US Army Corps of Engineers
Alaska District

ALASKA BARGE LANDING SYSTEM ASSESSMENT & DESIGN STATEWIDE PHASE 2

Various Locations, Alaska

FINAL REPORT

NOVEMBER 2010

Alaska Barge Landing System Assessment and Design

Various Locations, Statewide, Alaska Phase 2

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
ADOT	Alaska Department of Transportation and Public Facilities
AEA	Alaska Energy Authority
AMHS	Alaska Marine Highway System
AML	Alaska Marine Lines
ATV	all terrain vehicle
ASCE	American Society of Civil Engineers
AVEC	Alaska Village Electric Cooperative
Commission	Denali Commission
DCCED	Alaska Department of Commerce, Community and Economic Development
ft	feet (or foot)
IFA	Inter-Island Ferry Authority
IMO	International Maritime Organization
in	Inch(es)
Inc.	Incorporated
LOA	length overall
M	million
mph	miles per hour
MTSA	Maritime Transportation Security Act
OPCC	Opinion of Probable Construction Costs
RO/RO	roll-on / roll-off
St.	Saint
URS	URS Corporation
US	United States
USACE	US Army Corps of Engineers, Alaska District
USCG	US Coast Guard
USGS	US Geological Survey
VSW	Village Safe Water

EXECUTIVE SUMMARY

Introduction

In 2007, the Denali Commission (Commission) partnered with the US Army Corps of Engineers, Alaska District (USACE) to develop a Statewide Barge Landing System assessment to analyze and plan for barge mooring and fuel/freight transfer needs at Alaska's coastal and riverside communities. The work was undertaken to further the general findings of three reports (USACE 1997, ADOT 2004, and ADOT 2007) that had previously identified barge landing improvements as a critical need in rural Alaska.

The Commission provided funding, scoping, and general services to USACE for professional and technical services. USACE contracted URS Corporation (URS) to develop the barge landing assessment and design (Assessment) in concert with barge operators, freight and fuel companies, state and federal agencies, and community development groups. Phase 1 of the Assessment was completed in 2009 and covered 111 communities on the Alaska Peninsula, the Yukon, Kuskokwim, and Kobuk Rivers, and the Bering, Chukchi and Beaufort Sea coasts and resulted in 36 priority projects. This report represents Phase 2 which evaluates 91 communities that were not previously covered Phase 1. From these sites, 12 priority projects were identified for which concept designs and budgetary cost estimates were developed. The Assessment contains:

- A catalog of existing facilities
- A list of barge landing infrastructure improvement needs by community
- Potential design solutions to address the general categories of needed infrastructure
- Concept-level design drawings for selected designs that address a wide range of site conditions expected in the regions covered by the study
- A project ranking system used to develop priority needs
- A list of projects that ranked highest in the priority ranking system for a first generation of design and construction (Priority Sites)
- Site plans showing possible landing site improvements at each of the Priority Sites
- Budgetary estimates of probable construction costs associated with the proposed improvements at each of the Priority Sites

This Executive Summary outlines the barge landing needs, design features that address those needs and contains a table identifying improvements selected for a first generation of projects.

The first phase of the Assessment, completed in 2009, focused on communities in the Yukon, Kuskokwim and Kobuk Rivers, the Alaska Peninsula, and the Bering, Chukchi and Beaufort Sea coasts. Barging is the dominant re-supply method for communities throughout these areas of Alaska, and in most cases, the shore side receiving facilities are entirely absent or primitive.

Upon completion of the initial Assessment, DOT&PF agreed to participate along with USACE and Denali Commission, in funding the Phase 2 Assessment to focus on the remaining coastal/riverside communities in the Alaska Peninsula/Aleutians, Iliamna/Bristol Bay, Kodiak Island, South-central Alaska, and Southeast Alaska.

The goal is to identify for construction, projects that will improve barge operations, increase worker and environmental safety and/or cumulatively improve fuel and freight delivery costs through system improvements. In addition, the Assessment identifies operational improvements that could be implemented by the communities themselves, including most importantly, consolidation of fuel tanks or marine fuel header locations to facilitate a single stop/landing for delivering fuel in each community.

In many communities, especially at sites where delivery volumes are low and the landing areas consist of relatively flat and/or gravel beach materials, barge operations will continue as they do now. Smaller landing craft can land on these beaches by holding firm through tug maneuvering. In some communities however, some level of infrastructure improvements are needed to facilitate continued safe delivery of fuel and goods to locations where beach access is not possible and existing facilities are absent or in poor condition.

The Assessment outlines improvements that barge operators and other users have identified for each community via an interview process. In addition, the study prioritizes the sites to identify those projects that would be suitable for a first generation of capital improvements (referred to as Priority Sites in this report). Conceptual landing facility improvement designs, site plans and associated construction cost estimates have been completed and are included to facilitate discussions with community and user groups and funding entities.

Background

The highest volume of cargo delivered to rural communities is fuel. Fuel is used for power generation, home heating, and transportation and as such it is a life line commodity. Interruption of fuel deliveries can result in loss of power, loss of heat, and at remote locations can result in an emergency condition.

Deck freight, delivered along with fuel orders or separately on regular scheduled barges, is the second highest volume of products delivered. Deck freight is generally delivered as steel shipping containers and break-bulk cargo (loose non-containerized material such as long lengths of pipe and timber, vehicles, palletized cargo, etc.).

The third key delivery product is construction materials delivered by chartered barges. These products are generally associated with private residential or community construction projects like schools, fuel tank farms, health clinics and airports.

The larger communities such as Juneau, Ketchikan, Seward, Petersburg, Kodiak, Unalaska, Homer and many others have developed ports and an economic base to support them. Many communities in the regions covered by this phase of the

Assessment are able to receive regular freight via the Alaska Marine Highway System (AMHS), or other ferry services. A majority of the communities in the South-central Alaska Region are served by the Alaska State Highway system, with connection to Anchorage, Canada, and the Lower 48 states. With a few exceptions, communities on Prince of Wales Island are connected by road, which allows the smaller communities to truck fuel and supplies from hub communities such as Thorne Bay and Craig. Several small isolated communities in Southeast Alaska are primarily used only seasonally and residents tend to be self sufficient and do not have central utilities services or regular barge delivery service. This Assessment focuses priority on the communities that rely on direct barge service for continued receipt of fuel and supplies.

The barge operators emphasized that in general the communities included in the western regions of Alaska, covered by the Phase 1 Assessment, continue to be a higher priority for barge landing improvement needs. The high cost of fuel in those communities is closely related to the cost of delivering the fuel which can be exacerbated by the difficult landing conditions and multiple stops required to deliver fuel at single communities.   Some of these same issues exist at a handful of locations in the southern Alaska regions.

In fact, although the freight barge operator, Northland Services, Inc., provides service to Prince of Wales Island and other communities included in this phase of the Assessment; Northland declined to interview for this phase; indicating that their priorities were expressed during the Phase 1 Assessment and those regions represent their primary focus.

For fuel barge deliveries, there is a concern statewide, as the fuel barge companies plan to meet the International Maritime Organization (IMO) MARPOL deadline to transition to double-hull fuel barges by 2012. Continued safe access is questionable for many of the communities with shallow or rocky beach landings, or existing dock facilities that are aged or with insufficient mooring points for the new, larger vessels. Dock improvements, including the installation of new fenders and/or breasting dolphins would allow continued safe moorage at these facilities.

Fuel deliveries are generally made by side tying to a dock, where available, or in some cases by pushing the front of the barge into the beach and holding it in place with the tug. Fuel product is pumped through hoses directly to the tanks or to dock- or shore-based fuel headers. In the communities covered by this Phase 2 Assessment, the key issues that impede continued safe access and/or operational efficiency in fuel deliveries include:

- Existing dock facilities are aging and in poor condition. When fuel barges are required to upgrade to double hulled barges, these docks may not be stable enough to withstand the higher berthing and mooring loads. This poses a risk primarily to worker and environmental safety, and secondly costs incurred if catastrophic damage to the facility occurs.
- Barges cannot access the beach in front of a fuel header or tank due to shallow water or rocky coastlines. In these cases, fuel barges anchor offshore and float the hoses to shore. Although fuel transfers are done as

safely as possible, with air pressurized leak checks on the hose and other measures, floating hose to the shore increases time to offload and increases operational risks, including environmental risk associated with potential spills.

- Tank farms that have no marine header, such that fuel delivery operations require dragging hose up to several hundred feet to the tank farm locations. This increases offloading duration, worker safety, and environmental risks associated with longer hose runs.
- Some fuel tank systems have undersized pipelines for the volume of fuel that is to be delivered. An undersized pipe limits the rate at which fuel can be offloaded and this can result in lengthy delivery times.
- Multiple tanks and/or headers, each of which requires a separate barge landing within the same community. This extends delivery times, and at some tidally-influenced sites can halt operations for up to 24 hours.

Freight deliveries are accomplished either by side berthing to an existing dock facility and using a crane to offload or by RO-RO where the barge/landing craft noses into a bulkhead or ramp and uses either a shore-based ramp or barge-based ramp and offload using loaders or forklifts. Key difficulties associated with freight deliveries in the regions covered by this phase of the Assessment include:

- Accessibility issues associated with rock hazards, shallow/rocky coastlines, large tide ranges, or dredging required at existing facilities.
- Insufficient mooring or on/offloading arrangements at existing dock facilities.
- Keeping position in areas with swift currents or swells without dedicated mooring.
- Soft soils on the beach make driving loaders difficult.

Barge Landing Designs

Conceptual designs were developed to address barge landing facility improvement types recommended by user groups during the interview process. A drawing was created to illustrate each of the design concepts including:

- Mooring and breasting dolphins would be beneficial at sites where fuel barges cannot access a shallow or rocky coastline and are required to anchor and float hose to shore. Used in combination with a simple steel catwalk that extends to shore would allow workers to pull the fuel hose along the catwalk; or better yet, the catwalk could be outfitted with a marine fuel header and a pipeline.
- A typical fender design that can be installed independently of an existing dock. The fender is supported by piling and installed in front of an existing dock facility to allow the new double hulled barges to moor safely with less risk of damage to the existing facility by impact. In some cases this may be combined with a mooring dolphin (i.e., a breasting dolphin) or a mooring bollard or deadman could be installed nearby, on the existing dock, or on shore as site conditions warrant.

- A pass-pass dock, consisting of a pile supported concrete superstructure/deck may be considered at some sites where a high volume of cargo is delivered by freight barges and/or an existing dock facility is in need of replacement. It should also be combined with a trestle of similar construction, and used where there is a long distance from shore to the required water depth. This type of dock is designed to provide sufficient room for a forklift, or other equipment to maneuver containers of goods to/from shore and pass them over to/from the barge. The dock would also be suitable for fuel barge moorage.
- A fill causeway and sheetpile bulkhead, constructed to extend a fill area out from shore and provide a vertical docking face, where a barge could side tie or lower a ramp onto it. This may be considered at some relatively shallow sites that need improved freight unloading facilities, and the distance to sufficient water depths it short enough to warrant the amount of fill required.

Refer to the Phase 1 Assessment report for other design concepts, which could also be considered for barge landing improvements at some of these communities. These include:

- Several options for mooring points and deadmen.
- Gravel pads for use as staging areas to offload and store cargo.
- Gravel/Rock causeway or access ramp.
- Concrete plank ramp.
- Sheet pile bulkhead dock(s).

Recommendations

The following recommendations are central to development of a barge landing design and construction program at the Commission.

Fuel Deliveries

The primary recommendation for improving fuel delivery operational efficiency is to consolidate bulk fuel tanks and/or marine fuel headers to a single location at communities where multiple landings are currently required (i.e., power company, school, village corporation and/or stores all have separate tanks and headers).

To improve environmental concerns associated with floating fuel hose to shore at locations where the beach cannot be accessed, barge operators recommended installing offshore mooring and breasting dolphins to allow offshore moorage, combined with catwalks and a fuel pipeline and header. Where possible, removing navigation hazards or relocating the marine header to an accessible beach landing site may be an alternate option.

Fuel system improvements such as header and pipeline work are not included in the scopes of work emerging from this analysis, which focuses on the barge landing structures, however the Commission will work with individual communities and tank farm operators to find opportunities to combine these improvements in individual projects where practical.

Freight Deliveries

The most common recommendations to improve freight barge landings at rural communities in the southern regions of the State included providing improvements to existing dock facilities or to install onshore or offshore mooring points to hold position during offloading. In a few case, landing facilities such as a ramp or dock are recommended where none previously existed. Where practical and most needed, the Commission program will seek to design and construct dedicated landings such as a dock or ramp to improve and expedite freight transfers. At a number of sites, this work may also include single instance dredging or rock removal at the landing site.

Summary of Needs

All parties involved in the Assessment including barge operators, transportation planning experts and engineering specialists agree that practical improvements at several sites will significantly improve delivery services, help to contain costs, improve worker safety, lower environmental risk, and/or provide better product quality at the end destination. For the regions covered in Phase 2, landing facility improvements needs (not including fuel system upgrades) in order of priority are:

(1) Installing upland mooring points at beach landings with current or swells.

(2) Upgrading existing docks to provide safe moorage of barges or proper arrangements for freight offloading. This may include work such as expanding existing docks for barge access, installing mooring and breasting dolphins and/or fenders.

(3) Providing mooring and berthing dolphins with catwalk to shore for fuel header access where coastlines are too rocky for fuel barge landings.

(4) Repairing or replacing existing docks that are aged and may not be strong enough for barge berthing and mooring.

(5) Providing permanent ramps and/or bulkhead docks with erosion protection at a few sites with soft beaches and no other infrastructure in place.

(6) Dredging rocks from hazard areas or shallow areas at existing docks.

(7) Existing facility repairs such as ramp surfacing, corrosion protection, lighting, etc.

Rocky coastlines are prevalent in the southern Alaska regions, and beach landings are more of a challenge. Twenty-two communities in this Assessment had reported issues associated with difficult access. Of these, about 14 sites could be improved by providing safe deepwater moorage for vessels by repairing or refurbishing existing docks, or by installing new docks or offshore mooring and breasting dolphins. Many sites have docks that are beyond their intended design life and no longer provide secure moorage for larger vessels and barges. Improvements to these docks are needed, especially within the next few years, when barge companies are required to transition to the larger double hulled fuel barges.

The other 8 sites with accessibility issues are all located in the Iliamna/Bristol Bay Region and require transport of good by lightering to a shallower draft barge up the rivers. Six of these sites are located on Iliamna Lake and pose a special challenge associated with lightering fuel over a long section of shallow flats of the Kvichak River, which can take weeks to accomplish to deliver a relatively small volume of cargo. Fuel barge operators say that it has become more cost-effective to fly fuel in to these communities.

Fifteen of the communities studied have existing dock facilities that are either degraded due to age or construction type, or otherwise insufficient for safe barge mooring and offloading. About five of these facilities (e.g., Kake) could be improved with relatively inexpensive upgrades such as replacing fenders, mooring bollards, cleats or lighting. More involved upgrades such as installation of mooring/breasting dolphins or rebuilding or expanding docks are recommended for the other 10 docks. For example, these include dock expansions and upgrades at Angoon and Hoonah, replacing docks at Old Harbor and Port Lions, and installing mooring/breasting dolphins at Pelican and Chignik.

Of the 31 communities where no existing barge landing infrastructure exists, most do not receive regular barge service, or the volume of goods delivered is small such that infrequent charter barge service, landing craft, ferry service, road connections, or other methods are sufficient to meet the needs of the community. There are about 10 communities that do not currently have barge landing facilities and where such improvements would likely improve barge access, operational efficiency and/or safety. These include new docks at sites such as Hyder and Levelock as well as installing mooring and breasting dolphins with catwalks and fuel pipelines to shore for places like Larsen Bay where the beach close to the fuel header is not accessible by barge.

At communities where the volume of goods delivered is small and beach barge landings are possible, installing deadmen or other mooring points onshore is recommended to provide continued safe and efficient access. For the communities studied herein, Manokotak and Perryville were thought to be a priority for this kind of improvement, because these sites are exposed to tidal range, ocean swells and/or other factors that make holding position on the beach more difficult.

Dredging or rock hazard removal was recommended at several communities. Most of these were associated with draft issues at private dock facilities, which is outside the scope of public funding. About four sites require dredging associated with draft issues at public docking facilities or harbors. While one-time boulder/hazard removal may well be practical in a Commission transportation program, dredging improvements need to be carefully considered for their long-term stability. Routine or repeat maintenance dredging is not practical under the Commission's funding parameters. For this reason, these sites were not scored as high for priority rating.

About 18 communities in the proposed project list should have fuel pipeline and header improvements because of inaccessible beaches and the need to float hose to shore, long overland hose runs to tanks, and/or multiple stops at various fuel tank farms in the community. Co-locating fuel tanks and headers, as well as providing fuel headers on docks would significantly improve the efficiency of fuel deliveries at many locations. Future planning for locating fuel headers at any community should consider barge operators' recommendations for placement. At some locations, recent fuel system work resulted in locating marine headers where the shoreline is too shallow or rocky for barge access. Barge operators indicate that the header location is acceptable if it is installed no more than 300 ft from a dedicated landing site, while less than 100-ft from the landing is preferred.

The Priority Projects

This Phase 2 Assessment resulted in 12 Priority Sites that are recommended for barge landing facility improvements, with a total preliminary cost estimate of about $34 Million (M). The Priority Sites were chosen based on a scoring matrix that evaluated:

- the urgency of need/time frame in which the project can be completed,
- frequency of use and overall impact of the project for improving barge operations, and
- the relative simplicity for which the project can be planned and constructed.

The goal of the scoring exercise is to determine which sites have the most positive impact for the funds expended and are projects that can reasonably be expected to be ready for near-term funding and construction. Sites that received a score of 18 or higher were selected as Priority Sites and conceptual site plans were developed to illustrate the proposed improvements.

Opinion of Probable Construction Cost (OPCC) estimates were prepared based on the Site Plans for the Priority Sites to assist the Commission with planning and budgeting the first generation of work. These estimates were completed based on a stand-alone project and include budget-level estimates for mobilization, field investigation, design, and construction administration. Reflecting a key program goal, an effort should be made to group, or bundle projects by type of construction and/or geography to realize savings on costs associated with mobilization and materials purchases. This consideration should include projects that may be initiated under the Phase 1 Assessment as well.

The following table summarizes the proposed projects and associated OPCCs.

Alaska Barge Landing Facility Improvements, Phase 2 Priority Sites

Region	Comm-unity	Brief Description of Recommended Barge Landing Facility Improvements	Total Estimated Cost[1]
Northern Southeast Alaska	Angoon	Sheetpile bulkhead face with backfill on which freight barges can side tie or lower barge ramps, dolphins and fenders.	$ 2,646,000
	Hoonah	Mooring bollards at City dock and sheetpile bulkhead with fill causeway and ramp.	$ 1,837,000
	Kake	Replace fender piles on City dock, new mooring points on dock and upland.	$ 646,000
	Pelican	Install 2 breasting dolphins, dock repairs, and fender piles.	$ 1,526,000
Southern Southeast Alaska	Hyder	Install a fill causeway extension to ADOT harbor fill area with a pass-pass dock at end, 2 mooring dolphins and 2 breasting dolphins.	$ 4,897,000
Alaska Peninsula	Chignik	Install 4 dolphins and replace timber fender piles and mooring bollards/cleats at existing City Dock.	$ 3,117,000
	Perryville	Install 2 upland mooring points at each of 2 beach landing sites.	$ 290,000
Kodiak Island	Larsen Bay	Install 2 breasting dolphins and catwalk to fuel header.	$ 1,535,000
	Old Harbor	Install new pass-pass dock with dolphins.	$ 7,389,000
	Port Lions	Install new pass-pass dock with dolphins.	$ 7,202,000
Iliamna/ Bristol Bay	Levelock A	Option A: Install 2 breasting dolphins and catwalk to fuel header.	$ 1,262,000
	Levelock B	Option B: Install a new dock for both freight and fuel barge.	$ 2,100,000
	Manokotak	Install 3 upland mooring points/deadmen.	$ 244,000
Total[2]			**$33,429,000**

[1]Total project cost assumes projects will be completed individually.
[2]The total budget calculation includes the higher of the two options for Levelock (Option B).

1.0 INTRODUCTION

In March 2007, the Denali Commission (Commission) partnered with the US Army Corps of Engineers, Alaska District (USACE) to develop a Statewide Barge Landing Assessment and Design (Assessment) to analyze barge mooring and fuel/freight transfer needs at Alaska's coastal and riverside communities and plan for improvements. This report represents Phase 2 of the Assessment which evaluates 91 communities that were not previously covered by the Phase 1 Assessment. From these sites, 12 priority projects were identified for which concept designs and budgetary cost estimates were developed.

This work was undertaken to further the general findings of three studies that had previously identified barge landing improvements as a critical need in rural Alaska. The 1997 USACE Reconnaissance of Navigation Improvements, which examined marine facility needs in western Alaska states in Chapter 8, Conclusions and Recommendations "Every community in the study needs improved barge access and loading facilities for the delivery of fuel and cargo" The Alaska Department of Transportation and Public Facilities (DOT&PF) state in their Yukon-Kuskokwim Delta (March 2002, page 6-18) and Northwest Alaska Transportation Plans (February 2004, page 4-13) barge landing improvements for mooring and upland staging are critical infrastructure improvements needed in virtually all communities in the study areas. Since then, the Commission's transportation program has identified barge landing infrastructure improvements as a critical element in improving surface transportation in rural Alaska and it has begun to focus considerable available waterfront development funding in this area.

The Commission and the USACE have formed a partnership to conduct the Assessment, prepare a capital projects budget and, as funding allows execute design and construction of a first generation of projects at Priority Sites.

The purpose is to address the cost and safety concerns raised by communities and their fuel/freight transporters and this is accomplished by identifying for construction, projects that will improve barge operations, increase worker and environmental safety and/or cumulatively improve fuel and freight delivery costs through system improvement.

The Phase 1 Assessment was completed in January 2009, and focused primarily on 111 communities on the Alaska Peninsula, the Yukon, Kuskokwim, and Kobuk Rivers, and the Bering, Chukchi and Beaufort Sea coasts. The Phase 1 Assessment provided typical conceptual designs for landing site improvements, and identified a list of 34 priority projects. The Phase 2 Assessment was initiated with the purpose of covering the remaining areas of the state and reviewing these in a similar manner so that all community needs are identified in a single document. This work, funded in partnership with the USACE, Denali Commission and ADOT, has been undertaken in this Phase 2 Assessment, which is intended to accompany Phase 1 as a second volume.

Phase 2 includes the areas of the State not included in Phase 1. These include 91 communities including Iliamna/Bristol Bay, Alaska Peninsula, Aleutians, Pribilofs, South-central Alaska, Kodiak Island, and Southeast Alaska. This Assessment outlines existing conditions and improvements barge operators and other users have identified for each community via an interview process with fuel and freight barge operators who service these focus regions.

Barging is the dominant re-supply method for many of the communities throughout these regions of Alaska. However, when compared to the Western and Northern Alaska communities covered in the Phase 1 study, where most shoreside receiving facilities are either absent or primitive, communities in the Phase 2 study area typically have dedicated landing sites or docking facilities available. Many docks exist as a result of former fisheries/canneries and logging operations in these regions. In addition, most of the larger towns and cities in Alaska are located within South-central and Southeast Alaska and have well-developed port facilities and economic bases to support them. This is not to say that the smaller communities that once thrived on fishing and logging – activities that have since declined – are not in need of improved landing facilities. The facilities associated with those activities have typically been transferred to the local communities and are now showing signs of age.

Fuel barge operators indicate there is a concern statewide, as they plan to meet the deadline for transitioning to double-hull fuel barges. Depending on the size, age, and type of fuel carried, this deadline could be anytime between 2010 and 2015. One fuel barge company indicated that their barges will be double-hull by 2012. Continued safe access is questionable for many of the communities where these degraded facilities will not be sufficient to allow access and/or safe moorage for the deeper draft vessels with shallow or rocky beach landings. Dock improvements, including the installation of new fenders and/or breasting dolphins would allow continued safe moorage at these facilities.

For freight, the southern regions of Alaska seem to be generally well equipped to handle freight deliveries, with a few exceptions. Larger ports receive the bulk of the freight coming from Seattle or other locations to these regions and distribute to smaller communities by barge or landing craft. At communities where ferry service is available, much of the freight can be delivered via the ferry system. Private freight barge companies provide seasonal or more regular barge service for construction related cargo or other freight that cannot be carried by the ferry, such as propane or other hazardous freight. Smaller more remote communities may rely on smaller landing craft or charter services for freight and sometimes tanked fuel deliveries. There are several sites described in detail in this report, where freight barge operators have identified landing site improvements that are needed to improve safe access and deliveries.

2.0 PURPOSE

The purpose of the Assessment is to provide a comprehensive overview of barge landing improvement needs in Alaska, and addressing the cost, environmental, and safety concerns raised by communities and their fuel/freight transporters, and other commercial users.

Through interviews with barge operators and other users, the initial list of needed improvements in these southern regions of Alaska consists of fixed dock structures, mooring/breasting dolphins to provide offshore moorage where beach landings are not possible or where an existing dock structure cannot accommodate larger barge moorings, on shore mooring points (i.e., deadmen), and repairs to existing dock facilities such as adding mooring bollards, replacing fenders, etc.

The goal of the study is to identify the locations and types of landing, mooring and transfer improvements which if constructed would:

- Provide for operational efficiencies
- Increase worker safety
- Reduce environmental impacts
- Improve the quality of goods delivered.

The primary intent of this report is to describe the needs that exist at each community as expressed by the barge operators and provide recommendations for landing facility improvements. In addition, the report prioritizes the sites and develops a list of Priority Sites where a reasonable investment of the Commission's funds in the near term will provide good value. This includes conceptual designs and budgetary estimates of the funds that may be needed to complete the work at the Priority Sites.

To achieve this, concept designs were developed based on the barge operators' recommendations and site plans were developed to illustrate how the concept designs might be applied to each of the Priority Sites. An Opinion of Probable Construction Costs (OPCC) was estimated for each of the Priority Sites to help plan for design and construction of these projects.

3.0 ORGANIZATION OF THE REPORT

The first five sections of this report are intended to describe the background, purpose, goals, and method of the study for this assessment. The regions and communities included in the study are identified in Section 4. The process used to gather data and develop projects is described in Section 5.

Section 6 summarizes data collected from the interviews with barge operators and other user groups and solicitations for information. This information is provided for each community included in the study, organized by region. The intent is to document the individual sites' existing conditions and facility improvement needs information for future reference, whether or not the site is included in the list of Priority Sites projects. A record of data gathered during the interviews is included in Appendix A. The recommendations for each community and the priority scoring results are summarized in the matrix table provided in Appendix B.

Section 7 discusses the site-specific conditions that need to be considered and evaluated as part of the final design for each site. Because this preliminary assessment effort did not include site-specific field investigation or study outside of readily available maps and aerial photographs and previous experience in some areas, this section is provided to illustrate the importance of site-specific design considerations in order to control unforeseen costs during construction and to ensure a quality end product.

Section 8 introduces the recommended conceptual designs and associated drawings. The design concepts in this report represent those that are applicable to typical barge landing sites at the identified Priority Sites and intended to supplement the concepts developed in Phase 1. This section includes descriptions of the concepts and general considerations as to how they should be applied to address the needs identified in Section 6. Although each option presented may reasonably be expected to work for the intended purpose, the advantages and disadvantages of each option in the conditions expected at the various locations in Alaska are discussed. Subsequently, the conceptual design drawings were developed for the recommended design options. These concept design drawings are presented in Appendix C.

Section 9 describes the scoring method for prioritizing the sites for improvement projects. This was done through a scoring matrix described and presented in this section. A brief description of the proposed work for each of the Priority Sites projects is included. Site plans are provided in Appendix D to illustrate the proposed work at each of the Priority Sites. The site plans consist of an aerial photograph of each Priority Site, with the recommended concept design(s) overlaid to illustrate how the concept designs might be applied and provide a basis for future planning. Note that property ownership, current site layout and topography, and other basic site planning needs have not been completed as part of this initial assessment. It is expected that changes to the siting and layout of the work will be necessary.

Section 10 provides information for budgetary planning purposes. OPCC estimates were developed based on the site plans introduced in Section 9. The individual OPCC estimates for each Priority Site are provided in Appendix E.

Section 11 constitutes a summary of the barge landing improvement needs assessment and resulting recommendations.

4.0 STUDY AREA

4.1 Regions

The study area for this second phase of the Assessment focuses on the established rural Alaska communities that are dependent on barge service for delivery of fuel and supplies. Phase 2 covers the river and coastal communities that were not covered by Phase 1 and include the regions in Southeast, South-central, and Southwestern Alaska.

The communities chosen for inclusion were those communities where barging may be the dominant re-supply method and where barge landing improvements may have the most benefit. Although some communities have larger ports such as Juneau, these communities were included to provide a better understanding of the hub locations for barges coming to Alaska. The focus for improvements is on the more rural locations where improved barge service to the community could result in reducing fuel and cargo delivery costs, improving safety of fuel transfer, and/or quality of goods delivered to the site. The Phase 2 study area is divided into six regions including:

- Northern Southeast Alaska
- Southern Southeast Alaska
- South-central Alaska
- Kodiak Island
- Iliamna/Bristol Bay
- Alaska Peninsula/Aleutians

These regions are identified by the color-coded areas depicted in Figure 4.1.1.

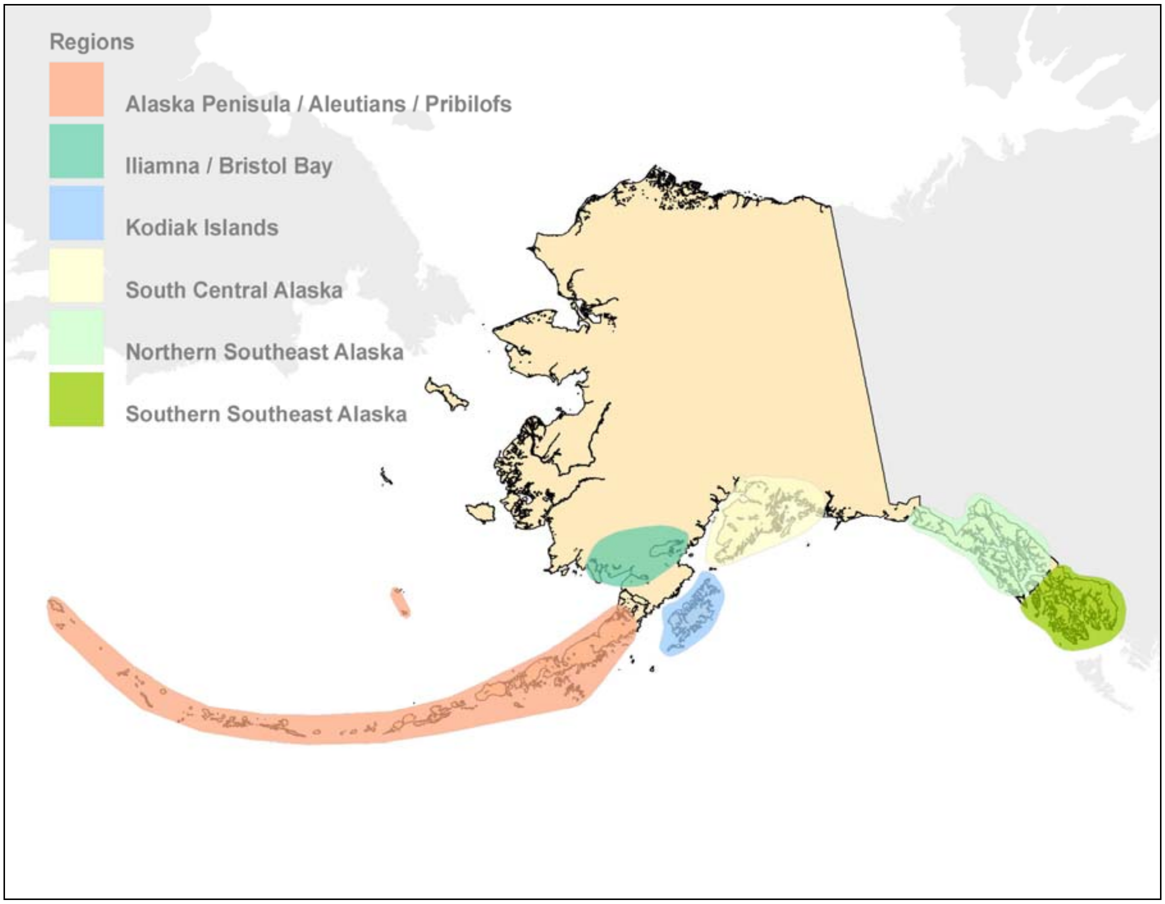

Figure 4.1.1: Alaska Barge Landing System Design, Phase 2, Study Regions.

Table 4.1 is a list of the communities that are included in the study, grouped and color-coded by region to match the regions shown on the map in Figure 4.1.1.

Table 4.1: Alaska Barge Landing System Design Study, Communities List

Region	Community	Region	Community	Region	Community
Northern Southeast Alaska	Angoon	Alaska Peninsula/ Aleutians/ Pribilofs	Adak	South Central Alaska	Chenega Bay
	Douglas		Attu		Cordova
	Elfin Cove		Chignik		Eyak
	Excursion Inlet		Cold Bay		Halibut Cove
	Gustavus		False Pass		Homer
	Haines		Ivanof Bay		Kasilof
	Hoonah		King Cove		Kenai
	Juneau		Nelson Lagoon		Nanwalek
	Kake		Nikolski		Ninilchik
	Pelican		Perryville		Pt. MacKenzie
	Sitka		Port Heiden		Seldovia
	Skagway		Port Moller		Seward
	Tenakee Springs		Saint George		Tatitlek
	Yakutat		Saint Paul		Valdez
Southern Southeast Alaska	Coffman Cove		Sand Point		Whittier
	Craig		Shemya	Iliamna/Bristol Bay	Aleknagik
	Edna Bay		Ugashik		Ekuk
	Hollis		Unalaska		Igiugig
	Hydaburg	Kodiak Island	Afognak		Iliamna
	Hyder		Akhiok		King Salmon
	Kasaan		Karluk		Kokhanok
	Ketchikan		Kodiak		Koliganek
	Klawock		Kodiak Station		Levelock
	Kupreanof		Larsen Bay		Manokotak
	Metlakatla		Old Harbor		Newhalen
	Meyers Chuck		Ouzinkie		Nondalton
	Naukati Bay		Port Lions		Pedro Bay
	Petersburg		Womens Bay		Portage Creek
	Point Baker				
	Port Alexander				
	Port Protection				
	Saxman				
	Thorne Bay				
	Whale Pass				
	Wrangell				

5.0 STUDY METHOD

The study approach was to focus on gathering data by interviewing the primary users of the barge landing sites in the study region. The people operating barges and commercial boats at these remote locations, often for several decades, are considered the experts when it comes to recommending landing site improvements. Information gathered from the interviews, combined with the expertise of USACE and waterfront engineers at URS Corporation (URS), provides the technical background to present solid recommendations for useful and cost-effective barge landing system improvements in the study region.

In addition to the vessel operators, interviews were attended by engineer(s) from URS and representative(s) from USACE. The information recorded by the attendees was compiled and summarized for each interview session. Documentation of the interviews is included in Appendix A.

The primary types of data requested from the commercial boat/barge operators and the community representatives included:

- Barge fleet/vessel types used to serve these communities
- Frequency of activity and volume/type of cargo delivered
- Existing conditions of landing facilities at each community, such as:
    - Description of the natural environment of the landing site such as type of existing facility or improvements and/or soil type, bottom conditions, beach slope, current, erosion, etc.
    - Identification of access/navigation, landing, and offloading challenges.
- Recommendations for facility improvements at each site that would increase operational safety, worker safety, product delivery, environmental impacts, or quality of goods delivered.
- Identifying the sites considered to be the highest priority for improvements.

Individual aerial photographs and/or maps of each of the communities were available during the interview meeting to facilitate expressing landing site locations, issues, and recommended improvements. Some of the operators provided their own photographs of the sites to illustrate the existing conditions.

The recommendations for improvements at each community are based on information gathered from the interviews and engineering experience. Additional study, site visit, and communications with local community representatives will be necessary to confirm and complete the designs for barge landing improvements at a community.

Next, concept design drawings were developed to illustrate the various proposed landing facility improvements, including several options for mooring points, staging area, landing ramps, and docks. The information gathered by the interview and data gathering process is detailed in the following section of this report.

6.0 SUMMARY OF DATA GATHERED

By volume, fuel is the primary product delivered to rural communities in Alaska by barge. The majority of the fuel is diesel used for community power plant operations and fuel oil for home heating. Deck freight, delivered along with fuel orders, or separately, on regular scheduled barges is primarily containers, or break-bulk cargo (loose, non-containerized material such as long lengths of pipe or timber, vehicles, palletized cargo, etc.). Chartered barges are generally associated with residential or community construction projects such as schools, roads, fuel tank farms, health clinics and airports.

Through interviews with barge operators and other users, the initial list of needed improvements in the southern coastal regions of Alaska consist of new fixed dock structures, mooring/breasting dolphins to provide offshore moorage where beach landings are not possible or where an existing dock structure cannot accommodate larger barge moorings, on- and off-shore mooring points, and repairs to existing dock facilities such as adding mooring bollards, replacing fenders, etc. To a lesser degree, dredge areas and landing ramps and staging areas were identified. With some exceptions, it was generally found that unlike the regions covered by the Phase 1 Assessment, the southern regions of Alaska covered by this phase of the Assessment tend to have some level of existing waterfront facilities and upland staging areas. Historically, the southern regions of Alaska are more populated, have a history of development by the timber and/or fishing industries, and hence the associated docking infrastructure is available in many locations. These facilities are now showing signs of age and it is apparent that improvements are needed at many locations to continue to provide safe barge landings. Fuel barge operators indicate that with the new requirement for double-hulled fuel barges in the next few years, some of these degraded facilities will not be sufficient to allow access and/or moorage for the larger vessels.

Loading and off-loading of freight from barges is traditionally done by cranes positioned on a dock or on the barge, driving cargo off of landing crafts using loaders or forklifts (roll-on/roll-off [RO/RO] or pass-pass operations).

Alaska Marine Lines (AML) and Northland Services (via Boyer Towing) are the major freight barge companies serving larger communities in South-central and Southeast Alaska. Boyer supports Northland’s contracts and supports the timber and mining/exploration industry. Northland indicated that overall, their highest priorities are in western Alaska and that the landing improvement needs at the communities within the region covered by this phase of the study is a lesser priority.

Boyer Towing, Olson Marine, and Sea Level Transport are some of the smaller freight barge operators who participated in the interviews. They run smaller barges and landing craft with end ramps (some with small cranes on board) that allow them to land on beaches and access shallow areas. This allows them to offer fill-in service for communities lacking ferry or barge service. Construction companies such as Trucano Construction were also interviewed and have similar barges and access/landing issues as the smaller freight barges.

Freight barges used in southern regions of Alaska range in size from landing craft that are 75 to 230 ft length overall (LOA) with 20-ft hydraulic ramps are typical. Most landing craft have a draft of less than 6-ft of water, although some are shallower. Mainline freight barges that come from Seattle and come into Alaska hubs are generally up to 360-ft LOA and have up to about 19-ft draft. These vessels primarily go to hub ports where freight is transferred to smaller vessels. Hub locations in Southeast Alaska include Ketchikan, Juneau, Petersburg, and Thorne Bay and Craig on Prince of Whales Island. Unalaska/Dutch Harbor is the major port in the Aleutians. Anchorage, Cordova, Valdez, and Whittier are some of the hubs for fuel and freight in South-central Alaska. Some rail barges that go into Whittier, for example, are up to 420-ft LOA and 100 ft wide. From the hub ports, barges that run up the coast of Alaska are on the order of 280-ft LOA and 76-ft wide. In Southeast Alaska, these barges are based in the hub ports and make runs up the coast once or twice every week.

The RO/RO method of offloading cargo, where wheeled vehicles are used to pick up cargo from the barge and stage it on shore, can be performed by using adjustable ramps usually mounted on the barge. Ramps attached to the barge often operate like a landing craft with the ramp dropping down onto a bulkhead, ramp, or beach. Although not always available in these communities, RO/RO operations usually entail an earthen ramp from shore that may have a gravel surface or in some cases, a paved surface. Pavements can be asphalt, concrete, or pre-cast concrete spaced-planks. Pavements provide a safer operating surface for equipment moving heavy loads. Operators and construction contractors generally use rubber-tired loaders with forks to move cargo.

Pass-pass refers to an operation where a forklift or loader on the barge transfers freight to second forklift or loader on shore. Although the lack of heavy equipment available in many remote communities often precludes the use of this method, it is more efficient and is used at most of the hub communities. This method involves the forklift on the barge picking up a load and setting it on a table. The shore-based forklift then picks the load off the table and places it in a storage location on shore. As the shore-based forklift moves the freight, the barge-based forklift goes to the next item, picks it up and places it on the table. The table is normally a steel or heavy wooden platform that can be located either on the barge or positioned on the dock or shore.

The primary items identified by freight barge operators to improve landings are to improve existing dock facilities to allow safe barge landings and/or to install on- or offshore mooring points to hold position. In addition, some sites have been identified as needing a dedicated landing such as a dock or ramp where none existed previously and lightering is required for beach landings.

Another method of offloading freight is by using a crane that is positioned either on a dock or, more commonly, on the barge. Cranes are available at several landing sites included in this study. In this case, the barge lands parallel to the shore and side-loads from the barge. They can also push into the beach, and load from the front of the barge. Problems with freight offloading at some locations is related to moving equipment and materials across soft beaches, which operators or community members currently resolve by putting out heavy-duty crane mats or steel plates upon landing to stabilize the soft ground and allow equipment to move up the bank to an upland staging area.

Petroleum/fuel barges typically range in size from 180-ft LOA, 50-ft wide, and drafting up to 10-ft to about 330-ft LOA, 86-ft wide, and drafting 17-ft. The new double-hulled barges that will be used are roughly 345-ft LOA, 78-ft beam, and can draw over 24-ft when fully loaded. Fuel barges typically draft more than freight barges and often displace more weight; hence access to shallow areas is more difficult and the heavier vessels put more forces on the fenders and mooring points.

Barge operators use smaller lightering vessels (i.e., 80-ft by 24-ft) with shallow drafts (i.e., 3-ft) to reach shallow upriver locations in Lake Iliamna/Bristol Bay Region or to work along some shallow coastal shorelines.

In Southeast Alaska, some fuel is delivered by landing craft that are usually less than 100-ft LOA and draft less than 4 ft. They transport fuel in iso-tanks to smaller communities not serviced by the larger fuel barge companies. As 2012 nears (when many fuel barges will transition to double-hulls), they anticipate picking up more fuel runs because the new barges are larger, more expensive and therefore less likely to service small communities with small deliveries or locations that are difficult to access or with insufficient moorage for the large vessels.

Fuel barges pump their products to shore through hoses. Usually, the pumps are on the barges although there are shore-based pumps at some locations. The hoses connect to pipe headers on shore which in turn are connected to storage tanks by pipelines that are either buried or above ground.

In cases where headers are not present, hoses may be run directly to nearby upland tank farm locations. The fuel barges that land at these communities either use dock-mounted fuel headers or run hoses from docks to the header or tank locations. At some locations barges must nose in to shore and push the beach. These barges have deeper draft than some of the lighter vessels used for delivering freight. Because of this and due to risk of fuel spills if the barge is damaged, they sometimes cannot land on shore at locations where freight barges can. At these sites, the barge operator will float or anchor offshore and float the hose to the beach and then drag it upland to the header or tanks. This can be time consuming and sometimes even further delayed, at sites that are tidally influenced and go dry or where bears are known to roam the beaches. For these sites, offshore mooring/breasting dolphins with catwalks to shore would provide safe and efficient fuel barge moorage during offloading. In addition, a fuel pipeline could easily be added to the catwalk. However, these improvements would not be suitable for heavy freight transfer, other than at sites where it could be beneficial to provide moorage for the larger barge while a lightering barge delivers cargo to shore.

