US Army Corps of Engineers
Alaska District

Integrated Feasibility Report,
Environmental Assessment and
Finding of No Significant Impact

Petersburg Navigation Improvements
Petersburg, Alaska

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Prepared by
U.S. Army Corps of Engineers
Alaska District

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ERRATA SHEET
CAP 107 Navigation Improvements, Petersburg, Alaska
Integrated Feasibility Report, Environmental Assessment and
Finding of No Significant Impact
4 September 2019

The intent of this errata sheet is to document a few revisions to the report resulting from the final review of the Integrated Feasibility Report, Environmental Assessment and Finding of No Significant Impact (IFR/EA). The edits are primarily undertaken to clarify the optimization of project depths to determine the dredge depth with the highest net benefits. The revisions do not affect the selection of the recommended plan or other considerations contemplated by the IFR/EA. Each edit is discussed further below.

Section 5.3.2 Alternatives Screened from Detailed Analysis

- **Removed from paragraph 2:**

  "Net benefits were increasing from Alternative 3 to Alternative 4 when the financial constraint was established. Appendix D explains the benefits associated with Alternatives 4 and 5 and reports initial analysis conducted on these alternatives."

- **Paragraphs 2 and 3 were combined and revised to read the following:**

  "Per ER 1105-2-100 Appendix E, para E-3(b)(5), Categorical Exemption for Flood Control and Navigation Projects, larger scale plans can be screened out if the NFS identifies a financial constraint and the net benefits were increasing as the constraint is reached. During concurrent review of the draft IFR/EA, Agency Technical Review (ATR), Pacific Ocean Division (POD) and the Public comment period), a comment from POD asked if additional depths besides -19.25 ft MLLW were assessed. An additional depth of -18ft MLLW was added to the analysis to determine which depth maximized benefits. No shallower depths were chosen because some areas within the study area have been maintained to a depth of -18ft MLLW per the original harbor depths established during the 1983 construction of South Harbor. Table 34 in section 6.5.3 shows that net benefits are increasing from -18 feet to -19.25 feet in depth as the constraint is reached. Most of the vessels will be accommodated at the depth of -19.25 feet so dredging any deeper would not increase benefits, but would incur additional costs. Therefore, net benefits would be less for any depth greater than -19.25 feet. This depth analysis can be found in section 6.5.3."

- **Paragraph 4 is now Paragraph 3 and has been replaced with:**

  “Appendix D discusses the initial benefits and analysis associated with alternatives that were screened out due to the financial constraint established by the NFS. This feasibility report does not discuss Alternatives 4 and 5 further. Alternatives 2 and 3 with depths -18 feet and -19.25 feet and the future without project condition were carried through the remaining analysis in order to determine the recommended plan.”

FINDING OF NO SIGNIFICANT IMPACT

Petersburg Navigation Improvements
Petersburg, Alaska

The U.S. Army Corps of Engineers, Alaska District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The final Integrated Feasibility Report and Environmental Assessment (IFR/EA) dated 29 July 2019, for the Petersburg Navigation Improvements addresses insufficient depths and existing marine infrastructure within the Petersburg harbor system opportunities and feasibility in the Petersburg, Alaska region. The final recommendation is contained in section 11.2 of the IFR/EA.

The Final IFR/EA, incorporated herein by reference, evaluated various alternatives that would improve navigational access and reduce transportation efficiencies in the study area. The recommended plan is the National Economic Development (NED) Plan and includes:

- Dredging to deepen to -19.25 ft MLLW the GNF elements: entrance channel, two maneuvering basins, and turning basin in front of crane dock (approximately 28,530 cubic yards (CY) of material);
- Dredging the following Local Service Facilities:
    - Sump area: -9 ft MLLW (2,750 CY of material);
    - Subsistence slips on backside of main float: -10 ft MLLW (19,690 CY of material);
    - Commercial slips & in between C and D floats: -18 ft MLLW (14,620 CY of material)
    - Offset from docks (66ft): -19.25ft MLLW (17,390 CY of material)
- Unconfined aquatic disposal of the entire volume of dredged material in Frederick Sound

In addition to a “no action” plan, two action alternatives were evaluated. The alternatives included Alternative 2: Non-Structural Reorganization of Petersburg harbor system and Alternative 3: South Harbor Dredging Only. Section 5 of the IFR/EA discusses in detail the process of building alternative plans that meet planning objectives and avoid planning constraints; including the initial and final arrays of alternatives and the rationale for dismissing or carrying forward alternatives as appropriate. The Non-Structural Alternative would have only minor and temporary environmental impacts, but was not selected because it does not address the study objectives of depth in the entrance channel, maneuvering basin, or turning basin; and would continue to present some vessel delays during low tides.

For all alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the recommended plan are listed in Table 1.

Table 1: Summary of Potential Effects of the Recommended Plan

	Insignificant effects	Insignificant effects as a result of mitigation	Resource unaffected by action
Aesthetics	☐	☐	☒
Air quality	☒	☐	☐
Aquatic resources/wetlands	☐	☒	☐
Invasive species	☒	☐	☐
Fish and wildlife habitat	☐	☒	☐
Threatened/Endangered species/critical habitat	☐	☒	☐
Historic properties	☐	☐	☒
Other cultural resources	☐	☐	☒
Floodplains	☐	☐	☒
Hazardous, toxic & radioactive waste	☐	☐	☒
Hydrology	☒	☐	☐
Navigation*	☒	☐	☐
Noise levels	☐	☒	☐
Public infrastructure*	☒	☐	☐
Socio-economics*	☒	☐	☐
Environmental justice	☐	☐	☒
Soils	☐	☒	☐
Tribal trust resources	☐	☐	☒
Water quality	☐	☒	☐
Climate change	☐	☐	☒
Essential Fish Habitat	☐	☒	☐

* Denotes beneficial impact to the resource

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. Best management practices (BMPs) as detailed in the IFR/EA will be implemented, if appropriate, to minimize impacts.

Aquatic Resources

The Alaska District included avoidance and minimization measures during plan formulation to mitigate the project's impacts to aquatic resources. The District conducted four seasonal biodiversity surveys to characterize the benthos in seven

potential aquatic disposal sites; ultimately selecting a site that avoids and minimizes impacts to important aquatic resources. The disposal site selected by the District contains sediment with substantially similar physical characteristics to the sediment that would be disposed in the site, so the impacts of disposal would be temporary. Detailed information on the site selection study can be found in section 8 of the IFR/EA.

Fish and Wildlife Habitat

The Alaska District included avoidance and minimization measures during plan formulation to mitigate the project's impacts to fish and wildlife habitat. The District conducted four seasonal biodiversity surveys to characterize the benthos in seven potential aquatic disposal sites; ultimately selecting a site that avoids and minimizes impacts to fish and wildlife habitat. The site selected by the District contains relatively poor fish and wildlife habitat in comparison to the other six sites the District evaluated. Detailed information on the site selection study can be found in section 8 of the IFR/EA.

Water Quality

1. Reasonable precautions and controls must be used to prevent incidental and accidental discharge of petroleum products or other hazardous substances. Fuel storage and handling activities for equipment must be sited and conducted so there is no petroleum contamination of the ground, subsurface, or surface waterbodies.

2. During construction, spill response equipment and supplies such as sorbent pads shall be available and used immediately to contain and cleanup oil, fuel, hydraulic fluid, antifreeze, or other pollutant spills. Any spill amount must be reported in accordance with Discharge Notification and Reporting Requirements (AS 46.03.755 and 18 AAC 75 Article 3). The applicant must contact by telephone the DEC Area Response Team for Southeast Alaska (907) 465-5340 during work hours or 1-800-478-9300 after hours. Also, the applicant must contact by telephone the National Response Center at 1-800-424-8802.

3. All dredging shall be conducted so as to minimize the amount of dredge material and suspended sediments that enter South Harbor and Frederick Sound. Appropriate Best Management Practices (BMPs) will be employed to minimize sediment loss and turbidity generation during dredging. BMPs may include, but are not limited to, the following:
    - Eliminating multiple bites while the bucket is on the seafloor
    - No stockpiling of dredged material on the seafloor
    - No seafloor leveling
    - Slowing the velocity of the ascending loaded dredge bucket through the water column
    - Pausing the dredge bucket near the bottom while descending and near the water line while ascending
    - Placing filter material over the barge scuppers to clear return water

- If dewatering runoff is discharged from the barge, silts must be removed prior to direct or indirect discharge to South Harbor and Frederick Sound.

Essential Fish Habitat

1. The proposed action shall cease in-water construction between March 15 and September 30th during peak herring spawning activities, juvenile salmon outmigration and rearing activities.
2. Project-related vessels and barges shall not be permitted to ground themselves on the bottom during low tide periods, unless there is a human safety issue requiring it.
3. A construction oil spill prevention plan shall be prepared.
4. The Corps will conduct post-dredge bathymetry surveys to ensure that only the material identified to be dredged was removed to the authorized depth.
5. A scow barge will be loaded so that enough of the freeboard remains to allow for safe movement of the barge and its material on the route to the disposal site.

Marine Mammals, Including ESA species

1. In order to minimize effects to marine mammals, the project will be constructed during the winter when marine mammal densities are likely lowest in the action area. The surveys, dredging, and disposal would occur between October 1, 2020 and March 15, 2021.
2. The Corps will establish a 328 foot (100 m) exclusion (i.e., shutdown) zone around all project vessels during operation; including dredging, transit to and from the disposal area, survey operations, and disposal operations.
3. The Corps will continuously monitor the exclusion zone during project operations for the presence of protected species.
4. The Corps will ensure that pilots of the dredge and barge, and pilots of the support vessels will have clear views of the exclusion zones around each vessel to facilitate effective monitoring for all protected species. These pilots will enforce the established exclusion zones for both stationary and moving vessels.
5. The Corps will stop work when a protected species is observed approaching or within the 328 ft. (100 m) exclusion zone of the project operations.
6. If a protected species enters or appears likely to enter the exclusion zone, project vessels will stop work as soon as practicable in order to prevent exposing protected species to sounds capable of causing harassment. Project vessels and operators will not compromise human safety when determining the practicability of shutting down equipment; i.e., tidal, current, and weather conditions may make it impossible to safely shut-down operation immediately.
7. In the event of a shutdown caused by protected species entering the exclusion zone, work will not restart until the protected species are observed leaving the exclusion zone or 30 minutes from the last protected species sighting within the exclusion zone have elapsed.
8. The Corps will ensure that project vessels do not exceed 13 knots in order to minimize exposure of protected species to vessel strike hazards.

9. No seafloor leveling by dragging the bucket or other device will occur.
10. Vessels may not be operated in such a way as to separate members of a group of marine mammals from other members of the group. A group is defined as being three or more whales observed within a 1641 ft (500 m) area and displaying behaviors of directed or coordinated activity (e.g., group feeding).
11. Vessels will avoid multiple changes in direction and speed when within 900 ft (274 m) of whales and also operate the vessel(s) to avoid causing a whale to make multiple changes in direction.
12. Consistent with NMFS Alaska Humpback whale approach regulations (50 CFR 216.18, 223.214, and 224.103(b)), operators of vessels will not approach within 300 ft (91 m) of humpback whales.
13. Consistent with NMFS marine mammal viewing guidelines (https://alaskafisheries.noaa.gov/pr/mm-viewing-guide), operators of vessels should, at all times, avoid approaching all other marine mammals within 300 ft (91 m).

Soils

The Alaska District included avoidance and minimization measures during plan formulation to mitigate the project's impacts to soils. The District collected sediment samples from the harbor and all seven potential disposal locations, ultimately selecting a site that avoids and minimizes impacts to soils by ensuring the dredge material would be substantially similar to that of the disposal site. Detailed information on the site selection study can be found in section 8 of the IFR/EA.

Noise

The Alaska District will establish a 100 meter exclusion radius around all project vessels to protect marine mammals from noise impacts. Detailed information about the hydroacoustic mitigation measures can be found in section 9.8 of the IFR/EA.

No compensatory mitigation is required as part of the recommended plan.

Public review of the draft IFR/EA and FONSI was completed on 16 November 2018. All comments submitted during the public review period were responded to in the Final IFR/EA and FONSI. A 30-day state and agency review of the Final IFR/EA was completed on 12 December 2018. Comments from state and federal agency review did not result in any changes to the final IFR/EA.

Pursuant to section 7 of the Endangered Species Act of 1973, as amended, the U.S. Army Corps of Engineers determined that the recommended plan may affect but is not likely to adversely affect the following federally listed species or their designated critical habitat: the threatened Mexico Distinct Population Segment (DPS) humpback whale (*Megaptera novaengliae*) or the endangered western DPS of Steller sea lion (*Eumatopias jubatus)*. The National Marine Fisheries Service (NMFS) concurred with the Corps' determination on 11 July 2019.

Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, the U.S. Army Corps of Engineers determined that the recommended plan has no effect on historic properties.

A water quality certification pursuant to section 401 of the Clean Water Act was obtained from the Alaska Department of Environmental Conservation, Division of Water. All conditions of the water quality certification shall be implemented in order to minimize adverse impacts to water quality.

By operation of Alaska State law, the federally approved Alaska Coastal Management Program expired on July 1, 2011, resulting in a withdrawal from participation in the CZMA's National Coastal Management Program. The CZMA Federal consistency provision, section 307, no longer applies in Alaska.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed. The Alaska District will exercise its authority under Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA), also known as the Ocean Dumping Act (ODA) to select a disposal site in the ocean waters of Frederick Sound for the unconfined aquatic disposal of the entire volume of dredged material. The District Engineer has applied the Ocean Dumping Criteria and will seek concurrence from the USEPA Region 10 Regional Administrator in accordance with 33 CFR 324.4(c) and 40 CFR 225.2(b)-(e). The USEPA Regional Administrator will within 15 days of receipt of the Ocean Dumping Criteria Analysis review the information submitted and request from the District Engineer any additional information he deems necessary or appropriate to evaluate the proposed dumping. Within 15 days of receipt of any additional requested information, the Regional Administrator will make an independent evaluation of the proposed dumping and respond in writing to the District Engineer.

Technical, environmental, and economic criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives. Based on this report, the reviews by other Federal, State and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the recommended plan would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

30 SEP 2019
Date

PHILLIP J. BORDERS
Colonel, Corps of Engineers
District Commander

EXECUTIVE SUMMARY

Petersburg South Harbor is a vital facility for the economy of the Petersburg Borough which hosts one of the most productive fishing fleets in Alaska, three major seafood processing plants, and several small custom processors. Petersburg lies approximately halfway between Juneau and Ketchikan in Southeast Alaska and lacks road access. Water accessibility is key to providing goods and services to the community and sustaining the economy as well as the subsistence way of life.

Insufficient depths and existing marine infrastructure within the Petersburg harbor system cause transportation inefficiencies and limit access for commercial fishing and subsistence activities, creating economic inefficiencies for the region and Nation. Currently, ocean going commercial fishing vessels are forced to wait for sufficient tides to operate in and around South Harbor; which is approximately 93 percent commercially utilized. The purpose of this Continuing Authorities Program Section 107 study is to improve navigation in the study area in order to reduce vessel delays due to insufficient depths and improve overall access to Petersburg South Harbor. The Section 107 (33 U.S.C. 577) authority allows for the construction of small river and harbor improvement projects.

This study evaluated a number of alternatives based on economic, engineering, environmental, and other factors. Economic costs and benefits were calculated using the Fiscal Year (FY) 2019 price level and converted to average annual equivalent values using the Federal FY 2019 discount rate of 2.875 percent and a 50-year period of analysis. Alternative 3, South Harbor dredging only, maximizes the net National Economic Development (NED) benefits and has been selected as the recommended plan. The non-Federal Sponsor (NFS), Petersburg Borough, supports the recommended plan.

For the General Navigation Features (GNF), the recommended plan, Alternative 3, was evaluated at two depths: -18 feet (ft) mean lower low water (MLLW) and -19.25 ft MLLW. Dredging to -19.25 ft MLLW maximized NED benefits. The recommended plan includes:

- Dredging to deepen to -19.25 ft MLLW the GNF elements: entrance channel, two maneuvering basins, and turning basin in front of crane dock (approximately 28,530 cubic yards (CY) of material);
- Dredging the following Local Service Facilities:
    - Sump area: -9 ft MLLW (2,750 CY of material);
    - Subsistence slips on backside of main float: -10 ft MLLW (19,690 CY of material);
    - Commercial slips & in between C and D floats: -18 ft MLLW (14,620 CY of material)
    - Offset from docks (66ft): -19.25 ft MLLW (17,390 CY of material)

The total volume of material recommend to be removed from South Harbor is 82,980

CY. This material consists of recent marine sediments over glacial marine sediments categorized as sandy silty clay, sandy silt, silty sand, poorly graded sand with silt, and poorly graded sand with gravel. USACE recommends disposal of the entire volume of material in the Frederick Sound disposal area approximately two miles east of the project area.

Deepening the entrance channel, maneuvering basins and turning basin in front of the crane dock would reduce transportation inefficiencies within the harbor system and create access to public facilities for commercial fishing and subsistence activities during more of the tidal cycle. Alternative 3 has a certified project first cost of $10,612,000. The total National Economic Development cost including the cost of operations and maintenance and interest during construction is $14,653,000.The average annual equivalent cost is $556,000 with annual National Economic Development benefits of $1,065,000. Using certified costs for the recommended plan, the project's benefit-cost ratio is 1.92 with net annual benefits of $509,000.

Under Section 107, the NFS is responsible for 100 percent of the construction and maintenance of the LSF and 10 percent of the total costs of construction of the GNF for depths less than or equal to 20 feet. The NFS would pay an additional 10 percent toward GNF over a period not to exceed 30 years. This may be accomplished through crediting for Lands, Easements, Rights of Way, Relocations, and Disposal Area (LERRD) provided or through direct payments. The estimated non-federal share of construction is $4.8 million and the federal share of construction is $5.8 million.

PERTINENT DATA

Recommended Plan	
Alternative 3: South Harbor Dredging Only	
Dredge South Harbor; Four areas identified ranging from -9 feet to -19.25 feet MLLW	
GNF Dredge Volume	28,530 CY
LSF Dredge Volume	54,450 CY
Total Dredge Volume	82,980 CY

Economics	
Item	**Total ($)**
Total Average Annual Equivalent Cost	$556,000
Total Average Annual Equivalent Benefit	$1,065,000
Net Annual National Economic Development Benefits	$509,000
Benefit-Cost Ratio	1.92

Note: Costs and benefits in this table are based on the certified cost for the recommended and differ slightly from the costs and benefits used for plan evaluation and comparison.

Cost Sharing			
Item	**Federal ($)**	**Non-Federal ($)**	**Total ($)**
Mobilization and Demobilization	$3,393,000	$377,000	$3,770,000
Dredging (GNF)	$1,430,100	$158,900	$1,589,000
Design & Implementation (D&I)	$1,129,500	$125,500	$1,255,000
Supervision, Inspection, and Overhead (SIOH)	$603,000	$67,000	$670,000
Sub-total Construction of GNF	**$6,555,600**	**$728,400**	**$7,284,000**
Lands, Easements, Rights of Way, Relocations, and Disposal Area (LERRD)	-	-	-
Certified Project First Cost	**$6,555,600**	**$728,400**	**$7,284,000**
Local Service Facilities (LSF)			
Dredging	-	$3,327,000	$3,327,000
Sub-total LSF	**-**	**$3,327,000**	**$3,327,000**
Aids to Navigation	-	-	-
Credit for LERRD	-	-	-
10% of GNF over time (less LERRD)[1]	($728,400)	$728,400	-
Cost Allocation[2, 3]	**$5,827,200**	**$4,783,800**	**$10,611,000**

1. The Non-Federal Sponsor shall pay an additional 10 percent of the costs of GNF, pursuant to Section 101 of WRDA86.
2. Final cost allocation is 55 percent Federal, 45 percent non-Federal.
3. Some rounding occurs in the cost share breakdown so the total differs by $1,000 from the certified project first cost of $10,612,000.

LIST OF ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AIS	Automated Information System
AKDOT&PF	Alaska Department of Transportation and Public Facilities
APE	Area of Potential Effect
ARU	Aquatic Resources Unit
BOEM	Bureau of Ocean Energy Management
C	Celsius
CAR	Coordination Act Report
C-MAN	Coastal Marine Automated Network
CFR	Code of Federal Regulations
CWA	Clean Water Act
CY	Cubic Yards
D&I	Design and Implementation
DMMU	Dredged Material Management Unit
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
EA	Environmental Assessment
EPA	Environmental Protection Agency
EQ	Environmental Quality
ER	Engineer Regulations
ESA	Endangered Species Act
etc.	Et Cetera
F	Fahrenheit
FAA	Federal Aviation Administration
FCSA	Federal Cost Sharing Agreement
FMP	Fishery Management Plan
FONSI	Finding of No Significant Impact
FSDS	Frederick Sound Disposal Site
FWCA	Fish and Wildlife Coordination Act
ft	Foot/Feet
GNF	General Navigation Feature
GOA	Gulf of Alaska
HCD	Habitat Conservation Division
IFR/EA	Integrated Feasibility Report and Environmental Assessment
LERRD	Lands, Easements, Rights of Way, Relocations, and Disposal Area
LSF	Local Service Facilities
MHHW	Mean Higher High Water

MHW	Mean High Water
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
MPRSA	Marine Protection, Research and Sanctuaries Act
MSL	Mean Sea Level
MTL	Mean Tide Level
N/A	Not Applicable
NED	National Economic Development
NEPA	National Environmental Policy Act
NFS	Non-Federal Sponsor
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRHP	National Register of Historic Places
NSRAA	Northern Southeast Regional Aquaculture Association (
O&M	Operation and Maintenance
OCT	Opportunity Cost of Time
ODMDS	Ocean Dredged Material Disposal Site
OMRR&R	Operation, Maintenance, Repair, Replacement, and Rehabilitation
PAL	Planning Aid Letter
R	Republican
RAC	Russian-American Company
SEF	Pacific Northwest Regional Sediment Evaluation Framework
SHPO	State Historic Preservation Officer
SSRAA	Southern Southeast Regional Aquaculture Association
U.S.	United States
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USDAFS	United States Department of Agriculture Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Vessel Operating Costs
WRDA	Water Resources Development Act
ZSF	Zone of Siting Feasibility

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APPENDICES

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1. INTRODUCTION

1.1 Project & Study Authority

This feasibility study is being conducted under authority granted by Section 107 of the River and Harbor Act of 1960, as amended (33 U.S.C. 577) which states in part:

"(a) Allotment from appropriations for construction
The Secretary of the Army is authorized to allot from any appropriations hereafter made for rivers and harbors not to exceed $62,500,000 for any one fiscal year for the construction of small river and harbor improvement projects not specifically authorized by Congress which will result in substantial benefits to navigation and which can be operated consistently with appropriate and economic use of the waters of the Nation for other purposes, when in the opinion of the Chief of Engineers such work is advisable, if benefits are in excess of the cost.

(b) Limitation on allotment
Not more than $10,000,000 shall be allotted for the construction of a project under this section at any single locality and the amount allotted shall be sufficient to complete the Federal participation in the project under this section."

1.2 Scope of Study

This study evaluates the feasibility and environmental effects of implementing navigation improvement measures in South Harbor at Petersburg, Alaska. United States Army Corps of Engineer (USACE) Regulation (ER) 1105-2-100, "Planning Guidance Notebook" defines the contents of feasibility reports for navigation improvement measures. ER 200-2-2, "Procedures for Implementing NEPA", directs the contents of environmental assessments. This document presents the information required by both regulations as an Integrated Feasibility Report and Environmental Assessment (IFR/EA). It also complies with the Council on Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act (NEPA, 42 U.S.C. 4321 et seq.) and the USACE regulations regarding proposed discharges of dredged materials into ocean waters (33 CFR 336 et seq.).

The Alaska District is primarily responsible for conducting studies for navigation improvements at Petersburg, Alaska. The analyses conducted for this study were made possible with assistance from many individuals and agencies, including the Petersburg Borough, the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Alaska Department of Fish and Game (ADFG), Alaska Department of Environmental Conservation (ADEC), Alaska Department of Natural Resources (ADNR), U.S. Environmental Protection Agency (EPA), Alaska State Historic Preservation Office (SHPO), and many members of the interested public who contributed information and constructive criticism to improve the quality of this IFR/EA.

1.3 Study Location

Petersburg is located on the northwest end of Mitkof Island in Southeast Alaska. It is between the shores of Frederick Sound and Wrangell Narrows, two of the many tidal channels among the hundreds of islands and passages of Southeast Alaska's Alexander Archipelago. It lies midway between Juneau and Ketchikan, approximately 120 miles from either community (Figure 1).

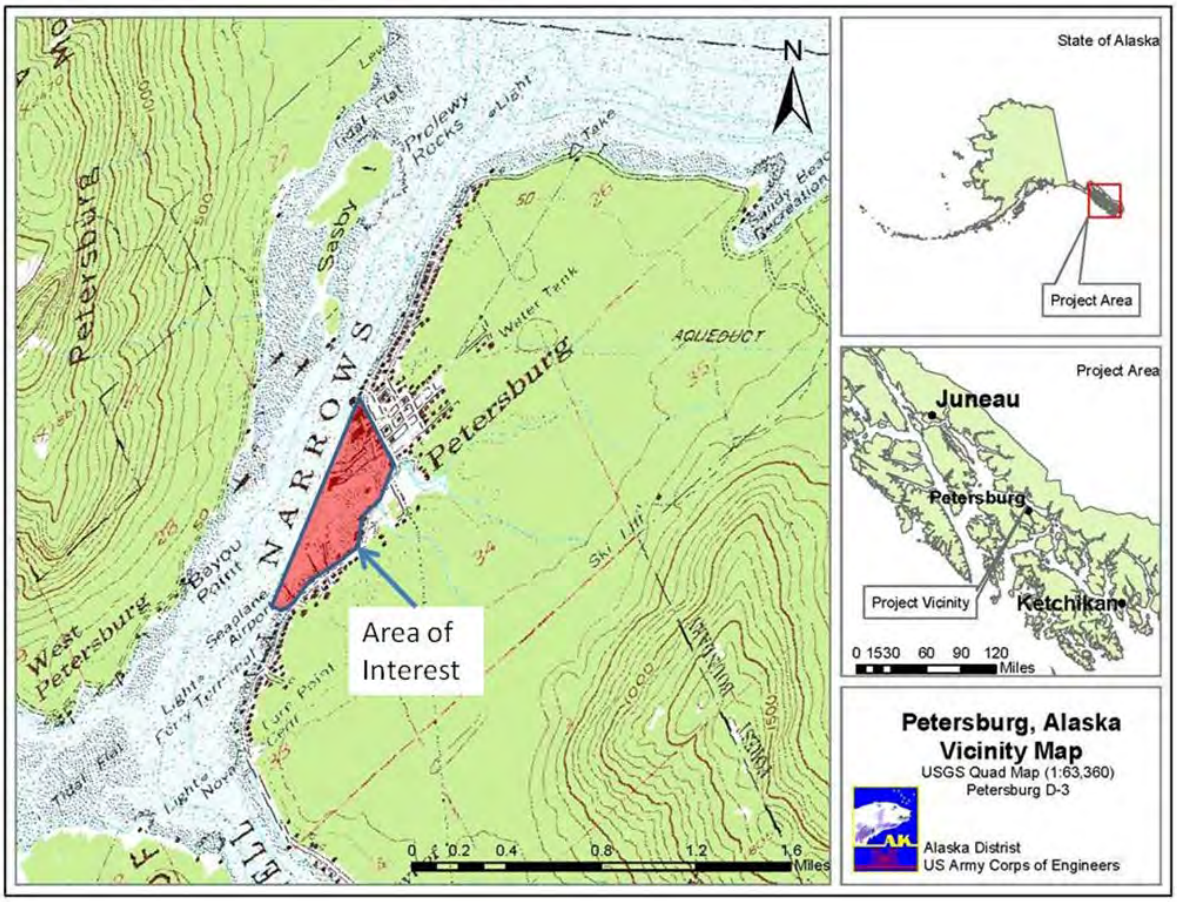

Figure 1. Petersburg Navigation Improvements Location & Vicinity.

The Petersburg harbor system encompasses three harbors, North, Middle and South Harbor (Figure 2). North Harbor is an existing USACE Federal Navigation Project. South Harbor is the focus of this study. It is a vital facility for the economy of Petersburg, which hosts one of the most productive fishing fleets in Alaska, three major seafood processing plants, and several small custom fish processors.

Figure 2. Petersburg Harbor System.

1.4 Congressional District

The study area is in the Alaska Congressional District, which has the following Congressional delegation:

Senator Lisa Murkowski, Republican (R);
Senator Dan Sullivan, (R);
Representative Don Young, (R).

1.5 Non-Federal Sponsor

The Petersburg Borough is the non-Federal sponsor (NFS) and has stated its intention to cost-share in a federally-constructed navigation improvement project. The Federal Cost Sharing Agreement (FCSA) for this Study was signed on 27 September 2017. This agreement creates a Federal and non-Federal partnership with the objective to effectively serve both local and national interests. The feasibility phase is conducted at a 50/50 cost share under Section 105(a) of the Water Resources Development Act (WRDA) of 1986.

1.6 Related Reports and Studies

USACE, A Study of Dredging Means and Disposal Methods in Eighteen Alaskan Small Boat Harbors, September, 1977.

USACE, Technical Memorandum, Chemical and Physical Data Pertaining to Placement of Dredged Harbor Sediment at Petersburg Landfill, September 2011.

USACE, Final Chemical Data Report, Petersburg North Harbor Maintenance Dredging, Petersburg, Alaska, May 2001.

USACE, Chemical Data Report, Petersburg Small Boat Harbor Sediment Study, Petersburg Small Boat Harbor, Petersburg, Alaska, June 2011.

USACE, ERDC TN-DOER-E21. Silt Curtains as a Dredging Project Management Tool, current velocity limits for silt curtains, September 2005.

2. PLANNING CRITERIA, PURPOSE & NEED FOR PROPOSED ACTION*

2.1 Problem

Petersburg South Harbor was dredged and developed in 1983 (Figure 3). The harbor's original depths ranged from -15 ft to -18ft mean lower low water (MLLW) in the entrance channel and commercial slips and was developed to -15ft MLLW in front of the fish processing center, Ocean Beauty, and the turning basin and entrance to the crane dock. There is no information on whether a design vessel was established for this initial development, but the current project's design vessel specifications can be found in section 7.2 and 7.3.

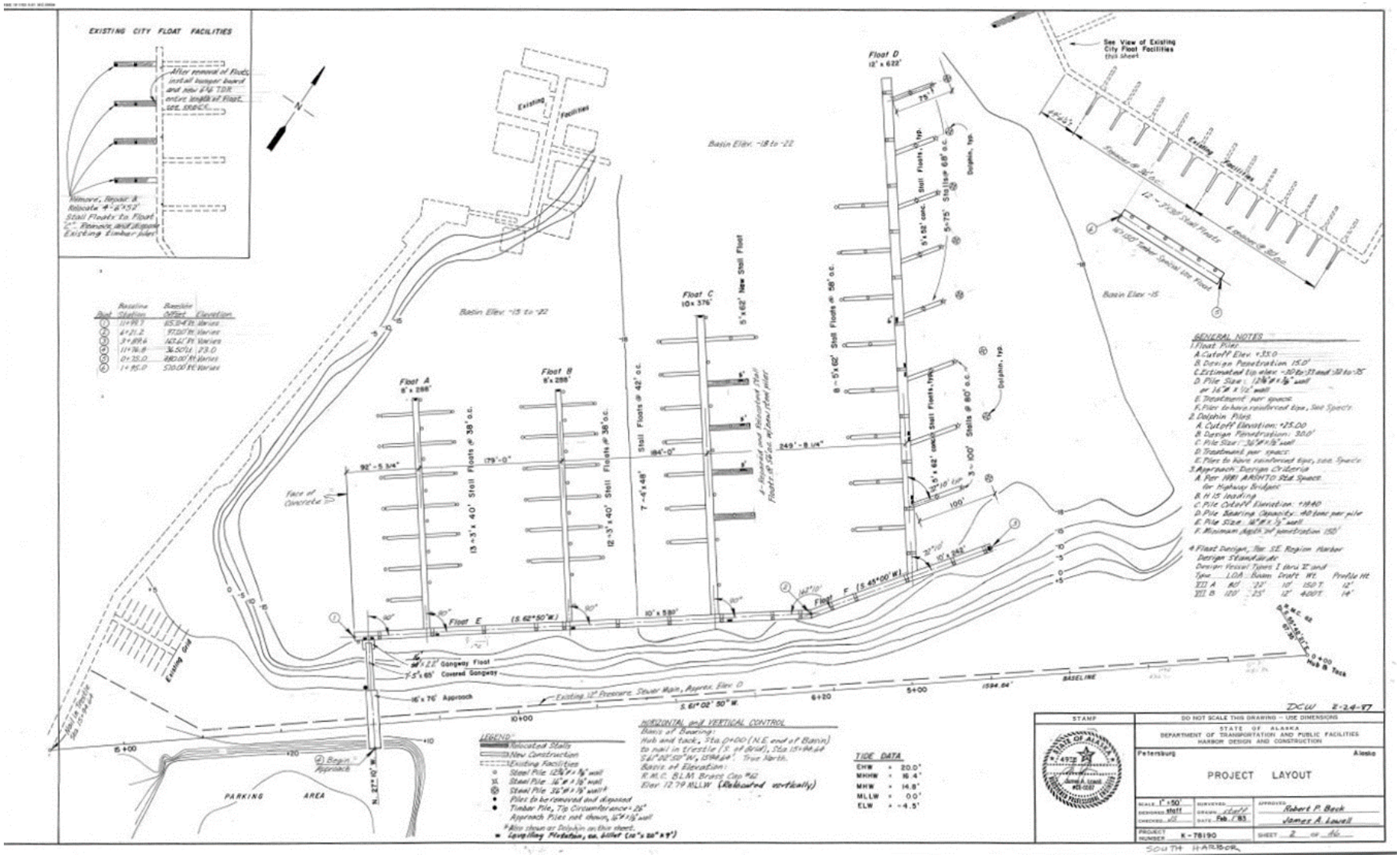

Figure 3. 1983 South Harbor construction map.

The original dredge depths have been maintained to -15ft MLLW to -18ft MLLW which is shown by the current survey information (Figure 4). Due to isostatic rebound, sedimentation from Hammer Slough and an unnamed stream (Figure 2), and increasing vessel size, the current design does not allow for safe navigation.

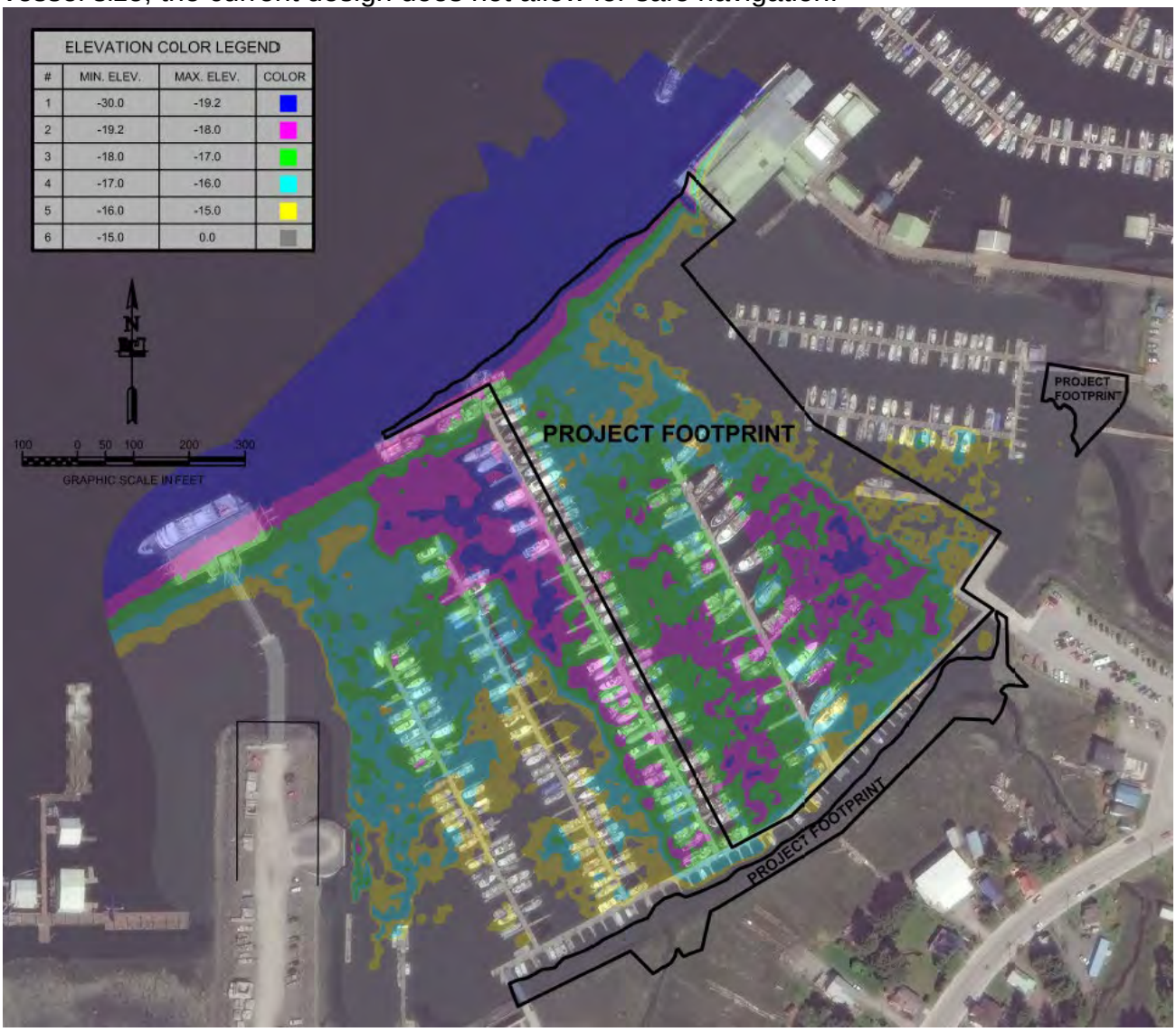

Figure 4. Bathymetric survey data showing existing depths in the project footprint.

The harbor has become inaccessible during low tides and fisherman are unable to bring their catch through the entrance channel to the fish processing plant nor offload equipment at the public use crane dock. The deepening of the entrance channel and maneuvering and turning basins (the General Navigation Features (GNF)) would allow access to public facilities including the crane dock and fish processing plant which are currently inaccessible during low tides. Local Service Facilities (LSF) are also being analyzed under this study because the benefits of deepening the general navigation features would not be realized if harbor users cannot access their slips during low tides. ER 1105-2-100, Appendix E, Section II-Navigation, E-8, a.(3) Local Service Facilities, states “[LSF] are the responsibility of the non-Federal interests, and they may be

required as part of project cooperation agreements if they are necessary for project benefits to accrue." The NFS understands that 100 percent of these costs are the responsibility of the NFS. Additional history on South Harbor can be found in section 3.3.3.1.

2.1.1 Problem Statement

The problem statement developed for the study is as follows:

Insufficient depths and existing marine infrastructure within the Petersburg harbor system cause transportation inefficiencies and limit access for commercial fishing and subsistence activities, creating economic inefficiencies for the region and Nation.

2.2 Purpose and Need

Petersburg lacks road access and is only accessible via water and air. Water accessibility is key to providing goods and services to the community and sustaining the economy as well as the subsistence way of life. Currently, ocean going commercial fishing vessels are forced to wait for sufficient tides to operate in and around South Harbor; which is approximately 93 percent commercially utilized. The tidal spectrum in Petersburg ranges in depths from -4 feet (ft) to +19 ft MLLW, causing economic inefficiencies and hazards to the growing fleet.

Scow Bay, explained in detail in Section 3.3.3.2, was initially included in this study as a possible location for beneficial use of dredged material. The plan formulation behind the development of alternatives at Scow Bay is explained in section 5. It is located approximately 2.5 miles southwest of the Petersburg harbor system (Figure 5). Although Scow Bay was evaluated for beneficial use of dredged material, the purpose of this study is to determine the feasibility of improving navigation in the study area in order to . reduce vessel delays due to insufficient depths and improve overall access to Petersburg South Harbor.

Figure 5. Location of Scow Bay

2.3 Opportunities

The following opportunities have been identified:

- Improve access for commercial and subsistence vessels
- Reduce life and human safety risks
- Increase regional economic activities
- Increase regional employment opportunities
- Reduce damage to catch and dead-loss, which is caused by delays and contamination.

Catch and dead loss refers to fish, crab or other species caught by commercial fishermen that may die in transit to the processing facility due to increased wait times and inability to access the facility during low tidal stages. Contamination refers to catch sitting in the hold for extended periods of time in stagnant water affecting the quality of the meat.

2.4 National Objectives

The national or Federal objective of water and related land resources planning is to contribute to National Economic Development (NED) consistent with protecting the nation's environment, pursuant to applicable statues, executive orders, and other Federal planning requirements. Contributions to NED are increases in the net value of the national output of goods and services, expressed in monetary units.

2.5 Study Objectives

The Petersburg Navigation Improvements Feasibility Study has two primary planning objectives. They are listed below without respect to priority as they would need to be addressed to arrive at an effective solution:

- Improve access to the Petersburg harbor system:
  - Entrance channel & maneuvering basin
  - Moorage areas
  - Public access facilities
- Reduce vessel delays due to insufficient depths within the harbor system

The first objective stated above would require deepening the following features: entrance channel, maneuvering basins, turning basin, moorage areas, and public access facilities based on the design vessel explained in section 7.2. This vessel is larger and has a deeper draft then the vessels used in 1983 when the original harbor depths were established. As explained in Section 2.1, the entrance channel, maneuvering basins and turning basin are GNF and cost shared with the NFS. .Benefits associated with GNF cannot be realized without also dredging access to the LSF moorage areas and public facilities. Similarly, the benefits associated with the LSF would not be realized without the GNF areas being dredged because access to these LSF would remain restricted by depth. LSF areas are 100 percent cost responsibility to the NFS.

2.6 Study Constraints

Dredging would need to be conducted outside of marine mammal migrations, spawning events and major fishing seasons to avoid impacts to fishing activities and environmentally sensitive species.

2.7 National Evaluation Criteria

The Water Resources Council's Federal Principles and Guidelines document establishes four criteria for evaluation of water resources projects. These criteria and their definitions are explained below.

2.7.1 Acceptability

Acceptability is defined as "the viability and appropriateness of an alternative from the perspective of the Nation's general public and consistency with existing Federal laws,

authorities, and public policies. It does not include local or regional preferences for particular solutions or political expediency."

2.7.2 Completeness

Completeness is defined as "the extent to which an alternative provides and accounts for all features, investments, and/or other actions necessary to realize the planned effects, including any necessary actions by others. It does not necessarily mean that alternative actions need to be large in scope or scale."

2.7.3 Effectiveness

Effectiveness is defined as "the extent to which an alternative alleviates the specified problems and achieves the specified opportunities."

2.7.4 Efficiency

Efficiency is defined as "the extent to which an alternative alleviates the specified problems and realizes the specified opportunities at the least cost."

2.8 Study Specific Evaluation Criteria

In addition to the above criteria used for all potential USACE water resources development projects, a study specific criteria to be considered is potential conflicts with dredging during peak fishing seasons or during spawning or migration events. Also, because the Federal Standard disposal option for the study could involve ocean dumping, the Ocean Dumping Criteria from 40 CFR 228.5 and 228.6 are additional study specific criteria.

2.8.1 General Criteria for the Selection of Sites (40 CFR 228.5, quoted in whole)

(a) The dumping of materials into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation.

(b) Locations and boundaries of disposal sites will be so chosen that temporary perturbations in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary, or known geographically limited fishery or shellfishery.

