US Army Corps of Engineers
Alaska District

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

General Investigation Study
Whittier, Alaska

June 26, 2018

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

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DRAFT FINDING OF NO SIGNIFICANT IMPACT

In compliance with the National Environmental Policy Act of 1969, as amended, the U.S. Army Corps of Engineers, Alaska District (USACE) has assessed the environmental effects of the following action:

Navigational Improvements at the Head of Passage Canal, Whittier, Alaska

USACE has evaluated this action for its effects upon significant resources, including fish and wildlife, wetlands, threatened or endangered species, marine resources, and cultural resources. No significant short-term or long-term adverse effects were identified.

Ultimately, this proposed USACE action will fully comply with the National Historic Preservation Act, the Endangered Species Act, the Clean Water Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the National Environmental Policy Act. The completed environmental assessment supports the conclusion that the action does not constitute a major Federal action significantly affecting the quality of the human or natural environment. An Environmental Impact Statement is therefore not necessary for USACE's proposed navigational improvements at the head of Passage Canal, Whittier, Alaska.

_____ _____

PHILLIP J. BORDERS
COL, EN
Commanding

Date

PERTINENT DATA

Tentatively Selected Plan

Project Component	
6-Lane Boat Launch with North Entrance Channel	
Rubble-mound breakwater	602 feet in length
Dredged entrance channel	at -10.5 ft MLLW
Small boat launch	6-lanes

Economics

Item	
Total Annual National Economic Development Cost	$894,000
Total Annual National Economic Development Benefit	$3,152,000
Net Annual National Economic Development Benefits	$2,258,000
Benefit/Cost Ratio	3.5

Total Project Costs

Description	**Total**	**Federal**	**Non-Federal**
Mobilization and Demobilization	$959,000	$863,100	$95,900
GNF	$14,914,000	$13,422,600	$1,491,400
LERR	$345,000	$0	$345,000
Project Cost Apportionment	**$16,218,000**	**$14,285,700**	**$1,932,300**
Aids to Navigation	$58,000	$58,000	$0
Local Service Facilities	$6,697,000	$0	$6,697,000
10% over time adjustment (less LERR)		($1,242,300)	$1,242,300
Final Allocation of Costs	**$22,973,000**	**$13,101,400**	**$9,871,600**
*10% over time adjustment: $959,000 mob/demob + $14,914,000 GNF = $15,873,000 x 10% = $1,587,300 - $345,000 = $1,242,300			

EXECUTIVE SUMMARY

The purpose of this study is to investigate the feasibility of navigation improvements at Whittier, Alaska. The study evaluates the efficiency of the identified alternatives to decrease navigation delays, congestion, and related damages that are prevalent at the existing navigation facilities in Whittier.

Whittier is on the northeast shore of the Kenai Peninsula, at the head of Passage Canal on the west side of Prince William Sound, 60 miles southeast of Anchorage. Despite having a 2017 population of only 244, as the closest small boat harbor to Anchorage and as the Gateway to Prince William Sound, the harbor facilities in Whittier are subjected to the demands of a much larger population.

Existing harbor facilities in Whittier are heavily congested and lack sufficient moorage and boat launch facilities to meet demand. Upland harbor facilities are similarly heavily congested. These conditions result in inefficiencies to all harbor users, increased vessel damages, and increased safety concerns.

This study evaluated a number of alternatives providing both moorage and boat launch facilities based on economic, engineering, and environmental factors. Due to concerns about meeting construction cost-sharing requirements, the local sponsor requested that the U.S. Army Corps of Engineers, Alaska District, suspend further development of alternatives providing moorage and to focus efforts upon smaller scale protected boat launch facilities. The City of Whittier, however, is hopeful to expand any protected boat launch facility constructed as a result of this study to provide moorage at a later date as finances permit.

Based on the preliminary National Economic Development analysis, the Tentatively Selected Plan (TSP) is Alternative 7, the 6-lane Boat Launch with North Entrance Channel, with a benefit-cost ratio of 3.5 and average annual net benefits of approximately $2.26 million. The TSP has a total construction cost with contingency of approximately $23 million (2018 price level) with no anticipated maintenance dredging needs. The City of Whittier would be required to pay approximately $9.9 million of the total construction cost.

Unavoidable environmental impacts of the TSP have been identified, however, they are minor in nature and do not constitute a major Federal action significantly affecting the quality of the human environment. Consequently, a Finding of No Significant Impact has been prepared.

ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
APE	Area of Potential Effect
BP	Before Present
Corps	U.S. Army Corps of Engineers
DLA	Defense Logistics Agency
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
FMP	Fishery Management Plan
FONSI	Finding of No Significant Impact
HTRW	Hazardous, Toxic, and Radioactive Wastes
LSF	Local Service Facilities
NED	National Economic Development
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRC	National Research Council
O&M	Operation and Maintenance
OMRR&R	Operation, Maintenance, Repair, Replacement, and Rehabilitation
PED	Preconstruction Engineering and Design
RED	Regional Economic Development
SHPO	State Historic Preservation Officer
TSP	Tentatively Selected Plan
U.S.	United States
USEPA	U.S. Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

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1. INTRODUCTION

1.1. Project & Study Authority

This feasibility study is being conducted under authority granted by a resolution adopted on December 2, 1970 which states in part:

> *the Board of Engineers for Rivers and Harbors is hereby requested to review the reports of the Chief of Engineers for Rivers and Harbors in Alaska, published as House Document Numbered 414, 83''' Congress, 2nd Session, and other pertinent reports, with a view to determine whether any modifications of the recommendations contained therein are advisable at the present time*

The project was authorized by Section 5007 of Public Law 110-114, the Water Resources Development Act of 2007 (WRDA 2007). The authorizing language from this act is as follows:

> *Section 5007. Expedited Completion of Reports and Construction for Certain Projects.*
>
> *The Secretary shall expedite completion of the reports and, if the Secretary determines that the project is feasible, shall expedite completion of construction for the following projects:*
> *(1) Project for navigation, Whittier, Alaska*

Additional guidance was provided in a memorandum dated 19 December 2008 of subject Implementation Guidance for Section 5007 of the WRDA 2007 – Expedited Completion of Reports and Construction of Certain Projects. The memorandum contained the following guidance specific to the feasibility study.

> *As study funds are available, the respective Districts should complete the feasibility report following report guidelines for projects authorized without a report as specified in Appendix H of ER 1105-2-100. The Districts will review the schedule for the proposed project to identify all opportunities to expedite study completion.*

In accordance with the above Implementation Guidance, the final product of this study shall be a Director's Report and the study is authorized to enter the Preconstruction Engineering and Design (PED) phase pending receipt of funds to do so.

1.2. Scope

The purpose of this study is to investigate the feasibility of navigation improvements at Whittier, Alaska. The study was conducted and the report prepared in accordance with goals and procedures for water resources planning as contained in Engineer Regulation 1105-2-100, *Planning Guidance Notebook*, and the project authorization. Alternatives were examined for their feasibility, considering engineering, economic, environmental, and other criteria.

1.3. Study Location / Congressional District

Whittier is on the northeast shore of the Kenai Peninsula, at the head of Passage Canal on the west side of Prince William Sound, 60 miles southeast of Anchorage (Figure 1). Whittier is accessible by vehicle, train, and boat. Access by vehicle is by the single-lane Anton Anderson Memorial Tunnel which was converted from a rail-only tunnel to a combined rail-vehicle tunnel in 2000. Prior to this expansion, Whittier was vehicle accessible only if the vehicle was transported via train. There is an airstrip in Whittier intended only for emergency use by small aircraft, but it is also utilized as a refueling point for U.S. Coast Guard search and rescue.

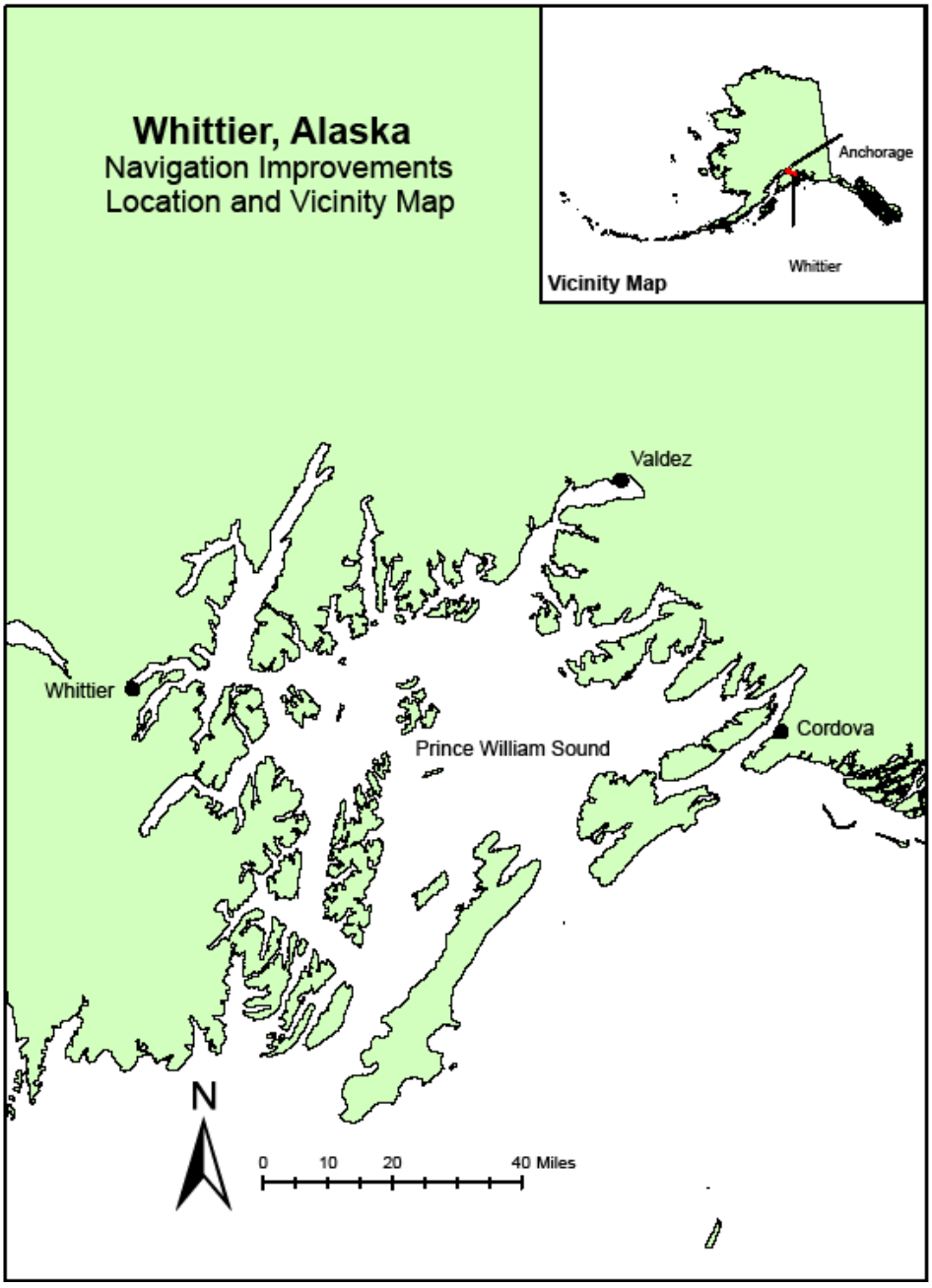


Figure 1. Project Location, Whittier, Alaska

Despite having a 2017 population of only 244, as the closest small boat harbor to Anchorage and as the Gateway to Prince William Sound, the harbor facilities in Whittier are subjected to the demand of a much larger population.

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

Senator Lisa Murkowski (R-AK)
Senator Dan Sullivan (R-AK)
Representative Don Young (R-AK)

1.4. Related Reports & Studies

Possible navigation improvements have been studied in the Whittier vicinity. The reports and their findings are as follows:

Department of the Army, Corps of Engineers, Office of the District Engineer, Anchorage, Alaska "Report on Proposed Port Development, Shotgun Cove, Alaska," September 1949. This report shows the feasibility of designing and constructing a commercial port and townsite at Shotgun Cove in Prince William Sound, Alaska.

U.S. Army Corps of Engineers, Alaska District. "Section 107 Reconnaissance Report, Whittier Alaska, 1979. The report recommended initiating detailed investigations to determine the design and feasibility of a small boat harbor at Whittier, Alaska.

U.S. Fish and Wildlife Service. "Whittier Small Boat Harbor, Shotgun Cove, Whittier, Alaska," Draft Fish and Wildlife Coordination Act Report, September 1986. This report discusses the environmental impacts mitigating factors associated with proposed harbor alternatives at Shotgun Cove.

U.S. Army Corps of Engineers, Alaska District. "Small Craft Navigation Study, Detailed Project Report and Environmental Considerations, Whittier, Alaska," August 1987. This study examined the need for small craft navigation and moorage improvements at Whittier. The recommended plan was a new harbor with floating breakwaters at Shotgun Cove.

U.S. Army Corps of Engineers, Alaska District. "Whittier Alaska, Small Boat Harbor Breakwater Improvement Appraisal Report," February 1989. This study looked at whether the Federal Government should participate in further studies on the feasibility of improving the State-constructed breakwater at Whittier.

U.S. Army Corps of Engineers, Alaska District. "Reconnaissance Report for Boat Harbor Improvements," April 1994. This report establishes a Federal interest in navigation improvements to assist in the development, safety, and conduct of waterborne commerce. Other objectives include optimizing commercial fishing, recreational boating, and refuge from storms.

Tryck Nyman Hayes, Inc. "Whittier Harbor Feasibility Study: Investigation of Commercial and Recreational Boating Demand," January 1996. The report discusses historical and future demand by commercial and recreational boating for waterfront facilities.

U.S. Army Corps of Engineers. "Alaska District Harbor Improvement Technical Report," February 1997. This report summarizes a set of separate harbor expansion projects that were considered for construction. These included shoreward expansion of the existing harbor, a dry storage and launch ramp complex west of the harbor, and a protected mooring area for larger vessels on the east side of the harbor.

