1.3.2 Mitigation for Ferry Alternatives G2, G3, ~~and~~ G4 and G4v (Preferred Alternative)

New roads for Alternatives G2 and G3 would be designed to maintain existing surface water courses and stormwater drainage. Final roadway design would include culverts or bridges along existing drainages and across streams on Gravina Island. DOT&PF would be responsible for developing an ESCP and the contractor would be responsible for developing a SWPPP based upon the ESCP ~~The construction contractor would be responsible for developing erosion and sediment control and SWPPP~~ to meet requirements of the Clean Water Act. The roadway and ferry terminal designs would incorporate a stormwater ~~treatment~~ management system to minimize the effects of runoff. ~~The stormwater treatment system would be approved by ADEC under its plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit.~~ BMPs would further reduce adverse effects on water quality (see Sections 4.12.2 and 4.25.10).

~~*4.30.1.3.3 Mitigation for Ferry Alternative G4v*~~

~~Final roadway design would include culverts or bridges along existing drainages and across streams on Gravina Island. The construction contractor would be responsible for developing erosion and sediment control and SWPPP to meet requirements of the Clean Water Act. The roadway design would incorporate a stormwater treatment system to minimize the effects of runoff. The stormwater treatment system would be approved by ADEC under its plan review for~~

[84] Wright, Stoney J., and Philip K. Czapla. 2011. *Alaska Coastal Revegetation and Erosion Control Guide*. Palmer, Alaska: Alaska Department of Natural Resources, Division of Agriculture, Plant Materials Center.

~~a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit. BMPs would further reduce adverse effects on water quality (see Sections 4.12.2 and 4.25.10).~~

4.30.1.4 Mitigation of Wetlands and Vegetation Impacts

4.30.1.4.1 Wetlands: Mitigation for All Action Alternatives

<u>Impacts to wetlands were avoided wherever practicable in the preliminary design phase of the project alternatives. Avoidance measures include designing roadways with a minimum-width fill footprint, maximizing use of the existing roadway, increasing the angle of fill slopes, maintaining natural flow patterns by installing culverts through the fill, minimizing the use of wetlands for staging and storage areas, minimizing the area of allowable disturbance during construction, minimizing all temporary fill in wetlands, and restoring wetlands that are temporarily disturbed. Using appropriate erosion control practices (including the installation of sediment barriers and sedimentation traps, and seeding and stabilizing road slopes) and implementing a storm water pollution prevention plan would minimize water quality impacts to wetlands.</u>~~Wetlands were avoided in preliminary design of the action alternatives as a first step in mitigating impacts. For example, through consultation with USACE, DOT&PF and FHWA revised the design of Alternative C3-4 to eliminate the need for fill in Tongass Narrows. Final mitigation for wetland impacts would be based on discussions among DNR, FHWA, USACE, and other resource management agencies. Detailed mitigation measures would be developed and implemented as a condition of federal permits for the project. In addition to the BMPs listed in Section 4.12.2, culverts would be installed through fill slopes in appropriate locations to maintain natural flow patterns for surface water courses and to ensure that the existing timing and amounts of inflow to adjacent wetlands and waters were retained.~~

DOT&PF proposes to compensate for unavoidable adverse impacts to wetlands <u>through the creation of a Compensatory Mitigation Plan developed during the Section 404/10 permitting process in coordination with the USACE. The Compensatory Mitigation Plan will likely involve an in-lieu-fee and/or permittee-responsible enhancement, restoration, and preservation mitigation projects developed using a watershed approach</u>~~by paying a fee in lieu of onsite wetland restoration, enhancement, or preservation. This compensatory mitigation would be calculated and applied to the preferred alternative identified in the Final SEIS. This fee would be provided to a land trust acceptable to the USACE. The proposed fee would be directed toward activities relating to wetland creation, restoration, enhancement, and preservation or land acquisition in the region~~.

4.30.1.4.2 Vegetation: Mitigation for All Action Alternatives

Final project design would avoid and minimize direct impacts to vegetation by reducing clearing limits and using previously disturbed areas for staging wherever feasible. Temporary disturbed areas would also be planted <u>or reseeded to</u> ~~with native woody vegetation that would~~ provide forage value for wildlife~~ and a net gain in stormwater quality~~.

4.30.1.5 Water Body Modification and Wildlife Impacts

4.30.1.5.1 Water Bodies: Mitigation for Bridge Alternatives C3-4 and F3

The project design would maintain natural water flow conditions under the Airport Creek bridge for Alternative C3-4. Potential adverse impacts of the crossing at Airport Creek would be avoided by using a clear-span bridge at the crossing. Changes to the hydrology of smaller creeks would be minimized by designing culverts that are appropriately sized and placed, would allow fish passage, would accommodate stormwater flow, and would not cause scour.

All construction in and around anadromous fish streams would occur when stream disturbances would have the least impact to anadromous fish species (see Section 4.25.12.3, subsection on EFH, for related detail regarding mitigation of construction impact). In accordance with the memorandum of agreement between DOT&PF and ADF&G,[85] the culvert crossing would use a Tier 1 stream simulation design, which means that it would maintain natural stream conditions such as flow, substrate, and existing fish passage efficiency for the fish in the stream. In-water work areas would be limited to the stream crossing areas and isolated from flowing waters in all anadromous fish streams. Additionally, gravels and streambed material would be used in the bottoms of culverts to simulate the natural streambed.

To reduce impacts of runoff on water bodies, roadway improvements would be designed to collect and filter stormwater in ditches before it is conveyed to surface waters. Bridge runoff likely would be collected in the railing curb and then directed through vertical pipes to the land or waters below the bridge. ~~Roadway and bridge designs would incorporate a stormwater treatment system that would collect, convey, treat, and detain runoff to minimize the effects of runoff.~~ The stormwater treatment system would be submitted to ADEC under its plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit. DOT&PF would be responsible for developing an ESCP and the contractor would be responsible for developing a SWPPP based upon the ESCP ~~The construction contractor would be responsible for developing erosion and sediment control and stormwater pollution prevention plans~~ to meet ADEC, EPA, and USACE requirements of the Clean Water Act.

4.30.1.5.2 Water Bodies: Mitigation for Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

The design of the ferry alternatives would maintain natural water flow conditions, and bridge or culvert design would accommodate stormwater flow, not result in scour, and allow fish passage. All construction in and around anadromous fish streams would occur when stream disturbances would have the least impact to anadromous fish species. (See Section 4.25.12.3, subsection on EFH, for related detail regarding mitigation of construction impact.) In-water work areas, except for stream crossings by construction equipment, would be isolated from flowing waters in all anadromous fish streams. In addition, gravels and streambed material would be used in the bottoms of culverts. Potential adverse impacts of the ~~reconstructed~~ new Airport Creek crossing would be avoided by using a clear-span bridge. The roadway and ferry terminal designs would incorporate a stormwater ~~treatment~~ management system to minimize the effects of runoff. ~~The stormwater treatment system would be approved by ADEC under its plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit.~~ (See Section 4.25.12.3 and its subsection on EFH for related detail on mitigation of construction impact.)

4.30.1.5.3 Marine Habitat~~:~~ —Aquatic Species—Anadromous Fish Mitigation for All Action Alternatives

~~Marine habitat mitigation is included in the description of mitigation for EFH at the end of Section 4.15.4.4.~~

~~Wildlife—Aquatic Species—Anadromous Fish: Mitigation for All Action Alternatives~~

All anadromous stream crossings would be designed to minimize impacts to proper stream function and, at fish streams, to provide passage to both anadromous and resident fish. At all stream crossings (both culverts and bridge crossings), stream banks would be recontoured to approximate original conditions and reseeded with native vegetation to minimize erosion. All road structures crossing other fish habitat would be designed to provide passage for resident

[85] Alaska Department of Fish and Game and Alaska Department of Transportation and Public Facilities. August 3, 2001. *Memorandum of Agreement Between the ADF&G and DOT&PF for the Design, Permitting, and Construction of Culverts for Fish Passage*. Juneau, Alaska.

fish. To mitigate the effects of placing bridge piers in nearshore areas, structures would be located in a manner that would leave a nearshore migration corridor (down to at least -5 feet MLLW) clear of obstruction to the extent practicable.

4.30.1.5.4 Wildlife—Aquatic Species—EFH: Mitigation for All Action Alternatives

Construction of this project would require an ~~DNR Title 41~~ADF&G Title 16 Fish Habitat Permit and a USACE Permit for fill in waters of the United States. As a result of the coordination with NMFS during development of the 2004 FEIS, the following conservation measures would be incorporated to avoid, minimize, and mitigate impacts to EFH:

- Recontour stream banks at all stream crossings (both culverts and bridge crossings) to approximate original conditions
- Reseed streambanks at all stream crossings (both culverts and bridge crossings) with native seed and annual rye to minimize erosion as recommended in the DNR *Coastal Revegetation and Erosion Control Guide*[86]
- Employ BMPs consistent with the Alaska Pollutant Discharge and Elimination System Permit to minimize the introduction of sediment and siltation of ponds and streams during adjacent fill placement and during culvert placement; related BMPs are listed in Sections 4.12; 4.14.1; 4.15.1 through 4.15.4; 4.25.10; and 4.25.11
- Design all anadromous fish stream crossings to provide passage for the salmon present in any given stream, per DOT&PF's memorandum of agreement with the ADF&G

These are general measures that would be modified during final design to address specific details of the preferred alternative through further coordination with the agencies. Further mitigation for adversely affected marine habitat may be determined at the time of project permitting with input from ~~DNR~~ADF&G, NMFS, USACE, and USFWS.

4.30.1.5.5 Wildlife—Bald Eagle: Mitigation for All Action Alternatives

~~If the selected alternative would come within 330 feet of a bald eagle nest, DOT&PF would work with USFWS to develop mitigation measures. Alternative G2 is constrained by topography, and it may not be practical to shift the alignments to more than 330 feet away to create a buffer between the road and nest. In addition, improvements at the intersection of the Airport Access Road, Lewis Reef Road, and Gravina Island Highway cannot be moved to create an adequate buffer between the road and nest. Biologists would be required to monitor construction activities around eagle nests, or adjacent construction activities (defined as work within 100 meters or blasting within one-half mile) would not be permitted during the nesting season for all the alternatives.~~

If the selected alternative requires a Bald Eagle Take Permit for construction, the permit may stipulate that DOT&PF would need to conduct post-construction occupancy, productivity, and nest fidelity surveys. Findings from the surveys would be summarized in a monitoring report and submitted to the USFWS Migratory Bird Permit Office for review.

[86] Wright, Stoney J., and Philip K. Czapla. 2011. *Alaska Coastal Revegetation and Erosion Control Guide*. Palmer, Alaska: Alaska Department of Natural Resources, Division of Agriculture, Plant Materials Center.

4.30.2 Mitigation of Construction Impacts

4.30.2.1 Land Use—Construction Impacts

4.30.2.1.1 Mitigation for Bridge Alternative C3-4

DOT&PF would work with the businesses and local residents to maintain property access throughout the construction phase using signs, temporary entrances, and traffic controls, as appropriate. Construction easements would be acquired and would be selected in a fashion that minimizes disturbance. Properties and land uses would be returned to preconstruction conditions to the maximum extent practicable. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

4.30.2.1.2 Mitigation for Bridge Alternative F3

DOT&PF would work with the property owners to maintain property access throughout construction using signs, temporary entrances, and traffic controls, as appropriate. Construction staging and movement would be constrained within construction easements. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

4.30.2.1.3 Mitigation for Ferry Alternative G2

DOT&PF would work with the commercial properties near Peninsula Point to maintain property access throughout construction using signs, temporary entrances, and traffic controls, as appropriate. Construction easements would be acquired and selected in a fashion that would minimize disturbance, and properties, and land uses would be returned to preconstruction conditions to the maximum extent practicable. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

4.30.2.1.4 Mitigation for Ferry Alternative G3

DOT&PF would work with the commercial and residential properties near the Revillagigedo Island terminal to maintain property access throughout construction using signs, temporary entrances, and traffic controls, as appropriate. Construction easements would be selected in a fashion that would minimize disturbance. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

4.30.2.1.5 Mitigation for Ferry Alternatives G4 and G4v (Preferred Alternative)

Construction easements would be selected in a fashion that would minimize disturbance. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

4.30.2.2 Social Environment—Construction Impacts

4.30.2.2.1 Community and Public Safety Facilities: Mitigation for All Action Alternatives

Vehicle access to all community and public safety facilities would be maintained throughout construction.

4.30.2.2.2 Accessibility: Mitigation for All Action Alternatives

DOT&PF contractors would be required to work with the businesses and local residents to maintain property access throughout the construction phase, using signs, temporary entrances, and traffic controls, as appropriate. Construction easements would be acquired and selected in a fashion that would minimize disturbance, and properties, and land uses would be returned to preconstruction conditions to the maximum extent practicable. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

4.30.2.3 Transportation—Construction Impacts

4.30.2.3.1 Aviation: Mitigation for Bridge Alternative C3-4

DOT&PF would work with helicopter and seaplane operators to minimize disruption of service to the maximum extent practicable during the construction period. Airport access would be maintained to the terminal during construction. The ramps and floats at the airport seaplane base would need to be relocated during construction, and may need to be permanently relocated. Throughout construction, DOT&PF would provide continued access to seaplane service for seaplane customers at the airport. The need to temporarily or permanently relocate the airport seaplane facilities would be determined during final design of Alternative C3-4, if it were selected. A possible future location would be the small cove at the end of the airport perimeter road.

4.30.2.3.2 Aviation: Mitigation for Bridge Alternative F3 and Ferry Alternatives G2, G3, G4, and G4v (Preferred Alternative)

DOT&PF would work with helicopter and seaplane operators to minimize disruption of service to the maximum extent practicable during the construction period.

4.30.2.3.3 Marine Navigation: Mitigation for Bridge Alternative C3-4

Impacts to ships transiting Tongass Narrows would be minimized by scheduling bridge construction activity, to the extent practicable, during times of the year when the marine traffic in Tongass Narrows is low (i.e., outside of the tourist and cruise ship season). DOT&PF would work with cruise ship and other marine vessel operators to facilitate marine navigation during construction. When bridge segment placement requires limiting vessel traffic, DOT&PF would issue notification of such closures to reduce conflicts with marine navigation activities.

4.30.2.3.4 Marine Navigation: Mitigation for Bridge Alternative F3

For this alternative, impacts to navigation could be minimized by constructing each bridge in a separate phase so that one of the two channels would always be unaffected by construction activities, including channel dredging in Alternative F3. DOT&PF would work with cruise ship and marine vessel operators to facilitate marine navigation during construction. During bridge segment placement DOT&PF would issue notification to residents and vessel operators of such closures to reduce conflicts with marine navigation.

4.30.2.3.5 Vehicle Traffic: Mitigation for All Action Alternatives

Under any action alternative, the construction contractor would develop a TCP to describe how traffic would be maintained and parking would be managed~~traffic maintenance and parking plan~~ to minimize impacts to vehicle travel on Ketchikan roadways and at the airport. Construction that might cause lane closures would be timed for low-traffic periods. Temporary roads and driveways would be employed where necessary to ~~ensure~~ support continued mobility during construction. Construction of temporary roadways might be required to maintain access to the airport facilities. For Alternative F3, construction to elevate a portion of South Tongass Highway, which would include road closure and restricting traffic to one lane, would be done during off-peak hours to the extent possible to minimize the impacts on vehicle traffic. Access to the USCG Station and other affected property would be accommodated during construction through temporary driveways.

4.30.2.4 Pedestrians and Bicyclists—Construction Impacts

4.30.2.4.1 Mitigation for All Action Alternatives

The ~~traffic maintenance and parking plan~~TCP would include provisions for maintaining pedestrian and bicycle traffic and safety through construction areas. The project would avoid obstructing or affecting roads, sidewalks, and bike paths whenever possible to maintain access. If obstructing access was unavoidable, the project would establish temporary detour routes.

4.30.2.5 Geological Resources—Construction Impacts

4.30.2.5.1 Mitigation for All Action Alternatives

Impacts to wetland soils would be minimized by placing geotextile mats or equivalent on top of wetland soils in areas that would be temporarily disturbed by construction equipment (see Section 4.25.11).

The construction contractor would be responsible for developing an erosion and sediment control plan associated with upland and wetland areas to meet ADEC and EPA requirements of the Clean Water Act. A registered engineer would prepare the erosion and sediment control plan, and the construction contractor would implement it to minimize soil disturbance during construction. The erosion and sediment control plan would provide guidance to construction contractors to reduce construction impacts, particularly those that would result in the destabilization of adjacent slopes. Disturbed areas within the construction easement would be restored to preconstruction conditions to the extent possible.

4.30.2.6 Air Quality—Construction Impacts

4.30.2.6.1 Mitigation for All Action Alternatives

The project would implement measures to control dust (PM_{10}) at construction sites. Measures, as needed, would include use of a water truck within construction areas, covering of soil and material stockpiles, and adhering to a designated construction speed limit to reduce generation of dust. The construction contractor would implement measures to minimize emissions from construction equipment and minimize construction-related traffic delays to reduce GHG emissions:

- To reduce impacts associated with construction delays and changes in traffic flow, the constructor would be required to create and execute a ~~Transportation Management Plan~~ ~~(~~TCP~~)~~, which would minimize construction-related congestion and would maintain traffic flow throughout the construction site.
- To reduce impacts associated with construction equipment, unnecessary idling of construction vehicles, trucks, and heavy equipment would be prohibited.
- The construction contractor would be required to routinely maintain and service all construction vehicles, trucks, and equipment to ~~ensure~~ confirm they are in proper working condition, and therefore running as efficiently as possible.
- To reduce energy use to retrieve construction materials, construction equipment and material would be located as close to project construction sites as possible to reduce hauling distances and energy consumption.

4.30.2.7 Noise and Vibration—Construction Impacts

4.30.2.7.1 Noise: Mitigation for Bridge Alternatives C3-4 and F3, and Ferry Alternative G3

In accordance with City of Ketchikan noise regulations, construction activities would be prohibited between the hours of 11:00 p.m. and 6:00 a.m. to minimize disruption to residents. The project may request some exceptions to the noise regulations during special construction activities.