(c) If at any time during or after disposal site evaluation studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet the criteria for site selection set forth in §§ 228.5 through 228.6, the use of such sites will be terminated as soon as suitable alternate disposal sites can be designated.

(d) The sizes of ocean disposal sites will be limited in order to localize for identification and control any immediate adverse impacts and permit the implementation of effective monitoring and surveillance programs to prevent

adverse long-range impacts. The size, configuration, and location of any disposal site will be determined as a part of the disposal site evaluation or designation study.

(e) EPA will, wherever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used.

2.8.2 Specific Criteria for the Selection of Sites (40 CFR 228.6(a), quoted in whole)

(1) Geographical position, depth of water, bottom topography and distance from coast;
(2) Location in relation to breeding, spawning, nursery, feeding, or passage areas of living resources in adult or juvenile phases;
(3) Location in relation to beaches and other amenity areas;
(4) Types and quantities of wastes proposed to be disposed of, and proposed methods of release, including methods of packing the waste, if any;
(5) Feasibility of surveillance and monitoring;
(6) Dispersal, horizontal transport and vertical mixing characteristics of the area, including prevailing current direction and velocity, if any;
(7) Existence and effects of current and previous discharges and dumping in the area (including cumulative effects);
(8) Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance and other legitimate uses of the ocean;
(9) The existing water quality and ecology of the site as determined by available data or by trend assessment or baseline surveys;
(10) Potentiality for the development or recruitment of nuisance species in the disposal site;
(11) Existence at or in close proximity to the site of any significant natural or cultural features of historical importance.

3. BASELINE CONDITIONS/AFFECTED ENVIRONMENT*

3.1 Physical Environment

Petersburg is located on Mitkof Island in the Alexander Archipelago of Southeast Alaska; a chain of about 1,100 islands off the western coast of North America. These islands are formed by the tops of submerged mountains rising from the seafloor, forming deep channels and fjords. South Harbor is situated on Wrangell Narrows, a narrow body of water separating Mitkof Island and Kupreanof Island (Figure 6).

Figure 6. Petersburg area map.

Wrangell Narrows is about 24 miles long and oriented on a general north-south alignment. It is about 750' wide at its narrowest point and about 1,500' wide in the vicinity of Petersburg. Wrangell Narrows connects Frederick Sound in the north with Sumner Strait in the south, resulting in very strong tidal currents in the Narrows as the water levels between the two large bodies of water (Frederick Sound and Sumner Strait) attempt tidal equalization through the constrained Narrows. Tidal currents in the Narrows are reported to be as high as seven knots and have a significant impact on navigation. Vessels operating in the Narrows often must time their trips to avoid an opposing tide.

Frederick Sound is a large, semi-enclosed marine water body extending nearly 100 miles along the western coast of North America, around Mitkof, Kupreanof, and Kuiu Islands. The southern lobe of the sound, ends in a shoal between the southern end of Mitkof Island and Dry Island near the mouth of the Stikine River. The western lobe connects to Chatham Strait around the north end of Kupreanof Island (Figure 7). South Harbor is the southernmost of three harbors in Petersburg, forming the harbor system (Figure 2). It is also the newest of the three harbors, constructed by the State of Alaska in the 1983.

Thomas Bay is large inland bay off of Frederick Sound, the mouth of which is about 16 miles north of Petersburg. The mouth of the bay features a submerged terminal moraine about 2-4 fathoms below MLLW controlling access across most of the mouth, with a narrow channel about 7 fathoms deep near the southern end of the mouth. Inside the Bay, depths increase to as much as 140 fathoms. The constricted opening of the bay limits flushing and confines the majority of the glacial silts and freshwater that are released within the Bay. The topography along the majority of Thomas Bay is very steep, with the exception of the western margin of the northern lobe of the Bay. The area around Thomas Bay is relatively undeveloped and there are no permanent residents.

Figure 7. Petersburg area topographic and marine features.

3.1.1 Temperature & Precipitation

Petersburg, Frederick Sound, and Thomas Bay fall within the southeast maritime climate zone, characterized by cool summers, mild winters and heavy rain throughout the year. Summer temperatures range from 57-63° F. Winter temperatures range from 36 to 49° F. Average annual precipitation is 109 inches, and average annual snowfall is 77 inches (Table 1).

Table 1. Monthly Climate Summary Petersburg, Alaska Period of Record: 1981-2010 (Provided by the National Climate Data Center).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	36.2	38.3	42.4	49.5	56.5	61.9	64.0	63.2	57.0	48.9	40.4	36.3	49.6
Average Min. Temperature (F)	26.0	27.1	29.6	34.1	40.4	46.3	49.2	48.2	44.0	38.1	30.9	27.2	36.8
Average Total Precipitation (in)	11.48	7.36	8.45	6.04	5.92	4.94	5.21	7.20	13.65	15.71	12.22	11.05	109.23
Average Total Snowfall (in)	21.9	16.1	16.9	0.7	0.0	0.0	0.0	0.0	0.0	0.6	9.1	11.4	76.7

3.1.2 Air Quality

The area around Petersburg, Alaska, including Thomas Bay and Frederick Sound, is not classified as a Clean Air Act non-attainment area. Neither EPA's webpage nor the State of Alaska's Department of Environmental Conservation air quality webpage document any record of air quality issues at Petersburg. As a coastal community adjacent to a continental land mass, the area experiences the usual alternating (day versus night) flows of air currents resulting from the repetitive heating and cooling of large land masses, and therefore, a "flushing" effect.

3.1.3 Ice Conditions

Petersburg is ice free year round. Ice forms on the surface of the upper parts of Thomas Bay during the coldest parts of the winter of some years due to the elevated freshwater concentrations from the streams flowing into the relatively confined embayment. The ice is generally thin enough it can be broken with a steel-hulled vessel. Icebergs regularly drift out of Leconte Bay, south of Petersburg, and into Frederick Sound. The icebergs can present a hazard for small vessels.

3.1.4 Sediments

3.1.4.1 Sediment Transport

The primary source of upland sediments is the sediment load transported downstream by Hammer Slough through Middle Harbor and then northwest into North Harbor (USACE 1977) (Figure 8).

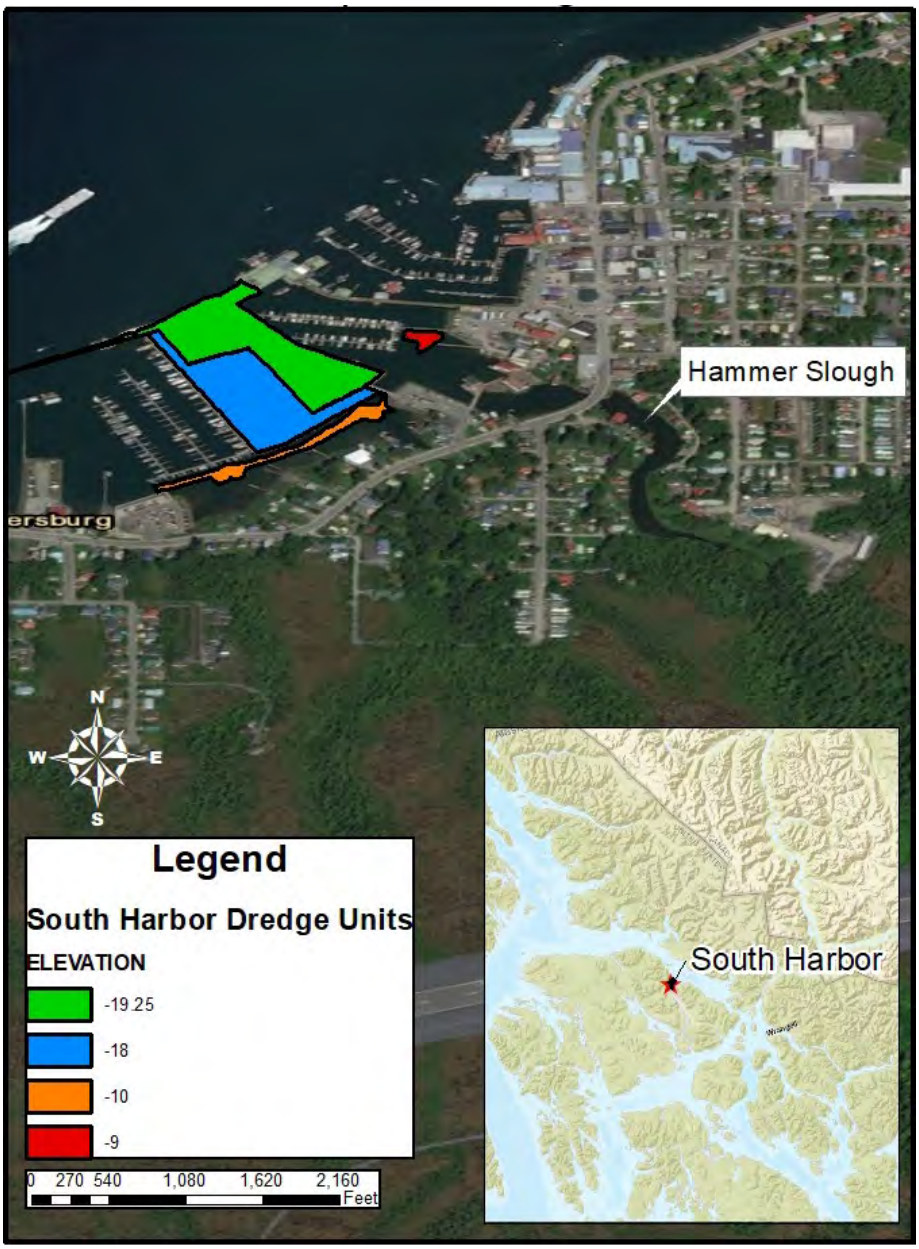

Figure 8. Location of Hammer Slough in relation to South Harbor dredge units.

The estimated rate of deposition in between Middle and South harbor resulting from Hammer Slough is 200 CY per year. A smaller unnamed stream entering Wrangell Narrows south of Hammer Slough may also contribute to the sediment accumulation in South Harbor since majority of the sediment from Hammer Slough is thought to move north into Middle and North Harbors. The report also notes that the input of marine derived sediments results primarily from tidal flood and ebb currents moving through the Wrangell Narrows at an average mid-channel rate of 3.7 and 3.4 knots, respectively. Mid-channel velocities can reach as high as 8 knots. No separate estimate of the rate of deposition or erosion of sediments resulting from Wrangell Narrows influence is available, nor is a combined estimate of the rate of fresh water and marine deposition or erosion available.

3.1.4.2 Sediment Quality

South Harbor. The Alaska District collected sediment samples in April 2018 in order to characterize the physical and chemical properties of the dredged material and newly exposed sediment surface, known as the “Z-layer”. Dredging alters the environmental conditions in the dredging area by exposing new sediments to direct contact with biota and the water column, so the chemical nature of the newly exposed sediments must be understood in order to accurately determine the suite of potential impacts from a proposed dredging project. Samples collected from the Z-layer are called “Z-samples” and Z-sample chemical concentrations were evaluated against the same screening criteria as the dredged material. Core samples were collected in South Harbor using a vibracore device (Figure 9).

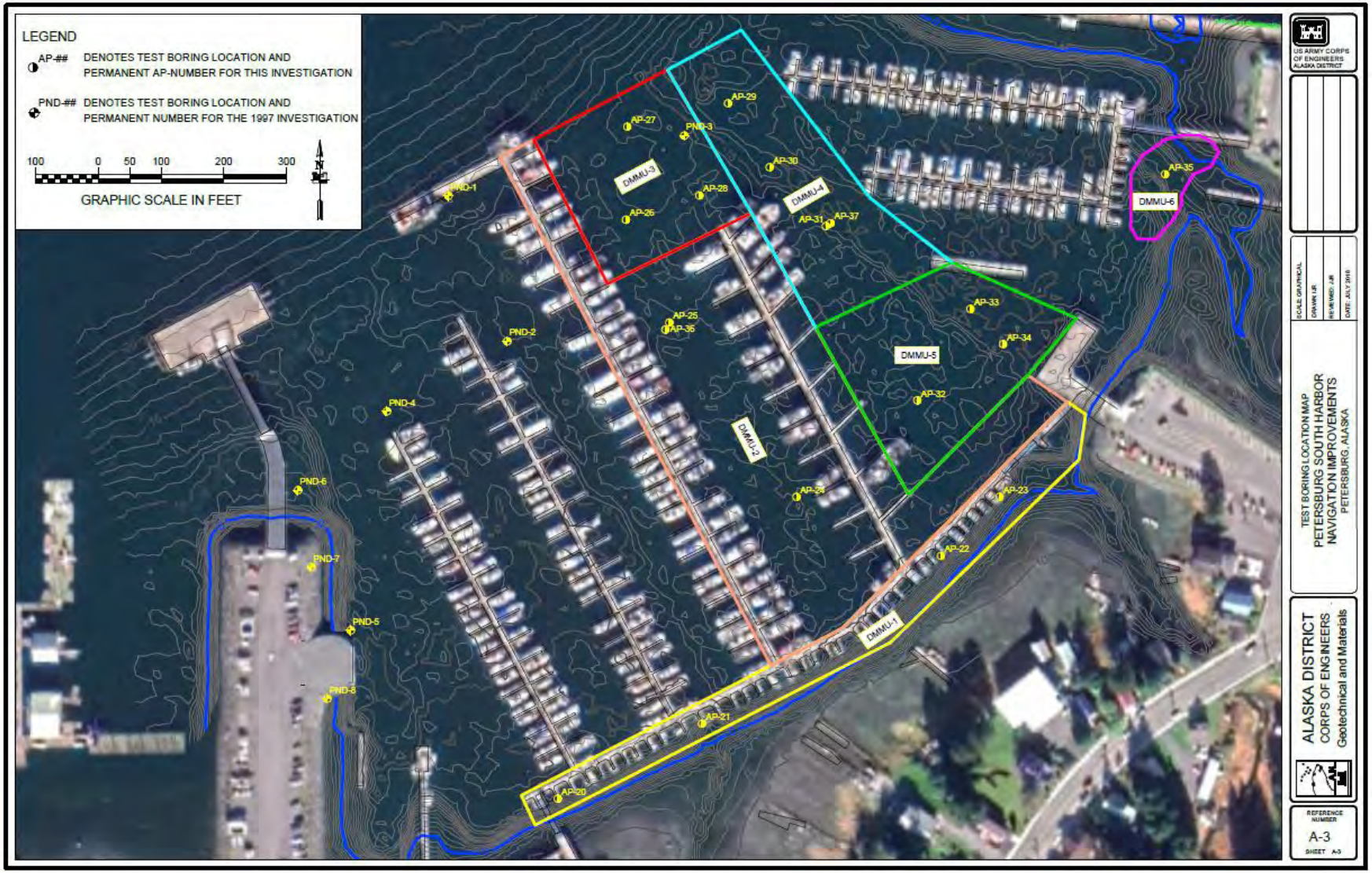

Figure 9. Test Coring Locations in South Harbor.

Sediment samples were taken throughout the vertical cross section of the dredge footprint, from the sediment surface to post construction depth or refusal. The physical characteristics of the sediments are displayed in Table 2.

Table 2. Summary of Geotechnical Laboratory Test Results.

Test Bore	**Composition (percent)**			**Unified Soil Classification ASTM 02487**
	Gravel	Sand	Silt/Clay	
TB-01	2	58	40	(SM) Silty sand
TB-02	6.6	89.8	3.6	(SP) Poorly-graded sand
TB-03	4.6	58.5	36.9	(SM) Silty sand
TB-04	0.2	82	17.8	(SM) Silty sand
TB-05	21.3	27.9	50.8	(Ml) Sandy silt w/ gravel
TB-05	8.2	25	66.8	(Cl-Ml) Sandy silty clay
TB-06	8.7	41	50.3	(ML) Sandy silt
TB-	10.9	28.3	60.8	(CL-Ml) Sandy silty clay
TB-07	20.8	68.4	10.8	(SP-SM) Poorly-graded sand w/ silt and
TB-08	13.4	82.8	3.8	(SP) Poorly-graded sand
TB-08	19.1	75	5.9	(SP-SM) Poorly-graded sand w/ silt and
TB-09	24.1	56.4	19.5	(SM) Silty sand w/ gravel
TB-10	7.8	86.6	5.6	(SP-SM) Poorly-graded sand w/ silt
TB-11	18.6	36.9	44.5	(SM) Silty sand w/ gravel
TB-12	13.6	36.7	49.7	(SM) Silty sand
TB-	12.6	31.1	56.3	(ML) Sandy silt
TB-	12.4	30.7	56.9	(Ml) Sandy silt
TB-13	11.2	34.8	54	(Ml) Sandy silt
TB-13	15.3	26.4	58.3	(Ml) Sandy silt w/ gravel
TB-14	16.2	37.5	46.3	(SM) Silty sand w/ gravel
TB-14	3.6	31.2	65.2	(Ml) Sandy silt
TB-15	23.7	30.2	46.1	(SM) Silty sand w/ gravel
TB-15	6.1	28.9	65	(CL-ML) Sandy silty clay
TB-16	28.9	41.2	29.9	(SM) Silty sand w/ gravel

The Alaska District does not have a regional sediment evaluation framework due to the extreme variability between the environmental conditions throughout the State, so the Pacific Northwest Regional Sediment Evaluation Framework (SEF) acts as an acceptable surrogate. The SEF provides a framework for assessing and characterizing sediment to: determine the suitability of dredged material for unconfined, aquatic disposal; determine the suitability of post-dredge surfaces; and predict effects on water quality during dredging. The SEF describes procedures for evaluating potential contaminant-related environmental impacts of dredging and the aquatic placement of dredged material in inland waters and the disposal of dredged material in ocean waters. The framework is designed for use in the Pacific Northwest, defined in the SEF as Washington, Oregon, and Idaho; but the use of the SEF in Alaska is appropriate due to similarities in mineralogy, water chemistry, and fauna.

The SEF serves as the Pacific Northwest's joint regional implementation manual for the two national sediment testing manuals:

- Evaluation of Dredged Material Proposed for Ocean Disposal (Ocean Testing Manual), which satisfies the Marine Protection, Research and Sanctuaries Act (MPRSA) sediment testing requirements (EPA and Corps 1991)
- Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual (Inland Testing Manual), which satisfies CWA sediment testing requirements (EPA and Corps 1998)

The Seattle District's Dredged Material Management Program (DMMP) User Manual includes the same chemical concentration criteria as the SEF; but is updated more frequently and the matrices are more easily exported for manipulation, so the Alaska District has historically adopted those screening level criteria.

The chemical properties of the sediments were compared to the screening levels for in-water placement described in the Seattle District's Dredged Material Management Program (DMMP) User Manual, and for terrestrial placement described in the ADEC cleanup levels for soil. The sediments did not exceed the thresholds of unconfined placement in the marine environment, meaning they're suitable for unconfined in-water placement.

Comparison of sediment chemistry to the ADEC, Over 40 Inch Zone indicated that the sediment exceeded the screening level for arsenic for the purpose of upland placement. This exceedance is assumed to be a result of natural mineralogy and would be confirmed through additional chemical analysis prior to disposal if necessary (Appendix A). The sediment characterization analysis indicated that in-water disposal in ocean waters is the least costly alternative with sound engineering practices that meets the applicable environmental standards and is the Federal Standard (33 CFR 335.7).

Potential In-Water Disposal Locations. Thomas Bay is an inland confined embayment that receives large volumes of sediment from Baird Glacier in the northern lobe. The fine grained material remains in the Bay and settles to the bottom, contributing to a depositional environment. There are no sources of anthropogenic contamination identified in the site history that would indicate Thomas Bay sediments may be contaminated. Sediment samples from Thomas Bay were collected in November 2018 in order to assess the physical characteristics of the material; sediments collected from all sampling locations were homogenous silt-sized particles in the grey hue range.

Frederick Sound is a large semi-enclosed ocean water body with diverse sediment characteristics. The Alaska District identified three areas in Frederick Sound in the zone of siting feasibility for the collection of site selection data, including sediment data. The shallower areas within the District's study area are more exposed to strong currents from the Wrangell Narrows, preventing the accretion of fine-grained material and resulting in a heterogeneous bottom composition. Material collected from areas deeper than 55 fathoms contained up to 10 percent sand, with the remaining 90 percent

composed of silt. Video footage from the 35 fathom range, closer to the Wrangell Narrows, suggests a predominantly sand/shell/cobble bottom.

3.1.5 Wind

A wind analysis performed by the Air Force Combat Climatology Center using historical wind speeds from the Five Finger Coastal-Marine Automated Network (C-MAN) was used to calculate the design wave height for the Scow Bay alternative. The design wave height was then used to calculate the armor stone size, which was used to determine the cost of the alternative. Results of the wind analysis are presented in Figure 10 and Table 3 to Table 4.

Figure 10. Location of C-MAN Station Used for Wind Data.

Table 3. North Wind Speed Extreme Analysis.

One-Hour Sustained Wind (Knots)	EXTREME VALUE ANALYSIS									
Five Finger AK Buoy - NORTH WIND										
55.27 N 133.63 W Elevation = 7 meters	PERIOD OF RECORD: 1985-2013									
QUANTILES	0.1	0.2	0.5	0.8	0.9	0.95	0.98	0.99	0.999	0.9999
RETURN PERIOD (YRS)	1.1	1.25	2	5	10	20	50	100	1000	10000
VARIATE 1 Hour Sustained Winds (Knots)	37.0	37.6	41.2	50.3	58.0	66.0	77.0	85.4	114.0	143.1

Note: The return period is the average elapsed time between occurrences of an event with a certain magnitude or greater.

Table 4. South Wind Speed Extremal Analysis.

One-Hour Sustained Wind (Knots)	EXTREME VALUE ANALYSIS									
Five Finger AK Buoy - SOUTH WIND										
55.27 N 133.63 W Elevation = 7 meters	PERIOD OF RECORD: 1985-2013									
QUANTILES	0.1	0.2	0.5	0.8	0.9	0.95	0.98	0.99	0.999	0.9999
RETURN PERIOD (YRS)	1.1	1.25	2	5	10	20	50	100	1000	10000
VARIATE 1 Hour Sustained Winds (Knots)	39.8	40.1	42.9	50.8	57.7	65.1	75.2	83.1	110.0	137.5

Note: The return period is the average elapsed time between occurrences of an event with a certain magnitude or greater.

3.1.6 Water Quality

Water quality in the Petersburg South Harbor is believed to be unimpaired due to the hydraulic flushing that occurs, as a result of the significant tidal currents passing unimpeded through the Harbor, from currents in Wrangell Narrows. The Harbor is not confined by a breakwater, so the entire volume of water is exchanged multiple times each day. The Alaska District's sediment chemistry evaluation corroborates the expectation of good water quality in the Harbor (see section 3.1.9). Since most structures within the harbors are on pilings, there is little to impede water driven by these currents from flowing through the exposed harbor basins. However, the harbors experience very little wave action.

There is no indication in the site histories of Thomas Bay or Frederick Sound that water quality is impaired. There are no sources of anthropogenic contamination or historic

water quality impacts that would warrant an in-depth water quality analysis of the potential disposal areas.

3.1.7 Water Level

Water level increase is typically a result of wave set up, storm surge, inverted barometer effects, and tide. Relative sea level rise is a longer term change in water level which needs to be considered when designing for a navigation improvements project.

Wave Setup. Wave setup is the water level rise at the coast caused by breaking waves. The features of this project extend beyond the area of breaking waves so wave set up was not considered in the calculations for the Petersburg Navigation Improvements study.

Storm Surge. Petersburg experiences low pressure events that could contribute to storm surge, but the water is too deep to stack up and cause a significant surge. A rise in the water elevation due to surge has not been a problem reported at Petersburg, so no storm surge was used in the calculations for this study.

Inverted Barometer. A high pressure system decreases sea level, and conversely, low atmospheric pressure results in sea level rise. Generally, a 1 millibar change in pressure results in a 1 centimeter (cm) change in the water surface. To compensate for a lowered water level due to a high pressure system the lowest astronomic tide was used when determining the dredge depth.

Tide. The mean higher high tide of 16.07 ft was used for the high water elevation.

Sea Level Rise. USACE requires that planning studies and engineering designs over the project life cycle, for both existing and proposed projects consider alternatives that are formulated and evaluated for the entire range of possible future rates of sea-level change (SLC), represented by three scenarios of “low,” “intermediate,” and “high” SLC. The SLC “low” rate is the historic SLC. Sea Level rise equations and calculations can be found in Appendix B.

3.1.8 Tides

Petersburg’s semi-diurnal tidal range is approximately 16 ft. The extreme tidal range is 23.8 ft with a mean range of 13.8 ft. Petersburg lies within a two-layered estuarine circulation system common in Southeast Alaska. It is a seasonal phenomenon, beginning during spring thaw with an increase in freshwater discharge. The freshwater flows seaward along the surface (of the ocean) and is replaced by saline water intruding at greater depths. During fall and winter, storms and reduced runoff combine to thoroughly mix the layers and destroy the system (USACE 1989).

The tidal parameters in Table 5 were determined using National Oceanic and Atmospheric Administration (NOAA) published data for Turn Point (approximately 1 mile southwest of Petersburg) published June 2009 for the tidal epoch 1983-2001. There was no reported highest observed water level and no lowest observed water level.

Table 5. Tidal Parameters – Petersburg.

Parameter	Elevation (ft)
Highest Astronomical Tide	19.69
Mean Higher High Water (MHHW)	16.07
Mean Sea Level (MSL)[1]	8.34
Mean Tide Level (MTL)[2]	8.34
Mean Lower Low Water (MLLW)	0.00
Lowest Astronomical Tide	-4.15

[1] MSL The arithmetic mean of hourly heights observed over the National Tidal Datum Epoch. Shorter series are specified in the name; e.g. monthly mean sea level and yearly mean sea level.
[2] MTL The arithmetic mean of mean high water and mean low water.

3.1.9 Currents

The current velocities approximately 300 yards from the face of the docks are reported to be as high as 7 knots (USACE 1977). Velocities within the harbor are estimated to be much less, but were not numerically quantified within USACE 1977. The estimated current for South Harbor is as follows: average maximum flood tide 3.2 knots and average maximum ebb tide 2.1 knots (Tides & Currents software Version 3.7.0.117). The highest fetch during maximum tides is reported to be approximately one-half mile.

3.1.10 Rivers and Creeks in the Project Vicinity

Hammer Slough feeds into the Petersburg harbor system between Middle and South Harbor. This slough appears to be the main supply of sediment deposited in the harbors. The frequency of infilling for this project is assumed to be similar to the USACE dredging in the North Harbor (Figure 2). The North Harbor was originally dredged in 1971, and again 42 years later in 2013. Maintenance dredging in 2013 removed approximately 27,000 cubic yards (CY) of material.

3.2 Biological Resources

Biological resources in the vicinity of South Harbor are typical of Southeast Alaska. Habitat within the proposed dredge footprint has been impacted since the Harbor basin was developed in 1983. Substrate located within the proposed dredging footprint consists mostly of sand and silt. There is no breakwater or other energy reducing structure to protect the Harbor due to its protected location in Wrangell Narrows. The following section identifies biological resources occurring in the study area. The study area can be viewed as two distinct areas for purposes of environmental analyses; South Harbor and potential in-water disposal locations. There are two potential disposal locations: Frederick Sound, an ocean disposal area located two miles east of the Petersburg South Harbor and Thomas Bay, an inland water body located approximately 20 miles northeast of the study area (Figure 11).

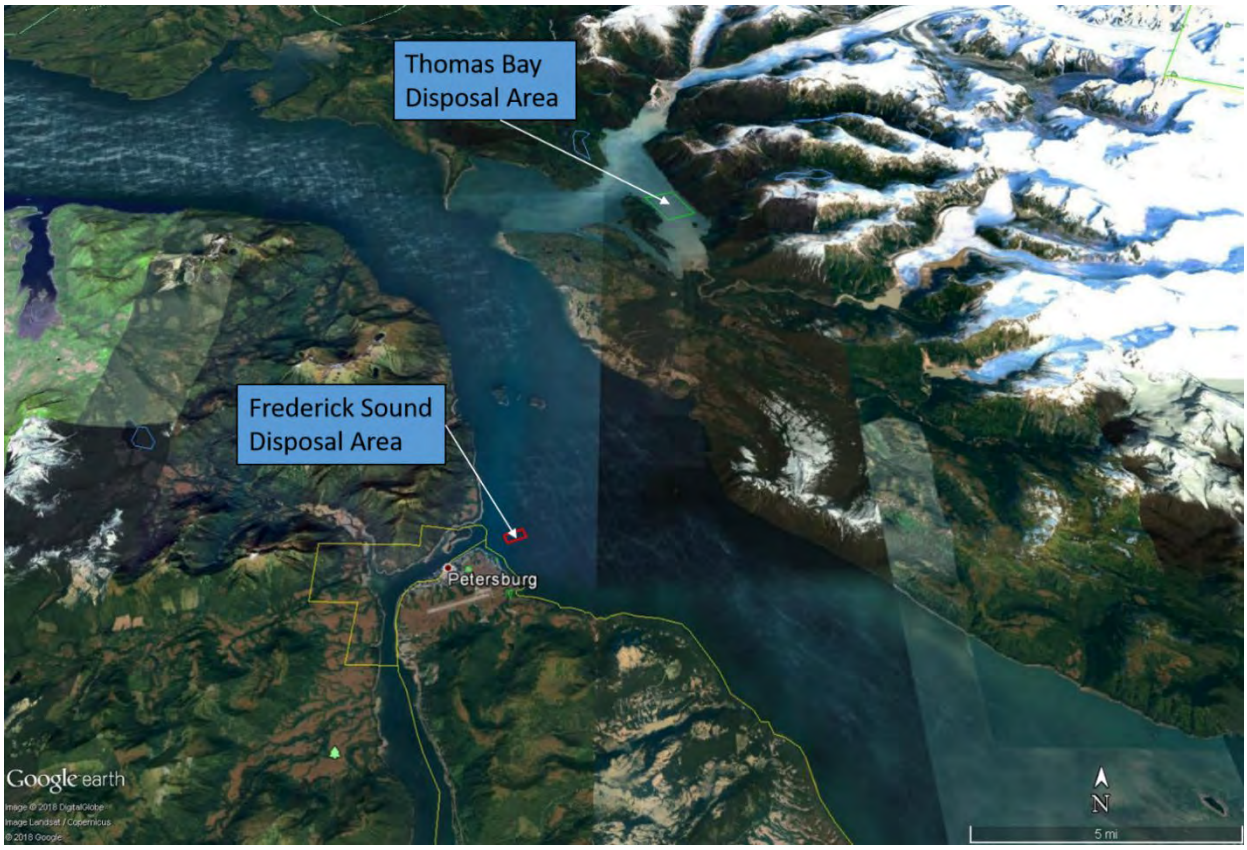

Figure 11. Location map showing biological data collection areas in Frederick Sound and Thomas Bay (Google Earth Pro 2018).

Disposal sites considered for this study are depicted in Figure 12 and Figure 13. The Alaska District collected biological data to support Plan Formulation in both Frederick Sound and Thomas Bay in order to demonstrate relative potential impacts and support contingencies.

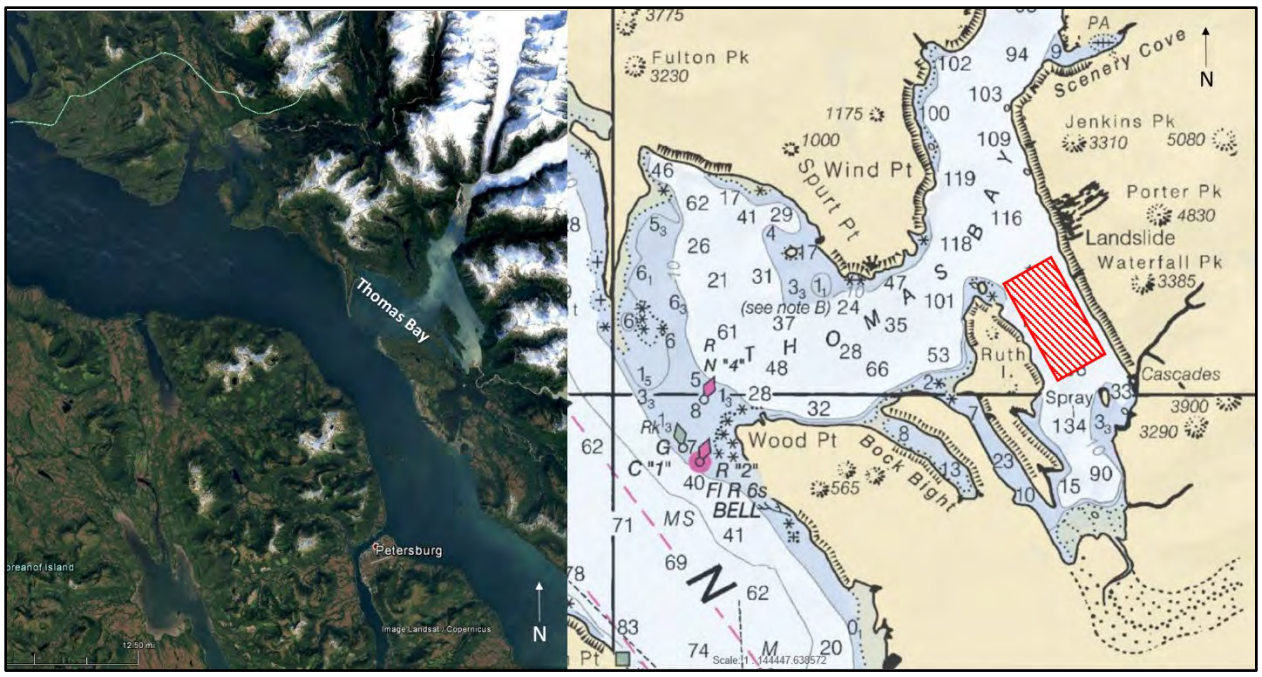

Figure 12. Vicinity Map of Thomas Bay (Potential in-Water Disposal Location marked in Red) (Google Earth Pro 2018; NOAA 2018b).

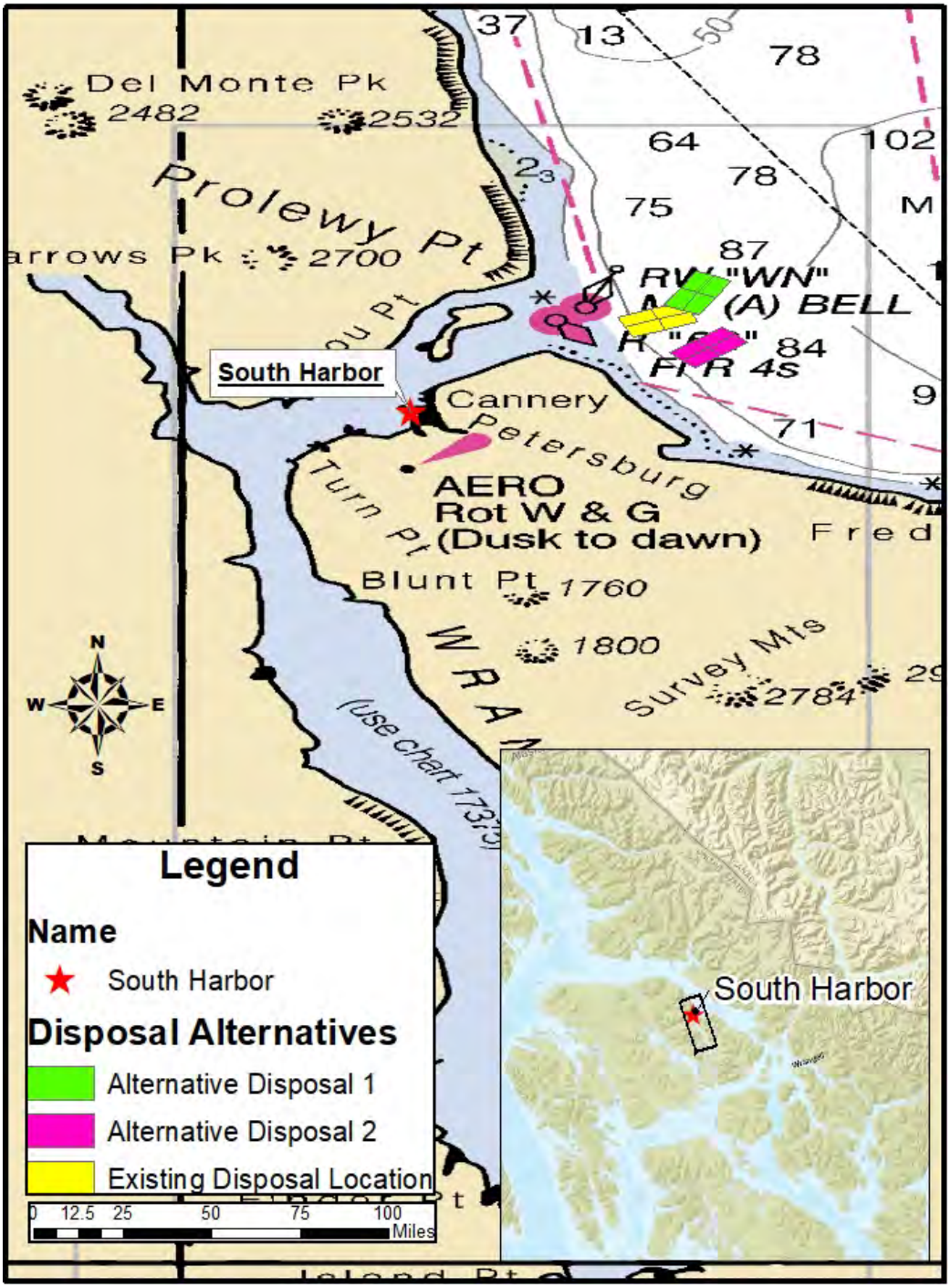

Figure 13. Sites evaluated in the Frederick Sound disposal location site selection evaluation with respect to Petersburg South Harbor.

3.2.1 Birds

South Harbor. During USACE's November 2017 site visit, several species of migratory ducks were observed in the study area; including long-tailed duck (*Clangula hyemalis)*, mallards (*Anas platyrhynchos)*, Barrow's goldeneye (*Bucephala islandica)*, bufflehead (*Bucephala albeola)*, common merganser (*Mergus merganser)*, and surf scoters

(*Melanitta perspicillata)*. In addition, Kingfishers (*Megaceryle alcyon*), bald eagles (*Haliaeetus leucocephalus*), crows (*Corvus sp.)*, and large gulls (likely herring gulls) were observed in the area.

Many species, such as common raven, northwestern crow, and gulls are consistently present across seasons. Shorebirds exhibit some degree of seasonality, with higher numbers occurring during spring migration and reduced numbers during the winter months. Waterfowl can also be found in and around Petersburg. Sea ducks, divers, and puddle ducks can all be found throughout Southeast Alaska depending on the season.

The bald eagle is the only raptor directly associated with the marine environment in Petersburg; however, merlin (*Falco columbaris*) and northern harrier *(Circus hudsonius*) could frequent Petersburg as they have been found around Sitka (FAA 2009). Bald eagles typically hunt fish in near shore and open water, snatch alcids, seabirds, and gulls flushed from the water or land, and scavenge carrion washed into the intertidal zones.

The USFWS lists marbled murrelets (*Brachyramphus marmoratus*) as a species of high concern in Alaska (USFWS 2006). They are also listed as a high concern species for North America and endangered globally, according to the USFWS Alaska Seabird Information Series. The Queen Charlotte goshawk (*Accipiter gentilis laing*), peregrine falcon (*Falco peregrinus*), olive- sided flycatcher (*Contopus cooperi*), and Townsend's warbler (*Setophaga townsendi*) are listed as special species of concern by ADFG and may also exist in the study area.

In-Water Disposal Locations. Water depth in the disposal locations exceed the foraging depth of locally occurring bird species. The water surface of both Frederick Sound and Thomas Bay are frequented by transient gulls following fishing vessels moving through the area and marbled murrelets have been observed at the surface of the waters surrounding these locations. The depth of most of the potential disposal area locations precludes direct impacts to bird foraging habitat.

3.2.2 Marine Fish

South Harbor Aggregations of juvenile fish, possibly herring, were observed amongst the flotsam entrained in the boat slips on C and D float (Figure 2). No fish were filmed incidentally underwater during the November 2017 site visit to determine whether dredge prism sediments could be collected with a vibra-core device or if a drill rig would be required. Vibra-core sediment collection is the less-costly and preferred sediment collection methodology and the November 2017 site visit confirmed that it would be an effective means of collecting the samples required for analysis. Coho salmon (*Oncorhynchus kisutch)* are reported to be present in Hammer Slough adjacent to South Harbor and pink salmon (*Oncorhynchus gorbuscha*) are believed to spawn in Hammer Slough. All five Pacific salmon species may be found in the marine waters off the coast of Alaska. Salmon fry out-migrating from the fresh waters near the study area are likely present in April and May while adult salmon returning to spawn transit the area in June through October.

In-water Disposal Locations. The potential disposal locations in Frederick Sound and Thomas Bay lie within the textual descriptions of Essential Fish Habitat (EFH) (Appendix C) for the following fisheries:

Gulf of Alaska (GOA) Groundfish EFH
Big Skate
Longnose Skate
Octopus
Sharks
Shallow Water Flatfish Complex

Bering Sea / Aleutian Islands Groundfish EFH
Octopus (Bering Sea)
Forage Fish Complex
Sharks (Bering Sea)
Squid Complex

Very few marine fish were captured incidentally during the USACE biological surveys conducted to gather information relevant to an ocean disposal site selection analysis. The Alaska District fished 12 crab pots and 12 shrimp pots in Frederick Sound for 24 hours in November 2018 and 24 hours in February 2019, capturing one blackfin sculpin (*Malacocottus kincaidit*) in November, and one Pacific halibut (*Hippoglossus stenolepis*), one arrowtooth flounder (*Atheresthes stomias*), another blackfin sculpin, and a rockfish (*Sebastes sp.*) in February 2019. The effort in Thomas Bay was even less productive, a Pacific tomcod (*Microgadus proximus*) was caught in November 2018 and a salmon snailfish (*Careproctus rastrinus*) was caught in February 2019.

Video footage collected for the site selection evaluation added spotted ratfish (*Hydrolagus colliei*) to the species of marine fish that may be found near the ocean floor in Frederick Sound. No new species were added as a result of the video collected in Thomas Bay.

3.2.3 Marine Mammals

South Harbor. Three Steller's sea lions (*Eumetopia jubatus)* and a single Northern sea otter (*Enhydra lutris*) were observed during the November 2017 site visit to South Harbor. Humpback whales (*Megaptera novaeangliae*) frequent the Wrangell Narrows, particularly in the late spring and summer. Killer whales (*Orcinus orca*), Pacific white-sided dolphins (*Lagenorhynchus obliquidens*), harbor porpoises (*Phocoena phocoena)*, and harbor seals (*Phoca vitulina*) are transient and could be present in South Harbor at any time during the year. All marine mammals are protected under the Federal Marine Mammal Protection Act (MMPA), while the Steller's sea lion (both the eastern distinct and western distinct populations) and humpback whale are also protected under the Endangered Species Act (ESA).

Killer Whale. In general, it is likely that transients and resident populations of killer whales use Frederick Sound habitats when seeking foraging opportunities. They are known to cruise the open water portions of Frederick Sound and transit channels to inner Frederick Sound, possibly feeding on salmon. Although their visits to inner Frederick Sound do not appear to be frequent, the habitats within the study area likely provide important prey or other attributes important for this species.

Harbor Seals. Near Petersburg, harbor seals congregate and pup in Leconte Bay. Dozens of isolated mother-pup pairs are found in Leconte Bay between May and June. Near the end of July, mothers and pups separate and additional seals enter the bay. It is not uncommon to see hundreds of seals dotting the icebergs during this time. Harbor seals can be found throughout Frederick Sound. Leconte Bay is about 18 miles south of the confluence of Wrangell Narrows and Frederick Sound and the presence of the Leconte Glacier at the head of the Bay provides a source of icebergs. Icebergs occasionally make it out of the Leconte Bay and into Frederick Sound.