Shannon and Wilson, Inc. prepared for City of Whittier. "Preliminary Geotechnical Engineering Report, Navigation Improvements Study, Head of Passage Canal, Whittier, Alaska," February 2014. This report presents the results of subsurface explorations, laboratory testing, and preliminary geotechnical engineering studies conducted at the head of Passage Canal. The purpose of this geotechnical study was to explore subsurface conditions and provide preliminary geotechnical engineering recommendations needed to support site selection, feasibility studies, and further the design efforts.

ERM Alaska, Inc. prepared for Defense Logistics Agency Energy. "Decision Document for the Defense Fuels Support Point – Whittier, Alaska," November 2015. This report documents the extent of soil and groundwater contamination related to the former bulk fuel storage and distributing facility located at the head of Passage Canal in Whittier. The report recommended a remediation plan consisting of bioventing and long-term monitoring.

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

2.1. Problem Statement, Purpose & Need

Existing harbor facilities in Whittier are heavily congested and lack sufficient moorage and boat launch facilities to meet demand. Upland harbor facilities are similarly heavily congested. These conditions result in inefficiencies to all harbor users, increased vessel damages, and increased safety concerns. A complete list of problems is included in Section 2.2.

2.2. Problems & Opportunities

The Whittier small boat harbor is heavily congested and lacks sufficient moorage, boat launch capacity, and upland support facilities resulting in numerous problems including transportation delays, increased vessel damages, and increased degradation of harbor facilities. Particular problems identified include:

- Delays to all transportation modes occurring in Whittier, including vessels, pedestrians, vehicles, and trains, as they converge into the upland area adjacent to the existing harbor.

- Delays to transient harbor users as they converge upon the often congested launch facilities of the existing harbor.
- Vessel and harbor infrastructure damages beyond normal wear and tear due to excessive rafting, rushed launching and recovery, or not being able to access the harbor during a storm.
- Lost business opportunities for commercial fishing vessels, charter fishing boats, site seeing tour boats, and water taxis.
- Lost opportunities for recreational boat owners for sightseeing, fishing, and access to hunting grounds.
- Significant unmet demand for moorage demonstrated by a waiting list that includes hundreds of boats waiting for years to get a slip. This is compounded by minimal turnover of existing slip owners.
- Congestion of the uplands causes inefficiencies in transferring goods for transport to Anchorage.
- The lack of moorage impacts the composition of the local fleet, as transient vessels are generally limited to sizes that are easily transported via boat trailer.
- There is no separation of users (sea kayakers, boat launch users, transient vessels, fishing charters, glacier cruises, commercial fishing, recreational vessels, etc.) within the harbor. This adds to the overall inefficiency of the harbor.
- The existing harbor is bounded by the Alaska Marine Ferry terminal to the east and a cruise ship terminal to the west. When these facilities are in use, it only exacerbates the congestion and inefficiencies experienced at the harbor. Additionally, the limited openings of the single lane tunnel concentrates periods of vehicular traffic, further exacerbating congestion in Whittier.
- Moorage is not available for the high volume of transient vessels during commercial fishing openers and the summer recreational season, causing vessels to travel long distances to other moorage opportunities.
- Moorage is not available for transient vessels seeking a harbor of refuge, forcing owners to incur delays and risk damages and life safety by anchoring while waiting for an opening.
- Lost opportunity for individuals to gather subsistence resources.
- Delays in oil spill response.
- Life and human safety risks exist with users crossing over rafted vessels, hurrying the loading and unloading of trailered craft, and crossing the railroad tracks and between rail cars to access upland parking.
- Lack of adequate uplands restricts support facilities such as vehicle parking, boat storage and repair sites, and areas safe for pedestrians. Facilities that do exist are congested and inefficient.

Particular opportunities identified include:

- Support economic growth in Whittier
- Decrease life and human safety risks

2.3. National Objectives

The Federal objective of water and land resources planning is to contribute to National Economic Development (NED) in a manner consistent with protecting the nation's environment. NED projects increase the net value of goods and services provided to the economy of the nation as a whole.

2.4. Study Objectives

The following study objectives were identified in the initial and refined in the subsequent steps and iterations of the planning process:

- Increase moorage
- Decrease navigation delays including boat launch delays
- Decrease damages to vessels and harbor infrastructure related to congestion
- Provide for a separation of different harbor users

2.5. Study Constraints

Particular constraints identified include:

- Cannot interfere with the safe use of other infrastructure (i.e. airstrip, cruise ship terminal, ferry terminal, railroad operations)
- Must possess sufficient uplands for siting of needed support facilities (i.e. parking, harbor office, restrooms, etc.)

2.6. National Evaluation Criteria

Alternative plans should be formulated to address study objectives and adhere to study constraints. Each alternative plan shall be formulated in consideration of four criteria: completeness, efficiency, effectiveness, and acceptability.

- Completeness is the extent to which alternative plans provide and account for all necessary investments or other actions to ensure the realization of the planning objectives, including actions by other Federal and non-Federal entities.
- Effectiveness is the extent to which alternative plans contribute to achieve the planning objectives.
- Efficiency is the extent to which an alternative plan is the most cost-effective means of achieving the objectives.

- Acceptability is the extent to which alternative plans are acceptable in terms of applicable laws, regulations, and public policies. Mitigation of adverse effects shall be an integral component of each alternative plan.

For the NED analysis, average annual benefits are compared to average annual costs expected to be derived from each alternative evaluated. Applying an appropriate discount rate and period of analysis makes costs and benefits comparable on the equivalent time value of money. For this analysis, all costs were calculated using Fiscal Year (FY) 2018 (October 2017) price levels and then converted to Average Annual Equivalent values using the FY 2018 Federal discount rate of 2.750 percent, assuming a 50-year period of analysis.

Each alternative has a total construction cost estimate, or project first cost, prepared by Cost Engineering utilizing MCACES. The total economic (NED) cost used in the NED analysis is the sum of project first costs, interest during construction, and operation and maintenance expenses. Further discussion of the NED analysis can be found in Appendix C, *Economics*.

2.7. Study Specific Evaluation Criteria

In addition to the above criteria used for all potential USACE water resource development projects, a study specific criteria of minimizing potential conflicts with known areas of soil and groundwater contamination has also been identified.

3. BASELINE CONDITIONS / AFFECTED ENVIRONMENT

The proposed project area is located approximately 60 miles southeast of Anchorage, Alaska, along the western boundary of Prince William Sound, at the head of Passage Canal fjord, approximately 1 mile northwest of the small community of Whittier. Despite its geographic isolation, Whittier is connected to the Alaska Highway and rail system, and is easily accessed from Anchorage and other Alaskan communities.

3.1. Physical Environment

3.1.1. Climate

The predominant influence upon the region's climate is the greater Gulf of Alaska and North Pacific Ocean. As such, Passage Canal experiences relatively mild maritime temperatures, allowing the port at Whittier to remain ice-free the entire year. High humidity, frequent overcast and foggy conditions, and high levels of precipitation are common. Features of the surrounding topography can facilitate extreme wind and precipitation events. Average annual precipitation measured at Whittier is 185 inches, highest average monthly temperatures occur in July at 61°F, and lowest average monthly temperatures occur in January at 23°F (U.S. Climate Data 2018).

3.1.2. Geology and Topography

The bedrock underlying the Passage Canal region consists primarily of sedimentary rock, alternating beds of weakly metamorphosed greywacke and slate of the Late Cretaceous Valdez Group. Regional tectonic activity has strongly folded and faulted the bedrock. The greywacke is resistant to chemical and physical weathering, whereas the slates generally weather and cleave easily. Several dikes of diorite and quartz diorite are present along both shores of Passage Canal, and large igneous intrusions (plutons) appear at the terminus of the Billings Glacier and in the Poe Valley/Pigot Bay area (USACE 2009; Lethcoe 1990). The overlaying soils, especially at the west end of Passage Canal, in the area of the proposed project footprint, consist of unconsolidated deposits of glacial and alluvial outwash and avalanche debris.

The Port of Whittier sits on a delta of fluvialglacial gravels originating at the Whittier Glacier and transported in part by Whittier Creek. The gravels are subangular to subrounded in a coarse sand matrix that measures at least 44 feet thick in some areas (USACE 2009; Kachadoorian 1965). The head of Passage Canal is overlain by a similar outwash delta of glacial and alluvial materials from Learnard Glacier and glaciers overhanging Portage Pass, carried in part by Learnard and Shakespeare Creeks. The depth of these deposits is not known in detail, although an exploration by USACE in 1985 drilled borings near the military tank farm as deep as 81 feet below mean low low water (MLLW) without reaching bedrock. The 1985 borings encountered alternating layers of sandy gravel and gravelly sand (USACE 1986). The north side of the delta at the head of Passage Canal is occupied by a large moraine from Learnard Glacier, consisting of blocks of greywacke and slate interspersed with sands and gravels (USACE 2009; Kachadoorian 1965).

3.1.3. Bathymetry

Passage Canal is a glacial fjord rimmed by steep mountain walls along much of its roughly 12-mile length. The land elevation rises abruptly to about 3,000 feet above sea level within 1 mile of the north shore, and to approximately 2,000 feet within 1 mile of the southern shoreline. Similarly, the seabed plunges hundreds of feet in depth within 1/2 mile of shore. Passage Canal has a “U-shaped” cross-section typical of fjords, with steep sides and a broad, relatively flat floor that gradually deepens from roughly 300 feet at the west end, to over 1,100 feet off of Decision Point (NOAA 2015) (Figure 2). Alluvial deposits at the head of Passage Canal have created a relatively shallow, nearshore shelf that lends itself to the development of navigational improvements.

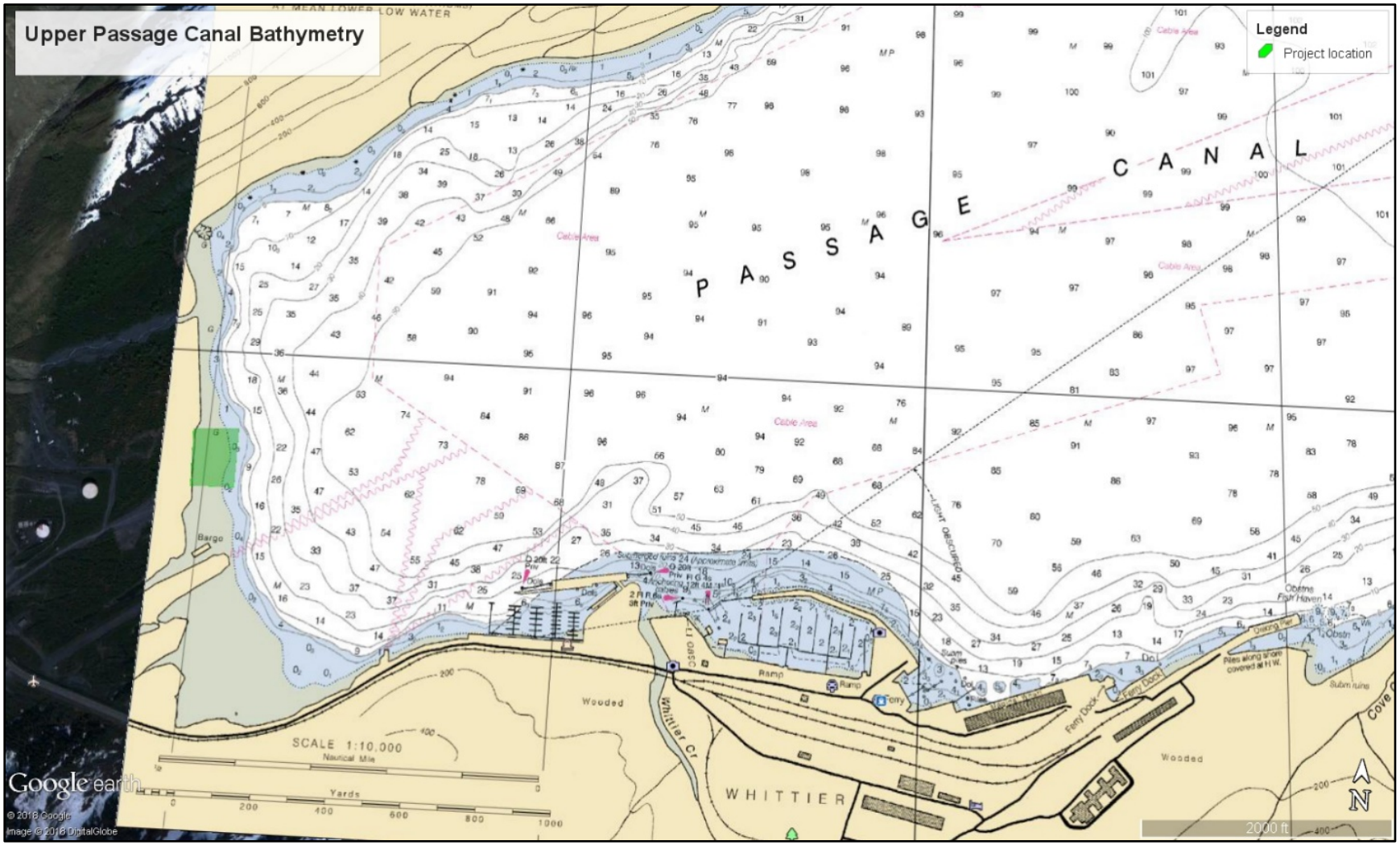


Figure 2. Bathymetry of Upper Passage Canal
Proposed project location is indicated in green.

3.1.4. Soils and Sediments

Surface soils and sediments within the vicinity of USACE's proposed project location are primarily comprised decomposed slate, large cobbles, various grades of glacial till, and alluvial deposits. Geotechnical sampling conducted between October 24 and November 8, 2013, in support of USACE's feasibility assessment and site characterization analyzed the chemical and physical characteristics of subsurface sediments at the head of Passage Canal.