4.30.2.7.2 Vibration: Mitigation for All Action Alternatives

Blasting would be controlled to avoid damage of nearby structures and to meet the requirements of the local noise ordinance. In-water blasting, pile driving, and/or drilling would be controlled to ~~ensure that the~~avoid generating pressure waves ~~generated~~ that would ~~not~~ pose a consistent, adverse threat to fish and other marine resources. The construction contractors would adhere to permit conditions for in-water work during construction.

4.30.2.8 Water Quality—Construction Impacts

4.30.2.8.1 Mitigation for All Action Alternatives

Construction of all water body and wetland crossings would adhere to applicable state and federal permit conditions. DOT&PF would be responsible for developing an ESCP and the contractor would be responsible for developing a SWPPP based upon the ESCP ~~The construction contractor would be responsible for developing erosion and sediment control and stormwater pollution prevention plans~~ to meet ADEC and EPA requirements of the Clean Water Act. BMPs would be used to control runoff from the construction area to minimize erosion and transport of sediment, to prevent any accidental leaks of oil or fuel from equipment from contaminating creeks or Tongass Narrows, and to contain any such leaks**.** The SWPPP, which would incorporate BMPs, would be prepared by a registered engineer per the DOT&PF *Alaska Construction Manual*, and implemented during project construction to minimize impacts to water quality.

Construction-related BMPs would include:

- Staking the planned outside limits of disturbance prior to construction to ~~ensure~~ confine ~~that~~ impacts ~~are limited~~ to that area
- Limiting clearing and grubbing outside of the fill footprint to the extent practicable to control physical disturbance of wetlands and habitats
- Installing ~~silt fences~~sediment barriers adjacent to waterways just beyond the estimated toe of fill to capture fine-grained material contained in runoff
- Installing ditch checks to reduce bank erosion
- Employing sedimentation ~~basins~~traps, as necessary (based on the potential volume of stormwater runoff), to limit sedimentation of adjacent wetlands and other waters and habitats
- Locating all staging, fueling, and equipment-servicing operations at least 100 feet away from all streams and wetlands
- Having spill response equipment readily available and ensuring that construction personnel are trained in spill response to contain accidental leaks of oil or fuel from construction equipment

Sections 4.12, 4.14.1, 4.15.1 through 4.15.4, 4.25.11, and 4.25.12 contain additional BMP-related discussion. DOT&PF would hold meetings at the beginning of construction with the construction contractor and agencies to ~~ensure~~ discuss implementation of BMPs and other mitigation commitments.

4.30.2.9 Wetlands —Construction Impacts

4.30.2.9.1 Mitigation for All Action Alternatives

Use of wetlands for construction activities would be minimized to the extent practicable. DOT&PF requirements to operate construction equipment on geotextile mats would allow complete removal of the mat without further soil disturbance upon completion of construction, which would protect wetland soils in the construction easement (including staging areas for Alternative F3, construction access roads, and temporary access areas). After construction activities, shrubs and herbs likely would recover naturally, but the disturbed areas would be reseeded after construction to minimize erosion. Seeding of the disturbed areas would conform to Section 618 of the DOT&PF Standard Specifications for Seeding. Materials used for seeding would conform to DOT&PF Standard Specification Section 724 (Seed), Section 725 (Fertilizer), and Subsection 712-2.01 (Water).[87]

DOT&PF also would require the construction contractor to place temporary fill on geotextile mats or other suitable materials of sufficient thickness to facilitate the removal of the fill and the materials to the maximum extent practicable when they are no longer needed for construction. No natural earthen material would be removed from under the geotextile mat (or equivalent materials) when the temporary fill was removed. Wetlands would be stabilized against erosion once construction equipment and protective mats were removed. DOT&PF would restore wetlands that had been temporarily filled by reseeding and revegetating the disturbed areas.

Detailed mitigation measures would be developed and followed as conditions of the required federal permits.

4.30.2.10 Water Body Modification and Wildlife —Construction Impacts

4.30.2.10.1 Water Bodies: Mitigation for All Action Alternatives

Construction activity in any water body would adhere to applicable state and federal permit conditions. Temporary diversions would be designed so that the flow of the water body was not impeded. Any creek banks or beds affected by diversion structure placement would be restored to preconstruction conditions to the maximum extent practicable.

4.30.2.10.2 Marine Habitat: Mitigation for All Action Alternatives

The construction contractor would be required to adhere to all applicable state and federal permit conditions throughout the construction phase of any action alternative. To minimize these potential adverse impacts, the DOT&PF would verify with the construction contractor~~ensure~~ that construction BMPs, an erosion and sedimentation control plan, and a spill prevention plan were all implemented during project construction. DOT&PF would be responsible for developing an ESCP and the contractor would be responsible for developing a SWPPP based upon the ESCP ~~The construction contractor would be responsible for developing erosion and sediment control and stormwater pollution prevention plans~~ to meet ADEC and EPA requirements of the Clean Water Act.

4.30.2.10.3 Wildlife—Marine Mammals, Anadromous Fish, Marine Fish, and Essential Fish Habitat: Mitigation for All Action Alternatives

Construction of this project would require a Title ~~41~~ 16 Fish Habitat Permit and a USACE Permit for fill in waters of the United States. Coordination with NMFS has been ongoing during the planning of this project. The following conservation measures would be incorporated to avoid, minimize, and mitigate impacts to marine species and EFH:

- Recontour stream banks at all stream crossings (both culverts and bridge crossings) to approximate original conditions, using native seed and annual rye as recommended in the DNR *Alaska Coastal Revegetation and Erosion Control Guide*[88] to minimize erosion

[87] Alaska Department of Transportation and Public Facilities. 2004. *Alaska Department of Transportation and Public Facilities Standard Specifications for Highway Construction*. <http://www.dot.state.ak.us/stwddes/dcsspecs/assets/pdf/hwyspecs> Accessed December 29, 2011.

[88] Wright, Stoney J., and Philip K. Czapla. 2011. *Alaska Coastal Revegetation and Erosion Control Guide*. Palmer, Alaska: Alaska Department of Natural Resources, Division of Agriculture, Plant Materials Center.

- Employ BMPs to minimize the introduction of sediment to ponds and streams during adjacent fill placement and during culvert placement
- Design all stream crossings to provide passage for anadromous fish species present in any given stream, per DOT&PF's memorandum of agreement with ADF&G
- Restrict in-water work in Tongass Narrows as follows:
    - o General use of boats and barges could occur year round for general survey and work on bridge structures above water
    - o Except for blasting, dredging, and pile driving, other work in marine waters could occur between July 1 and February 28
    - o As further described below, blasting, dredging, and pile driving could occur only November 1 through February 28, with the possible exception of mid-channel locations, based on further consultation with the ~~DNR~~ADF&G, NMFS, USACE, and USFWS
- When pile driving in Tongass Narrows, use a vibratory hammer to drive steel pilings instead of an impact hammer, and drive pilings during low tide when in intertidal and subtidal areas
- Conduct all construction in and around anadromous fish streams when stream disturbances would have the least impact on anadromous fish species:
    - o In-stream construction work in the Ketchikan area is June 15 through August 7
    - o Isolate in-water work areas, except for stream crossings by construction equipment, from flowing waters of all anadromous fish streams
- Require the contractor to prepare a blasting plan prior to any blasting activities, to include:
    - o Submit the blasting plan to be reviewed by NMFS for both EFH and marine mammal impacts
    - o Implement a fish and invertebrate monitoring program for any proposed blasting activities
    - o Conduct any blasting during typical daylight hours (i.e., generally 7:00 a.m. to 7:00 p.m.)
    - o Conduct a pre-blasting survey to ~~ensure~~ confirm that no fish schools are in the vicinity of the blasting area; if fish schools are detected, delay blasting until they leave
    - o Employ a biologist to record any kills within 100 feet up-current and 300 feet down-current of the blast area after blasting is completed
    - o Consider monitoring the dredge materials as a method for documenting organisms injured or killed in the blasting
    - o Consider measures such as covering the rock to be blasted with sand to dampen blast impact
    - o Conduct in-water blasting between November 1 and February 28 to avoid juvenile and adult salmon
- Except for Alternative F3, place dredged debris onto a barge where it would enter a settling basin and be disposed of on land. Alternative F3, which could require substantial removal of sediment and rock, would require ocean disposal. Ocean disposal would require permitting by USACE under Section 404 of the Clean Water Act and may require a USACE permit under Section 102 and 103 of the Marine Protection, Research, and Sanctuaries Act (see Section 4.13).

- Conduct fueling and servicing operations at least 100 feet away from all streams and water bodies, and store fuel at least 100 feet away from all wetlands and water bodies
- Obtain all necessary permits and agency approvals prior to construction
- Incorporate any permit stipulations into the construction contract specifications
- Require that the perimeter of the disturbance area be staked prior to construction to ~~ensure~~avoid~~ that there is no~~ additional impact from construction activities
- Use sediment control barriers adjacent to EFH stream channels, just beyond the estimated toe of fill
- Use gravels and streambed material in the bottoms of fish passage culverts to emulate natural streambed conditions
- Provide stream bank stabilization as necessary to maintain stream bank integrity, and include the use of bioengineering techniques to improve habitat value of the riprap, by incorporation of willow stakes or other locally available vegetation

These are general measures that would be refined to specifically address details of the selected alternative through further coordination with the agencies during design.

4.30.2.10.4 Wildlife—Amphibians, Birds, and Land Mammals: Mitigation for All Action Alternatives

To mitigate for construction impacts to wildlife, temporary areas of vegetation removal would be minimized to the extent practical. Prior to construction, specific trees and vegetation to be preserved would be identified. Throughout construction, BMPs would be used to minimize sedimentation, erosion, or other impacts to wildlife. Clearing of nests for species protected under the Migratory Bird Treaty Act will be conducted prior to construction and outside of the nesting season (typically March through July).

4.30.2.10.5 Wildlife—Bald Eagle: Mitigation for All Action Alternatives

If the selected alternative were to come within 660 feet of a bald eagle nest, DOT&PF would be required to obtain a Bald Eagle Take Permit for construction. This permit ~~would~~ may require development of mitigation measures with USFWS. Mitigation measures may require biologists to monitor construction activities around the area that would potentially affect eagle nests, and ~~w~~could limit certain construction activities, such as blasting, during the nesting season (typically February through August). Topography would constrain Alternative G2, and it may not be practical to shift the alignments to more than 660 feet away to create a buffer between the road and nest. In addition, improvements at the intersection of the Airport Access Road, Lewis Reef Road, and Gravina Island Highway could not be moved to create an adequate buffer between the road and nest.

4.30.2.11 Threatened and Endangered Species—Construction Impacts

4.30.2.11.1 Mitigation for All Action Alternatives

To ~~ensure no~~avoid injury to or harassment of ~~Steller sea lions,~~ humpback whales~~,~~ or other marine mammals, DOT&PF and FHWA are committed to the measures listed below:

- Conducting dredging and in-water blasting only in the period from November 1 to February 28, unless pre-approved by NMFS, to avoid runs of salmon and herring, on which humpback whales ~~and Steller sea lions~~ feed, and so that dredging and blasting occurred after most humpback whales had left Southeast Alaska for wintering grounds near Hawaii
- Requiring, via the construction contract, a blasting plan for Alternative F3, approved by NMFS (if blasting amounts are minor, and if agreed by the agencies, monitoring may not be required)

- Obtaining NMFS ~~approval~~ concurrence for a dredging plan for Alternatives F3, G2, and G3~~, and G4~~ and ensuring that, during blasting and dredging, the project would use trained and NMFS-approved observers to indicate when marine mammals were within a 164-foot (50-meter) zone around pier work or other in-water work, and delaying or ceasing work until the animals moved out of the area
- Issuing an in-water warning sound prior to blasting to allow any marine mammals to voluntarily move to a comfortable distance
- Acquiring all necessary permits and agency approvals prior to construction, and incorporating stipulations into contract specifications
- Obtaining any necessary incidental harassment authorization from NMFS
- Finalizing mitigation measures during the permitting process with input from ~~DNR~~ADF&G, NMFS, USACE, and USFWS

These mitigations are designed to be compatible with EFH mitigation measures for the project (see Section 4.25.12.3). ~~All project-related activities would conform to the pertinent provisions of the Marine Mammal Protection Act and the Endangered Species Act.~~

4.30.2.12 Historic and Archeological Preservation—Construction Impacts

4.30.2.12.1 Mitigation for All Action Alternatives

~~Once an alternative is selected~~Prior to construction, historic and arch~~a~~eological sit~~i~~es in the vicinity of construction areas will be identified for the construction contractor to avoid.

In general, under all alternatives, FHWA and DOT&PF would continue coordination with the SHPO through design. ~~Once the alignment was staked during design and prior to construction, a qualified archaeologist would be sent into the field to ensure that no cultural sites were present that might have been missed in previous field surveys.~~ If cultural resources were discovered during construction, construction at that location would halt for site evaluation. DOT&PF would consult with the SHPO about the appropriate course of action. Protocol and contact information for construction contractors in the event of an inadvertent cultural resource or human remains discovery will be developed by DOT&PF in coordination with FHWA and the Alaska SHPO and NHPA Section 106 consulting parties prior to commencement of construction.

4.30.2.13 Hazardous Waste Sites—Construction Impacts

4.30.2.13.1 Mitigation for All Action Alternatives

Construction contractors would be required to meet all federal, state, and local regulatory requirements regarding the discovery and use of hazardous materials. These regulatory requirements include worker right-to-know and safety training for the discovery and use of hazardous materials. Construction contractors on site must be trained to meet federal, state, and local regulatory requirements in recognizing and reporting discovery of unknown contamination, and proper use and handling of hazardous materials during construction. If unknown hazardous materials were encountered during construction, the contractor would be expected to isolate the area and prevent migration of any contaminants.

A spill prevention and response plan would be developed for the selected alternative. Cleanup would occur in accordance with state and federal regulation and in consultation with ADEC. Hazardous materials used during project construction would be stored and handled according to state and federal regulations. Material Safety Data Sheets would be available for all hazardous materials on the site. Construction vehicles will contain spill prevention kits in case of minor hazardous materials or chemical spills during construction.

4.30.2.14 Visual Environment—Construction Impacts

4.30.2.14.1 Mitigation for All Action Alternatives

All construction equipment and debris would be removed after construction was completed. Reseeding would repair bare soil areas. These efforts would repair the visual impacts of construction after the construction process was finished.~~ but would not affect~~

4.30.2.15 Utilities—Construction Impacts

4.30.2.15.1 Mitigation for All Action Alternatives

Affected customers would be given advance notice of any service interruptions. For longer outages, temporary facilities would be provided to ~~ensure~~ maintain~~enance of~~ service to affected customers.

4.31 Summary of Impacts

This section summarizes and compares the key beneficial and adverse impacts of the No Action and action alternatives for the Gravina Access Project.

4.31.1 No Action Alternative

The No Action Alternative would not affect airport property, existing airport or floatplane facilities, or Federal Aviation Administration (FAA) Part 77 airspace[89] in the vicinity of Ketchikan International Airport (14 CFR 77.1). Existing problems associated with access, convenience, and reliability for passengers, airport tenants, emergency personnel, equipment, and freight shipment would continue (see Section 4.7.1.1). Also, the No Action Alternative would have no change in the impact of current infrastructure and operation on cruise ship operations, the Ketchikan docking and berthing areas and facilities used by the cruise ships, or on facilities used by the AMHS ferries. There would be no traffic improvements that would change vehicular access to Ketchikan International Airport. The Gravina Island Highway and Lewis Reef Road would continue to provide access to other Borough and developable lands on Gravina Island. No wetlands or EFH would be lost to the construction of new facilities. Development would likely continue at the existing rate, with approximately 16 acres developed on Gravina Island by 2030.

4.31.2 Bridge Alternatives

4.31.2.1 Alternative C3-4

Alternative C3-4 is estimated to have a $305~~233~~ million construction and project development cost, a $~~2~~322 million lifecycle cost~~ ($214 million with a toll)~~, and a total life cost of $~~391~~ 490 million ($~~335~~ 427 million with a toll). The bridge associated with this alternative would intrude into the Part 77 airspace for Ketchikan International Airport, obstruct flight under normal VFR and could greatly reduce the effectiveness of SVFR for seaplane operators (see Section 4.7.1.2). Cruise ship passage would continue unhindered (see Section 4.7.2.2). Wetland habitat loss is estimated as ~~13~~ 6.0 acres (Table 4-13); 1.~~4~~9 acres of EFH are expected to be lost (Table 4-15). Development on Gravina Island is projected to be about 336 acres by 203~~0~~3 (see Section 4.26.1). Adding a $5 toll to the bridge would reduce the amount of development by approximately 13 percent.

[89] Part 77 airspace refers to the protected airspace for aeronautical navigation. Objects that affect navigable airspace are identified by the FAA in accordance with Part 77.

4.31.2.2 Alternative F3

Alternative F3 is estimated to have a $354~~276~~ million construction and project development cost, a $~~286~~ 385 million lifecycle cost~~ ($280 million with a toll)~~, and a total life cost of $~~576~~ 675 million ($~~531~~ 624 million with a toll). The Alternative F3 bridges would not intrude into the Part 77 airspace, but would affect seaplane operations because seaplanes would need to fly over or taxi under them (primarily the East Channel bridge). The bridges associated with this alternative would alter cruise ship navigation patterns by requiring large vessels to use the West Channel around Pennock Island (see Section 4.7.2.3). Wetland habitat loss is estimated as ~~33~~ 26.0 acres (Table 4-13); 15.~~3~~ 7 acres of marine EFH are expected to be lost and 6 anadromous streams crossed (Table 4-15). Development on Gravina Island is projected to be about 336 acres by 2033~~0~~ (see Section 4.26.1). Adding a $5 toll to the bridge would reduce the amount of development by approximately 14 percent.