Northern Sea Otter. Sea otters in the Southeast Alaska stock are not listed as “depleted” under the MMPA or listed as “threatened” or “endangered” under the ESA. However, all northern sea otters are listed by the State of Alaska as a species of special concern under their listing program. A Species of Special Concern is any species or subspecies of wildlife or population of mammal native to Alaska that has entered a long-term decline in abundance or is vulnerable to a significant decline due to low numbers, restricted distribution, dependence on limited habitat resources, or sensitivity to environmental disturbance. In general, northern sea otters are widely distributed in Southeast Alaska. During spring surveys around Japonski Island (90 miles northwest of Petersburg), a total of 45 sea otters were observed; however, several sightings were likely repeat sightings of the same individuals (FAA 2009).

Pacific white-sided dolphins. These sociable dolphins are generally found in temperate waters of the North Pacific, where they feed on a variety of small schooling fish such as anchovies and hake. Despite their distribution largely in deep, offshore waters, they are also found over the continental shelf and very near shore in some areas.

Harbor porpoise. Harbor porpoises are commonly found in bays, estuaries, harbors, and fjords less than 650 ft deep in northern temperate and subarctic waters. They feed on demersal and benthic species, mainly schooling fish and cephalopods.

Other Marine Mammals. The following marine mammal species have been observed in Southeast Alaska and may occur near Petersburg on an infrequent to rare basis: Dall’s porpoise (*Phocoenoides dalli)*, gray whale (*Eschrichtius robustus*), harbor porpoise (*Phocoena phocoena*), minke whale (*Balaenoptera acutorostrata*), fin whale (*Balaenoptera physalus*), sperm whale (*Physeter macrocephalus*), and pygmy sperm whale (*Kogia breviceps*). Based upon available information, these species are unlikely to rely upon habitats in the potential disposal areas, but may travel within the vicinity of Petersburg (FAA 2009).

In-water Disposal Locations.

Table 6 lists the marine mammals that may occur in the potential in-water disposal locations. A Steller sea lion was observed in Thomas Bay during the Alaska District's data collection in support of the site selection. The sea lion followed the survey vessel while the research crab pots were being set in the four study areas in Thomas Bay. The February research trip was immediately subsequent to the commercial Tanner crab season and it is likely the sea lion had learned to follow fishing boats with pot gear to eat discarded bait or bycatch during the fishing season. No marine mammals have been observed by Alaska District biologists in the area of Fredrick Sound identified as a potential disposal location.

Table 6. Potential Marine Mammals in Wrangell Narrows, Thomas Bay and Frederick Sound.

Common name	Species name	Regulatory protection
Harbor Seal	*Phoca vitulina*	MMPA
Dall's Porpoise	*Phocoenoides dalli*	MMPA
Harbor Porpoise	*Phocoena phocoena*	MMPA
Killer Whale	*Orcinus orca*	MMPA
Minke Whale	*Balaenoptera acutorostrata*	MMPA
Gray Whale	*Eschrichtius robustus*	MMPA
Steller Sea Lion	*Eumetopias jubatus*	ESA/MMPA
Pacific White Sided Dolphin	*Lagenorhynchus obliquidens*	MMPA
Humpback Whale	*Megaptera novaeangiae*	ESA/MMPA

3.2.4 Marine Invertebrates & Associated Habitat

South Harbor. South Harbor is not heavily used by invertebrates, likely due to a combination of environmental conditions including minimal structure, exposure to hydraulic energy, vessel traffic, nature of the substrate, and low primary productivity. Underwater video taken in November of 2017 captured footage of some red sea urchins (*Strongylocentrotus franciscanus)* and a small Tanner crab (presumed *Chionoecetes opilio*) in the Dredged Material Management Unit (DMMU) landward of the mainwalk float depicted in Figure 2. Seaward of the mainwalk float green sea urchins (*Strongylocentrotus droebachiensis*) and some anemones (*Metridium sp.*) were

observed clinging to the sparse structure present. The areas farther from land beneath the C and D floats are home to sea cucumbers (presumed *Cucumeria frondosa japonica*), more green sea urchins, and sea anemones. Evidence of bivalve mollusks was present in the form of shell litter.

In-water Disposal Locations. A site selection evaluation, including seasonal pot fishing and high definition video recording, for the placement of dredged materials was conducted by the Alaska District Environmental Resources section. Pandalid shrimp, specifically spot shrimp (*Pandalus platyceros*) were a commonly observed animal in the Alaska District's biological surveys; they were captured consistently on film and very commonly in pot surveys. Spot shrimp are protandric hermaphrodites; meaning they begin their lives as males and change sex to female as they grow, usually around 2-3 years old. Spot shrimp in Alaska can live as long as 11 years, spawn once as males around 2-3 years old, before changing sex and spawning multiple times as females for the remainder of their life. The preliminary camera survey indicates spot shrimp have a patchy distribution on the local scale, with relative densities ranging wildly for no discernible reason. There is some beam trawling activity in the shallow waters on the north end of Mitkof Island, but these fishermen target pink shrimp rather than spot shrimp.

The Tanner crab fishery is an important economic resource in Southeastern Alaska and is managed by the ADFG. Tanner crabs are much less abundant than spot shrimp in all of the areas surveyed by the Alaska District; but were assigned a higher conservation priority due to the greater economic significance, lower relative abundance, longer life span, and later relative age of sexual maturity. The ADFG administers a Tanner crab fishery every February, as long as census data indicates sustainable populations. Female Tanner crabs reach sexual maturity in about five years and males in about six years, living a maximum of about 14 years.

Ocular estimates of shrimp population density based on video review within the site exhibits a high degree of variability with no apparent distribution pattern (standard deviation 1.26 with range of 1-5.75 shrimp/m2). The pot fishing catch was also highly variable; with tanner crab catches ranging from 0-29 individuals per unit effort. The marine sediments in the potential Frederick Sound disposal area appear to be substantially similar to the sediments that would be removed from the South Harbor based on video footage from both locations. Due to the consistent presence of pandalid shrimp throughout the epibenthic video, the taxa was selected for relative productivity characterization in the potential Frederick Sound disposal area.

The potential Frederick Sound disposal area is not known to congregate organisms because of food resources. The sediment samples collected in November 2018 contained no biological resources and the samples from alternative disposal locations in the general vicinity contained only two nut clams and a mud star. However, the epibenthic and demersal region does provide prey items (ctenophors, amphipods, chaetognaths, copepods, shrimp, etc.) that are consumed by bottom-feeding fish, shrimp, crab, and other epibenthic and demersal organisms.

Epibenthic surveys were conducted in Thomas Bay to enable a relative productivity analysis. Thomas Bay video indicated very low epibenthic productivity; on the order of 1-2 pandalid shrimp during five minutes of video capture effort. However, pot fishing with crab gear was more productive in Thomas Bay than Frederick Sound; the largest catch returning nine red king crab (*Paralithodes camtschaticus*) and four tanner crab (*Chionoecetes sp.)*. Another potential site in Thomas Bay caught 18 tanner crab. The bottom sediments in Thomas Bay appear to be consistently fine glacial alluvium and evidence of crab burrowing in the soft sediments can be seen in the benthic video.

3.2.5 Federal & State Threatened & Endangered Species

The following NMFS-managed ESA species may occur in the Petersburg South Harbor, Frederick Sound Disposal Area, Thomas Bay and the route between the Petersburg Harbor and two potential disposal locations: humpback whale (endangered); Steller sea lion (threatened eastern population and endangered western population). The Pacific herring Southeast Alaska Distinct Population Segment (DPS) was a NMFS Candidate species following the 2008 initiation of a status review. In April 2014, NMFS determined the Southeastern DPS of Pacific Herring did not warrant listing under the ESA. No USFWS-managed ESA species exist in the project area. A brief summary about each species' presence in the study area follows.

Humpback whale. Humpback whales were listed as endangered under the ESA in 1970, depleted under the MMPA in 1972, and endangered under the State of Alaska Endangered Species list. This species travels through and forages in Frederick Sound throughout the year, but is most abundant in the spring and summer months. Local boaters have observed humpback whales in the study area "lounging," or resting in Frederick Sound.

In 2016, NMFS recognized the existence of 14 DPSs of humpback whale, whereas they had been previously listed under the ESA as a single endangered species worldwide. In the 2016 decision, NMFS classified four of the DPSs as endangered, one as threatened, and the remaining nine unwarranting of protection under the ESA. Three DPSs of humpback whales occur in waters off the coast of Alaska: the Western North Pacific DPS, which is an endangered species under the ESA, the Mexico DPS, which is a threatened species, and Hawaii DPS, which is not protected under the ESA. Whales from these three DPSs overlap to some extent on feeding grounds off Alaska.

The two DPSs of humpback whale likely to be encountered in Southeast Alaska and Northern British Columbia are the unlisted Hawaii DPS and threatened Mexico DPS. Humpback whales in the study area are expected to be represented by the unlisted Hawaii DPS 93.9 percent of the time and the threatened Mexico DPS 6.1 percent of the time (NMFS 2016).

There is no humpback whale critical habitat in the study area and most humpback whales are believed to return to the warmer waters off the coast of Hawaii or Mexico, depending on DPS, during the winter to calve. Humpback whales migrate seasonally

between warmer, tropical or sub-tropical waters in winter months (where they reproduce and give birth to calves) and cooler, temperate or sub-Arctic waters in summer months (where they feed). In their summer foraging areas and winter calving areas, humpback whales tend to occupy shallower, coastal waters. However, during their seasonal migrations, humpback whales disperse widely in deep, pelagic waters and tend to avoid shallower, coastal waters (Winn and Reichley 1985).

Humpback whales are present in Southeast Alaska in all months of the year. Most Southeast Alaska humpback whales winter in low latitudes, but some individuals have been documented over-wintering near Sitka and Juneau (NPS Fact Sheet available at http://www.nps.gov/glba). Late fall and winter whale habitat in Southeast Alaska appears to correlate with areas that have over-wintering herring (such as lower Lynn Canal, Tenakee Inlet, Whale Bay, Ketchikan, and Sitka Sound), none of which are in the action area (Baker et al. 1985, Straley 1990) Moran and Straley, in press).

Steller Sea Lion, Eastern and Western Distinct Population Segments. In 1997, the NMFS recognized two DPSs: the western DPS and eastern DPS. The segment of the population west of 144° W longitude was listed as “endangered,” while the segment of the population east of this delineation remained listed as “threatened.” The eastern DPS has recovered to the point that it is no longer considered threatened and the western DPS is recovering in much of its range, but remains endangered due to sharp declines in the Western and Central Aleutians. The study area lies within the range of the unlisted eastern DPS, and within the overlap range of the endangered western DPS.

There is no critical habitat designated within the USACE study area for the western and eastern populations. However, there is one major eastern Steller sea lion haulout approximately 15 miles southwest of Sitka Harbor at Biorka Island. Eastern Steller sea lions occur in Frederick Sound throughout the year, but are in much higher numbers during the spring herring season. Banded western Steller sea lions have been observed within Southeast Alaska eastern Steller sea lion critical habitat: the Kaiuchali Island haulout and the Biali Rocks rookery. From 2001 to 2006, 274 total sightings of western Steller sea lions were recorded in Southeast Alaska; however, these sightings likely represented 66 individuals repeatedly observed: Of the 66 western animals seen in Southeast Alaska, only two tagged western Steller sea lions have been observed at haulouts near Sitka Sound (FAA 2009).

Steller sea lions are present year-round in the project area and appear to be very habituated to anthropogenic activities. During the USACE November 2017 site visit, three sea lions were observed swimming in South Harbor. During the USACE August 2018 site visit, several sea lions were observed hauled out on the navigation buoy at the entrance of the Wrangell Narrows navigation channel. Local sources have related accounts of killer whale predation of sea lions in the study area, specifically from the navigation buoy at the entrance to Wrangell Narrows. These resident sea lions are presumed to forage on overwintering herring and available year-round Pollock and Hake.

3.2.6 Essential Fish Habitat

NMFS authority to manage EFH is directly related to those species covered under Fishery Management Plans (FMPs) in the United States. USACE's proposed dredging and dredged material placement project is within an area designated as EFH for two FMPs—GOA Groundfish and Alaska Stocks of Pacific salmon. These two FMPs include species or species complexes of groundfish and invertebrate resources and all Pacific salmon species. Species with established FMPs are listed in Table 7.

Table 7. Species with established FMPs in the Study Area.

GOA Groundfish	Alaska Stocks of Pacific Salmon
Skates (Rajidae)	Chinook
Pacific cod	Coho
Walleye Pollock	Sockeye
Thornyheads	Chum
Pacific ocean perch	Pink
Rougheye rockfish	
Yelloweye rockfish	
Rex sole	
Dover sole	
Flathead sole	
Sablefish	
Atka mackerel	
Shortraker rockfish	
Northern rockfish	
Dusky rockfish	
Yellowfin sole	
Arrowtooth flounder	
Rock sole	
Alaska plaice	
Sculpins (Cottidae)	
Sharks	
Forage fish complex	
Squid	
Octopus	

See Appendix C for a description of GOA Groundfish resources. No EFH "habitat areas of particular concern" are in the proposed dredge footprint or potential disposal areas.

Near-shore habitats in proximity to the harbor are expected to be used by juvenile salmonids during their early marine life history. According to the ADFG, approximately six streams in the Petersburg area are used by Chinook, coho, pink, and sockeye salmon. Juvenile salmon from these streams may use the near-shore study area during their spring outmigration, feeding along marine shorelines, gaining size and swimming ability before moving into more offshore waters. Young-of-the-year (all fish less than 1 year old) coho and sockeye salmon may also be found along the shoreline.

Rocky and mixed-soft shorelines provide a prey base of gammarid amphipods and harpacticoid copepods. Near-shore waters also harbor a myriad of predators on juvenile salmonids, including larger fish (e.g., rockfish and other salmonids), piscivorous birds (e.g., grebes, cormorants, herons), and marine mammals (seals, sea lions, and humpback whales). To avoid these predators, juvenile salmonids benefit from the presence of shoreline complexity (e.g., large wood, rocks, and kelp beds) that provide escape and hiding spaces. Offshore kelp beds in proximity to the harbor may provide an abundance of larval fish that are favored prey of juvenile pink and coho salmon. Both juvenile and adult salmon have been known to use kelp beds, but the association has not been well documented. Larval, juvenile, and adult life stages of several rockfish species could occur in and in proximity to the USACE study area.

Larval, juvenile, and adult life stages of several flatfish species are expected to occur on soft and mixed bottom habitats. EFH species of flatfish may be present in the study area, particularly common species such as yellowfin sole and rock sole. Several taxa of EFH sculpin are expected to occur in both rocky and mixed bottom habitats in the project area. It is conceivable that all life stages of sculpin are likely present. EFH forage species such as eulachon, capelin, and Pacific sand lance could also occur as they are also known to be abundant in the Sitka area.

Pacific herring are not included in the GOA Groundfish FMP and are not an EFH species; however, they serve an important ecological role within Frederick Sound. Pacific herring provide an abundant, high energy food source for a wide variety of fishes, mammals, and birds. Herring are also commercially important and support a roe fishery in Southeast Alaska that remains one of the largest and most valuable roe fisheries in Alaska.

Herring spawn from the intertidal zone down to about −40 ft MLLW, targeting areas with substantial macroalgae concentrations. Egg deposition can occur on all species of kelp as observed in the Sitka area, particularly *Macrocystis* and *Saccharina*, but herring also use eelgrass, coralline algae, red algae, and hard rocky substrates.

Additional EFH information can be found in Appendix C.

3.3 Socio-Economic Conditions

3.3.1 Population

An estimated 3,196 residents lived in the Petersburg Borough in 2016. This represents a population increase of 8.4 percent since 2010 and a decrease of 0.9 percent since 2000. The formation of the borough in 2013 may have been a contributing factor to the population increase since 2010, but the degree to which it contributed is not explicitly known. It should be noted that Petersburg has many transient workers during the fish processing season who are not counted by the U.S. Census, so these population estimates can be considered conservative. Based on 2016 census estimates, 74.8 percent of Petersburg residents are white; 10.4 percent are Hispanic or Latino; 7.5 percent are American Indian or Alaska Native; and 4.4 percent of residents are Asian. In the state of Alaska, 65.6 percent of residents are white; 6.7 percent are Hispanic or Latino; 14.1 percent are American Indian or Alaska Native; and 6 percent are Asian. Table 8 displays racial demographics for the Petersburg Borough, state, and Nation.

Table 8. Population by Race.

	Petersburg Borough	**Alaska**	**United States**
Total	3,196	736,855	318,558,162
White alone	74.8%	65.6%	73.3%
Black or African American alone	2.3%	3.3%	12.6%
American Indian and Alaska Native alone	7.5%	14.1%	0.8%
Asian alone	4.4%	6.0%	5.2%
Native Hawaiian and Other Pacific Islander alone	0.6%	1.2%	0.2%
Two or more races	8.3%	8.5%	3.1%
Hispanic or Latino	10.4%	6.7%	17.3%
White alone, not Hispanic or Latino	67.0%	62.0%	62.0%

Source: 2012-2016 American Community Survey 5-Year Estimates, Census Bureau

3.3.2 Employment & Income

In 2016, the median household income in Petersburg was $63,940, below the State of Alaska median income of $74,444 and above the national median income of $55,322. The mean household income was $82,803. Table 9 shows the number of households in Petersburg Borough, the State, and Nation and the percentage of each by their respective incomes.

Table 9. Family Income.

	Petersburg Borough	Alaska	United States
Total Households	1,237	250,235	117,716,237
Less than $10,000	5.0%	3.7%	7.0%
$10,000 to $14,999	6.1%	3.4%	5.1%
$15,000 to $24,999	10.1%	7.1%	10.2%
$25,000 to $34,999	7.9%	7.0%	9.9%
$35,000 to $49,999	7.8%	11.4%	13.2%
$50,000 to $74,999	21.3%	17.9%	17.8%
$75,000 to $99,999	11.9%	14.8%	12.3%
$100,000 to $149,999	15.6%	19.2%	13.5%
$150,000 to $199,999	9.8%	8.8%	5.4%
$200,000 or more	4.5%	6.8%	5.7%

Source: 2012-2016 American Community Survey 5-Year Estimates, Census Bureau

3.3.3 Marine Infrastructure & Facilities

As one of Alaska's major commercial fishing communities, there are multiple marine facilities around Petersburg that provide general moorage and other services to the fishing fleet. The majority of Petersburg Borough residents live on Mitkof Island and most of the commercial fish landings take place in Petersburg. This analysis focuses on facilities in the Petersburg harbor system where insufficient depths and marine infrastructure result in transportation inefficiencies for the commercial, subsistence, and recreational vessels utilizing these facilities. Scow Bay, mentioned previously as a potential beneficial use of dredged material site, is also explained in this section.

As stated above, Petersburg can be accessed by air and water. It is on the mainline state ferry route and has ferry terminals on the north and south ends of Mitkof Island (Figure 14). The state-owned James A. Johnson Airport has a runway for scheduled jet service and small plane charter services. Lloyd R. Roundtree Seaplane Base (on the Wrangell Narrows) allows for float plane services.

Harbor facilities include a petroleum wharf, barge terminals, three boat harbors (i.e. the "Petersburg harbor system") with approximately 573 slips available for permanent and transient moorage, a boat launch, and a boat haul-out. Freight arrives by barge, ferry, or cargo plane. Remote areas of the Borough are served by small state-owned boat docks at Papke's Landing in the Wrangell Narrows, on Kupreanof Island at the City of Kupreanof, and in Hobart Bay. Boat launch ramps are located on the south end of Mitkof Island at Banana Point, Blaquerie Point, and Woodpecker Cove. The state owned Mitkof Highway carries traffic north and south and is paved or chip sealed for 28 miles between the South Mitkof Ferry Terminal and the airport.

Float replacement is categorized under Future Without Project Conditions since the NFS has an established schedule. North Harbor floats were fully replaced in 2014 after

60 years. Middle Harbor floats were brand new in 2008 and should last 60 years with replacement in 2068. South Harbor floats are scheduled to be replaced in approximately 15 years (2033).

Figure 14. Mitkof Island

3.3.3.1 Petersburg Harbor System

The Petersburg harbor system is comprised of three contiguous areas along the downtown waterfront: the North Harbor between Icicle Seafoods and Ocean Beauty Seafoods; the Middle Harbor located south of Ocean Beauty Seafoods; and the South Harbor that extends between Middle Harbor and the drive-down dock (Figure 2).

Petersburg's harbors were primarily developed to serve the regional commercial fishing industry. In addition to the floating docks, it is home to three major fish processors and two small fish processors, a U.S. Coast Guard (USCG) mooring station, a sea-plane base, a fuel dock, and various public and private marine services. The harbor is also home to a substantial recreational fishing fleet that generally uses slips during the summer season and hauls out during the off-season. In recent years, tourism, yachts, and mini-cruise ship calls have contributed to Petersburg harbors' activity.

North Harbor. Petersburg North Harbor is an existing USACE project and was established in the 1930s. It is bounded to the north by the Icicle Seafoods processing plant and to the south by the Ocean Beauty Seafoods processing plant and pier (Figure 15). Trident Seafoods also operates a small processing plant within North Harbor. The North Harbor has two main floats with a connecting float that joins them. These floats support approximately 120 berths ranging in length from 18 to 75 ft. Several longer mooring positions are used for transient vessels along the outside margin of the end floats.

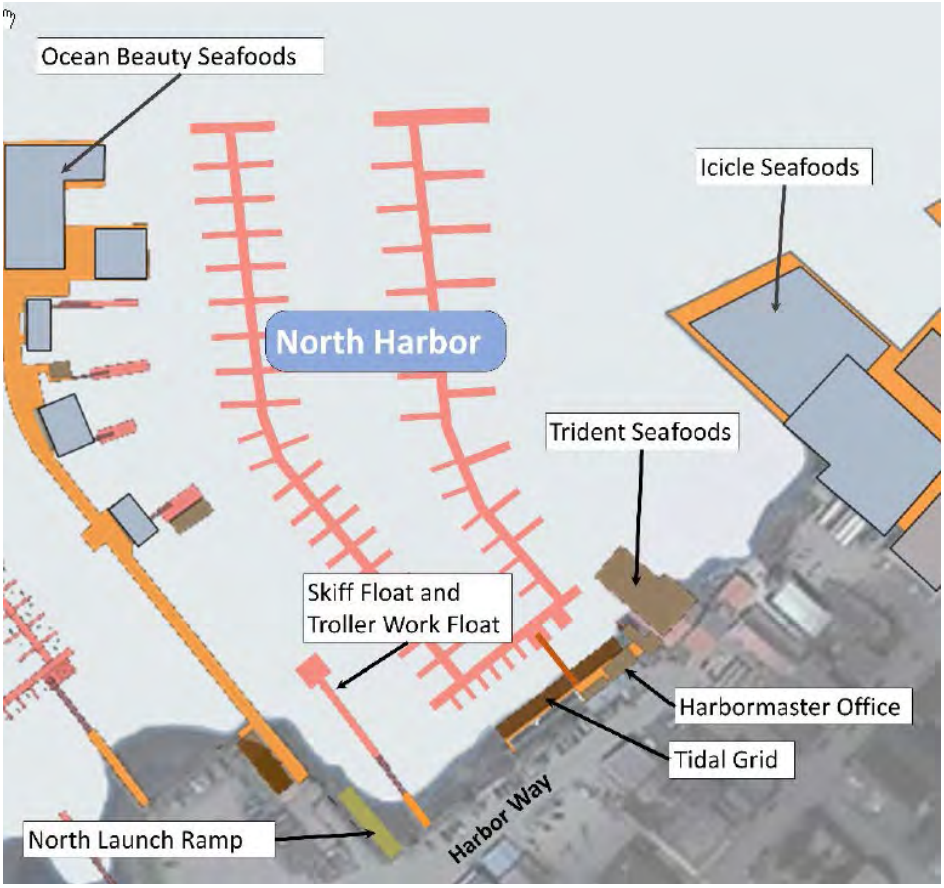

Figure 15. North Harbor.

In addition to the processing plants and berths, the North Harbor has a 136-foot skiff float for Borough residents arriving by small vessels from Kupreanof Island and other surrounding communities. It also has a tidal grid of staked timbers for maintenance of commercial vessels up to 42 ft in length. The tidal grid is approximately 200 ft long and

is primarily used for cleaning boat hulls below waterline. The North Harbor launch ramp, a timber ramp at the south side of the North Harbor, requires periodic maintenance. It is too short to launch boats at low tide and there is no adjacent dedicated trailer parking.

Prior to 2013, the last major renovation of North Harbor was performed in 1965 when more than 1,700 lineal ft of log float was removed and replaced with more than 17,000 square ft of polystyrene floats. In 2013, the existing headwalk float, both mainwalk floats, all stall ("finger") floats, and the transient float were removed, along with all existing timber pile. An existing steel gangway, 215 lineal ft of existing timber deck, and 37 lineal ft of existing catwalk adjacent to the harbor office, as well as four existing boat grid sleepers and their associated support piles were also removed. The entire slip area in North Harbor was dredged and a new approach dock, gangway, and float system was installed in a layout that increased the average north dock berth length.

Middle Harbor. Middle Harbor was established in the 1970s and is bounded to the north by the Ocean Beauty Seafoods processing plant and to the south by the Petersburg Harbor crane dock (Figure 16). The Middle Harbor has two mainwalks joined by a connecting float. These floats support approximately 137 berths ranging in length from 18 to 32 ft. In addition to the processing plant and berths, Middle Harbor has a 150-foot work float for maintenance of nets and gear. An 84-foot privately-owned boarding float is under lease to the ADFG. At the south end of Middle Harbor, the Petersburg Harbor Department maintains a 120-foot public crane dock for fishing boat gear change. Hammer Slough, a tidal drainage through the center of Petersburg, empties into the harbor between the ADFG float and the crane dock.

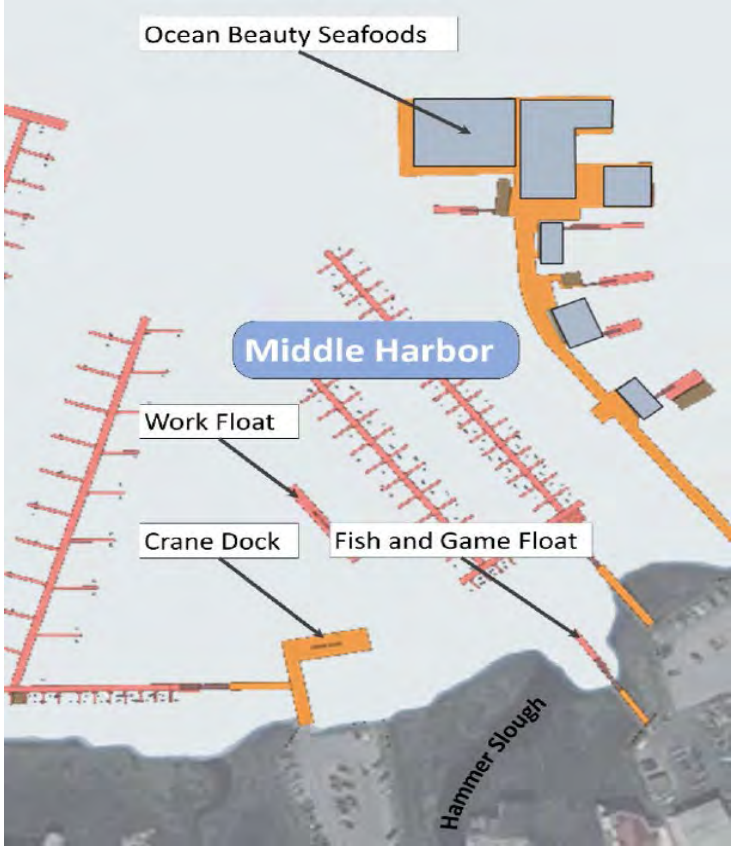

Figure 16. Middle Harbor**.**

Prior to 2005, the last major renovation of Middle Harbor took place around 1975 when the skiff float in the adjacent North Harbor was extended to relieve grounding issues at low tides. The area around the existing floats in Middle Harbor was also dredged to improve accessibility.

In 2005, the existing headwalk float, both mainwalk floats, and all stall ("finger") floats were removed, along with all existing pile. In addition, an existing gangway, and the seaward side of the existing timber approach dock (approximately 17 LF), and associated support piles were removed. A new gangway and float system was installed in a layout similar to that which had been removed. The Petersburg Borough inherited Middle Harbor from the State of Alaska in 2006.

In 2012, the bulkhead at the landward end of the existing timber approach trestle suffered a partial failure. Field-expedient repairs to the bulkhead to prevent continued loss of backfill, were executed by the Harbor Department. In 2015, a section of the mainwalk float was replaced due to damage incurred from a vessel strike. The remaining existing element of construction of immediate concern is the timber approach trestle, which would need to be either upgraded or replaced in the near future.

South Harbor. South Harbor, the focus of this study, is bounded to the north by the crane dock and to the south by the drive down dock. Figure 17 shows floats A, B, C,

and D with a connecting float joining them. These floats support approximately 242 berths ranging in length from 40 to 100 ft. Several longer mooring positions for transient vessels and small cruise ships are available on the end of float C. On the land side of the South Harbor connecting float, 74 berths (20-ft fingers) have been constructed for skiffs and small boats on the order of 18 ft in length.

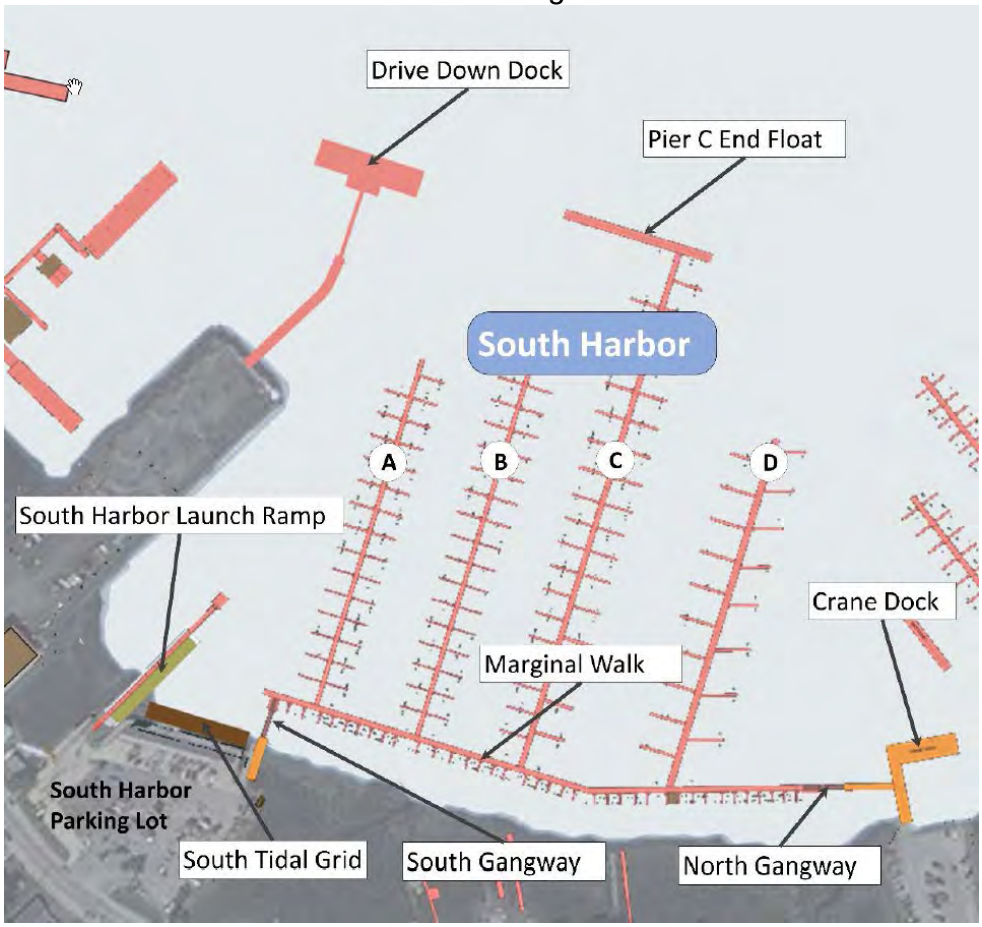

Figure 17. South Harbor.

The South Harbor connecting float has two access gangways, one extending from the crane dock and one that connects to the South Harbor parking lot. Both gangways are elevated to allow small boats that berth along the back of the connecting float to egress at high tide. At the south end of the harbor, the Harbor Department maintains a single-lane concrete launch ramp and boarding float. This ramp is usable in all, but the most extreme tidal conditions. There is limited trailer parking adjacent to this ramp. South Harbor also has a 195-ft steel tidal grid located parallel to the parking lot that is designed to take larger vessels up to 100 ft in length.

South Harbor development in 1983 included the current 12’ x 84’ access ramp approach and a 7.5’ x 65’ steel access ramp, mainwalk float A and float D, extension of mainwalk float B and float C with additional finger floats, 200 ft of new, vessel repair grid, and upland harbor improvements. The 1983 depths ranged from -15ft MLLW to -18ft MLLW (Figure 3). In 1999, mainwalk floats A, B, and C were replaced and additional finger

floats added along each extension. The existing transient float was also installed at the end of mainwalk float C.

The Petersburg Borough inherited South Harbor from the State of Alaska in 2000.That year, approximately 850 LF of existing timber approach trestle and a timber dock, and approximately 400 LF of an existing fuel dock approach trestle were demolished. Dredging occurred over an area of roughly six acres at dredge depths ranging from less than seven ft to more than ten ft of material and a new approach dock was constructed for the fuel dock trestle. In 2001, South Harbor was expanded to include additional floats and dredging occurred to remove approximately 61,000 CY. There is no additional information on how much of that material came specifically from the entrance channel, turning basin and maneuvering basins to maintain established depths. In 2002, a heavy rain event occurred resulting in a large amount of sediment getting deposited into the harbor from Hammer Slough. Dredging took place to remove about 100 CY from the sump area. In 2003, the western (channel side) half of floats A, B, and C were reconstructed with new steel piles and timbers. In addition, a new end float was added to the existing south launch to provide space for recreational and subsistence boaters to clean fish and load gear.

Many of the older existing vessel finger floats have begun to lose freeboard and it is anticipated that replacement of these finger floats may be necessary in the near term. Remaining areas of concern include existing finger floats, mainwalk float D, and the bearing of the existing gangway onto the existing gangway landing float. On the landside of the South Harbor connecting float, the small berths are currently restricted by sedimentation and would require dredging to remain operational throughout the full tidal range. This dredging is also necessary to prevent the connecting float from grounding at low tides and damaging the connections to the main floats. At 65 ft in length, the north and south access ramps are too short to allow them to effectively operate for the normal Petersburg Harbor tidal range. In addition, the existing depths in South Harbor range from -8ft MLLW in the subsistence slips behind the main float to -17ft MLLW in the entrance channel.

3.3.3.2 Scow Bay

Scow Bay is an industrial district and small residential neighborhood located approximately 2.5 miles south of Petersburg’s downtown along the Mitkof Highway (Figure 18). It is not located within a census designated urban area and is considered a rural area (along with the entire Petersburg Borough).

The Scow Bay site was originally owned by the State of Alaska and used as an amphibious aircraft facility to serve the local population. The facility was abandoned once the State constructed a gravel airstrip in 1969 allowing wheeled planes to land in Petersburg. Currently, a portion of the site is used to store State of Alaska road maintenance equipment, but the remaining marine capital assets exceeded their life expectancy many years ago and no effort was made to maintain or repurpose these assets once the facility was deemed redundant.

The existing site is constrained in many ways. The existing haul-out ramp (former seaplane ramp) has a slope that is considered too shallow for launch and recovery by conventional boat trailers for larger fishing vessels, however, it is occasionally used by local residents for small recreational vessels. Particularly, residents from nearby island communities utilize the ramp to gain access to the road system in Petersburg for employment opportunities as well as goods and services.

The site is used occasionally to haul commercial and recreational vessels of about 30 to 40 ft in length out of the water using a commercially-operated submersible hydraulic trailer for winter storage at a yard across the highway. One vessel at a time can be accommodated on the existing site for maintenance activities. The site is exposed to wind and wave action which limits the days when it is safe for vessels to use the ramp. The ramp is also too short for use throughout the tidal cycle (at low tide, the bottom of the ramp is dry) so the window of opportunity for haul outs is relatively small. Further, the site does not have infrastructure to address current federal environmental regulations restricting discharge of heavy metals, fuel, runoff, etc. into marine waters. This poses a risk to continued use of the site even for these limited activities.

Figure 18. Scow Bay

3.4 Cultural Resources

Cultural resources include precontact and historic sites, structures, districts, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or any other reason. They are limited, nonrenewable resources whose potential for scientific research (or value as

a traditional resource) may be easily diminished by actions affecting their integrity. Numerous Federal and State laws and regulations require that possible adverse effects to cultural resources be considered during the planning and execution of Federal undertakings. These laws and regulations stipulate a process of compliance, define the responsibilities of the Federal agency proposing the action, and prescribe the relationship among other involved agencies (e.g., SHPO, the Advisory Council on Historic Preservation). In addition to NEPA, the primary laws that pertain to the treatment of cultural resources during environmental analysis are the National Historic Preservation Act of 1966 (NHPA), the Archaeological Resources Protection Act of 1979, the Antiquities Act of 1906, the American Indian Religious Freedom Act of 1978, and the Native American Graves Protection and Repatriation Act of 1990.

3.4.1 Precontact Regional Context

Inhabitants of Southeast Alaska had some form of maritime adaptation since at least 9,000 years ago as evidenced by exotic obsidian sourced from island sites hundreds of kilometers from where they were discovered. Excavations at Shuká Káa Cave (PET-0408) on Prince of Whales Island also demonstrate long term occupation of Southeast Alaska since at least 10,300 years ago (Kemp et al. 2007). The presence of marine fauna in midden materials also indicates maritime adaptation and the ability to travel distances over water. Additionally, the archaeological record has shown continuity in subsistence practices between the early and late periods of the regions' history through documentation of the use of salmon, fish, shellfish, the occasional bird, and both marine and terrestrial mammals. By and large, archaeological evidence from the region suggests that subsistence resource efforts were focused on intertidal and nearshore environments. By the end of the Pleistocene, sea levels reached modern levels. Although generally ice-free, some areas experienced intense glaciation into the Holocene, which impacted human settlement in more northern areas such as Yakutat (Moss 1998).

Southeast Alaska is the traditional territory of the Tlingit and the Haida. Much of what is known today has been reconstructed from ethnographic data, as the climatic conditions and acidic soils are not conducive to preservation of organic material. Moss (1998: 92) defines the cultural sequence of Southeast Alaska as: the Early Period (10000-5000 BP), the Middle Period (5000 BP-1500 BP), and the Late Period (1500 BP-AD 1741).

Early Period sites have been found to have relatively high percentages of debitage manufactured on site, and much of the obsidian has been sourced to Mt. Edziza and Suemez Island, indicating long-distance marine travel and trade (Moss 1998). Stone tool technology of this period is generally consistent between sites with a low frequency of bifacial tools compared to later components. Archaeological sites in the project vicinity that have deposits dating to the Early Period include Ground Hog Bay 2 (JUN-0037), Hidden Falls (SIT-0119), and Thorne River (CRG-0177). The Ground Hog Bay 2 site is located on the mainland shore of Icy Strait, its lowest deposit in Component III dates to 9200 BP (Moss 1998). Artifacts characteristic of Component III include obsidian biface fragments, a chert scraper, and chipped stone debitage (Davis 1990). Other artifacts characteristic of this period include microblade cores, microblades,

hammerstones, bifaces, chopper, notches, scrapers, and utilized flakes (Moss 1998; Davis 1990). No faunal artifacts were recovered from the Ground Hog Bay 2 site, but its location on a shoreward ridge suggest marine-based subsistence (Moss 1998).

The Hidden Falls site is located on Baranof Island. It dates to the Early Period, with Component I dating between 9500 and 8600 BP; it is the earliest evidence of a ground stone and bone industry in Southeast Alaska (Davis 1990). Artifacts recovered at the Hidden Falls site include debitage related to a microblade industry, split cobble and pebble tools, scrapers, gravers, burinized flakes, and biface tips. A single fishbone and two fragments of marine shell were also recovered which indicates marine-based subsistence patterns (Moss 1998).

The Thorne River site is located along the Thorne River on Prince of Wales Island. This site also dates to the Early Period; one component, containing a microblade industry primarily consisting of obsidian cores, is dated to 7600 BP. Artifacts recovered include a large amount of obsidian microblade cores sourced to Suemez Island. Overall, there is continuity between the microblade industries recovered at Ground Hog Bay 2, Hidden Falls, and the Thorne River sites. Assemblages across sites dating to the Early Period indicate a primarily marine-based pattern of subsistence and relatively widespread regional travel or trade to Mount Edziza 200 km to the northeast in British Columbia, and Suemez Island located approximately 170 km southwest of Petersburg near the Dixon Entrance (Moss 1998).

Regional trends during the Middle Period include continuation of ground slate technology, the advent of wood stake fishing weirs, and an increase in the number and diversity of bone tools (especially unilaterally barbed ground bone points), stone knives, and hand mauls (Davis 1990; Moss 1998). Some of Southeast Alaska's earliest wood stake fish weirs date to at least 5000 BP, placing their development at the beginning of the Middle Period. Wood stake fish weirs dating to the Middle Period have been found in at least 18 archaeological sites in Southeast Alaska. Development of wood stake weir technology indicates mass salmon harvest. Components II and III of the Hidden Falls site also date to the Middle Period: Component II dates to 4600-3200 BP and Component III to 3000-1300 BP. The artifact assemblage recovered from Component II consists of approximately 50 percent non-diagnostic flake industry, 39 percent ground stone, and 4 percent hammerstones and abraders. Ground stone items include slate points, polished planing adzes, serpentine beads, labrets, and segmented stones (Moss 1998). Sites associated with the Middle Period are generally associated with shell middens. Ground slate and wood stake fish weirs appear during the middle period. Remains of both terrestrial and marine animals indicate the use of a mixed marine subsistence pattern with fish and shellfish being the main staple (USDAFS 2005). Shell middens on Kuiu Island, 77 km west of Petersburg have been dated from 4200 BP to 2000 BP with the median age of sites being 1280 BP. The reported date ranges fall within the Middle and Late Periods of the northern Northwest Coast cultural sequence.

Moss (1998) described a great deal of cultural continuity between all three periods; the beginning of the Late Period occupation at 1500 BP. Many late period sites were

seasonally occupied into the historic period and many are known by their Tlingit, Haida, or Eyak names through oral histories. The majority of Late Period sites are associated with the Tlingit but some have also been associated with the Haida and Eyak. Many of the sites were seasonally occupied, and some are still used today (Moss 1998). Characteristics of the Late Period include larger structures used for defensive purposes, copper tools, stone bowls and lamps, and an increased use of obsidian (Davis 1990). There are at least 26 sites dating to this period that are ethnographically known as "forts," defensive sites situated on high rocks or islands near main villages. These forts signal an intensification of regional conflict (Moss 1998; Crowell and Howell 2013). Salmon appears to be the most important food resource during this period, but evidence of other species of fishes, birds, and marine and terrestrial mammals indicate that activity areas may not have been specialized for a single species (Moss 1998). Assemblages collected from the Pillsbury Point site (Yaicai Nu) (SIT-0132) further demonstrate diversification of subsistence practices, showing increased numbers of marine mammals including sea otter, seal, and harbor porpoise (de Laguna 1960; AHRS 2018). Sites indicating the most dramatic shift in subsistence patterns from marine to terrestrial are located in the northern boundary of Southeast Alaska. Overall, subsistence for all three periods has demonstrated the importance of near-shore and intertidal environments, with an emphasis on salmon beginning with the development of wood stake fish weirs during the Middle Period (Moss 1998).