Some communities have multiple fuel headers, each requiring a separate barge landing within the same community. Although this is less prevalent in the southern regions of the State than in western Alaska, it does extend delivery times.

One possibility for improving fuel delivery efficiency may also be for the community to assess the feasibility of whether increasing fuel storage capacity would result in lowering the frequency of deliveries and in turn cost of fuel to the community. There are many factors to consider such as fuel consumption rates, the ability to pay for large volumes of fuel at one time, barge delivery capacity and routes, etc.

The following sections describe in detail the regions, communities, and specific conditions and the barge operators' recommendations for barge landing facility improvements at each site.

6.1 Northern Southeast Alaska Region

Southeast Alaska, sometimes referred to as the Alaska Panhandle, lies west of the northern half of the Canadian province of British Columbia. Southeast Alaska is bound on the inland side by mountain ranges (Chugach, Wrangell-Saint Elias, and the Coast Range), and has a very different climate, flora, and fauna from the areas inland of the mountain range. This coastal region has a relatively mild maritime climate, abundant marine life, and temperate rain forest. The majority of Southeast Alaska is part of the Tongass National Forest.

This Assessment divides Southeast Alaska into northern- and southern- regions. The Northern Southeast Alaska region, for the purposes of this Assessment includes 14 coastal communities, located in the northern portion of what is commonly referred to as Southeast Alaska, from the community of Sitka on Baranof Island in the south, to Yakutat in the north. Figure 6.1.1 depicts the communities included in the Northern Southeast Alaska study region.

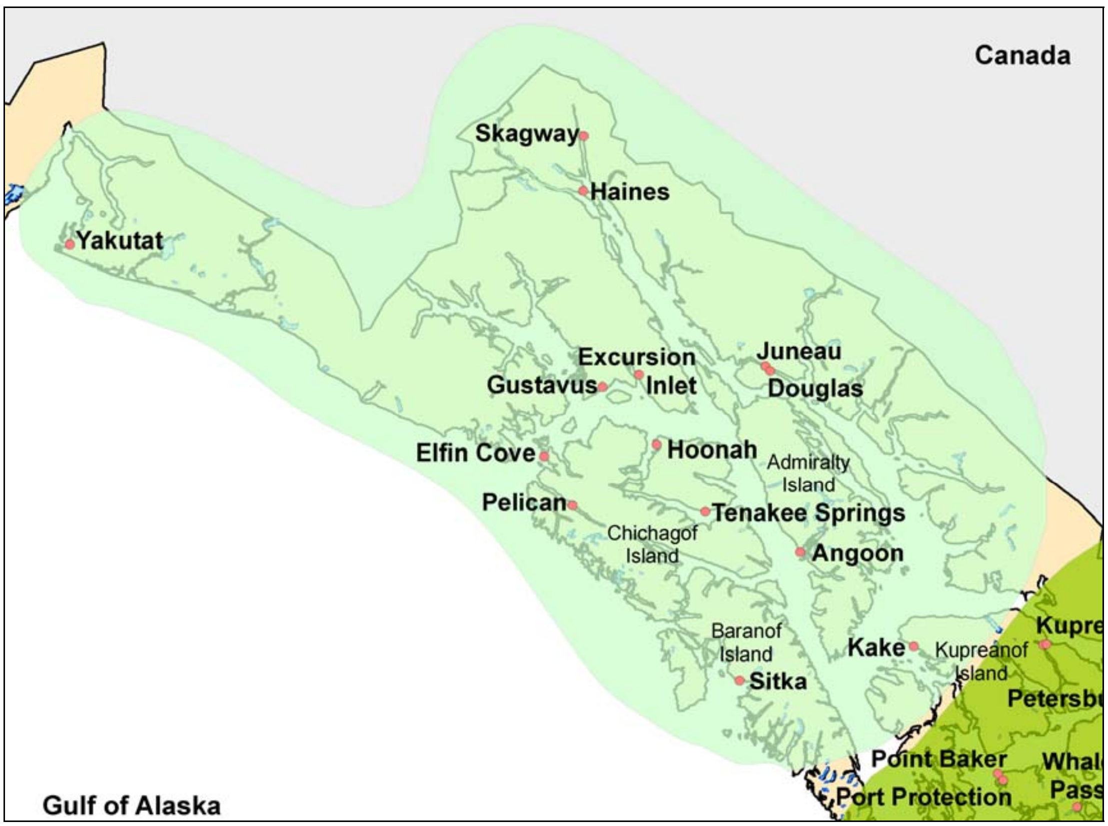

Figure 6.1.1: Northern Southeast Alaska Region Map.

The estimated population of the communities in the Northern Southeast Alaska Region is 46,630 inhabitants, about 65 percent of whom were concentrated in the city of Juneau. Almost all communities in the Northern Southeast Alaska region, with the exception of Skagway and Haines, have no road connections outside of the vicinity. For this reason, aircraft and boats are the major means of transport and many people rely on barge service, the Alaska Marine Highway System (AMHS), or personal boats for transporting fuel, freight, and other cargo.

Northern Southeast Alaska is the northern end of the Inside Passage, which provides sheltered coastlines and navigable waters, separated from the open ocean by the islands of the Alexander Archipelago. This navigable passage between islands and fjords begins with its south end starting in Puget Sound in Washington State. The coastal waters in this region are ice-free year round and barge deliveries are generally made on a regular basis, year-round, to deliver supplies to these communities.

6.1.1 Angoon

Angoon is the only permanent settlement on Admiralty Island, located on the southwest coast at Kootznahoo Inlet. Angoon is 55 miles southwest of Juneau and 41 miles northeast of Sitka. Summer temperatures range from 45 to 61 degrees Fahrenheit (°F). Winter temperatures range from 25 to 39°F. Temperature extremes include a low of -6°F and a high of 77°F. Angoon receives much less precipitation than is typical of Southeast Alaska, averaging 43-in (in) annually. Annual snowfall averages 63-in. Strong north winds during winter months cause rough seas, which may prevent aircraft landings (DCCED, 2009).

Angoon had a 2008 population of 430; this is down from the 2000 census population of 572 and 638 in 1990. Note that the census area was changed in 2007. Power service in Angoon is provided by Inside Passage Electric Cooperative and is generated from diesel. Fuel oil is the primary heat source and used in most homes (DCCED, 2009).

Angoon is accessible only by float plane or boat. Angoon's marine facilities include a deep draft dock, a small boat harbor, and State ferry terminal. Freight arrives by barge and ferry (DCCED, 2009).

Most regular cargo is brought to this community on the Alaska Marine Highway System (AMHS) ferry. A new ferry dock is planned for construction by AMHS. Alaska Marine Lines (AML) is a private carrier who provides seasonal freight barge service to Angoon for approximately five (5) freight deliveries per year consisting mostly of construction related cargo or other freight that cannot be carried by the ferry, such as propane. At present, these freight barges use the ferry terminal to transfer cargo, which according to AML has been sufficient for regular freight RO-RO operations but has not been a good place for equipment to load and unload. Their barge is too big to go anywhere else in Angoon. AMHS does not want the barge to land at their facility because it does not properly fit, is too large and may cause damage to their facility. Additionally, the ferry vessel transfer facilities are not strong enough to carry the loads that AML would like deliver and the ferry terminal is not designed to accommodate the berthing and mooring loads of the larger barges.

Some landing craft operators indicated that smaller barges can land at other beach locations in the community. One beach site is located adjacent to the seaplane float dock on the Kootznahoo Inlet side of the community. However, access is to this landing site is tidal due to the shallow, flat access and rocks.

Most barge operators agree that Angoon needs a dedicated ramp barge landing. They used to bring the barges in next to the dock, but there are rocks there now and the tide runs hard so they don't go there anymore.

Ideally, there should be a ramp landing on the south side of the ferry dock. Both AML and AMHS suggested construction of a rock fill and sheetpile bulkhead wharf structure with dolphins should be designed such that it is sufficient for lowering a barge ramp onto it to allow heavy cargo and containers to be transferred utilizing a forklift. AMHS has worked with the community and AML and have tentatively identified a good site for a new wharf that is located adjacent to the City dock to the west of the ferry terminal, shown in Figure 6.1.2.

Figure 6.1.2: Proposed site of new freight barge landing structure.

In addition, it was suggested that Angoon needs an upland staging area to support construction deliveries, possibly up to 2 acres. This could be accommodated as part of a bulkhead wharf and associated backlands at the proposed landing site. There is a native graveyard near the top of the bluff at this site that will need to be avoided when considering the staging area location. There is a local quarry (Kootznoohoo Quarry) which could be a local source of rock and clean fill for any new barge landing facility.

Fuel deliveries are made to Angoon about twice per month with a 230-ft barge at three locations within the community: Six deliveries per year of 30,000 gallons each are made to the power plant; twice per month Angoon Oil receives 21,000 gallons of fuel; and a private lodge (whaler's cove) receives 10,000 gallons of fuel 2-3 times per year.

To deliver fuel to the power plant, the barge moors at a "boat house" dock in front of town and floats over 800-ft of 2-inch (in) diameter hose to the beach, as depicted in Drawing D1 in Appendix D. The dock is considered to be in good condition, but it is exposed to swell from Chatham Strait and the location is not in close proximity to the power plant's tanks. They used to have a header on the dock with a pipeline to the power plant, but that was taken out of service several years ago. Fuel barge operators recommended repairing or replacing the fuel pipeline.

The landing facility at Angoon Oil consists of a dock that needs replacement of about 20% of the dock face fender piling.

At the Whalers Cove Lodge, the barge anchors offshore and floats about 600-ft of hose to the shore and tanks. They indicated that the biggest risk is having to watch for small vessel traffic when the hose is out.

Ideally, a consolidated fuel tank farm with sufficient capacity to reduce the number of stops in the community and the number of visits per year is recommended to help lower fuel delivery costs. In addition, a consolidated fuel header and pipeline and to a main dock or other barge landing site would eliminate the need to float hose to shore at this community.

The focus of this Assessment is on infrastructure improvements; therefore the recommended fuel system improvements are not included in the scope of this effort. However, because the ferry terminal limits the type and weight of cargo that can be transferred and because the large freight barges could cause damage to the ferry terminal facility, a new bulkhead wharf is recommended for this site for freight offloading. AML provided a sketch of the recommended barge landing improvements which involves extending a fill causeway with a sheetpile bulkhead face and a breasting dolphin to between this and the existing dock to help keep barges off of the dock. This sketch been reviewed by the City personnel and AMHS personnel and all agree that this is needed to facilitate barge transfers at this site. One barge operator emphasized that the sheetpile bulkhead should be set back no more than 15 to20 ft behind the face of the existing dock or new dolphin to ensure that ramp barges can utilize the landing as well as barges with side loading operations. The proposed improvements are depicted in Drawing D2 in Appendix D.

6.1.2 Douglas

Douglas lies within the City & Borough of Juneau, on the northeast coast of Douglas Island. The Gastineau Channel is traversed by the Juneau-Douglas Bridge. Locally, the Douglas area refers to the southern end of the Island (population 2,000), although the entire population of the Island is 5,100. Juneau has a mild, maritime climate with average summer temperatures between 44 to 65°F and winter temperatures between 25 to 35°F. Annual precipitation is 92-in in the downtown Juneau area, and 54-in ten miles north at the airport. Snowfall averages 101 -in(DCCED, 2009).

Power service in Douglas is provided by Alaska Electric Light & Power Company using hydro with a diesel backup. In 2000 fuel oil was the primary source of heat and used in 57% of households (DCCED, 2009).

Douglas/Juneau is accessible only by air and sea. Scheduled jet flights are available at the Juneau International Airport. Marine facilities include a seaplane landing area at Juneau Harbor, two deep draft docks, five small boat harbors, and a State ferry terminal. The AMHS ferries and cargo barges provide year-round services (DCCED, 2009).

Both freight and fuel barge operators agree that barge landing improvements of the type included in this Assessment are not needed at Douglas, primarily because there is a bridge connecting the community to the Port of Juneau.

Weekly freight service from Seattle delivered cargo to barge terminal facilities in Juneau. Fuel deliveries are made by barge to Petro Marine (a fuel vendor) at a private dock facility in Douglas. One fuel barge operator mentioned that dredging is needed at this facility to allow sufficient draft (at least 10-ft) for access by the new double hulled barges. In addition, the Petro Marine facility is in need of improved mooring points. However, because this is a private facility, these improvements are not in the scope of this assessment.

6.1.3 Elfin Cove

Elfin Cove lies on the northern shore of Chichagof Island, approximately 70 miles by air and 85 miles by boat west of Juneau; and 33 miles west of Hoonah. The community is only accessible by small seaplane or boat. Summer temperatures range from 52 to 63°F and winter temperatures range from 26 to 39°F (DCCED, 2009).

Elfin Cove had a 2008 estimated population of 30 and a 2000 census population of 32. Power service is provided locally by the Elfin Cove Utility Commission using diesel. And kerosene is the primary heat source for most households (DCCED, 2009).

A seaplane base and moorage for 25 marine vessels is available. Skiffs are the primary means of local transportation. The State Ferry lands at nearby Pelican. Freight arrives by seaplane or boat (DCCED, 2009).

Barge deliveries are made to several locations within the community primarily by landing craft because larger freight barges cannot get into Elfin Cove. There are a few docks that are accessible outside the cove, and the fuel tanks are accessible there. The fuel barge operators indicated the existing dock is showing signs of age and may risk damage if larger barges moored there. However, the volume of fuel delivered is small and so Elfin Cove is not a high call priority for the major fuel barge companies. Instead, fuel is usually delivered by landing craft which carries fuel in tanks on deck, lands on the beach next to the dock, and pumps the fuel out to tanks located near the beach.

This primary beach landing site is adjacent to the State dock at a small gravel beach landing area, shown in Figure 6.1.3. Sea Level Transport, LLC (Sea Level) serves this community at least annually and minimizes costs by sharing costs with Gustavus and by hauling freight alongside the fuel and propane as well as using the trip to backhaul solid waste, batteries, and recycling materials. This scenario seems to work well for this small community and barge operators agreed that improvements to the landing site would not significantly change current operations at Elfin Cove. However, the existing beach landing could use some gravel/rock surfacing to allow deliveries at a greater tidal range and improve safety during offloading.

Figure 6.1.3: Landing craft at Elfin Cove beach landing (©Sea Level Transport).

6.1.4 Excursion Inlet

Excursion Inlet is located in the Haines Borough, on the west coast of Lynn Canal, 38 miles northwest of Juneau. Average summer temperatures range from 46 to 76°F; winter temperatures range from 13 to 36 °F (DCCED, 2009).

Excursion Inlet had an estimated 2008 population of 12. The area is not accessible by road. A public seaplane base is available. There is no power service in Excursion Inlet other then individual generators. Wood is the primary heat source in most households (DCCED, 2009).

There is a pile supported dock in Excursion Inlet that is owned by Ocean Beauty Seafoods. AML owns a small rock fill bulkhead for stern ramp loading operations and there are some offshore pilings there to facilitate mooring. These facilities are shown in the photograph in Figure 6.1.4.

Seasonally, AML hauls fish out of Excursion Inlet and brings fuel in via (International Standards Organization) ISO-tanks. Their ramp is only accessible at high tide and is not accessible by some of the smaller landing craft operators, which use the nearby beach to land and load/offload when they service Excursion Inlet for charter service and smaller freight deliveries.

Barge operators did not recommend barge landing facility improvements at Excursion Inlet because the existing facilities are adequate for the small volume of goods delivered to this community.

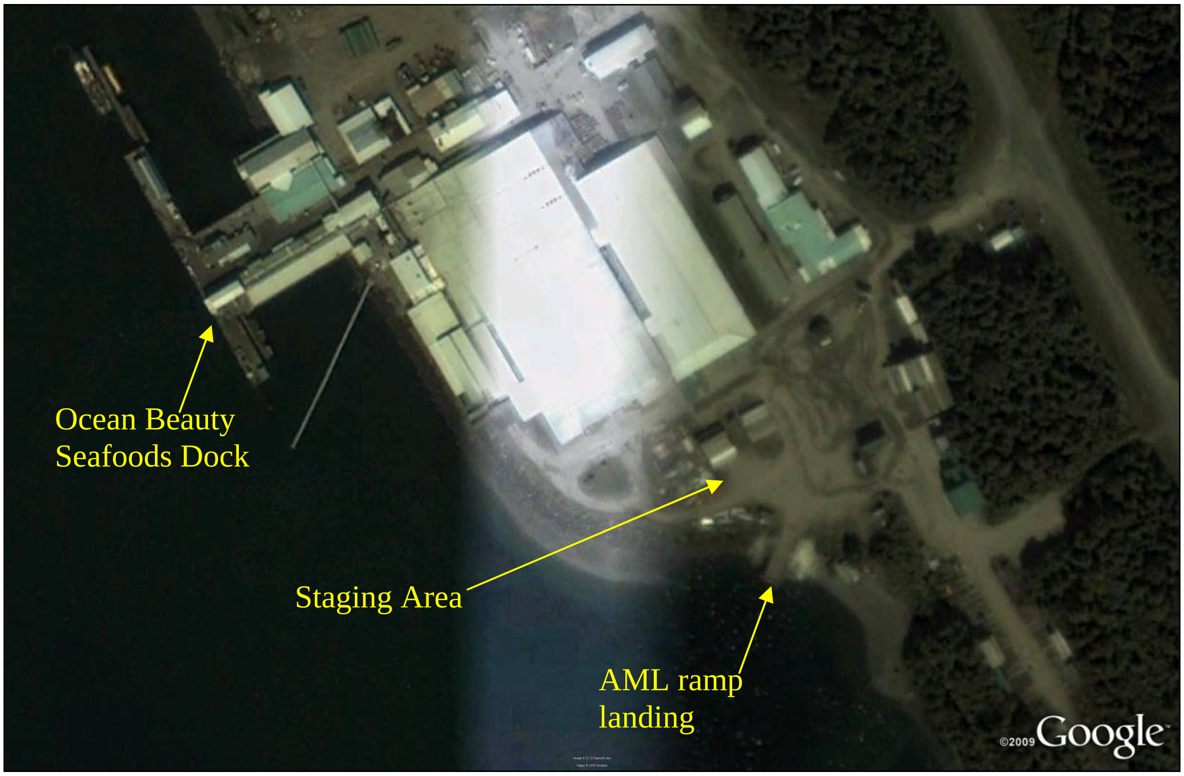

Figure 6.1.4: Excursion Inlet facilities (©Google Earth Pro).

6.1.5 Gustavus

Gustavus is about 48 air miles northwest of Juneau on the north shore of Icy Passage, near the mouth of the Salmon River. It is surrounded by Glacier Bay National Park and Preserve on three sides and the waters of Icy Passage to the south. Summer temperatures range from 52 to 63°F and winter temperatures range from 26 to 39°F (DCCED, 2009).

Gustavus has a stable population: it was estimated to be 448 in 2008 and had a census population of 429 in 2000. Power service is provided by the Gustavus Electric Company using diesel. In 2000 fuel oil was the primary source of heat and used in most households (DCCED, 2009).

Gustavus has a State-owned airport with jet capability and float planes land at nearby Bartlett Cove. There is a 10-mile local road connecting Bartlett Cove with the airport. Small boats and small ferry boats regularly use the Gustavus Dock in the summer. Freight is delivered to Gustavus by barge (DCCED, 2009).

Fuel is delivered by a 230-ft barge once per month to deliver 45,000 gallons of fuel (including diesel, gas, and jet fuel).

The existing timber dock, shown in Figure 6.1.5, is in very poor condition, and barge operators recommend condemning it. Construction of a new multipurpose dock facility is underway at Gustavus by the Alaska Department of Transportation and Public Facilities (ADOT). This new facility will accommodate mooring by the State ferry and barges, and includes a staging area. Upon completion of this facility, most barge operators indicated that no additional improvements would be needed at Gustavus.

Figure 6.1.5: Timber Dock at Gustavus.

Landing craft operators indicated that they would not be able to use the new facility because it is too high to lower their ramps. However, they typically pull up into the river and unload at a gravel ramp barge landing site, which has had new gravel surfacing added recently. Some other landing craft that sometimes deliver construction materials to Gustavus are too large to access this ramp, and instead land nearby on the beach and drop their ramp on the beach, as shown in the photograph in Figure 6.1.6., below. Some piles have been driven at this location to make it easier to land at this beach landing site.

Figure 6.1.6: Upriver barge/landing craft beach landing site at Gustavus.

One recommendation that barge operators indicated would help to expedite their operations at Gustavus is to deal with the vessel congestion that occurs at the dock during summer. Boats anchored up near the dock, combined with strong currents, can cause problems for barges trying to moor at the dock.

6.1.6 Haines

Haines is located on the western shore of Lynn Canal, between the Chilkoot and Chilkat Rivers. It is 80 air miles northwest of Juneau, just south of the Canadian border at British Columbia. Summer temperatures range from 46 to 66°F; winters range from 10 to 36°F. Temperature extremes have been recorded from -16°F to 90°F. Total precipitation averages 52-in a year, including 133-inof snowfall (DCCED, 2009).

Haines had an estimated 2008 population of 1,475 which is lower than the 2000 census population of 1,811. Power service is provided by Alaska Power Company using diesel. Nearly 84% of houses are heated using fuel oil (DCCED, 2009).

Haines is a major trans-shipment point because of its ice-free, deep water port and dock, and year-round road access to Canada and Interior Alaska on the Haines and Alaska Highways. It is a northern terminus of the AMHS/ferry system, a cruise ship port-of-call, and a hub for transportation to and from southeast Alaska. Haines has a runway, with daily scheduled flights to Juneau by small aircraft. There is also a seaplane base, two small boat harbors with a total of 240 moorage slips, a State Ferry terminal, and a cruise ship dock. Freight arrives by ship, barge, plane and truck (DCCED, 2009).

Fuel is currently delivered nine times per year using 280-ft to 345-ft long fuel barges and there is weekly freight barge service to Haines. In addition, smaller barges and landing craft sometimes deliver freight to private landing facilities associated with nearby logging and mining operations at Letnikof Bay on the Chilkat Inlet side of the community and at Comment Beach, respectively.

Fuel and freight barges land at the existing Lutak dock, shown in Figure 6.1.7, which is a former military facility located north of town, adjacent to the ferry terminal. The dock is cellular sheetpile with backfill and a concrete cap. A steel ramp has been added to the north end for ramp/end loading operations. The dock is equipped with a fuel header and pipeline to the bulk fuel tank farm located nearby.

Figure 6.1.7: Existing heavy cargo dock (Lutak Dock) at Haines.

The dock has evidence of subsidence of the backfill (see Figure 6.1.8.) which is evidence of corrosion or other failure of the steel sheets below and indicates that the entire structure is in need of an above- and below-water condition inspection and subsequent repairs.

Figure 6.1.8: Areas of damage/subsidence at Lutak Dock.

Although repairs to one existing cargo dock are needed, other areas of the dock can be used and Haines has alternative means of accepting fuel and freight via other docking facilities and/or by road. For this reason barge operators agree that Haines is not considered a priority for barge landing improvement needs.

6.1.7 Hoonah

Hoonah is a Tlingit community located on the northeast shore of Chichagof Island, 40 air miles west of Juneau. Summer temperatures average 52 to 63°F; winter temperatures average 26 to 39°F. Temperature extremes have been recorded from -25°F to 87°F. Precipitation averages 100-in annually, with 71-in of snowfall (DCCED, 2009).

In 2008, Hoonah had a population of 823 and in 2000 had a census population of 860. Power service in Hoonah is provided by the Inside Passage Electric Cooperative using diesel. Fuel oil is the primary source of heat used in a majority of households (DCCED, 2009).

Hoonah is accessible by air and sea: the State operates an airport and a seaplane base that are served by scheduled small aircraft from Juneau and a State ferry terminal, small boat harbor, and City dock facilities are also available. Freight arrives by barge or plane (DCCED, 2009).

Regular freight barge service is provided seasonally. The existing dock is too low capacity to run heavy equipment on it. In the past, to unload heavy freight, barges would land on the beach next to the City Dock. Recently, fill has been added in this area, between the City Dock and the ferry terminal. This new fill area includes a new boat haul out facility and a good sized staging area. However, the facilities are not adequate for barges to land. It is now too tight for barges to get in to the landing area without risking damage to the dock or the barge by hitting the rock slope of the new fill area. AML does access the area when calm conditions allow, by coming in along the dock, pushing to stay in place, and putting a ramp down to reach the fill area, as shown in Figure 6.1.9. At a minimum, mooring bollards are needed at the corner of the City dock as a high priority.

Figure 6.1.9: Current freight barge landing situation at Hoonah.

Additionally, smaller landing craft cannot use this area because the ramp is too steep and drops off too suddenly into deep water. Currently they can only access this on a tide of 16-ft or higher.   These landing craft are currently using a boat launch ramp area, but they indicate it is only suitable for the smaller landing craft on the order of 75-ft or smaller.

Hoonah is at the top of AML's and other barge operator's priority list for improvements in the Southeast Alaska region. Ideally, they would like to bring bigger barges into Hoonah and side tie for a pass/pass unloading operation or a better ramp for RO-RO operations. If side loading was feasible, they could make more frequent stops at Hoonah and quicker operations at less cost. Barge operators feel that this would be good for community growth, for instance, they currently service the mine at Hawk Inlet.

To facilitate side loading operations, the fill area should be extended out to meet the face of the City dock, and a mooring/breasting dolphin added to the corner of the dock. The seaward end of the fill area should include a sheetpile/vertical face and fenders to allow the barge to land against it. The boat haul out ramp could be provided on the north side of the new fill area and designed such that barges and landing craft could use it for RO-RO operations. The community is planning a new bulk fuel tank farm nearby the City Dock/ferry dock location and so, when this occurs the improvements recommended above would also apply for fuel barges.
These proposed improvements to the new fuel/freight barge landing area are depicted in Drawing D3 of Appendix D.

In addition, fuel is delivered to Hoonah Oil about five or six times per year using a 236-ft fuel barge. They land at Hoonah Oil dock, which is an old, small, wood pile dock that is aged and "tender" or degraded. When they switch to double hull vessels, the risk of damaging the dock will increase. They recommend installing two mooring/breasting dolphins as well as lighting on this dock for continued safe deliveries. These improvements are for a private facility and hence are not considered as a priority in this Assessment.

6.1.8 Juneau

Located on the mainland of Southeast Alaska, opposite Douglas Island, Juneau was built at the heart of the Inside Passage along the Gastineau Channel. It lies 900 air miles northwest of Seattle and 577 air miles southeast of Anchorage. Juneau has a relatively mild, maritime climate. Average summer temperatures range from 44 to 65°F; winter temperatures range from 25 to 35°F. Annual precipitation is 92-in in downtown Juneau, and 54-in ten miles north at the airport. Snowfall averages 101-in (DCCED, 2009).

Juneau had a 2008 population of 30,427; only slightly less than the 2000 census population of 30,711. Juneau is accessible only by air and sea. Scheduled jet flights and air taxis are available at the Municipally-owned Juneau International Airport, which includes a paved runway and a seaplane landing area. Power service in Juneau is provided Alaska Electric Light & Power Company using hydro, diesel, and natural gas (DCCED, 2009).

Marine facilities in Juneau include a seaplane landing area at Juneau Harbor, two deep draft docks, five small boat harbors and a State ferry terminal. The Alaska Marine Highway System and cargo barges provide year-round services (DCCED, 2009).

Juneau is considered one of the major hubs for cargo coming from Seattle prior to distributing to points north. Juneau is serviced by barge several times per week. Northland, AML, and other companies have private barge landing facilities at Juneau.

Similarly, fuel is delivered several times per month to Juneau. One fuel barge operator indicated that they sometimes deliver fuel with a 245-ft double hull barge to the Taku Oil dock at the south end of the harbor basin, approximately 3 times per month. Although this private facility is not eligible for the funding priorities of this project, it should be noted that the barge operators indicated that the Taku Oil dock is in poor shape and recommend that it be rebuilt and should include two dolphins to allow side tie/landing of the larger barge and a shallow spot approximately 40 to 50-ft south of the fuel headers against the sheet pile, has only 4-ft of water at low tide, and should be dredged.

Because so many private and public facilities are available, Juneau is not considered a priority for funding of barge landing improvements in the scope of this study.

6.1.9 Kake

Kake is located on the northwest coast of Kupreanof Island along Keku Strait, 38 air miles northwest of Petersburg, and 95 air miles southwest of Juneau. Kake receives less precipitation than is typical of Southeast Alaska, averaging 54-in a year, including 44-in of snow. Average summer temperatures range from 44 to 62°F; winter temperatures average 26 to 43°F. Temperature extremes have been recorded from -14 to 88°F (DCCED, 2009).

Kake had a 2008 population of 519, which is decreased from the 2000 census population of 710. Power service in Kake is provided by the Inside Passage Electric Cooperative using diesel. In 2000 fuel oil was the primary source of heat and used more than 80% of households (DCCED, 2009).

Kake can be reached by air and sea. Kake has a lighted paved runway west of town, and a seaplane base at the City dock. State ferry service is also available. There are about 120 miles of logging roads in the Kake area, but no connections to other communities on Kupreanof Island (DCCED, 2009).

Marine facilities include a small boat harbor, boat launch, deep water dock and State ferry terminal (DCCED, 2009). Private cannery docks and a fuel dock are available. These facilities are shown in the photographs in Figures 6.1.10 and 6.1.11.

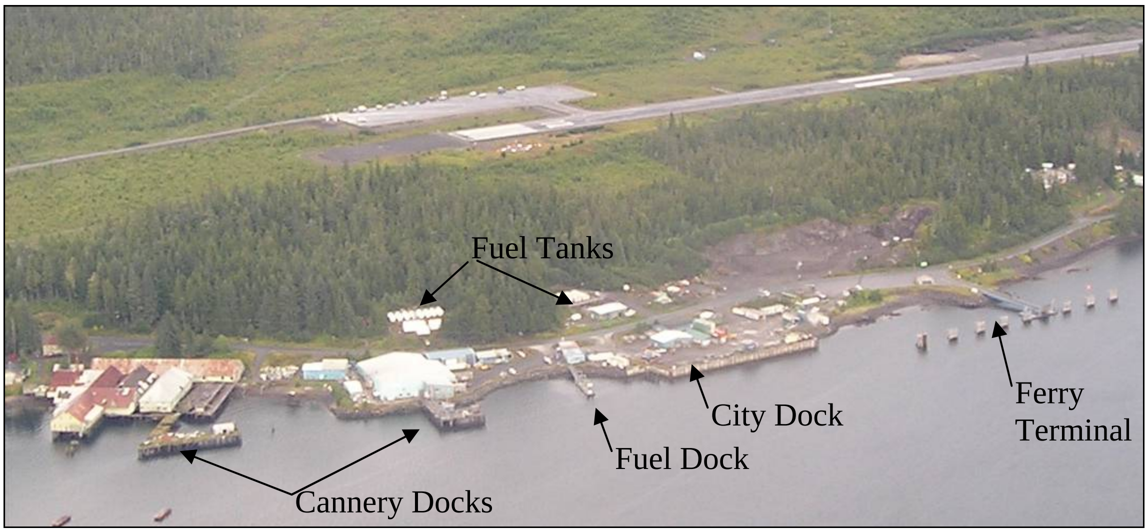

Figure 6.1.10: Marine facilities at Kake.

Figure 6.1.11: Kake's launch ramp landing, at the harbor in Portage Bay.

Cargo is delivered to Kake approximately once per week; however the volume delivered is relatively small. They make stops this frequently only because Kake is less than an hour diversion en route to Sitka. Freight barges moor at the City Dock and offload by a pass/pass operation with their own forklift. The City Dock is a sheetpile bulkhead with steel fender piles on the face. In addition, landing crafts deliver freight at the concrete boat launch ramp, located near the boat harbor (shown in Figure 6.1.11). Barges also land on a point of land further north from the community and the boat harbor, at the north end of Portage Bay. There is a staging area at this landing site.

Fuel is delivered to the tribal corporation and the power plant in Kake by a 230-ft barge, about two times per month. Both entities can be serviced from the same City Dock facility. This sheetpile bulkhead dock is in decent condition, except some piles have been pulled or displaced and need to be replaced.

Fuel barge operators find that tide is an issue when taking a loaded barge to this dock. Fender pile replacement and new mooring points are recommended for this facility. The 230-ft barge is relatively light and not as much of a problem, but when they change to a double hull barge happens, they feel that this will become important.

The recommended improvements to the City Dock are shown on the conceptual site plan in Drawing D4 in Appendix D.

6.1.10 Pelican

Pelican is located on the northwest coast of Chichagof Island on Lisianski Inlet. It lies 80 miles north of Sitka and 70 miles west of Juneau. Summer temperatures range from 51 to 62v; winter temperatures range 21 to 39°F. Temperature extremes have been recorded from -3 to 84°F. Annual precipitation is 127-in, including 120-in of snow. Access to the community is often limited during winter when fog, wind and high seas are common (DCCED, 2009).

Pelican had a 2008 population of 113, which is decreased from the 2000 census population of 163. Power service in Pelican is provided by the Pelican Utility Company using hydropower and diesel. Fuel oil is the primary source of heat used in almost all households (DCCED, 2009).

Most of the community is built along the waterfront on pilings. Pelican is dependent on float planes and the State Ferry for travel. Daily scheduled air taxi services are available from Juneau and Sitka. Facilities include a State-owned seaplane base, a small boat harbor, dock, and State ferry terminal. In addition, there are docking facilities associated with fish packing plants. The ferry provides two monthly departures during summer and one monthly departure during winter (DCCED, 2009).

Most freight is delivered to Pelican on the State ferry or by landing craft. The large freight barges don’t come into Pelican anymore. There is no good facility for larger barges to offload freight, except for a tie up location near the former fish cold storage facility. This location is difficult because the building is 10ft from the dock face, which leaves little room to unload goods; so, they pull a container up to the dock and unload small amounts at a time. Freight operators agree that there isn’t much demand for larger freight barges to come in, unless the cold storage began operation again.

Most freight that doesn't come in on the ferry, such as hazardous materials/fuel, and construction materials is delivered by landing crafts. Small ramp barges can stern load at the ferry dock, but the AMHS disapproves of this use of their dock. Landing crafts generally use the beach landings located next to the ferry dock. Additionally, landing craft can unload materials at Whiskey Flats, which is a large flat gravel beach that is only accessible at low tide. Occasionally, a small beach landing on the north side of town is used.

Up to 10,000 gallons of fuel (diesel, gas, and jet fuel) is delivered to Pelican once per month with a 230-ft fuel barge. The fuel barge lands at the main fuel dock and the fish plant dock. Both docks are older wood pile docks that are in fair to poor condition. In addition, tidal current can be problem when landing at these docks, especially when minus tides are encountered. There is concern that with larger barges and tidal currents, these older docks will not safely support the mooring loads. The fuel barge operator recommends installing 2 mooring/breasting dolphins at the dock. The proposed improvements at the fuel barge landing site are depicted in Drawing D5 in Appendix D.

6.1.11 Sitka

Sitka is located on the west coast of Baranof Island fronting the Pacific Ocean, on Sitka Sound. It is 95 air miles southwest of Juneau, and 185 miles northwest of Ketchikan. January temperatures range from 23 to 35°F; summers vary from 48 to 61°F. Average annual precipitation is 96-in, including 39-in of snowfall (DCCED, 2009).

Sitka had a 2009 population of 8,627 which is lower than the 2000 population of 8,835. Power is provided by Sitka Electric Department using hydro-power with diesel backup. About 73% of households heat using fuel oil followed by 22% that heat with electricity (DCCED, 2009).

The airport is located on Japonski Island, which is connected to downtown by bridge. The City & Borough of Sitka operates five small boat harbors and a seaplane base on Sitka Sound, at Baranof Warm Spring Bay. There is a breakwater at Thompson Harbor, but no deep draft dock. A boat launch and haul out/tidal grid are available. Cruise ships anchor in the Harbor and lighter visitors to shore. The AMHS (state ferry) has a docking facility and serves Sitka twice a week from Juneau. Freight arrives by barge and cargo plane (DCCED, 2009).

In addition to the public docking facilities, several freight companies have barge landing facilities in Sitka, including Northland, AML, and Samson. Smaller freight operators can use these facilities or the ferry terminal. For this reason, freight barge operators do not think that improvements are needed at Sitka.

Fuel barge operators also say that the existing facilities at Sitka are sufficient to meet their needs. One fuel barge operator who delivers fuel twice per month to two of Petro-Marine's fuel facilities in Sitka suggested that dredging is needed at the south side of their north dock.

Because so many private and public facilities are available, Sitka is not considered a priority for funding of barge landing improvements in the scope of this assessment.

6.1.12 Skagway

Skagway is located 90 miles northeast of Juneau at the northernmost end of Lynn Canal, at the head of Taiya Inlet. It lies 108 road miles south of Whitehorse, just west of the Canadian border at British Columbia. Average summer temperatures range from 45 to 67°F; winter temperatures average 18 to 37°F. Within the shadow of the mountains, Skagway receives less rain than is typical of Southeast Alaska, averaging 26-in of precipitation per year, and 39-in of snow (DCCED, 2009).

Skagway had a 2008 population of 846, which is lower than the 2000 census population of 862. Power service in Skagway is provided by the Alaska Power Company using diesel and hydro. In 2000 fuel oil was the primary source of heat used in 78.2% of households (DCCED, 2009).

Skagway is accessed by air, road, water, and rail. The Klondike Highway and Alaska Highway provide connection through Canada to the lower 48 states or to Interior Alaska. The State owns a runway and a seaplane base at the boat harbor, with scheduled air taxis. Skagway receives regular State ferry and barge services. A breakwater, ferry terminal, cruise ship dock, small boat harbor, boat launch, and boat haul-out are available. The White Pass and Yukon Route Company owns two deep draft docks for cargo. Freight arrives by barge, ferry and truck (DCCED, 2009).

Freight is regularly delivered to Skagway by barge at least once per week. AML has a pass/pass dock at Skagway that is sufficient for their needs. The only complaint with the facility is the location with respect to the cruise ship dock, located behind their facility, as depicted in Figure 6.1.12. When they are moored to their dock and a cruise ship comes in behind them, there is not enough room for them to get out and they can get trapped for up to a day until the cruise ship departs. However, a reasonable solution for this may be to coordinate freight schedules with the cruise ships' schedules, if possible.

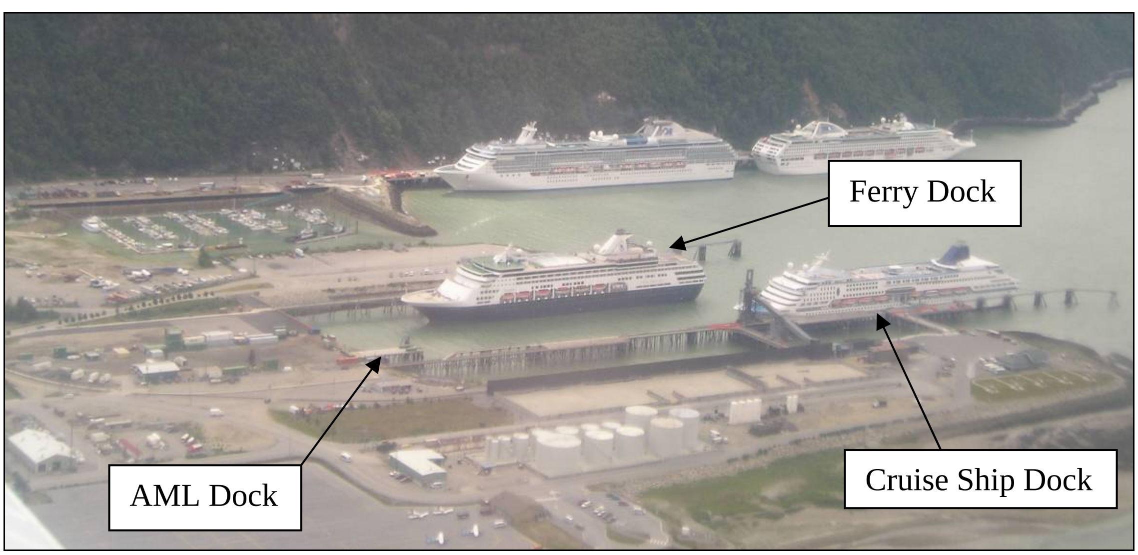

Figure 6.1.12: Skagway marine facilities.

Small barges/landing craft are occasionally chartered to deliver cargo or construction materials to Skagway. These operators use the launch ramp in the harbor to offload their cargo, which is shown in Figure 6.1.13.

Fuel barges up to 230-ft long tie up to Petro Marine Service's dock about four to six times per year to deliver up to 350,000 gallons of diesel and jet fuel. This private dock is a wood pile supported dock that is reported to be in good to fair condition. The dock is exposed to Taiya Inlet to the south and landings are made difficult to impossible during strong southerly winds.

Barge operators generally expressed that the landing facilities at Skagway were sufficient for their needs and no recommendations were made for improving the existing facilities.

Figure 6.1.13: Launch ramp at Skagway small boat harbor.

6.1.13 Tenakee Springs

Tenakee Springs is located on the east side of Chichagof Island, on the north shore of Tenakee Inlet. It lies 45 miles southwest of Juneau, and 50 miles northeast of Sitka. Summer temperatures range from 45 to 65°F; winters 24 to 39°F. The highest recorded temperature is 84°F, and the lowest recorded temperature is 3°F. Total precipitation averages 69-in a year, with 62-in of snow (DCCED, 2009).

Tenakee Springs had a 2008 population of 99; the census history shows the population staying close to 100 since 1990. Power service is provided by the City of Tenakee Springs using diesel fuel. In 2000, kerosene was the primary heat source in 73% of households (DCCED, 2009).

Tenakee Springs is dependent on seaplanes and the AMHS for transport. The City owns a seaplane base and heliport, and scheduled or chartered float planes are available from Juneau. The State Ferry provides only passenger transportation, since there are no local roads in Tenakee and the ferry dock is not suitable for highway vehicle loads. Barges deliver fuel and goods six times a year. The marine facilities include a small boat harbor and ferry terminal. Snyder's Mercantile operates a fuel dock. There is a 3-mile-long main street, used primarily by bicycle or ATV (DCCED, 2009).

Some small freight is delivered by the State ferry, which goes into Tenakee Springs a couple times per week. Many residents have private landing craft and can haul their own supplies. Others may charter landing craft operators to deliver freight, which usually land on the beach in front of their houses. Landing craft operators reported that the beach is rocky and has a lot of blue clay, which makes offloading heavy cargo difficult. A dedicated landing site with a firm gravel or concrete surface would be preferred.

Seasonal freight barge services are currently provided by AML who makes 5 to 6 deliveries each year. They tie up to the AMHS ferry dock, but this dock is not rated for vehicle or forklift loads so no RO-RO operation can be done here and hence heavier freight cannot be offloaded at this dock. Everything has to be on small loads suitable for 4-wheeler (ATV) to carry. However, it would be more efficient to deliver freight in containers that could be staged in the upland area.

There is a fuel header at the corner of the ferry dock to facilitate fuel offloading, and this is sufficient for fuel deliveries.

In addition the community does have problems with waste disposal. There is no landfill in the community. Some waste is burned on the beach; but metals and other materials have been disposed by dumping offshore. The community reportedly wants to recycle and ship out their waste by barge. However, there is no landing facility or staging area near the beach to put containers of waste for pickup.