Borings displayed various stratifications of sand and silt or sandy silt overlain by layers of gravel and course sand, respectively. Some of the sediments, specifically the sandy silt, and silty sand were noted as having strong organic odors. Chemical analysis of the sediments detected Diesel Range Organic compounds above the Alaska Department of Environmental Conservation (ADEC) method cleanup level in a single sample, B07-S3. (Whittier 2017). B07-S3 was collected at a depth of between 10 and11.5 feet below ground surface.

3.1.5. Water Quality

According to the U.S. Environmental Protection Agency (USEPA), the water quality of Passage Canal is not impaired. Similarly, water quality is generally very high in the area's numerous streams, which originate in undisturbed alpine settings. The streams exhibit low levels of dissolved solids and high concentrations of dissolved oxygen, although amounts of suspended sediment can vary greatly among individual streams and are flow rate dependent. The larger streams adjacent the project area—Learnard, Shakespeare, and Whittier Creeks—are fed by glacial meltwater and contain large quantities of fine silt (ADOT 1995). The plumes of sediment from these creeks often extend far into Passage Canal; the clarity of seawater at any given point in Passage Canal is often dependent on the proximity to one of these creeks, the localized extent of these sediment plumes is subject to the runoff rate, and wind and tidal forcing.

3.1.6. Tides / Surface Water / Stream Flow

Tide levels at Whittier, referenced to mean lower low water, are shown in Table 1. Tides in the project vicinity are diurnal. The average range of daily tide levels is approximately 12 feet with an extreme range of 17 feet, which can create tidal currents up to 2 knots. Storm surge at Whittier is expected to be minimal (USACE 2009).

Table 1. Tide Elevations at Whittier (in feet, relative to Mean Lower Low Water)

Mean Higher High Water	12.3
Mean High Water	11.3
Mean Tide Level	6.4
Mean Lower Low Water	0.0
Lowest Tide (estimated)	-4.0

The wave climate at Whittier is generally moderate but an event with extreme winds from the northwest can generate waves up to 6.3 feet high with periods of 4.3 to 4.7 seconds. High winds

from the east-northeast can also generate waves over a fetch of about 0.93 mile. Extreme winds from this direction can generate fetch limited waves from 1.3 feet with a period of 1.8 seconds. The design fetch is from the northwest and is 5.6 miles.

Surface hydrology in the area is limited to small streams. Streams discharging into Passage Canal are generally less than 2 miles long. Most have steep gradients for much of their length, and waterfalls and cascades are common.

3.1.7. Air Quality

Air quality at the head of Passage Canal is considered good. Local atmospheric convection is rigorous, and anthropogenic sources of air pollution bear little influence on overall air quality. The most conspicuous source of air pollution in Whittier is the relatively high volume of automobile, rail, and marine traffic that transitions through the area, particularly during the summer months. Over-land transportation moves nearly exclusively along a single roadway, running roughly 2 miles from the entrance of the Anton Anderson Memorial Tunnel into Whittier. That being said, marine traffic contributes equitably to the overall degradation of air quality in Whittier. Recreational and commercial vessels, cruise ships, marine ferry vessels, freight and barge traffic, and sightseeing vessels comprise the daily marine traffic during the peak summer season. However, Whittier is not in or near a “non-attainment”, “maintenance”, or Class I area, as defined by the Clean Air Act.

3.1.8. Noise

Anthropogenic ambient noise in the vicinity of the proposed project footprint is comprised of the normal operational sounds of the nearby railhead, harbor, industrial facility, and main thoroughfare. Naturally occurring sounds are generated by the wind, wave action, rain, flowing surface waters, and is augmented to a lesser degree by birds and other wildlife. With frequent gusts of up to 60 miles per hour, wind in the vicinity of up to 60 miles per hour, wind in the vicinity of the proposed project footprint is likely the loudest source of noise; it displays the greatest capacity to attenuate other sounds emanating from the proposed project location or those generated by other more distant sources.

3.1.9. Visual Resources

With glacier carved, snow-capped mountains, green surrounding hillsides, turquoise creeks, and pebble strewn beaches leading to icy, crystal clear marine waters, Passage Canal is a microcosm of the greater Prince William Sound ecotone. Vistas include actively calving glacial toes where the icebergs loiter before being set adrift on prevailing currents, and uninhabited, rugged wilderness as far as the eye can see. Sheer cliff faces teem with the activity of colonial nesting seabirds, while vast expanses of open water are only interrupted by the spouts of great whales. A significant portion of the local tourism industry is dedicated to transporting people to these vistas for a “once in a lifetime” experience.

3.2. Biological Resources

3.2.1. Terrestrial Habitat

Terrestrial habitat at the intertidal margin of the proposed project site is dominated by a log-strewn boulder/cobble beach front that abruptly terminates to the north and south in a line of successional mixed deciduous-spruce woodland and shrub thicket-type vegetation communities (Figure 3). The positioning of the log wrack and vegetated area in the upper beach area provides evidence of how this landscape is influenced by tidal forces. Wrack is accumulated at the high water mark during astronomical high tides while seawater intrusion into the water table precludes woody plant colonization past a certain point. Further inland, the proposed project site bears the prominent mark of considerable and ongoing anthropogenic disturbance; areas are actively cleared of vegetation and maintained as unimproved roadways to provide vehicle access and to facilitate opportunities for recreation. Historic disturbance at this site has also been high; at one point, an active U.S. Army fuel depot had grubbed and cleared the majority of the existing vegetation from the shoreline to the base of the steep slopes to the west. No terrestrial vegetation occurs within the proposed project footprint.

Figure 3. Proposed Project Location as Viewed From the North

3.2.2. Birds

Prince William Sound is world-renowned for its avifauna: songbirds, raptors, ducks, wading and shore birds. Gulls, terns, guillemots, murrelets, and puffins are omnipresent throughout the

fjords, cliffs, shorelines and open waters of the region during summer months. The Audubon Society has designated the greater Prince William Sound ecotone as an Important Bird Area for Kittlitz's murrelet (*Brachyramphus brevirostris*), marbled murrelet (*Brachyramphus marmoratus*), Barrow's goldeneye (*Bucephala islandica*), pelagic cormorant (*Phalacrocorax pelagicus*), black scoter (*Melanitta Americana*), and harlequin duck (*Histrionicus histrionicus*).

Within and immediately adjacent to the proposed project footprint, shorebirds such as black oystercatcher (*Haematopus bachmani*), and spotted sandpiper (*Actitis macularia*) can be present year-round. During summer months, various gulls and black legged kittiwakes (*Rissa tridactyla*) may congregate at the mouths of Whittier and Shakespeare creeks as they forage and socialize. Nesting passerine species may also be present in the vegetation immediately adjacent to the project footprint, as proposed. Various flycatchers, flickers, thrushes, kinglets, warblers, and sparrows are known to nest within the greater Prince William Sound Ecotone (Isleib and Kessel 1973).

3.2.3. Terrestrial Mammals

The shrubby woodlands and forests surrounding Passage Canal support black bear (*Ursus americanus*), snowshoe hare (*Lepus americanus*), porcupine (*Erethizon dorsatum*), beaver (*Castor canadiensis*), mink (*Mustela vison*) marten (*Martes americana*), short-tailed weasels (*Mustela erminea*), and red squirrel (*Tamiasciurus hudsonicus*). Sitka black-tailed deer (*Odocoileus hemionus sitkensis*) are found increasingly in the western Prince William Sound area, although steep terrain and deep snows may limit their use of Passage Canal. Mountain goat (*Oreamnos americanus*) may be observed on the steep alpine slopes facing Passage Canal (City of Whittier 2007; USFWS 1985).

3.2.4. Freshwater Fish

Other than anadromous salmonids that are seasonally present in the nearshore marine waters of Passage Canal, there are no obligate freshwater fish or freshwater fish habitats in the area of the proposed project footprint. The entirety of the proposed project footprint is located within the subtidal marine environment. The mouth of Leanard Creek occurs approximately 0.25 miles north of proposed project location. Similarly, the mouth of Shakespeare Creek occurs 0.30 miles to the south of the proposed project location. Freshwater obligate fish are not expected to occur within the proposed project footprint under normal circumstances.

3.2.5. Marine and Subtidal Habitat

As with its terrestrial habitats, Passage Canal serves as a microcosm of the overall aquatic habitat diversity found within the greater Prince William Sound ecotone. Coastal habitats in this region are structured by the dominant forces acting upon them—wave energy, fluvial processes, current energy, glacial processes, and anthropogenic modification (Harney et al. 2009). Benthic habitats in Passage Canal, too, are shaped by fluvial geomorphology, underwater topography and

hydrologic processes. Subtidal habitat at the head of Passage Canal is comprised of a shallow alluvial shelf that quickly increases in depth once the influence of the alluvium decreases.

USACE's proposed project footprint is oriented in such a way that it is subject to wave energy that can be quite vigorous at times, particularly during westerly wind events. Consequently, subtidal habitat in the proposed project footprint consists of a relatively heterogeneous distribution of coarse sands, gravels, cobbles, and boulders. Finer sediments are more abundant to the north and south of the proposed project footprint where Leanard and Shakespeare creeks empty into Passage Canal.

3.2.6. Submerged Aquatic Vegetation

Although eelgrass (Zostera marina) is present in areas of Prince William Sound, subtidal physical characteristics at the proposed project site do not lend themselves to eelgrass establishment. Eelgrass typically establishes in mud, sand, or fine gravel, and in moderately to fully sheltered areas. While conducting nearshore fishery surveys in 2009, brown algae of the genus Fucus was observed attached to boulders located within and below the intertidal zone (Figure 4). Although kelps in the family Laminariaceae are common in the protected and semi-protected coves of Prince William Sound, none were observed in the proposed project footprint.

Figure 4. *Fucus* Growth on Cobbles at the Head of Passage Canal

3.2.7. Marine Fish

National Marine Fisheries Service (NMFS) biologists collected fisheries data at the head of Passage Canal on 21 August 2009. With the help of USACE personnel, they collected samples with a beach seine at four locations, from Shakespeare Creek to Learnard Creek. A total of 3,756 fish representing 14 species were captured in the 4 seine hauls. Pacific herring (*Clupea pallasii*) accounted for 99 percent of the total catch. All Pacific herring were young-of-the-year and ranged from 28 to 48 mm. Pacific herring were captured at all sites; most (82 percent) of the herring caught were captured in a single seine haul south of Learnard Creek. Other species captured in small numbers included manacled sculpin (*Synchirus gilli*), Arctic shanny (*Stichaeus punctatus*), Dolly varden (*Salvelinus malma*), frog sculpin (*Myoxocephalus stelleri*), cresent gunnel (*Pholis laeta*), and padded sculpin (*Artedius fenestralis*). A large number of comb jellies (*Ctenatophora*) were also netted. No rooted marine vegetation, such as eelgrass or kelp, was collected in any of the seine hauls (NMFS 2009). In its trip report, NMFS considered the large number of herring caught to be noteworthy, as Pacific herring are regarded as a keystone species in Prince William Sound because of their importance in the diet of other fishes, seabirds, and marine mammals. Fish distributions by species and life history stages in Prince William Sound are closely associated with habitat type and submerged vegetation.

3.2.8. Marine Mammals

According to the NMFS and the U.S. Fish and Wildlife Service (USFWS), marine mammals that are known to occur in the waters of Prince William Sound and are therefore reasonably anticipated to be observed in the waters of Passage Canal include killer whales (*Orcinus orca*), Dall's porpoise (*Phocoenoides dalli*), gray whale (*Eschrichtius robustus*), harbor porpoise (*Phocoena phocoena*), minke whale (*Balenoptera acutorostrata*), Pacific white sided dolphin (*Lagenorhynchus obliquidens*), the Alaska southcentral Distinct Population Segment (DPS) of the northern sea otter (*Enhydra lutris kenyoni*), and harbor seal (*Phoca vitulina*).

3.2.9. Marine Invertebrates & Associated Habitat

Marine invertebrates in the proposed project footprint are subjected to the localized environmental conditions, and as such, it is expected that their populations would be variable and display seasonal patterns of abundance. In the absence of focused intertidal and subtidal invertebrate surveys, community composition must be inferred through knowledge of organism habitat preference. Generally, hard bottomed habitats support a variety of mussels, barnacles, limpets, chitons, and snails. Predatory sea stars are common in the nearshore rocky habitat areas, as are crabs, various shrimp, and occasionally, octopus.

3.2.10. Federal & State Threatened & Endangered Species

Federally endangered species that are known to occur within the waters of the greater Prince William Sound include the threatened Western DPS Steller sea lion (*Eumetopias jubatus*),

endangered fin whale (*Balenoptera physalus*), and the threatened humpback whale (*Megaptera novaeangliae*) Mexico DPS.

Steller sea lions are year-round residents of Prince William Sound. Their preferred haul-out areas are uninhabited rocky islands, the closest of which occurs east of a straight line drawn between Trinity Point and Gradual Point, approximately 6 miles from the proposed project location.

Fin whales and humpback whales are seasonal visitors to the waters of Prince William Sound. Although exceptions are rare, these large bodied whales prefer deeper water habitats than what exists at the deepest portion of the proposed project site.

3.2.11. Essential Fish Habitat

The entire subtidal portion of USACE's proposed project footprint is designated Essential Fish Habitat (EFH) under the Salmon Fisheries in the Exclusive Economic Zone Fishery Management Plan. Specifically, EFH is defined by the Magnuson-Stevens Fishery Conservation and Management Act as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. Federal agencies are required to consult with NMFS on all actions, authorized, funded, or undertaken by the agency that may adversely affect EFH.

Intertidal beach, nearshore bays, and island passes-type marine waters of Passage Canal and the greater Prince William Sound are considered EFH for the Marine Juvenile, Immature, and Maturing Adult life history stages of chinook (*Oncorhynchus tshawytscha*), and coho (*Oncorhynchus kisutch*) salmon.

EFH for pink (Oncorhynchus gorbuscha), chum (*Oncorhynchus keta*), and sockeye (*Oncorhynchus nerka*) salmon Marine Juvenile and Marine Immature and Maturing Adult life history stages is defined as all marine waters off the coast of Alaska to depths of 200 meters from the mean higher tide line to the 200 nautical mile limit of the United States Exclusive Economic Zone.