3.4.2 Regional Historic Context

On June 21, 1741, Captain Aleksei Chirikov and crew sailed into the vicinity of Yakobi Island in Southeast Alaska aboard the Sv. Pavel (Black 2004). Chirikov was under orders from the Empress of Russia, Anna Loannovna, to sail to the Americas, explore, and make contact with any people they came across. After losing contact with two shore parties and lacking any additional small boats to reach shore, Chirikov decided to turn back, assuming the parties were either captured or killed by the local Tlingit (Black 2004). Contact with Westerners may not have occurred again until 1775, when Spanish explorer Bruno de Hezeta sailed into Sitka, accidently infecting the Sitka Tlingit with smallpox (de Laguna 1990). In the 1790s, Russian trade continued in the region, while plans for a permanent settlement were developed in response to British, American, Spanish, and French trade and exploration in the area. Between 1741 and 1790, numerous British and French trade vessels visited the region exploring and trading for furs. Between 1795 and 1798, Aleksandr Baranov, manager of the eastern area of the Shelikhov-Golikov Company, later renamed the Russian-American Company (RAC) in 1799, sailed in the vicinities of Sitka and Glacier Bay making contact with the Tlingit (Black 2004).

In 1794, settlers supported by the Shelikhov-Golikov Company, built a permanent camp at Yakutat, which served as a transshipment point for furs going to Kodiak Island and hunters headed to Southeast Alaska. In 1799, Vasilii Medvednikov was selected to head the new southeast settlement of the RAC. Medvednikov aboard the Orel sailed to Sitka with building material for the construction of a new outpost later named Novo-Arkhangel'sk (Davis 1990; Black 2004). In 1802, in response to competition for sea otters, subsistence, and other disagreements between the Unanagan working for the

Russians and local Tlingit, Novo-Arkhangel'sk was destroyed during a retaliatory attack by the Tlingit. Baranov assembled a party of 300 kayaks and four other Russian vessels to retake Novo-Arkhangel'sk. During the trip, the party stopped at villages in Kake and Kuiu and ordered them burned (Black 2004). Upon arriving at Novo-Arkhangel'sk, the Russians attacked the Tlingit. After a fierce battle, peace negotiations were reached resulting in the reoccupation of Sitka by the Russians. Sitka remained occupied by the Russians until the Treaty of Cession in 1867. De Laguna (1960:15) notes that ethnohistoric descriptions of Tlingit houses were often vague and stereotyped with the modern framehouse replacing the traditional plank house early on during the contact period. Houses were generally built of timbers or planks of red cedar, spruce, and hemlock timber, roofed with heavy cedar bark or spruce shingles (ANHC 2011). Houses ranged in size from 35' x 50' to 40' x 100' with some measuring as large as 100' x 75', with each house holding between 20-50 individuals. Houses generally had a central fire pit and smoke hole in the roofs, faced the water, and were generally built in a single or double line depending on the size of the village (ANHC 2011).The Tlingit occupied both summer and winter villages, with sites located in sheltered bays with views of approaches and a suitable beach for a boat landing. Nineteenth century Tlingit settlements consisted of rows of large houses facing the water, with smokehouses, caches, and steam baths located inside or behind the houses (de Laguna 1990).

After the Treaty of Cession was signed in 1867, the War Department tasked the U.S. Army with administration of Alaska as a military district until 1877. Military occupation of Southeast Alaska continued to sour relations between the U.S. and Tlingit, often resulting in the use of military force. Between 1879 and 1884, the U.S. Navy was tasked with opening up settlements in Southeast Alaska for prospecting, mining, fishing, canning, and timber harvesting (Worl 1990). These activities, along with missionary and educational efforts and the expansion of Euromerican settlements and military establishments all reshaped the configurations of Tlingit culture (de Laguna 1960).

The salmon canning industry has traditionally been vitally important to the State of Alaska. During both World War I and II, canned Alaskan salmon served as a main food staple for those experiencing food shortages as a result of the war effort (Guimary 1983). The first canneries in Alaska originated in Sitka in 1878 (Worl 1990). Shortly after their introduction commercial success spread like wildfire, resulting in a large boom in the canning industry. By the late 1920s, there were 159 canneries operating in Alaska (Guimary 1983). From the late 19th century into the early 20th century, mining, fishing, and canning in Southeast Alaska continued and encouraged the settlement of Euromericans in the region (Worl 1990).

In the 1890s, Norwegian fisherman began settling the area around Petersburg which has retained a distinctly Norwegian identity since its founding. Peter Buschmann founded the Icy Strait Packing Company cannery, sawmill, and dock in Petersburg by 1900 (Alaska 2018). The city was formed in 1910, and by 1930, a census counted 1,252 people living in Petersburg.

3.4.3 Affected Environment

South Harbor. A search of the Alaska Heritage Resources Survey (AHRS) shows two cultural resources within the dredging area of potential effect (APE; Table 10). These two known cultural resources, PET-200 and PET-529, are historic vessels. They are still serviceable and afloat and could be moved to make room for dredging equipment as necessary. Because of this, PET-200 and PET-529 would not be affected by the proposed dredging action. Other resources are known to exist within the general vicinity of the study area, but not directly within the limits of proposed dredging or disposal. These resources are listed in Table 10 along with resources known to exist within the affected environment.

Table 10. Known Cultural Resources in the General Vicinity of South Harbor.

AHRS	Site Name	NRHP	In APE
PET-119	Sons of Norway Hall (Fedrelandet Lodge	Listed	No
PET-200	Ranger Boat Marine Vessel (M/V)	Listed	YES
PET-328	Petersburg Fisheries	Unevaluated	No
PET-513	Turn Point Fish Trap	Eligible	No
PET-529	Fishing Vessel (F/V) *Charles W.*	Listed	YES
PET-567	Indian Street Viaduct	Unevaluated	No
PET-569	Nelbro/Norquest Cannery	Unevaluated	No
PET-590	Boat Maintenance Shop	Not Eligible	No
PET-702	Petersburg Fishing Industry Historic	Unevaluated	No

PET-119 is the Sons of Norway Hall, Fedrelandet Lodge No. 23. PET-119 is a white two-story frame structure built in 1912 on pilings. The structure is located just northeast of PET-567 (Indian Street Viaduct). PET-119 is the first Sons of Norway Lodge built in Alaska; it is a symbolic monument of the Norwegian-American pioneers in Petersburg. The Sons of Norway Hall is listed on the National Register of Historic Places (NRHP).

PET-200 is a 1925 wooden-hulled U.S. Forest Service (USFS) Ranger Boat Marine Vessel (M/V) *Chugach* (Sorenson 1990). The *M/V Chugach* is the last wooden-hulled ranger boat still in use by the USFS in Alaska. It is listed on the NRHP, the statement of significance on the NRHP nomination form lists the *M/V Chugach* as having significance in maritime history and naval architecture (Sorenson and Schley 1991).

PET-328 is known as Petersburg Fisheries, and is a large canning facility constructed in 1902. Petersburg Fisheries was built by Peter Buschman of the Icy Straits Packing Company. The cannery has changed hands several times since its initial construction: it was purchased by the Petersburg Packing Company in 1915, the Pacific American Fisheries in 1929, and then Petersburg Fisheries Inc /Icicle Seafood's in 1965. PET-328's eligibility for the NRHP remains unevaluated.

PET-513 is known as the Turn Point Fish Trap. The site consists of hundreds of wooden stakes that are eroding out of the tide lines of a small creek that drains into the south side of South Harbor. The site was identified during an expansion of the Mitkof

Highway; a stake submitted for radiocarbon dating was determined to be approximately 2,000 years old (USDAFS 2005).PET-513 is considered eligible for the NRHP.

PET-529 is the fishing vessel (F/V) *Charles W.* The *F/V Charles W.* is a wooden sailing schooner that was launched in 1907 and brought to Petersburg in 1925 to be modified and operated for shrimping. PET-529 is listed on the NRHP; the statement of significance on the nomination form lists the *F/V Charles W.* as having significance relating to maritime history and commerce in Petersburg, Alaska between 1925 and 1955 (Moulton 2005).

PET-567 is the Indian Street Viaduct, ADOT&PF Bridge No. 1159, also known as the Rasmus Bridge. The Indian Street Viaduct is a multiple-span treated timber stringer bridge. The bridge was constructed in 1945 and has been modified several times since 1984 to replace rotting planks and pilings (ADOT&PF 2017). PET-567's eligibility for the NRHP remains unevaluated.

PET-569 is the Nelson Brothers Cannery. The Cannery was built in 1949 and experienced hiatus in operations in 1954, 1971, and 1976 (Guimary 1983). In 1982, the building was purchased by the Packers of British Columbia, Vancouver, Canada. The structure is a two story wood frame building with metal roof and siding. PET-569's eligibility for the NRHP remains unevaluated.

PET-590 is a Boat Maintenance Shop located just south of Petersburg South Harbor. The Boat Maintenance shop was constructed in the 1930's as a maintenance shop for wrecked ships. Modifications were made to the building in the 1960s when it was converted into a warehouse and living quarters. The roof was raised to allow for additional living space sometime in the 1980s. Due to the nature of the modifications, PET-590 has lost its historic integrity and is considered not eligible for the NRHP.

PET-702 is the Petersburg Fishing Industry Historic District. The district includes buildings located on the northeast side of the harbor along North Nordic Drive. The buildings are a mix of historic fishing industrial structures, historic company buildings, and two former bunkhouses. PET-702's eligibility for the NRHP remains unevaluated.

A search of the NOAA wrecks and obstructions database shows no known wrecks or obstructions within the limits of the dredging area (Table 11; Figure 19).

Table 11. Wrecks and Obstructions in the Vicinity of Petersburg Harbor (NOAA 2018).

Type	Status	Narrative	Latitude	Longitude
Wreck	Visible	Always dry	56.813557	-132.993668
Wreck	Visible	Visible Wreck	56.813545	-132.993576
Wreck	Visible	Always dry	56.817669	-132.971664
Wreck	Visible	Always dry	56.818798	-132.969467
Wreck	Visible	Always dry	56.82283	-132.964508
Wreck	Visible	Always dry	56.822731	-132.963211
Wreck	Visible	Old derelict fishing boat on mud flats	56.823265	-132.963104
Wreck	Visible	Old derelict fishing boat on mud flats	56.812103	-132.961716
Wreck	Visible	Always dry	56.820763	-132.961273
Obstruction	Submerged	Two-fathom-two-foot sounding	56.825409	-132.940216
Obstruction	Submerged	USACE disposal area	56.827778	-132.918335
Obstruction	Submerged	Wooden ATON tower depth 3.71m	56.804085	-132.989243

Figure 19. NOAA Wrecks and Obstructions Database Map (Dredge footprint marked in red) (NOAA 2018).

A search of the Bureau of Ocean Energy Management's (BOEM) 2011 shipwreck database provides no indication that any shipwrecks are within the proposed dredging APE (Table 12). USACE personnel conducted an underwater investigation with a waterproof camera and a remote-operated underwater vehicle at 12 locations in South Harbor (Figure 20 and Figure 21). A review of the footage shows a steel plate with bolts attached, cable, and rope at Location 5; rope and cable at Location 6; a coffee mug at Location 7; and pipe and metal debris at Location 8.

Table 12. Shipwrecks in the Vicinity of Petersburg Harbor (BOEM 2011).

Name	Type	Year	Location	Narrative Summary
Bonnie	Gas Screw	1922	Scow Bay	Foundered
Liberty	Fishing Vessel	1924	South of Scow Bay	Hit reef
Flora	Gas Screw	1927	Standard Oil Dock,	Fire, destroyed
Mission	Gas Screw	1927	Burnet Cannery	Burned
Mildred II	Gas Screw	1928	Off Turn Point, Petersburg	Fire, vessel
Tum Tum	Gas Screw	1933	Petersburg	Burned
St. Martin	Gas Screw	1937	Across from Scow Bay	Destroyed by fire
31-A-866	Fishing Vessel	1943	Herring Bay near	Wrecked
Arab	Gas Screw	1945	Petersburg	Burned
Ronald	Gas Screw	1946	Vicinity of Horn Cliffs	Foundered and lost
Salvor	Oil Screw	1948	Near Petersburg	Burned
31-B-460	Fishing Vessel	1950	Petersburg	Sunk at dock
Odin	Gas Screw	1958	Petersburg	Burned
Lief H.	Fishing Vessel	1965	Channel Light No. 32A	Grounded and sank
Rose[1]	Tug	1977	Kupreanof Beach	Sank and
Sweetbriar	CG buoy	1993	Opposite Scow Bay	Stuck in mud,
Loretta C	Longliner	1998	Petersburg	Burned

[1]The tug *Rose* sank while moored at the Petersburg boat harbor on June 1, 1977 and later became a landmark along the Kupreanof Beach where she was abandoned.

Figure 20. Locations of Underwater Recordings (Google Earth Pro 2018).

Figure 21. Underwater Digital Video Recording Image of the Typical Harbor Seafloor.

Thomas Bay Disposal Location. Cultural resources reported within the general vicinity of the potential Thomas Bay in-water disposal APE include both precontact and historic resources located along the shores of Thomas Bay on Ruth Island (Table 13). None of the identified resources fall within the potential disposal APE. In 1978, archaeologist Katherine Arndt surveyed the west side of Ruth Island in search of the Gardner Shrimp Company Cannery which was in operation between 1916 and 1918. Arndt was unsuccessful in locating the cannery, it is possible that the remains of site PET-0424 (Ruth Island Camp) is associated with the cannery.

Table 13. Known Cultural Resources Within the General Vicinity of Thomas Bay.

AHRS	Site Name	NRHP Status	In APE
SUM-007	Scenery Cove	Unevaluated	No
SUM-031	Porter Cove Cabin	Unevaluated	No
SUM-033	Cascade Creek Trappers Cabin	Not Eligible	No
SUM-034	Cascade Creek CCC Trail	Not Eligible	No
SUM-068	Duck Point Midden	Eligible	No
PET-424	Ruth Island Camp	Not Eligible	No
PET-426	Rock Shore Structures and	Not Eligible	No
PET-427	Bock Rock Alignment	Not Eligible	No

SUM-007 is a petroglyph site named Scenery Cove. The site was identified by a local informant in 1972 and has not been verified. The site's eligibility for the NRHP has not been evaluated. SUM-007 is located outside the potential in-water disposal area and would not be affected by the proposed action.

SUM-031 is the Porter Cove Cabin. The site was reported partially standing in 1997 by the USFS. The site's eligibility for the NRHP has not been evaluated. It is not located within the limits of the potential in-water disposal area and therefore, would not be affected by the action.

SUM-033 is the remains of a trespass cabin built in the 1930s by trapper Martin Marshall. The cabin was reported to be in an extreme state of decay in 1991 (AHRS 2018). The site is located on the east side of Thomas Bay, southeast of the potential in-water disposal area. SUM-033 is considered to be not eligible for the NRHP.

SUM-034 is the Cascade Creek Trail. SUM-034 was constructed by the Civilian Conservation Corps (CCC) between 1933 and 1941. The trails connects the Thomas Bay coast with Swan Lake Falls. SUM-034 is considered to be not eligible for the NRHP.

SUM-068 is the Duck Point Midden site. Two test units were excavated by the USFS in 1996. Results of radiometric analysis dated lower deposits to around 110 BP or A.D. 1670. The Duck Point Midden is considered eligible for the NRHP; however, the site is located outside the limits of the potential in-water disposal area and would not be affected by the proposed disposal actions.

PET-424 is the Ruth Island Camp located on the southern end of Ruth Island. The site contains debris that are believed to be less than or about 50 years old. The site is located on a spit one to two meters above a grassy estuary. Debris includes a lumber platform, iron bathtub, a sheet of black rubber, and log posts potentially used for boat launching at high water. The site is considered not eligible for the NRHP.

PET-426 is the Rock Shore Structures and Historic Mine. The site is located on the east side of Thomas Bay and is southeast of the potential in-water disposal area. The site consists of historic structures and a mine shaft dating to the 1920s and 1930s. PET-426 is considered to be not eligible for the NRHP.

PET-427 is known as the Bock Rock Alignment; the site is composed of a serpentine-shaped rock alignment located on the south side of Bock Bight. The site has not been verified as a cultural feature and may instead have been created by glacial activity. PET-427 is considered not eligible for the NRHP.

A search of the NOAA wrecks and obstructions database revealed four obstructions in the form of rocks at the entrance to Thomas Bay and one submerged wreck in the northeast portion of Thomas Bay (Figure 22; Table 14 and Table 15). The submerged wreck is located in Scenery Cove just south of Baird Glacier. All reported wrecks and obstructions are outside the limits of the potential in-water disposal area. A search of the BOEM 2011 shipwreck database reports two wrecks at the entrance to Thomas Bay. An unnamed and unverified wreck is reported near the entrance of the bay; this wreck has not been verified and may not exist. The second wreck is that of the *Kilamey* and is reported to have wrecked at Wood Point along the southern opening of the bay. No wrecks were reported within the vicinity of the potential in-water disposal area.

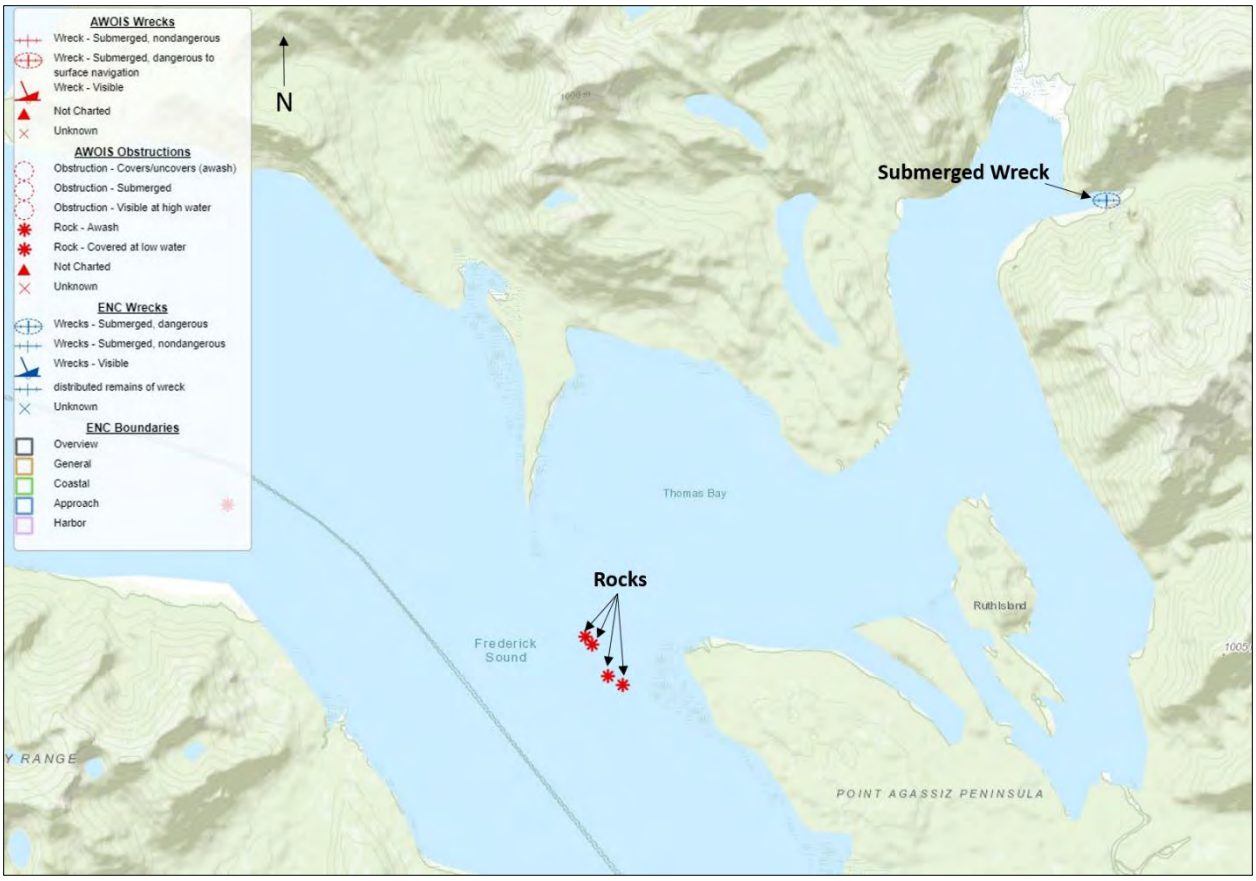

Figure 22. NOAA (2018) Wrecks and Obstructions Map- Thomas Bay.

Table 14. Wrecks and Obstructions Listed in vicinity of Thomas Bay (NOAA 2018).

Type	Status	Narrative	Latitude	Longitude
Obstruction	Covered at Low Water	Rock	56.986319	-132.967403
Obstruction	Covered at Low Water	Rock	56.988131	-132.972439
Obstruction	Covered at Low Water	Rock	56.994114	-132.977919
Obstruction	Covered at Low Water	Rock	56.995519	-132.980233
Wreck	Always submerged	Dangerous	57.078170	-132.7989035

Table 15. Shipwrecks in the Vicinity of Thomas Bay (BOEM 2011).

Name	Type	Year	Location	Narrative Summary
Unknown	3-mast, Russian Gun Boat	1840	Entrance to Thomas Bay	Sank, has not been verified.
Kilamey	Gas Screw F/V	1918	Wood Point, Thomas Bay	Foundered, 3 men lost
Evelyn Berg	Steamer	1937	Vandeput Spit, Thomas Bay	Stranded, not a total loss

Frederick Sound Disposal Location. Frederick Sound is located approximately 2.5 miles east of Petersburg. The potential in-water disposal area in Frederick Sound is adjacent to a relict dredged material disposal site. Cultural resources reported within the general vicinity of the potential Frederick Sound in-water disposal APE include both precontact and historic resources located along the shores of Frederick Sound on Mitkof Island (Table 16). None of the identified resources fall within the disposal APE. Recent underwater photography was collected for this area and was analyzed, no significant cultural resources were identified.

Table 16. Known Cultural Resources within the general vicinity of Frederick Sound.

AHRS	Site Name	NRHP Status	In APE
PET-027	Sandy Beach Petroglyph Site	Eligible	No
PET-386	Handtroller Camp	Unevaluated	No
PET-387	Tate Cabin and Midden	Unevaluated	No
PET-388	Petersburg Boy Scout Camp	Unevaluated	No
PET-519	Sandy Beach Midden	Eligible	No
PET-520	Sandy Beach CCC Shelters	Not Eligible	No

PET-027 is a petroglyph site on Sandy Beach. The site was first reported by Keithahn in 1966. In addition to multiple petroglphys, six fish traps have been identified in the intertidal zone. Three of the fish traps have been radiocarbon dated, producing dates ranging from 2090±60 BP to 1860±90 BP. The site has been determined to be eligible for the NRHP (AHRS 2018). PET-027 is located outside the potential in-water disposal area and would not be affected by the proposed action.

PET-386, the Handtroller Camp, was identified in 1994 by Charles Mobley. The only recorded structure at this site is a rock-lined hearth that protrudes from the ground not far from a few other rocks likely brought up from shore to weigh down a tent. The site's eligibility for the NRHP has not been evaluated (AHRS 2018). It is not located within the limits of the potential in-water disposal area and would not be affected by the proposed action.

PET-387 is the Tate Cabin and Midden. The site consists of the remains of a wood-frame hunting cabin and a nearby precontact midden. The cabin was used by Ida Sather from 1925-1933, Flora Tate from 1933-1941, and the Nickerson family from 1941-1945. A radiocarbon date of 1210±60 BP was obtained from the midden. Although Mobley suggested that both the cabin and midden were eligible, the site's eligibility for the NRHP has not been formally evaluated (AHRS 2018). It is not located within the limits of the potential in-water disposal area and would not be affected by the proposed action.

PET-388 is the Petersburg Boy Scout Camp. This camp site was used by local boy scouts in the 1920s; however, no structures were built at the site and no cultural remains were identified by Charles Mobley in 1994. The camp's eligibility for the NRHP

has not been evaluated (AHRS 2018). It is not located within the limits of the potential in-water disposal area and would not be affected by the proposed action.

PET-519 is the Sandy Beach Midden. This site was first identified by the USFS in 2003, and consists of a buried shell midden scattered along a 60 m by 5 m area of the beach. This site has been determined to be eligible for the NRHP (AHRS 2018). The Sandy Beach Midden is located outside the potential in-water disposal area and would not be affected by the proposed action.

PET-520 consists of the remains of the CCC Shelters at Sandy Beach. This site was identified by the USFS in 2003. The CCC program in Petersburg constructed two shelters between 1939 and 1940 near the beachfront; however, all that remains of the original shelter components are two cobble and cement cooking hearths and chimneys. The site was determined to be not eligible for the NRHP due to lack of integrity (AHRS 2018).

A search of the NOAA wrecks and obstructions database revealed two obstructions and no submerged wrecks in the general vicinity of the potential in-water disposal area. One of the obstructions is identified as a submerged shoal, and the other is identified as the USACE disposal area itself (NOAA 2018). A search of the BOEM 2011 shipwreck database reports two wrecks in the general vicinity of Petersburg. The *Roald*, a gas screw, foundered on January 18, 1946 near the Horn Cliffs, east of Petersburg, and sank. The *31-B-360* sank at the dock in Petersburg on February 20, 1950 (BOEM 2011). No wrecks have been reported within the potential in-water disposal area.

Section 106 Consultation. Consultation with Alaskan Native Tribes and corporations has been conducted. The USACE, Alaska District requested review of a finding of no historic properties affected (36 CFR § 800.4(d)(1)) for a Federal undertaking per Section 106 of the NHPA. A phone discussion with the Petersburg Indian Association (PIA) on October 18, 2018 revealed that the PIA did not have any current concerns with the proposed project and that individual board members of the PIA would contact USACE archaeologists with any concerns they may have. Consultation letters and attached SHPO coordination letter explaining the details of the project were mailed to the SHPO, Petersburg Indian Association, Central Council of the Tlingit and Haida Indian Tribes of Alaska, and Sealaska Corporation on October 17, 2018. Copies of the mailed correspondence are located in Appendix C. No response was received from Central Council of the Tlingit and Haida Indian Tribes of Alaska. The Sealaska Corporation responded by email and determined that the project would not significantly affect tribal rights and/or protect resources and that if any cultural resources or human remains were discovered inadvertently to contact Sealaska and inform them of the find. No response was received from the SHPO regarding the proposed dredging of the South Harbor and subsequent in-water disposal of dredged materials. A memorandum for record (MFR) is located in Appendix C documenting the non-response of the SHPO in regards to the Petersburg Navigation Improvements Feasibility Study. Per 36 CFR 800.3(c)(4) if the SHPO fails to respond within 30 days of receipt of a request for review of a fining or determination , the agency official may either proceed to the next step on

the process based on the finding or determination or consult with the Council in lue of the SHPO. The USACE, Alaska District choose to proceed to the next step in the process and continued under a determination of no historic properties affected.

3.4.4 Subsistence Activities

Depth constraints during low tide cycles cause delays for subsistence users and inhibit access to subsistence resources. Reducing delays and improving access for these users is expected to result in VOC and OCT savings as well as an increase in subsistence harvests. The value of foregone subsistence harvest expected to occur without navigation improvements is based on subsistence data and harvest replacement values from the ADFG Division of Subsistence. Potential benefits associated with reducing delays for subsistence vessels and improving subsistence harvesting opportunities have a present value of $5.0 million and average annual potential benefits of $191,000 over the period of analysis (Table 19).

Subsistence Fishing. For season dates, species, and locations applicable to the Petersburg area, see ADFG 2010 – 2011 Subsistence and Personal Use Statewide Fisheries Regulations, Southeastern Alaska Area, related State laws applicable to Native Corporation and Native allotment lands, and USFWS Subsistence Management Regulations for the Harvest of Wildlife and Federal Public lands in Alaska, July 1, 2010 – June 30, 2012. Subsistence data for Petersburg, Alaska noted that salmon made up 22.92 percent of the fish subsistence harvest (NOAA 2005).

Subsistence Hunting. For season dates, species, and locations applicable to the Petersburg area, see ADFG Regulations for Tier I and Tier II Hunting in Unit 3 and Cultural and Subsistence Harvests in Unit 3, related State laws applicable to Native Corporation and Native allotment lands, and USFWS Subsistence Management Regulations for the Harvest of Wildlife and Federal Public lands in Alaska, July 1, 2010 – June 30, 2012. Subsistence data for Petersburg, Alaska noted that marine mammals did not figure significantly into the composition of the subsistence diet. Of the subsistence diet, 28.95 percent is from terrestrial mammals and 1.80 percent from birds and eggs. Foraging for marine invertebrates and vegetation made up 19.49 percent and 4.36 percent, respectively (NOAA 2005).

4. FUTURE WITHOUT-PROJECT CONDITIONS

This section provides an analysis of conditions that are expected to persist at Petersburg, Alaska in the absence of navigation improvements. The purpose of this section is to estimate the economic costs of those conditions. The expected without-project conditions form the basis of evaluation against which with-project conditions are compared. For the purpose of this analysis, the Federal Fiscal Year 2019 discount rate of 2.875 percent was used.

4.1 Physical Environment

The existing conditions in the study area are not expected to significantly change over the 50-year period of analysis. The area could continue to experience a reduction in

relative sea level due to isostatic rebound. Isostatic rebound, also known as glacial uplift, is the rise of a land mass that was depressed by a large amount of ice during the last glacial period. As the ice melts, the land mass rises as the weight on it decreases. Information on relative sea level change in Southeast Alaska can be found in Appendix B.

4.2 Economic Conditions

Several assumptions were made when conducting the future without-project economic analysis. The most critical assumption is that the existing fishery would continue to support the fleet. This assumption is supported by the fact that fisheries in Alaska are regulated to assure future viability of resources. It is also assumed that the Petersburg harbor system would continue to be a cornerstone of the Petersburg Borough economy. However, absent Federal investment in navigation improvements, insufficient depths and existing marine infrastructure within the harbor system are expected to continue to cause transportation inefficiencies and limit access for commercial fishing and subsistence activities, resulting in economic inefficiencies for the region and Nation.

Approximately 93 percent of vessels utilizing Petersburg South Harbor facilities are commercial fishing vessels.[1] South Harbor is used primarily by commercial boaters, while most of the shoreline slips in the inland mooring area are used by subsistence and recreational boaters. Depth constraints are expected to affect all commercial fishing vessels moored on D Float (38 vessels) and the north half of C Float (36 vessels), as well as approximately 74 subsistence vessels moored on the main float shown in Figure 2. While all 74 commercial fishing vessels and 74 subsistence vessels would be affected if entering or exiting the harbor during low tide events, not all vessels use the harbor daily due to the different types of fisheries accessed from Petersburg.

A range of scenarios was evaluated based on the percent of commercial and subsistence vessels expected to be impacted by depth constraints during low tide cycles. The most conservative scenario assumes 25 percent of vessels would be affected during each low tide event, which likely results in an underestimation of potential benefits. Given that most vessels run multiple gear types and essentially fish year round, it is likely that a larger portion of vessels would be affected during each low tide cycle and would, therefore, benefit from the proposed navigation improvements including deepening the entrance channel, two maneuvering basins, and turning basin near the crane dock.

Based on focus group discussions with harbor users, depths during lower or minus tides resulting in vessel delays occur approximately five times during the summer salmon fishing season and impact access to South Harbor for an average of about four days at a time. Delays experienced by commercial fishing vessels average approximately five hours whereas delays for subsistence vessels range from about two to six hours depending on where the vessels can exit the harbor.

[1] Petersburg Harbormaster, Glorianne Wollen, October 4, 2017.

4.3 Vessel Operating Costs

Commercial fishing captains and crew members incur additional vessel operating costs (VOCs) while waiting for sufficient depths to safely enter, exit, and maneuver within the harbor system. Insufficient depths during low tides inhibit access to the harbor, fish processing facilities, the crane dock to offload gear, and designated slips, reducing the overall efficiency of the harbor system. Potential benefits associated with reducing VOCs have a present value of approximately $11.1 million and an average annual savings of $423,000 over the period of analysis. In addition to these potential savings, opportunities exist for vessels that currently utilize haul-out facilities and moorage at other harbors in the region, but could call on Petersburg if facilities were built at Scow Bay. When these additional opportunities are considered, potential VOC savings have a present value of $46.5 million and an average annual savings of $1.8 million. Table 17 shows potential VOC savings by area of use.

Table 17. Future Without-Project Condition: Vessel Operating Costs.

Potential Benefit by Area	Present Value	AAEQ Value	% of Total
South Harbor Only	$11,144,000	$423,000	24%
Scow Bay Only	$35,735,000	$1,356,000	76%
Total	**$46,879,000**	**$1,779,000**	**100%**

4.4 Opportunity Cost of Time

Opportunity cost of time (OCT) is the value of time which could otherwise be spent pursuing additional work or leisure activities. This analysis assumed that captains and crews in Petersburg would elect to use these saved hours as work time. Assuming four crew members per vessel, the hourly OCT per vessel is about $300. Based on delay hours and OCT, the total annual OCT value per vessel is approximately $15,000. Over the period of analysis, these potential OCT savings have a present value cost of approximately $27.6 million with average annual value of $1.0 million. Like with VOCs, additional opportunities exist for vessels that currently utilize haul-out facilities and moorage at other harbors in the region, but could call on Petersburg if facilities were constructed in Scow Bay. When these additional opportunities are considered, potential OCT savings have a present value of $44.9 million, equating to average annual value of $1.7 million. Table 18 shows potential OCT savings by area of use.

Table 18. Future Without-Project Condition: Opportunity Cost of Time.

Potential Benefit by Area	Present Value	AAEQ Value	% of Total
South Harbor Only	$30,920,000	$1,173,000	69%
Scow Bay Only	$13,973,000	$530,000	31%
Total	**$44,893,000**	**$1,703,000**	**100%**

4.5 Subsistence

Depth constraints during low tide cycles cause delays for subsistence users and inhibit access to subsistence resources. Reducing delays and improving access for these users is expected to result in VOC and OCT savings as well as an increase in subsistence harvests. The value of foregone subsistence harvest expected to occur without navigation improvements is based on subsistence data and harvest replacement values from the ADFG Division of Subsistence. Potential benefits associated with reducing delays for subsistence vessels and improving subsistence harvesting opportunities have a present value of $5.0 million and average annual potential benefits of $191,000 over the period of analysis (Table 19).

Table 19. Future Without-Project Condition Potential Subsistence Benefits.

Potential Benefits	Present Value	AAEQ Value	% of Total
Opportunity Cost of Time	$2,181,000	$83,000	46%
Vessel Operating Costs	$1,846,000	$70,000	40%
Foregone Subsistence Harvest	$1,015,000	$39,000	14%
Total	**$5,042,000**	**$191,000**	**100%**

4.6 Labor Resource Underutilization

USACE policy provides guidance on the NED benefit evaluation procedure for unemployed or underemployed labor resources. Given socioeconomic and employment characteristics in the Petersburg Borough, an opportunity exists to utilize unemployed or underemployed labor resources during project construction. Using this USACE criteria and recent unemployment trends in the Petersburg Borough determined by the U.S. Bureau of Labor Statistics, it has been determined that this project could qualify for labor resource benefits. Absent Federal investment, these potential benefits are considered a foregone opportunity and have a present value of approximately $6.2 million over the period of analysis with an average annual value of $235,000. Please see Appendix D for details of this analysis. Table 20 and Table 21 show the unemployment statistics and civilian labor force by occupation, respectively, for the Petersburg Borough, the state and the Nation.

Table 20. Unemployment Statistics

Year	Unemployment Rate by Area			% Above National Average for Petersburg Borough
	United States	Alaska	Petersburg Borough	
2013	7.4%	7.1%	8.7%	18%
2014	6.2%	6.9%	9.5%	53%
2015	5.3%	6.4%	9.0%	70%
2016	4.9%	6.6%	9.1%	86%
2017	4.4%	7.2%	9.3%	111%
Average	5.6%	6.8%	9.1%	62%

Sources: U.S. Bureau of Labor Statistics; Alaska Department of Labor & Workforce Development

Table 21. Civilian Labor Force by Occupation.

Occupation Category	Petersburg Borough	Alaska	United States
Civilian employed population 16 years old and older	1,632	357,098	148,001,326
OCCUPATION			
Management, business, science, and arts occupations	471	132,669	54,751,318
Service occupations	199	62,844	26,765,182
Sales and office occupations	268	79,782	35,282,759
Farming, fishing, and forestry occupations	242	3,668	1,062,331
Construction, extraction, maintenance, and repair occupations	182	37,664	12,440,120
Production, transportation, and material moving occupations	270	40,471	18,542,291

Source: 2012–2016 American Community Survey 5-Year Estimates, Census Bureau

4.7 Biological Environment

Under Future-Without Project Conditions, the Alaska District would not undertake navigation improvements in the Petersburg South Harbor so no new impacts would be presented to the biological resources in the Petersburg area. The biological resources described in Section 3.2 would likely continue along current trend-lines. There is no indication that the Future-Without Project Conditions would present a measureable change in the existing distribution, abundance, or behavior of biological resources. The impediments to safe navigation would remain, so there would be a residual threat of fuel or oil spillage in the Harbor from vessels grounding in the shallow areas of the Harbor and the associated impacts to biological resources from spillage. Offloading efficiencies would also remain suboptimal, which may have a deleterious impact on fishing effort due to the known inefficiency.

4.8 Summary of the Without Project Condition

The Without Project Condition forms the basis for impacts under the No Action Alternative. Absent Federal action to provide navigation improvements at Petersburg, the transportation inefficiencies, forgone harvest opportunities, and underutilization of labor resources described above are expected to continue throughout the period of analysis. These adverse impacts incurred as a result of current and expected future conditions have a present value of approximately $103 million with an average annual value of $3.9 million over the period of analysis. Commercial fishing makes up 90 percent of the Without Project Condition with a present value of $91.8 million. Table 22 summarizes the Future Without-Project Conditions.

Table 22. Summary of the Future Without-Project Condition.

Category	Present Value	AAEQ Value	Percent of Total
Commercial Fishing	**$91,772,000**	**$3,483,000**	**90%**
Opportunity Cost of Time	$44,893,000	$1,704,000	44%
Vessel Operating Costs	$46,879,000	$1,779,000	46%
Subsistence	**$5,042,000**	**$191,000**	**5%**
Opportunity Cost of Time	$2,181,000	$83,000	2%
Vessel Operating Costs	$1,846,000	$70,000	2%
Foregone Subsistence Harvest	$1,015,000	$39,000	1%
Labor Resource Inefficiencies	**$6,203,000**	**$235,000**	**5%**
Total	**$103,017,000**	**$3,910,000**	**100%**

5. FORMULATION & EVALUATION OF ALTERNATIVE PLANS*

5.1 Plan Formulation Rationale

Plan formulation is the process of building alternative plans that meet planning objectives and avoid planning constraints. Alternatives are a set of one or more management measures functioning together to address the study objectives. A management measure is a feature or activity that can be implemented at a specific location to address one or more of the objectives. A feature is a “structural” element that requires construction or on-site assembly. An activity is defined as a “non-structural” action.

5.2 Management Measures

During the planning charette, October 3-5, 2017, a number of measures were identified. Using the criteria discussed in section 2.7, the project delivery team evaluated the following structural and non-structural measures. These measures were combined to form the alternatives outlined in Section 5.3.

5.2.1 Criteria and Metrics

Measures were screened during the charette using the four National Evaluation Criteria criteria explained in section 2.7, acceptability, completeness, effectiveness, and efficiency. In addition, the team used specific screening criteria which included evaluating the measures for impacts to commercial fishing activities and spawning and migration on species in the study area, and the Ocean Dumping Criteria for the selection of disposal sites in waters of the U.S. Each measure was evaluated against the general metric whether the design would address the major mechanisms causing the vessel delays due to insufficient depths within Petersburg South Harbor. Specific engineering design criteria used to develop the measures is presented in Appendix B.

5.2.2 Non-structural Measures

Non-structural measures are those measures that reduce the consequences of vessel delays and utilize current available resources. These measures could include, rearranging the configuration of the float system, moving larger vessels with deeper drafts to slips in deeper water and shallower vessels to shallower slips, using navigation markers to identify areas that are shallow within entrance channels and maneuvering basins and imposing restrictions to harbor facilities during low tide. Table 23 lists the four non-structural measures discussed during the charette.

Table 23. Non-structural measures.

Navigation markers	Relocate vessels to a different harbor
Float re-organization of entire harbor system (North, Middle and South Harbor)	~~Imposing restrictions to harbor facilities during low tide~~

Imposing restrictions to harbor facilities during low tide was removed because harbor users already track the tidal cycles in order to get out of their slips and return to the harbor during high tide. In talking with commercial fishermen and the harbormaster, it was explained that the shallow spots in the harbor are known by local harbor users and all necessary precautions are taken to reduce the risk of running aground during low tide or having to wait to access public facilities and assigned slips.

5.2.3 Structural Measures

Structural measures are generally those measures that reduce the probability of vessel delays due to insufficient depths and improve access to the harbor system. Dredging was discussed heavily during the charette as an efficient way to address the insufficient depths in South Harbor. This spurred additional conversation on the beneficial use of dredged material since the NFS had used dredge material to construct the drive down dock on the south end of South Harbor. Scow Bay was discussed as a potential area to use this dredged material. The NFS had looked at creating an upland area in Scow Bay to support a haul-out facility and filling that area with gravel. The beneficial use of dredge material instead of gravel was thought to reduce overall study cost for disposal of the material from South Harbor since sediment characterization had not occurred and historic information on Petersburg North Harbor yielded contamination levels requiring upland disposal and capping in the landfill. From this discussion the following measures were developed: dredging, a haul out facility, creation of uplands from beneficial use of dredged material to support a haul out facility and building a new harbor to accommodate the growing fleet. Table 24 shows the structural measures discussed during the charette.

Table 24. Structural measures.

Dredging	Construct new harbor
Haul-out facility	Creation of uplands (for Haul-out facility)

It was suggested during the charette that South harbor be dredged to -20ft MLLW. It was determined that -19.25ft MLLW would be sufficient to account for the design vessel explained in section 7.2. These measures were used in the formulation of alternative plans explained in section 5.3.

Disposal methods for dredged material were also discussed with options including upland disposal, in-water disposal and beneficial used of dredged material to fill the upland areas associated with the haul-out facility. Sediment characteristics explained in section 3.1.4 determined that South Harbor sediments are clean for unrestricted in-water disposal, but above the threshold for arsenic for upland disposal, therefore, removing upland disposal as an option. Additional analysis would be performed to determine the Federal Standard for disposal of dredged material.

5.3 Preliminary Alternatives Considered

The following measures were carried forward to address the study objectives discussed in section 2.5 and develop the initial array of alternatives (Table 25).

Table 25. Measures Carried Forward into Alternative Plan Development.

Non-Structural Measures	Structural Measures
Navigation markers	Dredging
Float re-organization of entire harbor system (North, Middle and South Harbor)	Haul-out facility
Relocate vessels to a different harbor	Construct new harbor
	Creation of uplands (for Haul-out facility)

Four alternatives were developed using the above measures carried forward along with the future without-project condition (No Action). Table 26 shows the four combinations of measures or preliminary alternative plans developed for this study.

Table 26. Preliminary Alternatives Considered.

Alternative	Description
1	No Action
2	Non-Structural Reorganization of Petersburg Harbor System
3	South Harbor Dredging Only
4	South Harbor Dredging with Haul-out Area at Scow Bay
5	South Harbor Dredging and New Harbor at Scow Bay

5.3.1 Descriptions of Alternative Plans

5.3.1.1 Alternative 1: No Action

The Harbor depth would remain the same and all vessels in the Petersburg harbor system would remain in their assigned slips. If no action is taken, insufficient depths within the harbor system would continue to cause transportation delays and limit access for commercial fishing and subsistence activities, creating economic inefficiencies to the

region and Nation. The study objectives would not be met and no project benefits or opportunities would be realized.