Freight barge operators agree that some improvements should be made at Tenakee to provide a public barge landing to facilitate heavy cargo deliveries and removal of solid waste. One possibility would be to upgrade the existing ferry dock to increase its capacity to allow highway legal loads. Another option is to construct a new gravel fill area with a small ramp. This ideally would be located near the small boat harbor; because residents would not approve of such a facility in front of their houses. A small staging area should be provided nearby the ramp to allow staging of containers for heavy cargo deliveries and for collecting, staging, and barging out recyclable material and wastes.

The location of the marine facilities at described above is shown in the photograph in Figure 6.1.14.

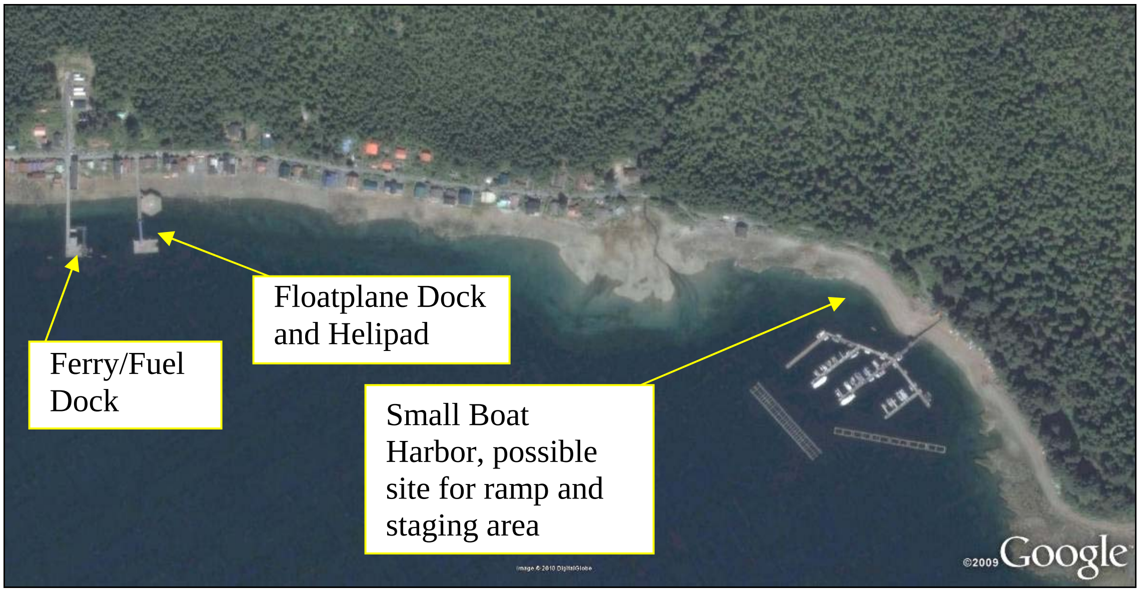

Figure 6.1.14: Tenakee Springs waterfront facilities.

6.1.14 Yakutat

Yakutat is isolated among the lowlands along the Gulf of Alaska, 225 miles northwest of Juneau and 220 miles southeast of Cordova. It is located at Monti Bay, at the mouth of Yakutat Bay, one of the few refuges for vessels along this stretch of coast. Yakutat has a maritime climate characterized by relatively mild, often rainy weather. Summer temperatures range from 42 to 60°F; winter temperatures, 17 to 39°F. Yakutat receives some of the heaviest precipitation in the state, averaging 132-in, including 219-in of snowfall (DCCED, 2009).

Yakutat had a 2008 population of 590 which has decreased since the 2000 census population of 808. Power service in Yakutat is provided by Yakutat Power using diesel. In 2000 fuel oil was the primary source of heat used in 91.3% of households (DCCED, 2009).

There are daily scheduled jet flights, air taxis and float plane services to Yakutat. The State owns two runways at the airport, located 3 miles southeast of town. A seaplane base is available 1 mile northwest of town. The Borough operates the State-owned boat harbor and the Ocean Cape Dock. Monti Bay is the only sheltered deep water port in the Gulf of Alaska. The State Ferry also provides service, which is restricted to summers only due to severe seas in the Gulf of Alaska during winter (DCCED, 2009).

Barges deliver goods monthly during the winter, and more frequently in summer. In the past, freight has been primarily delivered by who stages its operations from the City dock, which is an L-shaped sheetpile dock. The City charges a wharfage fee to use the dock; however, barge operators complain that they have done repairs on the dock at their own expense and it seems little maintenance on the facility is performed by the City. However, there is a new wharf that is being built near the fuel dock location. Barge operators plan to move their freight operations to the new facility. The dock facilities are depicted in the photograph shown in Figure 6.1.15.

Fuel barges moor at the fuel dock, located near the new wharf facility. Several fuel barge operators land at this facility, and indicate that it is reported to be in good condition. However, one fuel barge operator recommended to remove an old pile that remains from an old dock at that location and said that fuel piping should be routed to the face of the new wharf face (at the centerline of the vessel landing, rather than at the corner of the dock). This new facility is thought to be sufficient for most barge landing needs and so, no other improvements were recommended.

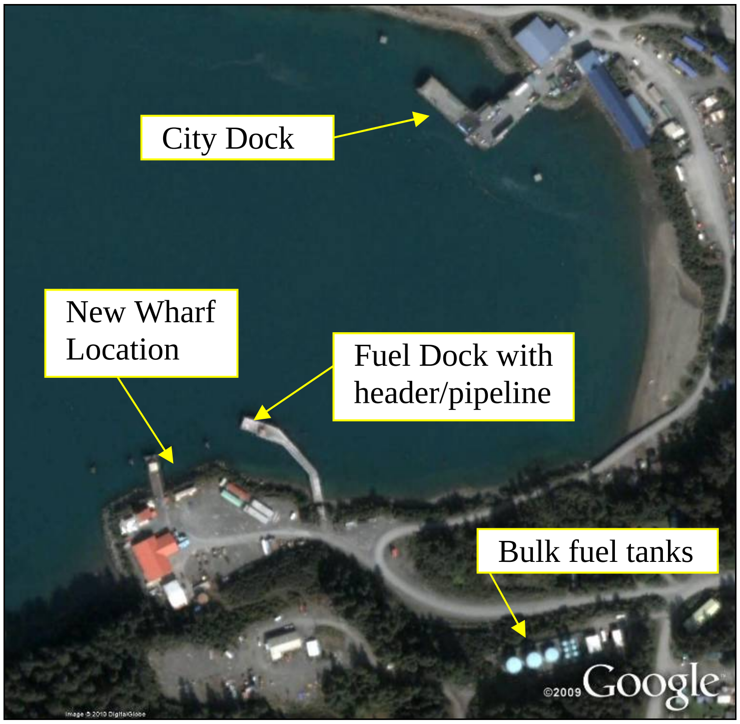

Figure 6.1.15: Yakutat dock facilities.

6.2 Southern Southeast Alaska Region

The Southern Southeast Alaska Region, for the purposes of this study, includes the coastal Alaska communities in Southeast Alaska from Kupreanof and Petersburg and south to Metlakatla. Similar to Northern Southeast Alaska Region, this southern half of the Alaska Panhandle is located between the mountains of the Coast Range and the Canadian province of British Columbia to the east and the open water of the Pacific Ocean. It includes the islands of the Alexander Archipelago; most notably in this lower region are Prince of Wales Island and Revillagigedo Island. This coastal region is dominated by a cool maritime climate, abundant marine life, and temperate rain forest. The majority of Southeast Alaska is part of the Tongass National Forest.

The waterways in this region are generally navigable year round and communities within the Inside Passage are well protected. The Southern Southeast Alaska region, for the purposes of this Assessment includes 21 coastal communities, located in the southern portion of what is commonly referred to as Southeast Alaska, from the community of Petersburg and Kupreanof in the north, and south to Metlakata on Revillagigedo Island and Hydaburg on Prince of Wales Island. Figure 6.2.1 depicts the communities included in the Southern Southeast Alaska Region.

The estimated population of the communities in the Southern Southeast Alaska Region is 17,889 residents, about 60 percent of whom are concentrated in the two largest communities—Ketchikan and Petersburg.

The communities in the Southern Southeast Alaska region have no road connections to the Lower 48, with the exception of Hyder which is connected to the Canadian highway system. Most of the Prince of Wales Island communities have roads connecting them together on the island. Aircraft and boats are the major means of transport and many people rely on barge service, the Alaska Marine Highway System, or personal boats for transporting fuel, freight, and other cargo. The coastal waters in this region are ice-free year round and barge deliveries are generally made on a regular basis, year-round.

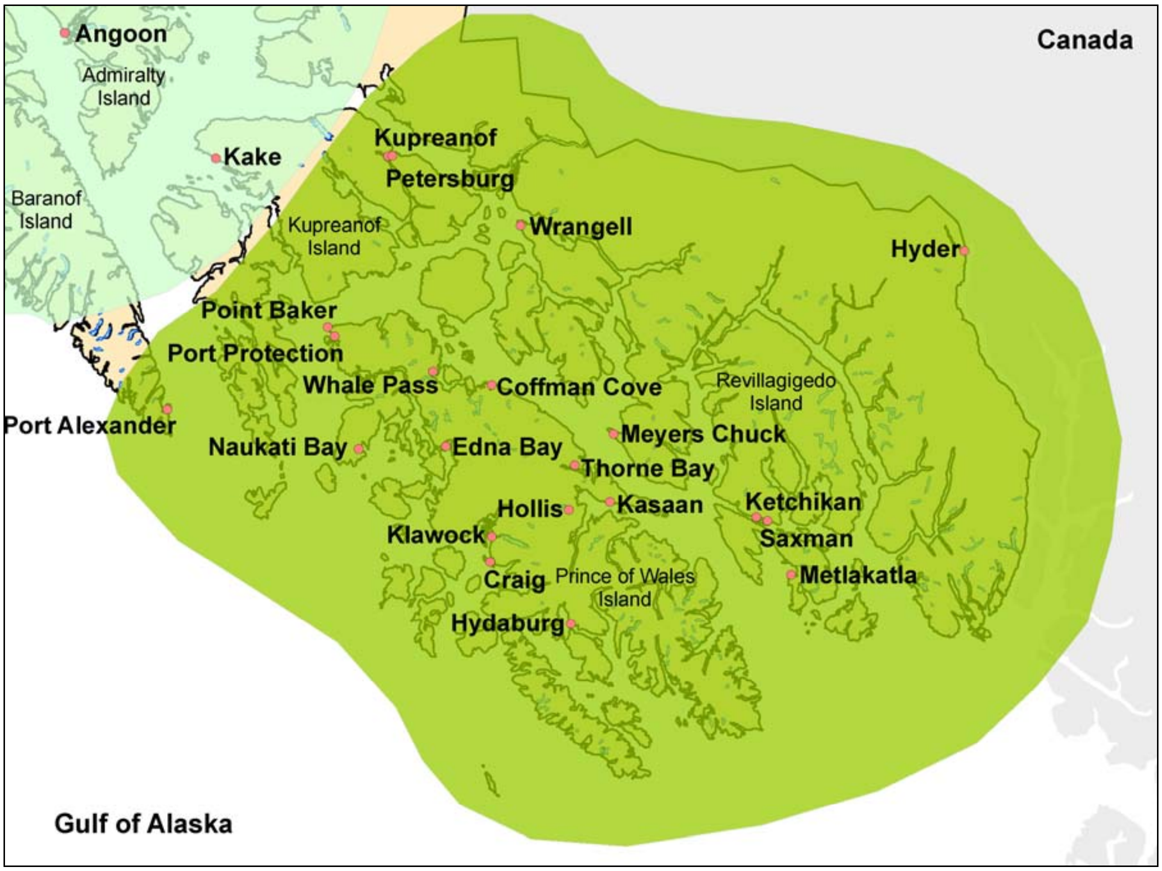

Figure 6.2.1: Southern Southeast Alaska Region

6.2.1 Coffman Cove

Coffman Cove is on the northeast coast of Prince of Wales Island in Southeast Alaska. It lies 73 miles northwest of Ketchikan and 42 miles southwest of Wrangell. Summer temperatures range from 46 to 70 °F. Winter temperatures range from 32 to 42 °F (DCCED, 2009).

Coffman Cove had a 2008 population of 141 this is down from the 2000 census population of 199. Power service in Coffman Cove is provided by Alaska Power Company and generated using diesel. In 2000 fuel oil was the primary source of heat and used in 73.9% of households (DCCED, 2009).

The ferry dock landing at Hollis provides access to the Prince of Wales Island road system. A State-owned seaplane base is available, and *Taquan* and *Ketchikan Air* provide daily scheduled air service from Ketchikan. The nearest landing strip is in Klawock. A boat launch and dock are available. Freight arrives by cargo plane, barge, ship and by road from Craig. The City is interested in constructing a marine commercial/industrial complex (DCCED, 2009).

A new ferry dock has been constructed in Coffman Cove recently. This facility is shown in Figure 6.2.2. The Inter-Island Ferry Authority (IFA) has since stopped ferry service to this community. Most freight is delivered to the ferry dock by barges, which are offloaded to the dock using ramps. A beach ramp also exists for offloading landing craft. Most freight and construction barge operators who were interviewed did not have any recommendations for barge landing improvements at this community.

Fuel barge operators also did not comment regarding needs at this community. Petro Marine Services (Petro Maine) has a bulk fuel facility in Craig and trucks fuel from there to the other Prince of Wales Island communities, including Coffman Cove.

Figure 6.2.2: Coffman Cove ferry terminal.

6.2.2 Craig

Craig is located on a small island off the west coast of Prince of Wales Island, and is connected to it by a short causeway. Prince of Wales Island is dominated by a cool, moist, maritime climate. Summer temperatures range from 49 to 63 °F. Winter temperatures range from 32 to 42 °F. Average annual precipitation is 120-in, and average annual snowfall is 40-in. Gale winds are common in the fall and winter months (DCCED, 2009).

Craig had a population of 1,117 in 2008 which has decreased since the 2000 census population of 1,397. Power service is provided by Alaska Power Company using diesel and hydro electric power. In 2000 fuel oil was the primary source of heat and used in 70.4% of households (DCCED, 2009).

Scheduled air transportation to Ketchikan is available from the nearby Klawock airport. A State-owned seaplane base at Klawock Inlet and a U.S. Coast Guard heliport are maintained in Craig. There are two small boat harbors, at North Cove and South Cove, a small transient float and dock in the downtown area, and a boat launch ramp at North Cove (DCCED, 2009).

Freight arrives to Craig by cargo plane, barge, and by the ferry in Hollis. The State ferry serves Hollis, located 30 miles away by road and enables transportation of passengers, cargo and vehicles to the Island. The relatively new J.T. Brown Marine Industrial Center is located on False Island, on the north side of Crab Bay and includes a boat launch ramp and a dock with a bulk fuel tank storage facility, as shown in Figure 6.2.3.

Freight is delivered by barge to Craig weekly. Some freight arrives by ferry to Hollis and then trucked across Prince of Wales Island. And other freight is brought to Thorne Bay by road and trucked to Craig. At Craig, three are several private docks as well as the new dock and one large landing ramp exists at the industrial center for barges to land. The ramp is most often used by the freight barge operators who were interviewed. It consists of a shot rock beach ramp and although it is tide dependant, local freight barge operators find that this is sufficient for their operations and given the volume of goods delivered.

Fuel deliveries are made by barge at least every three weeks at the fuel dock facility. Petro Marine has a bulk fuel facility at the industrial center and trucks fuel from here to the other Prince of Wales Island communities. Fuel barge operators confirm that it is a newer facility that is in excellent condition.

Figure 6.2.3: Marine Industrial Center at Craig.

6.2.3 Edna Bay

Edna Bay is located on the southeast coast of Kosciusko Island, northwest of Prince of Wales Island, in Southeast Alaska. It lies 90 miles northwest of Ketchikan. The area is dominated by a cool maritime climate. Average temperatures in the summer range from 46 to 70°F; winter temperatures range from 32 to 42°F (DCCED, 2009).

Edna Bay had an estimated 2008 population of 40, which decreased since the 2000 Census population of 49. There is no power service and residents rely on individual generators. In 2000, wood was the primary source of heat and used in 56% of households and kerosene is used for heating most other homes (DCCED, 2009).

Transportation and cargo are provided by float plane or boat from Craig, Ketchikan or Petersburg. Edna Bay is not connected to the Island's road system. A dock and harbor with breakwater are available at the community (DCCED, 2009).

Freight is brought to Edna Bay by barge, but freight barge operators indicate that for the most part, the residents have access to personal watercraft and take care of themselves. Sometimes barges/landing craft are charted for heavy cargo (i.e., construction related) and use an existing beach ramp for offloading. The ramp landing location is too shallow, and if improvements were made, it was suggested that an improved bulkhead be constructed in an area where deeper water access would be possible.

None of the fuel barge operators who were interviewed deliver fuel to Edna Bay. It is thought that because there is no central power plant in the community; it is unlikely that bulk fuel deliveries are made. Some communities charter landing craft, where only small bulk fuel volumes are delivered. Residents may bring in or charter for individual fuel deliveries in smaller quantities.

6.2.4 Hollis

Hollis is located on the east side of Prince of Wales Island, on Twelvemile Arm, 19 miles east of Craig by road, and 35 miles west of Ketchikan by water. Prince of Wales Island is dominated by a cool, moist, maritime climate. Average summer temperatures range from 49 to 63°F; winter temperatures vary from 29 to 39°F. Average annual precipitation is 145-in (DCCED, 2009).

Hollis has a slightly increasing population—it was at 172 in 2008, up from the 2000 census population of 139. Power service is provided by the Alaska Power Company using diesel. In 2000, fuel oil was the primary source of heat and used in 49.1% of households (DCCED, 2009).

Hollis is the location of the State Ferry landing that serves most Prince of Wales Island communities. The ferry landing facility is shown in Figure 6.2.4. A State-owned seaplane base, as well as a harbor, dock and boat ramp are also available on Clark Bay. An airstrip is located at nearby Klawock. The Island has a system of logging roads which provide access to surrounding communities (DCCED, 2009).

Barge operators indicated that because Hollis has a ferry dock with homeport daily service, most freight to this community and other Prince of Wales Island communities is transported on the ferry from Ketchikan. Generally, people will haul their own cargo on vehicles on the ferry. For heavy freight, a landing craft may be chartered. These barges use an existing two-level gravel fill bulkhead on which barges can lower their ramps and offload freight.

Figure 6.2.4: State Ferry landing facility at Hollis.

None of the fuel barge operators who were interviewed said that they service Hollis. Fuel is trucked into Hollis from Craig, which serves as the hub port for fuel deliveries to Prince of Wales Island communities.

6.2.5 Hydaburg

Hydaburg is located on the southwest coast of Prince of Wales Island, 45 air miles northwest of Ketchikan. It lies 36 road miles west of Hollis, which provides access to the State Ferry landing. Prince of Wales Island is dominated by a cool, moist, maritime climate. Summer temperatures range from 49 to 63°F; winter temperatures range from 32 to 42°F. Average annual precipitation is 120-in, including 40-in of snow (DCCED, 2009).

Hydaburg had a 2008 population of 341; this is decreased slightly from the 2000 census population of 382. Power service in Hydaburg is provided by the Alaska Power Company using diesel. In 2000, fuel oil was the primary source of heat and used in 70.9% of households (DCCED, 2009).

The State owns and operates a seaplane base in Hydaburg. The City owns a dock and small boat harbor; they want to construct a breakwater and boat launch. A road leads to Craig, Klawock and Hollis. Weekly barges from Seattle deliver goods, and cargo also arrives on the ferry to Hollis and is trucked to Hydaburg (DCCED, 2009).

Barge operators indicated that because Hydaburg is on the road system from Hollis/Klawock, most small freight is brought in on the ferry and transported by road to Hydaburg. Barges are used to deliver larger quantities of freight for the store and other heavy freight. Barges often land at a beach ramp located about 3 or 4 miles from Hydaburg, at the Native Corporation log dump site, shown in Figure 6.2.5. Bulk fuel is not currently delivered by barge directly to the community. Instead, fuel is delivered to Craig and then trucked to Hydaburg.

Figure 6.2.5: Aerial view of Hydaburg.

6.2.6 Hyder

Hyder is nestled at the head of Portland Canal, a 96 mile-long fjord which forms a portion of the U.S./Canada border. Hyder is 75 air miles from Ketchikan. It is the only community in southern southeast Alaska accessible by road; the only road into Hyder runs through Stewart, British Columbia, just two miles across the Canadian border. Summer temperatures range from 41 to 57°F; winters range from 25 to 43°F. Temperature extremes have been measured from -18 to 89°F. Rainfall averages 78-in annually, with annual mean snowfall of 162-in (DCCED, 2009).

Hyder had a 2008 estimated population of 72; this is decreased from the 2000 population of 97. At present, Hyder's economy is based primarily on tourism. Four of the five largest employers are tourist-related, and visitor services are shared with Stewart. Mining activity and exploration are increasing on the Canadian side of the border because of the current high price of minerals (DCCED, 2009).

Power service in Hyder is provided by B.C. Hydro (Canadian) using hydroelectric. In 2000 wood was the primary source of heat and used in more than 60% of households, followed by fuel oil and bottled LP gas (DCCED, 2009).

Marine facilities in Hyder include a seaplane base and a long access road and wood pile supported trestle that provides access to an artificial gravel island and small boat harbor area, and a collapsed large vessel float located in deeper water. The harbor requires dredging every two years. The State of Alaska is scheduled to replace the access trestle in 2010-2011. This work will also include expanding the existing fill area at the seaward end of the trestle, known as Harbor Island.

One freight barge operator, who regularly services Hyder to deliver fuel, cargo, and construction materials, indicated that this is one of his priority locations in Southeast Alaska for improving barge access. Currently, there is no access to Hyder by water because of the long tide flats in front of the community. The nearby community of Stewart, B.C. has a dock where barges can moor, but this is reportedly in poor condition and the area has filled in such that large vessels can no longer access the dock. Small ramp barges and shallower draft tugs also go to the Canada side and unload cargo on the beach there. Both delivery methods require trucking the cargo into Hyder by road. This means going through U.S. Customs, which adds greatly to the expense.

At one time a ferry terminal was located in the community, and smaller cargo previously was delivered by ferry; but, there is no longer ferry service to Hyder.

Similarly, freight brought into Hyder by road, has to come through Canada. Besides the fees and time constraints of this delivery method, some materials such as hazardous materials, solid waste, some food item, and other items are not restricted. The most serious of this is the environmental issues associated with solid waste collection and disposal. Because used oil and solid waste is not accepted in Canada, and the community does not have a designated landfill, the residents presumably burn or remove their own waste on their own property. However, tourists and some residents place their solid waste on a pile on private property, which is building up and causing problems and there is concern for potential impact to nearby fish streams. Hyder would like to barge their waste out to Ketchikan, similar to other remote Southeast Alaska communities.

The freight barge operator recommended that once the trestle bridge to the island is re-built, and fill added to the island, a barge terminal with a dock and ramp should be installed. This should include mooring dolphins. He recommended speaking to the Hyder Board of Trade who has done a lot of planning and fundraising for this project.

According to the Hyder Board of Trade, serving as a local not-for-profit economic development entity for the community, the marine terminal project at Hyder is their highest priority project. They have begun planning, developed partnerships, resources, and commitments to long term operation and maintenance of the marine terminal. Their justification for the project include (1) reducing the cost, time, and restrictions associated with bringing freight through Canada; (2) relieving environmental concern associated with the current solid waste disposal problem, by allowing barge transport of solid waste; (3) promoting vessel access to support community development projects such as construction of a proposed power hydroelectric plan, mining and gravel extraction, tourism, and fisheries.

It was recommended that the existing gravel island be expanded and a transfer bridge and four mooring/breasting dolphins be installed in the deep water area, where the collapsed large vessel float now exists. At a minimum, a rock fill causeway to deeper water with a small transfer platform dock (i.e., pass-pass dock) would provide minimal barge access at the deep water location, in a manner that would allow the community to expand the facility in the future. The cost of this work could be reduced if it were timed such that the equipment used to construct trestle replacement project could be utilized for this project. The proposed improvements are depicted in Drawing D6 in Appendix D.

6.2.7 Kasaan

Kasaan is situated on the east side of Prince of Wales Island on Kasaan Bay, 30 miles northwest of Ketchikan. Prince of Wales Island is dominated by a cool, moist, maritime climate. Average summer temperatures range from 49 to 63°F; winter temperatures average from 32 to 42°F. Average annual precipitation is 120-in, including 40-in of snow (DCCED, 2009).

Kasaan had a 2008 population of 54; this is up from the 2000 population of 39. Power service in Kasaan is provided by the Alaska Power Company using diesel. In 2000, kerosene was the primary source of heat and used in 75% of households (DCCED, 2009).

Kasaan can be accessed by automobile, float plane and boat. A State-owned seaplane base accommodates charter flights and air freight services from Ketchikan. There is a dock at the old cannery site and a small boat harbor. Freight is brought in by cargo plane or barge. The community has requested funds to develop a breakwater, deep sea port and industrial park at Tolstoi Bay. Kasaan is connected via a gravel road to the Prince of Wales Island road system (DCCED, 2009).

A magnetite mine is planned for Kasaan. Any development of a mine would include construction of a seagoing barge landing facility.

Freight is brought to Kasaan by air, barge, or via the ferry and Prince of Wales Island road system. The road between Kasaan and Thorne Bay is in poor condition however. Occasionally, freight is brought in by barge, and the ramp barges land on the beach.

Bulk fuel deliveries by barge are not usually made. Instead, fuel is hauled to Kasaan by truck via the road system from Craig. In general, barge operators had no recommendations for improvements, except possibly road improvements.

6.2.8 Ketchikan

Ketchikan is located on the southwestern coast of Revillagigedo Island, opposite Gravina Island, near the southern boundary of Alaska. It is 679 miles north of Seattle and 235 miles south of Juneau. It is the first Alaska port of call for northbound cruise ships and State ferries. The area lies in the maritime climate zone noted for its warm winters, cool summers, and heavy precipitation. Summer temperatures range from 51 to 65°F; winter temperatures range from 29 to 39°F. Ketchikan averages 162-in (13.5 ft) of precipitation annually, including 32-in of snowfall (DCCED, 2009).

In 2008, Ketchikan had a population of 7,508, which is slightly decreased from the 2000 census population of 7,922.

The State-owned Ketchikan International Airport offers regularly scheduled jet service. The airport lies on Gravina Island, a 10-minute ferry ride to the waterfront. Ketchikan is a regional transportation hub, with numerous air taxi services to surrounding communities. There are four float plane landing facilities: Tongass Narrows, Peninsula Point, Ketchikan Harbor, and Murphy's. Ketchikan is the first port of call in Alaska for cruise ships and AMHS vessels. Harbor and docking facilities include a breakwater, a deep draft dock, five small boat harbors, a dry dock and ship repair yard, boat launch, and a State ferry terminal (DCCED, 2009).

Ketchikan is considered a freight hub for serving Southeast Alaska; all barges out of Seattle stop in Ketchikan first, transfer to other barges, and go up the coast of Alaska. Several barge operators have their own waterfront docking facilities in Ketchikan. There is a public landing about 3 miles south of Ketchikan at Saxman that has a transfer bridge and a barge basin with rail capability. And, a beach landing ramp is available for landing craft. There is also a beach ramp and transfer bridge facility at a sawmill located on Gravina Island. Ward Cove also has three different beach ramps at the former pulp mill site as well as a 600-ft long concrete steel pile supported dock owned by the Borough.

Fuel is delivered to Ketchikan by barge several times per week to public and private facilities. Depending on lake water levels for hydroelectric power, fuel is sometimes delivered to the Ketchikan Public Utilities dock at Bailey Power Plant. The landing here consists of a wood pile cluster on the north end and steel pile dolphin on the south end. The dolphin at the north end has the header and pipeline and catwalk attached, as shown in Figure 6.2.6. This facility is fairly new and in good condition. However, dredging at the set of wooden piles is recommended because there is only 4 ft of water depth at zero tide in that area. With hazards of low water and high currents, the fuel barge only approaches this site at high slack tide. However, this is not considered a priority because the plant only requires fuel deliveries once or twice a year when water supplies in the Lake are low.

Barge operators generally agree that Ketchikan is a self-sufficient community and has enough existing private and public facilities to accommodate their needs.

Figure 6.2.6: Fuel Line to Barge Berth at Ketchikan.

6.2.9 Klawock

Klawock is located on the west coast of Prince of Wales Island, on Klawock Inlet, across from Klawock Island. It is 7 miles road north of Craig, 24 road miles from Hollis, and 56 air miles west of Ketchikan. Prince of Wales Island is dominated by a cool, moist, maritime climate. Summer temperatures range from 49 to 63°F; winter temperatures range 32 to 42°F. Average annual precipitation is 120-in, including 40-in of snow (DCCED, 2009).

Klawock had a 2008 population of 785; this is down from the 2000 census population of 854. Power service in Klawock is provided by the Alaska Power Company using diesel. In 2000, fuel oil was the primary source of heat and used in 74.8% of households (DCCED, 2009).

Klawock is dependent on air transportation from Ketchikan; however it is connected by the Prince of Wales Island road system to other communities. The only runway on the Island is located here. A seaplane base is operated by the State on the Klawock River. Ferry transportation is available to Hollis, 23 miles away. Klawock has a small boat harbor and boat launch ramp. A deep draft dock is located at Klawock Island, which is primarily used for loading timber. Freight arrives by cargo plane, barge and truck (DCCED, 2009).

There is weekly barge service to Klawock. AML reports that there is a relatively new dock that is available for barge landings. In addition, the community is connected to the Prince of Wales Island road system on the way to Craig. Therefore, there is access to freight deliveries via the ferry system. Landing craft/ramp barges can use either the Native Corporation dock, or a couple of beach ramps that area located near the lumber sawmill. Because several barge landing options currently exist in the community, no barge landing improvements were recommended.

6.2.10 Kupreanof

Kupreanof is located on the northeast shore of Kupreanof Island, across the Wrangell Narrows from Petersburg and Mitkof Island. It lies about 120 miles south of Juneau and 120 miles north of Ketchikan. Kupreanof is located in the maritime climate zone. Summer temperatures range 40 to 56°F, and winter temperatures range 27 to 43°F. Precipitation averages 105-in per year, including 93-in of snow (DCCED, 2009).

Kupreanof had a 2008 population of 27; this is up slightly from the 2000 census population of 23. There is no power service in Kupreanof other than individual generators. In 2000 kerosene was the primary heat source for all households (DCCED, 2009).

Small boats are the primary means of transportation to and from Kupreanof. Boat travel to Petersburg provides connection to that city's transportation services, including jet flights and the State ferry. Float planes can land at Government dock, but it is not a designated seaplane dock. Barges can also land at this dock. There are no harbor facilities. Trails exist throughout the City. Students from this community attend Petersburg public schools (DCCED, 2009).

None of the barge operators who were interviewed indicated that they serviced Kupreanof. It is likely that residents use personal watercraft to retrieve deliveries of fuel and goods made to Petersburg, located one-half mile away. Alternately, landing craft may be chartered to deliver heavy cargo. This appears to be sufficient to serve this very small community with close ties to Petersburg.

6.2.11 Metlakatla

Metlakatla is located at Port Chester on the west coast of Annette Island, 15 miles south of Ketchikan. Metlakatla is in the maritime climate zone with warm winters, cool summers, and an average annual precipitation of 115-in including 61-in of snowfall. An extreme of 200-in annual rainfall has been recorded. Summer temperatures range from 36 to 52°F; winter temperatures range 28 to 42°F (DCCED, 2009).

The population of the community is fairly steady. There were 1,318 residents in Metlakatla in 2008 and the 2000 census population was 1,375. Power service is provided by Metlakatla Power & Light using hydro-electric and diesel. In 2000, fuel oil was the primary source of heat and used in 68% of households (DCCED, 2009).

Metlakatla is accessible by air and water. The Annette Island Airport is owned and operated by the community, with a 7,500-ft asphalt runway and a 5,700-ft gravel crosswind runway. Two seaplane bases are available -- one State-owned, and one community-owned at Port Chester. Scheduled float plane services are available from Ketchikan. Port facilities include a dock with a barge ramp, two small boat harbors, and two marine ways. The State ferry serves Metlakatla from Ketchikan only between the spring and fall. Freight arrives by barge. A 15 mile road links the community to the northern end of Annette Island and to Ketchikan with a proposed hourly ferry (DCCED, 2009).

There is weekly freight barge service to Metlakatla from Ketchikan. Barges land at the public dock that has a transfer bridge. This was a former chip barge loading facility and is now reported to be in poor condition. However freight can also be delivered at any of three beach ramps in the vicinity. In addition, there is daily ferry service, which many residents use to deliver freight. For this reason, Metlakatla is not considered a priority for barge landing improvements.

Fuel is delivered to public and private entities using the same docking facility, located at the northern point of land at the community, as shown in Figure 6.2.7. This is a steel and wood pile dock that is in decent condition. Fuel barge operators indicated that fuel hose must be floated from the dock about 100-ft to the power plant header and 400-ft to Annett Island Fuel. In addition, there is not enough water depth at the dock during zero and minus tides when they come in with a heavily loaded barge. They recommend providing fuel piping to the dock face, and maintenance dredging.

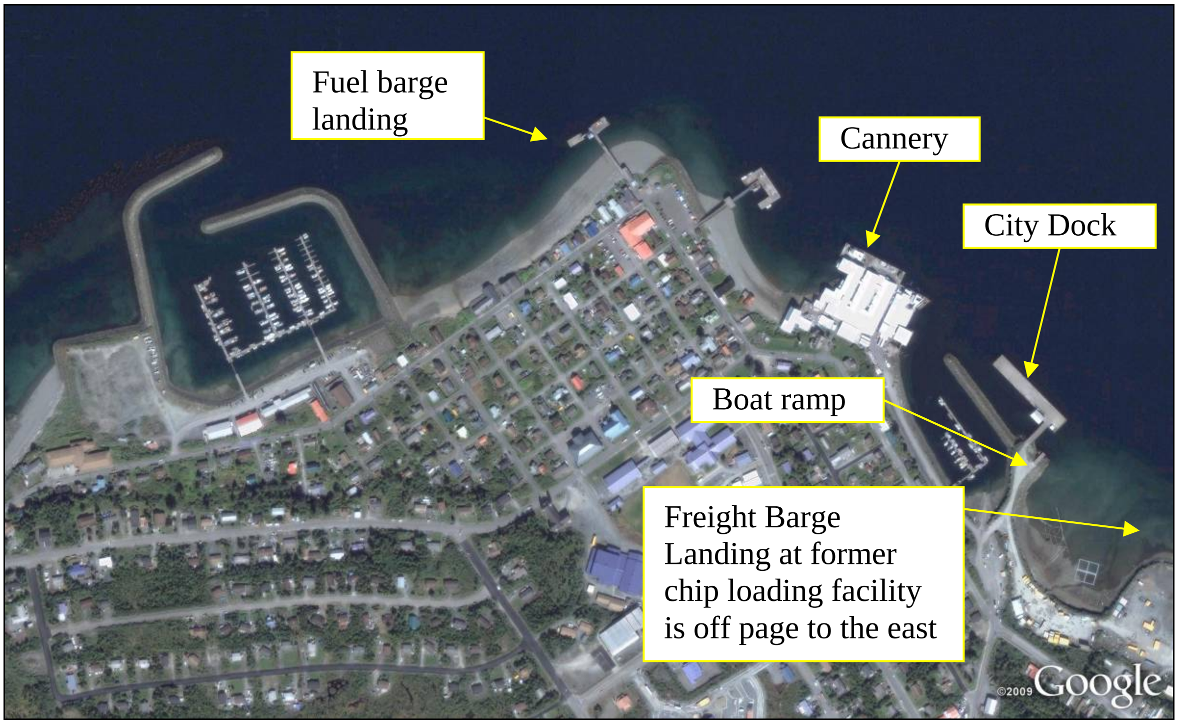

Figure 6.2.7: Waterfront Facilities at Metlakatla.

6.2.12 Meyers Chuck

Meyers Chuck is located along Clarence Strait on the northwest tip of Cleveland Peninsula. It lies 40 miles northwest of Ketchikan. It is in the maritime climate zone with warm winters and cool summers. Summer temperatures range from 49 to 65°F; winters range from 34 to 50°F. Record temperatures have been recorded from -10 to 92. Average annual precipitation is 82-in, including 50-in of snow (DCCED, 2009).

In 2008 there were an estimated 17 people living in Meyers Chuck; this is down from the 2000 census population of 21, and the population has declined with each census since 1980. There is no power service in Meyers Chuck other then individual generators. In 2000 wood was the primary heat source for all households (DCCED, 2009).

Meyers Chuck is accessible only by float plane or boat. A State-owned seaplane base is available. With the exception of the mail plane, there are no scheduled flights. Ketchikan-based charter services and barge transport are available. A boat dock provides 650 feet of moorage, and the site is a natural sheltered harbor. Residents use skiffs for local travel; a few boardwalks and trails connect homes (DCCED, 2009).

Freight barge operators occasionally bring building supplies and other heavy cargo to residents in Meyers Chuck; however they say that the frequency of deliveries has been decreasing over the years, because the population is declining. It thought to be mainly a place where people live for the summer since the school closed about 10 years ago. Barges currently land at on a beach inside the cove. They could use a dedicated ramp at this location to facilitate barge landings but it is not considered a priority. Landing craft can land on the beaches anywhere within the bay.

None of the fuel barge operators who were interviewed make deliveries to Meyers Chuck. It is expected that residents use personal vessels to haul their own fuel in small quantities.

6.2.13 Naukati Bay

Naukati Bay is located on the west coast of Prince of Wales Island in Southeast Alaska. The area is dominated by a cool, maritime climate. Average temperatures in the summer range from 46 to 70°F; winter temperatures range from 32 to 42°F (DCCED, 2009).

Naukati Bay is a former logging community that has experienced a declining population since the logging camp closed. There were an estimated 124 residents in Naukati Bay in 2008, and the 2000 census population was 135. Power is provided by the Alaska Power Company using diesel. In 2000 fuel oil was the main source of heat used fueling 68% of households, wood was used to heat the remaining households (DCCED, 2009).

Naukati Bay is accessed primarily by float plane or off of the North Island Road, connecting the community to the Prince of Wales Island road system. Most residents haul their own freight and fuel by personal vehicles. Occasionally, freight may be delivered by landing craft chartered by a resident for delivering construction materials, and they land at a gravel ramp, located near the small boat moorage float. The ramp is reported to be old and possibly needing repairs, but it is considered sufficient for the volume and frequency of deliveries to this location. In addition, there is an old log crib bulkhead at Naukati Bay. The waterfront facilities at Naukati Bay are shown in Figure 6.2.8.

Figure 6.2.8: Waterfront Facilities at Naukati Bay.

None of the fuel barge operators reported making deliveries to Naukati Bay. There are no bulk fuel tanks in the community. For these reasons, no recommendations for improvements to barge landing facilities were made.

6.2.14 Petersburg

Petersburg is located on the northwest end of Mitkof Island, where the Wrangell Narrows meet Frederick Sound. It lies midway between Juneau and Ketchikan, about 120 miles from either community. Petersburg's climate is characterized by mild winters, cool summers and year-round rainfall. Average summer temperatures range from 40 to 56°F; winters average from 27 to 43°F. Annual precipitation averages 106-in, including 97-in of snow (DCCED, 2009).

Petersburg had a 2008 population of 3,009 and a 2000 census population of 3,224. Power service in Petersburg is provided by Petersburg Municipal Power & Light using hydro-electric with a diesel backup. In 2000 fuel oil was the primary source of heat used in 85.3% of households (DCCED, 2009).

Petersburg is accessed by air and water. It is on the mainline State ferry route. The State-owned airport and seaplane base on the Wrangell Narrows allow for scheduled jet and float plane services. Harbor facilities include three docks, two petroleum wharves, two barge terminals, three boat harbors, a boat launch and boat haul-out. Freight arrives by barge, ferry or cargo plane (DCCED, 2009).

Petersburg is considered a major hub for barges servicing Southeast Alaska. Barges service Petersburg several times a week. AML owns the freight barge terminal, which has a transfer bridge to facilitate offloading, as shown in Figure 6.2.9. AML allows other barges access to the terminal; however.

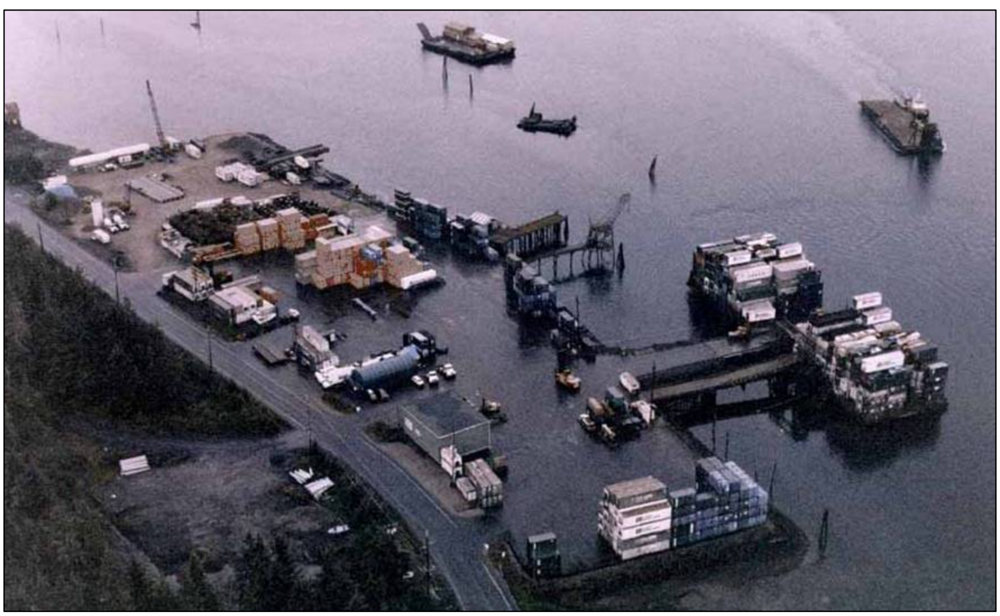

Figure 6.2.9: Barge transfer facility at Petersburg (photo courtesy of AML).

Other operators mentioned that this type of facility would be good for other locations that need a barge landing dock. It consists of a minimally sized pile supported dock (i.e., transfer bridge or pass-pass dock) where barges can berth and unload, connected to a sufficiently sized backlands area to allow for efficient movement and storage of freight. The only issues reported for this facility are associated with draft issues at the dock. A hump of mucky sediment has accumulated about 500-ft from

the dock. Barge operators recommend bathymetry and maintenance dredging. It is unclear whether it is deposited from the nearby creek or tide currents.
There are also beach ramps in the vicinity that are located on the road system to the south.

Fuel is brought to Petersburg by barge several times per week. One fuel barge operator, who delivers fuel to Petro Marine Services dock, indicated that this wood pile dock is in good condition but they suggest installing dolphins at each end of the dock to lessen the chances of dock damages. Because the improvements are associated with private facilities, they are outside the scope of this Assessment for public funding. Dredging for access to the freight barge terminal should be considered.

6.2.15 Point Baker

Located on the northern tip of Prince of Wales Island, Point Baker is 142 miles south of Juneau and 50 miles west of Wrangell. Prince of Wales Island is dominated by a cool, moist, maritime climate. Average summer temperatures range from 49 to 63°F; winter temperatures average from 32 to 42°F. Average annual precipitation is 120-in, including 40-in of snow (DCCED, 2009).

It had an estimated 2008 population of 27; this is down from the 2000 Census population of 35. The population peaked at 90 in 1980 and has been declining since. There is no power service in Point Baker other then individual generators. In 2000 wood was the primary source of heat used in 72% of households (DCCED, 2009).