4.31.3 Ferry Alternatives

Alternatives G2, G3, G4, and G4v would have lower construction and project development costs ($46 million~~23 million~~ to $$122~~81~~ million) and lower lifecycle costs ($~~182~~ 171 million to $~~331~~ 338 million) than the bridge alternatives, but would have higher total life costs ($~~1,050~~ 1,163 to $~~1,330~~2,017 million without toll or $~~712~~ 784 to $~~879~~ 1,512 million with toll) than the No Action and the bridge alternatives. The ferry alternatives would have no impacts to aviation. Alternatives G2, G3, and G4 would have a slight effect on marine navigation by increasing the amount of cross-channel traffic. These alternatives would not provide the convenience and reliability of access to the airport and other lands on Gravina Island as well as a bridge alternative would. Wetland habitat loss with Alternatives G2, G3, G4, and G4v is estimated as 17.2, 11.9, 6.0, and 6.0~~24, 18, 13, and 13~~ acres, respectively (Table 4-13); approximately ~~1.0, 4.0, 0.7~~2.1, 5.1, 1.4, and ~~0.1~~1.1 acres of marine EFH, respectively, are expected to be lost and Alternative G3 would cross 1 anadromous stream (Table 4-15). Projected development on Gravina Island under Alternatives G2, G3, and G4, at approximately 43 acres by 203~~0~~3, is approximately three times the amount of development projected under the No Action Alternative and Alternative G4v, but about one-tenth of what any of the bridge alternatives would provide.

Alternative C3-4: Transportation Impacts at Airport

Pier Footing

Alternative C3-4 (Centerline)

Date: January 17, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: KGB, HDR Alaska, Inc.

Gravina Access Project

0 150 300
Feet

N

Figure 4.1

Alternative C3-4: Proposed Pier Locations and Marine Resources

C3-4
Pier Footing

Marine Resources

- Algae
- Bull Kelp
- Cucumber
- Eelgrass
- Laminaria

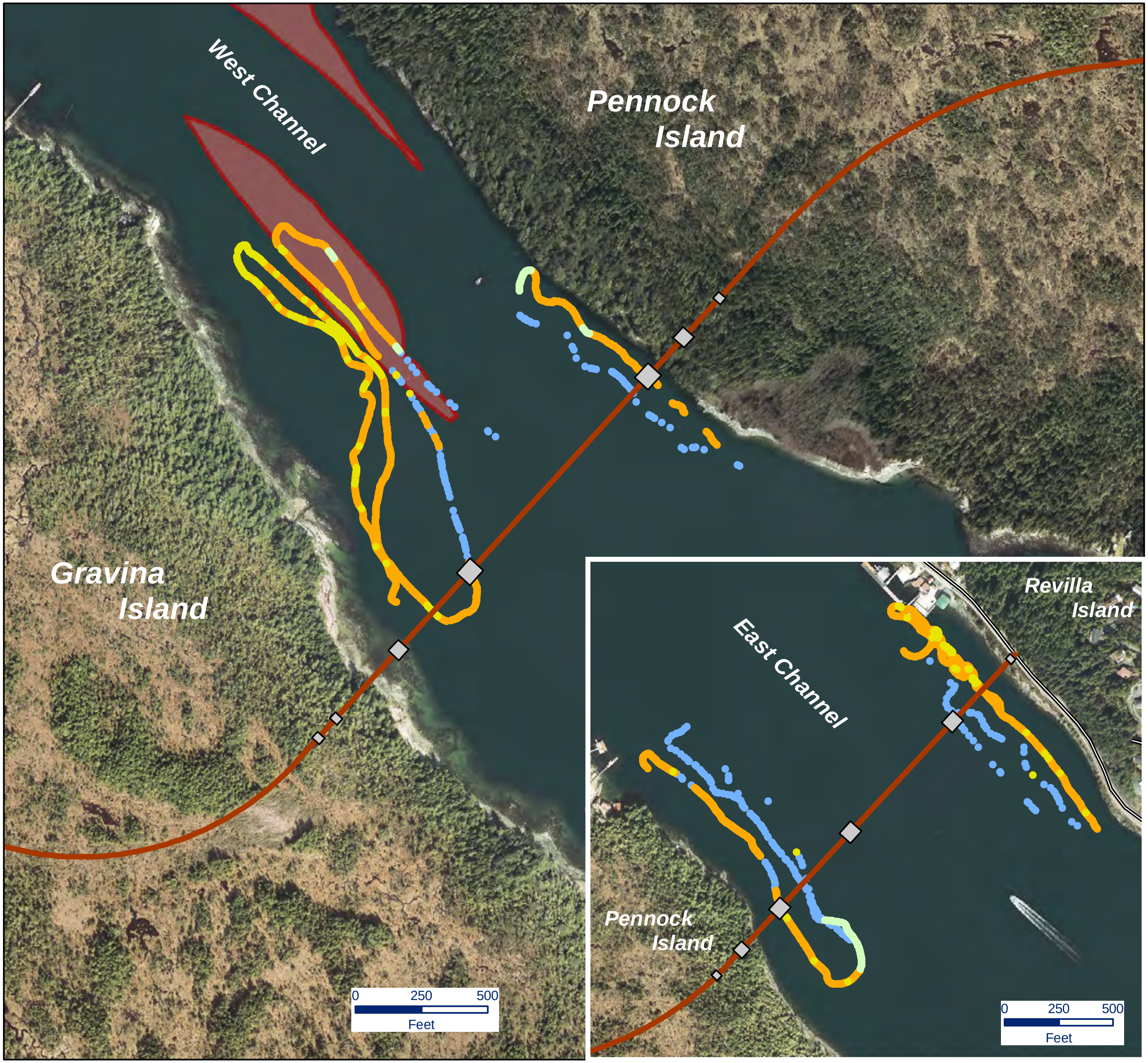
Date: January 17, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: KGB, HDR Alaska, Inc.

Gravina Access Project

0 250 500
Feet

N

Figure 4.2

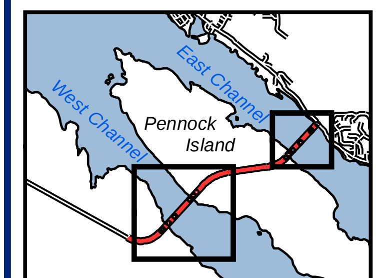


Alternative F3: Proposed Dredging, Pier Locations, and Marine Resources

- F3
- Pier Footing
- Proposed Dredging (West Channel only)

Marine Resources

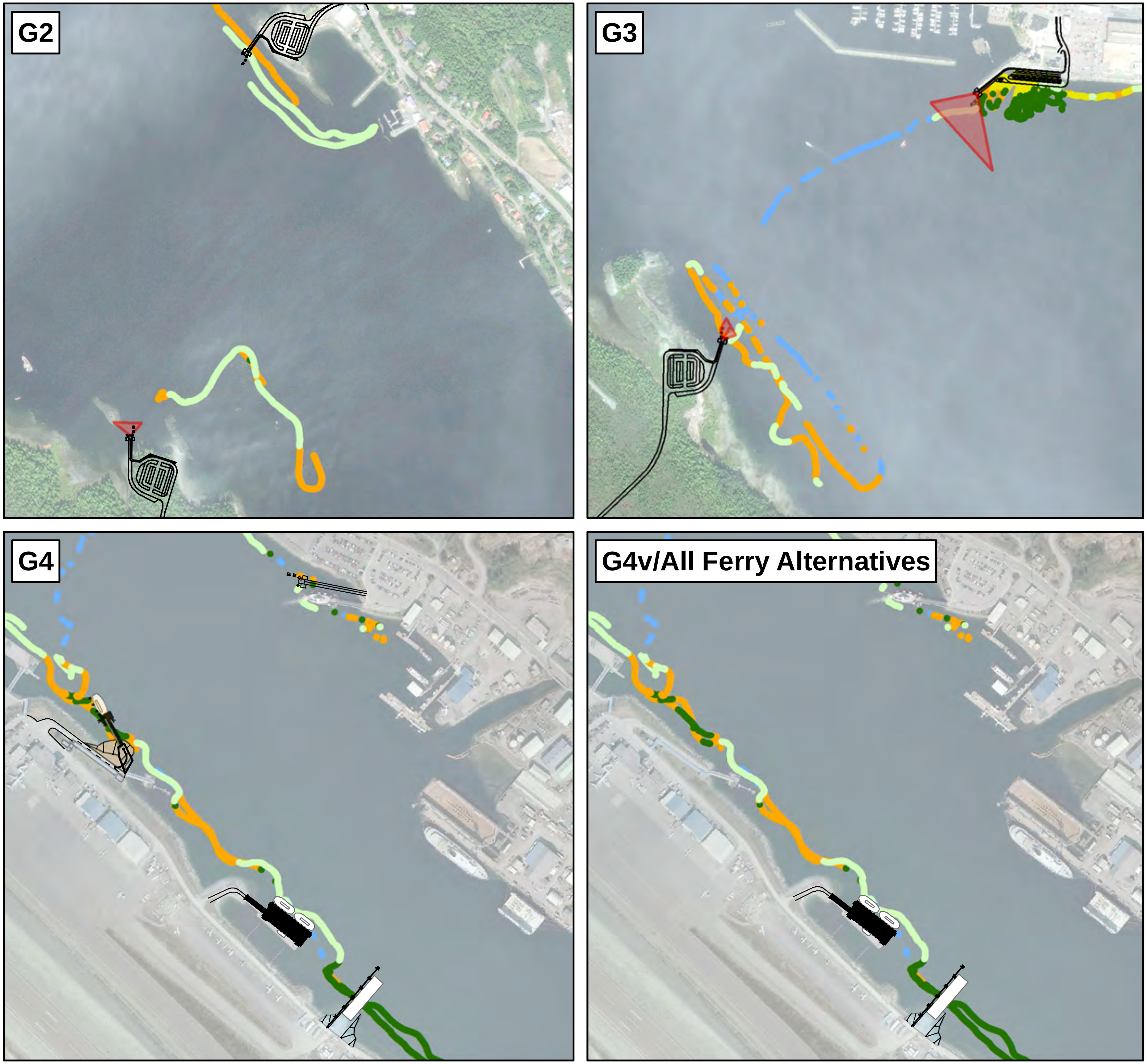
- Algae
- Bull Kelp
- Cucumber
- Eelgrass
- Laminaria



Date: October 18, 2012
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: KGB, HDR Alaska, Inc.

Gravina Access Project

Figure 4.3



Ferry Alternatives: Proposed Dredging and Marine Resources

Proposed Dredging for Ferry Alternatives

Marine Resources

- Algae
- Bull Kelp
- Cucumber
- Eelgrass
- Laminaria

Updated

Date: December 21, 2016
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: KGB, HDR Alaska, Inc.

Gravina Access Project

0 500 1,000
Feet

N

Figure 4.4

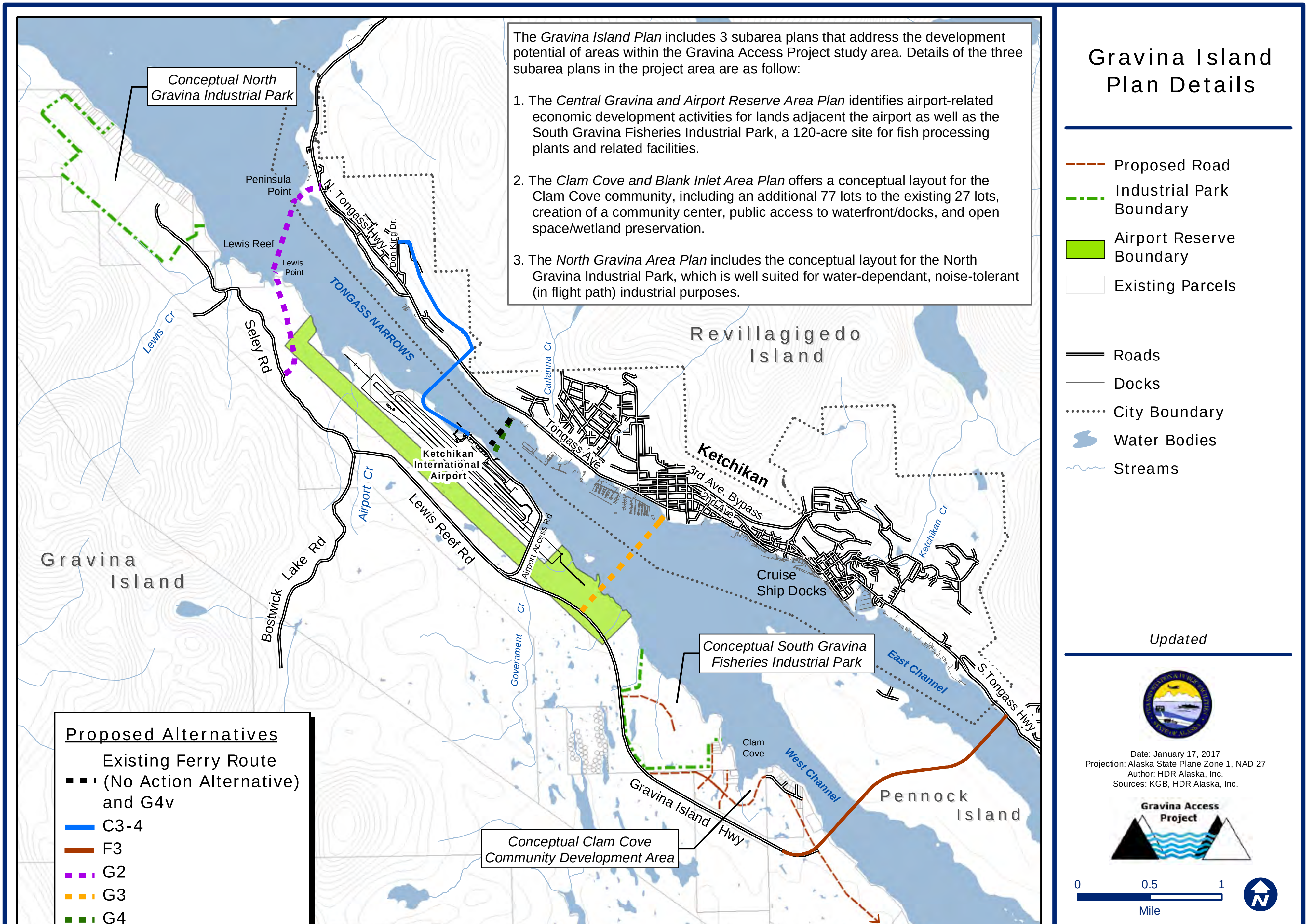

The Gravina Island Plan includes 3 subarea plans that address the development potential of areas within the Gravina Access Project study area. Details of the three subarea plans in the project area are as follow:
1. The Central Gravina and Airport Reserve Area Plan identifies airport-related economic development activities for lands adjacent the airport as well as the South Gravina Fisheries Industrial Park, a 120-acre site for fish processing plants and related facilities.
2. The Clam Cove and Blank Inlet Area Plan offers a conceptual layout for the Clam Cove community, including an additional 77 lots to the existing 27 lots, creation of a community center, public access to waterfront/docks, and open space/wetland preservation.
3. The North Gravina Area Plan includes the conceptual layout for the North Gravina Industrial Park, which is well suited for water-dependant, noise-tolerant (in flight path) industrial purposes.
Conceptual North Gravina Industrial Park
Peninsula Point
Lewis Reef
Lewis Point
N. Tongass Hwy
Don King Dr.
TONGASS NARROWS
Lewis Cr
Seley Rd
Carlanna Cr
Revillagigedo Island
Ketchikan International Airport
Tongass Ave
Ketchikan
3rd Ave. Bypass
2nd Ave
Airport Cr
Lewis Reef Rd
Airport Access Rd
Gravina Island
Lake Rd
Bostwick
Cr
Government
Cruise Ship Docks
Ketchikan Cr
Conceptual South Gravina Fisheries Industrial Park
East Channel
S. Tongass Hwy
Clam Cove
West Channel
Pennock Island
Gravina Island Hwy
Conceptual Clam Cove Community Development Area
Proposed Alternatives
Existing Ferry Route (No Action Alternative) and G4v
C3-4
F3
G2
G3
G4
Gravina Island Plan Details
Proposed Road
Industrial Park Boundary
Airport Reserve Boundary
Existing Parcels
Roads
Docks
City Boundary
Water Bodies
Streams
Updated
Date: January 17, 2017
Projection: Alaska State Plane Zone 1, NAD 27
Author: HDR Alaska, Inc.
Sources: KGB, HDR Alaska, Inc.
Gravina Access Project
0
0.5
1
Mile

Figure 4.5

5.0 LIST OF PREPARERS

Name, Professional Registration, and Project Role	***Education (Degree, Field, and Institution)***	***Years of Experience***
FHWA		
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DOT&PF		
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John Barnett Project Environmental Coordinator	Geology, Environmental Studies, Alaska Methodist University, Oregon State University	41
HDR		
Mark Dalton Project Manager	B.S., Biology and Geology, Colby College	32
Carol Snead Senior Environmental Planner	M.S., Geological Science, Rutgers University B.S., Geology, Boston College	25
Ronny McPherson, P.E.	M.S., Ocean Engineering, Texas A&M University B.S., Aerospace Engineering, Texas A&M University	9
Michael Tooley, P.E. Engineer Lead	B.S., Engineering, University of Alaska-Fairbanks	34
Shea Murphy	B.S., Civil Engineering, University of Alaska Fairbanks	3
Allison Biastock Public Involvement Lead	B.A., International Affairs, University of Nevada Reno	14
Mac Salway Senior Biologist	M.S., Environmental Sciences/Studies, Oregon Graduate Institute of Science and Technology B.S., Biological/Life Sciences, University of Puget Sound	17
Jon Schick Environmental Planner/ GIS Analyst	M.S., Environmental Science, Alaska Pacific University B.A., Environmental Design/ Urban Planning, University of Colorado at Boulder	10
Vanessa Bauman Senior GIS Analyst	M.A., Geography, University of Colorado at Boulder B.A., Geography, University of Nebraska at Lincoln	14

Name, Professional Registration, and Project Role	***Education (Degree, Field, and Institution)***	***Years of Experience***
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Molly Brown Quality Control	B.S., Environmental Studies, The George Washington University	20
Tina Adair Technical Editor	B.S., Communications, University of Texas at Austin	28
Corvus Culture		
Tracie Krauthoefer Cultural Resources Specialist	M.A., Historic Preservation, Savannah College of Art and Design B.A., Anthropology, University of Montana	15