5.3.1.2 Alternative 2: Non-Structural Reorganization of Petersburg Harbor System

This non-structural alternative would result in removal of all boats in the harbor system. The float layout and depth in each slip would be evaluated and boats drafting less water would be assigned to shallower slips. Larger vessels with deeper drafts would be moved to slips with deeper depths. This alternative would not address depth in the entrance channel, maneuvering basins or turning basin, which is a study objective, so some vessel delays would still occur during low tides. Access to public facilities including the fish processor and the crane dock would continue to be limited during low tides.

5.3.1.3 Alternative 3: South Harbor Dredging Only

Deepening the entrance channel, maneuvering basins, turning basin and commercial and subsistence areas in South Harbor would address vessel delays due to insufficient depths within the harbor and provide access to public facilities. Disposal of dredge material would follow the Federal Standard in accordance with current guidance. This alternative meets the study objectives of improving access to Petersburg South Harbor, public facilities and reducing vessel delays due to insufficient depths within the harbor system.

5.3.1.4 Alternative 4: South Harbor Dredging with Haul-out Area at Scow Bay

This alternative includes all features of Alternative 3 plus the installation of a vessel haul-out area at Scow Bay. This alternative would provide the infrastructure (a concrete ramp) for hydraulic trailers (provided by private sector) to transport commercial and recreational vessels from the water onto the uplands to access services at adjacent work and storage yards. Beneficial use of dredged material could be used to support the creation of uplands for construction of the haul-out facility since the existing area is not large enough to accommodate such a facility. This alternative meets the study objectives and provides additional opportunities for development of marine infrastructure in Scow Bay. In addition to providing the benefits estimated for Alternative 3, this alternative would result in additional transportation cost savings to vessels that currently utilize haul-out facilities at other harbors in the region.

5.3.1.5 Alternative 5: South Harbor Dredging with Haul-out Area and New Harbor Scow Bay

This alternative includes all features of Alternative 4 plus the installation of a new harbor at Scow Bay to accommodate additional demand for vessels seeking permanent and transient moorage at Petersburg. The existing 400-ft breakwater would be extended out to 800-ft total length to protect the float system and harbor entrance from wave action. Three rows of stalls supporting up to 32’, 42’, and 60’ vessels, respectively, would be constructed along with an outer slip area for transient moorage. Like Alternative 4, this

alternative also meets the study objectives and provides additional opportunities to vessels that currently utilize haul-out facilities and moorage at other harbors in the region. However, additional benefits beyond those estimated for Alternative 4, such as benefits associated with installing moorage in Scow Bay, were not evaluated in this analysis, as they were considered to exceed the scope of this study.

5.3.2 Alternatives Screened from Detailed Analysis

After developing initial Rough Order of Magnitude (ROM) costs, economic analysis and a discussion with the NFS, it was determined that due to a financial constraint, the NFS would not be able to construct a contained disposal facility at Scow Bay for the beneficial use of dredged material. This decision removed the possibility of Scow Bay Alternatives 4 and 5.

Per ER 1105-2-100 Appendix E, para E-3(b)(5), Categorical Exemption for Flood Control and Navigation Projects, larger scale plans can be screened out if the NFS identifies a financial constraint and the net benefits were increasing as the constraint is reached. Net benefits were increasing from Alternative 3 to Alternative 4 when the financial constraint was established. Appendix D explains the benefits associated with Alternatives 4 and 5 and reports initial analysis conducted on these alternatives.

During concurrent review of the draft IFR/EA, Agency Technical Review (ATR), Pacific Ocean Division (POD) and the Public comment period), a comment from POD asked if additional depths besides -19.25 ft MLLW were assessed. An additional depth of -18ft MLLW was added to the analysis to determine which depth maximized benefits. No shallower depths were chosen because some areas within the study area have been maintained to a depth of -18ft MLLW per the original harbor depths established during the 1983 construction of South Harbor. This depth analysis can be found in section 6.5.3.

Alternative 4 was re-cost and evaluated after Agency Technical Review (ATR) to ensure that for the -18ft MLLW depth in South Harbor, benefits were still increasing in order to be policy compliant per ER 1105-2-100 Appendix E, para E-3(b)(5). Benefits continued to increase from Alternative 3 to Alternative 4. Appendix D discusses the initial benefits and analysis associated with alternatives that were screened out due to the financial constraint established by the NFS. This feasibility report does not discuss Alternatives 4 and 5 further. Alternatives 2 and 3 and the future without project condition were carried through the remaining analysis in order to determine the recommended plan.

5.3.3 Alternatives Carried Forward

Alternatives 2 and 3 were carried forward along with the future without project condition (No Action).

6. COMPARISON & SELECTION OF PLANS*

6.1 With-Project Condition

Each alternative provides a varying degree of reduction to the inefficiencies described in the Without-Project Conditions section. Alternative 3 is expected to provide benefits in terms of transportation cost savings (measured as time and vessel operating cost savings) and increases in subsistence harvests. Commercial fishing and subsistence vessels are expected to experience a time savings With-Project in the form of the reduction in transit time delays, resulting in time savings and reduced vessel operating cost benefits. The proposed navigation improvements are also expected to enhance access for harvesting subsistence resources, which translates to an increase in harvest value based on the replacement cost analysis described in the Without-Project Conditions section.[2]
It is important to note that the non-structural alternative (Alternative 2) would not address depth constraints in the entrance channel maneuvering basins or turning basin, so only a portion of the potential benefits identified in the Without-Project Conditions section would be realized. As such, the “low” benefit scenario is considered most appropriate for Alternative 2.

Other costs and practices, such as land side costs, would not change as a result of the project and are assumed to remain constant. The period of analysis is 50 years, beginning with the base year of 2022, the project effective date, to 2073. The FY19 Federal discount rate of 2.875 percent is used to discount benefits and costs.

6.2 Alternative Plan Costs

Rough Order of Magnitude (ROM) costs were developed for the alternatives including those to construct and maintain facilities. Appendix E details the procedures and assumptions used to calculate these estimates. Cost risk contingencies were included to account for uncertain items such as sediment characterization and dredge type. Project costs were developed without escalation and are in 2019 dollars. Table 27 displays the ROM costs for each alternative.

Table 27. Rough Order of Magnitude Project First Costs by Alternative.

Cost Description	Alt. 2	Alt. 3
Lands, Easements, Rights-of-way, Relocations and Disposal Area (LERRD)	$0	$0
Mobilization & Demobilization	$0	$3,707,378
South Harbor Dredging & Disposal	$0	$5,393,936
Float Reorganization (entire harbor system)	$36,521,845	$0
D&I	$519,725	$1,220,198
SIOH	$2,766,089	$681,410
Project First Cost*	**$44,479,658**	**$11,002,922**

[2] Increase in subsistence activity is based on similar USACE studies involving navigation improvements and access to subsistence resources for Valdez (2011) and Craig, Alaska (2014).

*Project first costs used in the benefit-cost analysis are discounted/indexed to a base year and amortized for comparison against the average annual benefits, so these costs will differ slightly from those presented in the Cost Engineering Appendix E.

As with benefit cash flows, costs are compounded to a base year and amortized for comparison against average annual benefits. As such, the project first costs shown above and detailed in Appendix E differ slightly from those used in the benefit-cost analysis. Costs used in the benefit-cost analysis include the project first cost compounded to the base year using the FY19 discount rate, interest during construction, and operations and maintenance costs greater than the without-project condition.

Alternatives 2 and 3 are expected to be completed within one year so all costs would occur during the first year of construction. As such, a one-year construction window is used for the interest during construction calculations. Operations and maintenance costs are based on the cost of the 2013 North Harbor dredging effort at Petersburg and the estimated volume of dredged material for South Harbor. Maintenance dredging is assumed to occur in 30 years from project construction. Table 28 displays costs used in the benefit-cost analysis.

Table 28. Project Costs for Benefit-Cost Analysis.

Cost Description	Alt. 2	Alt. 3
Project First Cost (compounded to base year)	$45,912,001	$11,355,345
Interest During Construction	$636,364	$157,417
Operations, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R)	$0	$3,888,738
Total Economic Cost	**$46,548,365**	**$15,401,500**
AAEQ Economic Cost	**$1,766,421**	**$584,457**

6.3 With-Project Benefits

Each alternative provides a certain amount of relief from existing and expected future inefficiencies. The differences between the expected level of inefficiencies absent Federal action (without-project condition) and those that would occur under the various with-project conditions are benefits that accrue to the project and form the basis for selecting a recommended plan.

Total annual project benefits were determined at FY19 price levels by calculating the average annual reduction in transportation costs and increase in subsistence harvests. Benefits realized through the use of otherwise unemployed or underemployed labor resources during project construction were also calculated. Benefits are discounted to the FY19 price level using the Federal discount rate of 2.875 percent over a 50-year period of analysis.

Table 29 and Table 30 show the present value and average annual value of benefits for each alternative. Note that these tables summarize benefits for the “most likely” scenario considered, and that numbers may differ slightly from those shown in subsequent tables due to variations in @Risk simulation results.

Table 29. Present Value of Benefits by Alternative.

Category:	Alt. 2	Alt. 3
Commercial Fishing	**$31,548,000**	**$31,548,000**
Opportunity Cost of Time	$23,190,000	$23,190,000
Vessel Operating Costs	$8,358,000	$8,358,000
Subsistence	**$3,782,000**	**$3,782,000**
Opportunity Cost of Time	$1,635,000	$1,635,000
Vessel Operating Costs	$1,385,000	$1,385,000
Increased Subsistence Harvest	$762,000	$762,000
Labor Resources	**$3,257,000**	**$614,000**
Total	**$38,587,000**	**$35,944,000**
Total, @Risk Simulation	**$34,996,000**	**$28,056,000**

Table 30. Annual Benefits by Alternative.

Category:	Alt. 2	Alt. 3
Commercial Fishing	**$1,197,000**	**$1,197,000**
Opportunity Cost of Time	$880,000	$880,000
Vessel Operating Costs	$317,000	$317,000
Subsistence	**$144,000**	**$144,000**
Opportunity Cost of Time	$62,000	$62,000
Vessel Operating Costs	$53,000	$53,000
Increased Subsistence Harvest	$29,000	$29,000
Labor Resources	**$124,000**	**$23,000**
Total	**$1,465,000**	**$1,364,000**
Total, @Risk Simulation	**$1,328,000**	**$1,065,000**

6.4 Net Benefits of Alternative Plans

Net benefits and the benefit-cost ratio (BCR) are determined using the average annual benefits and average annual costs for each alternative. Net benefits are determined by subtracting the average annual equivalent costs from the average annual benefits for each alternative; the BCR is determined by dividing average annual benefits by average annual costs.

Table 31 summarizes project costs, benefits, and the benefit-cost ratio by alternative. The plan that reasonably maximizes net benefits is Alternative 3, the South Harbor Dredging Only alternative at a depth of -19.25ft MLLW.

Table 31. Summary of Costs and Benefits by Alternative.

Alternative	Present Value Benefits*	Average Annual Benefits	Present Value Costs	Average Annual Costs	Net Annual Benefits	Benefit -Cost Ratio
1	N/A	N/A	N/A	N/A	N/A	N/A
2	$34,996,000	$1,328,000	$46,548,000	$1,766,000	-$438,000	0.75
3 (-18 ft MLLW)	$22,699,000	$861,000	$15,348,000	$582,000	$279,000	1.48
3 (-19.25ft MLLW)	$28,056,000	$1,065,000	$15,402,000	$584,000	$481,000	1.92

*This table shows benefits for the “most likely” benefit scenario considered, which was estimated through @Risk simulations. The BCR for Alternative 3 (-19.25ft MLLW), which yields the highest net benefits, ranges from 0.81 to 3.10 based on the portion of vessels affected during low-tide cycles (Table 32).

6.5 Risk and Sensitivity Analysis

In the interest of further testing the sensitivity of project justification to uncertainty in parameters, future scenarios must be assessed. The analysis of these scenarios is intended to illustrate the effect of changes in different assumptions on project benefits and project justification.

6.5.1 Fleet and Marine Resources

Because of the inherent uncertainty surrounding the forecast of any growth in fisheries and related marine resources, a conservative “no growth” approach was taken in determining the future fleet in Petersburg. The fishing industry in Petersburg is considered strong and is expected to continue to support demand for moorage and other harbor facilities at Petersburg. Fisheries activities would continue to fluctuate as resource abundance varies, regulations change, or technical breakthroughs are made. Possible regulatory actions likely would result in an easing of catch regulations given the stability of the fisheries in the Southeast Alaska/Yakutat region, leading to an increase in fish harvests and demand for harbor facilities at Petersburg. The impact of growing foreign fisheries on the domestic fish export industry may cause prices for some exports to fall but, more likely, this would result in an overall increase in global demand for fish exports, also leading to an increase in harvests and demand for harbor facilities. At this time, however, not enough information is known to assign probabilities to any of these scenarios. They are simply intended to provide information to better understand the economic risks associated with the recommended plan.

6.5.2 Project Benefits

Alaska District economists conducted a sensitivity analysis regarding expected project benefits based on the assumed percent of commercial fishing and subsistence vessels impacted by depth constraints during low tide cycles. This resulted in a range of benefit scenarios for each alternative. The most conservative scenario assumes 25 percent of vessels would be affected during each cycle, which likely results in an underestimation of benefits. Given that most vessels run multiple gear types and essentially fish year round, it is likely that a larger portion of vessels would be affected during each low tide cycle, and would therefore benefit from the proposed navigation improvements. The "mid" and "high" scenarios assume 50 percent and 100 percent of vessels would be impacted by depth constraints during low tide cycles. The "most likely" scenario is based on simulations using @Risk, a Microsoft Excel add-in. To address variation and uncertainty in project benefits, the three scenarios noted above were used to create an @Risk triangular distribution, which yielded the "most likely" scenario for each alternative.

Alternative 3 is economically justified under all but the most conservative benefit scenario considered with a BCR range of 0.81 to 3.10 and net annual benefits of –$113,000 to $1.2 million. Table 32 and Table 33 summarize the sensitivity analysis for Alternative 3, the recommended plan. Appendix D summarizes all of the results of the sensitivity analysis for the final array of alternatives.

Table 32. Sensitivity Analysis: Summary for Alternative 3.

Scenario	PV Benefits	AAEQ Benefits	PV Costs	AAEQ Costs	Net Annual Benefits	BCR
Low	$12,391,000	$471,000	$15,402,000	$584,000	–$113,000	0.81
Mid	$24,167,000	$916,000	$15,402,000	$584,000	$332,000	1.57
Most Likely	$28,056,000	$1,065,000	$15,402,000	$584,000	$481,000	1.92
High	$47,720,000	$1,811,000	$15,402,000	$584,000	$1,227,000	3.10

Table 33. Sensitivity Analysis: Present Value Benefits, Alternative 3.

Category:	Low	Mid	Most Likely	High
Commercial Fishing	**$10,516,000**	**$21,032,000**	**$31,548,000**	**$42,064,000**
Opportunity Cost of Time	$7,730,000	$15,460,000	$23,190,000	$30,920,000
Vessel Operating Costs	$2,786,000	$5,572,000	$8,358,000	$11,144,000
Subsistence	**$1,260,000**	**$2,521,000**	**$3,782,000**	**$5,042,000**
Opportunity Cost of Time	$545,000	$1,090,000	$1,635,000	$2,181,000
Vessel Operating Costs	$462,000	$923,000	$1,385,000	$1,846,000
Increased Subsistence Harvest	$254,000	$508,000	$762,000	$1,015,000
Labor Resources	**$614,000**	**$614,000**	**$614,000**	**$614,000**
Total	**$12,391,000**	**$24,167,000**	**$35,944,000**	**$47,720,000**
Total, @Risk Simulation	**$12,960,000**	**N/A**	**$28,056,000**	**$46,625,000**

6.5.3 Project Depth

Finally, an optimization of project depths was performed to determine the dredge depth with the highest net benefits. Project costs and benefits were evaluated for dredge depths of –18 ft MLLW and –19.25 ft MLLW in the South Harbor GNF areas. These depths were chosen based on vessel characteristics and draft requirements (including under-keel clearance) for vessels utilizing permanent and transient moorage at Petersburg. This analysis confirmed that Alternative 3 with a project depth of –19.25 ft MLLW in the maneuvering channel maximizes net benefits (Table 34).

Table 34. Project Depth Sensitivity Analysis.

Dredge Depth	PV Benefits	AAEQ Benefits	PV Costs	AAEQ Costs	Net Annual Benefits	BCR
-19.25 ft MLLW	$28,056,000	$1,065,000	$15,402,000	$584,000	$481,000	1.92
-18 ft MLLW	$22,699,000	$861,000	$15,348,000	$582,000	$279,000	1.48

7. RECOMMENDED PLAN*

7.1 Description of Recommended Plan

The recommended plan is Alternative 3: South Harbor Dredging Only (Figure 23). The project depths are -19.25ft MLLW in the maneuvering basins, turning basin and entrance channel (labeled in red) -18ft MLLW in between C and D floats, -10ft MLLW landward of the main float, and -9ft MLLW behind floats 1 and 2. A 1 ft over dredge allowance was selected for this project. Disposal of 82,980 CY of dredged material would take place in-water in Frederick Sound which is the Federal Standard. The area in red is the designated GNF for this study. Arrows show the turning basin, maneuvering basins, and entrance channel while accounting for the 66ft allowance between moorage and other facilities. This allowance is calculated into the LSF area which is 100 percent NFS responsibility.

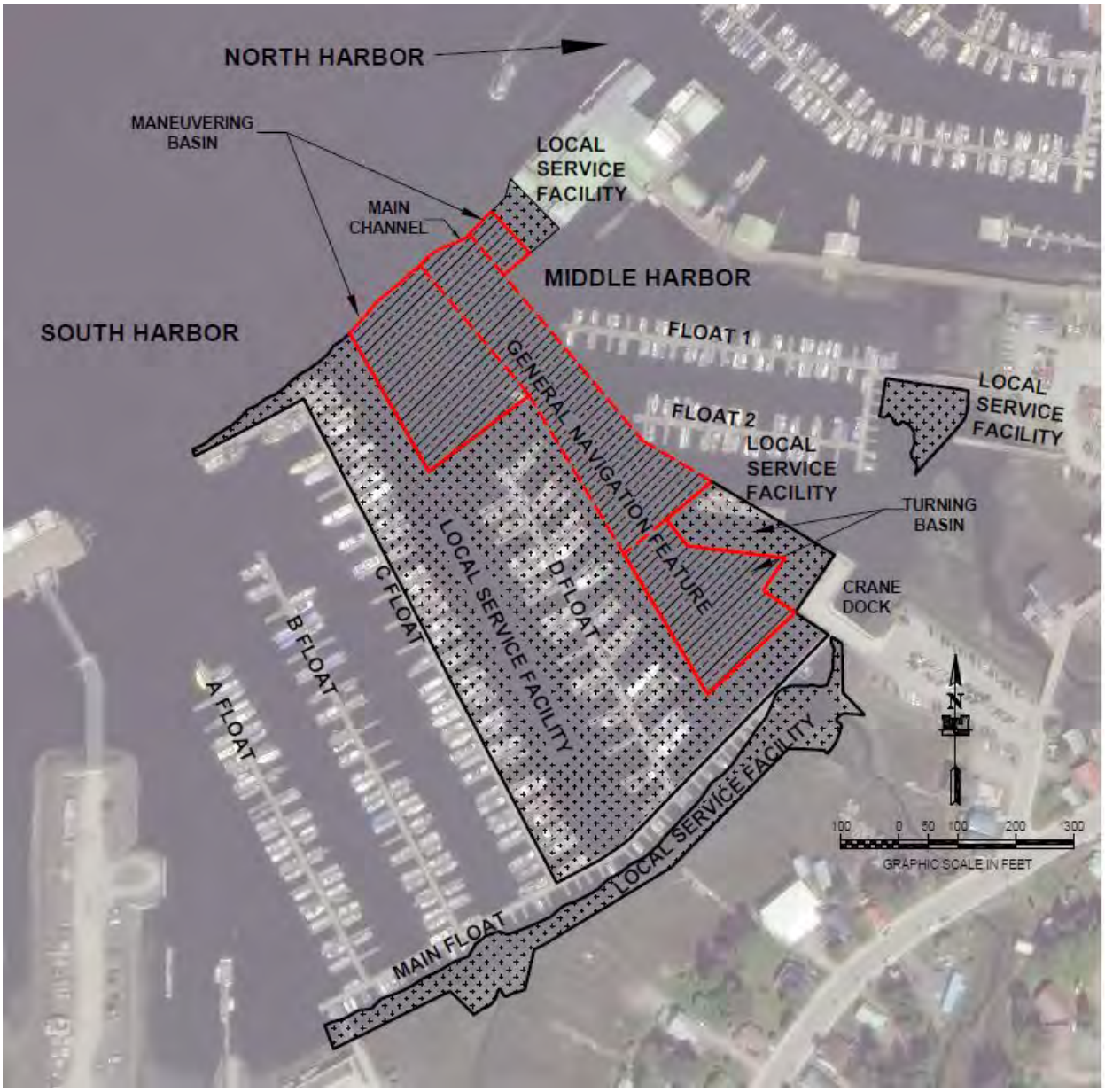

Figure 23. GNF and LSF areas within Alternative 3, the recommended plan.

7.2 Design Vessel

The design vessel is a hybrid of the National Geographic Sea Lion (length and beam) and a commercial fishing vessel (seiner) with a 12 ft draft. Table 35 lists the design vessel characteristics.

Table 35. Design Vessel Characteristics.

Vessel Length (ft)	Design Beam (ft)	Design Draft (ft)
164	33	12

Moving vessels must maintain clearance between their hulls and channel bottom; accordingly, various navigational design parameters are analyzed. Design parameters such as squat, safety clearance, vertical motion due to waves, and water density effects are added to determine the minimum required under-keel clearance (Figure 24).

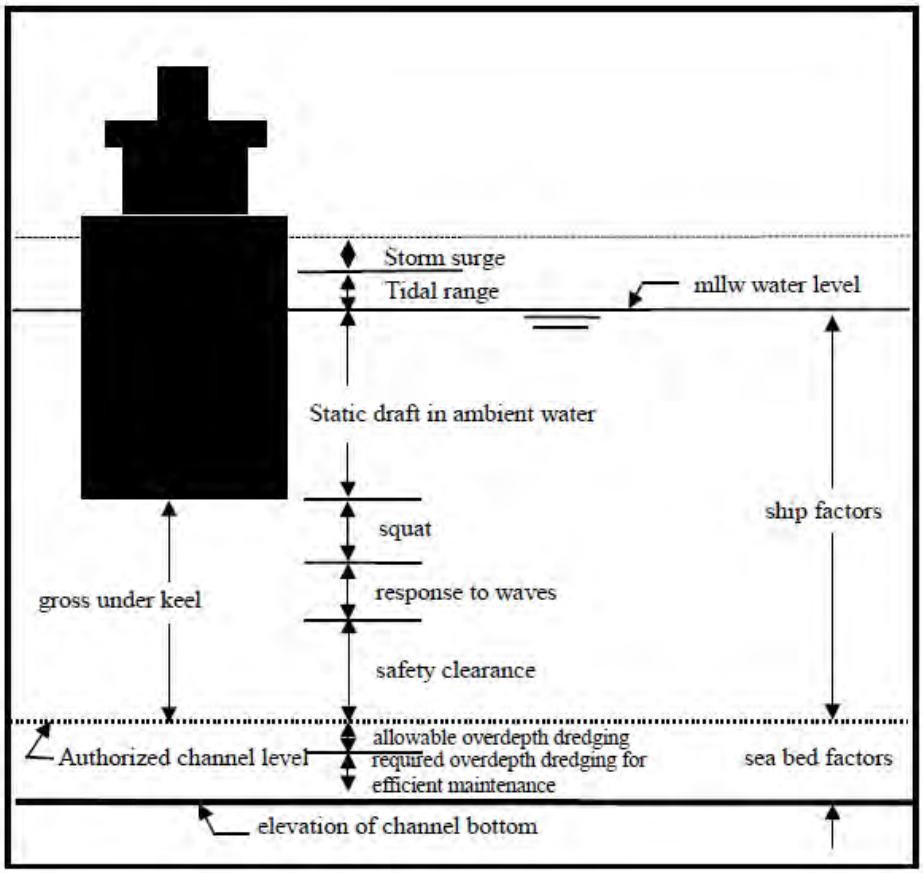

Figure 24. Under-Keel Clearance Parameters.

7.3 Plan Components

The maneuvering channel depth to the crane dock was determined using the criteria listed in Table 36. The lowest astronomical tide is -4.15ft MLLW which results in a depth of -19.25ft MLLW. This depth is usable 100 percent of the time for the established design vessel. Within the fairway area between floats C and D the squat and pitch, roll, and heave requirement is not necessary so required harbor depth reduces to -18ft MLLW.

Table 36. Maneuvering Channel Criteria (in MLLW).

Vessel Draft [ft]	12.0
Pitch, Roll, Heave [ft]	0.6
Squat [ft]	0.5
Tide Allowance [ft]	4.15
Safety Clearance	2.0
Total Depth Required (ft)	19.25

The dredge depth landward of the main float would reduce to -10ft MLLW for subsistence vessels based on original established harbor depths. The NFS requested that a fourth area be included and dredged to -9ft MLLW at the back of the Middle Harbor in order to trap the sediment accumulated from the Hammer Slough discharge. As explained in Section 3.1.4, Hammer Slough is a possible source of sedimentation for South Harbor and creating a sump to collect these sediments could reduce operations and maintenance (O&M) for dredging. Figure 23 shows a map of the harbor designated by GNF and LSF locations. The estimated dredge volume for each area is presented in Table 37.

Table 37. Dredge Volumes and Areas.

Dredge Area	Dredge Depth [ft]	Dredge Volume [cy]	Dredge Area [sf]	One Foot Overdepth Allowance (Rounded) [cy]	Total Dredge Volume [cy]	GNF/ LSF
Entrance Channel and Maneuvering/Turning Basins	-19.25	21,660	185,300	6,870	28,530	GNF
Offset from docks (66ft)	-19.25	13,160	113,949	4,230	17,390	LSF
Between C and D Floats	-18	5,820	237,369	8,800	14,620	LSF
Landward of Main Float	-10	17,370	62,390	2,320	19,690	LSF
Behind Floats 1 and 2	-9	2,370	10,191	380	2,750	LSF
Total		**60,374**	**609,199**	**22,610**	**82,980**	

7.3.1 Disposal Location-Components

Disposal in Frederick Sound is subject to the Ocean Dumping Criteria (40 CFR 227-228) and would be the Federal Standard if evaluation under the Criteria determines Ocean Dumping is environmentally acceptable, least costly, and designed with sound engineering principles. Section 8 of this report details the application of the Ocean Dumping Act.

In-water disposal is generally a more cost effective placement option due to the reduction in handling; sediments are placed on the barge by the dredge plant and transported to the disposal site and discharged directly into the water to settle on the ocean floor. This disposal method is evaluated through the SEF and the Dredged Material Management Program (DMMP) User Manual promulgated by the USACE, Seattle District (Alaska District does not have a regional management program)

The SEF serves as the Pacific Northwest's joint regional implementation manual for the two national sediment testing manuals:

- Evaluation of Dredged Material Proposed for Ocean Disposal (Ocean Testing Manual), which satisfies MPRSA sediment testing requirements (EPA and Corps 1991)
- Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual
(Inland Testing Manual), which satisfies CWA sediment testing requirements (EPA and Corps 1998)

The DMMP, also referred to as the User Manual, seeks to answer the following three questions:

1. Is the proposed dredged material suitable for open-water disposal?
2. Is the proposed dredged material suitable for in-water beneficial use?
3. Will the post-dredge surface (Z-layer or exposed substrate after pay is removed) meet anti-degradation standards when the project is finished?

To answer these questions, the DMMP uses a tiered approach to sediment characterization. There are four tiers of evaluation:

Tier 1: Site Evaluation and History
Tier 2: Chemical Testing
Tier 3: Biological Testing (bioassay and or bioaccumulation testing)
Tier 4: Special Studies

7.3.2 Construction Considerations

The dredging is anticipated to be completed during a 5 month period. Dredging activities would need to be closely coordinated with the Petersburg harbormaster in order to efficiently dredge in an active harbor. Dredging would take place between 1 October and 15 March in order to avoid the peak herring spawn and juvenile salmon out-migration and rearing activities, and when Steller sea lion and humpback whale feeding and abundance is expected to be greatest in the project area.

The nature of the obstructions identified during the 2017 survey of South Harbor should be identified to aid in planning for proper disposal of the obstructions. In order to attract a number of bidders, it is recommended that the project be advertised early in the year to maximize the number of contractors able to bid on this project.

7.3.3 Dredging Options

Mechanical dredges are characterized by the use of some form of bucket to excavate and raise the bottom material. They are not normally assigned to transport the material to the ultimate disposal area. In some cases, the dredged material can be deposited directly in-water or on the bank immediately adjacent to the dredging area. Normally, however, the mechanical dredge deposits material onto a barge for transport to the disposal site. In this way, the dredge plant can continue to produce at a rate limited by the number of barges servicing it.

Mechanical dredges are important to the dredging fleet due to their ability to remove harder material than hydraulic dredges, minimal sediment volume increase through agitation, and their separation from the transport mechanism. Mechanical dredges are classified into three subgroups according to how their buckets are connected to the dredge:

- Wire rope connected: Examples include the dragline, clamshell, sauerman, and orange-peel dredges. These dredges are frequently called “grab” or “bucket” dredges and are distinguished from the bucket ladder dredges.
- Structurally connected: Examples include the power shovel, back hoe, and excavator dredges. These dredges are frequently called “dipper” dredges.
- Chain and structurally connected: Examples include the bucket line dredge and bucket ladder dredge. These dredges differ from other mechanical dredges by dredging continuously with multiple buckets mounted on an endless chain.

Mechanical bucket dredging was successfully used in 2013 to dredge the North Harbor. It is anticipated that the same dredging method would be sufficient for this project. Figure 25 is an image of the dredge used during the 2013 dredging in North Harbor.

Figure 25. Dredging of North Harbor in 2013.

7.3.4 Operations & Maintenance

The main source of sedimentation in the North, Middle, and South harbors appears to be sediment from Hammer Slough, estimated at 200 CY/year (USACE 1977). Bathymetric survey of the area indicates that the Slough flow is channelized and directed towards Middle and North Harbor. The frequency of infilling and need to dredge for this project is assumed to be similar or less than the infilling in the North Harbor. USACE dredged the North Harbor in 1971 and, 42 years later, in 2013 maintenance dredging removed approximately 27,000 CY of material. The conservative estimate for O&M dredging for the recommended plan is 30 years based on the dredge frequency of North Harbor.

7.4 Integration of Environmental Operating Principles

The following environmental operating principles have been integrated into the planning process:

Foster sustainability as a way of life throughout the organization: This project would contribute to a more sustainable economy fostered by commercial fishing. The without-project condition sees continued vessel delays and loss of revenue negatively impacting Petersburg's economy and commercial and subsistence lifestyles. By dredging South Harbor, these negative impacts on the fishing fleet could be reduced.

Proactively consider environmental consequences of all Corps activities and act accordingly: Environmental consequences were considered throughout the planning process and every effort has been made to avoid, minimize, or mitigate all anticipated impacts. These actions include best practices during construction to avoid impacts to migration and spawning activities.

Create mutually supporting economic and environmentally sustainable solutions: The recommended plan is the NED plan and therefore, provides the maximum amount of benefits to the nation. The project was formulated in a way that makes it lasting, requiring limited maintenance, and avoiding long term environmental impacts wherever possible.

Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the Corps which may impact human and natural environments: A full environmental assessment (EA) has been conducted as required by the National Environmental Policy Act. In addition, the principles of avoidance, minimization, and mitigation would be enacted to the extent possible.

Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs: For this study, a systems approach was utilized to examine in-water disposal areas and categorize the species that could be impacted by the potential placement of dredge material in these areas.

Leverage scientific, economic and social knowledge to understand the environmental context and effects of Corps actions in a collaborative manner: USACE worked closely with the Petersburg Borough throughout this study. The Borough is very knowledgeable about the environment surrounding South Harbor and Frederick Sound. In addition, USACE reached out to the EPA in order to discuss the in-water disposal options and subsequent sampling efforts to determine that the correct measures were being taken to access these areas. Additional coordination took place with other federal and state agencies during the preparation of the draft Environmental Assessment.

Employ an open, transparent process that respects the views of individuals and groups interested in Corps activities: USACE made every effort to be responsive to stakeholder concerns. Public input was solicited and used for both environmental and economic analysis purposes. A meeting was held before the study started to gain feedback from commercial fishermen, the Borough, and stakeholders on what problems South Harbor faces and the impacts to commercial and subsistence activities. The group defined objectives, opportunities and constraints for the study and discussed alternative ideas that the team later screened and used to develop the final array of alternatives discussed in section 5.3.

7.5 Real Estate Considerations

There are no identified real estate issues that would prevent a project in this location. This project would exercise navigational servitude as addressed in Appendix F.

7.6 Summary of Accounts

Plan formulation was performed for this study with a focus on contributing to NED with consideration of all effects, beneficial or adverse, to each of the four evaluation accounts identified in the P&G. Plan selection was based on a weighting of the projected effects of each alternative on the four evaluation accounts. The PDT reviewed qualitative and quantitative information for major project effects and for major potential effect categories.

7.6.1 National Economic Development

Net benefits and the benefit-cost ratio are determined using the average annual benefits and average annual costs for each alternative. Net benefits are determined by subtracting the average annual equivalent costs from the average annual benefits for each alternative; the benefit-cost ratio is determined by dividing average annual benefits by average annual costs. Under all benefit scenarios considered, Alternative 3 is economically justified with a benefit-cost ratio ranging from 0.81 to 3.10, and net annual benefits of –$113,000 to $1.23 million. The most likely BCR is 1.92 with net annual benefits of $481,000.

7.6.2 Regional Economic Development

Economic benefits that accrue to the region, but not necessarily the nation include increased income and employment associated with the construction of a project. The RED analysis includes the use of regional economic impact models to provide estimates of regional job creation, retention, and other economic measures such as sales, or value added. Each alternative has a positive effect on RED commensurate with its construction expenditure.

Improving the navigation conditions at Petersburg increases opportunities for vessels to use the harbor. Vessels seeking permanent and transient moorage, many of which are on the current waitlist for moorage, would bring revenue to the region in the form of moorage fees, additional sales tax revenues on purchases of fuel and groceries for the vessel, additional corporate income taxes to the State of Alaska, crew patronage of local businesses, and fares on local air carriers between Petersburg and the crews' homes.

7.6.3 Environmental Quality

EQ displays the non-monetary effects of the alternatives on natural resources and is described more fully in the EA sections of the draft feasibility report. Qualitative enhancements to the environment include a reduction in fossil fuel usage and emissions due to decreased delays for vessels using the Petersburg harbor system as well as decreased travel for vessels that may relocate to Petersburg from other ports. For

alternative 2 and alternative 3 (the recommended plan), decreased delays drive the qualitative environmental effects.

7.6.4 Other Social Effects

The categories of effects in the Other Social Effects (OSE) account include urban and community effects; life, health, and safety factors; displacement; long-term productivity; and energy requirements and energy conservation. OSE can be either beneficial or adverse (positive/negative) depending on the standard being measured.

Construction of this project in Petersburg would allow the community to continue to engage in activities that would generate income. In addition, commercial fishermen would have the opportunity to access the harbor during more of the tidal cycle increasing the amount of time they can spend harvesting resources. This opportunity for additional income to the Petersburg Borough allows for the provision of social services to the community, increasing community viability and quality of life. Enhanced revenue to local businesses provides incentive to hire additional personnel, providing income stability to more of the local citizenry.

7.6.5 Four Accounts Evaluation Summary

Based on this analysis of the four accounts, each alternative has positive effects for the RED and OSE accounts, and temporary negative effects for the EQ account. Based on its preference in the NED account, the recommended plan for this study is Alternative 3. Table 38 shows a summary of the four accounts for the alternatives.

Table 38. Four Accounts Evaluation Summary.

Alternative	Net Annual Benefits & BCR*	EQ	RED	OSE
2	($438,000) 0.75	Negative (temporary)	Increased employment and income for the region and state	Beneficial
3	$481,000 1.92	Negative (temporary)	Increased employment and income for the region and state	Beneficial

*This table shows net benefits and benefit-cost ratios for the “most likely” benefit scenario considered, which was estimated through @Risk simulations. The BCR for Alternative 3 ranges from 0.81 to 3.10 based on the portion of vessels affected during low-tide cycles, with a most likely BCR of 1.92. See the Risk and Sensitivity section for details.

7.7 Risk & Uncertainty

In any planning decision, it is important to take into account the risk and uncertainty that is invariably present. For this study, there are a few risk and uncertainty categories that were identified and evaluated during the planning process. Table 39 summarizes the risk and uncertainty items remaining for this project.

Table 39. Risk and Uncertainty Summary

Assumption or Estimate	Risk Comment
O&M would occur within 30 years.	The need for maintenance dredging may vary based on rainfall coupled with increased sedimentation from Hammer Slough and unnamed stream. The rate of isostatic rebound may fluctuate or increase into the future due to increased melting of the glaciers feeding Frederick Sound, Wrangell Narrows and the surrounding areas. The most recent known maintenance dredge of North Harbor was at a rate of 42 years, so this number was conservatively calculated due to the known sedimentation from Hammer Slough and unnamed stream.
The Frederick Sound disposal area has been chosen as the Federal Standard.	The Ocean Dumping Criteria have been applied to the Frederick Sound Disposal Site, described in Section 8. The Site is consistent with the Criteria and the Alaska District Engineer is seeking concurrence on the Site Selection from the EPA R10 Regional Administrator.

7.8 Cost Sharing

The recommended plan would be cost shared 90 percent Federal and 10 percent non-Federal. The initial construction cost of the GNF is 90 percent for the initial Federal investment and 10 percent for the initial local share because the natural controlling depth of the project, defined in the case as “the shallowest portion of the channel that allows access to the mooring area” is shallower than -20ft MLLW. The NFS must also contribute an additional 10 percent, plus interest, during a period not to exceed 30 years after completion of the GNF construction. The NFS would be credited toward this 10-percent cost with the value of LERRD necessary for construction, operation, and maintenance of the GNF. The cost share breakdown is itemized in Table 40.

Table 40. Cost Share Breakdown

Item	Federal ($)	Non-Federal ($)	Total ($)
Mobilization and Demobilization	$3,393,000	$377,000	$3,770,000
Dredging (GNF)	$1,430,100	$158,900	$1,589,000
Design & Implementation (D&I)	$1,129,500	$125,500	$1,255,000
Supervision, Inspection, and Overhead (SIOH)	$603,000	$67,000	$670,000
NED Sub-total GNF	**$6,555,600**	**$728,400**	**$7,284,000**
Lands, Easements, Rights of Way, Relocations, and Dredged Material Disposal Area (LERRD)	-	-	-
NED Total Project First Cost	**$6,555,600**	**$728,400**	**$7,284,000**
Local Service Facilities (LSF)			
Dredging (LSF)	-	$3,327,000	$3,327,000
Sub-total LSF	**-**	**$3,327,000**	**$3,327,000**
Aids to Navigation	-	-	-
Credit for LERRD	-	-	-
10% of GNF over time (less LERRD)[1]	($728,400)	$728,400	-
Cost Allocation[2,3]	**$5,827,200**	**$4,783,800**	**$10,611,000**

1. The Non-Federal Sponsor shall pay an additional 10 percent of the costs of GNF, pursuant to Section 101 of WRDA86.
2. Final cost allocation is 55 percent Federal, 45 percent non-Federal.
3. Some rounding occurs in the cost share breakdown so the total differs by $1,000 from the certified project first cost of $10,612,000.

8. OCEAN DUMPING ACT (SECTION 103 MPRSA) CRITERIA ANALYSIS*

8.1 Authorities

This analysis is made under authority of Section 103(e) of the MPRSA, (also known as the Ocean Dumping Act), 33 United States Code (USC) 1413(e). Section 103(e) allows the Secretary of the Army to issue regulations pertaining to federal projects involving dredged material, requiring the application to such federal projects of the same criteria as that described for permits in Section 103(a), and established by USEPA for site selection under Section 102(a). Corps of Engineers factors to be considered in the evaluation of Corps dredging projects involving the discharge of dredged material into ocean waters are established in 33 CFR 336, et seq. These procedures allow the District Engineer to select a site not previously designated by USEPA upon an evaluation of the USEPA site selection factors, and others, in an appropriate NEPA document that evaluates a proposed disposal site and all other available alternatives, including a no dredging option. 33 CFR 336.2(d)(4). The USEPA site selection criteria are set forth at Title 40 of the CFR Sections 228.5 and 228.6.

8.2 Alternatives to Disposal at Frederick Sound Disposal Site (FSDS)

The beneficial use of the dredged material for marine infrastructure at Scow Bay, 2.5 miles south of the Petersburg South Harbor, was considered in preliminary planning as a potential placement option (Figure 26). Geotechnical investigation conducted in April 2018 in concert with the chemical analysis indicated the physical properties of the dredged material were not conducive for construction base. The high silt composition of the dredged material would not be capable of creating a stable construction base, would present constructability challenges due to the hydrophilic properties of silt, and cost more to confine than the material was worth.

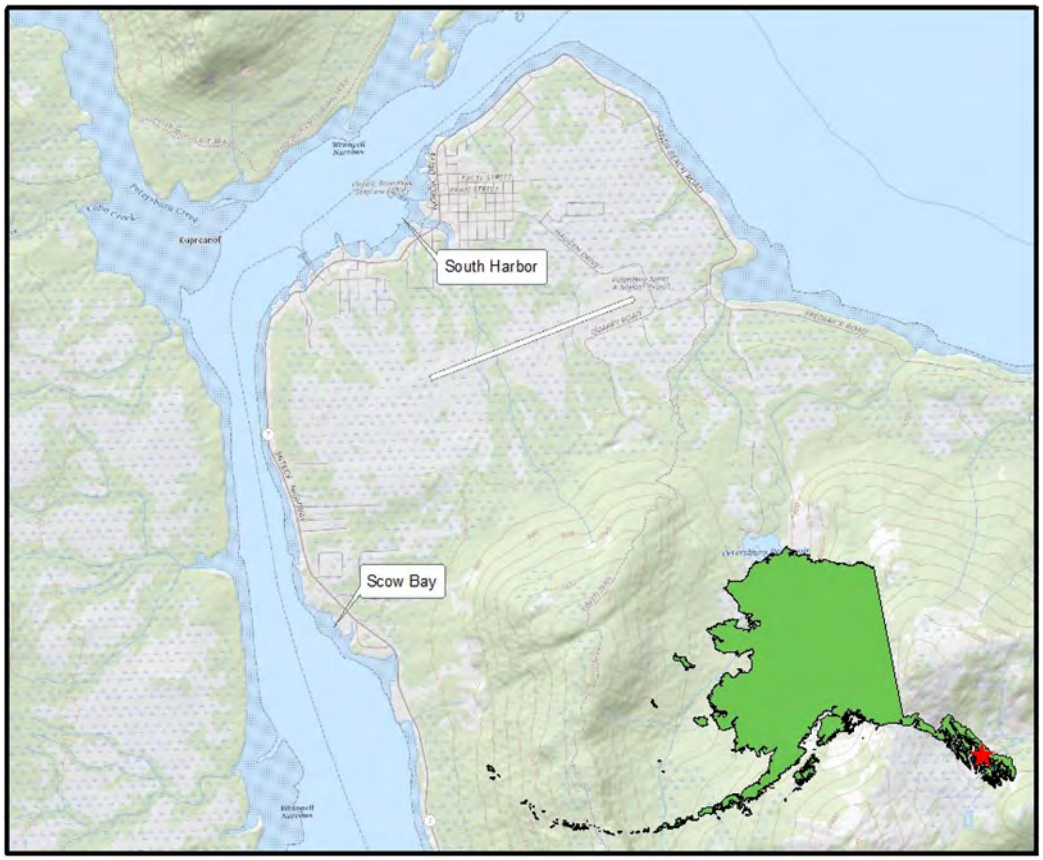

Figure 26. Scow Bay in Relationship to the Petersburg South Harbor.