Point Baker is accessible by float plane, helicopter, barge and skiff. A State-owned seaplane base and heliport serves chartered flights from Ketchikan. The community has a dock and small boat harbor. Barges deliver cargo from Wrangell. There is no direct access to the Prince of Wales road system, airport or ferry (DCCED, 2009).

Barge operators indicated that Point Baker is a small, mostly seasonal community with no demand for barge service. Barges only go in there if they have been chartered. When deliveries are made, they use either the state dock or a private dock to make deliveries. One barge operator indicated that beach landings are not feasible, and a dedicated ramp may be desirable; however, there is not much demand to warrant it.

None of the fuel barge operators who were interviewed reported making deliveries to Point Baker; however the State recently funded replacement of a small fuel tank farm. Fuel is likely delivered to the dock; and the condition of the dock is not known.

6.2.16 Port Alexander

Port Alexander is located on the south end of Baranof Island, 65 miles south of Sitka. It provides a safe harbor during the gales and storms that frequent Chatham Strait. Port Alexander is in the maritime climate zone, marked by cool summers and mild winters. Summer temperatures range from 41 to 55°F; winter temperatures from 32 to 45°F. Record temperatures range from 4 to 80°F. The average total precipitation is 172-in per year, including 85-in of snow (DCCED, 2009).

Port Alexander had a 2008 estimated population of 51; this is down from the 2000 Census population of 81. There is no power service in Port Alexander other then individual generators. In 2000 over 95% of the households were reported to heat with wood (DCCED, 2009).

Transportation is by float plane and boat. Passengers can fly on the essential float plane from Sitka or can charter flights from Sitka, Petersburg, Wrangell and Juneau. Waterfront facilities include a breakwater, dock and small boat harbor. There are no roads; skiffs are used for local transportation. A freight/mail boat delivers supplies and mail year-round. Most families transport their own essential supplies from outside of the community (DCCED, 2009).

Barge operators indicate that they don't service this community because there isn't any demand. The population is thought to consist mainly of summer homes and fisherman. Most residents are self-sufficient and many have their own boats and private docks and floats, in addition to the public waterfront facilities. The school and the store have bulk fuel tanks.

It is unclear which barge company delivers the fuel for these tanks. Because of the low volume, it is likely that deliveries are made by small chartered barge or landing craft. None of the barge operators who were interviewed had any recommendations for improvements at Port Alexander.

6.2.17 Port Protection

Located on the northern tip of Prince of Wales Island, Port Protection is 145 miles south of Juneau and 50 miles west of Wrangell. It lies in the Tongass National Forest. Prince of Wales Island is dominated by a cool, moist, maritime climate. Average summer temperatures range from 49 to 63°F; winter temperatures average from 32 to 42°F. Average annual precipitation is 120-in, including 40-in of snow (DCCED, 2009).

Port Protection had a 2008 estimated population of 66; which has been fairly steady since the 1990 Census population of 62. There is no power service in Port Protection other then individual generators. In 2000 wood was the primary heat source in 65% of households, followed by fuel oil and generator/electricity (DCCED, 2009).

The community is accessible by float plane and boat. A State-owned seaplane base is available. Skiffs are used for local travel, and there is a public boat harbor and launch ramp as well as private floats. Port Protection does not have direct access to the Prince of Wales road system, airport or ferry. Residents travel to Point Baker for mail. Freight arrives by chartered boat or float plane (DCCED, 2009).

There is no regular freight service to Port Protection. Residents tend to haul their own freight by personal boats, or larger freight arrives by chartered boat/landing craft or floatplane. Landing craft can use a boat launch ramp located in the cove, as shown in Figure 6.2.10. In addition, a possible freight barge landing is visible in aerial photographs in Labouchere Bay, which may be accessible to Port Protection by a logging road. Freight barge operators indicated that there is not enough demand in this community to provide regular freight service.

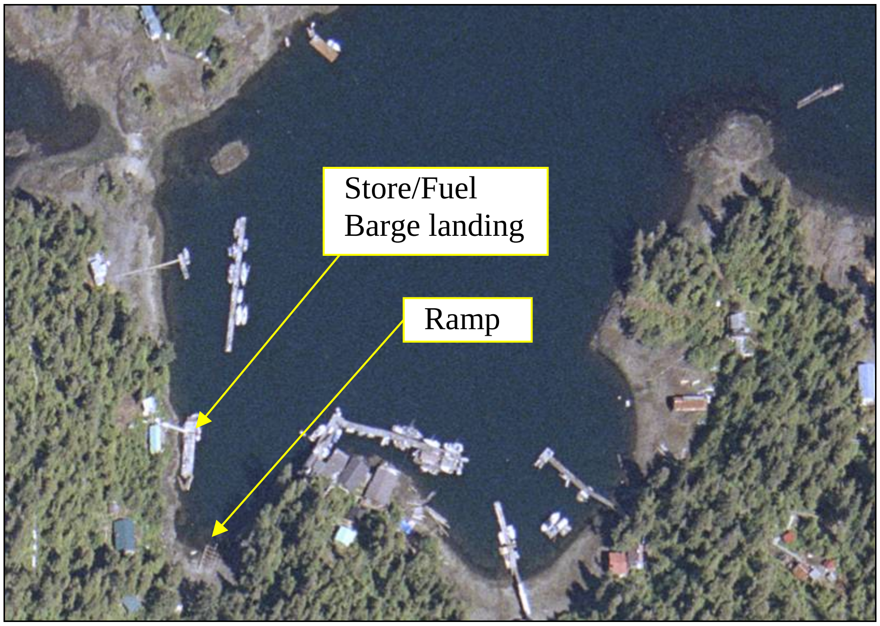

Figure 6.2.10: Waterfront facilities at Port Protection.

About 20,000 gallons of fuel (including diesel, gas, and jet fuel) is delivered once per month to the store, located in the main part of the community, which is situated in Wooden Wheel Cove. The 230-ft fuel barge moors at an old wood pile dock on the south end of the cove that is aged and in poor to very poor condition. Fuel barge operators indicate that the dock is in need of a total overhaul and they currently have to minimize the risk of causing catastrophic failure of the dock by limiting their landing at this site to light wind conditions only. The primary fuel barge operator suggests that two mooring/breasting dolphins be installed to allow the barge to moor against and stay off of the dock. Ideally, a catwalk with a fuel header and pipeline to the tanks should be considered. However, because this facility is a private facility, providing fuel to a private vendor, it is outside the scope of this project.

The barge operators thought that the community may have plans to replace the dock in the near future. If a new dock is planned, they suggest that the design consider alleviating the current problems with limited maneuvering room which may become more of a concern with the new, larger, double hull fuel barges.

6.2.18 Saxman

Saxman is located on the west side of Revillagigedo Island, 2 miles south of Ketchikan on the South Tongass Highway. Saxman lies in the maritime climate zone noted for its warm winters, cool summers, and heavy precipitation. Average summer temperatures range from 46 to 59°F; average winter temperatures range from 29 to 48°F. The record high temperature is 97°F; the record low is -4°F. Precipitation averages 163-in per year, including 69-in of snow (DCCED, 2009).

Saxman had a 2008 population of 420 and a 2000 census population of 431. Power service is provided by the Ketchikan Public Utilities using hydro-electric and diesel. In 2000 the primary source of heat in 71% of households was fuel oil, followed by electricity in 20% of households (DCCED, 2009).

Saxman and Ketchikan are connected by the South Tongass Highway. Scheduled jet and air taxi services are available in Ketchikan. A dock and commercial barge off-loading facilities are available at the Saxman Seaport. The community relies on Ketchikan for its boat moorage and State ferry services (DCCED, 2009).

There is no demand for barge deliveries directly to Saxman residents because of its close proximity by road to Ketchikan. In addition, there are not bulk fuel facilities in the community.

Saxman has a barge landing with a transfer bridge that used to be used as a rail car terminal. And there is a beach landing ramp is available for ramp barges or landing craft. These facilities are shown in the photograph in Figure 6.2.11. Barge operators indicate that there is very little traffic at these facilities, since it stopped being used as a rail car terminal. Once and awhile the transfer bridge is used for large cargo, but most often barges come into the port at Ketchikan instead.

Figure 6.2.11: Barge landing facilities at Saxman.

For these reasons, barge operators did not recommend any barge landing improvements at Saxman.

6.2.19 Thorne Bay

Thorne Bay is 47 air miles northwest of Ketchikan on the east coast of Prince of Wales Island. On the Prince of Wales Island road system, it lies 60 miles from Hollis and 36 miles east of the Klawock Junction. Prince of Wales Island is dominated by a cool, moist, maritime climate. Summer temperatures range from 49 to 63°F; winter temperatures from 32 to 42°F. Average annual precipitation is 120-in, including 40-in of snow (DCCED, 2009).

Thorne Bay's population was 440 in 2008, which is decreased since the 2000 census population of 557. Power service in Thorne Bay is provided by the Alaska Power Company using diesel. In 2000 fuel oil was the primary source of heat used in 45.5% of households and wood was the primary heat source for 47.8% of households (DCCED, 2009).

Thorne Bay is accessed by float plane, the airport at Klawock, and the State Ferry at Hollis. A breakwater, dock, small boat harbor and repair grid, concrete boat launch and State-owned seaplane base are available. Freight arrives by cargo plane, barge, ship and truck. The logging road provides access to other Prince of Wales Island communities (DCCED, 2009).

Additionally, Davidson Landing Harbor includes a pier and float system for boat moorage. Reconstruction of this facility is underway to include replacement of the float system and installation of a new concrete boat launch ramp. The first phase of the float system work is complete. The remaining phases have been permitted, but not yet funded.

There is weekly freight barge service to Thorne Bay. There is a barge terminal, shown in Figure 6.2.12, that includes a fixed loading ramp and a transfer bridge as well as two beach ramps, plus a sufficient backlands area for staging. Most freight to Prince of Wales Island comes through Thorne Bay, and then over the road system to the other Island communities. Boyer Towing owns the terminal, but it is now leased to Northland and used by Northland and AML.

Figure 6.2.12: Barge terminal at Thorne Bay.

A fuel dock and with a pipeline to the bulk fuel tank facility is shown on the 1981 community map of Thorne Bay (DCCED). Barge operators had no recommendations for barge landing improvements at Thorne Bay.

6.2.20 Whale Pass

Whale Pass lies on the northeast coast of Prince of Wales Island. It is north of Coffman Cove on Forest Development Road (FDR) 25, about 64 road miles north of Klawock. The area is dominated by a cool maritime climate. Summer temperatures range from 46 to 70°F; winter temperatures range from 15 to 42°F (DCCED, 2009).

In 2008 Whale Pass had an estimated population of 48; the census history shows that the population has been declining since peaking at 90 in 1980. Power service in Whale Pass is provided by the Alaska Power Company using diesel. In 2000 wood was the primary heat source in 65% of households (DCCED, 2009).

The community has access to the Prince of Wales Island road system. The State Ferry is accessible from Hollis. Float planes and boats are also prevalent means of transportation. There is a seaplane base, dock, boat slips and launch ramp (DCCED, 2009).

The major freight barge companies do not service Whale Pass because of lack of demand. They say that Whale Pass is a former logging camp that has little activity now. There are lodges and a few houses. Because it is on the road system, most freight comes in by road. In addition, the forest service has a log transfer bulkhead that can be used for offloading heavy cargo deliveries.

Fuel is usually brought to the community by truck or, occasionally by small barge or landing craft. Barge operators had no recommendations for barge landing improvements at Whale Pass.

6.2.21 Wrangell

The City and Borough of Wrangell is located on the northwest tip of Wrangell Island, 155 miles south of Juneau and 89 miles northwest of Ketchikan, near the mouth of the Stikine River. Wrangell is in the maritime climatic zone and experiences cool summers, mild winters, and year-round rainfall. Summer temperatures typically range from 42 to 64°F; winter temperatures range from 21 to 44°F. Average annual precipitation is 82-in, including 64-in of snowfall. Fog is common from September through December (DCCED, 2009).

Wrangell had a 2008 population of 2,112 and in 2000 it was 2,308. Power is provided by Wrangell Municipal Light and Power using hydro-electric with five backup diesel generators (DCCED, 2009).

The City is accessible by air and water. The State-owned runway enables jet service. A seaplane base is adjacent to the runway. Scheduled air taxi services are also available. The marine facilities include a breakwater, deep draft dock, State Ferry terminal, two small boat harbors, and boat launch. Freight arrives by barge, ship, ferry and cargo plane (DCCED, 2009).

There is limited maneuvering space available for larger barges when entering Wrangell harbor. The 230-ft barge that is used by the fuel barge operator is assisted by an extra tug to control the barge in the tight space.

Three is weekly freight barge service to Wrangell. Barges land at the City-owned dock, which is currently leased to Northland. The dock is equipped with a floating transfer bridge, as shown in Figure 6.2.13. South of town there is a sawmill with barge access. It has a two level bulkhead that can be used by ramp barges.

Figure 6.2.13: City of Wrangell Freight Barge Landing.

Fuel is delivered more than once a month to private facilities, owned by Wrangell Oil and Delta Western. These two docks are located next to each other and the 230-ft long fuel barge spans both of them to deliver fuel, as shown in Figure 6.2.14. The Wrangell Oil dock is a floating dock with mooring points on both ends. The Delta Western dock is a wooden dock that is reported to be in fair to good condition. However, a 4-ft or higher tide is needed to make a landing with a heavy loaded barge. Dredging was recommended for this landing site. In addition, dolphins were recommended to facilitate landing at the two docks.

Figure 6.2.14: Wrangell Harbor.

Because the fuel deliveries are made to privately-owned facilities these improvements are outside the scope of this Assessment for public funding. No improvements were recommended by barge operators for the public dock facility because the private facilities seem to meet their current needs.

6.3 Alaska Peninsula, Aleutians, and Pribilofs Region

The Alaska Peninsula/Aleutians/Pribilofs Region, for the purposes of this Assessment includes the Alaska Peninsula from the area south of Becharof Lake on Alaska's mainland; the Aleutians Islands which make up the border between the Bering Sea and the Pacific Ocean, and the Pribilof Islands; north of the chain in the Bering Sea.

There are 18 communities located in this region including Ugashik, located on the Alaska Peninsula and all the way out to Attu, at the far west end of the U.S. Aleutian Chain, plus Saint (St.) Paul and St. George in the Pribilof Islands. For the communities in this Region, there is an estimated total combined population of 7,649 which includes 6,579 people in the 18 communities covered by the Phase 2 assessment plus the remainder in the 5 communities covered by Phase 1. Nearly half of the population of the region lives in the City of Unalaska.

Figure 6.3.1 depicts the communities included in this Assessment that are located in the Alaska Peninsula/Aleutians/Pribilofs region.

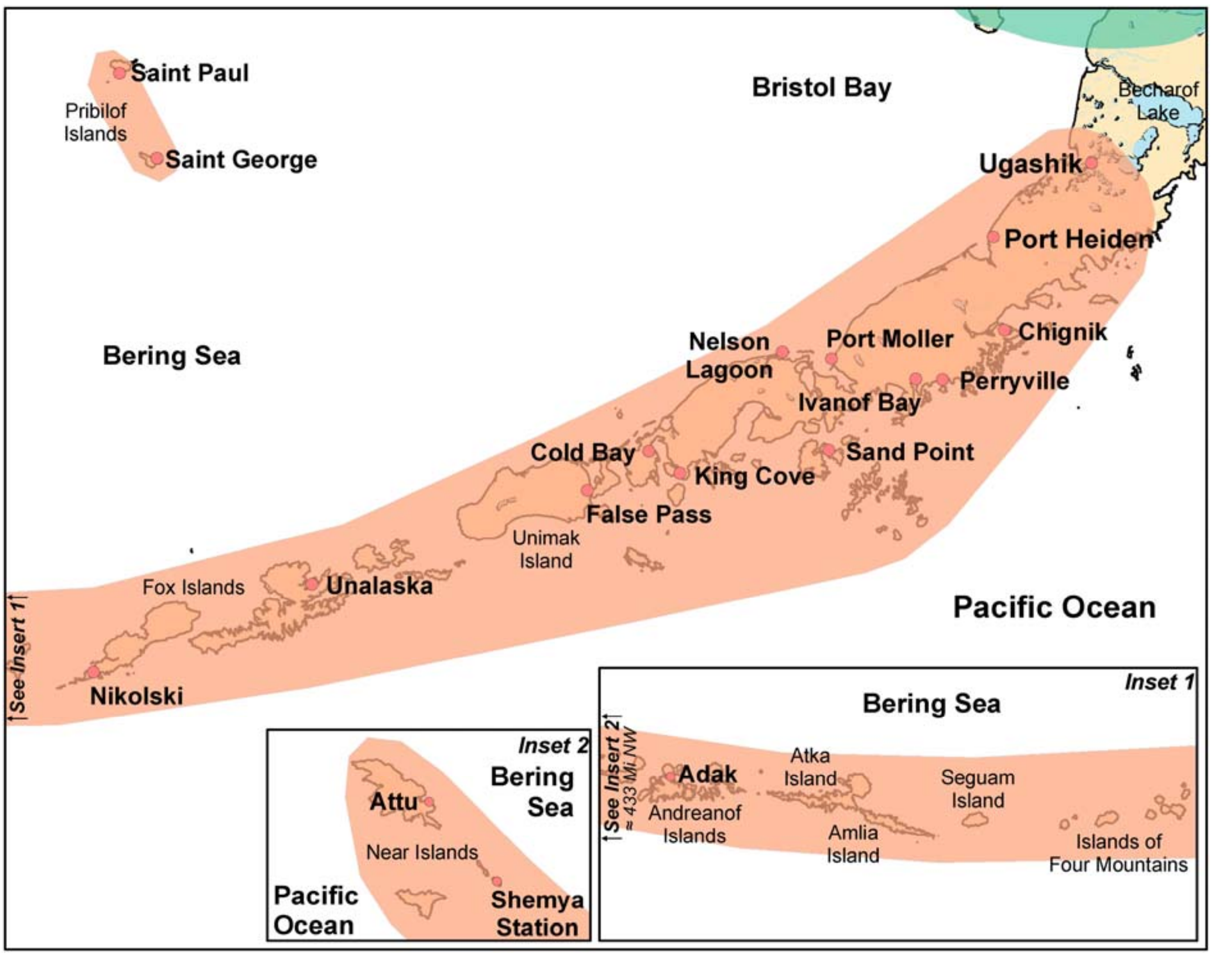

Figure 6.3.1: Alaska Peninsula/Aleutians/Pribilofs Region Map.

Alaska Peninsula is a large peninsula that extends almost 500 miles from the Alaska mainland to the southwest and separates Bristol Bay from the Pacific Ocean. The volcanic Aleutian Range runs along the length of the peninsula, dividing it. The southern side is characterized by mountains and rocky coastlines and the northern side consists primarily of low-lying wetlands. The northern Bristol Bay coastal side is generally shallow, turbid, and is highly influenced by extreme tidal ranges, whereas the Pacific coast is deep, clear, and less affected by tides.

The Aleutians Islands include a chain of more than 300 islands, extending westward from the Alaska Peninsula, towards Russia. The chain of islands includes 57 volcanoes and is a western continuation of the Aleutian Range on the mainland. The coastlines rise up steeply from the waterline and are rocky and exposed to open ocean swells.

The Pribilof Islands are a group of four volcanic islands located in the Bering Sea about 200 miles north of the Aleutian Islands. The islands include two established communities: St. Paul located on St. Paul Island and St. George on St. George Island. These are small (75 square miles total) rocky islands with the deep water and coasts directly exposed to the open ocean and sea ice during winter. Interaction between currents, sea ice, and weather make for often difficult access.

The climate of the Region is oceanic, with moderate temperatures and subject to heavy wind, rain, and fog. During the winter time the Aleutian Islands are the center for the semi permanent low-pressure area called the Aleutian Low. The mean annual temperature for the Region is about 38°F and ranges from 30°F to about 52 °F, with extremes of 78°F and 5°F respectively. The average annual rainfall is about 24 to 65-in on the Peninsula and up to about 80-in in the Aleutians.

6.3.1 Adak

Adak is located on Kuluk Bay on Adak Island. It lies 1,300 miles southwest of Anchorage and 350 miles west of Unalaska/Dutch Harbor, in the Aleutian Island Chain. Adak is the southern-most community in Alaska and is in a maritime climate zone, characterized by persistently overcast skies, high winds, and frequent storms with wind gusts in excess of 100 knots. Extensive fog forms over this area of the Bering Sea during summer. Average temperatures range from 20 to 60 °F, with severe wind chill factors. Total precipitation is 64-in annually, including an average accumulated snowfall of 100-in, primarily occurring in the mountains. (DCCED, 2009).

Adak was developed as a Naval Air Station and at its peak the station housed 6,000 naval personal and their families. In 1997, the station closed and most of the naval facilities have been transferred to the Aleut Corporation. The residential population of Adak has been decreasing recently from 316 in 2000 to 178 in 2008 (DCCED, 2009).

Adak Airport has a control tower and two asphalt paved runways with regular passenger and cargo jet service. There are three deep water docks and fueling facilities. The Aleut Corporation has numerous fuel tanks with a combined capacity of 22 million gallons (DCCED, 2009).

There are several docks in Adak, as shown in Figure 6.3.2. Freight is delivered to either of the two deepwater docks on the north side of the bay. There is a large backlands and staging area in the uplands at this location.

The Fuel Dock is a pre-cast concrete pile supported dock that is equipped with fuel headers. Fuel is delivered to the dock 6 or 7 times per year and the fuel barge operator indicated that by Maritime Transportation Security Act (MTSA) law, a security gate and fencing is required at this facility. Additionally, there is a fender pile that needs to be repaired.

Barge operators generally agree that although there is some deterioration evident on the existing dock at Adak, overall it is in good condition and sufficient to meet their cargo offloading needs. For this reason, this site is not considered a priority for the type of improvements covered by this study.

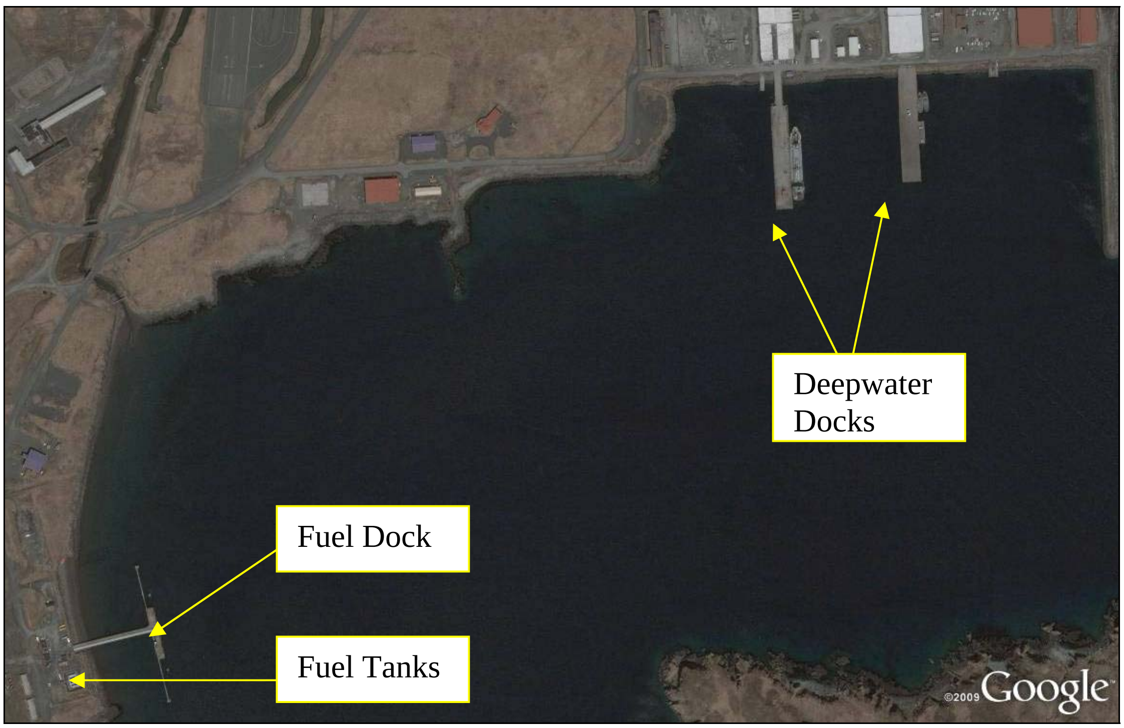

Figure 6.3.2: Existing docks at Adak.

6.3.2 Attu

Attu Island is located in the Near Islands group, on the far western end of the Aleutian Chain. The climate of this area is similar to Adak, with persistent fog and overcast skies, high winds, and frequent wind storms. Average temperatures range from 20 to 60 °F, with severe wind chill factors. Total precipitation is 64-in annually, including an average accumulated snowfall of 100-in, primarily occurring in the mountains (DCCED, 2009).

The island was historically inhabited by the Unangas and later occupied by Japanese forces during World War II. Attu was virtually destroyed in 1943 when the U.S. Army mounted a successful offensive against the Island. Currently, the only community on

Attu Island consists of a U.S. Coast Guard (USCG) LORAN station located on the northeast coast of the island, known as Attu Station (DCCED, 2009).

Attu Station is occupied by approximately 15 to 20 U.S. Coast Guard personnel who live in a group quarters facility; no families are stationed at Attu. All services needed for staff at this facility are available and provided by the USCG.

Fuel barges deliver fuel a few times per year with a 345-ft double hulled barge and with a smaller 180-ft barge. Access into Pyramid cove is rocky in places. There is a landing just south of the former middle dock (now dilapidated/unusable) where the road to the beach landing is visible. The beach is steep to the shore with no rocks in front of this area.

The smaller barge drafts less than 10 ft and can be beached on shore at low tide and they run 400-ft of hose from there to the bulk fuel tanks. Larger barges draw 18-ft or more and cannot beach so an additional 1000-ft of hose must be floated to shore. Access is further complicated due to the remains of old dock pilings in the area, and the barges have to navigate around these. To improve landing conditions, the fuel barge operator recommends installing breasting dolphins with a catwalk and fuel pipelines and headers.

Because the facilities are owned and operated by the USCG the recommended improvements are not within the scope of this project and therefore not scored as a priority for this Assessment.

6.3.3 Chignik

The City of Chignik is located on Anchorage Bay on south shore of the Alaska Peninsula. It lies 260 miles southwest of Kodiak. Chignik has a maritime climate with relatively cool summers and warm, rainy winters. Cloud cover and heavy winds are prevalent during winter. Summer temperatures range from 39 to 60 °F. Winter temperatures average 20 °F. Annual precipitation averages 127-in, with an average snowfall of 58-in (DCCED, 2009).

The population has been decreasing from 188 in 1990 to 79 residents in 2000, and approximately 59 in 2008.

Chignik is only accessible by air and sea. There is a State-owned gravel runway and a seaplane base and regular flights run from King Salmon and Port Heiden. Chignik Fisheries also owns a small gravel airstrip. Seasonal State service is also available. A 600-ft privately-owned (Trident Seafoods) dock and a boat haul-out are available. A breakwater, 110-slip small boat harbor and public dock are reportedly under development. Barge services arrive weekly from late spring through early fall, and monthly during the remainder of the year (DCCED, 2009).

Barges land at either of two docks: An L-shaped dock, owned by Trident Seafoods and the City Dock which is a retired former cannery dock that consists of two docks with space in between. Freight barge operators indicate that the docks at Chignik are sufficient for their purposes. Ramp barges can land at several locations along the beach or at a ramp facility. However, barge operators stressed that the nearby communities of Chignik Lake and Chignik Lagoon are more difficult to access, and there is a strong regional interest in constructing roads between the three communities. These issues were described in detail in the first phase of this Assessment. Freight barge operators did not recommend any specific improvements at Chignik.

Fuel barge operators, on the other hand, did recommend some improvements at the City Dock. Fuel is delivered to the community by more than one supplier. A 345-ft double hull barge delivers fuel to the Trident dock approximately 7 or 8 times per year. The City reportedly gets some of its fuel from Trident. Fuel is also delivered directly to the City Dock. When landing at the City Dock, the barge spans the end of both docks.

Both docks are reported to be in poor condition. Extra caution must be taken when landing at the docks, especially during windy conditions, because of risk of damaging the dock with the larger barges. Fuel barge operators would like to see new fenders installed, fender piles replaced, and mooring cleats and dolphins added at both docks.

Because only the public City dock is within the scope of this Assessment, the proposed improvements at the City Dock are recommended. Four dolphins, one on each side of the two docks new timber fender piling and bollards on the existing dock are depicted in Drawing D7 in Appendix D.

6.3.4 Cold Bay

Cold Bay is located in the Izembek National Wildlife Refuge at the western end of the Alaska Peninsula. The city has a maritime climate, with temperatures ranging from 25 to 60 °F. The average annual rainfall is 36-in, and average annual snowfall is 55-in. Wind speeds of 30 mph are common for Cold Bay (DCCED, 2009).

The 2000 Census population was 88; this is down from the 1990 Census population of 148 and has experienced a steady decline since 1970. Power service in Cold Bay is provided by G&K, Inc. and generated using diesel. In 2000 fuel oil was the primary source of heat and used in 90% of households (DCCED, 2009).

A State-owned paved and lighted runway with crosswind runway, an FAA Flight Service Station, and a seaplane base are available. Cold Bay is a regional transportation center, and provides scheduled flights to surrounding communities. The community has a dock and a launch ramp, as shown in Figure 6.3.3. and 6.3.4 Marine cargo services are available monthly from Seattle. The State Ferry operates bi-monthly from Kodiak between May and October. A hovercraft facility is also available, as shown in Figure 6.3.5. A local priority is to construct a 27-mile road to King Cove, through the Izembek National Wildlife Refuge. There are approximately 40 miles of local gravel roads (DCCED, 2009).

Figure 6.3.3: City dock and concrete ramp at Cold Bay.

Barges deliver freight and fuel to the City Dock, which is considered to be in relatively good condition, although some repairs are needed. In addition, ramp barges may use the concrete ramp located adjacent to the dock. One fuel barge operator, who delivers fuel to Frosty Fuels, indicated that a 24-hour stay is required to offload fuel. This is due to the fact that the fuel pipeline is only 4-inches which limits the offload rate to less than 800 barrels per hour. They recommend increasing the fuel pipeline to a 6-in line from the dock face to the shore tanks.

Figure 6.3.4: Concrete Launch Ramp (Heavy Haul-Out) Facility at Cold Bay.

Figure 6.3.5: Hovercraft Facility at Cold Bay.

6.3.5 False Pass

False Pass is located on the eastern shore of Unimak Island on a strait connecting the Pacific Gulf of Alaska to the Bering Sea. It is 646 air miles southwest of Anchorage. False Pass lies in the maritime climate zone. Temperatures range from 11 to 55°F. Snowfall averages 56-in, with total annual precipitation of 33-in. Prevailing southeast winds are constant and often strong during winter. Fog is common during summer months (DCCED, 2009).

False Pass had a 2008 population of 39; this is down from the 2000 population of 64. Power service in False Pass is provided by the False Pass Electric Association using diesel. In 2000 kerosene was the primary source of heat used in 87.5% of households (DCCED, 2009).

Boats and aircraft provide the only means of transportation into False Pass. A State-owned gravel airstrip and a seaplane base are available. Mail and passenger flights arrive three times weekly. A boat harbor, dock, boat ramp and storage facilities are available. Cargo barges are available from Seattle. The State Ferry operates from Kodiak once per month between May and October (DCCED, 2009).

Fuel and freight are delivered to the two City Dock facilities. One dock is the former Peter Pan cannery dock, which is a timber pile-supported dock that is aged and degraded. This dock is equipped with the fuel pipelines and headers and is shown in Figure 6.3.6. The pipelines run from this dock to two different bulk fuel tank farms.

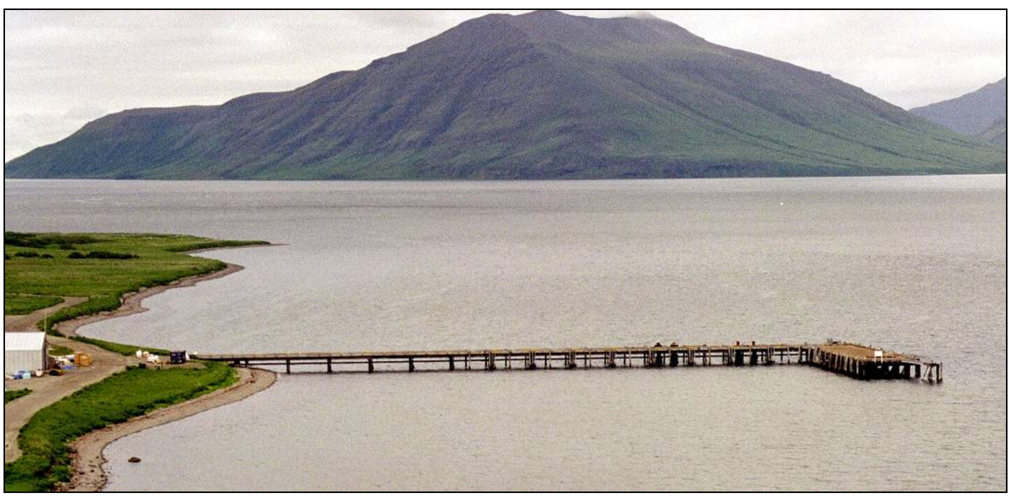

Figure 6.3.6: False Pass Timber Dock.

The other dock is a new sheetpile bulkhead dock facility that was recently constructed between the new harbor and the old timber dock, as shown in Figure 6.3.7. This dock is in excellent condition. Fuel barge operators indicated that with the new double-hull barges, they won't be able to moor at the old dock because the larger vessel may damage the dock and there are no mooring points. They recommend installing a fuel pipeline and headers on the new dock to allow fuel offloading from that facility. Alternately, if continued use of the old dock will be required, it needs mooring and breasting dolphins installed to help the larger vessels stay off the dock and facilitate safe moorage.

Figure 6.3.7: New harbor and City Dock at False Pass.

6.3.6 *Ivanof Bay*

Ivanof Bay is located on the northeast end of the Kupreanof Peninsula, 500 miles southwest of Anchorage and 250 miles southeast of Dillingham. Ivanof Bay has a maritime climate characterized by cool summers, warm winters and rainy weather. Average summer temperatures range from 39 to 60°F; winter temperatures range from 21 to 50°F. Precipitation averages 125-in per year, including 58-in of snow (DCCED, 2009).

Ivanof Bay had a population of 22 in 2000, which is less than the 1990 population of 35. Power service is provided Ivanof Bay Village using diesel. In 2000 kerosene was the primary source of heat in 78% of households (DCCED, 2009).

Bay View, Inc. owns a private 1,500-ft gravel airstrip, and Ivanof Bay is accessible by float plane. Flights from King Salmon average one per week in the winter and two per week in the summer, weather permitting. Bulk cargo goods are barged to Chignik Bay. There is no public dock or harbor, although it is a local priority to develop one. ATVs and skiffs are the primary modes of local transportation (DCCED, 2009).

There used to be a dock at Ivanof Bay, but all that remains now are some old timber pilings that must be avoided when trying to navigate to the beach landing sites. The beach is sand and gravel with small cobbles, but fairly deep access to the beach. This makes for a good beach landing. Barges try to land as close to the east side of the old pilings as possible, in front of the power plant tank farm. Fuel is delivered once per year to three locations: the power plan, the school, and the village corporation. The school tank farm has a pipeline and a marine header on shore. The only recommendation is to consolidate the pipeline/header locations to allow offloading fuel from one point.

6.3.7 *King Cove*

King Cove is located on the south side of the Alaska Peninsula, on a sand spit fronting Deer Passage and Deer Island. It is 18 miles southeast of Cold Bay and 625 miles southwest of Anchorage. King Cove lies in the maritime climate zone. Temperatures average 25 to 55°F, with extremes from -9 to 76°F. Snowfall averages 52-in, and total annual precipitation is 33-in. Fog during summer, and high winds during winter, can limit accessibility (DCCED, 2009).

King Cove had a 2008 population of 750; this is decreased since the 2000 census population of 972. Power service in King Cove is provided by the City of King Cove use hydro electric power with a diesel backup. In 2000 fuel oil was the primary source of heat and used in 84.9% of households (DCCED, 2009).

King Cove is accessible only by air and sea. A State-owned runway is available. Gale force crosswinds are common, as the airport lies in a valley between two volcanic peaks. A local priority is to construct a 27-mile road to Cold Bay, through the Izembek National Wildlife Refuge, to access their airport. The State Ferry operates bi-monthly between May and October. The North Harbor provides moorage for 90 boats, and is ice-free all year. The new Babe Newman Harbor is also available for moorage for 60 to 150-ft fishing vessels. Marine cargo services generally use one of three docks owned by Peter Pan Seafoods or the deepwater dock that is operated by the City (DCCED, 2009).

A City-owned sheetpile wharf and a timber dock are also available in the old harbor area, as shown in Figure 6.3.8. and Figure 6.3.9. These facilities are aged and in fair condition. The sheetpile wharf has loading restrictions for the crane use.

Figure 6.3.8: Sheetpile dock located in the King Cove old harbor area.

Figure 6.3.9: Timber dock located in the King Cove old harbor area.

The other docks available in King Cove are considered to be in good condition, and barge operators indicate that the existing dock facilities are sufficient to meet their needs. No recommendations for improvements were made for these facilities.

6.3.8 Nelson Lagoon

Nelson Lagoon is located on the northern coast of the Alaska Peninsula, on a narrow sand spit that separates the lagoon from the Bering Sea. It is 580 miles southwest of Anchorage. Nelson Lagoon lies in the maritime climate zone. Frequent and dramatic weather changes occur, with a constant prevailing wind of 20 to 25 mph. Temperatures average 25 to 50°F, with a range from -15 to 75°F. Snowfall averages 56-in, with a total annual precipitation of 33-in (DCCED, 2009).

The estimated 2008 population was 65; this is lower than the 2000 census population of 83. Power service in Nelson Lagoon is provided by the Nelson Lagoon Electric Cooperative using diesel. In 2000 kerosene was the primary heat source for all households (DCCED, 2009).

Nelson Lagoon is accessible only by air and sea. A State-owned gravel runway serves regularly-scheduled flights. A dock, boat ramp, a harbormaster's office and warehouse were completed in the mid- to late-1990s. Some freight is delivered to the Peter Pan Seafoods dock, 30 miles away at Port Moller (DCCED, 2009).
The barge landing is a southerly facing beach located about 3 miles from the lagoon entrance and about 1 mile east northeast of the village. The barge bows into the beach near the tank farm, which is about 200 feet away. The landing area is shown in Figure 6.3.10.

Figure 6.3.10: Beach landing site at Nelson Lagoon (©Yutana Barge Lines).

Barge operators did not have any recommendations for improvements to the existing barge landing facilities at Nelson Lagoon. It was reported that the dock is in good condition and has fuel headers on the dock.

6.3.9 Nikolski

Nikolski is located on Nikolski Bay, off the southwest end of Umnak Island, one of the Fox Islands. It lies 116 air miles west of Unalaska, and 900 air miles from Anchorage. Nikolski lies in the maritime climate zone. Temperatures range from 11 to 65°F. Snowfall averages 41-in; total precipitation is 21-in. Strong winds are frequent during the winter and fog is prevalent during the summer, which limits accessibility (DCCED, 2009).

It had a 2008 estimated population of 27; this is down from the 2000 census population of 39. Power service is provided by Umnak Power Company using diesel. In 2000 kerosene was the primary heat source used in all households (DCCED, 2009).

Nikolski has a gravel runway which provides passenger, mail and cargo air service. The airstrip is owned by the U.S. Air Force. Nikolski has no landing or port facilities for ships. Barges deliver cargo once or twice a year. Goods and passengers are lightered three miles to the beach (DCCED, 2009).

The village is exposed to the west, through north to winds and seas. If possible, barges tend to stay in a safe sheltered location until weather permits voyage to Nikolski. Freight barges beach the barge in front of the community only when the tide is high. The beach consists of pebbles and gravel which make for a good landing. However, heavy equipment is required to pull any delivery trucks or bulk cargo up the beach and onto the road.

Fuel is delivered to Nikolski once per year during summer. Rock hazards exist in the entrance, as shown in Figure 6.3.11. Fuel barges cannot beach on shore near the fuel tank farm because there are hazardous rocks near the shoreline. So, barges anchor offshore and float in 400 to 500 feet of hose to the tank farm header, located near the shoreline. They recommend dredging out the shallow rocks and installing about three navigational aids to facilitate beach access to this community.

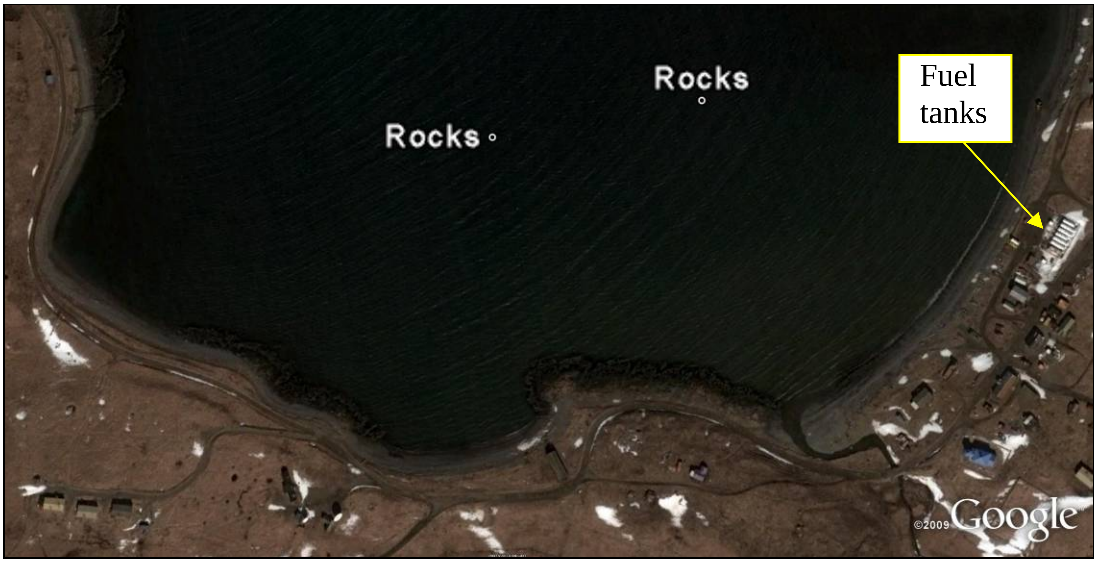

Figure 6.3.11: Barge access and beach landing areas at Nikolski.

6.3.10 Perryville

Perryville is located on the south coast of the Alaska Peninsula, 275 miles southwest of Kodiak and 500 miles southwest of Anchorage. Perryville's maritime climate is characterized by cool summers, warm winters and rainy weather. Average summer temperatures range from 39 to 60; winter temperatures average 21 to 50. Low clouds, rain squalls, fog and snow showers frequently limit visibility. Average annual precipitation is 127-in, including 58-in of snow (DCCED, 2009).

Perryville had an estimated 2008 population of 133; this is up from the 2000 census population of 107. Perryville is accessible by air and sea. There is a State-owned gravel runway and seaplane base (beach landing area) and scheduled and charter flights are available from King Salmon. Cargo barges deliver fuel and supplies each spring (DCCED, 2009).

Power service in Perryville is provided by the Native Village of Perryville using diesel. In 2000 fuel oil was the primary source of heat used in 86.2% of households (DCCED, 2009).