6.0 FINAL SEIS DISTRIBUTION LIST

COOPERATING AGENCIES

FEDERAL AGENCIES

U.S. Army Corps of Engineers (USACE)

Regulatory Branch
PO Box 6898
JBER, AK 99506-0898

Sitka Field Office
Post Office Box 16
Sitka, Alaska 99835

U.S. Coast Guard (USCG)

Management and Navigation Safety Branch
PO Box 25517
Juneau, AK 99802

Marine Safety Detachment Ketchikan
1621 South Tongass Avenue, Suite 202
Ketchikan, AK 99901

Commander (dpr)
Seventeenth Coast Guard District
PO Box 25517
Juneau, AK 99802-5517

Commander(s)
Maintenance and Logistics Command Pacific
Coast Guard Island, Building 54-D
Alameda, CA 94501-5100

Commanding Officer
Integrated Support Command Ketchikan
1300 Stedman Street
Ketchikan, AK 99901

Commanding Officer
Civil Engineering Unit Juneau
PO Box 25517
Juneau, AK 99802-5517

PARTICIPATING AGENCIES

FEDERAL AGENCIES

Federal Aviation Administration (FAA)

Office of the Regional Administrator—Alaska Region
222 West 7th Avenue, #14
Anchorage, AK 99513-7587

U.S. Environmental Protection Agency (EPA)

Region 10 NEPA Review & Assessment
1200 6th Avenue, Suite 900
Seattle, WA 98101-3140

Office of Federal Activities (2201A)
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Office of Federal Activities, EIS Filing Section
Mail Code 2252-A, Room 7241
Ariel Rios Building (South Oval Lobby)
1200 Pennsylvania Avenue NW
Washington, DC 20460

Advisory Council on Historic Preservation

401 F Street, NW, Suite 308
Washington, DC 20001

STATE AGENCIES

Department of Natural Resources (DNR)

Division of Forestry
2417 Tongass Avenue, Suite 213
Ketchikan, AK 99901

Division of Mining, Land, and Water, Suite 400
Willoughby Avenue, Fourth Floor
Juneau, AK 99801

Division of Parks and Outdoor Recreation
Office of History and Archeology
State Historic Preservation Officer (SHPO)
550 West 7th Avenue, Suite 1310
Anchorage, AK 99501

Alaska Mental Health Trust Land Office
2600 Cordova Street, Suite 100
Anchorage, AK 99503

LOCAL GOVERNMENT

Ketchikan Gateway Borough

1900 1st Avenue
Ketchikan, AK 99901

City of Ketchikan

City of Ketchikan
334 Front Street
Ketchikan, AK 99901

Ketchikan Public Library
1110 Copper Ridge Lane
Ketchikan, AK 99901

Ports and Harbors Department, Harbormaster Office
2933 Tongass Avenue
Ketchikan, AK 99901

City of Saxman
2841 South Tongass Highway
Ketchikan, AK 99901

TRIBAL GOVERNMENT

Central Council Tlingit & Haida Indian Tribes of Alaska
320 West Willoughby Avenue, Suite 300
Juneau, AK 99801

Ketchikan Indian Community
2960 Tongass Avenue
Ketchikan, AK 99901

Organized Village of Saxman
Route 2, Box 2
Ketchikan, AK 99901

Metlakatla Indian Community
PO Box 8
Metlakatla, AK 99926

ALASKA NATIVE CLAIMS SETTLEMENT ACT (ANCSA) CORPORATIONS

Sealaska Corporation
One Sealaska Plaza, Suite 400
Juneau, AK 99801

Cape Fox Corporation
2851 South Tongass Highway
PO Box 8558
Ketchikan, AK 99901

OTHER INTERESTED PARTIES

FEDERAL AGENCIES

U.S. Department of Interior
U.S. Fish & Wildlife Service
Juneau Fish & Wildlife Field Office
3000 Vintage Boulevard, Suite 201
Juneau, AK 99801

Office of Environmental Policy and Compliance
1849 C Street, NW, MS 2462
Washington, DC 20240

National Oceanographic and Atmospheric Administration (NOAA) Fisheries' National Marine Fisheries Service
Protected Resources Division
PO Box 21668
Juneau, AK 99802

Habitat Conservation Division
222 West 7th Avenue
PO Box 43
Anchorage, AK 99513

Office of Program Planning and Integration
1315 East-West Highway, SSMC-3
Silver Spring, MD 20910

U.S. Department of Agriculture
Forest Service (USFS)
Ketchikan Misty Fjords Ranger District-Alaska Region
3031 Tongass Avenue
Ketchikan, AK 99901

Alaska Regional Office
Attn: Engineering Staff
PO Box 21628
Juneau, AK 99802-1628

U.S. Public Health and Human Services
Office of Environmental Health and Engineering
4141 Ambassador Drive, Suite 300
Anchorage, AK 99508

STATE AGENCIES

Department of Fish and Game (ADF&G)
Office of Habitat Management and Permitting
PO Box 668
Craig, AK 99921-0668

Juneau Headquarters
PO Box 115526
Juneau, AK 99911

Department of Commerce, Community, and Economic Development
Division of Community and Regional Affairs
PO Box 110809
Juneau, AK 99811-0809

Department of Environmental Conservation
Division of Water
410 Willoughby Avenue, Suite 303
PO Box 111800
Juneau, AK 99801-1795

Ketchikan International Airport
1000 Airport Terminal Way
Ketchikan, AK 99901

Ketchikan Area Arts and Humanities Council
330 Main Street
Ketchikan, AK 99901

Alaska State Council on the Arts
161 Klevin Street, Suite 102
Anchorage, AK 99508

University of Alaska Southeast—Ketchikan Campus
2600 Seventh Avenue
Ketchikan, AK 99901

Southeast Alaska Discovery Center
50 Main Street
Ketchikan, AK 99901

Southeast Alaska Pilots' Association
1621 Tongass Avenue, Suite 300
Ketchikan, AK 99901

Taquan Air Tours
4085 Tongass Avenue
Ketchikan, AK 99901

Misty Fjords Air & Outfitting
1716 South Tongass Highway
Ketchikan, AK 99901

Pacific Airways
1621 Tongass Avenue, Suite 101A
Ketchikan, AK 99901

Southeast Aviation
PO Box 5797
Ketchikan, AK 99901

Promech
1515 Tongass Avenue
Ketchikan, AK 99901

Alaska Seaplane Tours (RDM Pilot)
4743 North Tongass Highway
Ketchikan, AK 99901

TEMSCO Helicopters Inc.
5411 North Tongass Highway
Ketchikan, AK 99901

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7.0 COMMENTS AND COORDINATION

To fulfill the requirements of NEPA and Section 6002 of SAFETEA-LU for the Gravina Access Project SEIS, FHWA, DOT&PF, and the project team consulted and coordinated with federal, state, and local agencies, tribal governments, and the public during the environmental review. These stakeholders provided input during the public and agency scoping process, and on the alternative and screening methodology development. They also were given an opportunity to review and comment on the screening report, which identified the reasonable alternatives for analysis in the SEIS. Section 7.1 describes coordination with federal, state, and local agencies in accordance with SAFETEA-LU. The public and agency scoping process is described in Section 7.2. Section 7.3 describes the processes for development and screening of the alternatives, including coordination with agency and public stakeholders for input and comment.

7.1 Agency Involvement

SAFETEA-LU Section 6002 established new guidance for the roles and responsibilities for agency involvement during the environmental review process for transportation projects. The types of agency involvement and their respective roles and responsibilities include:

- **Lead Agency/Agencies.** The lead agencies must perform the functions that they have traditionally performed in preparing an EIS. New guidance also requires the lead agency to identify and involve participating agencies, develop coordination plans, and provide opportunities for public and participating agency involvement in defining the purpose and need and determining the range of alternatives. Additionally, lead agencies must provide increased oversight in managing the process and resolving issues. For purposes of the SEIS, FHWA and DOT&PF serve as “joint lead agencies.”
- **Cooperating Agency.** Cooperating agencies are those agencies with jurisdiction by law or special expertise regarding the proposed action. Cooperating agencies have a higher degree of authority, responsibility, and involvement in the environmental review process. Every cooperating agency will also be a participating agency.
- **Participating Agency.** A participating agency is any agency that “may have an interest in the project.” These agencies include all federal, state, tribal, regional, and local government agencies. Participating agencies are involved in the NEPA process, especially in development of the purpose and need statement, range of alternatives, methodologies, and the level of detail to analyze the alternatives.

Agencies consulted during the development of the 2004 Final EIS were considered potential cooperating and participating agencies for the SEIS. FHWA, in collaboration with DOT&PF, invited these agencies in July 2008 to become either cooperating or participating agencies.

7.1.1 Cooperating Agencies

In July 2008, FHWA sent a letter to federal agencies with jurisdiction in the project area explaining the language in SAFETEA-LU, outlining the responsibility of cooperating agencies, and extending an invitation to serve as a cooperating agency in accordance with FHWA regulation 23 CFR 771.111(d). Table 7-1 lists the agencies that accepted the invitation to become cooperating agencies and their areas of jurisdiction or expertise.

Table 7-1: Cooperating Agencies and their Areas of Jurisdiction/Expertise

Cooperating agency	Jurisdiction/Expertise
U.S. Coast Guard (USCG)	Responsible for approval of the location and plans of bridges and causeways constructed across navigable waters of the United States
U.S. Army Corps of Engineers (USACE)	Responsible for issuing permits under Section 404(b)(1) of the Clean Water Act for impacts to wetlands or waters of the United States and under Section 10 of the Rivers and Harbors Act of 1899

EPA, USFS, USFWS, and FAA were invited to be cooperating agencies, but declined the invitation. EPA, USFWS, and FAA requested designation as participating agencies (see Section 7.1.2). USFS declined participation as a cooperating or participating agency.

7.1.2 Participating Agencies

On June 26, 2008, DOT&PF sent a letter to the state agencies, municipal governments, tribal governments, and Native corporations listed below to solicit scoping comments and invite them to become participating agencies.

- ADEC, Division of Air and Water Quality
- ADF&G, Division of Habitat
- DNR, The Trust Land Office
- DNR, Division of Coastal and Ocean Management[1]
- ADF&G, Office of Habitat Management and Permitting[2]
- DNR, SHPO
- Ketchikan Gateway Borough
- City of Ketchikan
- City of Saxman
- Organized Village of Saxman
- Ketchikan Indian Community
- Metlakatla Indian Community
- Central Council Tlingit and Haida Indian Tribes of Alaska
- Hydaburg Cooperative Association
- Craig Community Association
- Klawock Cooperative Association
- Organized Village of Kasaan

[1] The Division of Coastal and Ocean Management was dissolved on July 1, 2011, with the sunset of the Alaska Coastal Management Program.

[2] At the time DOT&PF sent its scoping letter, the Office of Habitat Management and Permitting was in DNR. The office has been within the ADF&G since July 2008.

Table 7-2 lists the agencies that provided written responses affirming their involvement as participating agencies, and their jurisdiction or expertise.

Table 7-2: Participating Agencies and their Areas of Jurisdiction/Expertise

Participating Agency	Jurisdiction/Expertise
FAA	Provides regulation and oversight for the safety and efficiency of air travel
USFWS	Administers the ESA, manages migratory bird populations, restores nationally significant fisheries, and conserves and restores wildlife habitat such as wetlands
EPA	Reviews, rates, and publicly comments on the environmental impacts of major federal actions Has a significant role in the Clean Water Act Section 404 process
DNR, The Trust Land Office	Manages Mental Health Trust land
ADF&G, Office of Habitat Management and Permitting	Primarily responsible for the protection of Alaska's fish and wildlife resources and their habitats Coordinates with other agencies during plan reviews to provide expertise for protecting important fish and wildlife habitat throughout the state.
Ketchikan Gateway Borough	Provides local government services including operation of the existing ferry service, airport management, and has planning authority within Borough boundaries
City of Ketchikan	A Home Rule city within the Ketchikan Gateway Borough Provides local city services including public school education, regional land-use planning and regulation, and property assessment and collection of taxes for both the Borough government and any cities within the Borough

As of August 19, 2008, the end of the formal scoping period, no tribal government had affirmed in writing its interest to be involved as a participating agency. On August 28, 2008, FHWA made follow-up calls to the tribes and Native corporations receiving the invitation letter. The Craig Community Association provided a definitive response indicating it was not interested in participating agency status. In other cases, either no direct contact could be made (left messages) or no definitive statement regarding participating agency status was obtained.

7.2 Public and Agency Scoping Process

The scoping process encompasses the methods used to engage agencies and the public in the environmental review and the means by which agency and public comments and concerns are reflected in the alternatives development and environmental analysis. More detailed information about the scoping activities undertaken for the SEIS is available in the *Gravina Access Project Supplemental Environmental Impact Statement Scoping Summary Report (Scoping Summary Report).*[3] Scoping activities included public notices of SEIS development activities, individual and small group meetings and briefings, agency review of study documents, public scoping meetings, and identification of comment opportunities.

7.2.1 Notice of Intent

On July 2, 2008, FHWA (in cooperation with DOT&PF) published in the *Federal Register* a Notice of Intent (NOI) to prepare the Gravina Access Project SEIS. The NOI described the project's proposed action, stated the purpose and need for action, and announced opportunities to comment on the scope of the analysis for the project and the range of alternatives. The NOI also announced the opportunity for anyone interested in the SEIS to attend public scoping meetings held on July 22, 2008, in Ketchikan, Alaska. The deadline for scoping comments (August 19, 2008) was also published in the NOI.

[3] Published in December 2008.

The NOI was posted on the Gravina Access Project Web site (http://dot.alaska.gov/sereg/projects/gravina_access/) and published in the newspapers listed in Table 7-3.

Table 7-3: Notice of Intent Publication List

Publication	Publication Date
Ketchikan Daily News	June 20, 2008
Juneau Empire	June 20, 2008
Southeast Island News	July 14, 2008

7.2.2 Agency Consultation

Agency consultation included written invitations to agencies soliciting their participation in the project either as cooperating or participating agencies (see Section 7.1), one-on-one agency scoping meetings, and letters to agencies requesting scoping and alternative development comments. The *Scoping Summary Report* includes the invitation letters, responses, meeting minutes, and related materials. Scoping comments received from the agencies are included in Appendix A of that report.

In addition to the meetings and requests for comments, the agencies, including tribal governments and Native corporations, received the following documents for review and comment:

- *Gravina Island Access Supplemental Environmental Impact Statement Coordination Plan*, October 2008.
- *Gravina Access Project Supplemental Environmental Impact Statement Scoping Summary Report*, December 2008.
- *Gravina Access Pre-Screening Alternatives Memorandum*, February 2009.
- *Gravina Access Project Alternatives Screening Methodology Report*, February 2009.
- *Gravina Access Project SEIS Alternatives Screening Report*, March 2010.

Table 7-4 provides the chronology of consultation and outreach efforts to the agencies and stakeholders with jurisdiction in the project area and/or a specific interest related to the project. Table 7-4 also documents the efforts by DOT&PF to obtain input during the scoping and alternative screening process to identify the reasonable alternatives evaluated in this Final SEIS.

Table 7-4: Agency and Stakeholder Consultation Activities

Meeting Date	Agency	Topics Discussed
May 6, 2008 Anchorage	DNR—SHPO	• Appropriate season for field work • Needs for additional surveys and information gathering
June 10, 2008 Ketchikan	ADF&G, Division of Habitat	• Information regarding SEIS • Issues or concerns related to ADF&G resources • Project information, alternatives • ADF&G confirmed the level of analysis conducted during the FEIS was appropriate
June 10, 2008 Ketchikan	City of Ketchikan	• Information regarding SEIS • Issues or concerns identified by the City • Project information, alternatives • The point of contact for the City

Meeting Date	Agency	Topics Discussed
June 12, 2008 Juneau	USFS	• Information regarding SEIS • Issues or concerns related to USFS resources • Project information, alternatives • The point of contact for the USFS
June 12, 2008 Juneau	DNR—Division of Coastal and Ocean Management[4]	• Information regarding SEIS • Issues or concerns related to coastal resources • Project information, alternatives • The point of contact for the Division
June 23, 2008 Anchorage	EPA	• Information regarding SEIS • Issues or concerns expressed by EPA • Project information, alternatives • The point of contact for the EPA
June 25, 2008 Juneau	USCG	• Information regarding SEIS • Issues or concerns related to navigation • Information needs
June 25, 2008 Juneau	NMFS	• Project history • Project information, alternatives • Issues or concerns related to marine wildlife
July 21, 2008 Ketchikan	Ketchikan Gateway Borough	• SEIS proposed purpose • Project area and range of alternatives
July 21, 2008 Saxman	City of Saxman	• SEIS proposed purpose • Project area and range of alternatives
May 12, 2010 Ketchikan	Ketchikan Gateway Borough	• Assumptions for population growth and future land use on Gravina Island
May 24, 2010 By phone	Misty Fjords Air (seaplane pilots)	• Concerns related to bridge alternatives • Online availability of *Alternatives Screening Report* • Other opportunities to meet and discuss alternatives with seaplane pilots
June 14, 2010 Ketchikan	Southeast Alaska Pilots' Association	• Range of alternatives and screening criteria • Areas of concern for marine pilots
October 20, 2011 Ketchikan	Misty Fjords Air (seaplane pilots)	• Range of alternatives and screening criteria • Areas of concern for small airplane operators
October 20, 2011 Ketchikan	Ketchikan Gateway Borough	• Range of alternatives and screening criteria • SEIS schedule update
November 2, 2011 Juneau	USCG	• Range of alternatives and screening criteria • Issues related to bridge alternatives

7.2.3 Tribal Government Consultation

FHWA recognizes the sovereignty of tribal governments and works to coordinate communication and outreach efforts under Executive Order (EO) 13175 Consultation and Coordination with Indian Tribal Governments and the requirements of Section 106 of the National Historic Preservation Act. EO 13175 defines "Indian tribe" as an Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges to exist as an Indian tribe pursuant to the Federally Recognized Indian Tribe List

[4] The Division of Coastal and Ocean Management was dissolved on July 1, 2011, with the sunset of the Alaska Coastal Management Program.