3.3. Socio-Economic Conditions

3.3.1. Population & Demographics

An estimated 244 residents lived in the City of Whittier in 2017. This represents a population increase of 10.9 percent since 2010 and an increase of 34.1 percent since 2000 (Table 2). It should also be noted that despite having a 2017 population of only 244, as the closest small boat harbor to Anchorage and as the gateway to Prince William Sound, the town of Whittier and its harbor facilities service a much larger population.

Table 2. City of Whittier Geographical Area – Total Population Data

Area	% Change '00-'16	2016	2010	2000
United States	14.8%	323,127,513	308,745,105	281,421,906
Alaska	18.3%	741,894	710,231	626,932
City of Whittier	34.1%	244	220	182

Source: 2000 Census, 2010 Census, 2016 Population Estimate; Census Bureau

Based on 2016 census estimates, 64.5 percent of Whittier residents are white, 9.4 percent of residents are Asian, 7.2 percent are Hispanic or Latino, and 6.6 percent are American Indian or Alaska Native. In the state of Alaska, 65.6 percent of residents are white, 6 percent are Asian, 6.7 percent are Hispanic or Latino, and 14.1 percent are American Indian or Alaska Native. Table 3 displays racial demographics for the City of Whittier, State, and Nation.

Table 3. Population by Race

	City of Whittier	Alaska	United States
Total	**318**	**736,855**	**318,558,162**
White Alone	64.5%	65.6%	73.3%
Black or African American Alone	2.2%	3.3%	12.6%
American Indian And Alaska Native Alone	6.6%	14.1%	0.8%
Asian Alone	9.4%	6.0%	5.2%
Native Hawaiian and Other Pacific Islander Alone	3.8%	1.2%	0.2%
Two or More Races	12.3%	8.5%	3.1%
Hispanic or Latino	7.2%	6.7%	17.3%
White Alone, Not Hispanic or Latino	63.2%	62.0%	62.0%

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

3.3.2. Employment & Income

In 2016, approximately 75 percent of the Whittier population was 16 years old and older. Of that population, 59.8 percent was in the labor force.

The unemployment rate for the City was 22.3 percent, well above both the State of Alaska at 7.8 percent and the United States at 7.4 percent.[1]. Table 4 lists occupational data for the study area.

[1] Data are from the U.S. Bureau of Labor Statistics and Alaska Department of Labor & Workforce Development. Whittier unemployment is calculated as the portion of the workforce filing unemployment insurance (IU) claims.

Table 4. Civilian Labor Force by Occupation, 2012-2016 American Community Survey 5-Year Estimates, Census Bureau

	City of Whittier	State of Alaska	United States
Civilian employed population 16 years old and older	124	353,954	148,001,326
OCCUPATION			
Management, business, science, and arts occupations	27 / 21.8%	129,916 / 36.7%	54,751,318 / 37.0%
Service occupations	26 / 21.0%	62,543 / 17.7%	26,765,182 / 18.1%
Sales and office occupations	33 / 26.6%	78,806 / 22.3%	35,282,759 / 23.3%
Natural resources, construction, and maintenance occupations	23 / 18.5%	43,695 / 12.3%	13,171,632 / 8.9%
Production, transportation, and material moving occupations	15 / 12.1%	38,994 / 11.0%	18,030,435 / 12.2%

In 2016, the median household income of Whittier was $47,813, which is below the State of Alaska median income of $74,444 and the national median income of $55,322. The mean household income was $67,255. Table 5 shows the number of households in the City of Whittier, Alaska, and the United States and the percentage of each by their respective incomes.

Table 5. Family Income, 2012-2016 American Community Survey 5-Year Estimates, Census Bureau

	City of Whittier	State of Alaska	United States
Total Households	**119**	**250,235**	**117,716,237**
Less than $10,000	3.4%	3.7%	7.0%
$10,000 to $14,999	3.4%	3.4%	5.1%
$15,000 to $24,999	17.6%	7.1%	10.2%
$25,000 to $34,999	8.4%	7.0%	9.9%
$35,000 to $49,999	20.2%	11.4%	13.2%
$50,000 to $74,999	19.3%	17.9%	17.8%
$75,000 to $99,999	9.2%	14.8%	12.3%
$100,000 to $149,999	10.9%	19.2%	13.5%
$150,000 to $199,999	0.0%	8.8%	5.4%
$200,000 or more	7.6%	6.8%	5.7%

3.3.3. Fisheries

Whittier harbor facilities primarily support fishing vessels: commercial, subsistence, charter, and recreational. Therefore, demand for harbor facilities depends on the viability of fishery resources in the region.

3.3.3.1. Commercial Fisheries

Salmon fisheries are a major economic driver in Prince William Sound, and form the lion's share of commercial fishing activity in the area followed by smaller harvests of halibut and other species. The outlook for commercial fishing in Whittier and Prince William Sound is considered good. Salmon stocks, which comprise the vast majority of commercial harvest in Whittier, are healthy and in some cases increasing. Shellfish fisheries experience low participation and are probably supplemental to the primary salmon fishing endeavors. Likewise, participation in groundfish and sablefish fisheries is low. Despite low participation in these fisheries, commercial fishing is expected to continue to be a viable industry in Whittier due to the strength of salmon fisheries in the region. The presence of a land-based processor (Whittier Seafood) also attracts commercial fishers to Whittier.

3.3.3.2. Sport Fisheries

Sport fisheries in Prince William Sound target five species of Pacific salmon, several species of groundfish (halibut, rockfish, and lingcod), and shrimp. Small populations of freshwater fish such as cutthroat trout and Dolly Varden are also available. These fisheries depend mainly on wild stocks but salmon are also raised in state and private non-profit hatcheries in Prince William Sound. King and silver salmon are the main sport fisheries out of Whittier. Sport fishing in the Whittier area is generally conducted from chartered or private fishing vessels usually targeting salmon or halibut. Most fisheries in Prince William Sound are accessible only by boat or plane with roadside fishing opportunities limited to Valdez and Cordova. Whittier's road access to the major population centers of the Municipality of Anchorage and the Matanuska-Susitna Borough make it a popular destination for anglers.

3.3.3.3. Subsistence Fisheries

Subsistence fishing and hunting are important for the economics and cultures of many families and communities in Alaska. Subsistence uses exist alongside other important uses of fish and game in Alaska including commercial fishing, sport fishing, and personal use fishing. All Alaska residents are eligible to participate in subsistence fisheries, and there are several subsistence fishing opportunities in Prince William Sound. While salmon comprises the majority of the subsistence catch in the Sound, halibut may also be caught by residents of rural communities through the Federal subsistence halibut program. Other subsistence fisheries include herring, bottomfish, and shellfish.

3.3.4. Existing Infrastructure & Facilities

Whittier is located on the northeast shore of the Kenai Peninsula at the head of Passage Canal in Western Prince William Sound. Transportation services to the community are by road, rail, state ferry, and boat. Whittier is also accessible by plane, but air travel is restricted by frequent adverse weather conditions and the airstrip is rarely used. Whittier Harbor provides moorage, vessel tendering and repair, haul-out services, and other related amenities. The harbor has 358

slips available for permanent and transient moorage. Separate facilities adjacent to the harbor include cruise ship, Alaska State ferry, and rail-barge loading and unloading facilities (Figure 5). A private harbor, the Cliffside Marina, was constructed in 2004 and provides moorage for 103 vessels. Space constraints limit dry storage, service areas, and parking near these facilities. These areas are used to capacity during the peak boating season.

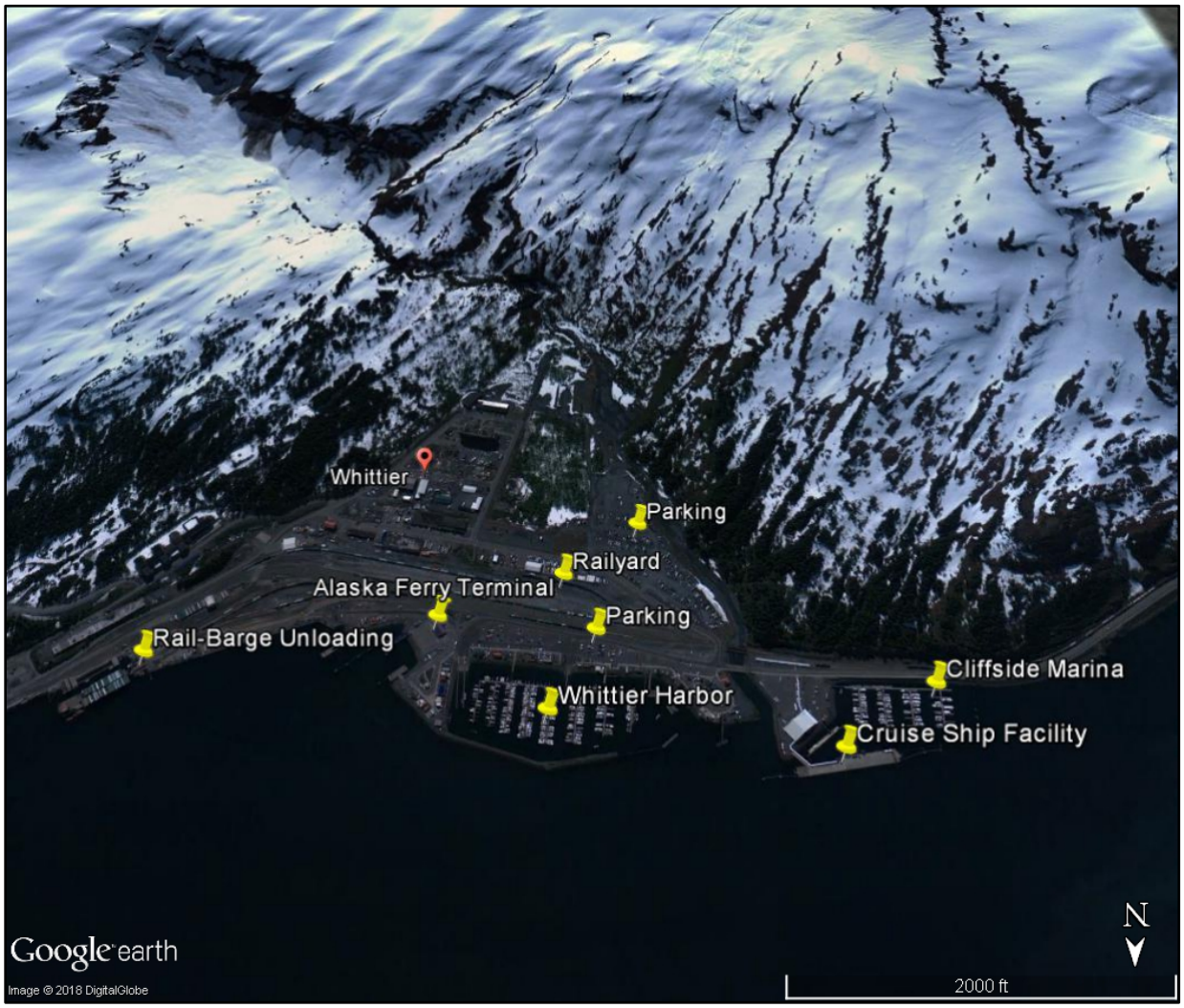


Figure 5. Google Earth Image of Existing Whittier Harbor and Surrounding Facilities

In 1972, construction of Whittier Harbor just east of the mouth of Whittier Creek was completed, primarily with State of Alaska funds. The harbor was designed with 100 berths, and upon opening, was immediately filled to capacity. A 225-foot sheet-pile breakwater extension and a 130-foot floating breakwater were added in 1972 and 1978, respectively. In 1980, the State of Alaska funded expansion of the original harbor to contain 332 slips. This expansion also immediately filled to capacity upon opening. A new float and access pier and ramp for loading passengers aboard day-tour excursion boats were completed in 1992. Whittier received ownership of the facility from the Alaska Department of Transportation & Public Facilities in

2004. A 2010 project added 26 additional slips to the harbor, bringing the total number of slips to 358. Whittier Harbor is seen in the center of Figure 6.

Figure 6. Whittier Marine Facilities

Source: City of Whittier. http://whittieralaska.gov/photo_gallery.html

Whittier Harbor has a single three-lane boat launch ramp inside the boat harbor that allows two lanes of traffic to go one direction and one lane going the other. Support facilities include a harbormaster's office, a 30-ton boatlift and dock, electric and water utilities, two boat maintenance grids, and marine fuel service facilities. In addition, the small boat harbor features the Ocean Dock, which serves large day-cruise vessels and the City Dock. The City Dock is used primarily by commercial fishers. A crane, boom, and net are available for unloading their catches of shrimp, halibut, or salmon. A boat lift may be used on the City Dock to hoist boats out of or into the water. Figure 7 is the Whittier Harbor Boat Slip Map from the City of Whittier website (http://www.whittieralaska.gov/whittier_harbor_map.html).