Freight barges deliver cargo about twice per month to an area located at the end of the airport bypass road at the southwest end of town. There is a beach landing site with a dedicated upland staging area. Prior to the barge arriving, residents construct a temporary ramp from the beach sand and installing load distributing mats to facilitate traction in the sand during unloading, as shown in Figure 6.3.12 and 6.3.13.).

Figure 6.3.12.: Cargo Mats at Perryville barge unloading area.

The fuel barge has customers at Perryville that include the School (400 ft of hose) and the power plant (350ft of hose) at one stop, and a second stop at the village fuel tank farm that is located at the end of the staging near the freight barge landing site (A tank farm is located just to the left of the photograph in Figure 6.3.13). The beach along this community is steep and barges currently push against the beach and hold it while offloading. Reportedly, there is less swell at the tank farm/freight landing site.

Figure 6.3.13: Freight barge landing area at Perryville, viewed from the water line.

Barge operators recommend installing upland mooring points (i.e., deadmen) to facilitate landing at these sites. In addition, a consolidated fuel tank farm for all customers with a pipeline and header to the high waterline would also facilitate offloading. However, because the volume of goods delivered is relatively low (40,000 gal) and the frequency of delivery is about twice per year, they consider this site lower priority than other sites in Alaska.

The USACE completed a Technical Report of Barge Landing and Marine Infrastructure for Perryville (November 2009) which evaluated several concepts for providing improved barge landing as well as a protected harbor for moorage for vessels including the costs and benefits for each.

The USACE report finds that because the community is often at risk of running out of heating fuel and barges are often delayed due to common harsh weather conditions, there are opportunities to reduce the costs of goods delivered as well as to improve residents way of life through more reliable and safer access to subsistence and commercial fisheries. The USACE report pointed out that the current practice of constructing the ramps for barges to land, prior to their arrival is generally unsafe, labor intensive, and subject to weather delays or cancellation of the barge delivery. Two alternatives were found to provide cost-effective solutions to address the highest priority needs of the community. One alternative consists of a hardened barge landing and boat launch ramp which would be located at the freight barge landing/tank farm location.

The second alternative consists of a harbor dredged within an existing lagoon with a rubble mound breakwater to separate the harbor from the existing creek. The harbor would contain a dock for offloading barged fuel and freight. Because the harbor alternative does not focus primarily on the needs of the barge operators, this alternative is considered beyond the scope of this Assessment. The barge landing/launch ramp is the option that is considered to provide a more immediate solution to the barge landing conditions with a limited amount of funds expended.

However, this type of comprehensive needs assessment is recommended when determining an overall solution for a particular site.

The upland mooring point improvements which were proposed by barge operators at each of the two landing sites are depicted in Drawing D8 in Appendix D.

6.3.11 Port Heiden

Port Heiden is at the mouth of the Meshik River on the north side of the Alaska Peninsula, about 424 miles southwest of Anchorage. It lies near the Aniakchak National Preserve and Monument. Port Heiden has a maritime climate, with cool summers, relatively warm winters, and rain. Snowfall averages 58-in per year. January temperatures average 25 °F and July temperatures average 50°F (DCCED, 2009).

In 2008 it had a population of 90, which is decreased since the 2000 census population of 119. Power service is Port Heiden is provided by Port Heiden Utilities using diesel. In 2000 kerosene was the primary heat source in 89% of households (DCCED, 2009).

A State-owned lighted gravel runway and crosswind runway can accommodate up to Boeing 737 aircraft, and regular air services are provided. The airstrip serves as a point-of-transfer for flights to the Pacific side of the Peninsula. There is a natural boat harbor, but no dock. A boat haul-out, beach off-loading area, and marine storage facilities are available. Cargo from Seattle is delivered twice yearly by a chartered barge, and is lightered and offloaded on the beach (DCCED, 2009).

Fuel barges use a beach landing site offshore of Port Heiden's bulk fuel tank farm. However, due to the shallows in the nearshore area, beach access is very difficult. These shallows are evident in the photograph shown in Figure 6.3.14. There are also some submerged pilings at a landing site on the northeast end of the community. Barge operators recommended installing navigational aides to identify the shallow areas. Additionally, a fuel pipeline and a marine header would help to expedite fuel offloading.

Figure 6.3.14: Shallows at beach barge landing area in Port Heiden.

However, because this landing site is reported to go dry, to accommodate all-tide access, a long dock would be required to alleviate the requirement for anchoring offshore and floating hose or lightering heavy freight to the beach. Due to the low volume of goods delivered, this was not considered a priority for the barge operators.

6.3.12 Port Moller

Port Moller is located 550 air miles southwest of Anchorage on the north side of the Alaska Peninsula, about 100 miles northeast of Cold Bay. It has a maritime climate, with cool summers, relatively warm winters, and rain. Temperatures are similar to other areas in the region with January temperatures averaging about 25 °F and July temperatures averaging about 50°F.

Historically, Port Moller was established when Eskimos from the Seward Peninsula were relocated to the community in the early 1900s. Later, an Air Force Station Distant Early Warning (DEW) Line site was established at Port Moller, which ceased operations in 1969. Although the station shut down, the airport remains operational. Although Port Moller is not listed in the State's community database, several seasonal, fishing related businesses exist in Port Moller including a fish processing (freezing) plant, State Fish and Game facilities, several private lodges, and private homes. During peak production at the seafood plant, Peter Pan Seafoods reports that there is a crew of 140 people. The facility is self sufficient, providing for all housing, food, electricity, water and other supplies.

Barge operators indicated that they primarily deliver fuel to the existing cannery dock about twice per year. This is a private dock with 200-ft face, owned by Peter Pan Seafoods. There is also a good bottom for anchoring. No recommendations for improvements to the facility were made.

6.3.13 Saint George

Saint (St.) George is located on the northeast shore of St. George Island, the southern-most of five islands in the Pribilofs, and about 47 miles south of St. Paul Island. The climate of St. George is controlled by the cold waters of the Bering Sea. The maritime location results in cool weather year round, and a narrow range of mean temperatures varying from 24 to 52°F. Average precipitation is 23-in, with 57-in of snowfall. Cloudy, foggy weather is common during summer months (DCCED, 2009).

St. George had a 2008 population of 112; the 2000 census population was 152. Power service is provided by the St. George Municipal Electric Utility power plant using diesel. In 2000, fuel oil was the primary source of heat used in 96.1% of households (DCCED, 2009).

St. George is accessible only by air and sea. There are two airstrips, one owned by the City, and a State-owned airport with a gravel runway. Scheduled flights are provided to St. Paul and the mainland. Most freight and supplies are delivered by ship from Anchorage on a monthly or bimonthly schedule; cargo from Seattle arrives five or six times a year. An inner harbor and dock facilities are available at Zapadni Bay, 5 miles by road from the City. There are three docks; two operated by the City and one operated by the village corporation (DCCED, 2009).

Cargo may be delivered to the City dock near the community on the north side of the island in good weather. Alternately, the dock facilities located in the breakwater area at Zapadni Bay can be used. Barge operators indicated that the existing dock facilities at St. George are in good condition. The issue associated with delivering fuel and supplies to the community is the island's exposure to harsh weather and the limited maneuvering room in the inner harbor for the larger barges. The fuel barge that is used to bring fuel to St. George is a 180-ft barge and the operator indicated that they make a 90-degree turn to enter the harbor and this cannot be attempted in adverse weather. Once inside the harbor, the dock access and condition is good and there is a fuel header located at the City Dock. Although not a high priority, they recommend that the only way to improve these conditions would be to widen the harbor entrance by moving the breakwater to the south.

6.3.14 Saint Paul

St. Paul is located on a narrow peninsula on the southern tip of St. Paul Island, the largest of five islands in the Pribilofs. It lies 47 miles north of St. George Island, 300 miles west of the Alaska mainland, and 750 air miles west of Anchorage. The climate of St. Paul is arctic maritime. The Bering Sea location results in cool weather year round and a narrow range of mean temperatures varying from 19 to 51°F. Average precipitation is 25-in, with snowfall of 56-in. Heavy fog is common during summer months (DCCED, 2009).

St. Paul had a 2008 population of 450; slightly lower than the 2000 census population of 532. Power service is provided by the St. Paul Municipal Electric Utility using diesel and wind. In 2000 fuel oil was the primary source of heat used in 86% of households (DCCED, 2009).

St. Paul is accessible by sea and air. The State-owned gravel runway allows for regularly-scheduled flights, under Visual Flight Rule conditions. Most supplies and freight arrive by ship. There is a breakwater, 700 feet of dock space, and a barge off-loading area (DCCED, 2009).

The City docks are used by barges for offloading freight and fuel. These are located on the inside of the west breakwater, as shown in Figure 6.3.15.

Barge operators have said that the docks are in good condition. Fuel is delivered eight or more times per year. The difficulty with accessing St. Paul is associated with harsh weather conditions, and rocks that exist in the shallow areas of the entrance and harbor basin area. One barge operator thought that a storm had washed part of the existing breakwater into the basin resulting in these rock hazards. If the inner harbor area were dredged to about 12 to 15-ft depth, it would allow access by laden barges. In addition, dredging would allow tugs and barges to turn around inside the protected area. This would facilitate more frequent access because it is easier for barges to get into the harbor area than to get out of it with the westerly and southwesterly winds.

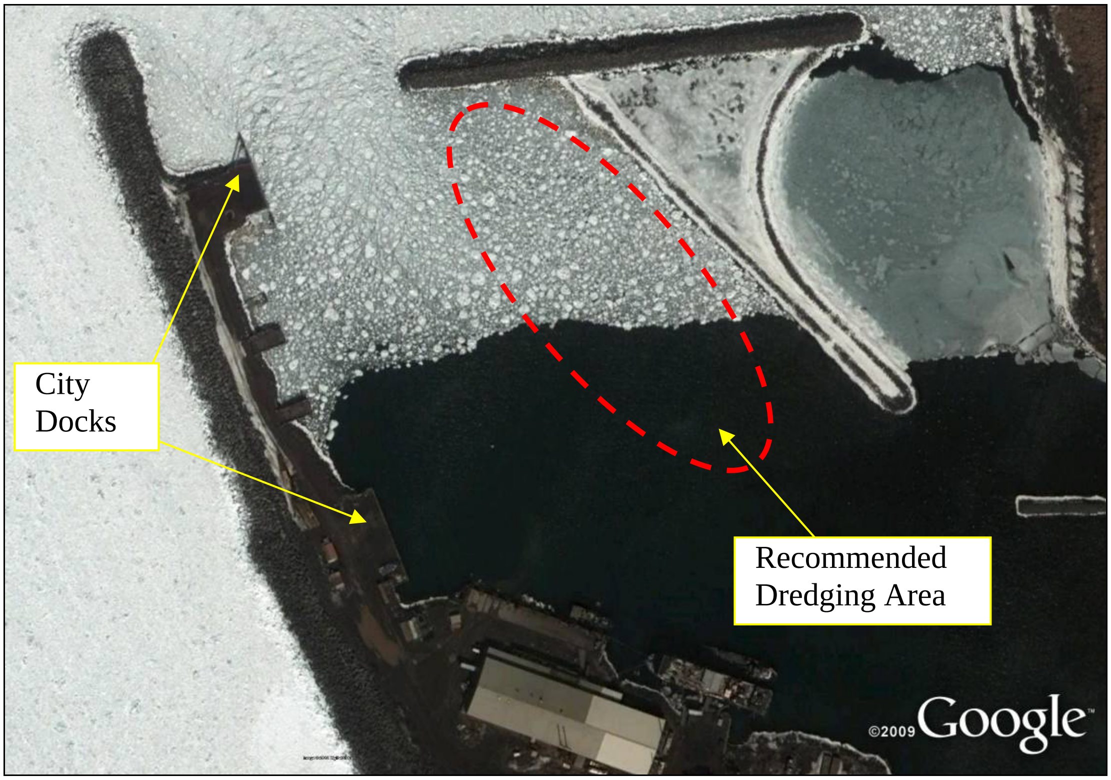

Figure 6.3.15: City Docks at St. Paul.

6.3.15 Sand Point

Sand Point is located on Humboldt Harbor on Popof Island, off the Alaska Peninsula, 570 air miles from Anchorage. It lies in the maritime climate zone with temperatures ranging from -9 to 76 °F. Snowfall averages 52-in, and annual precipitation is 33-in (DCCED, 2009).

There were 958 residents in Sand Point in 2008; similar to the 2000 Census population of 952. The TDX Corporation operates the local power plant, which runs on diesel fuel. Approximately 98% of the households in Sand Point heat with fuel oil (DCCED, 2009).

Sand Point has a State-owned airport with an asphalt runway. Direct flights to Anchorage are available. The state ferry operates bi-monthly between May and October. Marine facilities include a 25-acre small boat harbor with four docks, 134 boat slips, a harbormaster office, barge off-loading area, and a 150-ton lift. A new large vessel harbor and wharf area are also available. Regular barge services supply the community (DCCED, 2009).

There are several docks available for freight barges to use in Sand Point. The primary facilities for barge offloading are the City dock that is located on the outside of the new harbor breakwater and the new sheetpile wharf located in the new harbor basin. These two facilities are shown in Figure 6.3.16 and Figure 6.3.17. In addition there is a floating ramp offload area for ramp barges, located south of the new harbor.

Figure 6.3.16: City Docks at Sand Point's new harbor area.

Fuel is delivered at least 10 times per year to the Trident cannery fuel dock. The bulk fuel tank farms are very close to this dock and there is a pipeline to the dock. Fuel deliveries would be more efficient if the face of the dock were dredged an additional 5-ft so that the larger double hull barge could access this dock. The fuel barge currently passes Sand Point on their way through and come back after the barge is lighter—it would be more efficient if they could access it along their normal route up the Aleutian chain with a heavier load. In addition, Trident's dock is in very poor shape and needs a minimum of two mooring and breasting dolphins and upgraded mooring bollards on the dock. Alternatively, the bulk fuel tanks and/or pipeline could be relocated closer to one of the City's dock facilities.

Figure 6.3.17: New sheetpile bulkhead wharf.

6.3.16 Shemya

Earekson Air Force Station, or Shemya Station, is located on Shemya Island on the western end of the Aleutian Chain, roughly 1500 miles away from Anchorage, Alaska. The island of Attu is just to the northwest, while Agattu is just off to the west and can be seen from Shemya on a clear day. Shemya lies in the maritime climate zone. Average temperatures range from 11 to 65°F. Snowfall averages 41-in; total annual precipitation is 21-in (DCCED, 2009).

The Station was developed during World War II as an Army Air base, and at its peak, the Station housed over 1,100 personnel. Shemya was closed in 1995; and is now a strategic refueling stop for military aircraft as well as link in the United State's long-range DEW radar system. There is currently an estimated population of 27 all of whom are contracted as caretakers and residing on the Station. All services and utilities are provided by the U.S. Air Force. Power is generated using diesel fuel (DCCED, 2009).

Former Earekson Air Force has a 10,000-ft long and 150-ft wide asphalt runway and a seaplane landing facility. It is restricted to military craft or emergency landings. (DCCED, 2009).

The major freight barge operators do not regularly service Shemya; however, they have been there several times for charter work related to construction support, including delivery of armor rock last summer. They indicate that there is an existing dock that can be used. The major problem at this facility is that there is no protection from weather. The barges can wait a long time to get into Shemya. The dock has about 300-ft of dock face and is constructed of concrete and sheet pile with channel supports running vertically and horizontally along the face of the dock. They protrude outwards from the sheet pile such that a when docking, the barge cannot slide along the face of the dock. The channel irons are faced with 4 x 12 wood, some of which are rotten. Chafe gear is required where lines pass over dock, as there are no smooth cap rails. Guardrails are in place along the edge of dock but aren’t strong enough to take the strain of lines passing over them. Large tires are hung along the face as fenders.

One fuel barge operator, who delivers fuel to Shemya twice per year, confirmed that this site is difficult to access primarily due to exposure to weather. In addition, they reported that the existing dock’s fender panels are in poor condition and do not extend down far enough for a laden barge. The operators recommend replacing the fender panels with new ones that are about six feet longer in order to receive laden fuel barges at low tide.

6.3.17 Ugashik

Ugashik is located on the northwest coast of the Alaska Peninsula, 16 miles up the Ugashik River. Ugashik's maritime climate is characterized by cool, humid and windy weather. The average summer temperatures range from 41 to 60°F; winter temperatures average 12 to 37°F. Annual precipitation is 19-in, with snowfall of 38-in (DCCED, 2009).

It had an estimated 2008 population of 15. Every census population since 1910 has been lower than 100 and has declined since 1930. About 100% of the population heats their homes using individual generators powered by fuel oil.

Ugashik is accessible by air and water. There is a gravel airstrip at Ugashik Bay, approximately 12 miles from the village of Ugashik that is owned by the U.S. Bureau of Land Management. There is also a gravel airstrip in the village plus a State-owned gravel runway available. Barged freight is brought in from Naknek to a dedicated barge landing. The village council is seeking funds to rebuild the community dock. ATVs and skiffs are the primary means of local transportation (DCCED, 2009).

The dedicated barge landing area is on village council land and is a beach landing site with a graded gravel road from the beach to the uplands area, and an upland staging area. The landing area on the beach is about one half mile north of the main community. There are also two docks available. One is a cannery dock and the other is a small community dock. The community dock has a road leading to an upland staging area.

Freight barge operators did not comment on any difficulties accessing or offloading cargo at Ugashik. They said that the beach landing site consists of heavy mud with no rocks or other obstructions evident. Fuel barge operators indicated that there are problems associated with the number of fuel stops required at Ugashik for individual private deliveries, and the need to have a loader to use to hold the mooring at each one. They recommend installing two deadmen at each fuel stop. Ideally, the community should have a bulk fuel tank farm with a marine header instead of multiple private deliveries. However, the barge operators are skeptical that this would be feasible because of property issues in this community. For example, they regularly experience issues with property owners who refuse to allow the fuel hose to be brought across their land to a neighbor's tank.

6.3.18 Unalaska

Unalaska overlooks Iliuliuk Bay and Dutch Harbor on Unalaska Island in the Aleutian Chain. It lies 800 air miles from Anchorage. The name Dutch Harbor is often applied to the portion of the City on Amaknak Island, which is connected to Unalaska Island by bridge. Dutch Harbor is actually within the boundaries of the City of Unalaska. January temperatures range from 25 to 35°F; summers range from 43 to 53°F. Average annual precipitation is 57.7-in. The mean wind speed is 17 mph (DCCED, 2009).

Unalaska had a 2008 population of 3,551; this is down from the 2000 census population of 4,283. About 88% of the households in Unalaska heat using fuel oil/kerosene, followed by electricity. Power is generated using diesel at the local Unalaska Electric Utility (DCCED, 2009).

Daily scheduled flights serve the community at the State-owned paved runway. A seaplane base is also available. The State Ferry operates bi-monthly from Kodiak between April and October. There are ten major docks in Unalaska; three are operated by the City. A refurbished World War II sub dock offers ship repair services. The International Port of Dutch Harbor serves fishing vessels and shipping, with 5,200 ft of moorage and 1,232 ft of floating dock. The small boat harbor provides 238 moorage slips. The USACE recently completed a breakwater for a second small boat harbor in South Channel, Iliuliuk Bay, called the "Little South America" (DCCED, 2009).

Barges come into Unalaska several times per month, and the Port has modern facilities to meet their needs. Three are numerous options for docking at Unalaska/Dutch Harbor including public and private facilities. The City's Unalaska Marine Center (UMC), shown in Figure 6.5.18 includes seven dock positions comprised of various dock types (i.e., timber dock, steel pile supported dock, sheetpile bulkhead) and crane services for loading/unloading freight. This facility can accommodate several ocean going class freight vessels at one time and has a significant backlands area on the dock facilities for stacking containers, as shown in Figure 6.5.19. There is also a fuel header at the UMC.

Figure 6.3.18: Seven dock positions at UMC at Unalaska/Dutch Harbor.

Figure 6.3.19: Unalaska Marine Center crane/freight unloading area.

The City also owns and operates the Spit Dock and the Light Cargo Dock, shown in Figure 6.5.20. A condition assessment and 10-year Maintenance Plan for these marine facilities was completed by the City in 2008. It generally shows that the marine facilities at the Port of Dutch Harbor are in fair to satisfactory condition and the City is now proactively budgeting and funding a comprehensive maintenance and upgrade program.

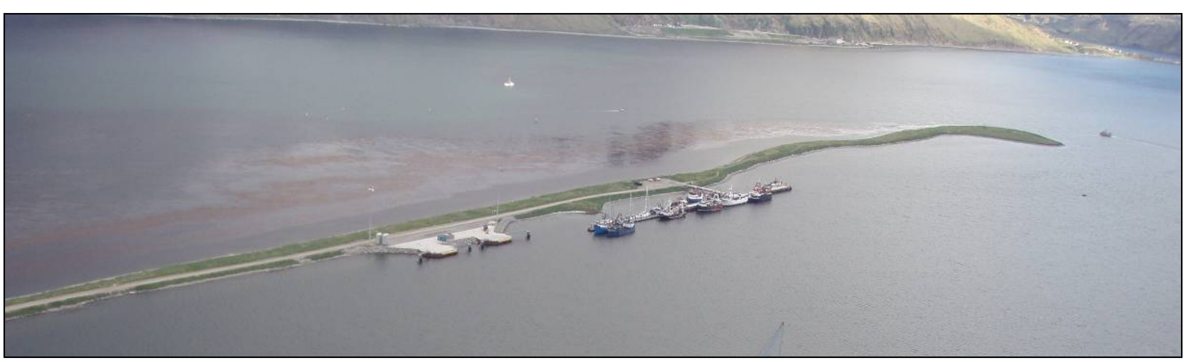

Figure 6.3.20: Light Cargo Dock and Spit Dock at Unalaska/Dutch Harbor.

One fuel barge operator indicated that the private dock facilities in Captain's Bay is in poor condition and has some pilings that are missing, and there are moorings that need to be replaced at Delta Western's dock. However, the City's dock was reported to be in good condition. For this reason, no barge landing improvements were recommended for Unalaska.

6.4 Kodiak Island Region

The Kodiak Island Region, for the purposes of this study, includes the communities located on Kodiak Island and Afognak Island, within Kodiak Island Borough.

The Kodiak Archipelago is warmed by the Japanese current. The climate is dominated by a strong marine influence. There is little or no freezing weather, moderate precipitation, and frequent cloud cover and fog. Severe storms are common from December through February. January temperatures range from 14 to 46°F. July temperatures vary from 39 to 76°F. Average annual rainfall varies by community from 35 to 74-in and snowfall averages 60-in (DCCED, 2009).

These islands are large islands on the south coast of Alaska, east of the Alaska Peninsula. Shelikof Strait separates Kodiak Island from the mainland. Kodiak Island is the largest island in the Kodiak Archipelago, with an area of about 3465 square miles. The largest community on the island is the City of Kodiak (population 5,974), which is one of 10 communities included in this Region. The total population of the Region is about 9,151, of which over 92% live in the City of Kodiak and the surrounding communities of Kodiak Station and Womens Bay which are connected by road to Kodiak.

Kodiak Island is mountainous and heavily forested in the north and east, and with fewer trees in the south. The island has many deep, ice-free bays that provide sheltered anchorages for boats.

All commercial transportation to and from this Region goes through the City of Kodiak either via airline, ferry, or barge. Other communities include Port Lions, Ouzinkie, Akhiok, Old Harbor, Karluk, Larsen Bay, and Womens Bay on Kodiak Island and Afognak on Afognak Island. Kodiak is also home to Kodiak Station, which is the largest U.S. Coast Guard base.

Figure 6.4.1 depicts the communities included in this study located in Kodiak Island Region.

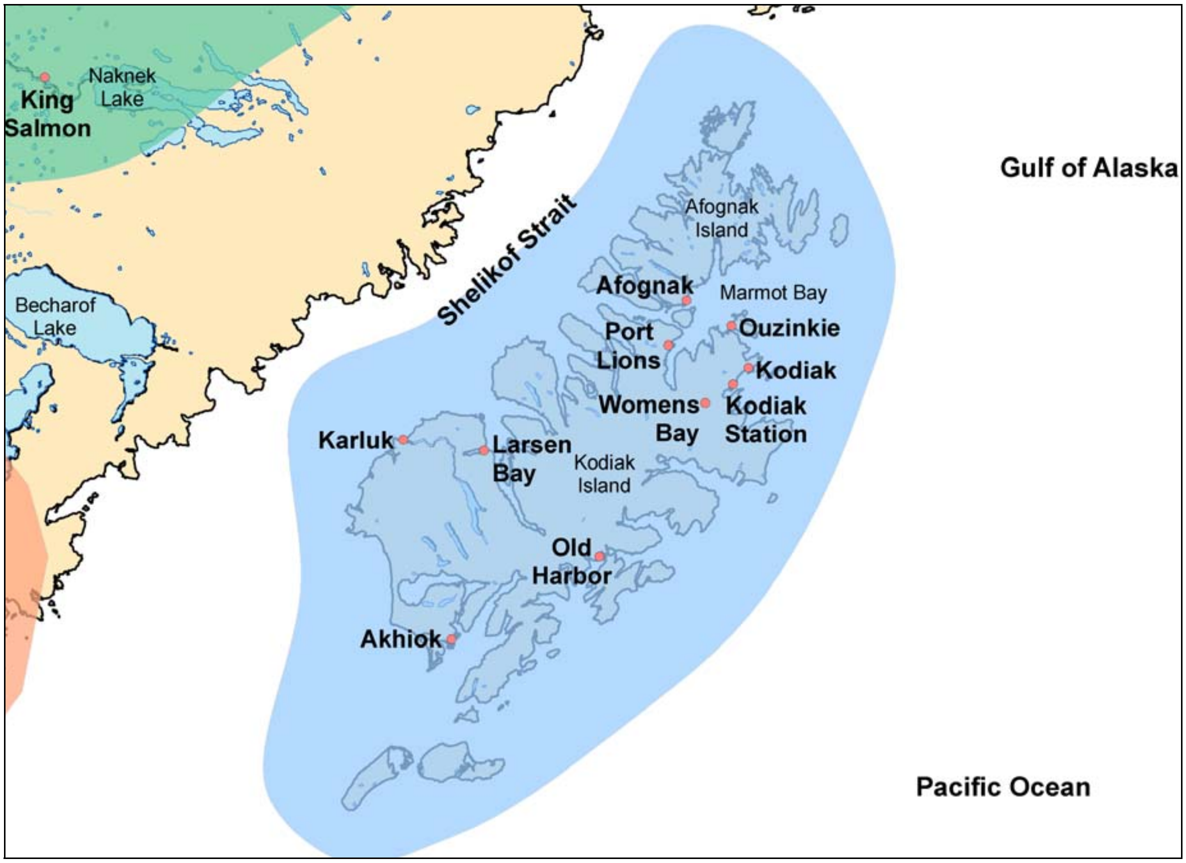

Figure 6.4.1: Kodiak Island Region Map.

6.4.1 Afognak

This traditional Alutiiq (Russian-Aleut) village was located on Afognak Bay, on the southwest coast of Afognak Island, north of Kodiak Island. The Kodiak Archipelago is warmed by the Japanese current. The climate is similar to Southeast Alaska, with less precipitation. January temperatures range from 14 to 46 °F. July temperatures vary from 39 to 76 °F. Average annual rainfall is 74-in (DCCED, 2009).

In 2000 Afognak did not have a defined community and no census data is readily available. Afognak has no public facilities and transportation is provided by float planes from Kodiak. The 1964 earthquake generated a tsunami which destroyed the village. A new community was constructed on the northeast coast of Kodiak Island, called Port Lions, and most of the residents of Afognak moved there permanently in December 1964 (DCCED, 2009).

There is no known regular freight barge service to Afognak; however, fuel barges deliver fuel about 6 times per year to the Native Corporation and the Evergreen Logging camp. The Evergreen Logging dock facility is reported to be in very poor condition and fuel deliveries are restricted to daylight operations only and calm conditions. However, since this dock is a private facility it is outside the scope of this Assessment.

The Native Corporation dock is a steel sheetpile and timber bulkhead that is located in Kazakov Bay, as shown in Figure 6.4.2. Access inside the bay is well protected. But, this facility is in very poor condition and lacks cleats, bollards, and fenders.


Figure 6.4.2: Bulkhead landing at Native Corporation in Afognak.

Currently, the tug hangs its gear and repositions on the stern of the barge and drops anchor on the way into the dock in order to stay off the dock. The barges tosses their mooring lines off the bow of the barge to create a 3 point mooring arrangement and to prevent contact with the dock; which is considered too degraded and tender to moor against it. In addition, the owners install four large loader tires on the face of the dock when the barge arrives. In addition, a barrel portable containment basin is provided for the area where the barge connects into the Owner's fuel hose. The fuel barge operator considers this a high risk location and limits docking to daylight and calm weather conditions. They recommend installing upland mooring points (i.e., bollards) to facilitate mooring near the dock without damaging it.

6.4.2 Akhiok

Akhiok is located at the southern end of Kodiak Island at Alitak Bay. It lies 80 miles southwest of the City of Kodiak. The climate of the Kodiak Islands is dominated by a strong marine influence. There is little or no freezing weather, moderate precipitation, and frequent cloud cover and fog. Severe storms are common from December through February. Annual precipitation is 35-in. Temperatures remain within a narrow range, from 25 to 54°F (DCCED, 2009).

Akhiok had a population of 48 in 2008, compared to 80 residents in 2000 and 77 in 1990. Power service is provided by the City of Akhiok using diesel fuel, which is the primary heat source for about 62% of households (DCCED, 2009).

The city is accessible only by air and water. Regular and charter flights are available from the City of Kodiak. There is a State-owned gravel runway and a seaplane base at Moser Bay, owned by Columbia Ward Fisheries. A boat launch is also available. Barge services are sporadic (DCCED, 2009).

The dedicated boat launch ramp is located near the power plant's marine fuel header on the beach in Akhiok Bay. None of the barge operators who were interviewed regularly service Akhiok or commented on any needs for improvements to the barge landing facilities. It is likely that because of the low volume of goods delivered, and the relatively protected bay in which the community is located, the existing beach and/or ramp landing is sufficient barge access.

6.4.3 Karluk

Karluk is located on the west coast of Kodiak Island, on the Karluk River, about 88 air miles southwest of Kodiak. The climate of the Kodiak Islands is dominated by a strong marine influence. There is little or no freezing weather, moderate precipitation, and frequent cloud cover and fog. Severe storms and winds are common from December through February. Annual precipitation is 23-in. Temperatures remain within a narrow range, from 31 to 54°F (DCCED, 2009).

It had an estimated 2008 population of 38; which is increased from the 2000 census population of 27, but lower than the 1990 population of 71. Power service in Karluk is provided by the Alutiiq Power Company using diesel. In 2000 fuel oil/kerosene was the primary heat source in 100 % of households (DCCED, 2009).

Karluk is accessible by air and water. Regular and charter flights depart from Kodiak. There is both a State-owned gravel airstrip and a seaplane base at Karluk Lake. Barge service is available twice a month from Kodiak, and goods are lightered to shore by skiff. Funds have been requested to construct a dock (DCCED, 2009).

Because of the swell conditions usually present offshore of Karluk and the small boulders present on the beach, barges do no usually land on the beach and instead double anchor offshore and lighter cargo or float hose to shore. Another hazard is the high population of bears that are often seen on the beach when the barge arrives. Barge operators recommend that installing a dock would be the only way to minimize the delays, problems and risks associated with anchoring offshore. Alternately, a lower cost option may be to install breasting dolphins with a catwalk to shore. There are currently two separate fuel tank fill-ups required, so any new docking facility should include a consolidated pipeline and header at the dock face.

6.4.4 Kodiak

Kodiak is located near the north western tip of Kodiak Island in the Gulf of Alaska. The climate of the Kodiak Islands has a strong marine influence. There is little or no freezing weather, moderate precipitation, occasional high winds, and frequent cloud cover and fog. Severe storms are common from December through February. Annual rainfall is 67-in, and snowfall averages 78-in. January temperatures range from 14 to 46°F; July temperatures vary from 39 to 76°F (DCCED, 2009).

Kodiak had a 2008 population of 5,974; this is down from the Census population of 6,334 in 2000 and 6,365 in 1990. Power is provided to Kodiak by a cooperative utility called Kodiak Electric Association, who operates and purchases power from the Four Dam Pool-owned Terror Lake Hydroelectric plant. It also owns a diesel-powered plant. In 2000 it was estimated that nearly 89% of households heat using fuel oil/kerosene (DCCED, 2009).

Kodiak is accessible by air and sea. The State-owned Kodiak Airport provides three asphalt runways. Kodiak Municipal Airport also offers a paved runway. Three scheduled airlines serve Kodiak with several daily flights, and a number of air taxi services provide flights to other communities on the Island. City-owned seaplane bases at Trident Basin and Lilly Lake serve floatplane traffic. The Alaska Marine Highway System operates a ferry service to and from Seward and Homer. The Port of Kodiak includes two boat harbors with 600 boat slips and three commercial piers - the ferry dock, city dock and container terminal. Boat launch ramps and vessel haul-outs are also available. Approximately 140 miles of state roads connect island communities on the east side of the island (DCCED, 2009).

Freight is delivered to Kodiak to any of several docking facilities available. Freight barge operators had no comments or suggestions for improving the freight landing or unloading facilities at Kodiak.

Fuel barges currently moor at the existing ferry terminal, also known as the City Dock, shown in Figure 6.4.3, which is considered to be in good condition. The fuel barge operator indicated that a new ferry dock is planned for construction soon, and he was unsure whether the City would maintain the old ferry dock. AMHS was contacted to determine the plans for the ferry docks at Kodiak, and they indicated that the reconnaissance report was currently being revised and a final decision has not been made as to whether the existing site would be improved and continued for use as a ferry dock or if the new ferry dock would be built at another location. Regardless, it was confirmed that this is a City-owed facility. And if the existing dock is to be continued for use for City fuel deliveries, the barge operators recommend installing a fuel header at the dock.

In general, barge operators agree that Kodiak is a full service port with several docking options for barges and any improvements would be considered a lower priority over some of the more rural communities without an economic base to support dock improvements.

Figure 6.4.3: Ferry dock (background) and fuel float at Kodiak.

6.4.5 Kodiak Station

Kodiak Station is located on the western shore of Kodiak Island, south and adjacent to the City of Kodiak. The climate of the Kodiak Islands is dominated by a strong marine influence. There is little or no freezing weather, moderate precipitation, and frequent cloud cover and fog. Severe storms are common from December through February. Annual precipitation is 60-in. January temperatures average 14 to 46°F; July temperatures vary from 39 to 76 °F (DCCED, 2009).

Kodiak Station is a USCG Base, housing military and their families. The base is self-contained, providing its own water and sewer systems. However, many Coast Guard families live off-base in the surrounding area. Kodiak Station had an estimated 2008 population of 1,782; this is close to the 2000 census population of 1,840. Power service in Kodiak Station is provided by the Kodiak Electric Association using hydro-electric power and there is also a diesel backup plant. In 2000 fuel oil was the main source of heat and used in 56.3% of households (DCCED, 2009).

The USCG uses the State-operated Kodiak Airport for transportation of personnel and materials. The Island is also accessible by state ferry. The Station has private docking facilities for large cutters and fishing vessels (DCCED, 2009).

None of the barge operators who were interviewed currently service Kodiak Station or recommended any improvements that are needed at the existing dock facility. It is thought that the USCG provides its own dock maintenance and because the community is accessible by road from the City of Kodiak, there is an alternate means of obtaining goods.

6.4.6 Larsen Bay

The community of Larsen Bay is located on Larsen Bay, on the northwest coast of Kodiak Island. It is 60 miles southwest of the City of Kodiak. The climate of the Kodiak Islands is dominated by a strong marine influence. There is little or no freezing weather, moderate precipitation, and frequent cloud cover and fog. Severe storms are common from December through February. Annual precipitation is 23-in. Temperatures remain within a narrow range, from 32 to 62°F (DCCED, 2009).

The 2008 population was 67; this is down from the 2000 census population of 115, and the population has declined with each census since 1980. Power service is provided by the Larsen Bay Utility Company using hydro-electric with a diesel backup. In 2000 fuel oil/kerosene was the primary heat source for all households (DCCED, 2009).

Larsen Bay is accessible by air and by water. Regular and charter flights are available from Kodiak. There is a State-owned lighted gravel airstrip and a seaplane base. Docking facilities and a breakwater and small boat harbor are available. A cargo barge arrives every six weeks from Seattle (DCCED, 2009).

The access into Larson bay is curvy with swift water on the flood and ebb tides and several rock hazards are present in the entrance. There are navigational aides in the channel that are maintained by the USCG.

One fuel barge operator delivers fuel to both the Icicle Seafoods dock and the City's marine fuel header. The Icicle Seafoods dock has a barge permanently moored with four steel piles at the west of the dock, with a ramp connecting it to the dock. The main dock is wood pile construction and is in poor condition, but the owners report that they are working on replacing the pilings and decking near the west end of the dock. Six wood bollards plus cleats on the deck of the barge provide for adequate moorage. Plus wood fender piles on the main dock. There are no fenders on the moored barge. There are fuel headers on the dock that are in fair condition. The fuel barges moor on the north side of this dock, near the headers. Freight can also be delivered to this dock, and depending on the size and draft of the barge, they may be limited to landing towards the west end of the dock because the shoreward end of the dock is too shallow. However, light freight barges can land toward the shore end of the dock, and utilize the dock offloading area. Shallow draft ramp barges or landing craft can use an improved boat launch ramp at the small boat harbor or other locations along the beach for offloading freight.

The City fuel header has been relocated to a site on the west side of the small boat harbor. Fuel barges cannot access the shore at the header location because the nearshore area is rocky and shallow. They double anchor offshore and float hose to the header. There are often bears along the shoreline that also present a hazard when bringing the hose to shore. They recommend the only way to minimize these hazards would be to construct a dock or other facility with a fuel pipeline and header to allow mooring offshore.

One fuel barge operator recommended installing two mooring/breasting dolphins at the City header location with catwalks, lights, and a fuel pipeline with a header. This arrangement could be oriented such that the barge is moored either perpendicular or parallel to shore. The proposed improvements are for the arrangement that is perpendicular to shore and is shown in Drawing D9 in Appendix D. Typically, a bow and stern mooring point would also be included for these arrangements. This could be provided with an anchor buoy, by anchoring the barge on approach, and/or the use of upland mooring points.

6.4.7 Old Harbor

Old Harbor is located on the southeast coast of Kodiak Island, 70 miles southwest of the City of Kodiak. The climate of the Kodiak Islands is dominated by a strong marine influence. There is little or no freezing weather, moderate precipitation, and frequent cloud cover and fog. Severe storms are common from December through February. Annual precipitation is 60-in. Temperatures remain within a narrow range, from 24 to 60 °F (DCCED, 2009).

Old Harbor had a 2008 population of 184; this is down from the 2000 census population of 237 and the population has declined with each census since 1980. Power service is provided by AVEC using diesel. In 2000 fuel oil was the primary source of heat used in all households (DCCED, 2009).

Old Harbor is accessible only by air and water. A new State-owned gravel runway and a seaplane base serve air traffic. Regular and charter flights are available from Kodiak. There is a timber dock and a small boat harbor. Seattle-based and local barge services are available (DCCED, 2009).

Freight is delivered to Old Harbor by one of two barge services that operate out of Kodiak. Generally this is on an irregular schedule, whenever there is a load of freight that needs to be delivered. Barges will land at the dock or on the beach nearby.

There are three fuel tank farms which receive fuel deliveries by barge: AVEC, the City of Old Harbor, and a private local fuel sales outfit. Fuel is delivered at least eight times per year, to the fuel headers that are located on the existing wood pile supported dock, shown if Figures 6.4.4 and 6.4.5. This dock is reported to be in poor condition: the wood fendering is in poor condition and there are numerous broken piles and a damaged mooring dolphin that is unusable because it is leaning inshore of the dock face. The mooring cleats on the dock are also in poor condition with minimal holding strength. The two ladders on the dock face are considered by barge operators to be unsafe for use. Because of the degraded condition of the dock, barges restrict mooring at the dock to favorable weather conditions. They note that south winds blow up the bay causing a swell to develop.

Figure 6.4.4: City Dock at Old Harbor.

Figure 6.4.5: Fuel pipeline and header on City Dock at Old Harbor.

Barge operators recommend rebuilding the dock. The new dock should include two dolphins, fuel pipeline and headers, and dock lighting. The City of Old Harbor has completed the design for a new dock facility and has secured partial funding for the project. However, the City is currently seeking the remaining funds needed for construction. The proposed improvements are shown in Drawing D10 in Appendix D.

6.4.8 Ouzinkie

Ouzinkie is located on the west coast of Spruce Island, adjacent to Kodiak Island. It lies northwest of the City of Kodiak. The climate of the Kodiak Islands is dominated by a strong marine influence. There is little or no freezing weather, moderate precipitation, and frequent cloud cover and fog. Severe storms are common from December through February. Annual precipitation is 60-in, with 87-in of snowfall. Temperatures range from 32 to 62°F (DCCED, 2009).

Ouzinkie had a 2008 population of 167; this is decreased since the 2000 census population of 225. Power service is provided by the City of Ouzinkie using hydro-electric with diesel backup generators. In 2000 fuel oil was the primary source of heat used in 89% of households (DCCED, 2009).

The village is accessible by air and water. There is a State-owned gravel airstrip and a float plane landing area at Ouzinkie Harbor. Facilities include a breakwater, small boat harbor and dock. Barges provide cargo delivery from Kodiak (DCCED, 2009).

Some freight barge operators land at the beach located west of the bulk fuel tanks and the dock. Because the bay is exposed to easterly weather and swells, an alternate moorage is at Shakmanof Point, just east of Ouzinkie, and they can lighter cargo from here to the community.

Fuel barges deliver fuel at least six times per year to the Native Corporation dock, which is a former cannery dock, shown in Figures 6.4.6 and 6.4.7.

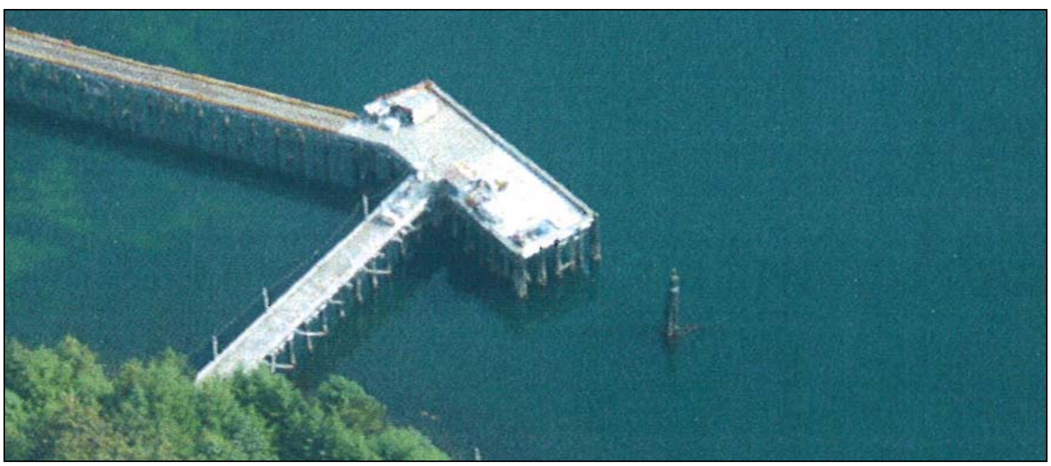

Figure 6.4.6: Existing Dock at Ouzinkie (©K-Sea Transportation Corp.).