Act of 1994, 25 U.S.C. 479a, and as expanded by the Omnibus Trade Act of 2000. EO 13175 outlines the manner in which each federal agency must ensure that it operates with a government-to-government relationship with the Indian tribe and also directs agencies to consult with the Indian tribe before taking action that affects tribal lands, resources, and members.

In June 2008, FHWA and DOT&PF reinitiated consultation with tribal governments and Native corporations in the project area for the SEIS. The list of potentially interested tribes and Native corporations was derived from the 2004 Final EIS effort and from communication between the agencies. FHWA sent an invitation to the tribes and Native corporations requesting their involvement as a participating agency on July 21, 2008.

Individual meetings were conducted with the Ketchikan Indian Community (June 10, 2008) and the Organized Village of Saxman (June 11, 2008). The lead agencies determined that it would be appropriate to meet with these tribal governments because of the potential adverse impacts of the project based on proximity of the alternatives to their communities. FHWA and DOT&PF described the SEIS process, shared the project schedule, described the project area, and introduced members of the study team. The project team also notified the Metlakatla Indian Community of the public scoping meetings.

7.2.4 General Public Outreach

7.2.4.1 Public Meetings

Two rounds of public meetings were conducted for scoping and to present the range of alternatives to be considered for the supplemental study of the Gravina Access Project. Two scoping meetings were held on July 22, 2008, and a meeting to discuss the range of alternatives was held on March 5, 2009. Both meetings were held in Ketchikan, Alaska, and were conducted in similar open house format.

The open house format was used to provide an informal environment for the project team members to engage the public. Each meeting provided the opportunity for the public to question individual team members and to provide written comments, which could be left with the project team at the open house or mailed at a later date. Table 7-5 summarizes the information about the meeting venue, times, and activities. Copies of the scoping meeting materials are included in the *Scoping Summary Report*. Copies of the Range of Alternatives meeting materials are included in Appendix B of that report.

Table 7-5: Public Meeting Venue, Schedule, and Content

Location/Venue	Date and Time	Activities
Ted Ferry Civic Center Ketchikan	July 22, 2008: 11:00–1:00 p.m. July 22, 2008: 5:00–7:00 p.m.	• Describe study area • Present the purpose and need statement • Explain SAFETEA-LU • Solicit input on special studies needed, issues and concerns, historic and cultural properties, and conceptual alternatives • Present previous alternatives studied • Explain need for supplemental study
Ted Ferry Civic Center Ketchikan	March 5, 2009: 11:00–1:00 p.m. March 5, 2009: 5:00–7:00 p.m.	• Describe study area • Present range of alternatives to be considered for the SEIS • Discuss the issues and concerns • Present proposed screening criteria • Solicit input on purpose and need, range of alternatives, and proposed screening criteria

The public meetings were advertised as follows:

- Display advertisements in the *Ketchikan Daily News*, each coordinated to be published approximately 2 weeks and 1 to 5 days before the public meetings
- Flyers posted in public places such as the local grocery store, post office, municipal offices, tribal government offices, and libraries
- Public service announcements to *Ketchikan Daily News*, *What's Up* email distribution list, *Southeast Alaska Island News*, and KRBD—105.9 FM in Ketchikan, Alaska
- Information and notices on the project Web site
- Newsletters and postcards distributed to contacts on the project mailing list
- State of Alaska Online Public Notice Web site

7.2.4.2 Newsletters

The public involvement team wrote three issues of a project newsletter to communicate project information and to provide status updates of the project. Each newsletter issue was distributed by mail to the mailing list and posted on the project Web site.

The following is a list of information presented in the three newsletter issues:

- January 2009, Volume 1, Issue 1
    - Draft SEIS announcement
    - Project schedule
    - Review of comments provided during scoping
- October 2010, Volume 1, Issue 2
    - Announcement and explanation of the reasonable alternatives to be studied in the SEIS
    - Updated project schedule
    - Overview of project studies
- June 2013, Volume 1, Issue 3
    - Expected release date of Draft SEIS
    - Public hearing announcement

7.2.4.3 Project Web Site

The Web site (http://dot.alaska.gov/sereg/projects/gravina_access//) for the Gravina Access Project is maintained by the DOT&PF to provide information about the proposed project and related studies for persons with Internet access. The Web address was included in all public notification materials related to the project. The Web site includes the following pages and information:

- Home: Welcome
- Project Background & Information
- Project Library
- Maps and Photos
- Submit Comments
- Contacts

7.2.4.4 Postcards

Two postcards were distributed by mail to the project mailing list. The first postcard was written to announce the SEIS and requested the addressees to send back confirmation that they would like to continue to receive information. Also included in the postcard were the Project Manager's contact information and the project Web site address. The postcard was mailed to 7,781 households; as of October 2008, 275 addressees affirmed their interest in being part of the project mailing list.

The second postcard announced the availability of the *Alternatives Screening Report* on the project Web site and requested comments, by April 16, 2010. The postcard provided the methods to submit comments to the project team.

7.3 2013 Draft SEIS Review Process

7.3.1 Review Process

The FHWA and DOT&PF issued the Gravina Access Project Draft SEIS ~~is~~ for review on June 21, 2013, providing the public and other interested parties (including government entities, regulatory agencies, and Native organizations) an opportunity to comment on its content during a 54-day comment period. The commenting period ran from June 21, 2013 to August 13, 2013. The 2013 Draft SEIS did not identify a preferred alternative. ~~available for review and public comment for 45 days following its release. In developing the SEIS, the joint lead agencies, FHWA and DOT&PF, met regularly with the Project Team and the Cooperating Agencies to collaborate, review, and revise the Draft SEIS. Cooperating and participating agencies and other stakeholders are afforded the same 45-day comment period.~~ The 2013 Draft SEIS ~~is available~~was available to the public for viewing during the comment period ~~to the public for review~~ on the project web site and at the following locations:

- Ketchikan Gateway Borough Planning Office
- City of Ketchikan Library
- City of Ketchikan Clerk's office
- City of Saxman Clerk's office
- Ketchikan Indian Community
- Organized Village of Saxman
- Metlakatla Library
- Southeast (now Southcoast) DOT&PF office (Juneau)

Compact disk versions of the document ~~are~~ were available for free upon request ~~at 2525 C Street, Suite 305, Anchorage, AK 99503 and at the Southeast DOT&PF office in Juneau~~. A printed version of the entire document with appendices ~~can be~~ was available for purchase~~d~~ ~~by contacting the Special Projects Office at (907) 465-1828;~~ for a ~~the~~ fee to ~~will~~ help offset printing costs.

The advertising and notices for the 2013 Draft SEIS release and comment process were as follows:

- Notice of Availability, Notice of Public Hearing, and Request for Comments published by FHWA in the *Federal Register* in Washington, DC, and on the internet June 21, 2013.
- Notice of Availability and Notice of Public Hearing published as a paid legal ad in the *Juneau Empire* on June 21, June 28, July 1, and July 14, 2013.
- Notice of Availability and Notice of Public Hearing published as a paid legal ad in the *Ketchikan Daily News* on June 21, 2013.
- Notice of Public Hearing published as a paid display on July 6 and July 13, 2013.
- Notice of Public Hearing was sent to the following for free public service notices or announcements:
    - Ketchikan radio stations
    - What's Up online listserv
    - GovDelivery
    - State Online Public Notices
    - DOT&PF Facebook page and Twitter

A public open house meeting with a formal hearing ~~is scheduled for~~was held on July 17, 2013, at Ted Ferry Civic Center, 888 Venetia Avenue, Ketchikan, Alaska 99901, from 11 a.m. to 8 p.m. FHWA and DOT&PF representatives were present during the public hearing portion of the meeting (5 p.m. to 8 p.m.). Attendees were given an opportunity to provide oral testimony at the public hearing and to provide written comments during the open house on a comment form. Written comments on the 2013 Draft SEIS were also accepted in the following ways:

~~*7.3.2 Commenting on the Draft SEIS*~~

~~Comments on the Draft SEIS will be accepted in the following methods:~~

- ~~Provide verbal comments at Public Hearings~~
- Submitted comment form
- Faxed to: (907) 465-4414
- Submitted ~~comments~~ through project web site: http://dot.alaska.gov/sereg/projects/gravina_access/
- Emailed ~~comments~~ to: deborah.holman@alaska.gov
- Mailed to:

Deborah Holman, Project Administrative Coordinator
Gravina Access Project SEIS
DOT&PF Southeast [now Southcoast] Region
P.O. Box 112506
Juneau, Alaska 99811-2506

7.3.2 2013 Draft SEIS Comments and Responses

The project team reviewed all comments received during the comment period for the 2013 Draft SEIS. Table 7-6 presents agency and public comments with FHWA's and DOT&PF's responses.

Table 7-6: 2013 Draft SEIS Comments and Responses [New]

Gravina Access Project 2013 Draft SEIS Comments	Response/Final SEIS Revision
U.S. Army Corps of Engineers Dated August 13, 2013	
For all of the proposed alternatives, it is imperative the following information is provided to the USACE: 1. A delineation of waters of the U.S. along with their functions. (This would include all streams, drainages, creeks, and wetlands.) 2. Identification of the upland and/or offshore disposal sites for dredged materials. 3. Consultation information with the National Marine Fisheries Service, United States Fish and Wildlife Service, Environmental Protection Agency, and the State Historical Preservation Officer. In accordance with 33 CFR Part 325.1 (d) (7), "For activities involving discharges of dredged or fill material into waters of the U.S., the application must include a statement describing how impacts to waters of the United States are to be avoided and minimized. The application must also include either a statement describing how impacts to waters of the United States are to be compensated for or a statement explaining why compensatory mitigation should not be required for the proposed impacts." Therefore, it is important to keep in mind the FSEIS should address all measures to avoid and minimize impacts to waters of the U.S., and then compensatory mitigation should be considered for fill impacts associated with the alternatives. Additional information can be obtained from the Alaska District's Final Mitigation Rule Public Notice, No. POA-2008-834, which is available for viewing on our website: http://www.poa.usace,army.mil/Missions/Regulatory.aspx.	1. FHWA and DOT&PF will continue to coordinate with USACE and provide USACE with a delineation of waters of the U.S. that would be affected by the preferred alternative and an assessment of their functions. The Final SEIS includes a draft Section 404 permit application and draft 404(b)(1) evaluation, which provide this detail on affected wetlands and waters (see Final SEIS, Appendix H). 2. Alternatives F3, G2, G3, and G4 would require dredging in marine waters. Section 4.25.12.4 of the Final SEIS explains that dredged debris from Alternatives G2, G3, and G4 would be placed "onto a barge where it would enter a settling basin and then be disposed of on land." Section 4.25.11 states, "The contractor will set the location for disposal of waste material to meet the following conditions of approval by DOT&PF: the site must be an upland location resulting in no fill placement in wetlands..." DOT&PF would inform USACE of upland disposal sites when they are identified. Dredged material from Alternative F3 would require ocean disposal. If Alternative F3 were selected, DOT&PF would request a permit from USACE under Sections 102 and 103 of the Marine Protection, Research, and Sanctuaries Act, as well as Section 404 of the Clean Water Act for disposal of dredged material in the ocean (see Final SEIS Section 4.13). 3. Appendix E of the Final SEIS includes consultation information with NMFS on ESA, MMPA, and EFH. No ESA-listed species under the jurisdiction of USFWS occur within the project area; therefore, no consultation with USFWS under Section 7 of the ESA was warranted. USFWS and EPA are participating agencies for the project and were consulted in that capacity. Section 106 consultation is described in Sections 4.21 and 7.2.3 of the Final SEIS. Chapter 7 of the Final SEIS has been updated to include information on agency consultation that has occurred since the 2013 Draft SEIS was released. The Final SEIS addresses measures to avoid and minimize impacts to waters of the U.S. and compensatory mitigation for fill impacts associated with the preferred alternative.
Department of the Interior Dated August 13, 2013	
We recommend that the Final SEIS include an evaluation of the effects of each alternative on migratory birds to	A discussion on potential impacts to migratory birds has been added to Section 4.15.6 of the Final SEIS.

assist in identifying an environmentally-preferred alternative and informing plan modifications that would help minimize potential impacts to migratory birds.	
Potential impacts to project area wetlands vary from 13 to 33 acres; marine impacts vary from 0 to 3 acres; and temporary disturbance to freshwater habitat ranges from 4 to 16 acres, depending on the alternative. These wetlands and freshwater habitats are important for feeding and nesting of migratory birds, as well as spawning and rearing of anadromous fish. The Alaska Department of Transportation and Public Facilities proposes to compensate for permanent loss of wetlands by paying a fee in lieu of mitigation (Draft SEIS page 4-161). These fees are likely to be assessed at ratios that vary with the functional qualities of the impacted resources. We recommend that the Final SEIS include a calculation of the functions and values provided by potentially-impacted aquatic resources using the Wetland Ecosystem Services Protocol for Southeast Alaska methodology, which was developed specifically for Southeast Alaska. This evaluation is important since it will identify the potential effects of each alternative in a more meaningful way, which in turn, will allow reviewers to evaluate the adequacy of proposed mitigation. We recommend that costs for wetland mitigation be shown for all alternatives, based on recent wetland debit costs and anticipated ratios commensurate with the functions and values afforded by the potentially impacted habitats. This will provide reviewers with information necessary for comparing the alternatives.	FHWA and DOT&PF have coordinated with USACE throughout development of the SEIS to adequately assess potential impacts to wetlands. In October 2011, DOT&PF submitted a *Wetlands Reevaluation Report* to USACE for review and issuance of a new jurisdictional determination for the Gravina Access Project. The report was prepared following consultation with USACE, and updated the wetland mapping and functional assessment completed for the 2004 FEIS in the *Wetland Evaluation Technical Memorandum* (Appendix M of the 2003 DEIS). The descriptive functional assessment completed for the 2004 FEIS was based on the professional judgment of wetland scientists after a field investigation was conducted and with input from ADF&G, USFWS, and USACE personnel. Wetland functions assessed included groundwater recharge and discharge; stream flow moderation; shoreline, stream bank, and soil stabilization; nutrient cycling, primary production, and carbon export; fish and wildlife habitat; and human values. The functional assessment completed for the 2004 FEIS adequately represents the current conditions of the wetlands potentially affected by the Gravina Access Project alternatives. The recently developed Wetland Ecosystem Services Protocol for Southeast Alaska (WESPAK-SE; 2011) and Nearshore Assessment Tool for Alaska: Southeast (NATAK-SE; 2016) were published subsequent to the baseline data collection for the Gravina Access Project. DOT&PF believes that using the WESPAK-SE or NATAK-SE methodology would not provide a more meaningful assessment of wetland functions and that the qualitative description of wetland habitat functions and values provided in the 2013 Draft SEIS (see Section 3.14) is sufficient for determining compensatory mitigation ratios associated with aquatic resource impacts. In the 2013 Draft SEIS, the DOT&PF proposed to compensate for unavoidable adverse impacts to wetlands by paying a fee in lieu of on-site restoration, enhancement, or preservation. The DOT&PF has revised its approach to compensatory mitigation to include development of permittee-responsible mitigation projects at a watershed level to the options that could be used to offset unavoidable wetland impacts. A detailed Compensatory Mitigation Plan for project impacts to wetlands and other Waters of the U.S will be developed during the USACE Section 404/10 permitting process. The USACE requires verification that impacts to wetlands have been avoided and minimized to the maximum extent practicable prior to their review of a Compensatory Mitigation Plan.
Ketchikan Gateway Borough Dated August 13, 2013	
The Assembly is aware of concerns on the part of some that either of the bridge options might negatively impact the local cruise ship tourism industry. Those concerns are addressed at length in the August 9 letter from the City of Ketchikan. I note that the Draft SEIS reached different conclusions than those expressed in the letter	FHWA and DOT&PF have carefully considered the City's concerns related to the potential impact of the bridge alternatives on the local cruise ship tourism industry and revised Section 4.26.3.3 of the Final SEIS. Section 4.26.3.3 of the Final SEIS acknowledges the potential fiscal impact associated with changes to cruise ship