Beach nourishment or nearshore disposal are not suitable options for disposal of the dredged material because grain size analysis indicates the material is comprised primarily of fine-grained materials; 10 of the 16 cores were over 50 percent silt/clay (Table 2). The fine-grained material would not be compatible with the sandy and rocky shorelines, created by exposure to hydraulic energy from currents and waves, found in the local area. The placement of fine grained material in the nearshore environment would provide only short term stabilization until the material was eroded and contribute to elevated turbidity in the water column as the fine-grained material was suspended. This would have a deleterious impact on nearshore ecology due to reduced light transmissivity and direct fouling as the material precipitates from the water column. The fine-grained material placed landward of the depth of closure would persist in the littoral

cell rather than being dispersed as it would in deeper water and concentrate the turbidity impacts in the more sensitive and confined nearshore ecosystem.

Upland disposal is not a suitable option for the dredged material due to economic limitations, lack of available disposal locations for the specified volume, resistance from the local community associated with the elevated dump truck traffic, impacts to public roads, and general level of effort that would be required for upland placement. Previous dredging in the Petersburg North Harbor required upland placement of dredged sediments due to the chemical composition of the materials; USACE collected sediments for chemical analysis in 2010 that were extensively contaminated with fuels, fuel constituents, and metals in exceedance of the allowable concentrations for ocean disposal. Approximately 26,400 cubic yards of dredged material from the North Harbor was placed in the uplands of the City of Petersburg landfill, consuming much of the available capacity in that facility. Consultation with the USFS, the primary Federal land manager on Mitkof Island, indicated that the transportation of dredged material across USFS maintained roads for the purpose of disposal would be characterized as a commercial or industrial activity and invoke road usage fees and rock replacement fees. A single site on USFS land large enough to accommodate the entire volume of dredged material does not exist on Mitkof Island, so multiple sites would have to be secured for the disposal; adding complexity and cost to the coordination and distributing the ecological impacts. The City of Petersburg owns a quarry on Mitkof Island that was evaluated as a potential placement location, but insufficient capacity exists for the volume of material that would be generated from the South Harbor dredging project.

The USEPA maintains one Ocean Dredged Material Disposal Site (ODMDS) in the State of Alaska at the Port of Nome, over 2,000 miles away from Petersburg. The transportation of dredged material to Nome for disposal is not feasible due to transportation costs.

The inland waters of Thomas Bay are approximately 16 miles north of Petersburg, across Frederick Sound (Figure 27). USACE has jurisdictional authority over the placement of dredged material in inland waters under Section 404 of the Clean Water Act (CWA). The upper reaches of Thomas Bay are turbid due to the proximity of Baird Glacier, over 700’ deep, with fine-grained sediment; which preliminarily suggested the area as a potential disposal location. USACE has evaluated the inland waters of Thomas Bay as a potential disposal location and determined it is not the Federal Standard (in other words, it is not the least costly alternative, consistent with sound engineering practices and selected through application of the 404(b)(1) guidelines or ocean disposal criteria). Furthermore, Thomas Bay is the site of Tanner and Dungeness crab fisheries, a chum salmon fishery, and several recreational resources. It has been called “Petersburg’s playground” due to its popularity with the residents of Petersburg. The USACE biological sampling in August 2018 indicated that adult Tanner crab and Red King Crab, both important economic resources, are more abundant in Thomas Bay than in the Frederick Sound Disposal Site (FSDS). The Alaska Department of Fish and Game submitted a letter in January 2019 to the USACE favoring the selection of the FSDS over Thomas Bay.

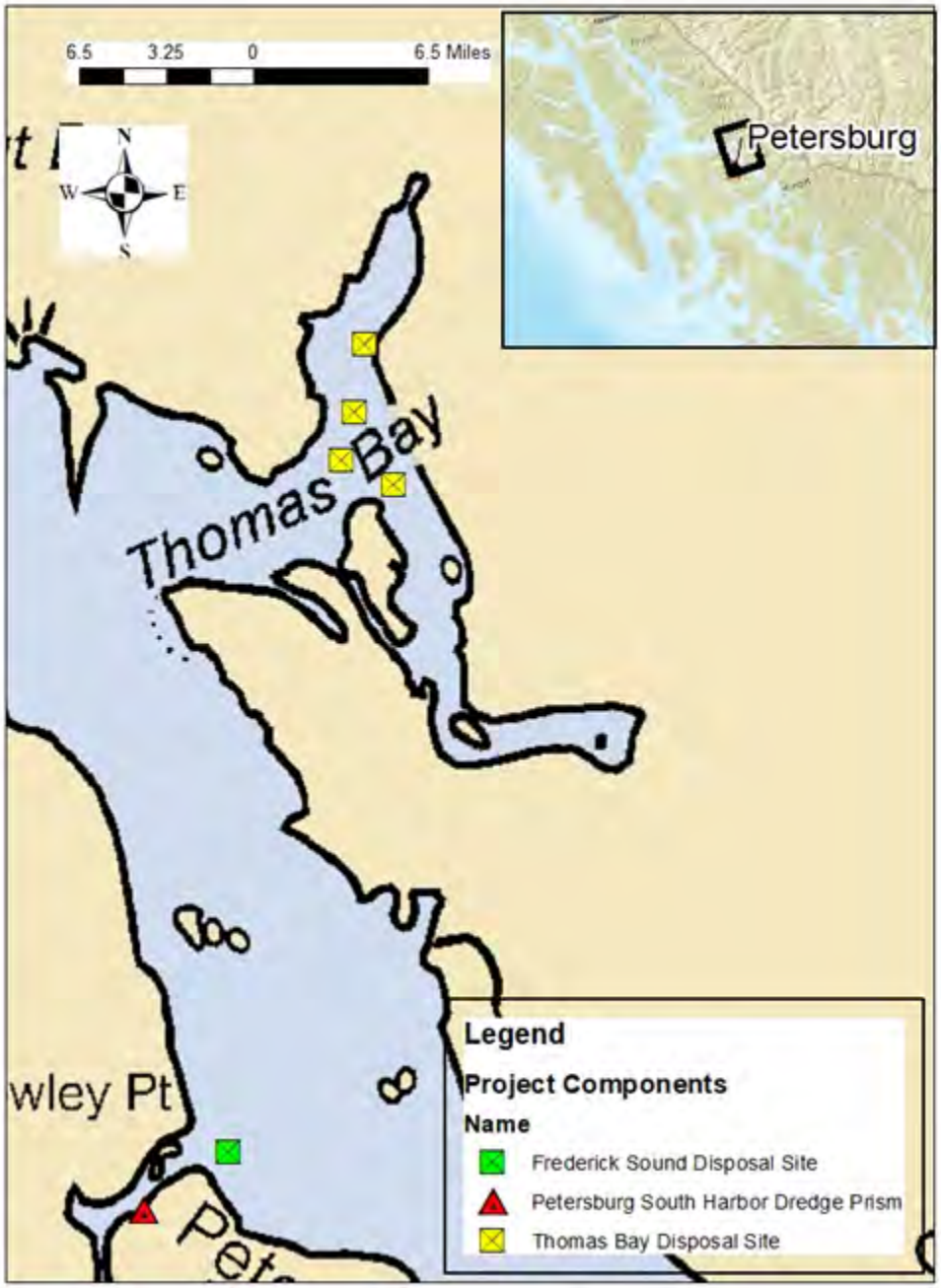

Figure 27. Petersburg South Harbor in Relationship to the FSDS and Thomas Bay.

8.3 Site Selection Criteria

Title 40 CFR Parts 220-238 (Ocean Dumping) contains the USEPA promulgated criteria that defines the designation and management of ODMDS. These regulations identify five general and 11 specific criteria that are used during the evaluation of an ODMDS designation. The five general criteria are (40 CFR 228.5, quoted in whole):

(a) The dumping of materials into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation.

(b) Locations and boundaries of disposal sites will be so chosen that temporary perturbations in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary, or known geographically limited fishery or shellfishery.

(c) If at any time during or after disposal site evaluation studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet the criteria for site selection set forth in §§ 228.5 through 228.6, the use of such sites will be terminated as soon as suitable alternate disposal sites can be designated.

(d) The sizes of ocean disposal sites will be limited in order to localize for identification and control any immediate adverse impacts and permit the implementation of effective monitoring and surveillance programs to prevent adverse long-range impacts. The size, configuration, and location of any disposal site will be determined as a part of the disposal site evaluation or designation study.

(e) EPA will, wherever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used.

The following 11 specific criteria shall also be considered (40 CFR 228.6, quoted in whole):

(a) "Geographical position, depth of water, bottom topography and distance from coast;

(b) Location in relation to breeding, spawning, nursery, feeding, or passage areas of living resources in adult or juvenile phases;

(c) Location in relation to beaches and other amenity areas;

(d) Types and quantities of wastes proposed to be disposed of, and proposed methods of release, including methods of packing the waste, if any;

(e) Feasibility of surveillance and monitoring;

(f) Dispersal, horizontal transport and vertical mixing characteristics of the area, including prevailing current direction and velocity, if any;

(g) Existence and effects of current and previous discharges and dumping in the area (including cumulative effects);

(h) Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance and other legitimate uses of the ocean;
(i) The existing water quality and ecology of the site as determined by available data or by trend assessment or baseline surveys;
(j) Potentiality for the development or recruitment of nuisance species in the disposal site;
(k) Existence at or in close proximity to the site of any significant natural or cultural features of historical importance."

8.4 Ocean Dumping Criteria Consistency Analysis

In order for the placement of dredged material in ocean waters to be authorized, both the dredged material and the disposal location must be characterized. The Alaska District performed chemical and geotechnical analysis of the dredged material in April of 2018 and determined that the sediments did not pose a hazard to the marine environment pursuant to the chemical concentration screening criteria contained in the SEF. The Alaska District has not promulgated specific regional chemical screening criteria for marine sediment and has previously used the Lower Columbia River Dredged Material Evaluation Framework and Puget Sound Dredged Disposal Analysis. Agency stakeholders in Alaska including the State Water Quality Certification Division at ADEC and the USEPA Aquatic Resources Unit (ARU) are aware of the differences between the marine environment in Alaska and the contiguous United States with respect to the naturally occurring metals and water temperatures and have taken those differences into consideration when applying screening criteria developed elsewhere. Alaskan marine sediments often contain metals concentrations, particularly arsenic and chromium, exceeding Tier II screening levels due to local mineralogy. Alaskan marine organisms are either tolerant of these naturally high concentrations or do not have the propensity to take up certain constituents in hazardous levels, otherwise they would not survive even absent of anthropogenic activities. The naturally cold water surrounding Alaska reduces the bioavailability of many constituents and also confounds the direct application of testing methods developed for the Lower 48 States; e.g., Alaskan marine organisms may experience elevated mortality due to environmental stress from water temperatures dictated in testing protocols, which would result in a false positive for sediment toxicity under a Tier III analysis.

The Alaska District conducted ecological sampling at the FSDS and in Thomas Bay over the course of a year in order to describe the benthos, understand seasonal variability in epibenthic population distribution, determine physical consistency between dredged material and the native substrate in the FSDS, estimate the impacts of dredged material disposal, and determine consistency with the five general of 40 CFR 228.5 and 11 specific criteria of 40 CFR 228.6.

8.4.1 General Criteria (40 CFR 228.5, quoted in whole)

(a) "The dumping of materials into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation."

The FSDS is not extensively fished by commercial recreational fishermen due to its low relative productivity, extreme depth, and exposure to strong tidal currents resultant from the Site's proximity to the Wrangell Narrows. Correspondence with the Petersburg Vessel Owner's Association in July 2018 disclose that "the area is black mud already with no crab or fish there" and "this is not a place any of our fleet go to fish and won't disrupt any of our fisheries". The ADFG submitted a letter to USACE in January 2019 stating that "The marine disposal area and adjacent sites in Frederick Sound near Petersburg lie within statistical area 108-60, which historically has exhibited much lower commercial Tanner crab effort and harvest" (PVOA 2018).

The proposed disposal area is south of the confluence of Wrangell Narrows and Frederick Sound, outside of the Alaska Marine Highway route and the majority of vessel traffic, as indicated by Automated Information System (AIS) data. Commercial fishing is the predominant source of marine traffic in the area and fishing traffic ebbs in the winter, when the FSDS would be used for disposal. Minimum depth in the FSDS exceeds 450', providing more than adequate depth for even the deepest drafting vessels in the world.

(b) "Locations and boundaries of disposal sites will be so chosen that temporary perturbations in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary, or known geographically limited fishery or shellfishery."

Any turbidity resulting from dredging would be temporary, occur only in the immediate vicinity of mechanical dredging, and dissipate rapidly by tidal mixing. Turbidity would temporarily increase in the vicinity of the disposal area as the sediment is released from the scow; but the depth of the water, energetic nature of the hydrodynamic environment, and substantially similar nature of dredged material and disposal area substrate ensure the turbidity impacts to water quality would be temporary and insignificant. All dredged material that would be placed in Frederick Sound has been tested for chemical constituents of concern and determined to be suitable for in-water placement in accordance with the Seattle District DMMP. The ADEC has determined that an Anti-Degradation Analysis for the proposed project is not warranted due to the low level of potential impact to water quality.

Juvenile salmon have been shown to avoid areas of high turbidities (Servizi 1988), although they may seek out areas of moderate turbidity (10 to 80 NTU), presumably as refuge against predation (Cyrus and Blaber 1987a and 1987b). Feeding efficiency of juveniles is impaired by turbidities in excess of 70 NTU, well below sublethal stress levels (Bisson and Bilby 1982). Reduced preference by adult salmon homing to spawning areas has been demonstrated where turbidities exceed 30 NTU (20 mg/L suspended sediments). However, Chinook salmon exposed to 650 mg/L of suspended volcanic ash were still able to find their natal water (Whitman et al. 1982).
Based on these data, it is unlikely that short-term (measured in hours based on tidal exchange frequency) and localized elevated turbidities generated by the proposed action would directly affect EFH for juvenile or adult salmonids and EFH for groundfish, such as flatfish, sculpins, and rockfish that may be present. Potential impacts would be further minimized by conducting all in- water work within approved environmental work windows that would avoid major periods of juvenile salmon outmigration.

Except for the short-term, localized turbidity associated with transition dredging and disposal, no adverse impacts to water or sediment quality is expected to occur as a result of the recommended dredging action.

> *(c) "If at any time during or after disposal site evaluation studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet the criteria for site selection set forth in 40 CFR 228.5 through 228.6, the use of such sites will be terminated as soon as suitable alternate disposal sites can be designated."*

USACE's Alaska District Environmental Resources Section has evaluated the impacts of disposal at FSDS by applying the criteria of Section 102(a) of the MPRSA for evaluation of material. This site selection document has evaluated information relative to FSDS which addresses the General and Specific criteria for site selection set forth in 40 CFR Sections 228.5 and 228.6 for the disposal of dredged material that meets criteria set by Section 102(a) of the MPRSA. This study does not reveal any conflicts concerning the selection of FSDS with respect to the site selection criteria.

The FSDS's location two miles from the Petersburg Harbor would allow the Alaska District to continue monitoring the FSDS during and after dredged material disposal. Petersburg is reliably accessible through the year, with adequate availability of support vessels and infrastructure. The FSDS's location in the Inside Passage limits the potential for weather interference with the port construction monitoring. The Alaska District would conduct monitoring events immediately post construction, at one year post construction, and at five years post construction in order to document continued compliance with the general and specific criteria of 40 CFR 228.5 through 228.6.

(d) *"The sizes of ocean disposal sites will be limited in order to localize for identification and control any immediate adverse impacts and permit the implementation of effective monitoring and surveillance programs to prevent adverse long-range impacts. The size, configuration, and location of any disposal site will be determined as a part of the disposal site evaluation or designation study."*

The FSDS is defined as a 75-acre rectangle on the seafloor, ½ mile by ¼ mile, centered at 56.832202 latitude and -132.911592 longitude. The size and shape of the site was determined by considering the previously used disposal site immediately west of the FSDS and translocating it to an area that would be more representative of the terminal disposition of the dredged material; accounting for the likelihood the dredged material placed in the previously used disposal area would come to rest at or beyond the toe of the slope.

Analysis of the May 2018 bathymetric survey of the previously used disposal area revealed a subsea slope failure. The failure could have been caused by previous dredged material disposal, seismic activity, or other factors. The Alaska District elected to avoid the potential to be responsible for another slope failure, translocating the previous disposal area from the high gradient slope to the subsea plains that form the majority of the seabed in Frederick Sound. The low-relief topography of the FSDS was hypothesized to provide poorer quality habitat than the high gradient slope of the previous disposal area as well.

The translocation of the FSDS was further supported by the biological sampling conducted by the Alaska District over the course of the one-year study. The District conducted video surveys, pot fishing, and sediment sampling at three locations in Frederick Sound and four locations in Thomas Bay. The FSDS was the least productive sampling area of the seven areas surveyed. Sediment samples from the FSDS consisted of homogenous fine-grained inorganic material with no entrained biota. The sediment from the previous disposal area varied in grain size and hue due to the wide range in energy level and depth which the samples were collected; the previous disposal area ranged from approximately 210 to 450 feet. The FSDS, covering the same acreage, has a much more consistent bottom elevation of between about 474 and 510 feet.

(e) *"EPA will, wherever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used."*

Transporting the dredged material to the outer continental shelf would raise the costs of the dredging project prohibitively as the distance to the outer shelf is approximately 30 nautical miles. The nearest location on the OCS is a "donut hole" within the upper part of Frederick Sound. Donut holes are the colloquial term for OCS formations resultant of

inside water with greater than six miles of fetch between the mainland and the islands of Alexander Archipelago; i.e., the three nautical mile boundary of the Submerged Lands Act boundary starting from the mainland and the islands do not connect in the reaches of water bodies greater than six miles across. FSDS is located only 2 nautical miles from the dredging site, making it a much more cost effective option.

A historically used disposal site, the previous Frederick Sound disposal area, was examined. USACE had jurisdiction over the previous site until the closing line demarcating inland waters from ocean waters was moved from the outside of Alexander Archipelago east to enclose the mouth of many smaller embayments, but exclude the majority of the Inside Passage. The NOAA baseline commission in 2005 moved the baseline inland to reduce the extent of State submerged lands without any consideration to the impacts the redrawing would have of jurisdictional authority with respect to the disposal of dredged material. Review of the Alaska District's Department of Army Permit administrative records indicated the previous disposal area had been determined to be inland waters by the USEPA as recently as 2002, but previous determinations do not override implications of the current closing line. This site selection analysis evaluated the potential to re-select the previous site due to its history of use. However, it was determined that the previous site contained a much higher degree of depth and gradient diversity, a mosaic of substrate classes, more complex habitat types, and the potential to allow sediment to mobilize from the face of the slope beyond the disposal area boundary. Given the potential for negative impacts that would be caused by the placement of dredged material in the previous site, it was deemed unacceptable.

The FSDS overlaps about five acres of the northeastern portion the previous disposal site. The Alaska District considers the location of the FSDS to be representative of the terminal disposition of disposal actions carried out in the previous disposal area due to the overlap between the two areas and the bottom topography of the previous site.

The previous disposal area has been used by the USACE, the AKDOT&PF, and the City of Petersburg for disposal of dredged material. Lack of complete records impair the Alaska District's ability to determine the exact timing and quantity of dredged material placed in the Frederick Sound Disposal Area, but historical documents help to inform some assumptions. Review of historical nautical charts include the disposal area in 1952 and later charts, but is not present in 1947 and earlier charts. This chart update coincides with the 1951 USACE project to increase the channel to 300 feet wide by 24 feet deep.

The USACE Projects and Inventory (P&I) Book identifies "Deep water disposal, outside the confines of the Narrows" as the option of choice for dredge spoils. A May 1966 Detailed Project Report on Petersburg Harbor states that *"Excess material will be wasted in Frederick Sound in water deeper than 40 feet below mean lower low water."*

The 1974 Combined Review of Reports on Dry Strait, Wrangell Narrows, & Turn Point Navigation, Alaska states that *"Material dredged from the north end of Dry Straits would be disposed of in deep water in Frederick Sound at the end of the dredged channel",* without identifying a specific location.

The City of Petersburg was authorized in 1998 by the USACE AK District Regulatory Division under DA Permit POA-1975-180-M2 to dispose of up to 80,000 cubic yards of clean dredged material from the South Harbor Expansion project.

The Frederick Sound deep-water disposal site is part of the Wrangell Narrows navigation channel project, which was initially constructed in 1934. It has been widened and maintenance dredged several times since then, including but not limited to:

- 1951: Work to increase the channel to 300 feet wide by 24 feet deep was completed in June.
- 1971: Maintenance dredging was conducted throughout the channel in September and October with 56,890 cubic yards removed by contract. Records from the disposal are unavailable, but it is assumed the dredged material from the northern portion of Wrangell Narrows was placed in Frederick Sound and the material from the southern portion was placed in Sumner Strait.
- 1979: The Turn Point vicinity near Petersburg was dredged in May and June with 36,900 cubic yards reportedly removed. A portion of the dredged material was used to construct uplands near the state ferry terminal at Turn Point and the rest was placed in the Frederick Sound Disposal Area, identifying the following corners (Table 41):

Table 41. 1979 Dredged Material Disposal Area Corners.

COORDINATES OF "ALTERNATE" DISPOSAL SITE

CORNER NO.	AK. STATE PLANE (ZONE 1)		GEOGRAPHIC	
	N	E	LONG. (W)	LAT. (N)
1	1,825,293.74	2,834,465.28	132° 55' 25"	56° 49' 42"
2	1,826,231.31	2,836,680.53	132° 54' 45"	56° 49' 51"
3	1,825,025.97	2,837,806.62	132° 54' 25"	56° 49' 39"
4	1,824,082.15	2,835,034.87	132° 55' 15"	56° 49' 30"

- 1989: The USACE owned dredge YAQUINA conducts dredging operations throughout the narrows' shoals.
- 1995: Wrangell Narrows maintenance dredging of the Federal channel was conducted under contract for two areas from Frederick Sound through Turn Point with a payable quantity of 41,000 cubic yards removed from the project. Dredged material was disposed in Frederick Sound Disposal Area; reference 1995 P&I book and reconnaissance study.

- 2000: Maintenance dredging began at selected locations from Mile 12.2 to 18.4 and at the Battery Islets near Mile 20.
- 2001: Maintenance dredging was completed in March. The total payable quantity removed was 33,939 cubic yards. The dredged material was disposed in the Frederick Sound Disposal Area in accordance with 1999 Wrangell Narrows O&M EA/FONSI. The detail and site plan identifies the disposal site corners (Table 42).

Table 42. 2001 Dredge Material Disposal Area Corners.

DISPOSAL SITE COORDINATES				
CORNER	NORTHING	EASTING	LATITUDE NAD83	LONGITUDE NAD83
1	1,825,345	2,834,472	56°49'41.26"	132°55'31.06"
2	1,826,283	2,836,679	56°49'50.27"	132°54'51.21"
3	1,825,051	2,837,203	56°49'38.07"	132°54'42.03"
4	1,824,112	2,834,996	56°49'29.05"	132°55'21.89"

8.4.2 Specific Criteria (40 CFR 228.6(a), quoted in whole)

(1) "Geographical position, depth of water, bottom topography and distance from coast."

The disposal area is in the shape of a rectangle, generally oriented in the cardinal directions (Table 43). The X-axis is approximately ½ mile long and follows a 66° heading and the Y-axis extends for about 1/4 mile along a 155° heading. The western end of the disposal area is the shallowest, but still quite deep at 79 fathoms. Depth increases gradually to 86 fathoms at the eastern edge of the area. In relation to the northeastern coast of Mitkof Island, the most proximal location of the disposal area is about 1 mile away and the most distal point is approximately 1 ½ mile away (Figure 28; Table 43). The FSDS is a flat area of the seafloor with fine-grained (silts and clays) surficial sediments.

Table 43. Frederick Sound Disposal Site Coordinates.

Frederick Sound Disposal Site Coordinates				
Corner	AK State Plane (Zone 1)		Geographic	
	Northing	Easting	Latitude NAD83	Longitude NAD83
Northwest	1,827,689.51	2,837,094.28	56°50'9.095"	132°54'42.763"
Southwest	1,825,584.91	2,836,019.11	56°49'48.655"	132°55'2.214"
Northeast	1,827,106.17	2,838,272.40	56°50'3.401	132°54'21.408
Southeast	1,824,990.13	2,837,220.10	56°49'42.664"	132°54'40.744"

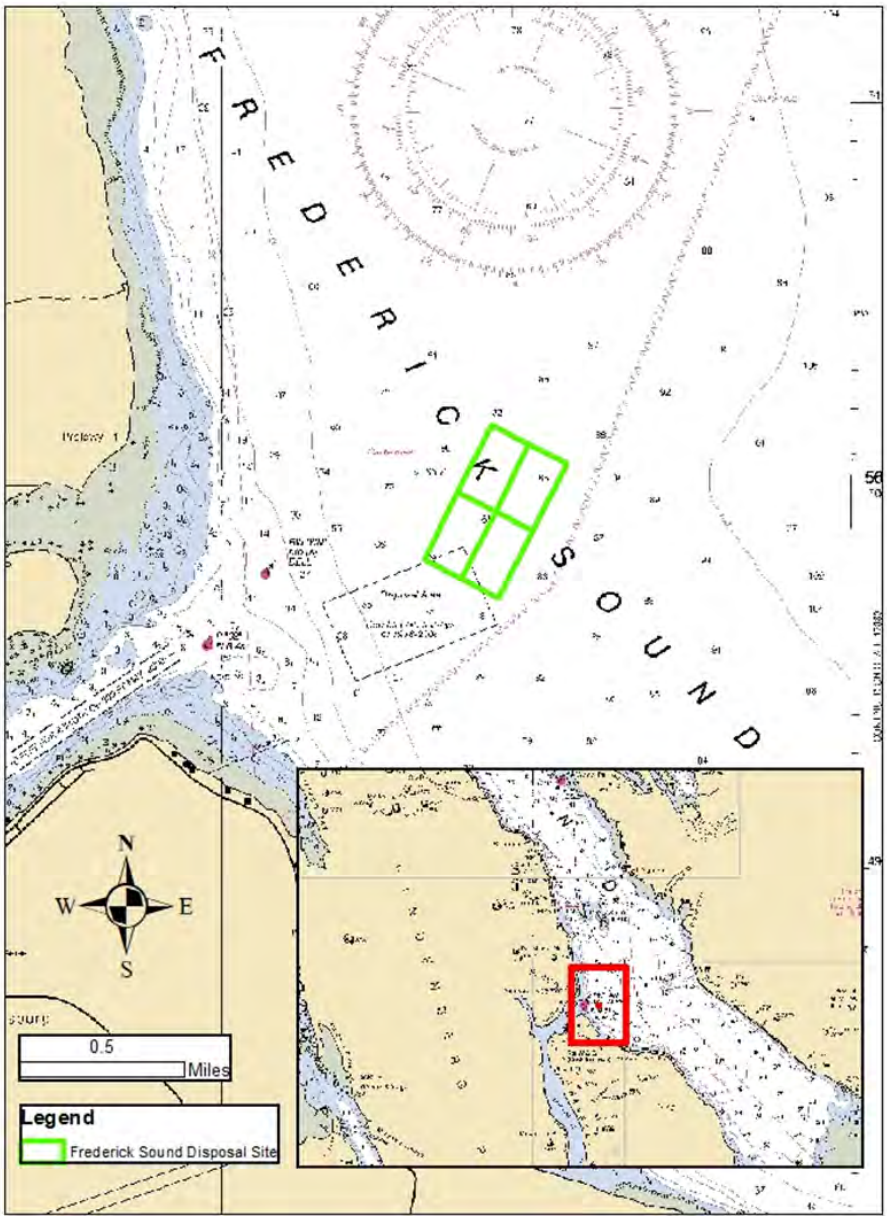

Figure 28. Frederick Sound Disposal Site Related to the Coast of Mitkof Island.

(2) "Location in relation to breeding, spawning, nursery, feeding, or passage areas of living resources in adult or juvenile phases."

The FSDS is about one mile offshore of Mitkof Island in Frederick Sound, part of Alaska's Inside Passage. Species characteristic of the Gulf of Alaska make up the marine community. Marine pelagic communities of zooplankton (e.g., copepods, euphausiids, ctenophors, and chaetognaths), meroplankton (fish and invertebrate larvae), forage species, and pelagic predators have coast-wide distribution and generally display seasonal changes in abundance. Benthic epifaunal communities present in the FSDS are dominated by pandalid shrimp and Tanner crab.

The USACE AK District Environmental Resources Section evaluated the proposed dredged material disposal project's impacts on EFH and determined the project was not likely to adversely affect EFH (USACE 2018). The potential impacts to EFH and Federally managed fish species/species complexes are likely to be highly localized, temporary, and minor, and not reduce the overall value of EFH in Frederick Sound. The NMFS Habitat Conservation Division (HCD) concurred with the USACE EFH determination on 7 February, 2019 via official correspondence (NMFS 2019).

Pandalid shrimp, specifically spot shrimp (Pandalus platyceros) were a commonly observed animal in the Alaska District's biological surveys; they were captured consistently on film and very commonly in pot surveys. Spot shrimp are protandric hermaphrodites; meaning they begin their lives as males and change sex to female as they grow, usually around 2-3 years old. Spot shrimp in Alaska can live as long as 11 years, spawn once as males around 2-3 years old, before changing sex and spawning multiple times as females for the remainder of their life. The preliminary camera survey indicates spot shrimp have a patchy distribution on the local scale, with relative densities ranging wildly for no discernible reason (Figure 29). There is some beam trawling activity in the shallow waters on the north end of Mitkof Island, but these fishermen target pink shrimp rather than spot shrimp.

The Tanner crab fishery is an important economic resource in Southeastern Alaska and is managed by the ADFG. Tanner crabs are much less abundant than spot shrimp in all of the areas surveyed by the Alaska District; but were assigned a higher conservation priority due to the greater economic significance, lower relative abundance, longer life span, and later relative age of sexual maturity. FSDS Tanner crab abundance in the Alaska District's biological surveys was significantly lower than any of the other study locations in November (19 crab total) and between the previous disposal site and alternate disposal site 2 in February (Figure 30). Catchability in all sampling locations is believed to improve in February, which is coincidental with the commercial Tanner crab season. The District assumes that improved catchability had a deleterious impact on the proportion of legal crab sampled in February due to the impacts of the commercial Tanner crab season immediately preceding the sampling trip. The ADFG administers a Tanner crab fishery every February, as long as census data indicates sustainable populations. Female Tanner crabs reach sexual maturity in about five years and males in about six years, living a maximum of about 14 years.

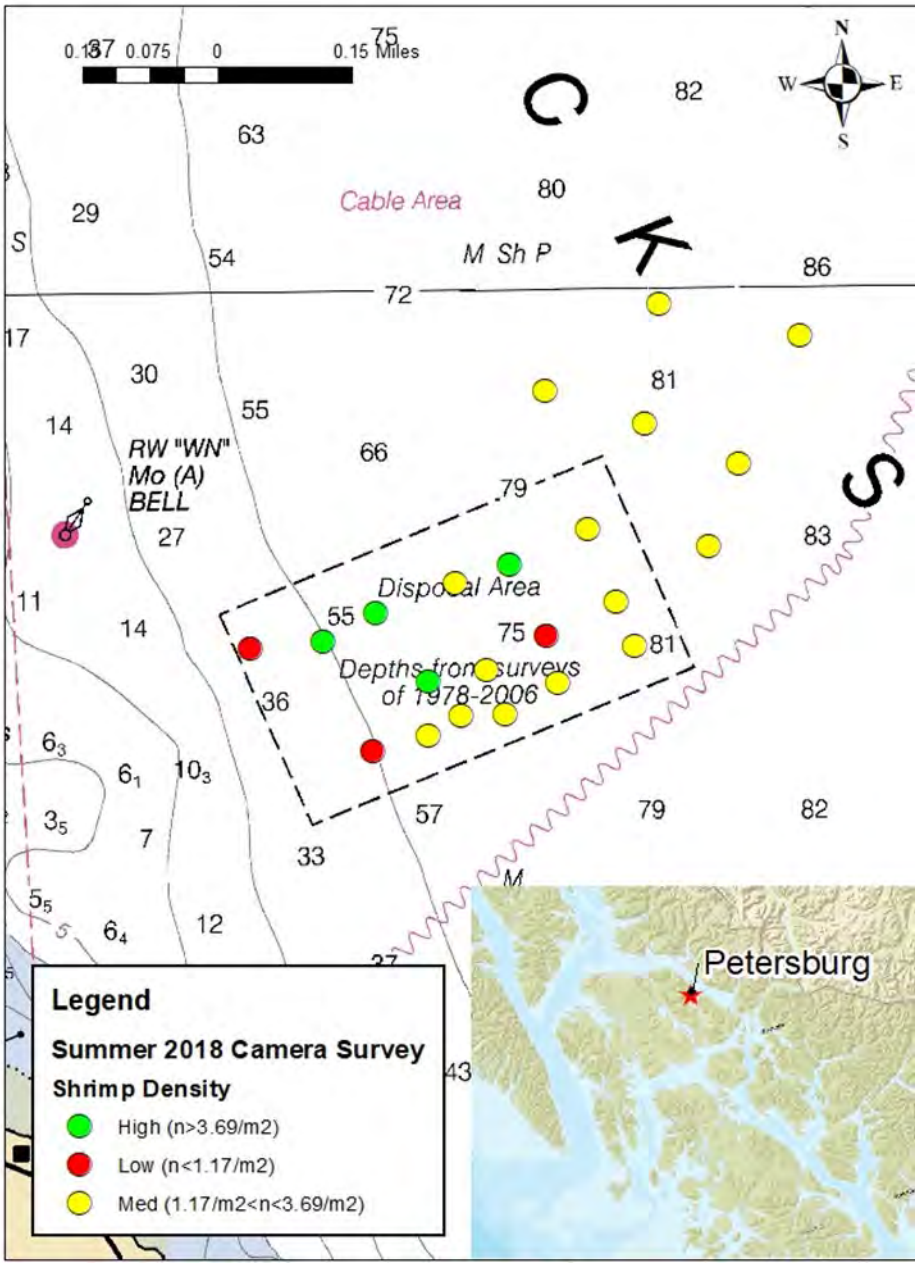

Figure 29. Relative Shrimp Density in August 2018.

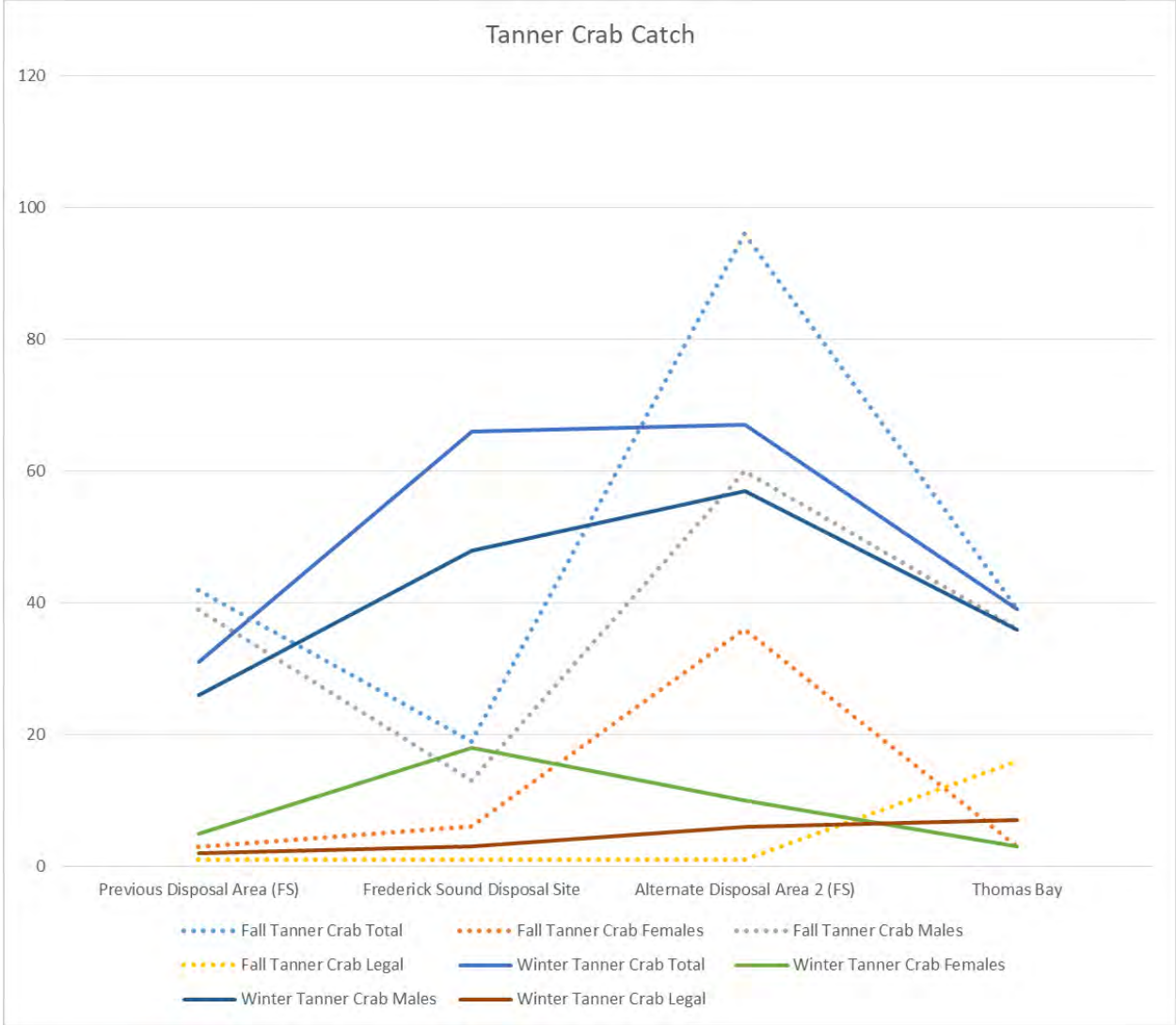

Figure 30. Tanner crab catch in the Alaska District's November (fall) and February (winter) surveys.

Spawning. The proposed site supports a variety of pelagic and demersal fish species and epibenthic invertebrates including crabs and shrimp. Many of these species have a reproductive strategy that includes releasing a large quantity of eggs so that some individuals would survive the substantial mortality common to the species during the larval and juvenile stages. The alteration of the seafloor at the proposed site from the placement of dredged material may temporarily impact resource spawning, however effects would be short-term and localized. Additionally, resource spawning is not exclusive to the proposed site and occur within the entire Zone of Siting Feasibility (ZSF) as well as outside the ZSF. The ZSF is the geographical are that was considered for the selection of an Ocean Disposal site considering the criteria of the Federal Standard. The portion of Frederick Sound between Petersburg and Thomas Bay is considered the ZSF. The FSDS has the lowest productivity of the three Frederick Sound survey areas evaluated in this study. The region of Frederick Sound that was identified

in the ZSF is lower relative productivity than many nearby areas, as indicated in the January 2019 letter from the ADFG stating, “sites in Frederick Sound near Petersburg lie within statistical area 108-60, which historically has exhibited much lower commercial Tanner crab effort and harvest” (ADFG 2019). The letter from ADFG is attached to this study and includes Tanner crab harvest, number of permits, and number of landings data.

Passage Areas. Various anadromous resources (e.g., Pacific salmon) that utilize the rivers and watersheds of Mitkof Island and land surrounding the Inside Passage may pass over the proposed disposal site. Placement of dredged material at the site is not anticipated to interfere with fish passage or adversely affect habitat used by transiting resources.

Nursery Areas. The proposed FSDS is a flat expanse of fine-grained sediments in 474-510 feet of water. This type of habitat is not generally noted as preferred nursery habitat for Gulf of Alaska species. The placement of dredged material has the potential to increase the complexity of the relatively featureless expanse of the Frederick Sound seabed and improving the quality of the nursery habitat through additional refugia. Therefore, no significant negative effects to nursery areas are expected from the selection of FSDS as an ODMDS.

Feeding. The proposed disposal site is not known to congregate organisms because of food resources. The sediment samples collected in November 2018 contained no biological resources and the samples from alternative disposal locations in the general vicinity contained only two nut clams and a mud star. However, the epibenthic and demersal region does provide prey items (ctenophors, amphipods, chaetognaths, copepods, shrimp, etc.) that are consumed by bottom-feeding fish, shrimp, crab, and other epibenthic and demersal organisms.

In summary, the proposed FSDS contains these resources, however the site does not provide unique breeding, spawning, nursery, feeding, or passage habitat. The results of the Alaska District’s biological survey confirm the FSDS is less biologically productive, when using the abundance of shrimp and crabs as the primary quantifying metric, than nearby areas. Additionally, the habitat for the species that inhabit the FSDS is not geographically limited to the ZSF and the disposal of dredged material occurs for discrete periods of time over a discrete spatial area. Thus, the temporary effects to the habitat at the site is not likely to translate into significant effects at a population or species level.

(3) *“Location in relation to beaches and other amenity areas*.”

Beaches in Alaska are not subject to the same usage type and intensities as beaches in many other regions due to the consistently low water temperature, but they can still serve as recreational areas for picnics, surfing, beachcombing, etc. FSDS is located approximately 2 miles off the nearest beaches in Petersburg, which is sufficiently offshore that there should be no effects at any of the beaches. In addition, the

topography of the disposal site, a deep flat depositional area of the seafloor, ensures that most of the material placed at the site would remain at the site and that any effects are limited to the immediate area of the FSDS.

(4) "Types and quantities of wastes proposed to be disposed of, and proposed methods of release, including methods of packing the waste, if any."

The material to be disposed of with this project consists of approximately 82,000 cubic yards of sandy silty clay, sandy silt, silty sand, poorly graded sand with silt, and poorly graded sand with gravel from the Petersburg South Harbor. The material has been chemically tested and geotechnically assessed and found to be suitable for unconfined open water disposal in accordance with the SEF. The harbor would be excavated to project depth in each of the four dredge units using a barge mounted excavator. The use of a mechanical dredge is required due to the consolidated nature of the sediment in the South Harbor. The excavator would place the sediment directly onto a waiting scow for disposal. When the scow reaches nominal capacity, it would be towed to the FSDS for unconfined ocean placement, likely through the use of a bottom dump.

(5) "Feasibility of surveillance and monitoring."

Surveillance and monitoring has already been demonstrated to be feasible by the efficient execution of the biological sampling to support this site selection analysis. The Alaska District would conduct a monitoring event immediately post construction, one year after construction, and five years after construction. The monitoring would consist of bathymetric surveys, pot fishing, and camera surveys to document the alterations and recolonization of the affected area.

(6) "Dispersal, horizontal transport and vertical mixing characteristics of the area, including prevailing current direction and velocity, if any."