This is a timber pile supported dock with 110-ft of dock face, 15-ft above water at MLLW and 15-ft water depth and equipped with a fuel header on the dock. The work area is considered adequate and safe, but the wood piles and decking are in fair condition. There are limited mooring points available for bigger barges. The mooring dolphin to the SE of the dock, the bollard on the NW corner of the dock, and the cleats and cap rail on the dock face are used for mooring, but are aging and may not be strong enough for the bigger double hulled fuel barges. In addition, the lack of lighting is an issue during winter deliveries. Barge operators recommend re-building the dock. At a minimum the dock should be renovated to include replacement of damaged piling, two new mooring dolphins, fuel headers, and dock lighting.

Figure 6.4.7: Existing Dock at Ouzinkie (©K-Sea Transportation Corp.).

6.4.9 Port Lions

Port Lions is located in Settler Cove, on the north coast of Kodiak Island, 247 air miles southwest of Anchorage. The climate of the Kodiak Islands is dominated by a strong marine influence. There is minimal freezing weather, moderate precipitation, and frequent cloud cover and fog. Severe storms are common from December through February. Annual precipitation is 54-in, with 75-in of snowfall. Temperatures remain within a narrow range, from 20 to 60 (DCCED, 2009).

Port Lions had a 2008 population of 190; which is decreased from the 2000 census population of 256. Power service in Port Lions is provided by Kodiak Electric Association using diesel. In 2000 fuel oil was the primary source of heat used in 91.4% of households (DCCED, 2009).

Port Lions is accessible by air and water. There is a State-owned gravel airstrip, and the City dock is used by seaplanes. There is also a boat harbor that provides 82 boat slips. The State Ferry operates bi-monthly from Kodiak between May and October (DCCED, 2009). The existing City Dock at Port Lions is a wood pile-supported dock that was built in the 1960s, and is shown in Figure 6.4.8. The dock is reported to be in poor condition, with significantly reduced load capacity. The City Dock is used for cargo, AMHS ferry, fuel deliveries, and local vessel loading/unloading.

Freight barge service from Seattle was discontinued in 2005 due to changes within the shipping company. Residents now rely on the AMHS ferry, landing craft, and airplane delivery of cargo. Due to weight restrictions on the City Dock, heavy freight must be delivered by landing craft to the small boat harbor or to the boat ramp. Although additional cost is incurred by these freight delivery methods, it is uncertain whether larger freight barges would service Port Lions if the dock was improved to allow side loading (pass-pass) operations.

Fuel barges deliver fuel to the City Dock, which is equipped with a fuel header and pipelines. Fuel barge operators recommend that the dock be renovated or replaced. Reportedly, the header at the existing dock is located at the end of the dock which makes unloading fuel difficult. Fuel barge operators recommend that if a new dock is built, the fuel header/vault should be located near the center of the dock face and the dock should be equipped with additional lighting to provide for safer operations during winter.

Figure 6.4.8.: Port Lions City Dock is aged and has reduced capacity.

A Technical Report by the USACE (October, 2009) describes the USACE's evaluation of the City Dock and ferry terminal at Port Lions with respect to the community's needs and the feasibility of repairing or replacing the existing dock. The report indicates that the USACE has determined that given the extent of degradation, repairing the existing dock is not a viable option and describes several alternatives for replacing the dock. The alternatives reviewed include (1) a steel pipe pile and concrete multipurpose dock with mooring and breasting dolphins and an access trestle; (2) a concrete launch ramp located at the existing launch ramp site for ramp barge unloading; (3) a sheet pile dock with fenders and an armored gravel access causeway; and (4) a steel pipe pile and concrete deck trestle with mooring and breasting dolphins.

Of these, the most cost-effective alternative that focuses on providing both heavy cargo and fuel deliveries may be a slightly scaled down version of the pile-supported multipurpose dock facility (Alternative 1 in the report). These proposed improvements are depicted in Drawing D11 in Appendix D.

6.4.10 Womens Bay

Womens Bay is an unincorporated community on the west coast of Kodiak Island, 8 miles south of Kodiak. It lies at the foot of Old Womens Mountain, along a bay of the same name. The climate of the Kodiak Islands is dominated by a strong marine influence. There is little or no freezing weather, moderate precipitation, and frequent cloud cover and fog. Severe storms are common from December through February.

Annual precipitation is 60-in. January temperatures average 14 to 46°F; July temperatures vary from 39 to 76°F (DCCED, 2009).

It had an estimated 2008 population of 701; the 2000 census population was 620. Power service in Womens Bay is provided by the Kodiak Electric Association using hydro-electric and diesel. In 2000 fuel oil was the primary source of heat used in 83% of households (DCCED, 2009).

Womens Bay is accessible by road from Kodiak. Hence, jet services, ferry access, docks and boat harbors are available nearby in Kodiak (DCCED, 2009).

None of the freight barge operators who were interviewed currently provide regular service to Womens Bay. It is thought that most residents haul their own freight or arrange for deliveries by road from Kodiak.

Primarily, barges tend to moor in Womens Bay to wait out weather. Barge operators recommend providing moorage in the bay for this purpose. However, because there is access from this community to the Port of Kodiak, no recommendations for barge landing facility improvements at Women's Bay were made.

6.5 South-central Alaska Region

The South-central Alaska Region, for the purposes of this study, includes the communities on the east side and north sides of Cook Inlet, the Kenai Peninsula, and on Prince William Sound. Communities in this region that are not included in this second phase of the Assessment were included in the "Cook Inlet" region of the first phase of the Assessment. This region is generally ice free year-round with the exception of the northern portion of Cook Inlet can fill with broken ice during winter.

Cook Inlet stretches 180 miles from the Gulf of Alaska to Anchorage in south-central Alaska and includes Knik Arm and Turnagain Arm at its northern end. The largest community in Alaska, the City of Anchorage, is located at the north end of Cook Inlet. Approximately 400,000 people live within the Cook Inlet watershed, which includes the non-coastal communities in the Matanuska-Susitna valley. The port of Homer is located at the southern end of the road system on the Kenai Peninsula. South of Homer is Kachemak Bay, which is a 40 mile long arm off of Lower Cook Inlet. The tides in this region are extreme, with an average range of 15 ft and extremes of over 28 ft. Turnagain Arm's bore tide is the second highest in North America, second only to the tide in Canada's Bay of Fundy.

The communities of Cook Inlet and the Kenai Peninsula are generally connected by road to the State of Alaska Highway system, except for the communities located on the Lower Peninsula, across Kachemak Bay from Homer, including Halibut Cove, Seldovia, and Nanwalek which are only accessible by boat or airplane.

Prince William Sound includes about 3,000 miles of shoreline to the east of the Kenai Peninsula and is surrounded by the Chugach Mountains to the east, west and north. Fifty-mile long Montague Island and several smaller islands form the southern end of the Sound in the northern part of the Gulf of Alaska.

The sound was created by millions of years of glaciation, which carved the coastal plateau and formed its many tributary fiords and passageways, islands and rocky shores. Fewer than 10,000 people live in the coastal communities of Whittier, Valdez, Cordova, Eyak, Chenega and Tatitlek. No roads connect many of these communities, with the exception of Whittier and Valdez, which are connected to the State Highway System.

In this Region, a total of approximately 24,524 people are residents of the 15 communities included in this phase of the assessment. In addition, the communities of Tyonek and Port Graham, also located in this region, were covered by the Phase 1 Assessment.

Figure 6.5.1 depicts the communities included in this study located in the South-central Alaska region.

Figure 6.5.1: South-central Alaska Region Map.

6.5.1 Chenega Bay

Chenega Bay is located on Evans Island at Crab Bay, 42 miles southeast of Whittier in Prince William Sound. Temperatures range from 17 to 28 °F in winter and 49 to 63 °F in summer. Average annual precipitation includes 66-in of rain and 80-in of snowfall (DCCED, 2009).

The population of Chenega Bay seems to be increasing somewhat. In 2000, Chenega Bay had a population of 94, compared to about 86 residents in 1990. Power service is provided by the Chenega Bay IRA Village Council using diesel. Kerosene is the primary heat source in over 90% of households (DCCED, 2009).

Chenega has a small boat harbor and a ferry dock. The ferry dock is shown in the photograph in Figure 6.5.2. In addition, there is a gravel runway and float plane landing area. According to North Pacific Rim Housing Authority, who manages and oversees many types of development projects for the community, Chenega has a fuel system that was built a few years ago. Because there is no marine header on or near the dock, and the tanks are located on the opposite side of town, a fuel barge from Valdez delivers to Chenega Bay using a truck that is transported on the barge and offloaded on the ferry dock.

Freight is delivered either via the ferry system or by barges to the ferry dock. Occasionally, a beach landing is used for offloading construction materials. This is area could use some grading and surfacing, but it is not considered a high priority. The major improvements that the community wants for the ferry dock are anodes to provide corrosion protection and ensure continued service, and potentially modifications to the dock to accept the new fast ferry.

Figure 6.5.2: Existing Ferry Dock at Chenega Bay.

6.5.2 Cordova

Cordova is located near the southeastern end of Prince William Sound in the Gulf of Alaska. The community was built on Orca Inlet, at the base of Eyak Mountain. It lies 52 air miles southeast of Valdez and 150 miles southeast of Anchorage. Winter temperatures average from 17 to 28 °F. Summer temperatures average from 49 to 63 °F. Annual precipitation is 167-in, and average snowfall is 80-in (DCCED, 2009).

Cordova had a 2008 population of 2,161 this is down from the 2000 census population of 2,454. Power service in Cordova is provided by Cordova Electric

Cooperative and generated using diesel and natural gas. In 2000 fuel oil was the primary source of heat and used in 90.3% of households (DCCED, 2009).

Cordova is accessed by plane or boat. It is linked directly to the North Pacific Ocean shipping lanes through the Gulf of Alaska. It receives year-round barge services and State Ferry service. The Merle K. "Mudhole" Smith Airport at mile 13 is State-owned and operated, with an asphalt runway and gravel crosswind runway. The State-owned and City-operated Cordova Municipal Airport provides another gravel runway. Daily scheduled jet flights and air taxis are available. Float planes land at the Lake Eyak seaplane base or the boat harbor. Harbor facilities include a breakwater, dock, small boat harbor with 850 berths, boat launch, boat haul-out, a ferry terminal, and marine repair services. A 48-mile gravel road provides access to the Copper River Delta to the east. Plans for a highway up the Copper River to connect with the statewide road system have been controversial (DCCED, 2009).

Freight is delivered to Cordova weekly at a minimum. This is increased to five or more times a week during the summer fishing season for trips between Cordova and Whittier. AML has a barge ramp facility that they maintain in Cordova and they lease the adjacent storage yard from the City. AML is currently the major freight service provider their dock is the primary location for freight barge loading and offloading.

In addition to the private facilities, Cordova has other existing dock facilities that can be used for both fuel and freight. The City has a timber pile supported dock, shown in Figure 6.5.3, which has a crane available to assist in offloading some freight, although the capacity of the crane is limited. The barge operators who were interviewed did not report using this facility for barge landings and so did not make any recommendations for improvements at this facility.

Figure 6.5.3: Timber Dock at Cordova.

Fuel barges offload at the ferry terminal, which is near the bulk fuel tanks, as shown in Figure 6.5.4. The ferry terminal includes steel pile mooring/breasting dolphins and a modular steel floating dock. This facility is in good condition and no recommendations for improvements were made.

There are several other private dock facilities at Cordova, as well as the USCG dock, which is a concrete dock that is supported with piling, as shown in Figure 6.5.5.

Because Cordova has several dock facilities available, barge operators did not report any issues with existing facilities, no improvements to barge landing facilities in Cordova are recommended.

Figure 6.5.4: Ferry terminal at Cordova is used for offloading fuel and freight.

Figure 6.5.5: Pile supported concrete dock at Cordova, USCG Cutter moorage.

6.5.3 Eyak

Eyak is on the Copper River highway, 5.5 miles southeast of the Cordova city center, between Eyak Lake and the Cordova airport. The area was annexed to the City of Cordova in 1992. Winter temperatures range from 17 to 28°F; summer temperatures from 49 to 63°F. Average annual precipitation includes 66-in of rain and 80-in of snowfall (DCCED, 2009).

Eyak has an estimated population of 137, compared to a Census population of 168 in 2000 and 172 in 1990. It is a federally-recognized Eyak Athabascan village located within the City of Cordova. Eyak has access to and shares utilities, facilities, and services with the City of Cordova (DCCED, 2009).

The barge operators who were interviewed do not provide service to Eyak. The community's close proximity to Cordova and the oceanfront facilities there are sufficient to meet the needs of this community.

6.5.4 Halibut Cove

Halibut Cove is an unincorporated community in the Kachemak Bay State Park on the Kenai Peninsula. It lies on the south shore of Kachemak Bay, 12 miles across the inlet from the Homer Spit. Winter temperatures range from 14 to 27°F; summer temperatures vary from 45 to 65°F. Average annual precipitation is 24-in (DCCED, 2009).

In 2008, Halibut Cove had an estimated population of 23; this is down from the 2000 population of 35, and 78 in 1990. The summer population can grow to around 160. Power service in Halibut Cove is provided by the Homer Electric Association using hydro-electric and natural gas. In 2000 kerosene was the primary source of heat and used in 63% of households (DCCED, 2009).

There is no airport or road access to Halibut Cove. Boats and float planes are the primary means of transportation. Kachemak Bay Ferry Service and other private ferry/water taxi services provide transportation from Homer (DCCED, 2009).

Halibut Cove is a self-sufficient community, with many homes that are used only during summer. There are no bulk fuel tanks or other central public services in Halibut Cove, other than a State float for public boat moorage. Sometimes, a landing craft from Homer will haul a fuel truck to deliver fuel to individuals. Otherwise, barge operators indicate that there is currently no demand for regular fuel or freight barge delivery services in Halibut Cove.

6.5.5 Homer

Homer is located on the north shore of Kachemak Bay on the southwestern edge of the Kenai Peninsula. The Homer Spit, a 4.5-mile long bar of gravel, extends from the Homer shoreline. Homer is 227 road miles south of Anchorage, at the southern-most point of the Sterling Highway. It lies in the maritime climate zone. During the winter, temperatures range from 14 to 27°F; summer temperatures vary from 45 to 65°F. Average annual precipitation is 24-in, including 55-in of snow (DCCED, 2009).

Homer had a 2008 population of 5,390; this is up from the 2000 population of 3,946, and the Census population history shows that it has been rising since the 1970's. Power service is provided by Homer Electric Association, which operates the Bradley Lake Hydroelectric Plant and is part owner of the Alaska Electric Generation & Transmission Cooperative, which operates a gas turbine plant in Soldotna. It also purchases electricity from Chugach Electric. About 49% of households in Homer are heated using electricity, followed by 27% that are heated using fuel oil/kerosene (DCCED, 2009).

Homer is accessible by the Sterling Highway to the State Highway System and the Lower 48 states. The State owns and operates the Homer Airport, with an asphalt runway and float plane basin, and a seaplane base at Beluga Lake. The City is served by several scheduled and chartered aircraft services. There are four additional private landing strips in the vicinity. The Alaska Marine Highway and local ferry or water taxi services provide water transportation. The deep-water dock can accommodate 30-ft drafts and 340-ft long vessels. There is a cruise ship dock, a boat harbor with moorage for 920 vessels, and a 5-lane boat launch ramp (DCCED, 2009).

Barge operators said that Homer is considered a relatively modern port and they use both the Deepwater dock and the Pioneer Dock to deliver goods, at least twice per month. These facilities, shown in Figures 6.5.6 and 6.5.7, can accommodate large vessels and are equipped with cranes and sufficient backlands area for storage. These facilities are considered to be in good condition. One fuel barge operator indicated that they deliver fuel to both docks and the Deepwater dock needs security fencing and a lockable gate to meet federal requirements. Otherwise, no barge landing improvements at Homer were recommended.

Figure 6.5.6: Deepwater Dock at Homer.

Figure 6.5.7: Pioneer Dock at Homer.

6.5.6 Kasilof

Kasilof is located on the east shore of Cook Inlet on the Kenai Peninsula. It lies on the Sterling Highway, 12 miles south of the City of Kenai. Winter temperatures range from 14 to 27°F; summer temperatures vary from 45 to 65°F. Average annual precipitation is 24-in (DCCED, 2009).

In 2008, it had an estimated population of 560; this is up form the 2000 census population of 471. Power service in Kasilof is provided from the Homer Electric Association using hydro and natural gas generation. In 2000, fuel oil was the primary source of heat and used in 82.3% of households (DCCED, 2009).

The Sterling Highway provides a route to Anchorage. The State owns and operates the gravel airstrip, and there are three additional private airstrips in the vicinity. There is a boat launch at the Kasilof River. The nearby community of Kenai offers an airport and coastal docking facilities (DCCED, 2009).

The beach at Kasilof is accessible by ramp barge and landing craft. However, most freight and fuel is delivered to the community by truck. None of the barge operators who were interviewed provide regular barge deliveries to Kasilof. Because this community is easily accessible by road, no barge landing improvements are recommended under the scope of this Assessment.

6.5.7 Kenai

Kenai is located on the western coast of the Kenai Peninsula, on the shore of Cook Inlet. It lies on the western boundary of the Kenai National Wildlife Refuge, on the Kenai Spur Highway. It is approximately 65 air miles and 155 highway miles southwest of Anchorage via the Sterling Highway. Winter temperatures range from 4 to 22°F; summer temperatures vary from 46 to 65°F. Average annual precipitation is 20-in (DCCED, 2009).

Kenai had a 2008 population of 7,134, and the Census population history shows a steadily increasing trend: the population was 6,742 in 2000 and 6,327 in 1990. Almost 95% of households heat with piped natural gas. Power service is provided by the Homer Electric Association using hydro-electric and natural gas (DCCED, 2009).

Kenai is accessible by the Sterling Highway to the State Highway System and the Lower 48 states. The City-owned Kenai Municipal Airport provides an asphalt runway, a gravel strip, a float plane strip, and helicopter service. Float plane facilities are also available at Island Lake and Arness Lake. There are five additional privately-owned airstrips in the vicinity. The Kenai City Dock and boat ramp are located near the mouth of the Kenai River. There are also a number of private commercial fish processing docks and oil refinery docks in the area. Small boat moorage is by buoys anchored in the Kenai River (DCCED, 2009).

None of the barge operators who were interviewed provide regular barge delivery services to Kenai. AML reported weekly freight service to the community by trucking/road. Because this community is easily accessible by road, no barge landing improvements were recommended for Kenai.

6.5.8 Nanwalek

Nanwalek (also known as English Bay) is located at the southern tip of the Kenai Peninsula, 234 air miles southwest of Homer, 10 miles southwest of Seldovia and west of Port Graham. Temperatures range from 14 to 27°F in winter and 45 to 60°F in summer. Average annual precipitation is 24-in (DCCED, 2009).

Nanwalek has an increasing population which was estimated at 229 in 2008 compared to the 2000 census population of 177. Power service in Nanwalek is provided by the Homer Electric Association using hydropower and natural gas. In 2000 wood was the main source of heat used in 48.9% of households and fuel oil was used in 36.2% of households (DCCED, 2009).

Nanwalek is not accessible by road. Boats are the primary means of transportation locally. The State Ferry provides service to nearby Seldovia. A State-owned gravel airstrip is available (DCCED, 2009).

Currently, freight and fuel is delivered to Nanwalek by landing craft from Homer and is limited to calm weather conditions, due to this site's exposure to waves from the Gulf of Alaska. Freight is offloaded on the beach and a fuel truck is used to deliver fuel to the community. After driving off of the barge, the fuel truck must be towed up the beach using a road grader. Due to the proximity of the beach to the airstrip, the grader must back onto the airstrip to pull the truck up off of the loose beach material and onto a packed drivable surface. To ensure safety, a spotter is used to watch for aircraft.

Navigation improvements alternatives have been studied by the USACE to determine the Federal interest in developing a harbor that would provide protection for local boat moorage as well as a barge landing/offloading site at Nanwalek (USACE, Dec. 2009). It is expected that barge landing improvements at Nanwalek would reduce the cost of delivering goods by allowing safe and efficient barge deliveries in lieu of the current practice of waiting for calm weather and/or flying in goods.

The USACE study reviewed three alternatives to address the needs of Nanwalek residents and barge operators: two of the alternatives include harbor development at Nanwalek and the third considers harbor development at Port Graham with a road link to Nanwalek. The study found that because the costs of all of the alternatives exceeded the potential economic benefits, further study to determine feasibility of providing the proposed improvements was not warranted at this time (USACE, Dec. 2009).

6.5.9 Ninilchik

Ninilchik lies on the west coast of the Kenai Peninsula on the Sterling Highway, 38 miles southwest of the City of Kenai, and 188 road miles from Anchorage. The community lies between mileposts 119 and 144 of the Sterling Highway. Winter temperatures range from 14 to 27°F; summer temperatures vary from 45 to 65°F. Average annual precipitation is 24-in (DCCED, 2009).

Ninilchik had an estimated 2008 population of 853; this is up from the 2000 census population of 772. Many homes in this area are used only seasonally. Power service in Ninilchik is provided by the Homer Electric Association using hydro-electric natural gas. In 2000 fuel oil was the main source of heat used in 57.2% of households (DCCED, 2009).

The Sterling Highway provides access to Anchorage and beyond. A State-owned dirt/gravel airstrip is located on Oilwell Road. The nearby community of Homer also offers an airport, harbor/docking facilities and State Ferry access. Ninilchik harbor was constructed in the early 1970s. Boats are launched from Ninilchik or Deep Creek beach; a tractor launch is also available from the beach (DCCED, 2009).

None of the barge operators who were interviewed provide regular barge delivery services to Ninilchik. Because this community is easily accessible by road, no barge landing improvements are recommended under the scope of this Assessment.

6.5.10 Point Mackenzie

Point MacKenzie is located across Knik Arm of Cook Inlet from Anchorage, in the Matanuska-Susitna Borough. It is on Point MacKenzie Road, south of Big Lake, about 15 miles southwest of Wasilla and accessible from the George Parks Highway. January temperatures range from 4 to 23°F and July can vary from 47 to 68 °F (DCCED, 2009).

There was an estimated 279 residents in Point MacKenzie in 2008, which is increased from the 2000 Census population of 111 (No Census data is available for 1990). Power service in Point Mackenzie is provided by Matanuska Electric Association using hydro-electric generation. In 2000, fuel oil/kerosene was the primary source of heat used in 42% of households (DCCED, 2009).

A variety of transportation means are available in the nearby cities of Wasilla, Palmer and Anchorage. A private airstrip is located in the community. The Point MacKenzie Industrial Port is a deep-draft port (DCCED, 2009).

A photograph of the existing dock and loading facility at Point MacKenzie is relatively new, and is shown in Figure 6.5.8. None of the barge operators who were interviewed have delivered fuel or freight to this community. This, combined with the fact that this community is easily accessible by road, no barge landing improvements are recommended under the scope of this Assessment.

Figure 6.5.8: Dock and chip loading facility at Point MacKenzie.

6.5.11 Seldovia

Seldovia is on the Kenai Peninsula across from Homer on the south shore of Kachemak Bay, a 15 minute flight or a 1 to 1.5 hour water taxi ride. Flight time to Anchorage is 45 minutes. Winter temperatures in Seldovia average from 12 to 21 °F; summers range from 48 to 65 °F. Annual precipitation is 34.5-in (DCCED, 2009).

Seldovia had a 2008 population of 284; the 2000 census population was 286 and in 1990 it was 316. Power service in Seldovia is provided by Homer Electric Association using diesel. In 2000, fuel oil/kerosene was the primary source of heat used in 84% of households (DCCED, 2009).

A State-owned gravel airstrip and a seaplane base are available. Direct flights are provided to Homer and Anchorage. A private airstrip is available at Oyster Cove. The State Ferry provides service to Seldovia. The Kachemak Bay Ferry and Mako Water Taxi are also available for passenger commutes to Homer, where the Sterling Highway enables road access. Small boat harbor and boat haul-out facilities are available (DCCED, 2009).

There is also a dock at Seldovia that is used by the state ferry, as shown in Figure 6.5.9. Barges also use this dock to offload fuel and freight. None of the barge operators who were interviewed reported providing regular freight service to Seldovia. It is thought that most residents haul their own freight, have freight brought on the ferry, or charter a landing craft from Homer for heavy freight.

Figure 6.5.9: Pile supported dock at Seldovia.

Fuel is delivered to Seldovia by barge about 8 times per year. The barge operator said that they do have restrictions going in to Seldovia for daylight and high tide due to the restricted channel. However, the dock is in good condition and they had no recommendations for improvements.

6.5.12 Seward

Seward is situated on Resurrection Bay on the east coast of the Kenai Peninsula, 125 highway miles south of Anchorage. It is considered the gateway to the Kenai Fjords National Park. Seward experiences a maritime climate. Winter temperatures average from 17 to 38°F; summer temperatures average 49 to 63°F. Annual precipitation includes 66-in of rain and 80-in of snowfall (DCCED, 2009).

In 2008 Seward had a population of 2,619; this is decreased since the 2000 census population of 2,830. Power is provided by the City of Seward Electric System, who purchases power from Chugach Electric and has six backup diesel generators. Almost 81% of households in 2000 used fuel oil/kerosene as their primary heating source (DCCED, 2009).

Seward is at the end of the Seward Highway, which is connected to the Alaska Highway system. Bus and commercial trucking services to and from Anchorage are available daily. Air services and charters are available at the State-owned airport. Seasonal passenger transportation is also available by railroad.

The Port at Seward serves cruise ships, cargo barges and ocean freighters from Seattle and overseas. The small boat harbor has moorage for more than 750 boats, and two boat launch ramps, two commercial docks, a fuel dock, and a small boat lift facility. The Alaska Railroad provides over 1.4 billion pounds of cargo transit each year, importing cargo for the Interior and exporting coal to the Pacific Rim. The Seward Marine Industrial Center (SMIC) on the east side of Resurrection Bay includes a ship haul out and maintenance facility and large vessel docking (DCCED, 2009).

Freight barge operators said that their weekly deliveries to Seward are generally by truck from Anchorage. Charter freight service and other barges deliver cargo to SMIC or landing craft sometimes use the existing gravel beach landing area in the northwest portion of the small boat harbor. The City has two timber docks also available inside the harbor area.

Fuel for the fuel dock facility is mainly supplied by the railroad but is also brought in by fuel barge about twice per year. The fuel barge lands at the North Dock at the City's SMIC facility, as shown in Figure 6.5.10. This barge is 282ft long and draws 14ft-8in when loaded and so it cannot access the small boat harbor docking facilities on the other side of the bay. This will be even more so when the larger double hull barges are used.

The North dock is a sheetpile bulkhead that is 450-ft long and 15-ft above water at MLLW with 18ft depth at the dock face. It is equipped with wood fender panels with seven heavy duty bollards located every 60-ft along the dock face. Two fuel vaults/headers exist about 10ft from the dock face. This area is adequate for their operations. The dock is reported to be in good shape, but fendering system, ladders, and walkways along dock face are in poor condition.

Figure 6.5.10: Seward Marine Industrial Center (©Aerometric, 2001).

The breakwater at SMIC does not fully protect the basin; the North Dock is exposed to the fetch of Resurrection Bay from the south/southwest; and so the fuel barge has stricter operating restrictions for weather from the south. During southerly winds, a significant surge can build at the North Dock. Ideally, barge operators would like to see a breakwater constructed at SMIC.

Prior to barge arrival, the facility operator deploys three log camels or other portable fenders to cover a 200-ft area where the barge will moor. The fender panel system at North Dock consists of timber panels that are mounted on steel pin piles. These are falling apart or do not exist in some places. At a minimum, it is suggested that the fender panels at the North Dock should be replaced.

Because this community is easily accessible by road, the recommended barge landing improvements are not considered a priority under the scope of this Assessment.

6.5.13 Tatitlek

Tatitlek is located on the northeast shore of Tatitlek Narrows, on the Alaska Mainland in Prince William Sound. It lies southwest of Valdez by sea near Bligh Island, and 30 air miles northwest of Cordova.

The population of Tatitlek has been relatively steady: in 2008 it had an estimated population of 102 and in 2000 the census population was 107. Winter temperatures range from 17 to 28°F and summers average 49 to 63°F. Annual precipitation includes 28-in of rain and 150-in of snowfall (DCCED, 2009).

Power service is provided by the Tatitlek Electric Utility using diesel. In 2000 fuel oil was the primary source of heat used in 94.9% of households (DCCED, 2009).

Tatitlek has a State-owned lighted gravel airstrip and a seaplane landing area; air charters are available from Valdez and Cordova. Boats are the primary means of local transportation. The USACE is considering the feasibility of constructing a breakwater and small boat harbor (DCCED, 2009).

Marine facilities in Tatitlek include a steel pile and concrete ferry dock and a timber pile supported City Dock. The City Dock was renovated in 2008 and included installation of a new one-ton crane intended for use by fishing vessels. This dock is tide dependant, as evident in the photograph depicted in Figure 6.5.11.

The ferry dock or beaches are often used for unloading freight via the ferry or heavy cargo by small barge/landing craft from Valdez. A fuel barge from Valdez transports a fuel truck on the barge and the truck is offloaded at the ferry dock to make fuel deliveries to Tatitlek. The major improvements that the community wants for the ferry dock are anodes to provide corrosion protection and ensure continued service.

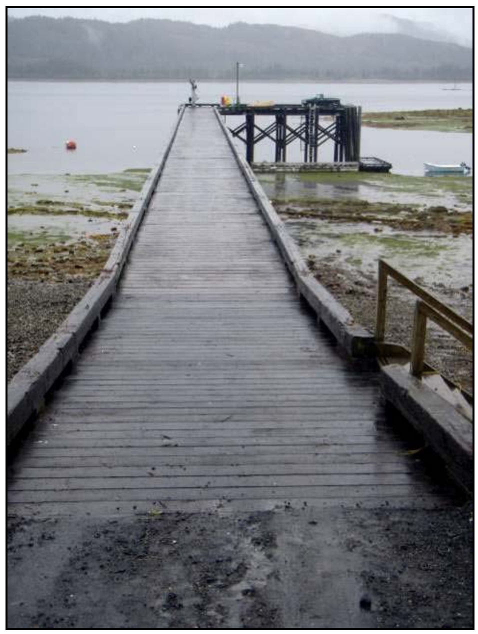

Figure 6.5.11: The City Dock at Tatitlek.

6.5.14 Valdez

Valdez is located on the north shore of Port Valdez, a deep water fjord in Prince William Sound. It lies 305 road miles east of Anchorage, and 364 road miles south of Fairbanks. It is the southern terminus of the Trans-Alaska oil pipeline. January temperatures range from 21 to 30°F; July temperatures are 46 to 61°F. Annual precipitation is 62-in. The average snowfall is 325-in (27 ft) annually (DCCED, 2009).

Valdez had a 2008 population of 4,498; this is increased from the 2000 census population of 4,036. Power is provided by Copper Valley Electric, who purchases hydro-electric power from the Four Dam Pool Power Agency and the Petro Star Refinery and owns backup diesel plants in Glennallen and Valdez. Approximately 82% of households were reported to heat using fuel oil/kerosene in 2000 (DCCED, 2009).

The Richardson Highway connects Valdez to Anchorage, Fairbanks and Canada. The airport is operated by the state, with a paved runway, instrument landing system and control tower. A State-owned seaplane base is available at Robe Lake. Port Valdez is ice-free year round and is navigated by hundreds of ocean-going oil cargo vessels each year. The State Ferry provides transport to Whittier, Cordova, Kodiak, Seward and Homer in the summer; and only to Cordova in the winter. Numerous cargo and container facilities are present in Valdez. A small harbor accommodates 546 vessels. Boat launches and haul-out services are available. Both barges and trucking services deliver cargo to the City (DCCED, 2009).

In addition to the ferry dock, Valdez has a container terminal with a floating concrete dock with 1,200 ft of moorage at a water depth exceeding 80-ft (see Figure 6.5.12), as well as two 600-ft docks. There are also fuel distribution centers and fish processing plants in Valdez who own their own dock facilities. In addition, the Alyeska Pipeline Marine Terminal is located across the bay and includes several docking facilities suitable for ocean-going oil tanker vessels.

Figure 6.5.12: Valdez Container Terminal.

Freight barge operators who were interviewed indicated that they provide weekly service to Valdez and had no recommendations for improvements to the existing facilities. Similarly, fuel barges of all types come into the Port of Valdez on a frequent basis and deliver fuel primarily to private entities. Valdez has a modern seaport with a cargo and container facilities, and although some maintenance to these facilities is needed, the City has an economic base to fund these repairs. For these reasons, and because the City's power is generated by hydro-electric and fuel purchased from the local petroleum entities, and the community is easily accessible by road, no barge landing improvements are recommended.

6.5.15 Whittier

Whittier is on the northeast shore of the Kenai Peninsula, at the head of Passage Canal. It is on the west side of Prince William Sound, 60 miles southeast of Anchorage. Winter temperatures range from 17 to 28°F; summer temperatures average 49 to 63°F. Average annual precipitation includes 197-in of rain and 241-in of snowfall (DCCED, 2009).

Whittier had a 2008 population of 161 and has been showing a decline since the Census population of 182 in 2000 and 243 in 1990. Power service is provided by Chugach Electric Association using hydro-electric and natural gas sources. In 2000, nearly 98% of the households in Whittier used piped natural gas as the primary heat source (DCCED, 2009).

Whittier has an ice-free port and two city docks (70 ft cargo dock & 60 ft floating passenger dock). A small boat harbor has slips for 360 fishing, recreation and charter vessels. The community is accessible by road, rail, the state ferry, boat and aircraft. The Anton Anderson Memorial Tunnel was reconstructed to accommodate both rail and road vehicles. The railway carries passengers, vehicles and cargo 12 miles from the Portage Station, on the Seward Highway. The State-owned gravel airstrip accommodates charter aircraft, and a City-owned seaplane dock is available for passenger transfer (DCCED, 2009).

Freight barge operators land at Whittier at least once per week and use the Alaska Railroad dock facility, shown in Figure 6.5.13. They reported that there has been a lot of improvement work completed at this facility in recent years and the dock is in good shape. Neither freight nor fuel barge operators reported issues or recommended improvements to barge landing facilities at Whittier.

Because this community is easily accessible by road, no barge landing improvements are recommended under the scope of this Assessment.

Figure 6.5.13: Railroad Dock at Whittier.

6.6 Iliamna/Bristol Bay Region

The Iliamna/Bristol Bay Region, for the purposes of this study, includes the communities located in the Iliamna Lake vicinity and along the coast of Bristol Bay in southwest Alaska, as well as the Igushik, Nushagak and Kvichak Rivers. Barge access to these communities is primarily from Bristol Bay.

Iliamna Lake is an inland body of water, located at the north end of the Alaska Peninsula, west of Cook Inlet (Gulf of Alaska), and drains southwest through the Kvichak River to Bristol Bay.

The Lake is 80 miles long and 25 miles wide with a maximum depth of about 988 ft and covers an area of 1,150 square miles. The communities of Iliamna, Newhalen, Kokhanok, Pedro Bay, and Igiugig lie on the shores of Iliamna Lake, and the community of Nondalton is accessible from Iliamna.

The waters of the Lake flow through the Kvichak River to Bristol Bay, which is the eastern-most arm of the Bering Sea. Several rivers flow into Bristol Bay including the Igushik, Kvichak, Nushagak, Naknek, Togiak, Ugashik, Egegik, and several others. Bristol Bay is subjected to some of the highest tides in the world: for example the Dillingham and Naknek have tidal extremes in excess of 30 ft. This, combined with the prevalent shallow water shoals and sandbars makes navigation by barge and other large vessels a particular challenge. Often, lightering to smaller draft vessels is required to reach the communities in this region.

The total population of the communities included in the Region for this phase of the Assessment is about 2,057. However, the Bristol Bay region covered by the Phase 1 Assessment included an additional 9 communities, with a total population of about 4,636, bringing the total population of this region to 6,693. The three largest communities in the region are Dillingham, Naknek, and King Salmon (the first two of these were covered by the Phase 1 report). Figure 6.6.1 depicts the communities included in this study which are located in the Iliamna/Bristol Bay region.

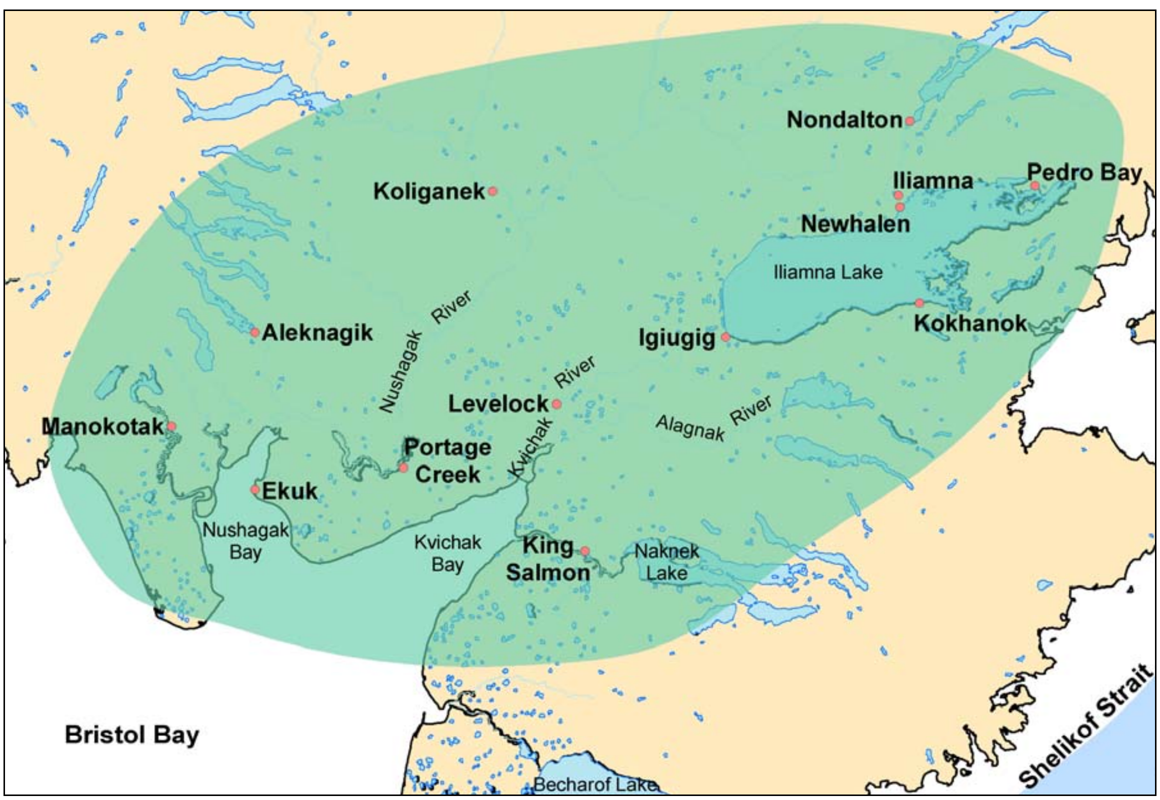

Figure 6.6.1: Iliamna/Bristol Bay Region Map.

6.6.1 Aleknagik

Aleknagik is located at the head of Wood River on the southeast end of Lake Aleknagik, 16 miles northwest of Dillingham. Aleknagik is in a transitional climate zone. The primary influence is maritime, although a continental climate does affect the weather here. Average summer temperatures range from 30 to 66 °F. Average winter temperatures range from 4 to 30 °F. Annual precipitation is 20 to 35-in and annual snowfall is 93-in. Fog and low clouds are common during July and August, and may preclude access. The lake and river are ice-free from June through mid-November (DCCED, 2009).

Aleknagik had population of 242 in 2008 and the population has increased slightly with each census since the 1970's. Power service is provided by Nushagak Electric Cooperative and generated from diesel. In 2000 fuel oil was used to heat 95.8% of the homes (DCCED, 2009).

The community spans an area on both the north and south shores of the lake at its southeast end. Aleknagik is the only regional village with a road link to Dillingham; a 25-mile road connects the south shore of the community to Dillingham. The north shore of the lake is not road accessible; residents use skiffs to travel to town on the south shore. The "New Aleknagik" airport is a State-owned gravel airstrip located on the north shore, and regular flights are scheduled through Dillingham. Moody's Marina and Seaplane Base, also on the north shore, accommodate float planes. There are two additional airstrips, the public Tripod Airport, a turf-gravel airstrip located 2 miles southeast of Aleknagik, and the 7th Day Adventist's Mission School Airport, which is a gravel/dirt airstrip with a crosswind runway. The State owns and operates a 100-ft dock on the north shore of Aleknagik Lake. A breakwater, barge landing, boat launch ramp and boat lift are available on the north shore (DCCED, 2009).

The Wood River and lower part of the Lake is affected by tide and access can be too shallow to access Aleknagik during extreme low tides. Approaches into the lake are usually only made at MHHW or higher tides. In addition to the docking facilities, there are several beach landing sites where barges can land safely. The waterfront facilities at Aleknagik are shown in Figures 6.6.2 and 6.6.3. The existing facilities are reported to be sufficient to meet the needs for barge deliveries, and barge operators made no recommendations for improvements.

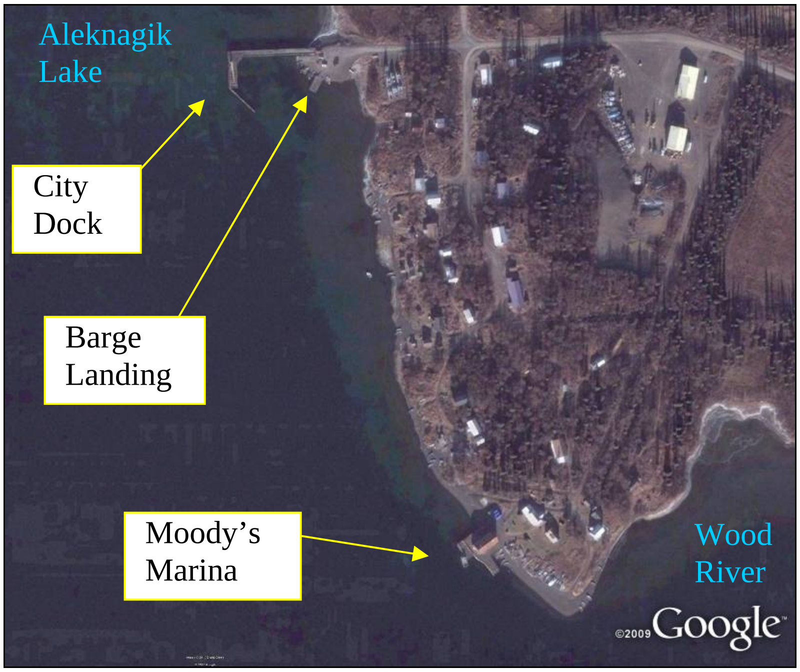

Figure 6.6.2: Waterfront facilities on the north side of Aleknagik.

Figure 6.6.3: Waterfront facilities on the south side of Aleknagik.

6.6.2 Ekuk

Ekuk is located on the east coast of Nushagak Bay, 17 miles south of Dillingham. Ekuk is in a climatic transition zone. The primary weather influence is maritime, although the arctic climate also affects the region. Average summer temperatures range from 37 to 66°F; winter temperatures range from 4 to 30°F. Annual precipitation is 20 to 26-in. Fog and high winds are common during winter months. The Bay is ice-free from June through mid-November (DCCED, 2009).

Historically Ekuk was a Yup'ik Eskimo village, but now it used only as a summer commercial cannery and subsistence-use site. Currently, the only permanent residents are the cannery watchman's family (Census population of 3 in 1990 and 2 in 2000). In the summer, the number of people living in Ekuk grows with cannery crews, commercial fishing, and subsistence activities. There are no central facilities; Ward's Cannery operates its own water and sewer system and diesel power generators (DCCED, 2009).