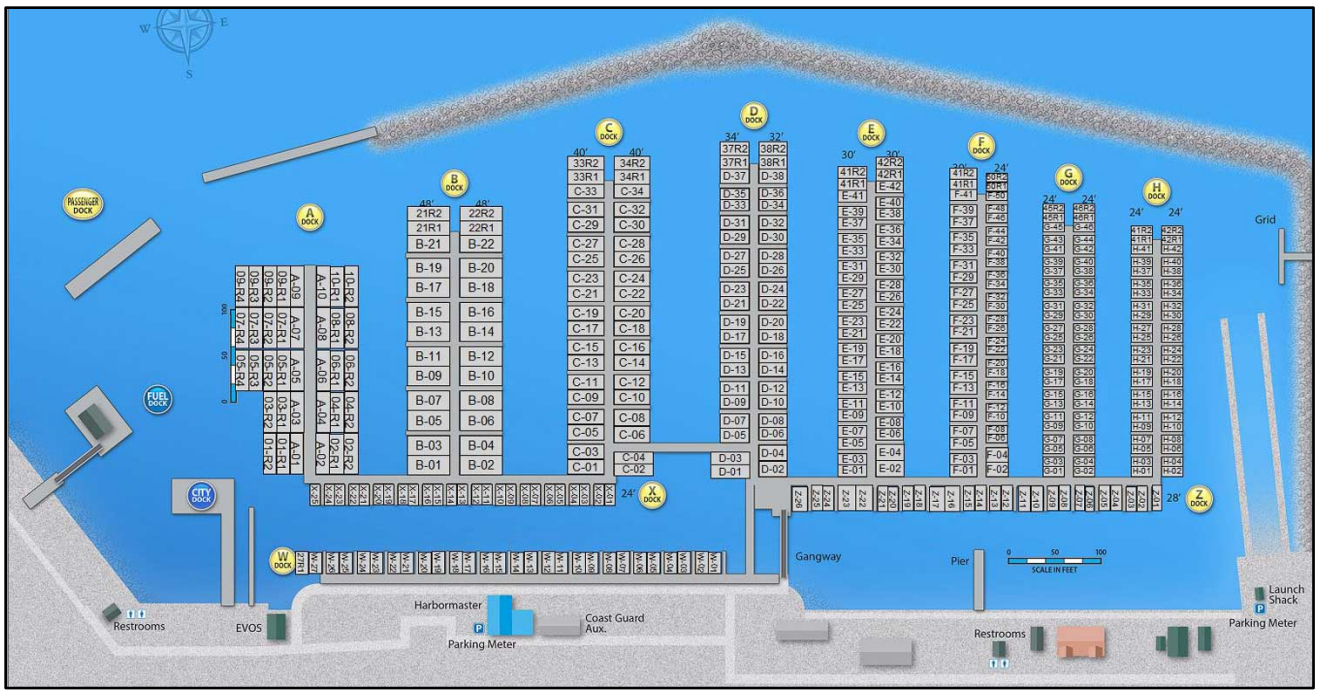


Figure 7. Whittier Harbor Boat Slip Map (http://www.whittieralaska.gov)

3.3.5. Moorage and Boat Launch Demand

The quality of the fishing and recreation experience in Prince William Sound and the proximity to the largest population center of the state puts enormous pressure on Whittier's limited harbor facilities. Peak moorage and boat launch demand occurs during the summer season of mid-May through mid-October. During this time, commercial fishing, charter/sightseeing/water taxi, and recreation and subsistence vessels all attempt to use the harbor facilities. Inadequate moorage, overcrowding, rafting (double or triple parking of boats), and hot berthing (temporary assignment of a vacant stall that is otherwise occupied) increases the need for maintenance and repairs to both vessels and facilities (Figure 8). During the busy summer season, excessive demand for moorage and launching necessitates constant shuffling of boats about the harbor, and requires operators to take special precaution during storms to secure protected moorage. Furthermore, the lack of permanent slips forces some operators to move their boats to distant harbors or dry storage when their vessels are not in use. These activities take time and labor and raise operating costs, thereby reducing net income for commercial fishers and charter/sightseeing/water taxi boat operators, as well as reducing income for the harbor itself.

Figure 8. Rafted Vessels at Whittier Harbor

Boat launch users trailer their vessels to Whittier, using the launch ramp facilities at the harbor to begin and end their voyage. Substantial growth in the use of the boat launch ramp has occurred since the opening of the Anton Anderson Tunnel in 2000 to vehicles, making Whittier Harbor more accessible to boaters. Boat launch users contribute significantly to congestion. Vessels using the boat launch must enter and exit the harbor through the same harbor openings as permanent and transient vessels, use the same fueling facilities, fish cleaning stations, etc. As illustrated in Figure 3-6, the boat launch is at the far end of the harbor requiring all vessels that launch to travel through the entire harbor. Boat launch users significantly add to the delays experienced by all users of the harbor by increasing the amount of vessel traffic in the facility.

An Office of Management and Budget-approved mail-out survey, personal interviews, and other research was conducted in order to ascertain the level of demand for moorage and boat launching at Whittier. The survey was the primary data-gathering tool with other methods supplementing survey results. The resulting information was used to inform the benefits model used to determine whether the project was justified from an economic perspective. The survey was mailed to 1,855 boat owners and permit holders in the region. There were 519 responses for an overall response rate of 28 percent.

Survey results show that demand for moorage and boat launching at Whittier exceeds supply. When added to those vessels currently utilizing Whittier harbor facilities, total demand for moorage can be calculated (Table 6).

Table 6. Total Demand for Moorage at Whittier

Description	0-28'	28-34'	34-37'	37-45'	45-54'	54-60'	>60'	Total
Commercial Fishing Vessels								
Permanent	7	11	1	4	4	0	0	25
Transient	99	121	4	11	28	11	4	277
Boat Launch	18	0	0	0	0	0	0	18
Other	7	28	0	0	14	4	4	57
Total	131	160	4	14	46	14	7	377
Charter Vessels								
Permanent	4	0	1	7	0	0	0	11
Transient	0	7	1	11	11	11	4	43
Boat Launch	11	0	0	0	0	0	0	11
Other	0	0	0	0	0	0	4	4
Total	14	7	1	18	11	11	7	68
Recreational/Subsistence Vessels								
Permanent	203	53	36	43	11	0	0	345
Transient	228	97	29	47	39	0	7	447
Boat Launch	352	53	18	0	0	0	0	423
Other	46	36	14	21	11	4	7	138
Total	829	239	97	111	60	4	14	1354
Other Vessels								
Permanent	0	4	0	0	0	0	0	4
Transient	0	4	0	0	0	0	0	4
Boat Launch	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0
Total	0	7	0	0	0	0	0	7
Total Vessels	**974**	**413**	**102**	**143**	**117**	**28**	**28**	**1806**

3.3.6. Cultural & Subsistence Activities

As previously mentioned, subsistence fishing and hunting are important for the economics and cultures of many families and communities in Alaska. Subsistence uses exist alongside other important uses of fish and game in Alaska including commercial fishing, sport fishing, personal use fishing, and hunting. Please see Appendix C, *Economics*, for more details.

3.4. Historical, Cultural & Archeological Resources

Cultural resources have been identified within the area of potential effect (APE), however, none of them are considered eligible for the National Register of Historical Places. Archaeological

surveys have been conducted in the area in 1985, 1993, and 1994 and have reported no known cultural resources along the shoreline in the proposed project area.

4. FUTURE WITHOUT PROJECT CONDITIONS

4.1. Physical Environment (Future Projections, Climate Change)

Engineer Regulation (ER) 1100-2-8162, *Incorporating Sea Level Change in Civil Work Programs*, states that potential sea level rise must be considered in every USACE coastal activity. Studies and designs should consider multiple sea level rise scenarios to deal with uncertainties within the estimates. The sea level rise scenarios include a “low” estimate which corresponds to the historic rate of sea level rise, an “intermediate” estimate which corresponds to the modified NRC Curve I, and a “high” estimate which corresponds to the modified NRC Curve III (Figure 9).

Whittier does not have a continuously operating tide station. The closest tide station with a sufficient period of record is station 9455090 Seward, Alaska. The National Oceanic and Atmospheric Administration (NOAA) analysis of historic sea level data for station Seward shows a decrease in sea level during the analysis period of 1964 through 2017. The mean sea level trend is -2.53 mm/yr with a 95% confidence interval variance of 0.68 mm/yr.

For the standard project design life of 50 years, the “low” estimated sea level rise is -0.44 feet, the “intermediate” estimated sea level rise is +0.04 feet, and the "high" estimated sea level rise is +1.53 feet. The historical sea level trend indicates a decreasing sea level, while the NRC sea level rise curves indicate increases in sea level.

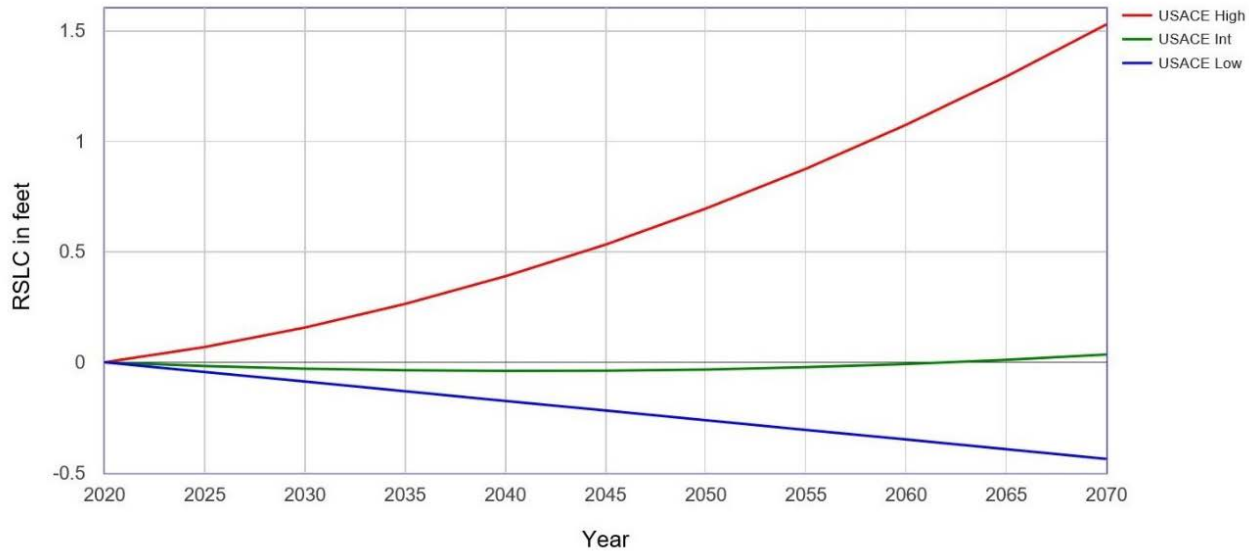


Figure 9. Estimated Sea Level Rise Estimates from 2020 to 2070

Impacts of the “low” estimated sea level rise would include minor reduction in water levels. The low (historic) sea level rise estimate would result in minor reductions in project water depths at the end of project life. Potential project alternatives would experience minor reductions in channel and mooring depths.

Impacts of the “intermediate” estimated sea level rise would include negligible increases in water levels. The negative and positive changes in water depth would not be noticed during the project life. Potential project alternatives would experience minor increases in channel and mooring depths and little to no over topping of wave protection structures during a design event occurring near the end of project life.

Impacts of the “high” estimated sea level rise would include a significant increase in water level. Potential project alternatives would experience increases in channel and mooring depths and over topping of wave protection structures during a design event occurring especially during the latter half of project life. The potential for damages to wave protection structures during the design event and smaller events would be increased.

4.2. Economic Conditions (Stable, Growing, Declining)

Several critical assumptions were made when conducting the future without-project economic analysis. Chief among them is that the existing fishery will continue to support the fleet. This is a critical assumption supported by the fact that all fisheries present in the Whittier area are highly regulated in order to assure future viability of the resource. That is not to say that factors beyond what is reasonably assured cannot occur.

4.2.1. Fleet Composition

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 at Whittier. Conversely, there is no evidence that demand for moorage and boat launching at Whittier will decrease over time. Therefore, it is assumed that the fleet identified in Appendix C, *Economics*, will remain stable throughout the 50-year period of analysis.

4.2.2. Planned Development

Due to concerns about meeting construction cost-sharing requirements, the local sponsor requested that we suspend further development of alternatives providing moorage and to focus the study upon smaller scale protected boat launch facilities. The City of Whittier, however, is hopeful to expand any protected boat launch facility constructed as a result of this study to provide moorage at a later date as finances permit. Given uncertainty about the timing and funding of such development, no corresponding moorage benefits have been included in our benefit analysis.

Navigation related improvements currently planned by the City include addressing erosion concerns extending from the Ocean Dock to the Fuel Dock and rebuilding the City and Ocean Docks including a replacement of the boat lift currently located on the City Dock.

4.2.3. Damages

Given the stated assumptions, absent Federal investment, it is assumed that damages and inefficiencies will continue to occur at Whittier. As the closest road-accessible small boat harbor facility to Anchorage, Alaska's largest population center, Whittier will continue to serve as the Gateway to Prince William Sound and provide support for commercial fishing, subsistence, and recreational activities. Under future without project conditions, harbor facilities in Whittier are expected to remain heavily congested and lack sufficient moorage and launching capabilities to meet demand. Upland harbor facilities will similarly remain heavily congested.

These overcrowded conditions will continue to result in inefficiencies to all harbor users, transportation delays, damages to vessels and harbor infrastructure, and safety concerns. Some mariners will continue to travel long distances to alternate harbor facilities due to the prevalent congestion at Whittier. Commercial fishing, subsistence, and recreational opportunities will continue to be hindered. Without such improvements, these transportation inefficiencies, damages, safety concerns, and lost opportunities are expected to persist throughout the period of analysis. The expected future levels of these damages and inefficiencies are detailed in Appendix C, *Economics*.

4.3. Biological Environment

While there is no possible way of knowing what the future condition at the head of Passage Canal would look like without the implementation of USACE's proposed navigational improvements, the reasonable continuation of existing processes can be extrapolated to provide this type of scenario.

Hazards associated with increased navigational congestion at Whittier have an inherent capacity to increase the likelihood of an inadvertent environmental release of petroleum or other environmentally persistent contaminants. Although spill protection devices are in place at the port of Whittier, a large enough release would essentially be cordoned off from the rest of Prince William Sound by containment booms. Thus, the spill would be wholly confined to upper Passage Canal. Environmental remediation from this type of action can take years to decades to complete depending upon the extent of the damage. Consequently, the existing ecological baseline is only 54 years removed from the cataclysmic effects of the 1964 Good Friday earthquake which released untold thousands of gallons of petroleum and environmentally persistent contaminants into the waters of Passage Canal.

Despite the tendency to emphasize worst-case scenarios while future-casting a project of this nature, it is also entirely plausible that the future without project conditions could remain stable, and that there would be little to no observable shift in the ecological baseline over the course of the theoretical timeline. Coastal and subtidal habitats at the head of Passage Canal are dynamic, they are subject to geologic forces that have acted upon them in real-time; annual freeze-thaw cycles, unique meteorological conditions, and anthropogenic influence have also contributed to the baseline as it exists today.