from the City. Therefore, I urge you to carefully evaluate the City's concerns and determine whether legitimate concerns on the part of the City might be readily mitigated by reasonable redesign of the bridge options.	operations that may result with a bridge alternative. Extensive study of the navigational clearances was performed in development of the original alternatives for the 2004 FEIS. Alternative F1, which was selected in the 2004 ROD and permitted by both the USCG and USACE, had the same vertical and horizontal clearances as the 2013 Draft SEIS bridge alternatives. DOT&PF would consider only minor design changes during the design phase, if a bridge alternative were identified and selected as the preferred alternative. It is not possible to redesign the bridges with a navigational opening large enough to mitigate the concerns expressed by cruise ship operators without elevating project costs substantially and beyond available funding. As stated in the Final SEIS at Section 2.1.4, current State and federal fiscal constraints were a major factor in the identification of the preferred alternative. Given the effort and associated cost to re-engineer the bridge alternatives with the knowledge that construction costs would substantially increase would be a poor use of limited State and federal resources.
Similarly, some in the community have raised concerns that the C3-4 option will adversely impact air travel. The C3-4 option would intrude into Part 77 airspace, and would also be an obstruction for seaplanes. Those concerns may warrant further evaluation as well.	The FHWA and DOT&PF relied on FAA's 2009 Determination of No Hazard to Air Navigation for the analysis of aviation impacts of Alternative C3-4 in the 2013 Draft SEIS. In October 2013, DOT&PF requested a new Determination of No Hazard to Air Navigation from FAA for Alternative C3-4. On August 15, 2014, FAA provided a Determination of Hazard to Air Navigation. This new information is reflected in Section 4.7.1 of the Final SEIS.
The risk losing the $96 million drove the Assembly to discuss enhanced ferry service between Revillagigedo and Gravina islands. The Assembly did not embrace ferry service that would include 24-hour daily operations, unless demand warrants such. Moreover, the following specific elements were included in the Assembly's discussion of its vision of improved ferry service: 1. Purchase and development of the property adjoining the existing Airport parking area on Revillagigedo Island to provide additional parking and space for improvements. 2. Construction of a new Airport terminal on the property adjoining the existing Airport parking area on Revillagigedo Island where departing travelers would check their baggage and check in for flights, and arriving passengers receive their baggage. 3. Provide funding for one additional ferry for redundancy. 4. Construct one additional ferry ramp on Gravina Island near the existing ramp and one additional ramp on Revillagigedo Island at the property noted in 1 above. 5. Establish air-porter-type service between Revillagigedo and Gravina islands, to provide critically needed transit service, particularly for the disabled, elderly, and infirm. 6. Provide an endowment with the remaining funds to subsidize ferry operations to keep ferry fares	1. Section 2.1.3 of the 2013 Draft SEIS includes "expansion of paved parking areas" at the existing ferry terminal site on Revillagigedo Island as an element common to all ferry alternatives. DOT&PF did not assume property would be purchased for this expansion. This point has been clarified in Section 2.1.3 of the Final SEIS. 2. FHWA and DOT&PF considered including a baggage and/or passenger check-in terminal at the existing ferry terminal on Revillagigedo Island when it was suggested as an added element to the ferry alternatives during SEIS scoping. As noted in Section 2.2.2 of the Final SEIS, "Arrangements for baggage and passenger check-in are coordinated by the airlines under FAA regulations, and are not a surface transportation issue"; therefore, this feature is not included with the ferry alternatives. 3. The Final SEIS presents a range of ferry alternatives: two with new service at additional locations (G2 and G3), one with additional capacity and redundancy at the existing location (G4), and one with no additional capacity or redundancy until warranted by demand (G4v). Based on demand projections, the preferred alternative, G4v, does not include an additional ferry for redundancy. 4. Additional ferry ramps adjacent to the existing ferry ramps are elements of Alternative G4. 5. All ferry alternatives include purchase of shuttle vans to carry pedestrians and their baggage from

reasonable.	the existing ferry terminal on Revillagigedo Island to the airport terminal on Gravina Island. 6. Establishment of a "Gravina Access Permanent Fund" was recommended as an added element to the ferry alternatives during SEIS scoping. As noted in Section 2.2.2 of the Final SEIS, establishing "a fund to defray ferry operating costs is outside the scope of this project because it does not pertain to the purpose of and need for the project." This was explained in the July 23, 2009, letter from David Miller, FHWA Alaska Division Administrator, to Dan Bockhorst, Ketchikan Gateway Borough Manager. In that letter, Mr. Miller further explained that such a fund is not eligible for federal assistance. State funding is not available for this purpose.
City of Ketchikan Dated August 9, 2013	
While a bridge connecting Revillagigedo Island to Gravina Island has long been a dream of many members of the community, most have come to the realization that it would be cost prohibitive to construct and detrimental to our economically critical cruise ship tourism industry if constructed within the clearance parameters stated in the SEIS. Specifically, sea pilots are concerned about the bridge alternatives, especially Alternative F3, due to the challenges of the larger cruise ships navigating the west channel between Pennock and Gravina. Both bridge alternatives have a vertical clearance of only 200 feet which is the same as the Lions Gate Bridge in Vancouver. It should be noted that the largest ship currently calling in Ketchikan, the Celebrity Solstice, has an air draft of 200 feet and does not call in Vancouver, travelling to Seattle instead. Ships that could enter the Alaskan market in the future include Royal Caribbean's Voyager Class and Oasis Class which have air drafts of 208 feet and 236 feet respectively. If these larger classes of ships enter the Alaskan market, they would likely skip Ketchikan due to the additional time it would take to retrace their route and go around Gravina upon arrival or departure (depending on their direction). The time in port in Ketchikan for many ships has already decreased over the past 10 years as a result of their calling in Seattle instead of Vancouver due to the increased distance and increased cost of fuel. The Gravina detour would likely add up to two hours to the travel time, which would make a Port such as Prince Rupert, an attractive alternative destination between Juneau and Seattle. Each time a ship the size of the Celebrity Solstice calls in Ketchikan, the City receives over $25,000 in direct revenues from Port fees and an estimated $460,000 in consumer spending in the community (based figures released in 2011 of $161 per passenger). With 17 calls scheduled for the Solstice this year alone that would total over $8,000,000 in lost revenues. If four or five similar sized ships would stop calling in Ketchikan you can see that the total lost revenue per year could be staggering.	Alternative F1, which was selected in the 2004 ROD and permitted by the USCG, had the same vertical and horizontal clearances as the SEIS bridge alternatives. Based on updated information regarding large cruise ships that planned to operate in Southeast Alaska during the 2016 tourist season (information provided in the Final SEIS at Table 3-12), Celebrity's *Solstice* and Royal Caribbean's *Explorer of the Seas* are the only cruise ships with air draft greater than 200 feet currently operating in Tongass Narrows. A bridge would not preclude large vessels such as these from navigating in Tongass Narrows because they could avoid passing under a bridge by entering and exiting from the same direction. FHWA and DOT&PF cannot speculate what decision the cruise ship companies might make in response to construction of a bridge over Tongass Narrows. SEAPA representatives commenting on the 2013 Draft SEIS (letter from Captain Larry D. Pullin dated July 28, 2013) raised navigation issues related to bridge alternatives and noted that increased operating costs and sailing time (from detours) could result in lost port time and "place Ketchikan at a disadvantage with other Alaskan and nearby Canadian ports." The Cruise Lines International Association - North West & Canada (CLIA-NWC, formerly NWCCA) supported SEAPA's comments in a subsequent communication, not commenting specifically on the 2013 Draft SEIS (personal communication:, Donna Spalding, CLIA-NWC, with Jessica Conquest, HDR; January 23, 2014). Sections 4.7.2.2 and 4.7.2.3 of the Final SEIS describe the DOT&PF's assessment of impacts of the bridge alternatives on marine navigation. The assessment determined that Alternatives C3-4 and F3 increase the risk of ship groundings and allisions (e.g., ships running into the bridge structure), with larger ships having increased risks, noting that a bridge over Tongass Narrows would introduce a new obstacle for ships to maneuver around. Text has been added to Sections 4.7.2.2 and 4.7.2.3 in the Final SEIS to acknowledge that the increased risk could affect operations and change the length of port calls or reduce port calls from some ships. Section 4.26.3.3 has also been revised for the Final SEIS to acknowledge the potential fiscal impact associated

	with the change in length or reduced number of port calls.
In evaluating the proposed ferry options the one that makes the most operational sense is Alternative G4, the construction of new facilities adjacent to the existing ferry facilities. In order for this option to provide adequate access to Gravina commensurate with a bridge, the City recommends the following: • Two ferries should operate during the workday and one ferry should operate overnight instead of only when the airport is open. Although it is not addressed in the sections of the SEIS provided for review, it has been stated by DOT and airport personnel that the FAA may decide not to provide any supplemental funding for ferries in the future if they are allowed to operate when the airport is closed. DOT personnel have, however, also stated that other FHWA funding sources could possibly be found. • The ferries should be operated with complete State subsidy which would eliminate the toll. This will be critical to encourage both commercial and residential development of Gravina Island, which contains the majority of the relatively flat land available within the Borough. • Only one additional ferry would need to be constructed instead of two. Subsequently placing all three on a 30-35 year replacement schedule would result in the first replacement coming due in approximately 20 years. Constructing a third ferry would still allow the operation of two ferries during the workday when one of the other ferries was unavailable due to routine or emergency maintenance. • The construction of a second loading ramp on each side is a key element of this option as it would provide the redundancy necessary to consider the ferry option the operational equivalent of a bridge. Having two loading ramps on each side would allow uninterrupted service when a ramp needed routine or emergency maintenance. This was made extremely evident just this past May when the community had to scramble to improvise vehicle access for ambulances while overnight maintenance was being performed on one of the current loading ramps. In summary, the City of Ketchikan desires 24 -hour ferry access between Revillagigedo Island and Gravina Island commensurate with the access that could be provided by a bridge and it appears that Alternative G4, with the changes recommended above, comes closest to providing this level of access.	Alternative G4 includes, and the Final SEIS assesses the impacts of, two additional ferry terminals/loading ramps: one on each side of Tongass Narrows adjacent to the existing airport ferry terminals, operating under a schedule that is similar to current operations (see Section 2.1.3). Selection of Alternative G4 would not preclude ferry operations on a 24-hour schedule. The operational costs and environmental impacts associated with Alternative G4 would increase if overnight ferry operations were added. The additional environmental impacts would be minor, related primarily to the increase in ferry and vehicle emissions, fuel use, and employment. These impacts would be offset if Alternative G4 added only one ferry, instead of two. It is not clear what statements were made by DOT&PF or airport personnel regarding supplemental funding by FAA. Funding from FAA was not anticipated to support construction or operation and maintenance of any elements of the project alternatives in the SEIS. Neither FAA nor FHWA funds can be used for routine maintenance and operations of ferries. FHWA funds could be used for new ferries if they were part of the selected alternative. During the SEIS scoping process, a request was made for the State to fund the airport ferry system. This option was dismissed from further consideration: as stated in Section 2.2.2 of the Final SEIS, "A fund to defray ferry operating costs is outside the scope of this project because it does not pertain to the purpose of and need for the project."
Southeast Alaska Pilots Association Dated August 2, 2013	
The Southeast Alaska Pilots Association (SEAPA) supports economic development in the Ketchikan area, however we have serious concerns for the proposed over-water crossings (the F3 and C3-4 bridges) of Tongass Narrows. The primary concerns are for the degradations to safety of marine navigation and secondary concerns	1., 2., and 4. Numerous navigation studies were performed in development of the 2004 FEIS, which included evaluation of Alternative F3. FHWA and DOT&PF determined that the information provided in those studies was sufficiently representative of the potential navigation impacts of Alternative F3

are for the decreases to the efficiency of maritime transportation by the bridge proposals now under consideration and described in the June 2013 draft SEIS. As one of the primary waterway users that would be significantly impacted by these proposals, SEAPA is quite willing to discuss proposals for safer and more efficient access to Gravina I. from a freedom of navigation perspective. The basis for our Association recommendation against adopting the F3 and C3-4 bridge proposals follows: 1. The F3 bridge proposal creates several unsafe conditions that are presently nonexistent by completely changing the linear traffic pattern of major marine traffic in Tongass Narrows. The East and West Channels of Tongass Narrows provide a natural, safe, efficient and effective bifurcation for maritime traffic in the Ketchikan area. This proposal does not adequately address navigation safety of large vessels and tugs and tows and ferries meeting and maneuvering in close proximity to each other. This proposal neglects to identify and state the hazards of introducing significant maneuvering requirements (including very large turns in the proximity of multiple navigation hazards) for the approaches to Ketchikan's harbor for these very large vessels and for tugs with large tows (including significant petroleum barges). There is no examination of safety margins for maneuvering; the challenges to how those turns will be safely executed particularly during the frequent occurrences of limiting environmental factors (e.g. high winds (frequently in excess of 20 knots), large tide and current ranges and reduced visibility). 2. The F3 proposal closes the safer East Channel of Tongass Narrows for larger vessels, forcing these vessels to instead share the West Channel with AMHS ferries, tugs and tows, and numerous smaller vessels. The West Channel is currently fully utilized as a traffic separator for Northbound from Southbound traffic at peak times, and forcing the largest ships into the West Channel will create unacceptable hazardous traffic situations in that channel (which currently do not exist with the East Channel use). 3. The F3 proposal and previous ten-year-old simulator studies neglect to consider the adverse effects of reduced visibility in rain and fog in the navigation by large vessels transiting under either of the proposed bridge crossings. 4. The F3 proposal neglects to consider the adverse effect of the revised traffic patterns in the harbor on the use of the main anchorage area of Ketchikan. 5. Page 4-27 of the F3 proposal misrepresents the economic cost incurred in turning large vessels around Pennock Reef to approach the downtown berths in Ketchikan, and then turning again to head out of the harbor, suggesting that the cost of adding 1.8 miles is only ""adding approximately 3 minutes in running times..."" In fact 30 to 40 additional minutes will be required for each safe transit of each large ship to avoid Pennock Reef (and therefore this time lost to each port call). If a detour around Guard	evaluated in the 2013 Draft SEIS. For example, Appendix F, *Consequences of Various Channel Closures to Large Shipping Technical Memorandum* and Appendix G *Reconnaissance of Vessel Navigation Requirements Updated Report,* of the 2003 DEIS and incorporated by reference into the 2004 FEIS, adequately examined the potential effects of maneuvering in Tongass Narrows to avoid navigating under a bridge and the resulting increase in sailing time. Appendix H, *Monte Carlo Navigation Simulation Technical Memorandum;* Appendix I, *Ketchikan Bridge Project Summary Report*; and Appendix J, *Real Time Navigation Simulation Study (STAR Center) Technical Memorandum,* of the 2003 DEIS and incorporated by reference into the 2004 FEIS evaluated the safety and hazards associated with large ships transiting under a bridge spanning Tongass Narrows. The *Simulation Study* considered variables associated with wind, tide, and visibility. Section 4.7.2.3.1 of the Final SEIS states that requiring cruise ships to use West Channel "would have an adverse effect on cruise ship operations because it would require additional maneuvering and increased sailing time." Safety margins were not explicitly described; however, safety for large ships transiting West Channel and the potential change in traffic patterns was an identified concern in 2003 DEIS Appendix F (page 4): "The maneuver around Pennock Reef, the passage of West Channel, and the increased traffic through the anchorage and across tender traffic lanes, all have adverse safety implications." Section 4.7.2.3 of the Final SEIS has been revised to acknowledge that the increased risk could affect operations and change the length of port calls or reduce port calls from some ships. Section 4.26.3.3 has also been revised for the Final SEIS to represent the economic cost incurred by additional ship maneuvering with Alternative F3 based on best available information and analysis. 3. and 6. The 2003 DEIS Appendix I, *Ketchikan Bridge Project Summary Report,* and Appendix J, *Real Time Navigation Simulation Study (STAR Center) Technical Memorandum,* describe how reduced visibility and adverse effects of variable wind speeds would affect navigation under Alternative F3's West Channel bridge and the Alternative C4 bridge, which has similar navigation constraints as Alternative C3-4. The modeling in 2003 DEIS Appendix G, *Reconnaissance of Vessel Navigation Requirements Updated Report,* accounted for the swept path of the ships. Section 4.7.2.3 has been revised in the Final SEIS to explain that ships larger than those considered in the modeling effort are now transiting Tongass Narrows and with Alternative F3 may need to navigate the opening during lower tides and calm seas, or enter and exit Tongass Narrows from the same direction to avoid crossing under the bridge. 5. As stated in the Final SEIS at Section 4.7.2.3.1, Alternative F3 would result in a loss of running time

Island is required, one hour and forty (1:40) minutes will be lost on each port call. This lost time will have to be made up either in reduced port time or the same amounts of time at high fuel consumption speeds. 5. Page 4-27 of the F3 proposal misrepresents the economic cost incurred in turning large vessels around Pennock Reef to approach the downtown berths in Ketchikan, and then turning again to head out of the harbor, suggesting that the cost of adding 1.8 miles is only ""adding approximately 3 minutes in running times..."" In fact 30 to 40 additional minutes will be required for each safe transit of each large ship to avoid Pennock Reef (and therefore this time lost to each port call). If a detour around Guard Island is required, one hour and forty (1:40) minutes will be lost on each port call. This lost time will have to be made up either in reduced port time or the same amounts of time at high fuel consumption speeds. 6. The F3 and the C3-4 bridge proposals both fail to provide adequate horizontal or vertical clearance for the largest existing ships in conditions of winds over 20 knots, or tidal heights over MHHW. For five (05) of the ships currently calling in Ketchikan the air drafts are 190 feet to 200 feet, and the swept horizontal paths exceed 400 feet at normal operating speeds, leaving an unsafe clearance for those vessels. 7. The data provided in Table 3-12 is incorrect, citing waterline beam, where it says ""maximum beam"", for all the vessels in the table. The maximum beam of these large ships is on the order of 50 feet wider than the water line. The swept path calculations derived from these figures are thus incorrect in their entirety. 8. The assertion made on page 3-39 of the 2013 SEIS that ""As a result nearly all cruise ships calling at Ketchikan pass under the Lions Gate Bridge and/or the Seymour Narrows Cable"" is incorrect. In fact in 2013, nearly half of the ships calling at Ketchikan go to Seattle via the Straits of Juan de Fuca, bypassing both of those areas. 9. The C3 and C3-4 proposals cite the 200 foot by 550 foot opening in both proposals as adequate because they are like the Lions Gate bridge. The comparison is incomplete in that the Lions Gate Bridge Channel width is 1260 feet, or more than twice as wide as either the F3 or C3-4 proposals, and the tidal range is less than the tidal range at Ketchikan, and thus is not a realistic comparison. 10. The C3 and F3-4 proposals neglect to consider that on six (06) days each month the high tide in Ketchikan is significantly higher than the datum used for the navigational clearance (15.4 feet for MHHW) and the impact on scheduled port calls and tour business to avoid the bridge on those days. 11. Page 3-3 of the June 2013 draft incorrectly states that: ""The largest vessels operating in Tongass Narrows have an air draft of 165 feet, and the average 71,000 gross tons"". In fact 15 out of 27	averaging 3 minutes for southbound voyages and 18 minutes for northbound voyages, in addition to an additional 30 to 40 minutes for maneuvering in the harbor. The DOT&PF's economic analysis predicted cruise ship operators would increase running speed to make up for the lost time rather than reduce time in port. Section 4.26.3.3 has been revised for the Final SEIS to represent the economic cost incurred by additional ship maneuvering with Alternative F3 based on best available information and analysis. 7. FHWA and DOT&PF revised Table 3-12 in the Final SEIS to correct this error. 8. The statement of cruise ship port calls south of Ketchikan in Section 3.7.2.1 has been revised in the Final SEIS to more accurately reflect current conditions with the information provided in this comment. 9. The Final SEIS compares the navigational vertical opening of the bridge alternatives to Lion's Gate Bridge because it is a limiting factor for cruise ships entering and exiting Vancouver Harbor. The horizontal opening is not limiting for cruise ships. 10. The navigational opening for the bridge alternatives was based on extensive modeling. FHWA and DOT&PF recognize that conditions for navigation change with respect to tides and weather, and that scheduled port calls may be interrupted or cancelled based on unfavorable navigation conditions. The Final SEIS provides a comparison of alternatives based on navigation models identified in consultation with USCG. 11. The information on the largest vessels in Tongass Narrows in Table 3-12 and the accompanying paragraph have been updated in the Final SEIS to reflect the recent data. 12. FHWA and DOT&PF have considered the development of a bridge over Tongass Narrows in the context of potential impacts on navigation, including effects on large cruise ships. FHWA and DOT&PF did not neglect to acknowledge industry trends and increasing numbers of large ships. Table 3-12 has been updated in the Final SEIS to present current information on large cruise ships calling at Ketchikan. FHWA and DOT&PF cannot anticipate the extent of changes in the market that would affect shifting ship size and routing. This SEIS discloses potential impacts of a bridge on navigation based on the best available information and analysis. 13. Appendix G, *Reconnaissance of Vessel Navigation Requirements Report,* of the 2003 DEIS and incorporated by reference into the 2004 FEIS examined the risks associated with navigation under the Gravina Access Project bridge alternatives based on statistical analysis and modeling. 14. Selection of a bridge alternative would require permitting with the USCG, and the bridge would be designed and operated to meet the requirements of