Air transport is the most frequent means of getting to Ekuk. Choggiung Limited owns a dirt/gravel airstrip. Scheduled and charter flights are available from Dillingham during the summer. The village has a small dock on the south side. Other private docks are in use. The cannery has two docks and a boat haul-out. Clark's Point, two miles north, can be reached by snowmachine during winter (DCCED, 2009).

Barges deliver fuel and goods to the cannery dock or to a beach landing site. There is a muddy bottom with no rocks or obstructions. There is a creek running diagonally across in front of the dock, which is approximately 4-ft deep; hence access to the dock is limited to vessels drawing less than this. The dock is a timber pile supported dock, shown in Figure 6.6.4.

Fuel is delivered a few times per year to the cannery's bulk fuel tanks. They will lay out 400 to 500 feet of hose at low tide and sit for 1 or 2 tides depending on the amount of fuel delivered. A fuel pipeline and header to the high waterline was recommended to improve offloading efficiency to the cannery. However, since this is a private facility, it is outside the scope of this Assessment.

Figure 6.6.4: Dock at Ekuk.

6.6.3 Igiugig

Igiugig is located on the south shore of the Kvichak River, where it flows from Iliamna Lake, on the Alaska Peninsula. It is 50 air miles northeast of King Salmon and 48 miles southwest of Iliamna. Igiugig lies within the transitional climatic zone. Average summer temperatures range from 42 to 62°F; winter temperatures average 6 to 30°F. The record high is 91°F, and the record low is -47°F. Precipitation averages 26-in annually, including 64-in of snow (DCCED, 2009).

In 2008 the estimated population of Igiugig was 40; this is down from the 2000 census population of 53. Power service is provided the Igiugig Electric Company using diesel. In 2000 kerosene was the primary source of heat. The bulk fuel capacity in Igiugig totals almost 69,000 gallons (DCCED, 2009).

Igiugig is accessible primarily by water and air. Charter flights are available from Iliamna and King Salmon. The State owns and maintains a gravel runway. A small public dock is available. Barges deliver goods from Naknek or Dillingham in the fall. Igiugig Corporation operates a barge system on Iliamna Lake (DCCED, 2009).

Most cargo is delivered to Igiugig and the other Iliamna Lake communities by airplane. Heavy freight is brought into the Lake region via a barge from Homer to Williamsport on Cook Inlet, and then trucked along the unimproved road to Pile Bay, on Iliamna Lake. The inner-lake barge service can distribute freight to Igiugug and other communities on the Lake.

Mr. Salmon of Igiugig, operates a small barging operation in the Lake during the summer. He pushes a 5-ft deep float with fishing vessels to deliver freight to the various destinations on the Lake.   Mr. Salmon indicated that he picks up his freight at Pile Bay, where it is delivered via the haul road from Williamsport on the Cook Inlet side, as shown in Figure 6.6.5. For this reason, Pile Bay might be considered as a possible location to develop a hub dock facility to serve the Lake communities.

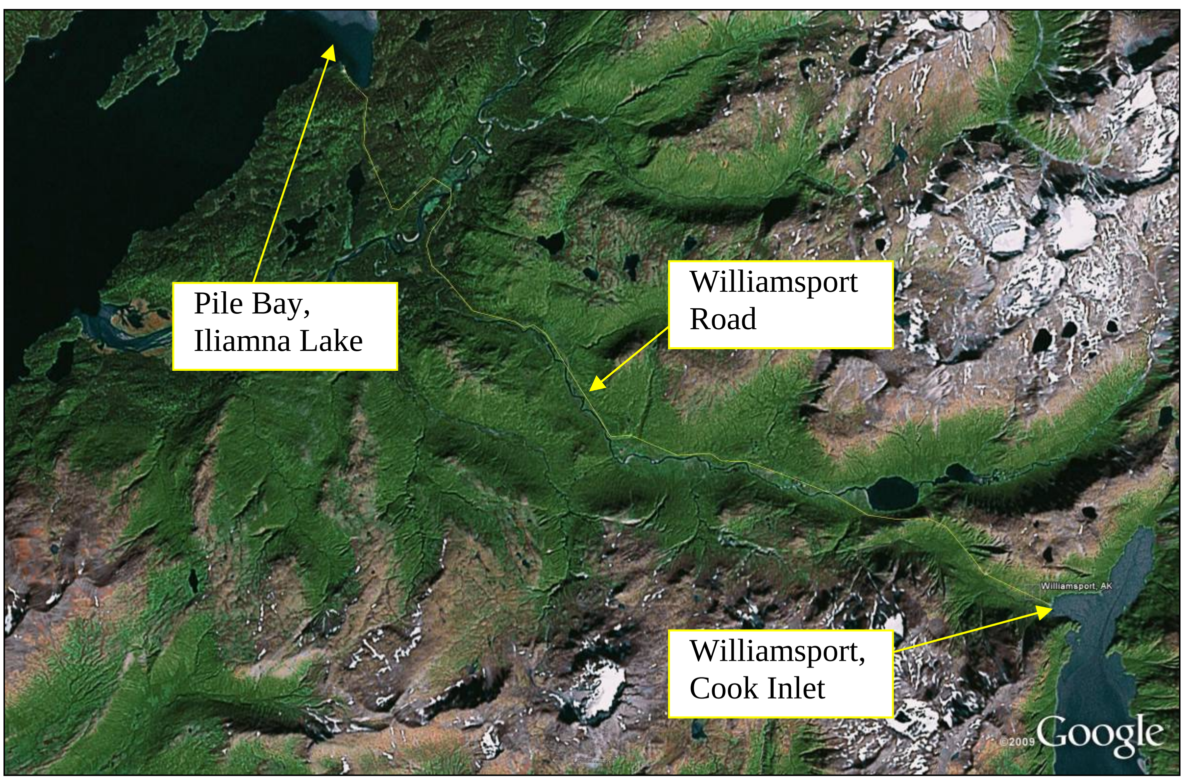

Figure 6.6.5: Williamsport Road connecting Iliamna Lake to Cook Inlet.

In the past, fuel barge operators would deliver fuel by barge from Dillingham via the Kvichak River to these communities, and it proved to be too costly. There is a portion of the river near its mouth where there are “shallows” less than 3 or 4 ft deep, shown in Figure 6.6.6 and 6.6.7. Because barges that come up the Kvichak River generally draft more than 3-ft, once they reach the shallows, they need to transfer cargo to a smaller, shallow draft lightering vessel and continue on to Igiugig and the other Lake communities. Then, continue this operation of shuttling back and forth until all of the bulk fuel tanks on the Lake are filled. This would take 3 boat crews more than a week or two. It takes them just about as long for them to travel to these communities, offload the fuel, and get back to the flats as it does for the barge to travel back to Dillingham and come back to the flats to repeat the operation.

Because the volume of fuel delivered to Iliamna Lake communities is relatively small, it is cheaper to fly fuel into the airport at Iliamna and distribute the fuel to the other Lake communities by lake barge. Of all the Lake communities, the largest volume of fuel is delivered to Iliamna and Igiugig.

When asked whether improving the road from the dock at Pile Bay on Iliamna Lake, to Williamsport on Cook Inlet (See Figure 6.6.5), would help to lower costs, the fuel barge operators replied that it is unlikely that this scenario would be more efficient. Williamsport is tide-dependant, where the barge would have to wait for the tide on the way in and the way out. That combined with the time and effort associated with trucking the fuel 14 miles to the Lake would offset the costs associated with flying fuel to Iliamna. For heavy freight, however, this scenario may be the only feasible option.

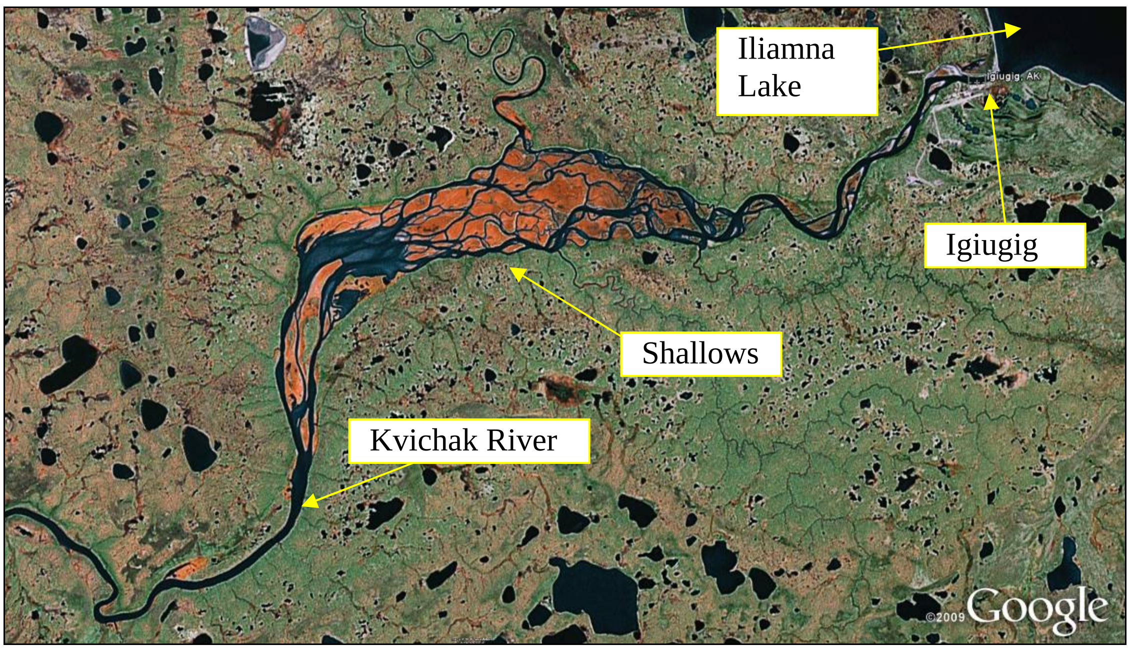

Figure 6.6.6: Kvichak River from Lake Iliamna.

Figure 6.6.7: Slough of the Kvichak River shallows.

Once at Igiugig, the shallow draft barges generally can land at several locations on the sand and gravel beaches in front of the community on both sides of the Kvichak River and on the lake. The river current and waves on the lake tend to move material around and when offloading freight, barge operators usually build up a new ramp each year and/or use 5-ft wide by 1-in thick steel plates which they lay down to get traction over the beach. A dedicated ramp landing facility would help to improve traction for loaders that bring cargo from the barge to the upland area.

6.6.4 Iliamna

Iliamna is located on the northwest side of Iliamna Lake, 225 miles southwest of Anchorage. It is near the Lake Clark Park and Preserve. Iliamna lies in the transitional climatic zone with strong maritime influences. Average summer temperatures range from 42 to 62°F; winter temperatures average 6 to 30°F. Annual precipitation is 26-in, including snowfall of 64-in (DCCED, 2009).

The estimated 2008 population was 95; this is slightly lower then the 2000 population of 102. Power service in Iliamna is provided the I-N-N Electric Cooperative using hydro-electric with a diesel backup generators. In 2000, fuel oil/kerosene was the primary source of heat (DCCED, 2009).

Iliamna is primarily accessible by air and water. An 8-mile gravel road connects Iliamna to Newhalen, and a 22-mile road to Nondalton. There are two State-owned gravel airstrips, located between Iliamna and Newhalen. Additional facilities include: float plane facilities at Slopbucket Lake (Triangle Lake), East Bay and Pike Lake, a private airstrip at Iliamna Roadhouse, and private float plane access at Summit Lake. A breakwater, boat harbor and dock are available (DCCED, 2009).

Most cargo is delivered to Iliamna by airplane. Heavy freight is brought into the Iliamna Lake region via a barge from Homer to Williamsport on Cook Inlet, and then trucked 14 miles on the unimproved road to Pile Bay, and barged from there to Iliamna. A City Dock is available at Iliamna and is reported by barge operators to be in good condition.

As discussed previously for Igiugug, the fuel barge operators used to deliver fuel by barge to Iliamna Lake communities, via the Kvichak River. However, due to the requirement to shuttle across the shallows in the river, combined with the low volume of fuel delivered, it became more cost-effective to fly fuel into Iliamna. The fuel barge operators do not expect that improving the road from Pile Bay to Williamsport would improve efficiency enough to stop delivering fuel by airplane. For heavy freight, however, the road may still be the only feasible option.

For barging within the lake, Iliamna has a dock that is reported to be in good condition. In addition, barges may land anywhere along the north beach in front of Slopbucket Lake. There are deadmen available on this beach to facilitate mooring. An aerial photograph showing the dock and beach landing areas is shown in Figure 6.6.8.

Figure 6.6.8: Dock and beach landing areas at Iliamna.

The lighter barge operator for the fuel company suggested that for Iliamna Lake communities, a hub dock would be a benefit. To make deliveries within the Lake more efficient, he recommends a dock where they could tie up a barge and a push boat and secure their equipment at the lake for winter. Such a dock would only require 80 to 100-ft of dock face in a sheltered area. He suggested that the best location for the hub dock might be at Iliamna or Newhalen, where a large volume of goods are delivered and flight service in and out of the community is more reliable any time of year. With the exception of a small inlet in Roadhouse bay, near Iliamna, this area does not appear to be as sheltered as some of the other communities and may require some kind of breakwater structure. However, this is not considered a priority for this Assessment given the relatively small volume of goods delivered.

6.6.5 King Salmon

King Salmon is located on the north bank of the Naknek River on the Alaska Peninsula, about 15 miles upriver from Naknek. The climate is mainly maritime, characterized by cool, humid, and windy weather. Average summer temperatures range from 42 to 63°F; average winter temperatures range from 29 to 44°F.

Extremes from -46 to 88°F have been recorded. Total precipitation is 20-in annually, including 45-in of snowfall. Fog is common during summer months (DCCED, 2009).

King Salmon had an estimated 2008 population of 409; slightly lower than the 2000 population of 442. Power service in King Salmon is provided by the Naknek Electric Association using diesel. In 2000, kerosene was the primary source of heat and used in 94% of households (DCCED, 2009).

King Salmon is a transportation hub for Bristol Bay. Formerly an Air Force Base, the State-owned airport offers a paved, lighted runway, an asphalt/gravel crosswind runway, and FAA air traffic control tower. There are scheduled jet flights and charter services to and from Anchorage. A 4,000-ft stretch of the Naknek River is designated for float planes. A seaplane base is also located at Lake Brooks, within the Katmai National Park to the east. Four docks are available on the Naknek River -- owned by the U.S. Park Service, U.S. Fish & Wildlife, Alaska State Troopers and the Bristol Bay Borough. Cargo goods are delivered to Naknek by barge and trucked upriver to King Salmon via a 15-mile connecting road. During winter, an ice road provides access to South Naknek (DCCED, 2009).

Barge operators reported that King Salmon is not accessible by barge because the river is too rocky and shallow. Only skiffs can get to King Salmon on the river. The fuel barge delivers fuel to a fuel tank farm at Naknek. Fuel and freight is trucked from Naknek to King Salmon on the paved road that connects the two communities. Barge operators had no recommendations for improvements at King Salmon.

6.6.6 Kokhanok

Kokhanok is located on the south shore of Iliamna Lake, 22 miles south of Iliamna. Kokhanok lies in the transitional climatic zone. Average summer temperatures range from 40 to 64°F; winter temperatures average 3 to 30°F. The record high is 84°F; the record low is -47°F. Precipitation averages 32-in annually, including 89-in of snowfall. Wind storms and ice fog are common during winter (DCCED, 2009).

The estimated 2008 population was 179; the 2000 census population was 174. Kokhanok generates power from diesel only during the summer months; in winter, electricity is purchased from the School District. In 2000, fuel oil was the primary source of heat and used in 90% of households. The bulk fuel capacity in Kokhanok is about 66,000 gallons (DCCED, 2009).

Kokhanok is accessible by air and water. A State-owned gravel airstrip and a seaplane base serve scheduled and charter air services from Anchorage, Iliamna, and King Salmon. Supplies delivered by barge via the Kvichak River must be lightered to shore. There are no docking facilities. The community wants to develop a boat harbor and launch ramp (DCCED, 2009).

Barges can land along the sandy gravel beach at the north end of the community—several near the airport, which has a wide flat beach. Another barge landing site is located further east, at a wide beach located near the power plant and school bulk fuel tanks, as shown in Figure 6.6.9. Currently, when freight barges land in Kokhanok, they often have to build up a ramp using the existing beach gravels and put down steel plates to provide traction while offloading cargo across the beach. Installing a concrete ramp across the beach area would provide a more permanent solution to this problem.

Fuel barge operators said that there are deadmen available for the beach landing site and this is sufficient to meet there needs.

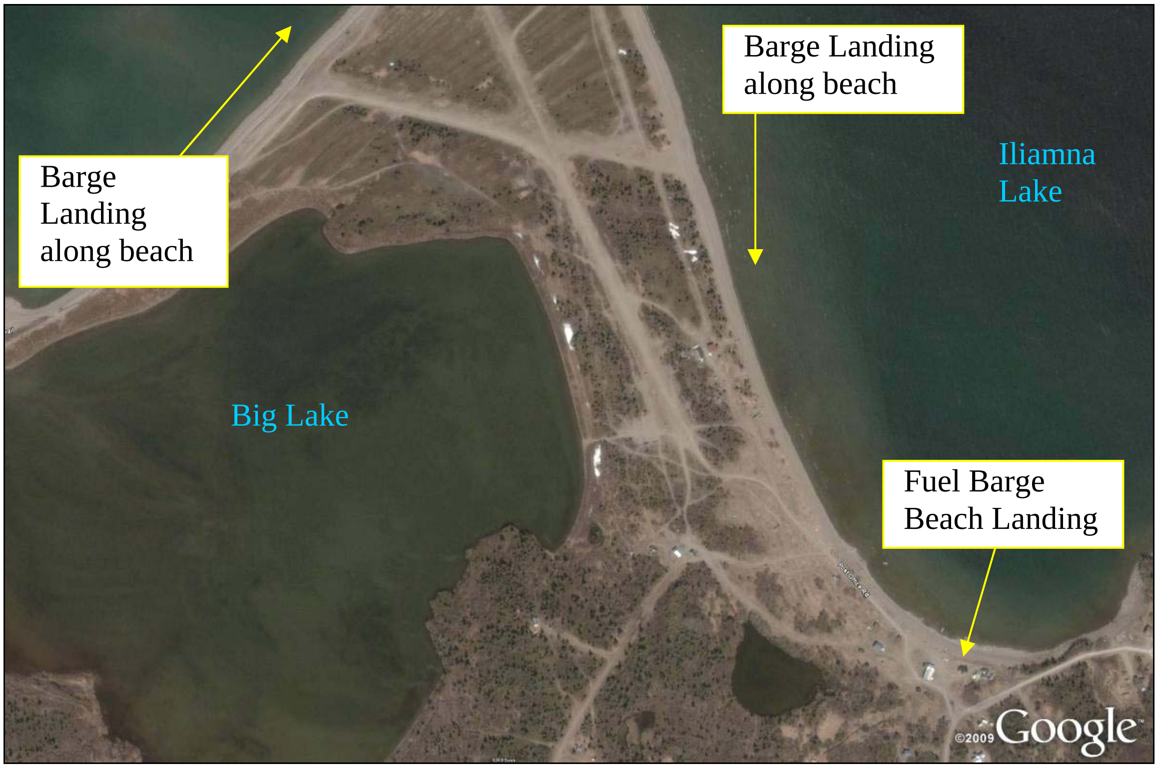

Figure 6.6.9: Barge beach landing areas at Kokhanok.

6.6.7 Koliganek

Koliganek is located on the left bank of the Nushagak River, and lies 65 miles northeast of Dillingham. The area is in a climatic transition zone. The primary influence is maritime, although a continental climate affects the weather. Average summer temperatures range from 37 to 66°F; winter temperatures range from 4 to 30 °F (DCCED, 2009).

Koliganek had a 2008 population of 174; slightly lower than the 2000 census population of 182. Power service is provided by the New Koliganek Village Council using diesel. In 2000, fuel oil/kerosene was the main source of heat and used in 70% of households (DCCED, 2009).

A new State-owned runway is available. Boats and ATVs are used in the summer; snow machines in the winter. Locals travel to New Stuyahok frequently. There are no docking facilities; goods are lightered from Dillingham (DCCED, 2009).

There is a steep bank from the river up to the community and one main road that comes down to the beach. Both fuel and freight barges land at this location. It is about 600-ft to the three fuel tank farms in the community, which are separate but all located very near each other. The landing site has deadmen to facilitate mooring at the beach landing site. No improvements were recommended by barge operators.

6.6.8 Levelock

Levelock is located on the west bank of the Kvichak River, 10 miles inland from Kvichak Bay. It lies 40 miles north of Naknek and 278 air miles southwest of Anchorage. It is located near the Alagnak Wild and Scenic River Corridor. Levelock is in a climatic transition zone; it is primarily maritime, although the continental climate also affects the weather. Average summer temperatures range from 30 to 66°F; winter temperatures average from 4 to 30°F. Annual rainfall is 26-in, including 70-in of snow. Fog and low clouds are common during the summer. The River is ice-free from June through mid-November (DCCED, 2009).

The population of Levelock has been decreasing in recent years: the estimated 2008 population was 70 and the 2000 population was 122. Power service is provided by the Levelock Electric Cooperative using hydropower and diesel. In 2000 kerosene was the primary heat source for 95% of households (DCCED, 2009).

Levelock is accessible by air and water. In the winter, trails to surrounding villages are used. The State owns a lighted gravel runway and scheduled and charter flights are available. Bulk goods are delivered by barge. A 110-ft long dock and beach unloading area are available. The dock needs improvements to enable barge landings (DCCED, 2009).

The dock is a sheetpile bulkhead and an upland staging area for freight. However, the bulkhead is often dry and is not accessible by barge. Freight barges currently land on the beach near this area to offload cargo. Fuel barges anchor offshore and float hose into shore when offloading fuel. The barge operators say that bad weather “rips through this area”. This, combined with rocks, debris, and boats along the shoreline make landing directly on the shore hazardous.

One solution suggested was to extend the dock out to deeper water or use a grounded barge to tie to, as was the previous arrangement at this site.
Both freight and fuel barge operators agree that, at a minimum, this site is a priority for installation of mooring points (i.e., deadmen) on shore to facilitate holding position while offloading. A new tank farm was installed in 2009 and by Alaska Energy Authority (AEA) and included a pipeline and header to the high waterline at the beach landing location.

Another barge landing site for offloading fuel was located downriver for the Village Council fuel tanks. At this location, the fuel barge holds to the beach and anchors both ends of the barge to avoid being pushed into rocks by the current—they recommended installing deadmen at this location. However, the 2009 fuel tank project by AEA included decommissioning these tanks, such that only one fuel stop at the new marine header will now be required.

A new dock would eliminate the need for fuel barges to float hose to the shore header/location. One option (Option A) is to install a pair of mooring/breasting dolphins with catwalks to shore, to provide deepwater moorage and access to the marine fuel header. Alternately (Option B), a rock fill causeway, with armor rock erosion protection and a vertical sheetpile face would also provide a surface for direct freight offloading. The proposed improvements at Levelock are depicted in Drawing D12 in Appendix D.

6.6.9 Manokotak

Manokotak is located 25 miles southwest of Dillingham on the Igushik River. Manokotak is located in a climatic transition zone. The primary influence is maritime, although the arctic climate affects the region. Average summer temperatures range from 40 to 70°F; winter temperatures average from 4 to 30°F. Annual precipitation ranges from 20 to 26-in. Fog and high winds exist periodically through the year. The river is ice-free from June through mid-November (DCCED, 2009).

Manokotak has an increasing population: it was 430 in 2008 and the 2000 census population was 399 (DCCED, 2009).

Manokotak is accessible by air and water. The Igushik River consists of tight, broad meandering loops, such that many miles of waterway must be traveled to cover a comparably short distance in air miles. Regular and charter flights are available from Dillingham. There is a lighted gravel airstrip located one mile to the north, and a seaplane base. Lighter barges deliver cargo each summer, but must pull up to the mud beach; there are currently no docking facilities on the Igushik River. ATVs, snow machines, and some vehicles are used for local travel. The Manokotak Trail to Dillingham is used by snow machines during winter to haul fuel (DCCED, 2009).

Power service is provided by the Manokotak Power Company using diesel. In 2000 fuel oil was the primary source of heat and used in 97.9% of households (DCCED, 2009).

Freight deliveries are made to a dedicated barge landing area on the Snake River to the east; and there is a 6.5-mile road from the community to this site. This seems to be adequate for the volume of goods delivered to this community.
Fuel barge operators consider Manokotak a priority for improvements. The river is strongly affected by the tidal range and there is a lot of debris and skiffs beached along the riverbank in front of the community. One fuel barge was damaged in the past when attempting to land on the beach at this site. It was recommended that three mooring points (i.e., deadmen) be installed at a dedicated landing site. Ideally, if fuel system improvements are planned for the community in the future, a fuel header and pipeline should also be installed at the dedicated barge landing area.

The proposed mooring points at Manokotak are depicted in Drawing D13 in Appendix D.

6.6.10 Newhalen

Newhalen is located on the north shore of Iliamna Lake at the mouth of Newhalen River, 5 miles south of Iliamna. Newhalen lies in the transitional climatic zone. Average summer temperatures range from 42 to 62°F; winter temperatures average 6 to 30°F. The record high is 91°F; the record low, -47°F. Annual precipitation is 26-in, including 64-in of snow (DCCED, 2009).

The 2008 population was 162; the 2000 census population was 160. Power service in Newhalen is provided by the I-N-N Electric Cooperative using hydro-electric with diesel backup. The INN Electric Cooperative owns a diesel plant in Newhalen and 50 miles of distribution line to connect the three communities of Iliamna, Newhalen and Nondalton. The bulk fuel capacity, including the Clinic, Nondalton Village Corporation, the City, and the School totals an estimated 464,000 gallons. Hence, a majority of the fuel delivered to Iliamna Lake is delivered to these communities.
In 2000, fuel oil was the primary source of heat used in all households in Newhalen (DCCED, 2009).

There are two State-owned gravel airstrips, located between Iliamna and Newhalen. Scheduled and charter air services are available. A gravel road connects these communities and the airport. A local priority is the construction of a road between Iliamna and Nondalton, with a bridge over the Newhalen River. Barges deliver bulk goods via the Kvichak River, which are lightered to shore (DCCED, 2009).

A dock exists at Iliamna and a road connects it to Newhalen. Freight is usually delivered to the City Dock at Iliamna and recipients can pick it up there or it can otherwise be trucked into Newhalen. Bulk fuel is delivered to the marine fuel header located on the beach of the Newhalen River, as shown in Figure 6.6.10. Barge operators indicated that there are deadmen located on the beach and this is sufficient for their purposes.

Figure 6.6.10: Fuel barge beach landing site at Newhalen.

6.6.11 Nondalton

Nondalton is located on the west shore of Six Mile Lake, between Lake Clark and Iliamna Lake, 15 air miles north of Iliamna. Nondalton lies in the transitional climatic zone. Average summer temperatures range from 42 to 62°F; winter temperatures average 6 to 30°F. The record high is 91°F and the record low is -47°F. Annual average rainfall is 26-in, with 64-in of snowfall (DCCED, 2009).

Nondalton had a 2008 population of 202; the 2000 census population was 221. Nondalton is primarily accessible by air and water. Power service in Nondalton is provided by the I-N-N Electric Cooperative using hydro with a diesel backup. There is a total of about 60,000 gallons bulk fuel storage in Nondalton. In 2000, fuel oil was the main source of heat used in 77% of households (DCCED, 2009).

A State-owned gravel runway allows for scheduled and charter air services, which is the primary way to access this community. There are no docking facilities (DCCED, 2009).

None of the barge operators who were interviewed provide direct barge service to Nondalton. Fuel is flown into Nondalton. Freight is delivered to the dock in Iliamna then it is taken by a gravel road to Fish Camp, located across from Nondalton on the east side of the lake, where it is ferried by skiff or barge to the west side, as shown in Figure 6.6.11. It is assumed that the residents are responsible for their own transportation of cargo from Iliamna to Nondalton. Construction of a bridge across the river is recommended to facilitate this.

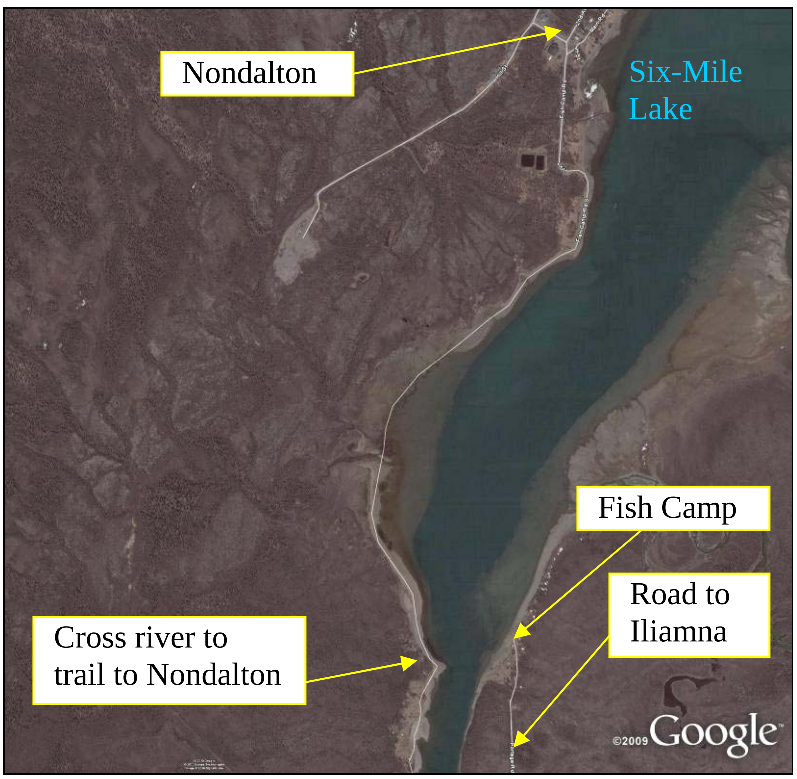

Figure 6.6.11: Access to Nondalton.

6.6.12 Pedro Bay

Pedro Bay is located at the east end of Iliamna Lake, at the head of Pedro Bay, 176 air miles southwest of Anchorage on the Alaska Peninsula. Pedro Bay lies in a transitional climatic zone with strong maritime influences. Average summer temperatures range from 42 to 62°F; winter temperatures range from 6 to 30°F. Annual rainfall is 26-in, with 64-in of snowfall (DCCED, 2009).

It had an estimated 2008 population of 44; this is down slightly from the 2000 census population of 50. The Census Population History has been reasonably stable since 1950. Power service is provided by the Pedro Bay Village Council using diesel. The total bulk fuel capacity is about 58,000 gallons including the Village Council and the School. In 2000, fuel oil/kerosene was the primary heat source for 78% of households (DCCED, 2009).

Pedro Bay is accessible by air and water. There is a State-owned gravel airstrip, which is undergoing major improvements. Scheduled and charter air services are available. Barge service is available from Naknek via Kvichak River. Goods are also sent by barge from Homer to Iliamna Bay on the Cook Inlet side and portaged over the 14-mile road to Pile Bay, located 10 miles to the east of Pedro Bay. There is a landing ramp and upland storage at Pile Bay that is owned by a private landowner, which barges use for receiving cargo transferred from Cook Inlet (DCCED, 2009).

Figure 6.6.12: Landing ramp location at Pedro Bay.

There is a gravel ramp located at Pedro Bay that is used for barge landings; it is located in a protected cove in Smokehouse Bay, shown in Figure 6.6.12. Barge operators have indicated that the ramp works well for their purposes and because it is in a well-protected area, the gravel material that forms the ramp does not get washed away as easily as in the more exposed locations on the Lake. Fuel barge operators indicated that it would be easy for Pedro Bay to tie into the road system to Williamsport; however, it still would be less costly to fly fuel into Iliamna and barge it to Pedro Bay. Barge operators had no recommendations for improvements to the barge landing facilities at Pedro Bay.

6.6.13 Portage Creek

Portage Creek is located at the mouth of Portage Creek, a tributary of the Nushagak River, 29 miles southeast of Dillingham. Portage Creek is located in a climatic transition zone. The primary influence is maritime, although a continental climate affects the weather. Average summer temperatures range from 30 to 66°F; winter temperatures range from well below zero to 30°F. Annual precipitation ranges from 20 to 35-in. Fog and low clouds are common during the summer. The River is ice-free from June through mid-November (DCCED, 2009).

Portage Creek had an estimated population of 7 in 2008; this is down significantly from the 2000 census population of 36. Through the mid-1980s, Portage Creek was an active community, but the population has since declined and now is primarily used in summer for recreational and subsistence purposes. There is no power service in Portage Creek other then individual generators. There is no central bulk fuel storage in the community. In 2000, wood was the primary heat source in all households (DCCED, 2009).

Chartered air transport is most frequently used to reach Portage Creek, and skiffs are used locally. There is a State-owned gravel airstrip, maintained only during summer months, and seaplanes may land on the Nushagak River. Cargo goods are brought to the beach, since there are no docking facilities. Snow machines are used for winter travel (DCCED, 2009).

Barges land on the beach at Portage Creek, and push the beach to maintain position while offloading their cargo. They said that mooring points, or deadmen, are recommended to eliminate the need for this, but it is not a priority because the volume of goods delivered to this community is small.

Summary

A summary of the recommended barge landing improvements for each of the communities included in this study is shown in Table 6.1, below.

Table 6.1: Alaska Barge Landing Assessment, Phase 2, Recommended Improvements

Region	Community	Mooring Points (Dock or Shore)	Dolphins and/or Fenders	New Dock	Ramp	Dredging or Rock Removal	Fuel System Improve-ments[1]	Other[2]
Northern Southeast Alaska	Angoon	--	--	X	--	--	X	X
	Douglas	--	--	--	--	--	--	--
	Elfin Cove	--	--	--	X	--	--	--
	Excursion Inlet	--	--	--	--	--	--	--
	Gustavus	--	--	--	--	--	--	X
	Haines	--	--	--	--	--	--	--
	Hoonah	X	X	--	X	--	--	X
	Juneau	--	--	--	X	--	--	--
	Kake	--	--	--	--	--	--	X
	Pelican	--	X	--	--	--	--	X
	Sitka	--	--	--	--	--	--	--
	Skagway	--	--	--	--	--	--	X
	Tenakee Springs	--	--	--	X	--	--	X
	Yakutat	--	--	--	--	--	X	--

Region	Community	Mooring Points (Dock or Shore)	Dolphins and/or Fenders	New Dock	Ramp	Dredging or Rock Removal	Fuel System Improve-ments[1]	Other[2]
Southern Southeast Alaska	Coffman Cove	--	--	--	--	--	--	--
	Craig	--	--	--	--	--	--	--
	Edna Bay	--	--	X	--	--	--	--
	Hollis	--	--	--	--	--	--	--
	Hydaburg	--	--	--	--	--	--	--
	Hyder	--	X	X	--	--	--	--
	Kasaan	--	--	--	--	--	--	X
	Ketchikan	--	--	--	--	X	--	--
	Klawock	--	--	--	--	--	--	--
	Kupreanof	--	--	--	--	--	--	--
	Metlakatla	--	X		--	--	X	--
	Meyers Chuck	--	--	--	X	--	--	--
	Naukati Bay	--	--	--	--	--	--	--
	Petersburg	--	--	--	--	X	--	--
	Point Baker	--	--	--	X	--	--	--
	Port Alexander	--	--	--	--	--	--	--
	Port Protection	--	--	X	--	--	--	--
	Saxman	--	--	--	--	--	--	--
	Thorne Bay	--	--	--	--	--	--	--
	Whale Pass	--	--	--	--	--	--	--
	Wrangell	--	--	--	--	X	--	--
Alaska Peninsula/ Aleutians/ Pribilofs	Adak	--	--	--	--	--	--	X
	Attu	--	X	--	--	--	X	--
	Chignik	X	X	--	--	--	--	--
	Cold Bay	--	--	--	--	--	X	X
	False Pass	--	X	--	--	--	X	--
	Ivanof Bay	--	--	--	--	--	X	--
	King Cove	--	--	--	--	--	--	--
	Nelson Lagoon	--	--	--	--	--	--	--
	Nikolski	--	--	--	--	X	--	X
	Perryville	X	--	--	X	--	X	--
	Port Heiden	--	--	--	--	--	X	X
	Port Moller	--	--	--	--	--	--	--
	Saint George	--	--	--	--	--	--	X
	Saint Paul	--	--	--	--	X	--	--
	Sand Point	X	X	--	--	X	--	--
	Shemya	--	--	--	--	--	--	X
	Ugashik	X	--	--	--	--	X	--
	Unalaska	--	--	--	--	--	--	--
Kodiak Island	Afognak	X	X	--	--	--	--	--
	Akhiok	--	--	--	--	--	--	--
	Karluk	--	X	X	--	--	X	--
	Kodiak	--	--	--	--	--	X	--
	Kodiak Station	--	--	--	--	--	--	--

Region	Community	Mooring Points (Dock or Shore)	Dolphins and/or Fenders	New Dock	Ramp	Dredging or Rock Removal	Fuel System Improve-ments[1]	Other[2]
	Larsen Bay	--	X	--	--	--	--	--
	Old Harbor	--	--	X	--	--	X	--
	Ouzinkie	--	X	--	--	--	X	--
	Port Lions	--	--	X	--	--	X	X
	Womens Bay	--	X	--	--	--	--	--
South Central Alaska	Chenega Bay	--	--	--	X	--	--	X
	Cordova	--	--	--	--	--	--	--
	Eyak	--	--	--	--	--	--	--
	Halibut Cove	--	--	--	--	--	--	--
	Homer	--	--	--	--	--	--	X
	Kasilof	--	--	--	--	--	--	--
	Kenai	--	--	--	--	--	--	--
	Nanwalek	--	--	--	X	--	--	X
	Ninilchik	--	--	--	--	--	--	--
	Pt. MacKenzie	--	--	--	--	--	--	--
	Seldovia	--	--	--	--	--	--	--
	Seward	--	X	--	--	--	--	X
	Tatitlek	--	--	--	--	--	--	X
	Valdez	--	--	--	--	--	--	--
	Whittier	--	--	--	--	--	--	--
Iliamna/Bristol Bay	Aleknagik							
	Ekuk	--	--	--	--	--	X	-
	Igiugig	--	--	--	X	--	--	--
	Iliamna	--	--	X	--	--	--	X
	King Salmon	--	--	--	--	--	--	--
	Kokhanok	--	--	--	X	--	--	--
	Koliganek	--	--	--	--	--	--	--
	Levelock	X	X	X	--	--	--	--
	Manokotak	X	--	--	--	--	X	--
	Newhalen	--	--	--	--	--	--	--
	Nondalton	--	--	--	--	--	--	X
	Pedro Bay	--	--	--	--	--	--	--
	Portage Creek	X	--	--	--	--	--	--

[1] Providing fuel headers and/or pipelines, relocating fuel headers or fuel tanks or any improvements to private facilities is not included in Denali Commission Funding program. This is included for general information only. It is not included in the scoring for this report.
[2] Other: This generally consists of existing dock/landing facility repairs, electrical work, roads, breakwater structures, providing navigational aides, security fencing, or logistical or other issues.

7.0 BARGE LANDING IMPROVEMENTS – DESIGN CONSIDERATIONS

The purpose of this study is to develop “standard” conceptual designs for barge facilities to serve remote coastal communities in southeast, south-central, and southwestern Alaska. The first phase of this Assessment (USACE, 2008) included concept designs for barge landing facilities in northern and western Alaska coastal and riverside communities.

The designs presented are intended to be as simple as practical and require the use of construction tools and equipment that are typically available in the associated regions of Alaska. The concept designs presented herein are intended to supplement those provided in the Phase 1 report. A standard industry rule of thumb for public works projects is a useful design life of 30 to 50 years. These standards were considered when developing the design concepts for this report.

The landing site improvement design that is applicable to a site will vary from the concept designs provided in this report, depending on the specific conditions found at the site. These may include a number of physical and environmental conditions that must be understood and designed for accordingly. For the regions covered by this report, these include, but are not limited to:

- Soils and depth to bedrock
- Variable tides/water levels
- Existing ground elevations (i.e., topography and bathymetry)
- Oceanography/wave exposure
- Erosion
- Seismic
- Corrosion

Each of these will be further discussed in the following subsections.

7.1 Soils and Depth to Bedrock

In contrast to the commonly found weak soils and permafrost areas common to the regions studied in the Phase 1 Assessment, the soils in many areas included in this phase of the study are often course-grained or rocky and depth to bedrock can be relatively shallow. However, the soils in some of the sites located along rivers (e.g., Levelock) are primarily alluvial silts with similar properties as those discussed in the Phase 1 report.

Coarse grain soils including gravel and shot or crushed rock are typically better for foundations due to their inherently better structural properties and the ability to achieve the required capacities during pile driving. They typically have high internal angles of friction which mean that they can stand on a steeper slope and will be more resistant to undesirable movement. Coarse grain soils also provide better drainage. Fine grain soils can hold water and this can result in undesirable movement especially in freezing and thawing conditions.

However, the presence of shallow bedrock can present problems. Pile designs for docks, dolphins, or other marine structures require driving the piling to a sufficient embedment depth in order to achieve the required load capacities. If bedrock is encountered prior to reaching the required depth, it may prevent driving the piling using normal pile driving equipment and methods. If this occurs, drilling, socketing, or more sophisticated means to anchor the piling into the rock would become necessary.

Construction cost-savings may be realized and construction claims mitigated if more information is gathered about site-specific subsurface conditions prior to final design of a new barge landing facility. Without a site specific geotechnical investigation the design must be predicated on conservative assumptions and there is a much higher risk of unanticipated conditions. The presence of shallow bedrock and or unsuitable fine grained soils could add significantly to the cost of construction especially if the contractor is forced to mobilize additional and unanticipated equipment or materials to the site.

Site specific geotechnical investigations should be conducted for all new structural improvements. Borings must extend deep enough to classify the soils throughout the required pile embedment depths and to verify the presence, or absence, of bedrock. In addition, it is recommended to include load testing and pile driving analysis (PDA) during pile driving to ensure that the necessary bearing capacities are being achieved during construction.

7.2 Variable Tides/Water Levels

Most of the communities covered by this Assessment are coastal communities and are affected by tides. Tidal variations in Southeast Alaska, Kodiak Island, and the Alaska Peninsula/Aleutians/Pribilofs regions are generally moderate, as compared to some areas of Bristol Bay and South-central Alaska which experience some of the most extreme tidal ranges on the planet. Published tide predictions are available for most coastal areas. The riverside communities are subject to seasonal variations in water levels, spring flooding, and freeze-up and breakup. The operational river stage must be established based on available hydrographs or local anecdotal information. The operational river stage will likely vary over the shipping season.

These conditions lead to a number of design considerations. Ideally, the structure should be positioned so that it is accessible by the largest drafting vessel at the lowest tide elevation, with one or two feet of clearance beneath the hull of the vessel. The percentage of time that a berth can be occupied by a given vessel may vary; 100 percent access is the goal but in some cases may not be practical. In coastally affected areas at extreme low tides nearshore water depths may result in grounding unless dredging is possible. In these situations, barges may have to hold off until the flood tide to access the dock. Extreme low tides that prevent a vessel from reaching a specific dock, breasting dolphin, or ramp may occur over a relatively small percentage of the time. In cases where full tide access is required, modifying the ocean or river bottom through dredging may need to be considered.

Next, it is important to set the deck height of the structure so that it is optimized for all tide ranges, or for rivers—the normal navigational flow of the river. This should consider the freeboard and draft of the design vessel as well as the recorded extreme high water levels, and design wave heights as appropriate so that its top is at least at the level of the anticipated high water during its design life, and ideally with 2 to 4 ft above the highest recorded water levels. Some over topping during storm events may occur. In addition, the finish grade of the structure will need to consider the freeboard and draft of the barges they serve.