Indeed, in such a dynamic environment, it may be difficult to characterize or precisely detect the effects of climate change without a rigorous, long-term data collection effort that considers wide array of environmental parameters. Consider also that sea level change itself is a relative term, it describes the relationship between the elevations of the sea surface and the elevation of a particular land mass in question. Much of the Alaskan land mass experiences glacial isostatic rebound, a remnant condition of the previous ice age that increases the elevation of the land in relation to the elevation of the surrounding seas. According to NOAA's Tides and currents sea level trends website, accessed May of 2018, Valdez, Alaska, located 85 miles northeast of Whittier, in Prince William Sound, experiences quite a different sea level change rate of -8.59 mm/year.

4.4. Summary of the Without Project Condition

Absent Federal action to provide navigation improvements at Whittier, harbor and upland navigation facilities in Whittier are expected to remain heavily congested and lack sufficient launching and moorage capabilities to meet demand, resulting in inefficiencies to harbor operations and all harbor users, transportation delays, damages to vessels and harbor infrastructure, safety concerns, and lost opportunities for commercial fishing, subsistence, and recreational activities. A summary of these expectations is provided in Table 7.

Table 7. Summary of Future Without Project Conditions

Category:	Present Value	Average Annual
Harbor Operations Costs	$671,000	$25,000
Vessel Delays	$3,559,000	$132,000
Travel Cost Inefficiencies	$909,000	$34,000
Vessel Damages	$9,037,000	$335,000
Commercial Harvest Inefficiencies	$28,976,000	$1,073,000
Subsistence Harvest Inefficiencies	$16,872,000	$625,000
Labor Resources Underutilization	$8,749,000	$324,000
Recreation Unit Day Value (UDV)	$59,366,000	$2,199,000
Recreation UDV Discouraged Users	$41,326,000	$1,531,000
Total	**$190,306,000**	**$7,572,000**

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 one or more planning objectives. A management measure is a feature or activity that can be implemented at a specific geographic location to address one or more planning objectives. A feature is a "structural" element that requires construction or assembly on-site whereas an activity is defined as a "nonstructural" action.

5.2. Plan Formulation Criteria

Alternative plans were formulated to address study objectives and adhere to study constraints. Each alternative plan shall be formulated in consideration of four criteria as defined earlier in Section 2.6: completeness, efficiency, effectiveness, and acceptability.

In addition to these criteria used for all potential USACE water resource development project, a study specific criteria of minimizing potential conflicts with known areas of soil and groundwater contamination has also been identified.

5.3. Individual Project Components Considered

5.3.1. Structural and Nonstructural Measures

Both structural and nonstructural measures were considered to improve navigation conditions at Whittier. Structural measures considered included floating breakwaters, rubble mound breakwaters, pile structures, mooring basins, and entrance and navigation channels. Nonstructural measures included existing facility improvements, harbor management measures, upland storage of vessels, and relocating vessels to other existing harbors.

5.3.2. Project Site Selection

This section describes potential sites for the proposed project (Figure 10) and how they fit the study objectives and formulation criteria.

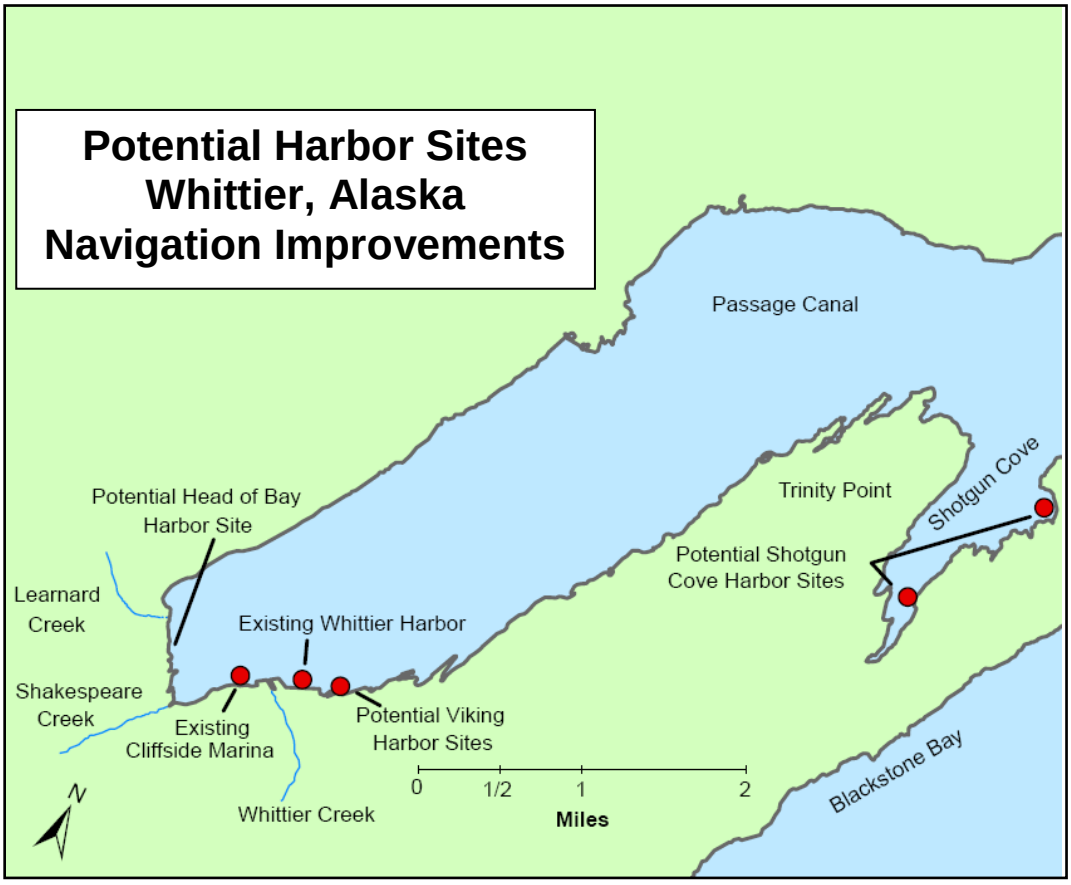


Figure 10. Potential Project Sites, Whittier Alaska

Whittier Harbor. As documented in a 1989 Corps report, the existing harbor breakwater is built on the outside edge of an alluvial fan that moved to its present elevation during the 1964 earthquake. The report documents the slope and breakwater instability that led to repairs in 1990. Because of slope instability, expanding the existing breakwater seaward is not practicable. Expanding in other directions would provide additional moorage and could lessen delays as shown in previous Corps reports. However, removing uplands would likely increase congestion because there would be even less room for vehicles. Expanding the existing harbor inland may also be environmentally damaging because of extensive diesel fuel contamination that occurred in a spill during the 1964 earthquake. Existing development on both sides of the harbor hinder expansion to both the east and west. Due to these limitations, constructing navigation improvements at the existing harbor is excluded from further consideration.

Cliffside Marina. This privately owned harbor is to the west of Whittier Harbor and the mouth of Whittier Creek. It was constructed in 2004, providing moorage for 103 vessels. The few slips that were available were selling for $125,000 to $175,000. Transferring the rights to the existing slips into public ownership would require an expenditure of $15 to $20 million at the $175,000 per slip price. Expansion options are limited because of the deep water in which a protective structure would need to be built. Very little upland area exists for future use. This

option would likely increase upland congestion. The considerable extra expense and the lack of uplands are the factors that remove Cliffside Marina from further consideration.

Head of the Bay. The Head of the Bay site is about 1 mile west of Whittier and about 1/2 mile northeast of the Anton Anderson Memorial Tunnel. The site is bounded on the south by Shakespeare Creek and by mountainous terrain just to the north of Learnard Creek. The shoreline consists of a low-lying, shallow-sloping alluvial fan composed of cobbles, pebbles, sand and some finer sediments. Several large stands of dense deciduous vegetation spread across the areas upland of the beach. The shore slopes gradually to a depth of about 10 feet where the depth increases sharply. The site and an adjacent gravel parking lot is currently accessible by gravel road.

At the Head of the Bay, there are three potential project sites bounded by the two creeks:

- Between Airstrip and Learnard Creek
- Shakespeare Creek
- North of Learnard Creek

There is potential to identify an alternative at this location that could provide additional moorage, launch facilities, and reduce congestion by providing a separate facility for much of the transient fleet, thus achieving the objectives of the project.

The Head of the Bay was the site of the former Defense Fuel Support Point-Whittier (DFSP-W), established to support U.S. military installations in Alaska during the Cold War. DFSP-W was operated as a bulk fuel storage and distributing facility from 1949 through closure in 1996. At the time of closure, the facility included 26 fuel storage tanks, a railroad loading rack, access roads, and support buildings (Figure 11). Following closure in 1996, the site has undergone various demolition and decommissioning activities. As of November 2015, no tanks remain on site, and only 13 tank platforms of reinforced concrete remain where the large aboveground storage tanks once stood. According to a Defense Logistics Agency Energy report from 2015, the area is contaminated with petroleum products released during operation of the facilities. Despite numerous remediation efforts, subsurface soils and groundwater remain contaminated with residual fuel constituents in some areas.

Figure 11. 2003 Aerial Photo of Head of Bay Site
(Storage tanks have since been removed.)

A comparative analysis of the three potential project site identified at the Head of the Bay location resulted in identifying the area bounded to the south by the airport safety zone and to the north by Learnard Creek (Figure 5-2) as the preferred location.

North of Learnard Creek. This potential site is bound by Learnard Creek to the south and mountainous terrain to the north. The amount of uplands that can be safely developed is limited due to threats from stream erosion, landslides, and avalanches. Additional infrastructure would need to be constructed to access and provide utilities to the site. Since this site is the farthest from any development, it would likely be the most expensive site to provide access and

services to. However, this site is least likely to contain contaminated soils since it is the furthest distance from the former fuel storage facility. Development at this site would not interfere with any existing development. Deep depths located not far offshore limit breakwater construction to the shallower depths in the nearshore. To provide ample moorage, expensive upland excavation is likely to be required. Wind and wave conditions would be similar to the remaining sites. Land north of Learnard Creek is owned by the Alaska Railroad Corporation and leased to the City of Whittier for development.

Due to the increased costs to develop this site and the minimal uplands that could be safely developed, this is the least preferred of the three potential Head of Bay project locations.

Between Airstrip and Learnard Creeks. This potential site is bound by Learnard Creek to the north and the gravel airstrip to the south. An existing gravel road provides access to a gravel clearing located within the southern portion of this site. This site is adjacent to ample uplands suitable for development. However, this site is closest to the former fuel storage facility and is most likely to possess soil and water contamination. Any upland and harbor development at this site will require the proper consideration and disposal of contaminated materials. The land needed for the local sponsor facilities (LSFs) is owned by the Alaska Railroad Corporation and leased to the City of Whittier, for development. While the airstrip is adjacent to this site, there is enough area for harbor development available to minimize any potential for conflicting use of space. Deep depths located not far offshore limit breakwater construction to the shallower depths in the nearshore. To provide ample moorage, upland excavation is likely to be required. Upland excavation, especially of contaminated soils, would be a substantial cost to project development. Wind and wave conditions would be similar to the remaining sites.

While this site does have potential concerns that must be properly addressed, it has been identified as the preferred Head of Bay location due to the ample uplands available and less expensive access to infrastructure and utilities.

Shakespeare Creek. This potential site is bound by the airstrip to the north and the paved road leading to Whittier to the south. Developable uplands at this site appear to be insufficient. In addition to being limited by the adjacent airstrip and road, they are also bisected by Shakespeare Creek. Shakespeare Creek is an anadromous creek. Construction of a harbor in the mouth of an anadromous creek is not likely to be a favorable alternative to resource agencies or the public. A majority of the land is owned by the Alaska Railroad Corporation and would need to be acquired by the City of Whittier. Potential impacts to the airstrip are a bigger concern than the site between the Airstrip and Learnard Creeks since there is less available space to develop a harbor at this location. The site is adjacent to existing infrastructure which would likely reduce the costs to provide required access and utilities. Anecdotally, wind and wave conditions at this site may be less severe than the other two.

Due to this site being located in the mouth of an anadromous stream and possessing limited uplands, it is not the preferred site. There is potential that a diversion of Shakespeare Creek combined with development of additional uplands on the opposite side of the airstrip could make

this a favorable site. Hence, this site is identified as the second Preferred Alternative for development.

Shotgun Cove. Shotgun Cove is 5 miles east of Whittier on the southern shoreline of Passage Canal. Heavily vegetated bedrock outcroppings, sheer rock faces, and gravel beaches comprise the majority of Shotgun Cove's shoreline. Low-sloped shoreline areas are restricted to the head of the cove and isolated sections along the southern shoreline.

Access to Shotgun Cove is by boat or trail. A road has been constructed for about half the distance, with plans underway for further construction. The Shotgun Cove Road project is a multi-phase undertaking by the City of Whittier in partnership with the U.S. Forest Service and Chugach Alaska Corporation to facilitate community development, provide recreational opportunities, and enhance public safety. The first two project phases which are the focus of the City's near-term efforts have independent utility and will result in, among other important benefits, road access to U.S. Forest Service property at Trinity Point. The total cost of this project is about $30,000,000. Although plans identify a road corridor within Shotgun Cove area proper, extending the road from Trinity Point to the head of Shotgun Cove where a harbor could be built is not considered viable at this time. The route would literally need to be carved out of the side of the mountains, making the project cost likely too excessive to be feasible. Additionally, limited space for upland facilities at Shotgun Cove would mean leaving the congestion problem at the existing harbor or transferring it to Shotgun Cove.

Since access to this site is unlikely in the foreseeable future, this location does not merit further consideration.

Viking Harbor. Viking Harbor was identified and documented as a potential site in the Corps' 1997 Navigation Improvements study. It is east of the existing harbor on the landward side of the Alaska State ferry terminal. This relatively small site was designed to hold eleven vessels 60 feet in length or longer. Past Corps feasibility studies showed that Viking Harbor could feasibly provide moorage for about seven boats of the size 60 feet or longer.