Water circulation in the vicinity of FSDS is strongly influenced by the ebb and flood currents from the Wrangell Narrows. The FSDS is located approximately one mile off the northeastern coast of Mitkof Island in an area subject to powerful semi-diurnal tidal currents. The most proximal tidal data station is a subordinate station at Prolewy Rocks in the mouth of Wrangell Narrows, about 1.5 miles away from the FSDS. Prolewy Rocks currents regularly exceed five knots on both flood and ebb tides (Figure 31). Tidal currents progressively weaken as the distance from the constriction in Wrangell Narrows increases, but anecdotal observations from the biological sampling events in support of this site selection confirm the presence of very strong currents over the FSDS. Positioning the survey vessel over the pot fishing, camera survey, and sediment collection coordinates during flood and ebb tides was very challenging due to tidal velocity.

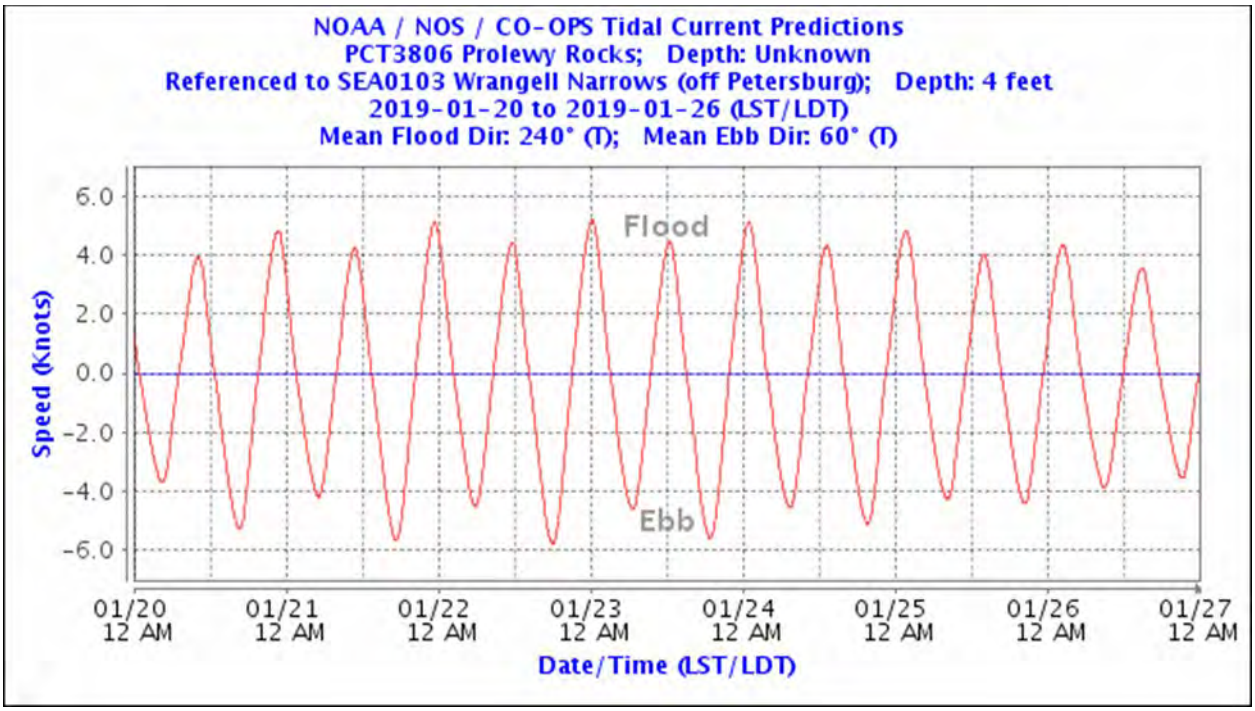

Figure 31. Prolewy Rocks Subordinate Tidal Current Predictions for the Week of 20-27 January, 2019.

The Alaska District collected salinity and temperature data in the upper 100 meters of the water column during the biological sampling events. In general, salinity near the surface was lower than salinity of deeper water. Salinity in November 2018 increased from 29.5 practical salinity units at the surface to 31.7 PSU at 83 meters below the surface. The majority of the salinity increase was realized in the upper 10 percent of the water column sampled, going from 29.5 PSU at the surface to over 31 PSU at 7.6 meters. The portion of the water column between 7.6 meters and 83.3 meters only increased by 0.7 PSU. The temperature profile of the FSDS was also very homogeneous, featuring a standard deviation of 0.056°C in the 83.3 meters of water column sampled. The mean temperature was 6.98°C and the range of temperature values was only 0.25°C. These data indicate a well-mixed water column as a result of current effects (Figure 32).

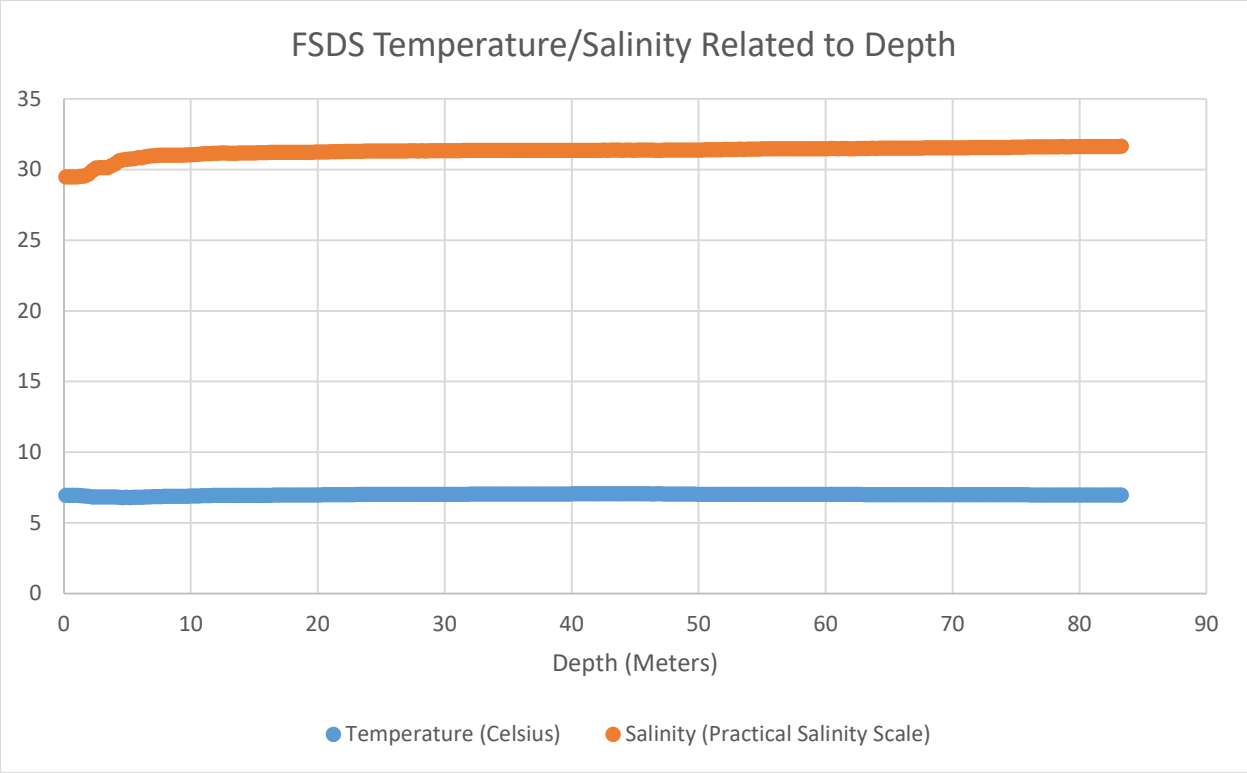

Figure 32. FSDS Temperature/Salinity Related to Depth.

Given the demonstrated mixing of the water column in the FSDS and the distance from the shoreline of Mitkof Island, any temporary perturbations in water quality as a result of the disposal would have dissipated long before reaching any beach or shoreline. There are no marine sanctuaries or geographically limited fisheries or shellfisheries near the FSDS. Comments received during scoping indicate the area is not fished commercially or recreationally. The FSDS's proximity to Petersburg, coupled with the 100+ year history as a commercial fishing hub, suggest that if significant fishery resources were present in the FSDS, they would have been discovered long ago and a fishery would be established.

(7) "Existence and effects of current and previous discharges and dumping in the area (including cumulative effects)."

USACE dredging and disposal records show that the previous disposal area proximal to the FSDS was used multiple times for the placement of dredged material from Petersburg harbor dredging projects ad Wrangell Narrows dredging project. Anecdotal accounts from Petersburg residents also describe the disposal of materials other than dredged sediments; including derelict vessels. USACE encountered two such derelict vessels on the seabed during the August 2018 camera surveys, nearly losing the camera in the process.

Analysis of the bathymetric surveys of the previous disposal site revealed a subsea slope failure within the bounds of the previous disposal site (Figure 33). This may have been a result of previous disposal operations, seismic activity, or other phenomena.

Camera surveys in support of the site selection study recorded sporadic occurrences of clay masses protruding from the generally featureless seabed; these may be relicts of previous disposal activities. The clay masses provide more structure than the surrounding areas, attracting shrimp and other animals.

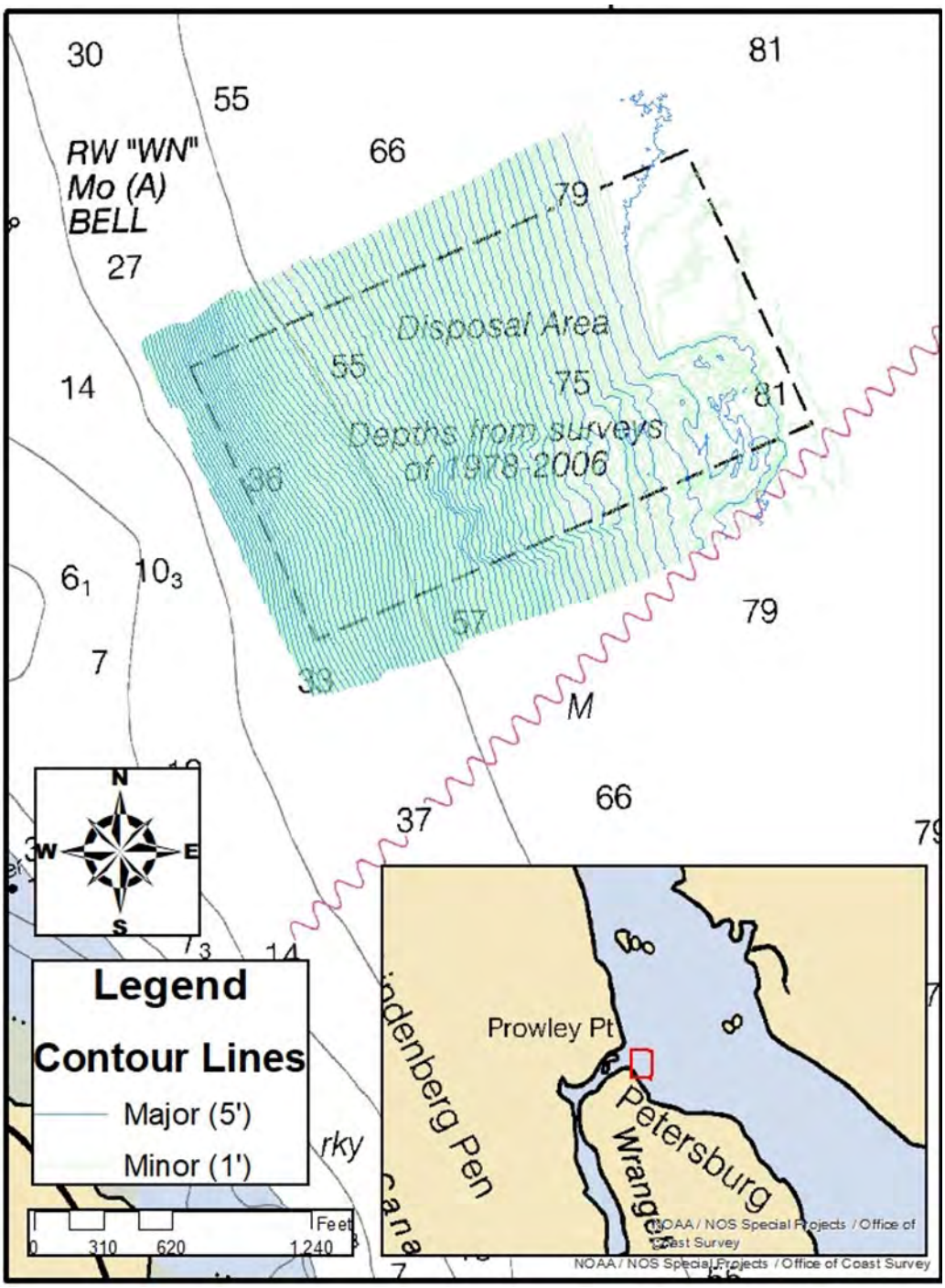

Figure 33. Bathymetric Survey Depicting the Subsea Slope Failure within the Previous Disposal Area.

(8) "Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance and other legitimate uses of the ocean."

Shipping. The USACE does not anticipate conflicts with commercial navigation at the FSDS. In a personal communication on 19 November 2018 between Mr. Matt Ferguson of the USACE-POA and Lt. Bart Buesseler of the National Marine Fisheries Service (NMFS), Navigation Management Branch, USACE-POA discussed the proposed FSDS disposal site location and its anticipated use with respect to navigation transit impacts. The USACE stated that for the Petersburg South Harbor dredging project about three disposal trips per day were anticipated during the winter construction window. Lt. Buesseler indicated that vessels transiting the Wrangell Narrows and Inside Passage follow a route west of the Sukoi Islets. Vessels approaching or departing Wrangell Narrows do cross the general area of the FSDS disposal site, but the majority of vessel traffic, as recorded by AIS, avoid the FSDS.

Conflicts between dredge disposal operations and shipping can be avoided by adequate notice to mariners of disposal activities and frequent marine communication between the disposal tugs and the Petersburg Harbormaster.

Commercial and Recreational Fishing. Commercial fishing in the vicinity of the proposed FSDS includes beam trawling, pot fishing, gill netting, and long lining. These activities are not exclusive to the site and occur within the entire Gulf of Alaska. Fishing efforts in the FSDS are so low they can be assumed nonexistent; the Petersburg Vessel Owner's Association reported that none of their members fished the area and the consensus gathered during site selection scoping was that the FSDS would be a good area for an unsuccessful fishing effort. The ADFG responded to queries regarding commercial fishing over the FSDS by stating that "marine disposal area and adjacent sites in Frederick Sound near Petersburg lie within statistical area 108-60, which historically has exhibited much lower commercial Tanner crab effort and harvest."

Only two years out of the 10 year period analysis reported over three permits fished in the entire statistical area 108-60, a section of Frederick Sound about 15 miles long extending from the mouth of Thomas Bay to Frederick Point and enclosing about 43,000 acres. Effort and harvest data is considered to be confidential if fewer than three permits were fished; the fact that only one of the 10 years in the period of analysis exceeded three permits is corroboration of a very low level of effort. One of the years (2013/2014) received no effort, eight of the years were fished by one or two permit holders, and one year was fished by three permit holders. The total reportable harvest during the 10 year period of analysis was 7,456 pounds (Table 44). This is compared to the same dataset from statistical area 110-12; which is the statistical area enclosing Thomas Bay and consisting of about 17,000 acres about 16 miles north of Petersburg (Table 45). Statistical area 110-12 was fished by at least three permit holders 9 of the 10 years during the period of analysis with an average harvest of 40,798 pounds and a cumulative harvest of 367,185 pounds. That is approximately 50 times more crab harvest by mass from an area less than half the size of statistical area 110-12.

Cumulative total harvest for statistical area 108-60, including confidential data, for the period between the 2008-2009 season and the 2017-2018 season was 46,476 pounds. The cumulative total for statistical area 110-12 during the same period was 379,913 pounds (Stratman 2019).

Table 44. Commercial Tanner Crab Harvest, Number of Permits, and Number of Landings in the Frederick Sound District 8 Closest to the Community of Petersburg (Statistical Area 108-60), 2008/2009 through 2017/2018 seasons.

Season	Harvest (lb)	Number of permits	Landings
2008/2009	*	*	*
2009/2010	*	*	*
2010/2011	*	*	*
2011/2012	*	*	*
2012/2013	*	*	*
2013/2014	0	0	0
2014/2015	7,456	3	3
2015/2016	*	*	*
2016/2017	*	*	*
2017/2018	*	*	*
Average	4,648	1	2

* Confidential data (fewer than three permits fished).

Table 45. Commercial Tanner crab harvest, number of permits, and number of landings in Thomas Bay (Statistical Area 110-12), 2008/2009 through 2017/2018 seasons.

Season	Harvest (lb)	Number of permits	Landings
2008/2009	49,319	3	5
2009/2010	31,998	7	10
2010/2011	36,224	5	7
2011/2012	58,819	5	8
2012/2013	59,873	4	7
2013/2014	29,671	3	3
2014/2015	*	*	*
2015/2016	59,357	8	12
2016/2017	19,656	4	6
2017/2018	22,268	3	7
Average**	40,798	5	7

* Confidential data (fewer than three permits fished).
** Average doesn't include the 2014/2015 season.

Recreational pot fishing for spot shrimp is concentrated along the Horn Cliffs, across Frederick Sound from Mitkof Island. The mouth of Thomas Bay to the north of the FSDS is a popular area from recreational and commercial Chinook salmon trolling and the areas surrounding Sukoi Islets receive significant halibut effort from recreational fisherman. None of the Petersburg residents interviewed during the site selection study indicated interest in recreational fishing over the FSDS.

Recreation. The waters in the vicinity of the FSDS offer very little marine related recreation opportunities such as recreational boating, whale watching, and fishing. Empirical and anecdotal data demonstrates a very low level of fishing effort is directed towards the FSDS. The turbulent hydrodynamic environment above the FSDS is not conducive to drifting; vessels in the vicinity are generally underway from one point to another. Given the discrete spatial and temporal components of dredge material placement, it is unlikely that any interference would occur with these activities.

Mineral Extraction. There are no known mineral extraction operations or proposed operations in the vicinity of the proposed disposal site. The disposal site is not expected to interfere with any future offshore mining or oil/gas exploration or extraction.

Desalination. There are no desalination plants in the area of the FSDS.

Fish and Shellfish Culture. There are no commercial fish aquaculture or shellfish aquaculture operations that would be impacted by use of the proposed FSDS. The

Crystal Lake Hatchery operated by the Southern Southeast Regional Aquaculture Association (SSRAA) releases 600,000 Chinook salmon smolt annually in Blind Slough, approximately 18 miles south of Petersburg and 20 miles south of the FSDS. The chinook return as adults between four and seven years later and can produce a sport fish harvest of more than 4,000 fish. Some of these fish undoubtedly pass through the FSDS on their way to or from the Gulf of Alaska, North Pacific, or Bering Sea for growth to maturity and return for spawning. Some fish also may establish a resident population in Frederick Sound. The placement of dredged material may temporarily impact chinook salmon forage base in a limited spatial distribution.

A chum salmon remote release site in Thomas Bay was established by the Northern Southeast Regional Aquaculture Association (NSRAA) in 2017 and has released smolt each year since 2017. The mouth of Thomas Bay is about 16 miles north of the FSDS and the remote release site is about six miles into the bay, in the southern lobe. The 2019 return is expected to net 10,000 adult chum salmon for the commercial fishery. These fish are less likely to transit the FSDS due to its location with respect to the release site, but still may utilize some forage base in Frederick Sound on their way to the open ocean.

The selection of the Frederick Sound Disposal Site is not expected to have a measureable impact on fin-fish or shellfish aquaculture.

Areas of Special Scientific Importance. There are no known oceanographic research efforts directly within the area of the FSDS.

(9) "The existing water quality and ecology of the site as determined by available data or by trend assessment or baseline surveys."

Water and sediment quality analyses conducted in conjunction with past disposal actions in the Frederick Sound region have not identified any adverse water quality impacts from ocean disposal of dredged material. The ecology of the proposed FSDS is a fine-grained bottom community. This determination is based mainly on fisheries and benthic data. Neither the pelagic or benthic communities should sustain long-term adverse effects because of their resilience to episodic disturbance and the substantially similar nature of the seabed and dredged material.

(10) "Potentiality for the development or recruitment of nuisance species in the disposal site."

There is no evidence that the disposal of dredged material at FSDS would lead to the development or recruitment of nuisance species. The USFWS was consulted in November 2018 regarding the potentiality to unintentionally introduce or allow the establishment of invasive species. The USFWS responded:

"The U.S. Fish and Wildlife Service has management authority for the conservation of a variety of trust resources and their habitats including migratory

birds, inter-jurisdictional fish, and threatened and endangered species. Invasive species have the potential to negatively affect our ability to conserve these resources. There are no invasive species of concern that come to mind with a dredging project that occurs entirely within the marine environment near Petersburg, Alaska. Particularly one that does not include an upland component or that does not have transport or use of earth moving equipment. Although several terrestrial invasive species of concern occur in the Petersburg area (as identified through Alaska Exotic Plant Information Clearinghouse), the project description does not include movements of equipment or machinery from one terrestrial environment to another over water to suggest actions associated with the project may affect terrestrial invasive species spread. Given the lack of identified invasive species of concern occurring within the marine environment of the project area, the Service has no concern on the spread of invasive species within the marine environment."

Given the extreme variance in the water depth in the Petersburg South Harbor and the FSDS, it is unlikely that organisms incidentally entrained during dredging operations would be adapted for life in the disposal area due to the differences in pressure, temperature, and light regime.

(11) "Existence at or in close proximity to the site of any significant natural or cultural features of historical importance."

The FSDS has been screened for cultural resources using the AHRS, BOEM shipwreck database, and NOAA shipwreck database. Cultural resources reported within the general vicinity of the potential Frederick Sound in-water disposal APE include both precontact and historic resources located along the shores of Frederick Sound on Mitkof Island (Table 16). None of the identified resources fall within the disposal APE. No cultural or historic resources are expected to be impacted by the placement of dredged material in the FSDS. Reasonably foreseeable future actions within and adjacent to the developed project area are subject to review and approval by the SHPO, and would be anticipated to have minor impacts, if any, on cultural resources.

8.5 Site Management Plan

MPRSA Section 103(b) requires that the criteria and factors identified above are used in a manner consistent with their application pursuant to Section 102(c). Section 102(c)(3) requires the Administrator of USEPA to develop a site management plan for each site designated pursuant to Section 102. The selection of alternative sites by the District Engineer under Section 103 does not require the development of a site management plan due to the limited temporal duration of the authorized disposal. Although selection of FSDS as an alternate site in this action does not require development of such a plan, the FSDS would be monitored in order to document the impacts of dredged material disposal in ocean waters. The data collected during the monitoring period would be used to inform future decisions regarding the suitability of disposal sites and any applicable extensions to the alternate site selection that may be warranted by future work in the vicinity of the disposal area. In accordance with Section 103(b), disposal at

the alternative site shall be limited to a period not to exceed five years unless the site is designated by the USEPA or the District Engineer determines there is a bona fide need for authorizing the site for another period not to exceed five additional years and the USEPA Regional Administrator determines the extension does not pose an unacceptable risk to human health, aquatic resources, or the environment.

The specification of disposal coordinates are the means of directing disposal at FSDS. The disposal would be specified to occur at the center of the FSDS; latitude 56.832216 and longitude –132.911594. The disposal coordinates restricts the spatial extent of disposal impacts and affords a limited burial impact within the bounds of the FSDS where active disposal is occurring. A single disposal point allows for the best control of disposal release. The disposal point can be moved as capacity in a particular region of the disposal site is approached.

Quality control for disposal of dredged material at FSDS is ensured though USACE regulations regarding disposal of dredged materials for federal projects. The approval of transportation of dredged material for disposal at FSDS by the USACE is conducted under the authorities of Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972. Only that material shown through appropriate sediment, chemical, and biological testing, as needed, to be suitable for unconfined disposal at FSDS is allowed to be disposed of at FSDS.

On May 10, 2019 the Alaska Department of Environmental Conservation certified there is reasonable assurance that the Petersburg Navigation Improvement project, as well as any discharge which may result, will comply with applicable provisions of Section 401 of the CWA and the Alaska Water Quality Standards, 18 AAC 70, provided that the following additional measures are adhered to.

(1) Reasonable precautions and controls must be used to prevent incidental and accidental discharge of petroleum products or other hazardous substances. Fuel storage and handling activities for equipment must be sited and conducted so there is no petroleum contamination of the ground, subsurface, or surface waterbodies.

(2) During construction, spill response equipment and supplies such as sorbent pads shall be available and used immediately to contain and cleanup oil, fuel, hydraulic fluid, antifreeze, or other pollutant spills. Any spill amount must be reported in accordance with Discharge Notification and Reporting Requirements (AS 46.03.755 and 18 AAC 75 Article 3). The applicant must contact by telephone the DEC Area Response Team for Southeast Alaska (907) 465-5340 during work hours or 1-800-478-9300 after hours. Also, the applicant must contact by telephone the National Response Center at 1-800-424-8802.

(3) All dredging shall be conducted so as to minimize the amount of dredge material and suspended sediments that enter South Harbor and Frederick Sound. Appropriate Best Management Practices (BMPs) will be employed to minimize

sediment loss and turbidity generation during dredging. BMPs may include, but are not limited to, the following:

- Eliminating multiple bites while the bucket is on the seafloor
- No stockpiling of dredged material on the seafloor
- No seafloor leveling
- Slowing the velocity of the ascending loaded dredge bucket through the water column
- Pausing the dredge bucket near the bottom while descending and near the water line while ascending
- Placing filter material over the barge scuppers to clear return water
- If dewatering runoff is discharged from the barge, silts must be removed prior to direct or indirect discharge to South Harbor and Frederick Sound.

The FSDS would be subject to preconstruction surveys of the bathymetry, sediment chemistry, and epibenthic community composition in order to establish an environmental baseline. The same surveys would be performed one year after construction and five years after construction in order to document the effects of dredged material placement. A schedule for review and revision of a site management plan is not necessary in this case as no site management plan is required in a Section 103(b) alternate site selection. Furthermore, this selection is limited in time to the duration of the Petersburg South Harbor Navigation Improvement dredging project, and because the future use of FSDS would be evaluated on a case-by-case basis.

A reference area would also be subjected to the same battery of surveys as the FSDS in order to quantify any deviations from undisturbed conditions across the same temporal period. The reference site would be selected from the suite of alternative disposal sites evaluated during the site selection study in order to present the most complete dataset available for comparison. The reference site would be an area of similar topography, substrate consistency, and benthic community in the geographic vicinity of the FSDS.

The FSDS would be used for the disposal of dredged material associated with the Petersburg Navigation Improvement project. The Alaska District has no intention to use the FSDS for the disposal of dredged material from any other projects, or to authorize others to use the FSDS for the disposal of dredged material not characterized and included in the ODA Criteria Analysis found in Section 8 of this report. In accordance with the temporal limits of the District Engineer’s alternative site selection, the FSDS would be authorized for disposal of dredged materials for five years. The site could be authorized for an additional five years if needed and the extension was evaluated and additional disposal was determined to be necessary and not present unacceptable environmental consequences.

8.6 Determination

The Alaska District has applied the Ocean Dumping Criteria and determined that the FSDS is the Federal Standard for dredged material disposal as the least costly, environmentally acceptable alternative with sound engineering practices. The harbor

sediments were subjected to chemical and geotechnical analysis in order to determine their suitability for a suite of placement options. Ocean disposal was selected as the Federal Standard due to the chemical and physical compatibility of the sediments with the FSDS. The USACE Manual on Navigation and Dredging Operations and Maintenance (ER 1130-2-520) states that:

> "It is the policy of the Corps of Engineers that dredging shall be accomplished in an efficient, cost-effective, and environmentally acceptable manner to improve and maintain the Nation's waterways and make them suitable for navigation and other purposes consistent with Federal laws and regulations."

The harbor sediments do not contain chemicals of concern exceeding the screening levels contained in the Pacific Northwest Sediment Evaluation Framework (SEF 2016). The physical properties of the dredged material are substantially similar to those of the disposal site; the dredged sediments and surficial material of the FSDS seabed are primarily inorganic silt and clay sized particles. The selection of the FSDS for the disposal of the entire volume of dredged material from the Petersburg Navigation Improvement project complies with the Ocean Dumping Act.

9. ENVIRONMENTAL CONSEQUENCES*

9.1 Physical Environment

The environmental consequences are explained below for Alternative 2 and Alternative 3 (the recommended plan).

9.1.1 Air Quality

9.1.1.1 No-Action Alternative

Under the No-Action Alternative, air quality would remain as in the Future Without-Project Condition. No new permanent or temporary impacts to air quality would be realized as a result of the project and air quality would remain "good"; as indicated by the most proximal air quality monitor, located in Juneau. Air quality would persist as described in the Affected Environment Section 3.1.2 Air Quality.

9.1.1.2 Alternative 2: Non-Structural Reorganization of Petersburg Harbor System

The nonstructural reorganization of the Petersburg harbor system would result in slight elevations of air emissions during the reorganization from the increased vessel traffic. This increase in emissions would be temporary and minor.

9.1.1.3 Alternative 3: South Harbor Dredging Only

Dredging. The dredging would not take place in a Clean Air Act designated non-attainment area for criteria pollutants and would only represent a minor, temporary elevation in air pollutant emissions associated with the operation of the dredge in the Harbor area for the period of construction. The proposed dredging action would not

increase airborne particulate matter in the project area above acceptable threshold levels. Operation of dredging machinery and other equipment would cause a minor, temporary increase in air emissions because of exhaust, which would cease once dredging is completed. There also would be localized increases in noise levels from dredging, barging, and offloading of the material. Noise levels would not likely be noticeable over ambient conditions at either the dredging or offloading sites as both are adjacent to or near industrial areas, port facilities, boat operations, and other sources of noise and artificial light

Disposal. The disposal of dredged material in Frederick Sound would not take place in a designated non-attainment area for criterion pollutants. The operation of the tug towing the barge to and returning from the disposal area would represent only a minor, temporary elevation in air pollutant emissions for the period of construction. The emissions released by the tug would be virtually indistinguishable from the emissions released by the commercial barge traffic transiting the Inside Passage.

9.1.2 Water Quality and Circulation Patterns

9.1.2.1 No-Action Alternative

Under the No-Action Alternative, water quality and circulation patterns would remain as in the Future Without Project Condition. No new permanent or temporary impacts to water quality or circulation patterns in the Harbor or disposal area would be realized as a result of the project. Water quality and circulation patterns would persist as described in the Affected Environment Section 3.1.6 Water Quality.

9.1.2.2 Alternative 2: Non-Structural Reorganization of Petersburg Harbor System

A nonstructural float reorganization would not impact circulation patterns and would not have a measurable impact on water quality. The reorganization would require the movement of vessels in the Harbor area and transit between the North, Middle, and South Harbors; but this would most resemble a continuation of the normal fishing season vessel traffic. The same vessels that normally make use of the Petersburg harbor system would be reassigned to slips appropriate for their draft requirements. Fuel and oil spills are always a possibility during the operation of vessels under power, but the float reorganization alternative would not recruit any additional hazardous materials or create any circumstances with a greater likelihood of spills than normal harbor operations.

9.1.2.3 Alternative 3: South Harbor Dredging Only

Dredging. The discharge site (South Harbor basin) is the same site from which the sediment is being dredged, so sediments settling out within the harbor should be essentially the same as the existing substrate. The strong tidal currents of Wrangell Narrows flow nearly unimpeded through the Petersburg harbor system. The sediment suspended in the water column by dredging would be dispersed widely and rapidly, and would not be expected to accumulate in any way that would affect water circulation, tidal

fluctuations, or salinity. Due to dispersal by the strong currents, the re-suspended sediments should settle out in a thin layer, and not significantly alter the existing topography. Chemical concentrations in the dredged material are not sufficiently elevated to cause water quality impacts during dredging in the harbor.

Disposal. Three sites near the existing Frederick Sound disposal area were investigated by the Alaska District in order to determine physical and biological compatibility. Comparative sampling is being conducted at four locations in the head of Thomas Bay in order to contrast the potential impacts to a different habitat type. The FSDS was selected from the suite of alternative sites as the most optimal disposal location based on the analysis described in Section 8.

Thomas Bay substrate is dominated by fine grained sediment released by glacial meltwater entering the Bay. According to the NOAA Nautical Chart's "Nature of the Substrate", the bottom of Thomas Bay includes areas of mud and sand. High suspended sediment load contributes to a silty surface as the glacial alluvium settles out of the water column. The Alaska District collected hours of video (Figure 34) and collected sediment from the bottom of Thomas Bay during the site selection study, confirming the assumptions based on remote sensing, literature review, and aerial photography interpretation that silt is the dominant component of the sediment matrix.

Thomas Bay is fairly confined by the headlands and shallow moraine across the mouth of the bay. Aerial photography interpretation indicates little water circulation between the water of upper Thomas Bay and that of Frederick Sound. Alaska Department of Fish and Game stock reports in Thomas Bay depict a low salinity (10-27 psu) lens on the surface and extending to about 20 meters, below which the salinity abruptly increases to about 30 psu, where it begins trending upwards to a maximum of about 33 psu at 250 meters. The water temperature in the near surface lens is about 7.5 degrees Celsius until a depth of 20 meters, where it increases to over 8 degrees Celsius before trending down to 5 degrees Celsius at 250 meters.

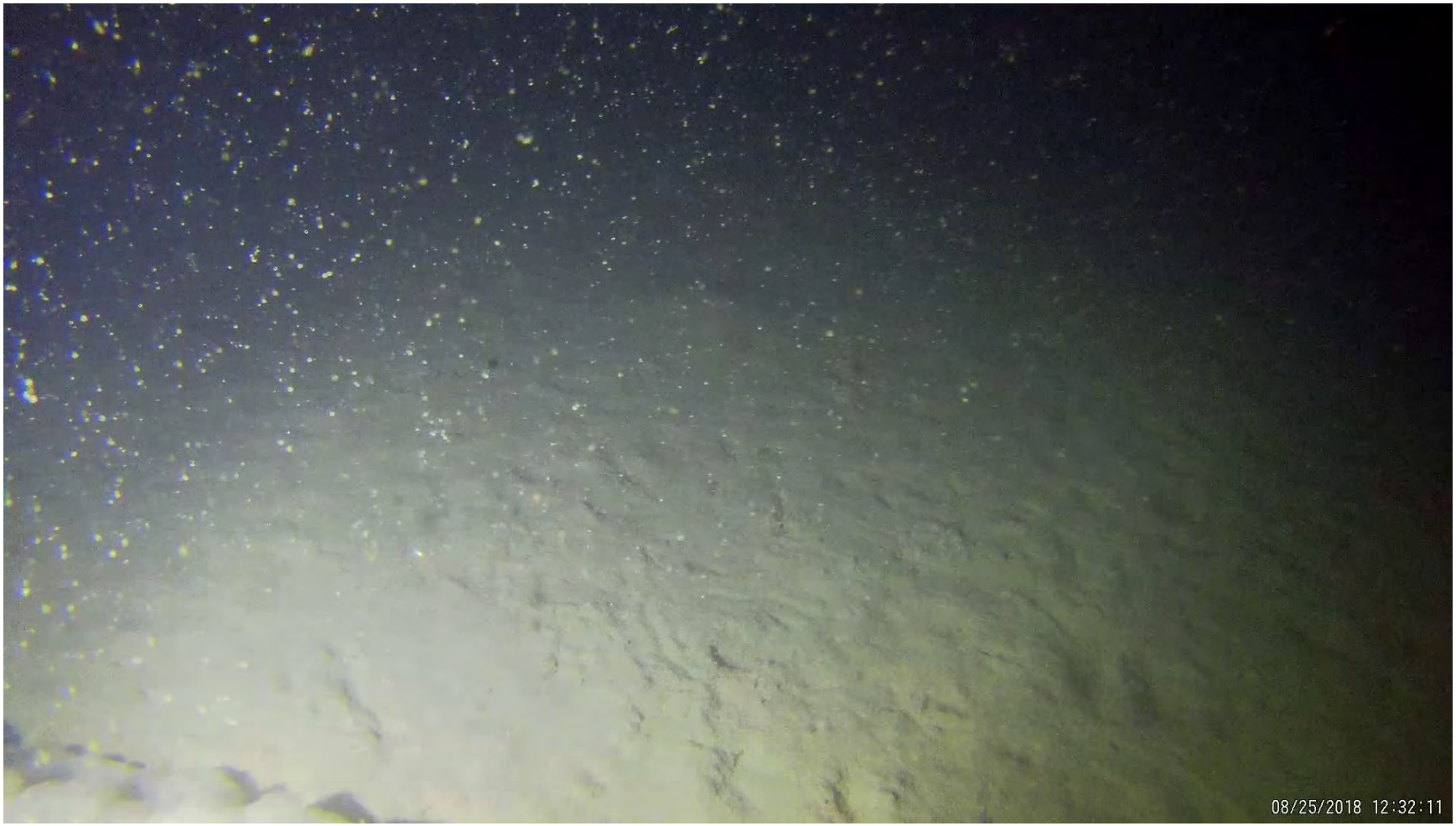

Figure 34. Nature of the substrate in Thomas Bay.

The nature of the substrate in Frederick Sound is more variable and site specific than that of Thomas Bay, depending largely on the amount of energy exposure. Shallower areas tend to hold larger particles and be fairly well-graded due to the strong currents in Wrangell Narrows, while the deeper areas near the toe of the slope are overlain by silty sand (Figure 35).

The Frederick Sound disposal area is subjected to strong tidal currents in the upper part of the water column that would disperse the unconsolidated portion of the dredged material during the material's transit through the approximately 480' water column. The consolidated materials, composed of boulders and cohesive clay masses, would descend to the seafloor and come to rest inside the bounds of the disposal area. The fine grain unconsolidated material may become temporarily suspended and dispersed in the tidal currents. Some of the surficial clay from the cohesive masses may erode as they descend through the water column, becoming temporarily suspended and dispersed as well.

The impact of the boulders and clay masses would disturb the unconsolidated layer of fine sediments, resulting in temporary increases to bottom turbidity. The suspended sediment would come to rest in the vicinity of the impact area due to the lower current energy near the ocean floor. These irregularities in the bottom topography would add complexity to the otherwise uniform landscape. Camera surveys conducted as part of the site selection study have indicated relatively complex bottom structure to be related to higher epifaunal density.

Turbidity would temporarily increase in the vicinity of the disposal area as the sediment is released from the scow; but the depth of the water, energetic nature of the hydrodynamic environment, and substantially similar nature of dredged material and disposal area substrate ensure the turbidity impacts to water quality would be temporary and insignificant. All dredged material that would be placed in Frederick Sound would betested for chemical constituents of concern and determined to be suitable for in-water placement in accordance with the Seattle District DMMP User Manual. The ADEC has determined that an Anti-Degradation Analysis for the proposed project is not warranted due to the low level of potential impact to water quality.

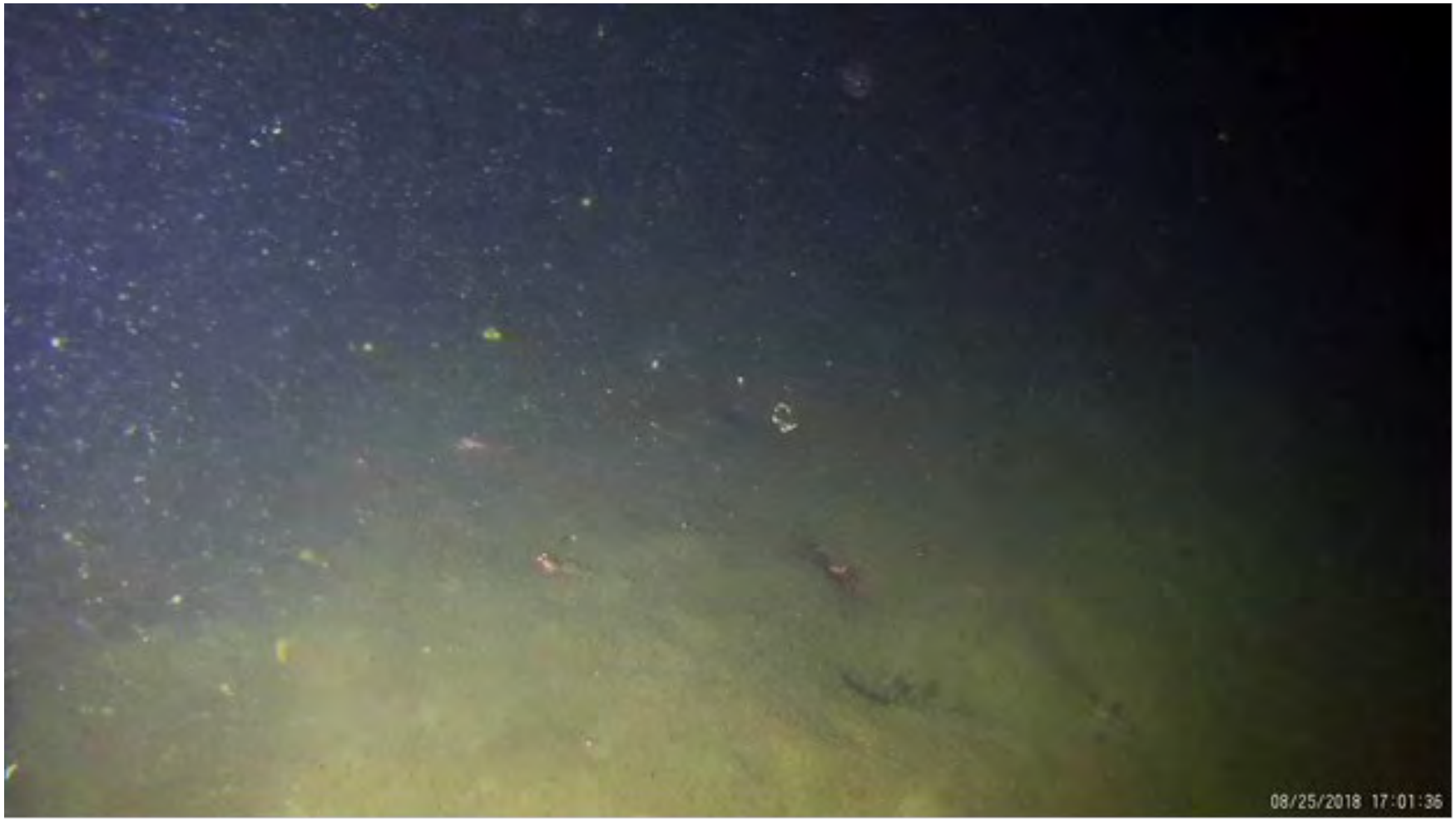

Figure 35. Nature of the substrate in Frederick Sound.

9.2 Biological Resources

Biological resources include fish and wildlife, vegetation, wetlands, Federal threatened and endangered species, other protected species. While historic development within and adjacent to the study area has caused some loss of aquatic habitat, these actions occurred in a regulatory landscape that is different from today. While future development would likely have localized impacts on these resources, under the current regulatory regime these resources are unlikely to suffer significant losses. The City of Petersburg was established and most of the infrastructure was constructed prior to the environmental regulations of the 1970s; including the Endangered Species Act, Clean Water Act, Marine Mammal Protection Act, Resource Conservation and Recovery Act, and others. Any future Federal actions would require additional evaluation under the National Environmental Policy Act and other applicable laws at the time of their development.

9.2.1 Birds

9.2.1.1 No-Action Alternative

Under the No-Action Alternative, bird resources would remain as in the Future Without Project Condition. No new permanent or temporary impacts to birds in the Harbor or disposal area would be realized as a result of the project. The conditions described in the Affected Environment Section 3.2.1 Birds would persist.

9.2.1.2 Alternative 2: Non-Structural Reorganization of Petersburg Harbor System

The nonstructural reorganization of the slips in the Petersburg harbor system would have a negligible impact on birds. The reorganization would take place over an extended period of time and would resemble an extension of the normal harbor traffic patterns. Vessels would be assigned to slips more appropriate for their draft, but this would likely take place before, during, and after the normal fishing season. The harbor system might experience slightly elevated vessel traffic, but the birds using the harbor are already habituated to anthropogenic influences and the nonstructural reorganization would not present a significant deviation from the existing environmental conditions as they apply to birds.