(over half) of the ships currently calling in Southeast Alaska, have air drafts over 165 feet, and five (05) have air drafts of 189 feet or more and tonnages of over 100,000 gross tons. 12. The C3 and F3-4 proposals neglect to take into consideration the actual 30-year trend towards larger ships and continued projection that even larger ships will be the norm. The two Norwegian Breakaway class ships have been identified for the Alaska cruise market. All of those ships have over 200 feet air draft and have swept path widths in the vicinity of 450 feet. If Ketchikan goes forward with either of the proposed C3 or F3-4 bridges, it will be the only port in the Alaska market with the vertical and horizontal size restrictions of 200 feet by 550 feet. 13. The proposals neglect to consider or assess directly relevant events including the 1994 grounding of the New Amsterdam while making a sharp turn in dense fog at Gravina Point, or the allisions of large ships with bridges in Tampa Florida and in San Francisco Bay and the enormous losses that can occur from even a single event. 14. The effects of the over water proposals on marine safety are not simply degraded ... they are unsafe and do not provide for the existing or reasonable projections of safe navigation. The disruptions to marine commerce create increased operating costs and place Ketchikan at a disadvantage with other Alaskan and nearby Canadian ports. The consequences for a marine mishap with a bridge over the navigable channel as proposed are unacceptable."	safe navigation in Tongass Narrows. The 2003 DEIS Appendix K, *Effects on Cruise Ship Operations*, described the change in cruise ship operating costs for the DEIS alternatives, which included Alternative F3. The Final SEIS has been revised to include that information at Section 4.26.3. The FHWA and DOT&PF do not anticipate that Ketchikan would be a less desirable port of call if a bridge were constructed.
Individual Public Comments and Public Hearing Testimony	
Some specific comments on details in the Draft SEIS: It appears that the true costs of the bridge options have been understated in many places, thus making it appear that the bridge options are less costly than they really will be. For example, no cost has been put in for additional parking at the airport. Currently, I drive from south of town to the airport ferry parking lot where I leave my car and hop on the ferry to the airport. (If I lived in town, I would take the city bus to the ferry parking lot). Nobody will be able to do that anymore...we'll all be driving to the airport so of course the cost of additional parking lots over there needs to be included (and this is not). Also I believe that the annual maintenance costs for the bridge and road have been understated. Currently, ADOT is unable to keep up with maintenance and repair on existing roads in Ketchikan. To keep a bridge and additional highway free of ice and snow will require additional equipment and workers.	DOT&PF did not identify airport parking facilities as an element that would be necessary to address the purpose and need for the proposed action and, therefore, they are not included in the cost estimates for any alternative. As stated in Section 4.26.4.1.2 of the Final SEIS: "In the 2004 FEIS, all alternatives (bridges and ferries) included a parking structure adjacent to the airport terminal to accommodate anticipated future needs for airport travelers. This feature was removed from the alternatives evaluated in this SEIS because FHWA and DOT&PF determined that future development of parking facilities would occur when warranted and when funding became available. The type and extent of parking facilities at the airport would be determined based on future demand, which is unknown at this time. This funding source likely would be FAA rather than FHWA because parking for airport access is an airport function. DOT&PF considers the future expansion of parking facilities on Gravina Island at the airport as a reasonably foreseeable future action and provides an assessment of impacts in Section 4.27, Cumulative Impacts." Operations and maintenance costs presented in the Final SEIS assume DOT&PF typical maintenance activities, such as snow and ice removal, resurfacing, and other scheduled maintenance

	activities. DOT&PF establishes annual budgets for normal maintenance of state highways using a "cost per lane mile."
Bridge option F3 is particularly disturbing to me due to its effect on the Tongass Narrows West Channel. I lived over near there for many years and am familiar with the kelp beds, the eelgrass, the fish and whales in that channel, the boat traffic and the weather and tides. Blasting and dredging that channel (including 184,000 cubic yards of material over 16 acres) would be a terrible environmental action. That channel has unique and environmentally significant intertidal and subtidal habitat which supports aquatic life--not just in the channel, but also beyond. The combination of the dredging and the support pilings would change forever the habitat and water flow.	Environmental consequences resulting from Alternative F3 and all other alternatives, such as impacts to intertidal and subtidal habitat, were evaluated in Chapter 4 of the 2013 Draft SEIS and were considered during the identification of a preferred alternative for the Final SEIS.
The safety of ships, towed barges, cruise ships, small boats is also at risk in that channel. I commuted across there in a small skiff for many years and vividly remember 50-90mph winds, fogs that reduced visibility to nothing, currents and boat wakes, etc. It is a bad idea to purposefully obstruct navigational width and height in that area frequented by large and small vessels. The environmental consequences of adding the ferry terminal at Lewis Point (Option G-2) concerns me due to the intertidal aquatic life in that area (e.g. clams, mussels, cockles)	FHWA and DOT&PF conducted detailed modeling and technical studies in the development of alternatives for the 2004 FEIS (e.g., Appendix G, *Reconnaissance of Vessel Navigation Requirements Report*) and the refinement of alternatives for the 2013 Draft SEIS (see the 2012 *Construction Cost Estimate Report*). The results of these studies were considered in the identification of the preferred alternative for the Final SEIS. Selection of a bridge alternative would require permitting with the USCG, and the bridge would be designed and operated to meet the requirements of safe navigation in Tongass Narrows. Impacts to aquatic life from all alternatives were evaluated in Sections 4.15 and 4.25.12 of the 2013 Draft SEIS and considered during the identification of a preferred alternative for the Final SEIS.
4.10.2.1.2 says that the proposed project alternatives would incorporate designs that are expected to reduce the use of single occupant vehicles. The bridge options do just the opposite of this, and your charts show this. That you expect one way vehicle trips to increase up to 4000 or 5000 per day (table 4-27)! In this day and age, transportation planning (especially multimillion dollar planning) should include serious attempts to reduce single occupant travel. Note that adding passenger vans to the improved ferry options does help with this. Bridge alternative F3 would create traffic nightmares through town and at the intersection with Tongass Hwy.	The commenter has identified an inconsistency in the 2013 Draft SEIS. Section 4.10.2.1.2 has been revised in the Final SEIS to more accurately reflect measures that would be implemented to reduce emissions of air pollutants during the long-term use of project facilities. Future traffic conditions under Alternative F3 at South Tongass Highway and through downtown for the afternoon peak hour are represented in Section 4.26.4.3 of the Final SEIS. As noted in that section, the traffic forecast for Alternative F3 conducted for the SEIS was much lower than the forecast presented in the 2004 FEIS (e.g., the 2025 average number of one-way trips across Tongass Narrows via Alternative F3, as presented in the 2004 FEIS, was 5,100 compared with 2,730 trips in 2033, as presented in the Final SEIS). Using the Level of Service calculations from the 2004 FEIS is therefore a very conservative approach to assessing potential impacts of the SEIS alternatives on intersections in the project area. Note that the bridge alternatives in the 2025 forecast present an overall traffic congestion forecast for this intersection similar to that for the No Action Alternative (see Table 4-28 of the Final SEIS).
Section 4.23 Visual impacts--The photo simulations of adding what the bridges would look like from various places are bizarre. It's like someone decided to show what the bridge would look like from over a mile away on a very hazy day. The reality is that these bridges are of a scale that they would very much dominate the visual landscape	The photo simulations of the bridge alternatives were prepared based on best available information from preliminary engineering and design. They are intended to provide a representation of the effect of the bridge structures on the viewshed from key viewpoints. Section 4.23.2 in the 2013 Draft SEIS makes clear that

from many places.	the bridges would dominate the visual landscape from many viewpoints. This assessment was not changed in the Final SEIS.
I am disappointed in how the cumulative environmental effects are characterized and minimized. For example, the effects on wetlands and tidal habitat are brushed off by saying that they are just a small part of the wetlands and habitat in the area. This is exactly why the lower 48 has decimated its coastal lands, tidelands, etc.--each project just being a small part. Same for the discussion of vehicle emissions and greenhouse gases, saying that it would only be a small percentage of the GHGs emitted in Alaska.	FHWA and DOT&PF did not brush off or minimize the assessment of cumulative environmental effects. The potential impacts of the Gravina Access Project alternatives, including impacts to GHGs, wetlands, and tidal habitat, were put into the context of past, present, and reasonably foreseeable future actions in accordance with regulations implementing NEPA (40 CFR 1508.25). Cumulative effects related to vehicle emissions and GHGs are appropriately considered in the context of a wide geographical area: from an airshed monitored for its attainment with the NAAQS to global climate change issues. As demonstrated in the cumulative impacts analysis for air quality, the magnitude of air quality impacts attributed to vehicle emissions from the Gravina Access Project alternatives is indistinguishable in the context of the airshed and global climate change (see Section 4.27.6 of the Final SEIS). Potential direct and indirect impacts to wetlands and tidal habitat with the project alternatives are fully disclosed in the Final SEIS (see Sections 4.14, 4.15, 4.25, and 4.26). How those impacts contribute to a cumulative effect is not minimized in Section 4.27, rather they are put in the broader context of current and anticipated future conditions of those resources if the proposed project were not implemented.
It's important to recognize that the Ketchikan Gateway Borough operates on behalf of the State of Alaska, the fifth busiest airport in the State of Alaska located on Gravina. Access to that airport is critical to this community. The Ketchikan Gateway Borough is the regional government that encompasses Gravina Island and 60 some hundred square miles in the surrounding territory. It's been in existence for nearly 50 years. So, the Ketchikan Gateway Borough is representing, as a corporation, all the citizens of the greater Ketchikan community. I wanted to submit for the record two documents that have been adopted by the elected officials of the Ketchikan Gateway Borough. The first is Resolution 2295; it's a four-page resolution that was adopted in January of 2011. It includes a number of recitals that are statements of fact by the elected body in support of its position. The position that the Ketchikan Gateway Borough Assembly took at that time, in January of 2011 was to support the two-bridge alternatives that are presently available; the F3 and the C3-4 for alternatives. The rationale is set out carefully in the resolution. The other resolution that I will submit for the record is Resolution 2358. It is a six-page resolution adopted nine months after the Resolution 2295. What is important about the Resolution 2358 is that it expresses growing concern regarding progress with respect to access to Gravina by the community, and that is a major concern in the community. The reason that the Assembly adopted its resolution in support of the two bridge alternatives is consistent with what you said in terms of the purpose of what is trying to be accomplished here; and that is to provide the most reliable,	The 2009 decision to evaluate tolls as part of the bridge alternatives was made by then DOT&PF Commissioner Leo von Scheben (memorandum dated September 17, 2009, to Gary L. Davis, Southeast Regional Director at Appendix A of the Final SEIS). [Note that tolls were always assumed to be part of the ferry alternatives.] Consistent with the direction provided by Commissioner von Scheben, toll revenue from bridge and ferry alternatives would partially offset construction and operations costs. Over the total life of the project, toll revenue would reduce the costs of bridge alternatives by $45 million (Alternative F3) to $56 million (Alternative C3-4). The costs of ferry alternatives would be reduced by as much as $451 million with toll revenue (e.g., Alternatives G2, G3, and G4). Additional funding sources would need to be identified to cover these costs if no tolls were collected.

efficient, convenient, and cost effective access to the Ketchikan International Airport, again, Alaska's fifth busiest airport, and to promote long term economic development on Gravina Island. So, I will submit those two materials for the record. Again, those two bridge alternatives are clearly the most fiscally responsible, what you said is the target, and that's consistent with the Assembly's objectives. The other point I would stress is that there is opposition to the prospect of any tolls. The Ketchikan Gateway Borough, representing its citizens, wants equal treatment as residents of other communities have with respect to their airports. This is a major airport. I'm unaware of any other airport in Alaska that -- other than Ketchikan, which we have currently a, in effect, a toll in order to get there. So, we are in opposition to any prospect of a toll unless similar arrangements apply to every resident of this state. So, with that, I'll conclude and offer my two materials for the record. Any questions, I'll be glad to try to address those.	
I represent the Southeast Alaska Pilots Association, a state recognized organization of marine pilots for the Southeast Alaska region, charged with the safe and efficient navigation of ships in Southeast Alaska. Briefly, my background in making these remarks is I've been practicing pilotage in Ketchikan and throughout Alaska for over 30 years as an Alaska licensed pilot as it relates to the navigation of large vessels under bridges. And I'm also a US Coast Guard licensed pilot of unlimited tonnage vessels in New York Harbor, San Francisco Bay and Puget Sound. I have practiced as a marine pilot, vessels up to 80,000 tons under various bridges in New York Harbor in the early years in my career. I also served 10 years as a reserve officer in the US Navy and have served active duty for training in the pilotage of large navel vessels up to the size of aircraft carrier under the bridges of San Francisco Bay. I represented the Southeast Alaska Pilot's Association and public hearings related to Gravina access as early as 1983. And I have commented and written proposals -- in writing to proposals since then. In summary, Southeast Alaska Pilots have serious concerns about the marine navigational safety and secondarily the navigational efficiency of the bridge proposals now under consideration described in the June 2013 Draft SEIS. Our association recommends against the F3 and the C3-4 bridge proposals for the following reasons: One, the F3 bridge proposal completely changes the linear traffic pattern of large vessels in the Tongass Narrows without adequately addressing the navigational safety of large vessels and tugs and tows and ferries meaning a maneuvering in close proximity to each other. This proposal neglects to state the hazards that are introducing so many turns in the approaches to Ketchikan's harbor for very large vessels and how those turns will be safely executed at times of winds are over 20 knots or reduced visibility. Two, the F3 proposal effectively closes the preferred east channel of Tongass Narrows for larger vessels, forcing these vessels to instead share the west channel with ferries, tugs and tows, and smaller vessels. The west channel has already been fully utilized as a traffic separator from northbound from southbound traffic at peak times. Forcing the largest ships into the west channel will create	See response to Comment 15.

hazardous traffic situations in that channel. Three, the F3 proposal neglects to consider the adverse effects of reduced visibility in rain and fog as it relates to traffic or navigation by large vessels under either of the bridge crossings. Four, the F3 proposal neglects to consider the adverse effect of the revised traffic patterns in the harbor on the use of the main anchorage area for a fifth vessel in the anchorage. Five, page 4-27 of the F3 proposal misrepresents the economic costs incurred in turning large vessels around Pennock Reef to approach the downtown berths in Ketchikan and then turn it again to head out of the harbor, suggesting that the 1.8 miles, quote, unquote, adds approximately three minutes in running times. In fact, 30 to 40 minutes will be lost in each port call by each ship just by going around Pennock Reef. And if a detour around Guard Island is required, one hour and 40 minutes will be lost on each port call. This lost time will have to made up either in reduced port time or the same amounts of time at high fuel consumption speeds. Number six, the F3 and C3-4 bridge proposals both fail to provide adequate horizontal or vertical clearance for the largest ships in conditions of winds over 20 knots or tidal heights over a mean high or high water. For five of the ships currently calling in Ketchikan, the air drafts are 190 feet to 200 feet and the swept horizontal paths exceed 400 feet at normal operating speeds, leaving an inadequate clearance for those vessels. Number seven, the math in table 3-12 is incorrect, citing waterline beam, where it says, quote, unquote, maximum beam. For all of the vessels in the table, these maximum depths -- these maximum beams, excuse me, of large vessels are on the order of 50 feet wider than the waterline depth -- width. The swept path calculations thus derived from these figures are incorrect in their entirety. Number eight, the assertion made on pages 3-39 of the 2013 SEIS say that, quote, as a result, nearly all cruise ships calling in Ketchikan pass under the Lions Gate Bridge and/or the Seymour Narrows Cable, unquote. But this is incorrect. In fact, in 2013, nearly half of the ships calling at Ketchikan go to Seattle via the Straits of Juan De Fuca and pass through neither of those areas. Number nine, the C4 -- C3 and the C3-4 proposals cite the 200 by 550 foot opening in both proposals. The C3 and C3-4 proposals cite that 200 foot by 550 foot openings in both proposals as adequate because they are like the Lions Gate Bridge. In fact, the Lions Gate Bridge Channel width is 1260 feet, or more than twice as wide as either of these proposals. The tidal range is less than the tidal range of Ketchikan, and thus cannot be realistically compared.	
1. Reduce bridge cross-section to 40-feet by eliminating extra 8-foot lane. 2. The bridges impinge on floatplane landings and takeoffs. 3. Consider a combination floating bridge with a slip section on the alignment of Alternative G3. The slip section would allow passage of state ferries and cruise ships and a bridge 100 feet above MLLW	1. Part of the need for the project is "to provide the Borough and its residents more reliable, efficient, convenient, and cost-effective access for vehicles, bicycles, and pedestrians to Borough lands and other developable or recreation lands on Gravina Island in support of the Borough's adopted land use plans" (Section 1.4 of the Final SEIS). The bridge alternatives would accommodate bicycles and pedestrians in the two 8-foot shoulder lanes and the