The Viking Harbor site is removed from further consideration. The limited room available for this site does not allow for sufficient moorage of additional vessels needed to improve congestion, nor does the site improve upland congestion.

5.4. Preliminary Alternative Plans

The following potential alternatives were initially identified for the Head of the Bay project site to meet the identified project objectives.

1. No Action. Under this alternative, navigation improvements would not be implemented at Whittier.

2. 4-Lane Boat Launch with Harbor Breakwater. This alternative consists of a rubble-mound breakwater protected 4-lane boat launch and dredged entrance and

maneuvering channel. The breakwater design would be such that it would also provide protection for up to 300 moored vessels if future expansion of the facility to provide moorage were constructed.

3. Harbor with Moorage for 150 Vessels. This alternative consists of a rubble-mound breakwater protected boat harbor, including a boat launch facility, dredged entrance channel, maneuvering channel, and moorage area. The harbor would provide moorage for 150 vessels.

4. Harbor with Moorage for 300 Vessels. This alternative consists of a rubble-mound breakwater protected boat harbor, including a boat launch facility, dredged entrance channel, maneuvering channel, and moorage area. The harbor would provide moorage for 300 vessels.

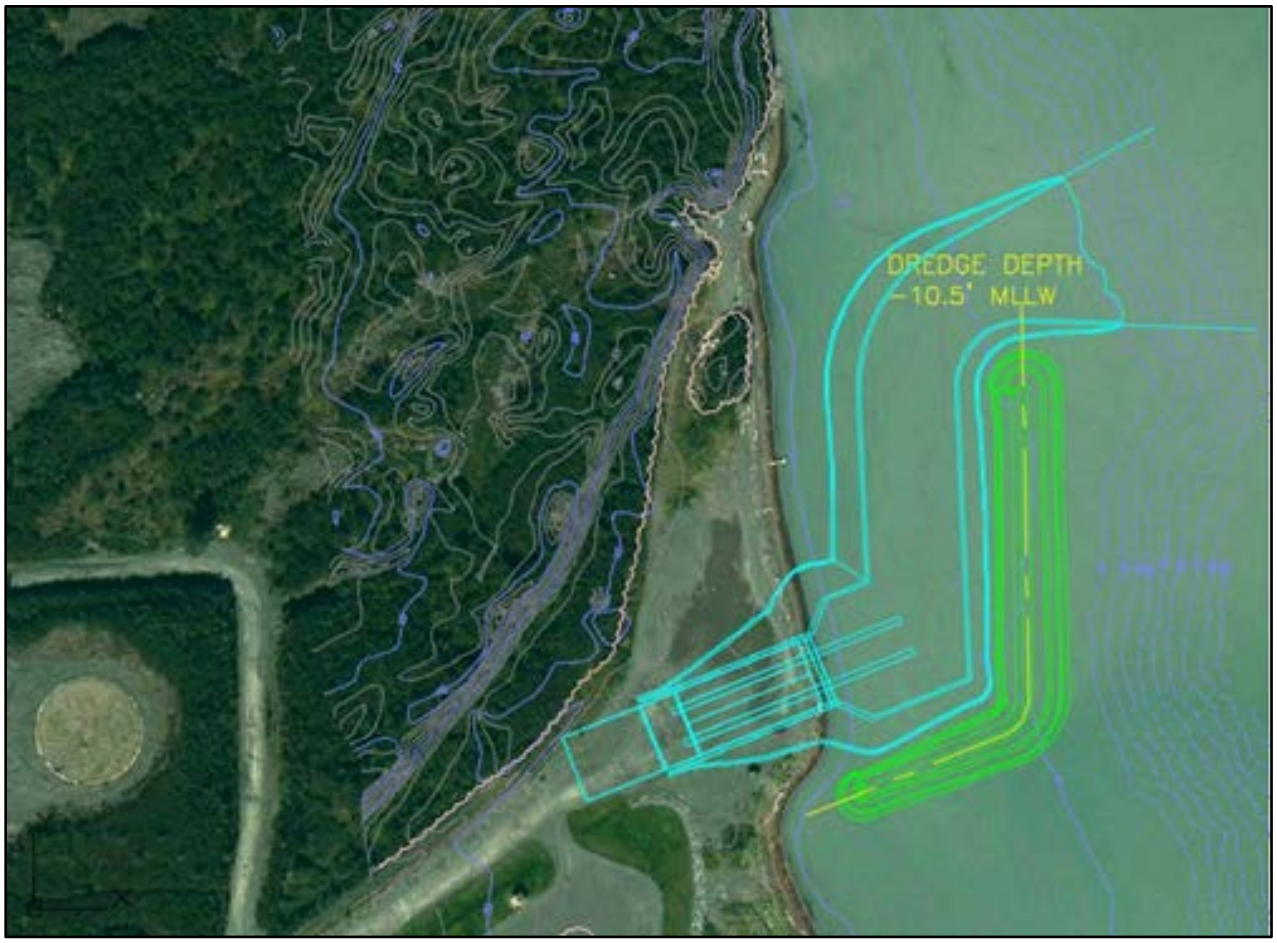
5. Shakespeare Creek Harbor. A harbor facility considered for the mouth of Shakespeare Creek.

Alternatives Eliminated from Detailed Analysis. Subsequent to the identification of the first five alternatives, due to concerns about meeting construction cost-sharing requirements, the local sponsor requested that the U.S. Army Corps of Engineers suspend further development of alternatives providing moorage and to focus remaining study efforts upon smaller scale protected boat launch facilities.

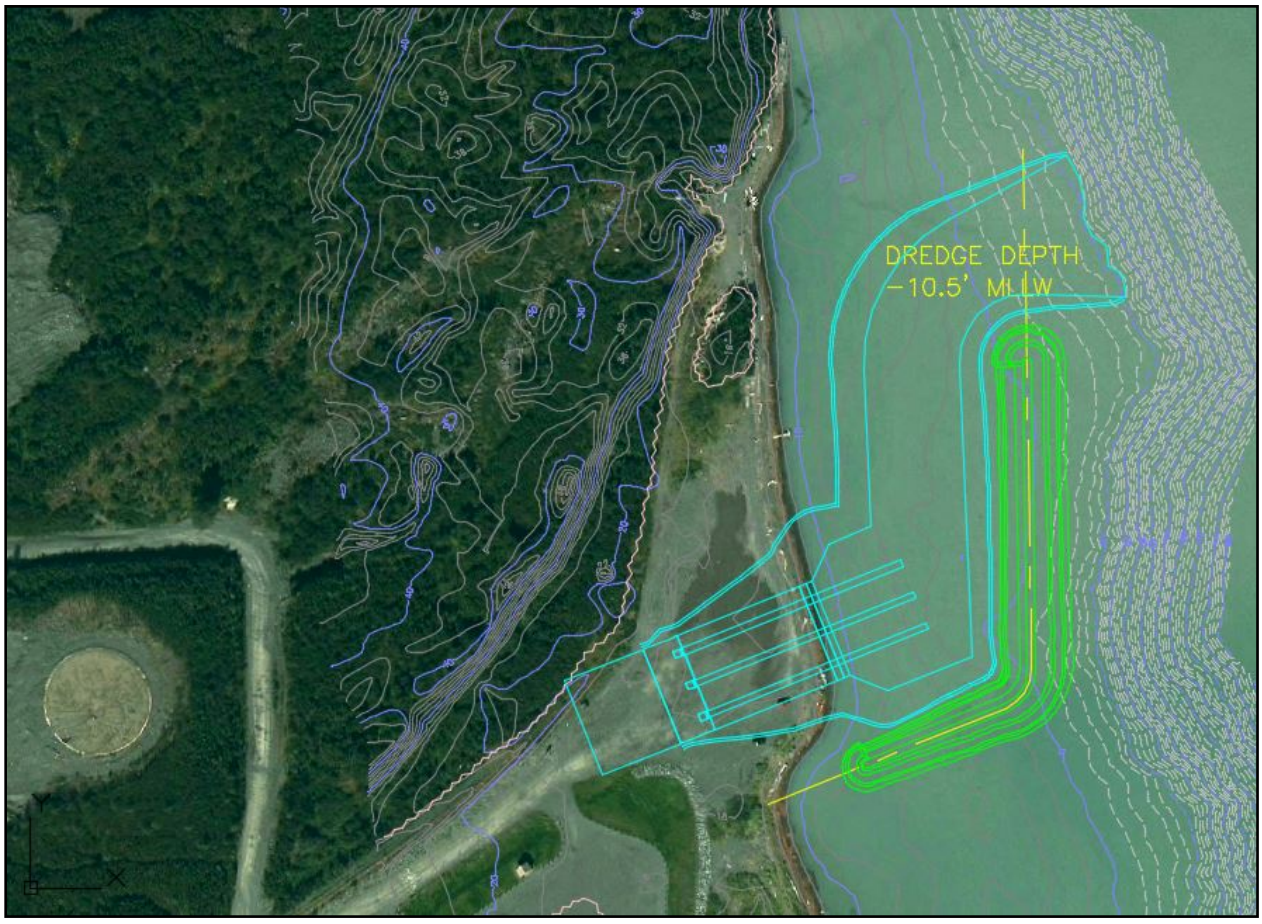
However, the City of Whittier is hopeful, that when fiscal constraints permit, they can expand built navigation improvements such that they also provide moorage. Consequently, the sponsor is in favor of alternatives that could provide this flexibility.

Alternatives Carried Forward. Following the above request, only Alternatives 6 through 9 were carried forward for further evaluation as follows:

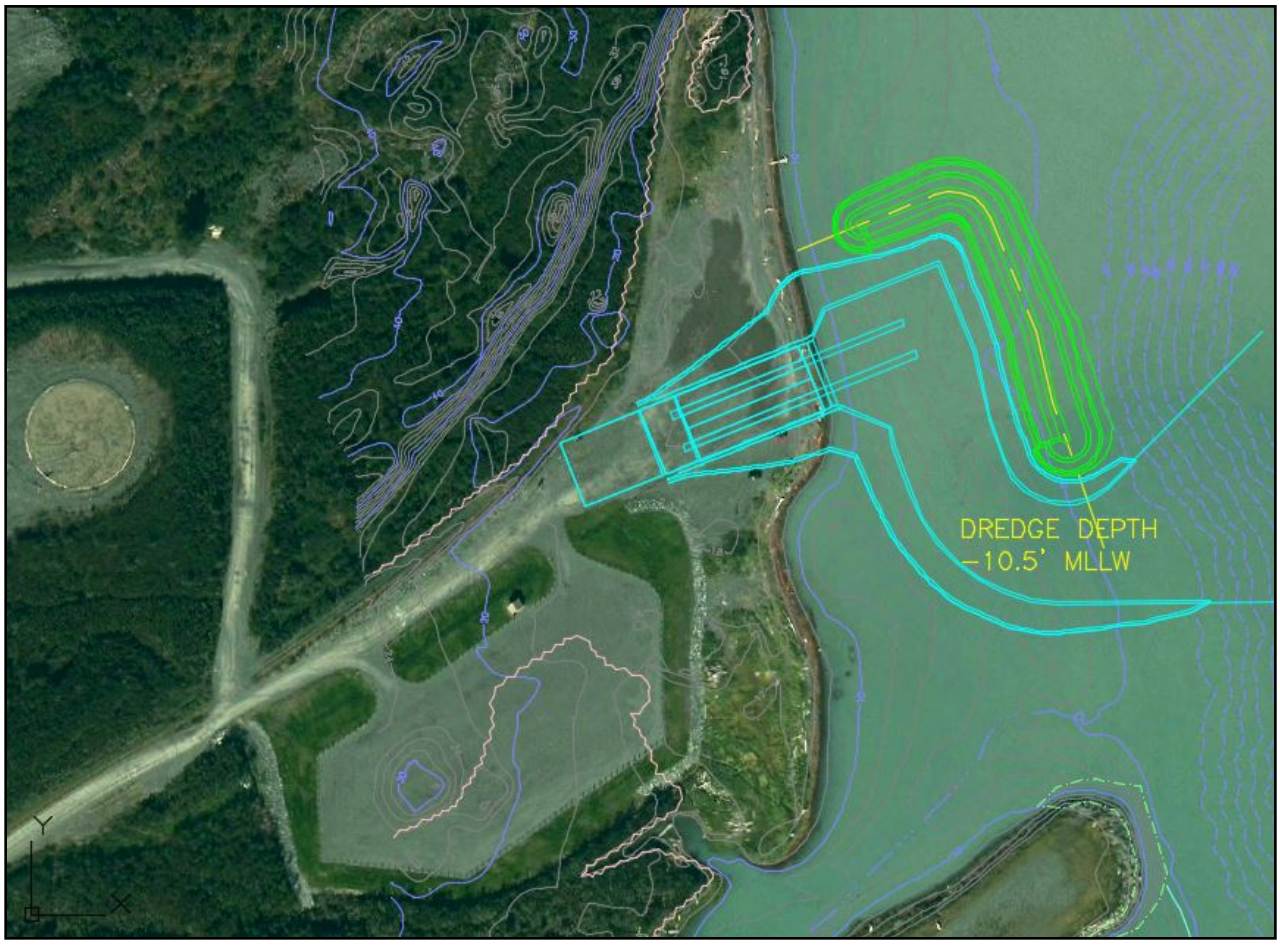
Alternative 6 – 4-Lane Boat Launch with North Entrance Channel. This alternative includes a 4-lane launch ramp, dredged entrance and maneuvering channel, and a rubble-mound breakwater with a north entrance. This breakwater alignment is longer and more costly than that of a south facing entrance channel due to the significant wave's southwest angle of incidence. The north breakwater alignment does have the advantage of a lower cost for a future mooring basin expansion to the north since less breakwater would have to be demolished for a northward breakwater extension. The north breakwater alignment also has the advantage of being less likely to encounter soil contamination at levels requiring costly transport for treatment off-site.