In some cases for riverside sites, this may not be feasible, and the design must include protective features for potential extreme water levels and flooding. During spring break up this may be accompanied by ice. Some loss of fill from a bulkhead or other fill structure may occur as a result. Placing a layer of cobbles a foot or so below the top of the fill may help to mitigate the loss of material during flooding under these circumstances.

This includes erosion protection for the toe of the structures and for any fill behind it that may be impacted. The structural design must also include consideration of the hydraulic forces of saturated fill and foundation materials. Finally, the location and elevation of ancillary equipment and structures (buildings and fuel headers for example) must take into consideration the local extreme water levels.

7.3 Existing Ground Elevations

Understanding the local topography (upland elevations) and bathymetry (offshore ground elevations) is important prior to completing the design any structure. This is especially important for more involved structures, such as docks, where the difference in a few feet can result in a dock that is not accessible by the barges or huge cost overruns during construction.

7.4 Oceanography / Wave Exposure

The regions included in this study are dominated by coastal sites. The physical oceanography of the regional and local area should be studied to understand currents, sediment transport, and wave action at any particular site. For example, localized currents can affect maneuverability, sedimentation, and erosion at a landing site and a structure could be located to minimize the effects or designed for accordingly by varying orientation or layout of the structure, using erosion protection, and other means.

Similarly, the design wave that a structure experiences should be considered in the final design process. Waves will effect the barge landing in a number of ways. First they exert a force on the structure that must be accounted for in design. Next they may effect the crest or deck elevation of various structures. The maximum water level including wave height and run up must be evaluated to account for this. Finally they can effect operations. Even if a structure is designed for a local wave climate it may be too rough to safely operate a barge loading or unloading operation.

Waves will vary by location, by fetch and by exposure. The primary contributing factors to locally generated waves are the length of fetch and the wind conditions. Some sites along the coast may also be exposed to long period wavers generated in the open ocean away from the project site. There are a number of ways to estimate the wave conditions including methods outlined in the USACE Shore Protection

Manual (1984), the USACE Coastal Engineering Manual (2002), other computer based techniques, and project site specific measurement.

7.5 Erosion

The coastline or stream bank in the vicinity of the proposed facility should be evaluated for stability prior to final design. Historical records including surveys and aerial photographs can aid in this. It is important to note that the addition of a large structure into an otherwise stable river area or coastal area that experiences longshore flow may alter the flows and create an erosion problem where none previously existed.

Ramps, fill areas, or wharfs with bulkhead designs should consider erosion protection alternatives, including placement of armor rock. Barge operators have indicated that rocks bigger than about 8-in are considered a hazard. Any landing that requires large angular rock may not be useful and may become more of an obstacle for landing.

Erosion at the toe of ramps or fill structures with sheetpile bulkheads can increase the loads on walls and tie-back anchors (if used) and reduce global stability. A scour allowance should be included in the design of any structure where erosion is expected.

7.6 Seismic

Many of the sites are in active seismic zones. Because the barge landings are important lifelines to the communities, it is important to include attention to the seismic performance of the structures in the design. The US Geological Survey (USGS) National Seismic Hazard Maps can be used to provide appropriate probability based peak ground accelerations for various return periods. Pile supported platform docks can be designed using seismic design procedures outlined in American Society of Civil Engineers standard 7-10 (ASCE, 2010). For earth filled structures the Mononobe Okabe or more advanced methods can be used to account for increased lateral loads and decreased soils properties in a seismic event. The level of seismic design included in a particular structure’s design depends on the level of risk that is acceptable in relation to the importance of a structure in a community. For the most part, barge landing facilities consisting of wharfs or docks at large hub communities may warrant some level of seismic design as opposed to simple barge landings and offloading areas at small destination/end communities.

7.7 Corrosion

Corrosion protection is particularly important for structures in or near saltwater or in tidally effected river areas. In theses areas it can be one of the most important considerations for design life and maintenance. Corrosion protection should be included in the design for any structure located in these areas. Consideration should be given to coatings, galvanizing, and active and passive anode systems.

7.8 Other Considerations

In addition to the environmental conditions that need to be considered when siting and designing berthing facilities, other factors should be considered including the drafts and freeboard of the vessels expected to utilize the facility, the type of cargo to by on/offloaded, and the methods used for on/offloading cargo. This will affect the type of structure chosen, structure height, fenders, mooring requirements, and other appurtenances associated with the structure.

Bollards or other type of fixed mooring points are needed to moor vessels. Where soil properties permit, this may be as simple as driving a pipe pile to depth, cutting it off above finish grade, capping it and installing a cross-arm to form a bollard. In other situations, where barges land on the beach for example, deadmen-type anchors on shore may be required. Deadmen can be created using navy anchors, pre-cast concrete blocks or anchor piles. The use of mooring dolphins combined with fendering (e.g., breasting dolphins) may be considered in lieu of a full scale dock structure at some locations where beach access is not possible.

Some form of fenders should be provided along the outer face of a fill bulkhead or breasting dolphin to protect the structure and the vessels. For larger vessel moorage, or for fenders on pile supported dock structures these may include fixed pin piling and energy absorbing fender panels, or a combination of these and timber piling installed along the face of a dock structure. For smaller vessel moorage or where a dock or bulkhead with a vertical face, these may be as simple as used heavy equipment tires chained to the face, or commercial pneumatic or foam-filled cushions. At river sites where ice is expected, fenders should be removed at the end of each season to avoid loss or damage from winter ice or from ice during spring breakup.

8.0 BARGE LANDING IMPROVEMENTS – CONCEPT DESIGN OPTIONS

To accommodate the type of barge operations typical of these southern Alaska regions, barge operators suggested a few primary types of improvements that could be made including:

- New docks, or re-building existing docks
- Mooring and breasting dolphins
- Other mooring points (i.e., dock bollards, deadmen)
- Repairs or upgrades to existing dock facilities such as
    - improving mooring or offloading arrangements (i.e., where existing facilities exist but are not easily safely accessible by barge),
    - installing mooring points,
    - replacing fenders, and
    - lighting and fuel pipeline improvements

To a lesser degree, at some locations barge operators recommended:

- Existing facility repairs and upgrades such as ramp surfacing, corrosion protection and security fencing.
- Dedicated landing ramps and upland staging areas/gravel pads for freight operations.

- Dredging for access to shallow areas or for navigation safety (i.e., removing specific boulder hazards) or installing navigational aides.

A detailed study of the soils/bedrock, bathymetry, currents, erosion, and sediment transport must be conducted at each site prior to final design of any dock structure to be located on a waterfront to determine the pile lengths and pile embedment depth, erosion and scour potential, and downstream effects of structure placement, as well as other factors.

It should be noted that any structure placed in waterfront areas are subject to regular periodic maintenance needs that may include minor dredging or placement of rock and/or gravel material in areas where sediment deposition, erosion, scour and ice-plucking have occurred at the landing facility.

The Phase 1 Assessment focused on concept designs for barge landings that were most applicable for the western regions of the State and included various types of upland mooring points and bollards on docks, sheetpile bulkhead wharf facilities, rock fill causeway ramps, concrete plank ramps, dry upland staging areas, and combinations of these.

Although some of the sites in the southern regions of the State should and do consider the applicability of these concepts for barge landings where similar site conditions are found. For example, a permanent ramp or bulkhead type dock facility may be more appropriate for the river and lakeshore communities in the Lake Iliamna/Bristol Bay Region. Similarly, a small rural community that does not receive regular or frequent barge deliveries due to low demand, may not require a full scale dock facility yet the rocky shorelines prevalent in the southern regions of the State may preclude beach landings especially for fuel barges where the environmental risk of groundings is high. In such instances, for example, barge operators may recommend offshore mooring and breasting dolphins be installed to allow secure offshore moorage during fuel offloading.

Many locations in the southern coastal regions of Alaska generally have some level of existing infrastructure in place. Hence, many of the recommended improvements are associated with repair or upgrades to the existing facilities. This varies from installing new fenders, replacing fenders or mooring bollards, to completely re-building aged and degraded dock facilities. In addition, some locations where existing docks are in place are at risk of damage due to difficult mooring arrangements or the degraded condition of the existing facility. In these cases specific improvements such as fill structures and bulkheads as well as breasting dolphins to help keep the vessel off of the existing structure during berthing were recommended.

To encompass these recommendations and to supplement the concept designs included in the Phase 1 Assessment, the following concept designs were developed to illustrate practical options for barge landing improvements:

- Mooring and breasting dolphins, with optional catwalk to shore
- Fenders
- Pile-supported pass-pass dock

- Rock fill causeway with sheetpile bulkhead face

Concept designs have been developed for the recommended improvements and are illustrated in the drawings included in Appendix D.

8.1 Mooring and Breasting Dolphins

To facilitate tying off of barges and holding position during offloading, some type of mooring point is needed. Even at locations where beach landings are practical, upland mooring points, such as bollards or deadmen are needed at a minimum. Many sites in the southern regions of Alaska, however, have rocky coastlines. Where shallow rocks present a hazard to barges and where no existing dock facility is available, fuel barge operators recommended installing offshore mooring and breasting dolphins.

A dolphin is a marine structure that extends above the water level and is not connected to shore. Dolphins are usually installed to provide a fixed structure when it would be impractical to extend a dock or causeway out from shore to provide a dry access facility. Typical uses include providing a point to moor to (a mooring dolphin) or extending a berth (a berthing or breasting dolphin).

Mooring dolphins may be installed at existing docks to facilitate mooring of larger barges where the dock is small or has insufficient bollards or cleats. These dolphins should be located offset from the dock facility to each side.

Mooring dolphins consist of a pile cluster, typically consisting of 3 to 5 piles, driven into the seafloor and connected above the water level with framing to provide a platform and/or a fixing point. These often include a mooring bollard at the top to facilitate tying off of vessel mooring lines. Mooring dolphins should be placed so that the vessel can have bow and stern lines at reasonable angles to provide adequate mooring. An ideal rule of thumb spacing would be about a vessel beam width in front and behind the vessel; although a distance of half of this can be suitable. This is not always achievable for facilities where many types and sizes of vessels are expected to use the facility.

The piles can be pressure treated wood poles, or steel or reinforced concrete. Smaller mooring dolphins can have the piles drawn together with wire rope, but larger dolphins would typically be fixed using a reinforced concrete capping and/or a structural steel frame. A boat may be required to access a mooring dolphin, but a pedestrian catwalk may be installed to connect dolphins together and/or to a dock or shore.

Breasting dolphins are dolphins that are designed to withstand berthing loads and are essentially mooring dolphins that are equipped with energy absorbing fenders. Breasting dolphins were recommended by some barge operators to allow safe berthing at existing docks which are aged and not considered strong enough to handle the berthing loads of the larger barges.

Breasting dolphins placed seaward of the dock face and to each side would allow a barge to breast against the dolphin instead of the existing dock facility. Mooring and breasting dolphins may also be used as part of a full-scale dock design as a way to minimize the overall size of the dock face while still allowing larger vessels to berth.

A typical configuration recommended by barge operators utilizes breasting dolphins and catwalks as a way to access hazardous shores and enable the fuel barge to run the fuel hose to the shore-based fuel header. An example of this arrangement is illustrated in Drawings C1-A and C1-B in Appendix C.

This type of barge landing would not be suitable for heavy freight transfer, but would be helpful for freight deliveries these smaller communities where it could be beneficial to provide moorage for the larger barge while a lightering barge delivers cargo to shore. It should be noted that ideally, a catwalk and breasting dolphin arrangement like this would also include mooring dolphins set back from the breasting dolphins and about a barge beam away at each end. Alternatively shore based mooring points, buoys, or other mooring aides could be used. In an effort to provide minimal improvements to make more efficient and safer barge landings, especially at the smaller rural communities that see infrequent use. This may mean that a costly mooring dolphin is not included in a site plan when a breasting dolphin and catwalk arrangement is recommended—to keep costs down it is thought that these improvements combined with an upland mooring point and/or in combination with barge anchoring methods go a long way to improve the current conditions.

The strength and location of the breasting dolphins will be a function of the size and draft of the vessels, the local currents and the orientation of the vessel when moored. Details showing a typical mooring and breasting dolphin are included in Drawing C1-B in Appendix C. These dolphins can be used alone for mooring, or used in conjunction with fenders (discussed in the next section) for breasting, and also conjunction with the catwalk arrangement discussed previously.

8.2 Fenders

Fenders for docks are devices that are installed between the face of the dock and the vessel to reduce the shock or impact of the vessel on the dock (and vise versa) when berthing. Fenders come in many forms and may be as simple as used heavy equipment tires chained to the face of a dock, or could be free-standing sophisticated energy absorption units. Other common fenders include commercial pneumatic or foam-filled cushions, synthetic or log camels, timber piling installed along the dock face, or pin piling with energy absorbing panels.

Some form of fenders should be provided along the outer face of a fill bulkhead or breasting dolphin to protect the structure and the vessels. For barge moorage at breasting dolphins or pile supported dock structures, the fixed pin pile fender units depicted in Drawing C2 in Appendix C are recommended. These may be used in combination with timber piling or other fender types. For sheetpile bulkhead dock faces, timber piling, heavy equipment tires or other commercially available fenders may also be appropriate.

At several locations, existing fenders may require the exterior panels to be replaced. The two most common materials used for fender panel facing include timber and hard plastic (Ultra High Molecular Weight Polyethylene [UMWM-PE]). Either material is subject to wear including abrasion and impact damage and may have to be replaced during the service life of a fender system. Design considerations should include routine panel replacement and it may be desirable to include providing these as spare materials as part of the original project.

8.3 Permanent Dock Structures

There are numerous options for construction of permanent dock structures that may be used for delivering fuel and cargo. Many of these include various types of sheetpile bulkhead wharf structures which were described in detail in the Phase 1 Assessment report. The type of dock most recommended for the southern regions of the State, covered by this phase of the Assessment, primarily include:

- Pile-Supported Pass-Pass Dock (Transfer Bridge)
- Rock fill causeway with Sheetpile Bulkhead

8.3.1 Pile-Supported Pass-Pass Dock

In many coastal communities, freight is often delivered to a site via a pass-pass dock, otherwise referred to as a transfer bridge. This is a pile supported platform dock with a concrete deck on which the barge operators can drive forklifts and operate cranes as needed. They use what is called pass/pass arms to pass cargo between a barge and the dock using forklifts. The primary disadvantage of this type of facility is that a certain tide is needed for the barge deck to match up with the dock to drive equipment across or this can be accomplished using jump ramps. In addition, a forklift needs to be available in the community or provided by freight company.

This is an ideal option to efficiently deliver freight at hub communities or other communities where a large volume of freight is delivered. This type of dock can be designed to accommodate ferry landings and offloading of vehicles. This may be a priority for some communities where the existing docking facilities are aging resulting in the risk of the community losing ferry service. In addition, such a dock can be equipped with a fuel header and/or a crane to facilitate use by fuel barges, commercial fisherman, and other users in the community.

Typically, a pile-supported platform dock consists of pre-cast concrete deck panels over a grid of steel beams, which in turn are supported by pipe piling. The piling and the beams should be hot-dip galvanized. The beams should be connected to one another by bolting and attached to the piles by field welding. The deck should be designed for composite action with the beams through the use of welded headed studs. In this arrangement, the deck panels have block-outs to accept the studs, which are in turn filled with concrete to develop the composite action. The use of pre-cast concrete reduces field labor costs and insures the overall quality of the deck. The pre-cast panels may be either pre-stressed or normally reinforced. A typical pile supported pass-pass dock is illustrated in Drawing C3 in Appendix C.

Pipe piles must resist gravity and lateral loads. The lateral loads include mooring and berthing and possibly seismic loads. Piles may be driven initially with a vibratory hammer but should be proofed with an impact hammer and PDA to ensure the required pile bearing capacities are achieved.

Erosion protection should be provided where site conditions warrant it and includes accounting for the estimated maximum potential scour depth as well as effects to adjacent property. This may consist of a sheetpile bulkhead abutment that extends a certain distance on either side of the dock and/or armor rock erosion protection.

Fenders should be installed on the outboard face of the dock, as described in the previous section.

8.3.2 Rock Fill Causeway with Sheetpile Bulkhead

Some coastal or river communities are shallow near shore, prohibiting freight or fuel barge access for beach landings. Depending on site conditions and availability of appropriate fill material, a short causeway constructed of gravel or rock fill material may be an economical approach to providing access to deepwater for freight offloading.

For barge landings, the causeway could have a sloped end, as was described in detail in the Phase 1 report, to allow ramp barges to offload. This was recommended for western Alaska regions, where ramp barges are typically used, especially for upriver locations. However, for coastal sites, both side and end loading are common and a vertical face at the end of the causeway is preferred. In this case, the causeway end is equipped with a sheetpile bulkhead face.

Sheetpile structures are sensitive to soil conditions and erosion. Accordingly, these structures may require a more conservative design approach, particularly, tied-back bulkheads. The loads on the wall increase with finer grained soils with low internal friction values. Erosion at the toe of the sheets can be controlled through the use of rip-rap or other manmade products. Depth of placement is critical because rip-rap creates a hard-angular bottom condition, which may create grounding conditions if adequate space cannot be maintained or assured between the top of the rip-rap and the bottom of barges.

Sheetpile bulkheads that employ tie-backs may use substantially less steel than cellular-type sheetpile structures. These bulkheads rely on passive soil pressure against anchors or anchor walls and passive soil pressure against the toe of the sheets to resist the lateral soil pressure. The soil in front of the anchors must be sufficiently strong to develop the needed passive soil pressure to resist the forces; this normally equates to a well-graded granular material with an internal friction angle of 30 degrees or greater.

Threaded rod tie-backs would be anchored to either pre-cast concrete anchor blocks, battered anchor piles or a sheet-pile anchor wall. Individual anchors often consist of cast-in-place or pre-cast concrete blocks buried 30 to 40 ft (or more), behind the front wall. Discrete groups of sheetpiles may also be used as anchors. Alternatively, battered or cantilevered pipe or H-piles may be used to resist the tie-rod loads. The tie rods are typically spaced 8 to 12 ft on center and extend from the face of the bulkhead to the anchoring system. These walls are normally constructed of Z-sheets in order to resist bending stresses and reduce deflection. A waler consisting of steel channels would be installed on the inboard face of the bulkhead for attaching the tie-back anchors in a way that minimizes projections on the outboard face that could damage barges. At some sites, external walers will be required with a timber facing to protect barges and other vessels. Some type of fenders will be provided on the face all wharfs, as described in previous sections. The return walls at the ends of the wharf will be armored at the toe of the wall to prevent erosion. Armoring of the front face where depths are sufficient to protect barges may also be required. An example of a fill causeway with a tied-back sheetpile bulkhead face is illustrated in Drawing C4 of Appendix C.

In locations where shallow bedrock is expected, sufficient embedment depth may not be achievable by driving sheets. It is possible to put a shoe on them and set them into a hard layer, in some cases. Alternatively, a combination wall (combi-wall) could be used, which employ pipe or H-piles in combination with the Z-sheets to achieve the required stiffness to control deflections and/or stress. In this case, these pipe or H-piles would be drilled and socketed into the bedrock, while the sheets stop at bedrock. However, this is fairly specialized and would require a site specific design.

Another way to achieve a similar design concept is for a fill causeway to be used in conjunction with a pile-supported pass-pass dock.

8.3.3 Bollards

Bollards consisting of a pipe pile with a smaller diameter pipe cross-arm may be installed at key points along the face of a new or existing dock. Pipe piles 20 to 24-in by 0.50-in wall with 6-in diameter extra strong cross arms should be considered.

9.0 PRIORITY SITES AND PROPOSED IMPROVEMENTS

The 91 communities included in this study have been evaluated and scored to determine the Priority Sites that should be considered for initial funding. Any site that received a score of 18 or higher was included as a Priority Site, and Site Plans and cost estimates were developed for these projects.

Keeping in mind the focus of priority still being placed on the remote, rural Alaska communities that depend on continued barge service for survival, the weight of some of the scoring criteria listed below was revised somewhat in an effort to provide a comprehensive evaluation of priority for both phases of the Assessment. This is explained in more detail below.

Each of the communities where scored based on:

1. Urgency/Timeframe: Based upon the apparent urgency for landing facility improvements at a particular site, this score represents the practical timeframe for which the recommended improvements should be performed. Private facilities are not within the scope of this Assessment for public funding, and although discussed in the report to provide an understanding of overall needs, it does not qualify as a priority for public funding.
    - 10 points: Immediate need
    - 5 points: Recommend improvements within 5 years
    - 1 point: Recommend improvements within 10 years
    - 0 point: Improvements not recommended, other facilities are available at the site, or the facility is a private facility, or

improvements are recommended for completion beyond 10 years.

2. Frequency/Impact: This score is based on the relative frequency that barges deliver fuel and supplies to a particular site, and the perceived impact that improvements would have on increasing frequency of use or improving the operational efficiency, worker safety, environmental impacts, and/or quality of goods delivered to a community or region. For this phase of the Assessment, more emphasis was placed on scoring for the impact that the proposed improvements would have on the community, because barge landing facilities in southeast Alaska tend to have a higher frequency of use (i.e., Juneau) and this seemed to unfairly score these sites as higher priority when compared to communities in western Alaska that are hub ports for their region but are not equipped as a full scale port and do not see weekly barge service.
   - 10 points: Barges currently utilize the site frequently and improvements would clearly improve efficiency, safety, environment, and/or quality of goods to a region.
   - 8 points: Barge deliveries are made frequently and the community is dependant on continued barge service to this facility, and improvements would clearly improve access, efficiency, safety, environmental impact, and/or quality of goods at the site.
   - 7 points: Barge deliveries are made only a few times per year and improvements would likely result in increased deliveries, and/or would significantly improve efficiency, safety, environmental impact, and/or quality of goods at the site.
   - 5 points: Barges currently utilize the site several or many times per year and improvements are considered somewhat effective in improving efficiency, safety, environmental impact, and/or quality of goods at the site.
   - 3 points: Barge deliveries made only a few times per year or improvements would not result in increased deliveries or significant improvement in efficiency, safety, environmental impact, or quality of goods at the site.
   - 1 point: Barge access is one or more times per year and/or the community has alternate means of obtaining goods (i.e., road, another dock) or improvements are unlikely to have a significant impact on efficiency, environmental impacts, safety, or quality of goods.
   - 0 points: Barge deliveries made once or less per year and usage not expected to increase if improvements made. Or, existing landing site facilities or delivery methods are sufficient. Or, another project is in progress to handle the need.

3. Ease of Construction: The primary types of needed landing facility improvements identified during the study were used to score the community for ease of construction. The highest score is given to sites where simple improvements, involving little planning and design, and minimal specialized equipment are given the highest scoring. Sites where a significant amount of study, planning, and design or complicated construction may be necessary to complete the work are given lower scores. Essentially, this category facilitates the potential for funding of the Priority Sites projects which will take less time to be ready for construction.

    - 10 points: Recommendations for improvements primarily consist of mooring points installed on non-rocky shores or replacing bollards on docks or other minor dock repairs.
    - 7 points: Recommendations for improvements consist of other mooring points and/or gravel ramp, surfacing improvements, and/or staging area improvements.
    - 6 points: Recommendations for improvements include mooring and/or breasting dolphins with or without catwalk structures.
    - 5 points: Recommendations for improvements include a sheet pile or pile-supported dock structure or installation of fenders on existing structures.
    - 2 points: Recommendations for improvements include dredging and/or more involved work (i.e., breakwater, long road).
    - 0 points: Recommendations for improvements were not made, or include fuel tank/header work or other work that is not considered a “landing” under this study, or improvements are currently being studied under a separate project.

This method of scoring was derived to allow priority funding of projects at sites with the highest need and where simple improvements will provide the most value. The scores given in each of the three categories was summed to give the total score for each site. The results of the scoring are included in the matrix table provided as Appendix B. The sites with a total combined score of 18 or more points were selected as the Priority Sites projects. This resulted in 12 Priority Sites projects, which are summarized in Table 9.1, below.

Conceptual Site Plans showing the proposed work at each site have been developed using ortho-rectified (i.e., to scale) aerial photography, where available and standard aerial photographs or satellite imagery where ortho-rectified photos where not available. A sketch of the recommended facility improvements for each Priority Site has been overlaid onto the photograph to illustrate the extent of work proposed. Note that property ownership, current site layout and topography, and other basic site planning needs have not been completed as part of this initial assessment. It is expected that changes to the siting and layout of the work will be necessary. These Site Plans were used to estimate quantities and develop budgetary construction cost estimates, discussed later in this report. In addition, the Site Plans are intended to serve as a basis for discussion with community representatives, user groups, and others to aid in planning and completing the design work for the landing facility improvements. The conceptual site plans have been included in Appendix D.

Table 9.1: Proposed Barge Landing Improvements, Phase 2 Priority Sites

Region	Community	Dwg No.*	Brief Description of Recommended Barge Landing Facility Improvements
Northern Southeast Alaska	Angoon	**D1 & D2**	Sheetpile bulkhead face with backfill on which freight barges can side tie or lower barge ramps, dolphins and fenders.
	Hoonah	**D3**	Mooring bollards at City dock and sheetpile bulkhead with fill causeway and ramp.
	Kake	**D4**	Replace fender piles on City dock, new mooring points on dock and upland.
	Pelican	**D5**	Install 2 breasting dolphins, dock repairs, and fender piles.
Southern Southeast Alaska	Hyder	**D6**	Install a fill causeway extension to ADOT harbor fill area with a pass-pass dock at end, 2 mooring dolphins and 2 breasting dolphins.
Alaska Peninsula/ Aleutians/ Pribilofs	Chignik	**D7**	Install 4 dolphins and replace timber fender piles and mooring bollards/cleats at existing City Dock.
	Perryville	**D8**	Install 2 upland mooring points at each of 2 beach landing sites.
Kodiak Island	Larsen Bay	**D9**	Install 2 breasting dolphins and catwalk to fuel header.
	Old Harbor	**D10**	Install new pass-pass dock with dolphins.
	Port Lions	**D11**	Install new pass-pass dock with dolphins.
Iliamna/ Bristol Bay	Levelock A	**D12**	Option A: Install 2 breasting dolphins and catwalk to fuel header.
	Levelock B	**D12**	Option B: Install a new dock for both freight and fuel barge.
	Manokotak	**D13**	Install 3 upland mooring points/deadmen.

*Drawing number associated with the drawings included in Appendix D.

10.0 CONSTRUCTION COSTS

All of the Priority Sites, which are being considered for the first generation of improvement projects, are located in rural Alaska and are not accessible via the road system, with the exception of Hyder which is accessible via Canada's road system.

Some sites can be reached by shallow draft tugs and barges, while others may be accessible by deeper ocean-going barges. In a few situations, in the Iliamna/Bristol Bay region especially, cargo is transferred from ocean-going barges to lighters and then to shore. Most of the communities either have runways, or are near other communities with runways.

There is a limited number of qualified marine construction firms that do the type of work involved in constructing these waterfront facilities. Competition in southeast Alaska regions will be better than in the western Alaska regions; hence prices should be relatively lower. Mobilization costs can vary widely depending on the location, type of equipment available in the region, and size of the project, among other factors. It is generally more cost effective to combine several projects under a single contract if the projects are located within the same vicinity and use similar equipment. This will allow the contractor to better utilize personnel and equipment.

Because of the short construction season at remote sites, work is normally performed on a schedule of 10 hours per day, 6 or 7 days per week. Labor costs are about $800 to 1000 per day per worker, including room, board, transportation and overtime. Crew sizes will likely be 4 to 5 people, plus local hire. Typical unit prices for this work are as follows:

- Sheetpiling (projected area, coated) — $60 to 75 per square ft
- Tie-back deadman anchors — $10,000 each
- Classified Fill (sand/gravel)-local source — $50 per cubic yard
- Classified Fill (sand/gravel)-imported — $75 per cubic yard
- Rip-rap armor rock (Southeast, South-central) — $60 per cubic yard
- Rip-rap armor rock (Other regions) — $225 per cubic yard
- Pile-Supported Concrete Dock — $275 per square ft
- 3-pile dolphin — $200,000 each
- 5-pile dolphin — $300,000 each
- Anchoring/tensioning piles in shallow bedrock — $25,000 per pile
- Socket piles in rock — $5,000 per pile
- 2 pin pile fender panel w/ energy unit (add to dolphin for breasting dolphin or dock) — $80,000 each
- Foam filled fender — $12,000 each
- Equipment tire fender, or timber fender pile — $4,000 each
- 4ft wide Catwalk — $200 per linear ft
- Dredging — $35 per cubic yard
- Excavation — $20 per cubic yard
- Deadman or stake pile mooring point — $8,000 to 10,000 each

The cost to transport materials and equipment to and from the sites – mobilization and demobilization – represents a significant construction cost at remote sites; $200,000 to $350,000 is not unusual to move marine construction equipment, materials, and personnel to a site and then back again when the job is complete. Recently, we have seen bids come in with mobilization costs as high as $500,000 for similar projects in the Aleutian Islands and Alaska Peninsula. It is probable that contractors from Seattle will bid on jobs in these southern regions of Alaska, and this may account for some high mobilization costs.

One way to reduce mobilization costs is to combine multiple projects that are located in the same vicinity and have the same equipment required. For example, the proposed projects for Larsen Bay and Port Lions both involve similar construction methods and equipment and are located on Kodiak Island. It is likely that $200,000 in mobilizations costs could be realized if these projects were bid together.

Other public projects such as schools, fuel tank farms, and road and airport construction may be planned for some of these communities and the opportunity to piggy-back some costs with other projects should be explored where possible. For instance, if such a project is planned for a community where only mooring points are needed for landing facility improvements, it makes the most sense from an economic standpoint to include the mooring points into the larger project (i.e., Manokotak).

Unknown geotechnical conditions can also result in a wide variability in project costs for pile driving. In some regions included in this Assessment, shallow bedrock is prevalent and estimates for anchoring piling in bedrock either by socketing or other means should be included in budget level estimates. A geotechnical field investigation is recommended for sites where subsurface conditions are not known. This will help to reduce cost overruns and claims during construction, because without a site specific geotechnical investigation the design must be predicated on conservative assumptions and there is a much higher risk of unanticipated conditions. The presence of shallow bedrock and or unsuitable fine grained soils could add significantly to the cost of construction especially if the contractor is forced to mobilize additional and unanticipated equipment or materials to the site.

For locations where sheetpile bulkheads are planned, if shallow bedrock is found, alternate bulkhead design using a combination wall or cellular diaphragm type configuration may be required. The cost of the bulkhead portion of the facility is estimated to be approximately double that of driving sheetpile in locations where the full penetration depth can be achieved. This is because specialized techniques would need to be employed with the design, such as a combi-wall, alternate sheetpile bulkhead design, or pile supported dock design.

Another factor affecting prices is bid timing. Projects should be advertised and awarded on a schedule that allows adequate time to purchase and ship materials so that the work can be completed in one season, including demobilization. Of particular note is the availability of steel, particularly sheet piling. Delivery times of 8 to 16 weeks or more is common to the Pacific Northwest.

This work can be done under either lump sum or unit price contracts. We recommend unit price contracts where the funding source allows. Where funding is tight or prices are not well known, deductive alternates should be considered to avoid the need to revise and re-bid work, including the associated delays.

Opinion of Probable Construction Cost (OPCC) estimates for this work represents fair market value; it is not the lowest price. For example, if there were five bids for a project the engineer’s estimate should be about the third lowest cost. There should also be a contingency set aside for unforeseen or changed conditions.

Traditionally, 10 percent contingency is used at the final design stage; however, in some cases it may be prudent to set a larger amount aside. At this stage, these are planning level estimates and a 20 to 25 percent contingency should be carried.

Funding level budgets must include amounts for field investigations (e.g., survey, geotechnical study), permits, design, and construction administration. A typical allowance for these services is 15 to 20 percent. Where standard or repetitive designs are used the design fee may be less than the traditional 5 to 6 percent. Field investigation costs may be higher then normal due to mobilizing field crews and equipment to remote areas. Like construction, the field costs can be reduced by doing multiple sites under one contract or mobilization.

OPCC estimates for the recommended improvements at each of the Priority Sites are included in Appendix E. Table 10.1 provide a summary of the total estimated costs for these individual projects. These total costs assume that each site represents a stand-alone project for design and construction. In addition, these estimated do not include any costs for land acquisition, Owner's internal project management, administration, legal fees or extensive public involvement.

Table 10.1: Proposed Barge Landing Facility Improvements, Estimated Costs

Dwg No.	Community	Brief Project Description	Total Estimated Cost*
D1 & D2	Angoon	Sheetpile bulkhead face with backfill on which freight barges can side tie or lower barge ramps, dolphins and fenders.	$ 2,646,000
D3	Hoonah	Mooring bollards at City dock and sheetpile bulkhead with fill causeway and ramp.	$ 1,837,000
D4	Kake	Replace fender piles on City dock, new mooring points on dock and upland.	$ 646,000
D5	Pelican	Install 2 breasting dolphins, dock repairs, and fender piles.	$ 1,526,000
D6	Hyder	Install a fill causeway extension to ADOT harbor fill area with a pass-pass dock at end, 2 mooring dolphins and 2 breasting dolphins.	$ 4,897,000
D7	Chignik	Install 4 dolphins and replace timber fender piles and mooring bollards/cleats at existing City Dock.	$ 3,117,000
D8	Perryville	Install 2 upland mooring points at each of 2 beach landing sites.	$ 290,000
D9	Larsen Bay	Install 2 breasting dolphins and catwalk to fuel header.	$ 1,535,000
D10	Old Harbor	Install new pass-pass dock with dolphins.	$ 7,389,000
D11	Port Lions	Install new pass-pass dock with dolphins.	$ 7,202,000
D12	Levelock A	Option A: Install 2 breasting dolphins and catwalk to fuel header.	$ 1,262,000
D12	Levelock B	Option B: Install a new dock for both freight and fuel barge.	$ 2,100,000
D13	Manokotak	Install 3 upland mooring points/deadmen.	$ 244,000
Total*			**$33,429,000**

*Total Estimated Costs are based on quantities and assumptions included in Appendix E. To estimate the total budget, the more expensive of the two options for Levelock (Option B) was used.

11.0 SUMMARY

This Phase 2 Assessment of barge landing system needs, focusing on the southern regions of Alaska, has identified the infrastructure improvements needed at each community included in the study, with the goal of improving barge operations, increasing worker and environmental safety and cumulatively, improving fuel and freight delivery costs through system improvement.

By volume, fuel is the primary product delivered to these rural communities, followed by deck freight, such as containers, or break-bulk cargo (loose, non-containerized material such as long lengths of pipe or timber), vehicles, palletized cargo, etc. Chartered barges and landing craft may be used for community or residential construction projects. Some smaller communities charter landing craft to deliver bulk fuel to the community, where the access is too difficult or demand is too small for the larger barge companies to include them on their route.

There are many communities such as Juneau, Ketchikan, Kodiak, Petersburg, Sitka, Seward, Homer, Cordova, Unalaska, Whittier, and others that are well-developed ports with multiple docks and other facilities available and an economic base to support construction and maintenance. Many more communities in the regions covered by this phase of the Assessment are able to receive some regular freight via the AMHS or IFA ferry services. Still other communities, especially in the South-central Alaska Region are connected to the State road system, with connection to Anchorage and the Lower 48. Most communities on Prince of Wales Island are connected by inter-island road system, and to hub communities of Thorne Bay and Craig. There are also many small isolated communities in Southeast Alaska Region that are primarily seasonal summer communities where residents do not rely on public services. The focus of this effort is to prioritize barge landing improvements for rural Alaska communities that depend on continued barge service for delivery of essential fuel and supplies.

These communities that do not fall into the categories above, and need barge landing improvements, tend to already have some level of docking infrastructure in place. There are some exceptions to this, as identified in the text. However, most of the existing waterfront infrastructure in these rural areas is in place from past logging and fishing industry operations. The ownership and maintenance of many of these facilities is now the responsibility of the community. Due to age and deterioration over the years, many of these docks are in poor condition. Barge operators report that they continue to use these docks under restricted weather conditions, but fuel barge operators in particular, fear that when their companies switch over to the larger double-hull barges required by law, the docks will not be able to support the berthing and mooring loads. So, the primary concern here is continued safe access and environmental safety and concept designs and site plans were developed to address this need. Dock improvements, including the installation of new fenders and/or breasting dolphins in many cases would be sufficient to allow continued safe moorage at these facilities.

The barge operators agree that overall the communities of western Alaska covered by the Phase 1 Assessment continue to be a higher priority for barge landing improvements from an operational efficiency and safety standpoint. The high cost of fuel in those communities is closely related to the cost of delivering the fuel which can be exacerbated by the difficult access and landing conditions and multiple stops required to deliver fuel at single communities. As has been highlighted in this Assessment, some of these conditions exist at a handful of locations in the southern Alaska regions.

The solution to these problems is different primarily because of the existing conditions that are prevalent in these regions. Where shallow and wet landing sites and river currents pose problems in the western Alaska river regions, rocky shoreline hazards and dangerous wildlife creates access problems and delays in Southeastern Alaska. Therefore, although a hardened ramp surface may solve the access problem on a river site, a more sophisticated structure such as a dock or a breasting dolphin arrangement may be necessary on a rocky coastline.

Fuel Deliveries

Fuel deliveries are generally made by side tying to a dock, where available, or by anchoring the stern on approach and berthing nose in to a small bulkhead, or in some cases by pushing the front of the barge into the beach and holding it in place with the tug. Fuel product is pumped through hoses directly to the tanks or to dock- or shore-based fuel headers. In the communities covered by this Phase 2 Assessment, the key issues that impede continued safe access and/or operational efficiency in fuel deliveries include:

- The most common issue is the poor condition of existing dock facilities and the fact that with bigger fuel barges these docks will not be able to handle the higher mooring and berthing loads.
- In many locations without dock facilities, shallow or rocky coasts prevent access to the beach and floating hose to the shore is required.
- To a lesser extent, fuel system improvements are required. Several communities have tank farms that have no marine header, so fuel delivery operations require dragging hose long distances to the tank farm locations. In addition, a few sites have multiple tanks and/or headers, each of which requires a separate barge landing within the same community.

Although fuel system improvements such as header and pipeline work are not included in the scope of design effort for this study, these concerns expressed by the barge operators are included in the report for the purposes of future planning associated with fuel system upgrades in the communities. In fact, any landing facility that is constructed under this program should consider providing accommodations for future fuel pipeline and header as part of the design. This may include fuel header platform or pipe supports off the side of a trestle, for example, which is easily accommodated at low cost during initial construction, rather than installing these as an add-on at a later date.

Where fuel hoses are currently being floated in to shore, it may be possible for access to be provided more cost-effectively by dredging out any large rocks or boulders or minor dredging of shallow areas where continued access can be maintained by doing so.

Freight Deliveries

Freight deliveries are accomplished either by side berthing to an existing dock facility and using a crane to offload or by RO-RO where the barge/landing craft noses into a bulkhead or ramp and uses either a shore-based ramp or barge-based ramp and offload using loaders or forklifts. The main issues with freight deliveries in the southern regions of Alaska, in order are:

- Accessibility issues associated with rock hazards, shallow/rocky coastlines, large tide ranges, or dredging required at existing facilities.
- Insufficient mooring or on/offloading arrangements at existing dock facilities.
- Keeping position in areas with swift currents or swells without dedicated mooring.

- Soft soils on the beach make driving loaders difficult.

The most common recommendations by freight barge operators consisted of improvements to existing dock facilities, such as fixing a difficult offloading arrangement (i.e., Angoon and Hoonah) or to install onshore or offshore mooring points to hold position during offloading (i.e., Manokotak, Perryville). In a few cases, landing facilities such as a ramp or dock are recommended where none previously existed (i.e., Hyder). Where practical and most needed, the Commission program will seek to design and construct dedicated landings such as a dock or ramp to improve and expedite freight transfers.

In summary, barge operators and other users indicated that in the southern regions of Alaska, the needed landing facility improvements (not including fuel system upgrades) in order of priority are:

(1) Installing upland mooring points at beach landings with current or swells.

(2) Upgrading existing docks to provide safe moorage of barges or proper arrangements for freight offloading. This may include work such as expanding existing docks for barge access, installing mooring and breasting dolphins and/or fenders.

(3) Providing mooring and berthing dolphins with catwalk to shore for fuel header access where coastlines are too rocky for fuel barge landings.

(4) Repairing or replacing existing docks that are aged and may not be strong enough for barge berthing and mooring.

(5) Providing permanent ramps and/or bulkhead docks with erosion protection at a few sites with soft beaches and no other infrastructure in place.

(6) Dredging rocks from hazard areas or shallow areas at existing docks.

(7) Existing facility repairs such as ramp surfacing, corrosion protection, lighting, etc.

A summary of the recommended improvements at each community is presented in a matrix table provided in Appendix B.

Conceptual designs were developed to address barge landing facility improvement types recommended by user groups during the interview process. A drawing was created to illustrate each of the design concepts including:

- Mooring and breasting dolphins would be beneficial at sites where fuel barges cannot access a shallow or rocky coastline and are required to anchor and float hose to shore. Breasting dolphins used in combination with a simple steel catwalk that extends to shore would allow workers to pull the fuel hose along the catwalk; or better yet, the catwalk could be outfitted with a marine fuel header and a pipeline. Breasting dolphins may be used in combination with offset mooring dolphins, bollards on docks, mooring buoys, or upland mooring points as site conditions allow.
- A typical fender design that can be installed in conjunction with a dolphin (i.e., breasting dolphin) or independently at an existing dock. The fender is

supported by piling and installed in front of an existing dock facility to allow the new double hulled barges to moor safely with less risk of damage to the existing facility by impact.

- A pass-pass dock, consisting of a pile supported concrete superstructure/deck may be considered at some sites where a high volume of cargo is delivered by freight barges and/or an existing dock facility is in need of replacement. It should also be combined with a trestle of similar construction, and used where there is a long distance from shore to the required water depth. This type of dock is designed to provide sufficient room for a forklift to maneuver containers of goods to/from shore and pass them over to/from the barge. The dock would also be suitable for fuel barge moorage.
- A fill causeway and sheetpile bulkhead, constructed to extend a fill area out from shore and provide a vertical docking face, where a barge could side tie or lower a ramp onto it. This may be considered at some relatively shallow sites that need improved freight unloading facilities, and the distance to sufficient water depths it short enough to warrant the amount of fill required.

Refer to the Phase 1 Assessment report for other design concepts, which could also be considered for barge landing improvements at some communities. These include:

- Several options for mooring points and deadmen.
- Gravel pads for use as staging areas to offload and store cargo.
- Gravel/Rock causeway or access ramp.
- Concrete plank ramp.
- Modified diaphragm type sheet pile bulkhead dock(s).

A group of Priority Sites is identified for the initial round of funding. These Priority Sites were chosen based on a scoring matrix (Appendix B) which evaluated (1) the urgency of need/time frame in which a project can be completed, (2) the frequency of use and impact that the project may have for improving barge operations, and (3) the relative ease for which the project can be planned and constructed. Essentially, the goal of the scoring is to determine which sites are thought to have the most positive impact for the funds expended and can reasonably be expected to be ready for near-term funding and construction. An attempt was made to score the projects while keeping in mind the over-arching sentiment from barge operators that the priority sites in western Alaska identified by the Phase 1 report, in their perspective continue to be a higher priority for improvements overall. The result was 12 Priority Sites that are recommended for the first round of barge landing facility improvements.

OPCC estimates were prepared for each of the Priority Sites to assist the Commission with the planning and budgeting of the work. These estimates were completed based on a stand-alone project and include separate mobilization, field investigation, design, and construction administration costs for each site. The result is a total of approximately $34M to complete barge landing facility improvements at the 12 Priority Sites.

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