9.2.1.3 Alternative 3: South Harbor Dredging Only

Dredging. Primary activities possibly affecting local avian populations within and in proximity to the study area are the to-and-from mobilization of construction equipment, vessels and personnel, and dredging. Vessels moving through the area to access the harbor could displace waterfowl and sea ducks within their intended course. Vessel lights could become an attractive nuisance causing bird collisions and subsequent injury or death; however, there is more potential for environmental impacts associated with vessels relating to the effects of petroleum compounds and other hazardous material spills. The effects of fuel spills on avian populations are well documented, as direct contact and mortality is caused by ingestion during preening as well as hypothermia from matted feathers. The displacement of local avian populations from the study area

during construction would be short-term. Overall, USACE believes that the recommended navigation improvement project would not have a long-term effect on local avian populations. No significant adverse impacts are expected.

Disposal. The depth of the water in the proposed disposal location would likely preclude direct impacts to birds from the placement of material. The consolidated material would remain largely intact as the cohesive bodies moved through the water column, altering the relative topography in the immediate vicinity of the terminal disposal site. This alteration would result in a more complex bottom composition and could attract greater epibenthic diversity, but the birds utilizing the water surface and upper water column would not be the direct beneficiaries of any additional benthic productivity because the water depth exceeds their maximum foraging depth.

The sediment would release a plume of turbidity as it passes through the water column, but the strong tidal currents in the proposed disposal location would disperse the fine grained sediment during its transit through the water column and the discharge of dredge material would not measurably contribute to suspended sediment.

9.2.2 Marine Fish and their Essential Fish Habitat (EFH)

Essential fish habitat are the waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The NMFS manages, in accordance with the species' respective fishery management plan, essential fish habitat for fish species determined to have an economic importance to the U.S.

9.2.2.1 No-Action Alternative

Under the No-Action Alternative, Marine Fish and their EFH resources would remain as in the Future Without Project Condition. No new permanent or temporary impacts to fishes in the Harbor or disposal area would be realized as a result of the project. The conditions described in the Affected Environment Section 3.2.2 Marine Fish would persist.

9.2.2.2 Alternative 2: Non-Structural Reorganization of Petersburg Harbor System

The nonstructural reorganization of the Petersburg harbor system would result in temporary vessel traffic increase during the reorganization. It would not have the potential to impact marine fish or their habitat in a meaningful way.

9.2.2.3 Alternative 3: South Harbor Dredging Only

Dredging. Transitional dredging would have little direct effect on mature fish inhabiting the project area, as their mobility allows them to avoid construction activities (e.g. mechanical dredging, generated turbidity, vessel movements, and underwater construction noise). No long-shore movements of juvenile fish would be disrupted by dredging due to the project's winter construction schedule.

Per the 1996 amendments to the MSFCMA, USACE has completed consultation and coordination with the NMFS regarding the potential effects of the recommended plan. Impacts from implementation of project alternatives would result in short-term or minor alterations of EFH for marine species and species such as rockfish, flatfish, gadids, salmonids.

Short-term impacts include: direct mortality to some sessile organisms, or those without the means to evade, directly impacted by the dredged material through smothering or crushing, resulting in immediate mortality; water quality impacts in the form of temporarily increased levels of turbidity resulting from fill placement dredging and dredged material disposal; noise disturbance from operation of heavy equipment, cranes, or barges; disturbance from increased construction-related work boat traffic in the project area and along supply routes; and a temporary increase in waterborne noise from the excavation of harbor sediments and operation of equipment including boats, barges, and support vessels. The conservative estimate regarding the maintenance dredging interval is 30-42 years based on the dredging interval for the North Harbor, which experiences similar rates of RSLC and higher rates of sedimentation from Hammer Slough. The direct mortality, turbidity, noise, and general noise effects from maintenance dredging in the harbor would be less than transition dredging; maintenance dredging is not likely to adversely affect EFH in the Harbor.

Direct Mortality**.** The dredging and disposal project components have the potential to entrain, displace, injure, smother, and kill demersal and benthic organisms. The probability of injury, impact, or death is inversely related to the affected taxon's mobility; i.e., a sessile animal is more likely to be impacted than a motile organism because the sessile organism lacks the ability to move away from the dredge or disposal area as the disturbance occurs. Crabs and, to a lesser extent, shrimp would be more susceptible to impact than flatfishes, which would in turn be more vulnerable than demersal fishes like flatfish and cod.

Waterborne Noise. Waterborne noise would result from construction activities, such as the noise generated directly by work vessels (propulsion, power generators, on-board cranes, etc.) or by activities conducted by those vessels (e.g., clamshell dredging and placing material into the barge). However, in-water activities associated with the USACE proposed dredging (e.g., work vessel traffic and operation) do not have the potential to generate the type and intensity of sound pressures that would result in adverse impacts to fish. At levels of sound resulting from the work activities anticipated, the primary reaction of EFH fish species/species complexes is expected to be simply a movement away from the work area. These effects would be further minimized by restricting in-water work to periods when few juvenile salmonids are in the area. Groundfish species such as flatfish, rockfish, and sculpins can be present year-round, so they may move out of the area during the construction period as well.

Construction-related Work Boat Traffic. Constructing the USACE proposed project would heavily involve mechanical dredging and the placement of

materials into ocean waters for disposal. For EFH fish, interactions with tug and barge traffic would be relatively benign, consisting of the animals simply moving away from the vessels as they transit back and forth. Vessels and barges would not be permitted to ground themselves on the bottom during low tide periods, thus no destruction or alteration of bottom habitats that constitute EFH for several pelagic and groundfish would occur.

Loss and Conversion of Marine Habitat. The removal of dredged material from the South Harbor would expose a new sediment surface, known as the “Z-layer”. The physical characteristics of this newly exposed surface would be substantially similar to the existing surface. Some sediment from Hammer Slough and Wrangell Narrows would very gradually accrete into South Harbor similarly to the way sediment accreted after the initial construction of the harbor in the 1983. This accretion occurs very slowly due to the low sediment load of the contributing water bodies, but is expected to deposit a fairly uniform surface of sand-sized particles throughout the Harbor. This mechanism would eventually return the sediment surface to pre-project conditions.

Disposal. The placement of Harbor sediments in the Frederick Sound Disposal Area would create a mound on the seafloor. The District expects much of the material removed from the South Harbor to be cohesive masses of fine grained material (clay) and come to rest on the seafloor in pieces approximately the same size and shape as the excavator bucket that removed the material from the Harbor. If the material were deposited in a one foot thick layer, it could cover as much as 57 acres of the 75 acre disposal area.

The placement of dredged material in the Frederick Sound disposal area would create a more complex bottom habitat, which could increase the species density of the immediate area. The placement of dredged material would temporarily depress the invertebrate population inside the affected area due to direct mortality, but the newly created topographic variability and cover would be recolonized by locally occurring invertebrates in greater densities than were present prior to disposal, The impacts to epibenthic invertebrates would cause a second order effect to marine fish by altering their forage base; a slight decrease in prey availability in the immediate short term, followed by an increase after recolonization.

No significant long-term impacts are expected. The material that would be placed in the Fredrick Sound Disposal Area is substantially similar in terms of grain size as the native sediment in the Disposal Area; primarily particles in the range of silt and clay mixed with small amounts of sand. The depth of the water would allow some dispersion to occur as the material descends through the water column and ensure that no alteration of the photic regime would be manifested by raising the bottom elevation of the disposal area to the extent it would allow more light to reach areas impacted by the placement of dredged material that areas that were not impacted.

The Alaska District has determined that the proposed project may affect, but is not likely to adversely affect, EFH due to the temporary nature of the disturbance, relatively low productivity of the disposal area, substantially similar nature of the disposal area and harbor sediments, and winter construction window. The impacts to EFH from the disposal of maintenance dredged materials would be less than the impacts from the transition dredging given the 30-42 year maintenance dredging interval; the USACE has determined that the disposal of maintenance dredged materials is not likely to adversely affect EFH. The Alaska District has completed an informal consultation with the NMFS Habitat Conservation Division (HCD) and has received concurrence on the EFH determination that the project may effect, but is not likely to adversely affect EFH (Section 9.1.2-9.1.4).

9.2.3 Marine Mammals

9.2.3.1 No-Action Alternative

Under the No-Action Alternative, marine mammal resources would remain as in the Future Without Project Condition. No new permanent or temporary impacts to marine mammals in the Harbor or disposal area would be realized as a result of the project. The conditions described in the Affected Environment Section 3.2.3 Marine Mammals would persist.

9.2.3.2 Alternative 2: Non-Structural Reorganization of Petersburg Harbor System

Airborne noise would be generated by the operation of equipment, and waterborne noise would be generated by work boats. At levels of sound resulting from the work activities, expected to be less than 150 dB re 1 uPa, the primary reaction of marine mammals is likely to be to move away from the work area during the construction period. The noise generated by barges and tugs in transit to or from the work area from other locations in Southeast Alaska would be similar to that generated by routine small vessel traffic in the shipping lanes. Overall, this noise would likely cause marine mammals that would otherwise be present in the vicinity to move away from the area temporarily during periods of higher vessel activity and movement within the harbor, but would not likely produce significant long-term harm to any species.

9.2.3.3 Alternative 3: South Harbor Dredging Only

Dredging. Construction noise, construction vessel traffic, and construction-generated turbidity related to maintenance dredging would temporarily and indirectly disturb marine mammals near the site. Airborne noise would be generated by the operation of heavy equipment, and waterborne noise would be generated by work boats and the clamshell dredge. At levels of sound resulting from the work activities, expected to be less than 150 dB re 1 uPa, the primary reaction of marine mammals is likely to be to move away from the work area during the construction period. Similarly, the noise generated by barges and tugs in transit to or from the work area from other locations in Southeast Alaska would be similar to that generated by routine small vessel traffic in the shipping lanes. Low levels of turbidity would be generated by dredging and placing the

material on the barge in the marine environment, causing marine mammals to temporarily avoid the area until such time that the construction-generated plume dissipates to background levels. Overall, the noise would likely cause marine mammals that would otherwise be present in the vicinity to move away from the area temporarily during construction, but would not likely produce significant long-term harm to any species.

Disposal. The discharge of dredged materials in Frederick Sound would not likely directly impact marine mammals present in that area due to the depth of the water and dominant feeding patterns of the marine mammals found in the area; none of the mammals listed in Table 6 are deep-diving benthic feeders. Second order impacts to marine mammals could be manifested through trophic levels if the placement of dredged materials in Frederick Sound has a significant impact on the benthic productivity. For example, if low trophic level organisms such as polychaetes are significantly impacted, the nutrient availability in the system could be reduced and impact animals higher in the food chain such as marine mammals.

Frederick Sound camera surveys indicate that bottom habitat complexity is related to species density, so the placement of dredged material in Frederick Sound is expected to have a positive impact on the species composition of the affected area. Mammals could be impacted by the transportation of dredged materials to the disposal location through vessel strikes, but this is unlikely given the low speed of the barges that would service the project.

9.3 Marine Invertebrates

9.3.1.1 No-Action Alternative

Under the No-Action Alternative, marine invertebrate resources would remain as in the Future Without Project Condition. No new permanent or temporary impacts to marine invertebrates in the Harbor or disposal area would be realized as a result of the project. The conditions described in the Affected Environment Section 3.2.4 Marine Invertebrates & Associated Habitat would persist.

9.3.1.2 Alternative 2: Non-Structural Reorganization of Petersburg Harbor System

This non-structural alternative does not aim to disturb the substrate nor create any turbidity in excess of increased vessel traffic. Overall, it is not anticipated that any marine invertebrates would be disturbed during the reorganization of the float system.

9.3.1.3 Alternative 3: South Harbor Dredging Only

Dredging. Sessile invertebrates such as the urchins and anemones within the dredge prism would likely be killed or injured by the proposed project due to their inability to move out of the project area during dredging. The consistency of the substrate would also be significantly altered by the removal of the upper section of the seafloor. The underlying clay would be exposed and alter the physical characteristics of the area. The

newly exposed clay would be difficult to colonize by benthic invertebrates due to the lack of interstitial areas or voids. Epifauna may also find the area lacking in suitable attachment structure. Post construction invertebrate habitat would be poor quality.

Motile invertebrates such as crabs would likely vacate the area during construction, but some animals could be killed by construction or turbidity. The harbor area did not appear to be heavily used by motile invertebrates during the November 2017 USACE site visit.

Disposal. Camera surveys of the proposed Frederick Sound disposal locations indicate the substrate consists primarily of inorganic material carried and deposited by tidal currents. The dominant grain size is particles in the silt range, with grain size increasing as the depth and distance to the mouth of Wrangell Narrows decreases. The shallower reaches of the proposed disposal locations are sparsely inhabited by sessile organisms such as pink sea urchins, but when depths exceed approximately 300 ft the sessile animals disappear. The most abundant macro-invertebrate observed in the camera surveys are Gammarid amphipods, followed by Pandalid shrimp; including spot shrimp and pink shrimp.

The primary impact would be direct physical injury caused by the impact of the dredged material on benthic epifauna. Infaunal impacts would also occur; the placement of thousands of CY of sand, silt, and clay would entomb organisms living in the seafloor. The physical nature of the substrate would be temporarily altered by the placement of the dredged material; the existing hard or soft mud and sand would be replaced by a fairly well-sorted sediment surface composed of clay masses, sands, and silts from the dredge prism.

Some habitat conversion would occur as a result of the dredged material disposal. The cohesive material like clay and large rocks would remain intact as it descended through the water column. This would come to rest on the ocean floor of the disposal area and create more complex bottom topography. Analysis of the video footage from the potential disposal areas in Frederick Sound has indicated that areas of greater micro-topographic relief are inhabited by more individual animals as well as more diverse invertebrate communities. The fine grained material would become suspended and be distributed via ocean currents, dispersing the material.

9.3.2 Threatened and Endangered Species

Section 7 of the ESA requires that any action by a Federal agency shall ensure that its actions are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of habitat of such species.

The following NMFS-managed ESA species may occur in the project area: humpback whale (threatened); Steller sea lion (endangered western population overlap). The two DPSs of humpback whale likely to be encountered in Southeast Alaska and Northern British Columbia are the unlisted Hawaii DPS and threatened Mexico DPS. Humpback

whales in the project area are expected to be represented by the unlisted Hawaii DPS 93.9 percent of the time and the threatened Mexico DPS 6.1 percent of the time.

9.3.2.1 No-Action Alternative

Under the No-Action Alternative, marine mammal resources would remain as in the Future Without Project Condition. No new permanent or temporary impacts to marine mammals in the Harbor or disposal area would be realized as a result of the project. The conditions described in the Affected Environment Section 3.2.3 Marine Mammals would persist.

9.3.2.2 Alternative 2: Non-Structural Reorganization of Petersburg Harbor System

The nonstructural reorganization of the Petersburg harbor system would result in temporarily elevated vessel traffic for the duration of the reorganization. Steller sea lions frequent the Harbor and surrounding areas, including the navigation buoy at the entrance to Wrangell Narrows. Humpback whales are unlikely to venture into the Harbor curtilage due to the shallow and confined nature of the area. The operation of vessels under power in areas with marine mammal populations has the potential to create interactions between protected species and vessels, which are sometimes fatal for the marine mammals. However, the risk of taking marine mammals as a result of the reorganization is negligible due to the low speeds that the vessels would be operating during the reorganization and the habituation of the sea lions that could be present in the immediate vicinity of the reorganization traffic.

9.3.2.3 Alternative 3: South Harbor Dredging Only

Dredging. Project construction activities would result in temporary alterations to habitat used by Steller sea lions in the project area. Vessel noise and transit associated with construction activities have the potential to cause avoidance, disturbance, or displacement of Steller sea lions and humpback whales from the Petersburg area during peak Pacific herring spawning activities when Steller sea lions and humpback whales feed on staging and spawning adult herring. Therefore, USACE has proposed to cease in-water construction during peak Pacific herring spawning activities (between 15 March and 1 June). Construction activities outside this period coincide with periods when a minimum quantity of marine mammals is present. Additionally, speed limits would be imposed on construction vessels moving between the project area and material suppliers to mitigate the danger of vessel-marine mammal collisions.

Disposal. The placement of dredged material in the Frederick Sound Disposal area would involve many transits between South Harbor and the Disposal Area, creating the potential for a vessel strike involving sea lions or humpback whales. The act of disposal in Frederick Sound would create temporary water quality perturbations due to sediment suspension and permanently alter the bottom composition in the Disposal Area.

USACE would limit vessel speed, require dedicated marine mammal observers, or a combination of the two mitigative measures to ensure project vessels did not strike

marine mammals during construction or transit to the disposal area. The impacts to water quality would be minor and temporary due to the strength of the tidal currents over the disposal area and depth of water. The alteration to the bottom composition in the Frederick Sound Disposal Area would result in a temporary depression of benthos, but would rebound to productivity levels exceeding the existing condition due to the additional habitat complexity provided by the dredged material. The placement of dredged material on the otherwise featureless seafloor is expected to result in a net boost to benthic productivity.

USACE has determined that the proposed action: (1) would not modify or adversely affect designated critical habitat; and (2) may affect, but is not likely to adversely affect, humpback whales or Steller sea lions. The USACE initiated informal consultation with the NMFS on November 14, 2018 regarding the ESA determination and received a letter concurring with the USACE determination on July 11, 2019.

9.4 Subsistence

The Alaska Native Interest Lands Conservation Act identifies three factors related to subsistence uses as items affected by changes in management activities or land uses: resource distribution and abundance; access to resources; and competition for the use of resources. Subsistence resources, such as marine plants and animals affected primarily by the various alternatives are predominantly food resources collected for primary diet, customary and traditional practices, or to supplement other existing food resources.

9.4.1 No-Action Alternative

Under the No-Action Alternative, subsistence resources would remain as in the Future Without Project Condition. No new permanent or temporary impacts to subsistence resources in the Harbor or disposal area would be realized as a result of the project. The conditions described in the Affected Environment Section 3.4.4 Subsistence Activities would persist.

9.4.2 Alternative 2: Non-Structural Reorganization of Petersburg Harbor System

The nonstructural reorganization of the Petersburg harbor system would have negligible impacts to subsistence resources. Temporarily elevated Harbor traffic may incur slight delays to subsistence users, resulting in a minor impact to resource access.

9.4.3 Alternative 3: South Harbor Dredging Only

Dredging. The proposed deepening project could increase the commercial fishing activity in Petersburg and in doing so, increase the pressure on subsistence fishing in the region. The Alaska District does not have an expectation that this increase in commercial fishing would have a significant impact on subsistence fishing.
Harbor dredging may temporarily impact subsistence users in ways similar to the float reorganization; slight delays in departing or returning to the Harbor may be caused by active dredging. Winter time construction would likely mitigate the subsistence impacts due to decreased subsistence usage during the winter.

Disposal. The placement of dredged material may have a minor impact to subsistence resources due to barge traffic interfering with subsistence users entering and departing the harbor. The disposal has the potential to cause minor impacts to Pacific halibut through direct mortality and alteration of forage base; two halibut were caught in the August 2018 pot fishing survey.

9.5 Cultural and Historic Resources

9.5.1 No-Action Alternative

Under the No-Action Alternative, cultural resources would remain as in the Future Without Project Condition. No new permanent or temporary impacts to cultural resources in the Harbor or disposal area would be realized as a result of the project. The conditions described in the Affected Environment Section 3.4 Cultural Resources would persist.

9.5.2 Alternative 2: Non-Structural Reorganization of Petersburg Harbor System

Non-structural measures such as reconfiguration of the float system or moving vessels based on draft depth, or the additional of navigation markers would not affect any cultural resources within the project area. The Petersburg Fishing Industry Historic District (PET-702) is listed as being located along the waterfront northeast of the project area, but non-structural measures are not expected to impact any landscape characteristics related to the district as specifically the historic fishing industrial structures, historic company buildings, and two former bunkhouses are the features which contribute to PET-702. An Additional resource within the project area is PET-529, a historic vessel which could be moved in the event of a non-structural reorganization of the Petersburg Harbor float system.

9.5.3 Alternative 3: South Harbor Dredging Only

Dredging. South Harbor has undergone previous dredging actions without cultural resources incident. No submerged resources were recorded during the underwater stationary digital video survey of specific locations throughout south harbor as discussed in section 3.4.3. No known submerged resources are known to exist within the proposed dredge area. PET-529 a known historic vessel is known to exist within the project area and could be moved if required during dredging operations.

Disposal. The Frederick Sound disposal area has been screened for cultural resources via underwater stationary video survey no cultural resources were noted during review of the survey footage. The Thomas Bay disposal area has also been screened via underwater stationary video survey, no cultural resources were recorded during review of the survey footage. Additionally, disposal of dredged sediments would not expected to constitute an adverse effect on any unknown submerged resources. No cultural or historic resources are expected to be impacted by the proposed dredged material placement action. The USACE, Alaska District determined that the project would result in no historic properties affected (36 CFR § 800.4(d)(1)).

9.6 Socioeconomics

The socioeconomic impacts of the structural and nonstructural alternatives would be similar. The proposed action and future USACE maintenance dredging activities would alleviate shoaling impacts to navigation and would not change the type or quantity of goods shipped or the type or size of commercial vessels transiting the harbor. Waterborne commerce would remain an important component of the local and regional economy. Some short-term interference to recreational and commercial traffic could occur during proposed and future dredging and material placement activities, including USACE maintenance dredging of the harbor and any future dredging that may be recommended. However, these conflicts are expected to be an inconvenience rather than a direct impact to commercial and recreational activity.

9.7 Cumulative & Long-term Impacts

NEPA documents are required to assess cumulative effects, which are the impact on the environment resulting from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. The past and present actions that have occurred within and adjacent to the harbor project area are identified below. Together, these actions have resulted in the existing conditions of the project area (see Section 1.1).

- 1983-The original harbor project was constructed.
- 2002-Expansion of the South Harbor was completed by the City of Petersburg, including the construction of a sheetpile bulkhead drive-down dock to contain sediment exceeding in-water disposal standards.

The reasonably foreseeable future actions under consideration in this analysis are identified below. The list includes relevant foreseeable actions within and adjacent to the harbor, including those by USACE, other Federal agencies, State and local agencies, and private and commercial entities.

- Continued operation and maintenance of the harbor to the various design depths plus 1 foot of overdepth.
- Continued use and development of the project area, including areas adjacent to the harbor for commercial, industrial, and residential uses in proportion to any future increases in population within the Petersburg area.
- Continued operation and maintenance of private berths and terminals associated with the harbor.

The proposed project is intended to improve access for commercial and subsistence vessels, reduce life and human safety risks, increase regional economic activities, increase regional employment opportunities, and reduce damage to catch and dead-loss caused by delays and contamination. Consistent with the economic analysis provided in Section 6.5, a conservative “no growth” approach was taken in determining the future fleet in Petersburg. A significant increase in the number of vessels that call

on the South Harbor is not expected to occur as a result of the proposed dredging project, therefore there would be no measureable increase in the risk of vessel strike, acoustic impacts, or habitat change in the post-project condition.

The cumulative impact analysis evaluated the effects of implementing the proposed action in association with past, present, and reasonably foreseeable future USACE and other parties' actions within and adjacent to the project area. Past and present actions have resulted in the present conditions in the harbor. Reasonably foreseeable future actions that have been considered included, relevant foreseeable actions within and adjacent to the project area, including those of USACE, other Federal agencies, State and local agencies, and private and commercial entities. The cumulative impacts associated with implementation of the proposed action were evaluated with respect to each of the resource evaluation categories, and no cumulatively significant adverse impacts were identified.

9.8 Mitigation Measures

"Mitigation" is the process used to avoid, minimize, and compensate for environmental consequences of an action. The Alaska District included avoidance and minimization measures during plan formulation in order to mitigate impacts to natural resources from the proposed project. Incorporating the following mitigation and conservation measures into the recommended plan would help to ensure that no significant adverse impacts would occur to natural resources in the project area.

Water Quality

1. Reasonable precautions and controls must be used to prevent incidental and accidental discharge of petroleum products or other hazardous substances. Fuel storage and handling activities for equipment must be sited and conducted so there is no petroleum contamination of the ground, subsurface, or surface waterbodies.

2. During construction, spill response equipment and supplies such as sorbent pads shall be available and used immediately to contain and cleanup oil, fuel, hydraulic fluid, antifreeze, or other pollutant spills. Any spill amount must be reported in accordance with Discharge Notification and Reporting Requirements (AS 46.03.755 and 18 AAC 75 Article 3). The applicant must contact by telephone the DEC Area Response Team for Southeast Alaska (907) 465-5340 during work hours or 1-800-478-9300 after hours. Also, the applicant must contact by telephone the National Response Center at 1-800-424-8802.

3. All dredging shall be conducted so as to minimize the amount of dredge material and suspended sediments that enter South Harbor and Frederick Sound. Appropriate Best Management Practices (BMPs) will be employed to minimize sediment loss and turbidity generation during dredging. BMPs may include, but are not limited to, the following:
    - Eliminating multiple bites while the bucket is on the seafloor
    - No stockpiling of dredged material on the seafloor

- No seafloor leveling
- Slowing the velocity of the ascending loaded dredge bucket through the water column
- Pausing the dredge bucket near the bottom while descending and near the water line while ascending
- Placing filter material over the barge scuppers to clear return water
- If dewatering runoff is discharged from the barge, silts must be removed prior to direct or indirect discharge to South Harbor and Frederick Sound.

Essential Fish Habitat

1. The proposed action shall cease in-water construction between March 15 and September 30th during peak herring spawning activities, juvenile salmon outmigration and rearing activities, and when Steller sea lion and humpback whale feeding and abundance is expected to be greatest in the project area.
2. Project-related vessels and barges shall not be permitted to ground themselves on the bottom during low tide periods, unless there is a human safety issue requiring it.
3. A construction oil spill prevention plan shall be prepared.
4. The Corps will conduct post-dredge bathymetry surveys to ensure that only the material identified to be dredged was removed to the authorized depth.
5. A scow barge will be loaded so that enough of the freeboard remains to allow for safe movement of the barge and its material on the route to the disposal site.

Marine Mammals, Including ESA species

1. In order to minimize effects to marine mammals, the project will be constructed during the winter when marine mammal densities are likely lowest in the action area. The surveys, dredging, and disposal would occur between October 1, 2020 and March 15, 2021.
2. The Corps will establish a 328 foot (100 m) exclusion (i.e., shutdown) zone around all project vessels during operation; including dredging, transit to and from the disposal area, survey operations, and disposal operations.
3. The Corps will continuously monitor the exclusion zone during project operations for the presence of protected species.
4. The Corps will ensure that pilots of the dredge and barge, and pilots of the support vessels will have clear views of the exclusion zones around each vessel to facilitate effective monitoring for all protected species. These pilots will enforce the established exclusion zones for both stationary and moving vessels.
5. The Corps will stop work when a protected species is observed approaching or within the 328 ft. (100 m) exclusion zone of the project operations.
6. If a protected species enters or appears likely to enter the exclusion zone, project vessels will stop work as soon as practicable in order to prevent exposing protected species to sounds capable of causing harassment. Project vessels and operators will not compromise human safety when determining the practicability

of shutting down equipment; i.e., tidal, current, and weather conditions may make it impossible to safely shut-down operation immediately.

7. In the event of a shutdown caused by protected species entering the exclusion zone, work will not restart until the protected species are observed leaving the exclusion zone or 30 minutes from the last protected species sighting within the exclusion zone have elapsed.
8. The Corps will ensure that project vessels do not exceed 13 knots in order to minimize exposure of protected species to vessel strike hazards.
9. No seafloor leveling by dragging the bucket or other device will occur.
10. Vessels may not be operated in such a way as to separate members of a group of marine mammals from other members of the group. A group is defined as being three or more whales observed within a 1641 ft (500 m) area and displaying behaviors of directed or coordinated activity (e.g., group feeding).
11. Vessels will avoid multiple changes in direction and speed when within 900 ft (274 m) of whales and also operate the vessel(s) to avoid causing a whale to make multiple changes in direction.
12. Consistent with NMFS Alaska Humpback whale approach regulations (50 CFR 216.18, 223.214, and 224.103(b)), operators of vessels will not approach within 300 ft (91 m) of humpback whales.
13. Consistent with NMFS marine mammal viewing guidelines (https://alaskafisheries.noaa.gov/pr/mm-viewing-guide), operators of vessels should, at all times, avoid approaching all other marine mammals within 300 ft (91 m).

10. PUBLIC AND AGENCY INVOLVEMENT*

The following list of agencies were contacted during the May 15, 2018 through June 15, 2018 scoping period in order to solicit input on the scope of the impacts and resources affected by the proposed project. No responses were received regarding the proposed South Harbor deepening and disposal project at that time. All coordination letters can be found in Appendix C.

- Alaska Department of Environmental Conservation, Water Quality Division
- Alaska Department of Fish and Game, Habitat Division
- Alaska Department of Fish and Game, Commercial Fishing Division
- Alaska Department of Natural Resources, Division of Land, Mining and Water
- Alaska State Historic Preservation Office
- Alaska Department of Environmental Conservation, Solid Waste Program
- U.S. Environmental Protection Agency, Region 10 Dredged Material Program
- National Marine Fisheries Service, Habitat Conservation Division
- National Marine Fisheries Service, Protected Resources Division
- U.S. Fish and Wildlife Service, Planning Assistance Unit
- City of Petersburg, Harbormaster’s Office

Public review of the draft IFR/EA and FONSI was completed on 16 November 2018. Two public comments were received; one expressing support for the project and the other requesting information about dredged material chemical data specifically associated with a project measure that was dismissed during plan formulation. All comments submitted during the public review period were responded to in the Final IFR/EA and FONSI. A 30-day state and agency review of the Final IFR/EA was completed on 12 December 2018. Comments from state and federal agency review did not result in any changes to the final IFR/EA.

The Alaska District posted a public notice from 13 March, 2019 through 28 March, 2019 requesting the ADEC Division of Water to certify that the discharge of dredged material would not violate State water quality standards. There were no comments received and the ADEC Division of Water issued a Certificate of Reasonable Assurance on 10 April, 2019.

10.1 Status of Environmental Compliance

10.1.1 Fish and Wildlife Coordination Act

On November 2, 2018 the USFWS indicated via email that the USACE has addressed the Service's limited concerns regarding the proposed project. The Service declined to request a Fish and Wildlife Coordination Act Report due to their low level of concern with the project as described and limited staff availability. A copy of the email is located in the Environmental Appendix.

10.1.2 Compliance with Executive Order 13112: Invasive Species

The USACE determined that the proposed project does not include project features that would suggest the project would contribute to the spread of invasive species. The translocation of dredged material from the Harbor to the disposal area would present a profound change in habitat; including the available light, temperature, depth, pressure, forage base, and other factors reducing the likelihood that any unidentified invasive would be able to become established in the disposal location. The USACE circulated this determination to the ADFG, USFWS, and NMFS in order to solicit comments and gain concurrence. The USFWS via email stated that "Given the lack of identified invasive species of concern occurring within the marine environment of the project area, the Service has no concern on the spread of invasive species within the marine environment." A copy of the email is included in the Environmental Appendix.

10.1.3 Compliance with Applicable State Water Quality Standards

On May 10, 2019 the Alaska Department of Environmental Conservation certified there is reasonable assurance that the Petersburg Navigation Improvement project, as well as any discharge which may result, will comply with applicable provisions of Section 401 of the CWA and the Alaska Water Quality Standards, 18 AAC 70, provided that the following additional measures are adhered to.

(1) Reasonable precautions and controls must be used to prevent incidental and accidental discharge of petroleum products or other hazardous substances. Fuel

storage and handling activities for equipment must be sited and conducted so there is no petroleum contamination of the ground, subsurface, or surface waterbodies.

(2) During construction, spill response equipment and supplies such as sorbent pads shall be available and used immediately to contain and cleanup oil, fuel, hydraulic fluid, antifreeze, or other pollutant spills. Any spill amount must be reported in accordance with Discharge Notification and Reporting Requirements (AS 46.03.755 and 18 AAC 75 Article 3). The applicant must contact by telephone the DEC Area Response Team for Southeast Alaska (907) 465-5340 during work hours or 1-800-478-9300 after hours. Also, the applicant must contact by telephone the National Response Center at 1-800-424-8802.

(3) All dredging shall be conducted so as to minimize the amount of dredge material and suspended sediments that enter South Harbor and Frederick Sound. Appropriate Best Management Practices (BMPs) will be employed to minimize sediment loss and turbidity generation during dredging. BMPs may include, but are not limited to, the following:

- Eliminating multiple bites while the bucket is on the seafloor
- No stockpiling of dredged material on the seafloor
- No seafloor leveling
- Slowing the velocity of the ascending loaded dredge bucket through the water column
- Pausing the dredge bucket near the bottom while descending and near the water line while ascending
- Placing filter material over the barge scuppers to clear return water
- If dewatering runoff is discharged from the barge, silts must be removed prior to direct or indirect discharge to South Harbor and Frederick Sound.

10.1.4 Compliance with the Marine Preservation, Research, and Sanctuaries Act (MPRSA)

The District applied the Ocean Dumping Criteria and disclosed the FSDS's consistency with the Criteria in Section 8 of this report. The final report will be transmitted to the EPA Regional Administrator for concurrence at the same time the final report is submitted to POD. The USEPA Regional Administrator will within 15 days of receipt of the Ocean Dumping Criteria Analysis review the information submitted and request from the District Engineer any additional information he deems necessary or appropriate to evaluate the proposed dumping. Within 15 days of receipt of any additional requested information, the Regional Administrator will make an independent evaluation of the proposed dumping and respond in writing to the District Engineer. The USEPA Region 10 has been informally engaged in the plan formulation process since scoping began on May 14, 2018 and began providing formal comments on June 28, 2018. The District provided the USEPA with a draft of the Ocean Dumping Criteria Analysis on February 7, 2019 and provided comments on February 14, 2019. This correspondence is found in the Environmental Appendix. Compliance with the MPRSA is pending the submittal of

the final report to POD and contingent upon the concurrence of an external agency, the USEPA, that the District has satisfied the Ocean Dumping Criteria.

10.1.5 Compliance with the Magnuson-Stevens Fishery Conservation and Management Act

The National Oceanic and Atmospheric Administration, National Marine Fisheries Service works with the regional fishery management councils to identify the essential habitat for every life stage of each federally managed species using the best available scientific information. EFH has been described for approximately 1,000 managed species to date. The preferred alternative would have a less than significant impact on essential fish habitat due to the low levels of short and longterm impacts described in the EFH Assessment. The NMFS Habitat Conservation Division (HCD) has concurred on the USACE determination that the project may affect, but is not likely to adversely affect EFH. The project is in compliance with the Magnuson-Stevens Act. Refer to Appendix C for the EFH analysis.

10.1.6 Compliance with Endangered Species Act of 1973

The proposed action may affect, not likely to adversely affect threatened or endangered species or their critical habitat. There would be no direct impacts to critical habitat and the proposed mitigation measures would prevent impacts to endangered Steller sea lions and threatened humpback whales. USACE requested concurrence on November 14, 2018 from the NMFS Protected Resource Division regarding the determination the proposed project may affect, but is not likely to adversely affect, ESA listed species or their critical habitat The NMFS concurred with the USACE determination in the form of a letter on July 11, 2019. This letter can be found in Appendix C.

10.1.7 Environmental Justice and Protection of Children

Executive Order 12898 directs Federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their actions on minority and low income populations, to the greatest extent practicable and permitted by law. Based on 2016 census data the estimates for the Petersburg Borough population was approximately 3,196 residents. Of the total population 74.8 percent of residents identified as white, 10.4 percent identified as Hispanic or Latino, 8.3 percent identified as two or more races, 7.5 percent identified as American Indian or Alaskan Native, 4.4 percent identify as Asian, 2.3 percent identified as Black or African American, and 0.6 percent identified as Native Hawaiian and other Pacific Islander. The Petersburg Borough minority populations when combined equate to 33.5 percent of the total borough population. This is below the 50 percent threshold for minority population size specified in the federal environmental justice guidelines. The proposed project involves dredging of the south harbor and in-water disposal of dredged materials. The Harbor dredging would occur within the footprint of the publicly-owned Harbor system and no adverse impacts are expected to propagate beyond the immediate vicinity; the terrestrial component of which is dominated by industrial facilities like canneries, upland support facilities, Harbor operations offices, and parking lots. The disposal action would involve a tug and barge transiting between the Harbor and disposal site in ocean waters; no adverse impacts are expected to propagate beyond the immediate vicinity or

into the terrestrial environment where there could be a disproportionate impact to minority and low income populations. The project would not present disproportionate adverse impacts to minority and low income populations.

10.1.8 Executive Order 13045: Protection of Children from Environmental Health Risks and Safety Risks

Executive Order 13045 directs Federal agencies to identify and address any potential environmental health or safety risks that may disproportionately affect children. Children under the age of 5 make up 7.11 percent of the Petersburg population, ages 5-9 years make up 5.74 percent of the population, ages 10-14 years make up 7.01 percent, and agers 15-19 make up 5.57 percent of the Petersburg population. Dredging and disposal operations would be limited to in water actions and are not expected to impact environmental health or safety risks that would disproportionately affect children.

10.2 Views of the NFS

The Petersburg Borough supports the findings of this study and understands the cost share for design and construction of the recommended plan, Alternative 3.

11. CONCLUSIONS & RECOMMENDATIONS

11.1 Conclusions

In view of the analysis presented, it is recommended that Alternative 3, South Harbor Dredging only, to a depth of -19.25 ft MLLW be approved as the recommended plan. The proposed deepening of the South Harbor would not constitute a significant impact to the quality of the human environment based on the analysis presented in the EA. The dredged material has been tested as described in the attached Chemical Data Report and found to contain concentrations of environmental contaminants below the screening levels provided in the DMMP and so determined suitable for unconfined in-water disposal. The newly exposed surface of the seafloor predates anthropogenic influences, so the dredging would not expose any contamination. The District Engineer has applied the Ocean Dumping Criteria and is seeking concurrence from the USEPA Region 10 Regional Administrator in accordance with 33 CFR 324.4(c) and 40 CFR 225.2(b)-(e).

The recommended plan has a total first construction cost with contingency of $10.6 million (FY19 dollars). This plan maximizes total net benefits and has a Benefit-to-Cost Ratio (BCR) of 1.92. The recommended plan is supported by the Petersburg Borough which is the NFS.

11.2 Recommendations

I recommend that the selected navigation improvements plan at Petersburg, Alaska be constructed generally in accordance with the selected plan herein, and with such modifications thereof as in the discretion of the Director of Civil Works may be advisable at an estimated FY19 certified project first cost with contingency of $10,612,000. The Federal portion of the project cost is $5.8 million which is below the $10 million Federal project limit for CAP. The remaining $4.8 million is the non-federal share of construction.

Federal implementation of the recommended project would be subject to the NFS agreeing to enter into a written Project Partnership Agreement (PPA), as required by Section 221 of Public Law 91-611, as amended, to provide local cooperation satisfactory to the Secretary of the Army. Entering into the PPA will ensure compliance with Federal laws and policies, including but not limited to:

a. Provide, during the periods of design and construction, funds necessary to make its total contribution for commercial navigation equal to:

   (1) 10 percent of the cost of design and construction of the general navigation features attributable to dredging to a depth not in excess of -20 ft mean lower low water (MLLW), plus

   (2) 25 percent of the cost of design and construction of the general navigation features attributable to dredging to a depth in excess of -20 ft MLLW but not in excess of - 50 ft MLLW, plus (does not pertain to the Petersburg Navigation Improvements Feasibility Study)

   (3) 50 percent of the cost of design and construction of the general navigation features attributable to dredging to a depth in excess of -50 ft MLLW.(does not pertain to the Petersburg Navigation Improvements Feasibility Study)

b. Provide all lands, easements, rights-of-way, and relocations, including those necessary for the borrowing of material and placement of dredged or excavated material, and perform or assure performance of all relocations, including utility relocations, as determined by the Federal government to be necessary for the construction or operation and maintenance of the general navigation features;

c. Pay with interest, over a period not to exceed 30 years following completion of the period of construction of the general navigation features, an additional amount equal to 10 percent of the total cost of construction of the NED Plan general navigation features less the amount of credit afforded by the Federal government for the value of the lands, easements, rights-of-way, and relocations, including utility relocations, provided by the NFS for the general navigation

features. If the amount of credit afforded by the Federal government for the value of lands, easements, rights-of-way, and relocations, including utility relocations, provided by the NFS equals or exceeds 10 percent of the total cost of construction of the general navigation features, the NFS shall not be required to make any contribution under this paragraph, nor shall it be entitled to any refund for the value of lands, easements, rights-of-way, and relocations, including utility relocations, in excess of 10 percent of the total costs of construction of the general navigation features; Provide 50 percent of the excess cost of operation and maintenance of the project over that cost which the Secretary determines would be incurred for operation and maintenance if the project had a depth of 50 feet;

d. Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements, and rights-of-way or the addition of facilities which might reduce the outputs produced by the project, hinder operation and maintenance of the project, or interfere with the project’s proper function;

e. Provide, operate, and maintain, at no cost to the Federal government, the local service facilities in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and state laws and regulations and any specific directions prescribed by the Federal government;

f. Give the Federal government a right to enter, at reasonable times and in a reasonable manner, upon property that the NFS owns or controls for access to the project for the purpose of completing, inspecting, operating, maintaining, repairing, rehabilitating, or replacing the project.

g. Hold and save the U.S. free from all damages arising from the construction or operation and maintenance of the project, any betterments, and the local service facilities, except for damages due to the fault or negligence of the U.S. or its contractors;

h. Keep, and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, and other evidence are required, to the extent and in such detail as will properly reflect total cost of the project, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and local governments at 32 CFR, Section 33.20;

i. Perform, or ensure performance of, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9601-9675, that may exist in, on, or under lands, easements, rights- of-way, relocations, and disposal areas that the Federal government determines to be necessary for the construction or operation and maintenance of the general navigation features. However, for lands, easements, or rights-of-way that the Federal government determines to be subject to the navigation servitude, only the Federal government shall perform such investigation unless the Federal government provides the NFS with prior specific written direction, in which case the NFS shall perform such investigations in accordance with such written direction;

j. Assume complete financial responsibility, as between the Federal government and the NFS, for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under lands, easements, rights-of-way, relocations, and disposal areas required for the construction or operation and maintenance of the project;

k. Agree, as between the Federal government and the NFS, that the NFS shall be considered the operator of the local service facilities for the purpose of CERCLA liability, and, to the maximum extent practicable, perform its obligations related to the project in a manner that will not cause liability to arise under CERCLA;

l. Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended, (42 U.S.C. 1962d-5b) and Section 101(e) of the WRDA 86, Public Law

99-662, as amended, (33 U.S.C. 2211(e)) which provide that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the NFS has entered into a written agreement to furnish its required cooperation for the project or separable element;

m. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended, (42 U.S.C. 4601- 4655) and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way necessary for construction, operation, and maintenance of the project including those necessary for relocations, the borrowing of material, or the disposal of dredged or excavated material; and inform all affected persons of applicable benefits, policies, and procedures in connection with said act;

n. Comply with all applicable Federal and state laws and regulations, including, but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600- 7, entitled “Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army”; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 (revising, codifying and enacting without substantive change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a et seq.), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 et seq.), and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c)); and

o. Not use funds from other Federal programs, including any non-federal contribution required as a matching share therefore, to meet any of the NFS’s obligations for the project unless the Federal agency providing the funds verifies in writing that such funds are authorized to be used to carry out the project.

p. Accomplish all removals determined necessary by the federal government other than those removals specifically assigned to the federal government;

30 JULY 2019

PHILLIP J. BORDERS
Colonel, U.S. Army
Commanding

Date

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