would allow passage of most other vessels.	one 8-foot sidewalk. Keeping pedestrians and bicycles separate from vehicular traffic improves safety and meets current design standards; therefore, the 8-foot shoulder lanes cannot be eliminated from the bridge design. 2. Impacts to floatplane operations have been disclosed in the Final SEIS in Sections 4.7.1 and 4.25.5. 3. As noted in Sections 2.2.2 and 2.2.3 of the Final SEIS, Alternatives M1 and M2 were moveable bridge options considered by FHWA and DOT&PF and evaluated in a screening process. They were not considered reasonable alternatives because their costs were above the $305 million threshold. It was also noted in the screening process that moveable bridges would cause unacceptable delays for travelers going across the bridge due to frequent bridge raisings (or in this case moving the slip section) for marine traffic (particularly cruise ships in summer). In this sense, they would fail to meet the need for improved reliability of access. The volume and size the marine traffic through Tongass Narrows would require that the bridge be closed to vehicular traffic during substantial portions of the normal day, resulting in unacceptable delays and overall degradation of access to Gravina Island.
I've spent years living on Gravina since 1956 when my mother started to homestead property at Vallenar Point. Never did my mother ask or expect her government to provide her access to the remote property she chose to live on. Nor have I. For first time visitors a ride on the airport ferry is a good introduction to the water travel so prevalent in SE Alaska. For residents of Ketchikan the disruption caused by a bridge or bridges to existing Tongass Narrows air and water traffic remains as one of several flaws in a fiscally irresponsible idea. I'm very skeptical of the assertion that numerous vehicle trips over bridges and miles of road to and from Ketchikan's airport is cheaper, safer, and more environmentally benign than the short ferry rides we currently have. That being said, I would like to see improved baggage handling for the ferry crossing the Narrows both directions, and perhaps even baggage check-in being done on the Ketchikan side. People throughout the world live on islands or remote places that don't have road access to a major airport. I'm weary of the continued pouring of money into the Gravina Access Project. It's long past time to put this bridge boondoggle to rest and dedicate hard-earned tax dollars to making the airport ferries more user-friendly.	The SEIS documents the myriad environmental impacts associated with the build alternatives and does not assert that they would be environmentally benign. The relative safety of the alternatives is addressed in the Final SEIS relative to navigation (Section 4.7.2), emergency vehicle access (Section 4.3.3), and bikes and pedestrians (Section 4.8). FHWA and DOT&PF did not assert in the SEIS that bridge alternatives would be a safer mode of travel. FHWA and DOT&PF considered including baggage handling at the existing ferry terminal on Revillagigedo Island when it was suggested as an added element to the ferry alternatives during SEIS scoping. As noted in Section 2.2.2 of the Final SEIS, "Arrangements for baggage and passenger check-in are coordinated by the airlines under FAA regulations, and are not a surface transportation issue"; therefore, this feature is not included with the ferry alternatives. All ferry alternatives would improve baggage handling because they include shuttle vans to carry pedestrians and their baggage from the existing ferry terminal on Revillagigedo Island to the airport terminal on Gravina Island. The Final SEIS does indicate that bridges would be cheaper than a ferry alternative, from a lifecycle and a total life cost standpoint.
I would like to express my concern about option F3. If this option is selected it would create significant difficulties for the cruise ships visiting Ketchikan. With difficulties in navigating around North Pennock and the West Channel on both north and south bound cruises, the cruise lines may forgo visiting Ketchikan all together. The cruise lines have expressed this during previous comment periods.	The Final SEIS discloses impacts of bridge alternatives to cruise ship operations in Section 4.7.2 and the local economy in Section 4.5.2. The FHWA and DOT&PF relied on FAA's 2009 Determination of No Hazard to Air Navigation for the analysis of aviation impacts of Alternative C3-4 in the 2013 Draft SEIS. In October 2013, DOT&PF requested

Tourism is the lifeblood of Ketchikan, without their support there will be no need to expand into Gravina Island. Options C3-4 projects a structure greater than 200 feet above MHHW. Such a structure would be necessary for cruise ship traffic though would create a significant safety and navigation impediment to floatplane operations in the harbor. Social and economic conditions have not changed enough to warrant new consideration for this project. The objections other have made are still valid. The people and businesses of Ketchikan did not want the bridge before, and this still remains the case.	a new Determination of No Hazard to Air Navigation from FAA for Alternative C3-4. On August 15, 2014, FAA provided a Determination of Hazard to Air Navigation. This new information is reflected in Section 4.7.1 of the Final SEIS.
Building the bridge will bring about lost jobs and decreased property valves (*sic*) for all of Ketchikan. This will occur for many reasons a few are as follows: There will be far less cruise ship traffic in all of Alaska, not just Ketchikan if we build this bridge. Ketchikan currently the ideal first or last port of call in Alaska for cruise ships because of its southern location and harbor that requires no back tracking. The schedules are so tight for these ships with required speeds of 18-20 knots for the trips to Vancouver or Victoria then Seattle and back again. If a vessel has to use the west channel it will probably skip Ketchikan or pull out of the Alaska market altogether. I am not sure that I would feel comfortable with a 115,000 gross ton ship like the Diamond Princess in west channel. She has inboard turning propellers and the rudders are NOT directly behind the propellers. Because of this she and her sisters are pigs to handle and the west channel might prove too much for them. There is currently one ship in Alaska bigger (Celebrity Solstice) and I am 100% sure larger ones can be expected by 2015. Of course the swept path of one of these large ships will make the already too small bridge opening seem laughable. The wind coming up Nichols Passage will come over Gravina around blank inlet (swirling off Judy Hill) and hit the top half of these ships and cause a large set with no visible wind on the water in west channel. It will take a full 2 minutes to correct for an unexpected set (assuming a 5 degree per minute turn and a 10 degree drift angle). Also in west channel bank suction can be expected further hampering efforts to keep the ship off the rocks. Do you think a Costa Concordia type event in west channel would be good for Alaska? Because of the aforementioned reasons less cruise ships will mean less jobs for locals making their living off the cruise ships and their passengers. There are the obvious! people, Charter fisherman, guides, cooks, store owners, longshoreman, harbormasters office, tours and taxis. But don't forget the trickle down effect to the rest of the Ketchikan: Teachers, police officers, fire fighters, Medical industry workers, Hardware store employees, suppliers employees, the list goes on to all of us in one way or another. Why not just uses ferries and let our local shipyard build and repair them? Property values will decrease because the economic heath of Ketchikan and all of SE Alaska will be adversely effected. Of course the people who have to live right next to the bridge will have lower property values but that is to be expected. It is the rest of Ketchikan that I am worried about. In closing please do the right thing for Ketchikan and the state of Alaska, don't build the bridge to nowhere!	FHWA and DOT&PF cannot speculate what decision the cruise ship companies might make in response to construction of a bridge over Tongass Narrows. SEAPA representatives commenting on the 2013 Draft SEIS raised navigation concerns related to bridge alternatives and noted that increased operating costs and sailing time (from detours) could result in lost port time and "place Ketchikan at a disadvantage with other Alaskan and nearby Canadian ports." These comments were supported by the Cruise Lines International Association - North West & Canada (CLIA-NWC, formerly NWCCA). There has been no specific comment from the cruise ship industry that states that they would stop visiting the Port of Ketchikan as a result of the selection of either of the bridge alternatives evaluated in the SEIS. FHWA and DOT&PF acknowledge that the addition of a bridge over Tongass Narrows (particularly for Alternative F3) would affect cruise ship navigation by introducing a new obstacle to maneuver around, which could affect operations and change the length of port calls or reduce port calls from some ships (see Section 4.7.2.3.1 of the Final SEIS). FHWA and DOT&PF also acknowledge the safety concerns of cruise ship companies and marine pilots for navigating in West Channel, but determined channel widening would improve navigability of West Channel to a level above the East Channel (see 2013 Draft SEIS Section 4.7.2.3.1). Still, some cruise ship companies might avoid routing some vessels in the West Channel because of the size or handling ability of the vessels, in which case those ships would enter and exit Tongass Narrows from the north or bypass Ketchikan. If there were a reduction in cruise ship port calls or time in port as a result of Alternative C3-4 or F3, it would affect the local economy. To provide context for the magnitude of that effect, DOT&PF reviewed the economic impact assessment of changes in cruise ship operations conducted for Alternatives C3(b) and D1 in the 2004 FEIS (see Section 4.7.2). These alternatives comprised bridge crossings near the airport with a navigational clearance height of 120 feet, which would restrict more large ships transiting Tongass Narrows than Alternatives C3-4 and F3 with their navigational clearance height of 200 feet. The total reduction in annual cruise-related spending for Alternatives C3(b) and D1 in the 2004 FEIS was approximately $2.2 million, using 2001 as the base year for spending data. The secondary economic effects of reduced cruise-related spending for those

	alternatives were estimated to be (in 2003 dollars): $2.7 million reduction in gross regional product; $1.9 million reduction in total labor income, property type income, and indirect business taxes; and loss of 60 jobs. The effects of Alternatives C3-4 and F3 are projected to be less because their larger vertical navigational clearance would not be as restrictive to larger vessel passage as Alternatives C3(b) and D1 from the 2004 FEIS. The number of local construction jobs anticipated for each alternative is provided in Table 4-18 of the Final SEIS.
I am talking to you as a property owner in the Forest Park area. I am against the Pennock link of the bridge -- portion of the bridge. I own some of the waterfront down there and I'm concerned that it will affect how I can develop my property or if I can develop my property, especially if I wanted to put in, like, a floatplane dock or something. And I'm also concerned about the effect it'll have on my view and my property values. So, I wanted to just speak out and say that I am not in favor of this project and I hope that you decide on some other option. Thank you.	Alternative F3 would require ROW acquisition on Pennock Island, which would preclude development of those acquired properties. Private lots adjacent to the bridge would remain available for development, and any restrictions on that development would remain unchanged; e.g., the bridge would not preclude installation of a floatplane dock on an adjacent property. Existing homes on Pennock Island would be more than 700 feet from the bridge centerline. Anticipated noise levels at the house on Pennock Island nearest the bridge are expected to be 48 dBA during the peak traffic hour under future traffic conditions (see Section 4.26.7.3). This is well below the noise abatement criteria (NAC) threshold of 66 dBA established by the FHWA to identify traffic noise impacts for residential land uses. While the document does disclose that views and noise levels adjacent to the bridge would be affected, the analysis indicates that existing and potential development would not be precluded.
The F3 Alternative provides access to Pennock as well as Gravina. Pennock has many more residents than Gravina and continues to grow. A bridge through Pennock would provide and allow for easy and profitable development. Also, a drawbridge may be an option to allow for more vertical clearance. An alternate route can allow more horizontal clearance at the cost of a slightly longer bridge.	The 2013 Draft SEIS did identify effects of increased access to Pennock Island associated with Alternative F3. As noted in Sections 2.2.2 and 2.2.3 of the Final SEIS, Alternatives M1 and M2 were moveable bridge options considered by FHWA and DOT&PF and evaluated in a screening process. They were not considered reasonable alternatives because their costs were above the $305 million threshold. It was also noted in the screening process that moveable bridges (a.k.a. drawbridges) would cause unacceptable delays for travelers going across the bridge due to frequent bridge raisings for marine traffic (particularly cruise ships in summer). Bridge alternatives with horizontal clearances of 750 feet were eliminated from further consideration during the development of alternatives for the 2004 FEIS because of the high costs associated with the long spans. These bridge alternatives were not revisited in developing alternatives for the SEIS because DOT&PF was instructed by the Governor to find a lower cost alternative relative to Alternative F1.
I am opposed to the current bridge alternatives for the following reasons: The two bridges will negatively impact the safety of cruise ships during extreme tides and currents, high winds or low visibility, and force the ships to make U-turns in order to arrive or depart. One ship-bridge	The impacts of the bridge alternatives to cruise ship navigation are evaluated in the Final SEIS: Section 4.7.2 describes the risks of allisions of ships with bridge piers. Numerous navigation studies were performed in development of the 2004 FEIS, and

accident could block all access by cruise ships, and stop traffic to the airport at the same time. Access to the airport will actually be more difficult when there is heavy snowfall or icing. It will cost additional dollars to plow the route to the airport. It will take more time to drive South of town, cross the bridges, and then drive to the airport then taking the current ferry.	FHWA and DOT&PF determined that the information provided in those studies was sufficiently representative of the potential navigation impacts of Alternatives C3-4 and F3 evaluated in the 2013 Draft SEIS. For example, Appendix F, *Consequences of Various Channel Closures to Large Shipping Technical Memorandum,* and Appendix G, *Reconnaissance of Vessel Navigation Requirements Updated Report*, of the 2003 DEIS and incorporated by reference into the 2004 FEIS adequately examined the potential effects of maneuvering in Tongass Narrows to avoid navigating under a bridge and the resulting increase in sailing time. Appendix H, *Monte Carlo Navigation Simulation Technical Memorandum;* Appendix I, *Ketchikan Bridge Project Summary Report*; and Appendix J, *Real Time Navigation Simulation Study (STAR Center) Technical Memorandum,* of the 2003 DEIS and incorporated by reference into the 2004 FEIS adequately evaluated the safety and hazards associated with large ships transiting under a bridge spanning Tongass Narrows. The *Simulation Study* considered variables for wind, tide, and visibility. Travel time calculations did not account for winter conditions; however, it is reasonable to assume that adverse road conditions from snow and ice would increase travel time, regardless of alternative. Annual operations and maintenance costs presented in the Final SEIS include winter maintenance activities, such as snow removal.
Building a bridge that would close the east channel to ship, ferry and barge traffic would be very short sighted and create a significant navigational hazard. As it stands now the cruise ship Celebrity Solstice requires 61m, over 200 feet of vertical clearance - and these ships are not getting any smaller. I urge that neither bridge option be considered. Between the two bridge options, from the mariner point if view, the C3/4 single high bridge near the airport is a better choice than closing East Pennock Channel permanently to commercial vessel traffic. However 200' of clearance is not enough for the larger ships coming to Alaska.	Alternative F3 would not close the East Channel to ship traffic. As noted in Section 2.1.2.2 of the Final SEIS, "The primary waterway users of the East Channel under Alternative F3 would be tugs and barges, USCG vessels, charter boats, and local private craft." Numerous navigation studies were performed in development of the 2004 FEIS to assess potential navigation restrictions and hazards resulting from bridge alternatives. FHWA and DOT&PF determined that the information provided in those studies was sufficiently representative of the potential navigation impacts of Alternatives C3-4 and F3 evaluated in the Final SEIS (see Section 4.7.2). Section 4.7.2.3 of the Final SEIS has been revised to acknowledge that the increased risk could affect operations and change the length of port calls or reduce port calls from some ships. Section 4.26.3.3 has also been revised for the Final SEIS to represent the economic cost incurred by additional ship maneuvering with Alternative F3, based on best available information and analysis. FHWA and DOT&PF acknowledge industry trends and increasing numbers of large ships; however, they cannot anticipate changes in the market that would affect ship size and routing. This SEIS discloses potential impacts of a bridge on navigation based on the best available information. FHWA and DOT&PF also considered a tunnel alternative (Alternative T1), but it was eliminated from detailed consideration in Section 2.2 of the Final SEIS because its construction and life cycle costs were well beyond anticipated funding.

Ketchikan and Alaska would be better served by the improved ferry option. I am disappointed that a tunnel option was not considered.	The State's preferred alternative is G4v. FHWA and DOT&PF did consider a tunnel alternative (Alternative T1), but it was eliminated from detailed consideration in the SEIS (see Section 2.2) because its construction costs were well beyond anticipated funding.
Why does the bridge have to be all the way out of town? The bridge should be built across the airport. I want to know where is the morning going to come from, would like to not pay for this bridge taxes.	The SEIS identified six reasonable build alternatives through a screening process (see Final SEIS Section 2.3), including a bridge near the airport. Availability of funding was a consideration in identifying the preferred alternative.
I see no where in your presentation the cost or toll of travel by foot or by oar (sic) to Gravina and back. please confirm	The analysis of ferry alternatives assumed the cost of travel by ferry to be the same as current conditions; i.e., "Toll collection would continue at the existing rate for all ferry routes" with tolls applying to both vehicles and pedestrians (see Final SEIS Section 2.1.3). The current (2016) tolls for pedestrians and vehicles crossing Tongass Narrows on the airport ferry have been added to Section 2.1.3 in the Final SEIS. Tolls considered for travel across a bridge, for vehicles only, were \$2, \$5, and \$16 (see Final SEIS Table 2-1). The DOT&PF did not consider a toll for pedestrians crossing Tongass Narrows on a bridge alternative.

7.3.3 Selection of a Preferred Alternative and Subsequent Agency Consultation

In October 22, 2015, DOT&PF issued a public notice identifying Alternative G4v as the preferred alternative. On March 3, 2016, FWHA joined DOT&PF in announcing Alternative G4v as the preferred alternative and FWHA's intent to prepare a combined Final SEIS and Record of Decision (ROD) pursuant to Section 1319(b) of the MAP-21. Comments were requested by April 7, 2016. Comments could be submitted to DOT&PF through mail, email, fax, or the website. DOT&PF received only one communication with comments on the preferred alternative and the combined Final SEIS/ROD. The communication DOT&PF received was a letter from the Ketchikan Gateway Borough, Office of the Borough Mayor, David Landis. The letter from Mayor Landis expressed the Borough's support for the preferred alternative and endorsement of the Final SEIS/ROD as a combined document.

The FHWA and DOT&PF will continue to coordinate with the Borough as the design of Alternative G4v is advanced. DOT&PF, in collaboration with the Borough, is actively developing other transportation projects in the immediate vicinity of Alternative G4v that are not included in this Final SEIS.

8.0 INDEX

A

B

C

D

E

F

G

H

J

K

L

M

N

O

P

R

S

T

U

V

W

Z