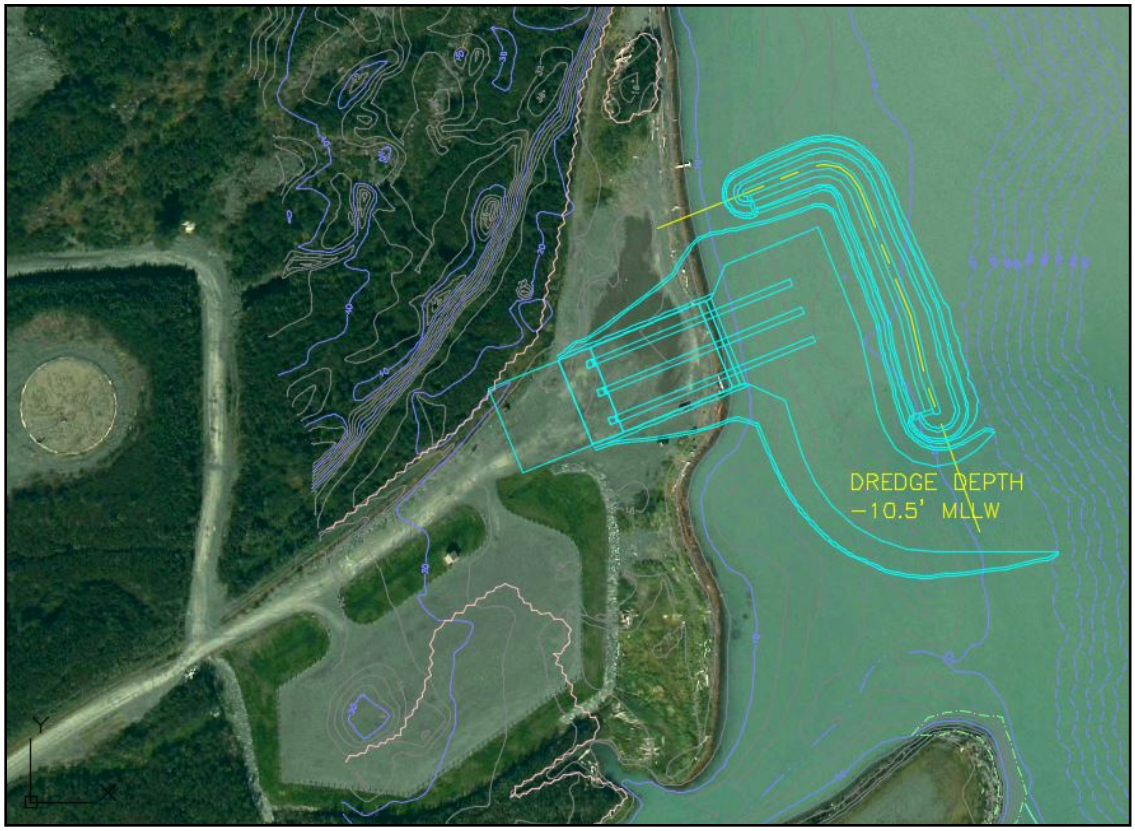
Alternative 7 – 6-Lane Boat Launch with North Entrance Channel. This alternative includes a 6-lane launch ramp, dredged entrance and maneuvering channel, and a rubble-mound breakwater with a north entrance. This breakwater alignment is longer and more costly than that of a south facing entrance channel due to the significant wave's southwest angle of incidence. The north breakwater alignment does have the advantage of a lower cost for a future mooring basin expansion to the north since less breakwater would have to be demolished for a northward breakwater extension. The north breakwater alignment also has the advantage of being less likely to encounter soil contamination at levels requiring costly transport for treatment off-site.



Alternative 8 – 4-Lane Boat Launch with South Entrance Channel. This alternative includes a 4-lane launch ramp, dredged entrance and maneuvering channel, and a rubble-mound breakwater with a south entrance. This breakwater alignment is the shortest and is the least costly of all alternatives. The south breakwater alignment does have the disadvantage of a higher cost for future mooring basin expansion to the north since more breakwater would have to be demolished for a northward breakwater extension. The south breakwater alignment also has the disadvantage of being more likely to encounter soil contamination at levels requiring costly transport for treatment off-site.



Alternative 9 – 6-Lane Boat Launch with South Entrance Channel. This alternative includes a 6-lane launch ramp, dredged entrance and maneuvering channel, and a rubble-mound breakwater with a south entrance. This breakwater alignment is shorter and is less costly than the 6-Lane north oriented breakwater alternative, Alternative 7. The south breakwater alignment does have the disadvantage of a higher cost for future mooring basin expansion to the north since more breakwater would have to be demolished for a northward breakwater extension. The south breakwater alignment also has the disadvantage of being more likely to encounter soil contamination at levels requiring costly transport for treatment off-site.



6. COMPARISON & SELECTION OF PLANS*

6.1. Detailed Alternative Plans Descriptions

6.1.1. With-Project Conditions

The alternatives were designed to meet the planning objectives and criteria and were evaluated based on environmental, economic, and engineering considerations. Regardless of the selected alternative, under the with-project condition, there would be a marked decline in damages and inefficiencies.

6.2. Alternative Plan Costs

Rough Order of Magnitude (ROM) costs for the alternatives including those to construct and maintain facilities are shown in Table 8. Cost risk contingencies were included to account for uncertain items such as sediment characterization and dredged material disposal methods. Interest during construction assumes a 2-year construction window. Initial estimates of operations and maintenance assume 15 percent of breakwater armor rock would be replaced in 25 years. Project costs were developed without escalation and are in 2018 dollars.

Based on existing information about potential sediment management and dredged material disposal options, the north entrance alternatives (Alternatives 6 and 7) are expected to require less sediment treatment off-site than the south entrance alternatives (Alternatives 8 and 9). It is assumed that 5 percent of dredged material would require off-site treatment for the north entrance alternatives, whereas 15 percent of dredged material would require off-site treatment for the south entrance alternatives. These differences are accounted for in the cost estimates.

Table 8. Rough Order of Magnitude Costs by Alternative

Item	Alt 6	Alt 7	Alt 8	Alt 9
Mobilization and Demobilization	$959,000	$959,000	$959,000	$959,000
Breakwaters	$4,191,000	$4,253,000	$3,419,000	$3,980,000
Breakwater	$3,167,000	$3,167,000	$2,546,000	$3,011,000
Topographic/Hydrographic Surveys	$453,000	$453,000	$453,000	$453,000
Navigation Aids	$58,000	$58,000	$58,000	$58,000
Slope Protection Rock	$513,000	$575,000	$362,000	$458,000
Dredge Maneuvering Basin	$4,342,000	$4,642,000	$3,932,000	$4,343,000
Disposal of Dredge Spoils	$1,934,000	$2,070,000	$4,282,000	$4,748,000
Boat Launch Ramp	$4,465,000	$6,697,000	$4,465,000	$6,697,000
LERRS	$345,000	$345,000	$345,000	$345,000
Construction Management	$1,400,000	$1,400,000	$1,400,000	$1,400,000
PED	$2,549,000	$2,549,000	$2,549,000	$2,549,000
Project Cost	**$20,243,000**	**$22,973,000**	**$21,409,000**	**$25,080,000**
IDC	$558,000	$633,000	$590,000	$691,000
O&M	$529,000	$529,000	$512,000	$533,000
Total Investment Cost	**$21,330,000**	**$24,135,000**	**$22,511,000**	**$26,304,000**

6.2.1. Total Average Annual Equivalent Costs

Average annual costs were developed by combining the initial construction costs with the annual Operations and Maintenance costs for each alternative using the FY18 Federal Discount Rate of 2.75 percent along with a period of analysis of 50 years (Table 9).

Table 9. Average Annual Cost Summary by Alternative

Cost Type	Alt 6	Alt 7	Alt 8	Alt 9
AAEQ Investment	$770,000	$874,000	$815,000	$955,000
AAEQ OMRR&R	$20,000	$20,000	$19,000	$20,000
Total AAEQ Cost	**$790,000**	**$894,000**	**$834,000**	**$975,000**

6.3. With-Project Benefits

Each alternative provides a certain amount of relief from existing and expected future damages and inefficiencies. The differences between the expected level of damages and inefficiencies absent Federal action (without-project condition) and those that will 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 FY18 price levels by calculating average annual reductions in transportation costs, vessel damages, vessel delays, and harbor infrastructure damages, as well as annual increases in commercial fishing harvests, subsistence harvests, and recreational value. Projected benefits realized through the use of otherwise unemployed or underemployed labor resources during project construction were also calculated. Tables 10 and 11 show the present value and average annual value of benefits, respectively, by benefit category for each alternative. All project costs and benefits are in 2018 dollars with present values based on the FY18 discount rate and 50-year period of analysis. See Appendix C, *Economics*, for more details.

Table 10. Present Value of Benefits by Alternative

Category:	Alt 6	Alt 7	Alt 8	Alt 9
Harbor Operations Benefits	$199,000	$199,000	$199,000	$199,000
Vessel Delays Prevented	$2,278,000	$2,983,000	$2,278,000	$2,983,000
Travel Cost Savings	$779,000	$909,000	$779,000	$909,000
Expected Vessel Damages Prevented	$7,267,000	$8,589,000	$7,267,000	$8,589,000
Commercial Harvest Gains	$4,484,000	$4,484,000	$4,484,000	$4,484,000
Subsistence Harvest Gains	$1,843,000	$1,843,000	$1,843,000	$1,843,000
Returns on Labor Resources	$7,706,000	$8,749,000	$7,183,000	$8,479,000
Aggregate Recreation UDV Gained	$16,020,000	$16,020,000	$16,020,000	$16,020,000
Returns from Recreation UDV Discouraged Users	$31,386,000	$41,326,000	$31,386,000	$41,326,000
Total	**$71,962,000**	**$85,102,000**	**$71,439,000**	**$84,832,000**

Table 11. 6-4. Annual Benefits by Alternative

Category:	Alt 6	Alt 7	Alt 8	Alt 9
Harbor Operations Benefits	$7,000	$7,000	$7,000	$7,000
Vessel Delays Prevented	$84,000	$110,000	$84,000	$110,000
Travel Cost Savings	$29,000	$34,000	$29,000	$34,000
Expected Vessel Damages Prevented	$269,000	$318,000	$269,000	$318,000
Commercial Harvest Gains	$166,000	$166,000	$166,000	$166,000
Subsistence Harvest Gains	$68,000	$68,000	$68,000	$68,000
Returns on Labor Resources	$285,000	$324,000	$266,000	$314,000
Aggregate Recreation UDV Gained	$593,000	$593,000	$593,000	$593,000
Returns from Recreation UDV Discouraged Users	$1,163,000	$1,531,000	$1,163,000	$1,531,000

Net Benefits of Alternative Plans. Net benefits are determined by subtracting the average annual equivalent (AAEQ) costs from the average annual equivalent benefits for each alternative. Table 12 summarizes project costs, benefits, and benefit-cost ratio (BCR) by alternative. The plan that reasonably maximizes net benefits is highlighted in yellow.

Table 12. Summary of Costs and Benefits by Alternative

Alternative	Total PV Costs	Total AAEQ Costs	Total AAEQ Benefits	Total Net Benefits	BCR
6	$21,330,000	$790,000	$2,666,000	$1,876,000	3.4
7	$24,135,000	$894,000	$3,152,000	$2,258,000	3.5
8	$22,511,000	$834,000	$2,646,000	$1,812,000	3.2
9	$26,304,000	$974,000	$3,142,000	$2,168,000	3.2

6.4. Summary of Accounts and Plan Comparison

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.

6.4.1. National Economic Development

The results of the NED analysis were discussed in the previous section with Alternative 7 maximizing net benefits.

6.4.2. 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. Regarding construction

spending, further analysis of regional economic benefits is detailed in the Regional Economic Development (RED) analysis section of Appendix C, *Economics*. 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.

6.4.3. Environmental Quality

Environmental Quality displays the non-monetary effects of the alternatives on natural and cultural resources and is described more fully in the environmental assessment sections of this report. Impacts on species of economic importance due to a project are not expected given management of fisheries in Prince William Sound. Substantial impacts to food, water, and breeding habitat to species of concern as a result of a project are also not expected, and thus, a Cost Effectiveness/Incremental Cost Analysis (CE/ICA) to compare project alternatives' impacts on species of concern is not required here.

6.4.4. Other Social Effects

Other social effects displays the non-monetary effects of the alternatives on the population of the project area. These affected aspects are health and safety, quality of life, and educational, cultural, and social services.

Construction of this project in Whittier supports the local economy and provides income to a small community. This injection of income to the City of Whittier supports the provision of public services to the community and improves quality of life. Beneficial effects of each alternative also include a temporary increase in jobs, associated demand for temporary housing, and spending of disposable income. The health and safety of those involved with navigation at Whittier will benefit by reducing overcrowding/congestion in and around the harbor and city center.

6.4.5. Four Accounts Evaluation Summary

Based on this qualitative 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 Tentatively Selected Plan (TSP) for the Study is Alternative 7. Table 13 shows a summary of the four accounts for all alternatives, with the TSP highlighted in yellow.

Table 13. Four Accounts Summary

Alternative	Net Annual NED Benefits BCR	Average Annual Cost	EQ	RED	OSE
No Action	$0	$0	Neutral	Neutral	Neutral
6	$1,876,000 (3.4)	$790,000	Negative	Increased employment and income for the region and state	Beneficial
7	$2,258,000 (3.5)	$894,000	Negative	Increased employment and income for the region and state	Beneficial
8	$1,812,000 (3.2)	$834,000	Negative	Increased employment and income for the region and state	Beneficial
9	$2,168,000 (3.2)	$974,000	Negative	Increased employment and income for the region and state	Beneficial

7. TENTATIVELY SELECTED PLAN*

7.1. Description of Tentatively Selected Plan

Based on the preliminary NED analysis, the TSP is Alternative 7, the 6-lane Boat Launch with North Entrance Channel, with a BCR of 3.5 and average annual net benefits of approximately $2.26 million. These preliminary NED calculations will be further refined between the TSP and Agency Decision Milestones.

7.1.1. Plan Components

Alternative 7 (Figure 12) includes a 6-lane launch ramp, dredged entrance and maneuvering channel, and a rubble-mound breakwater.

Launch Ramp. This alternative would add six additional breakwater protected boat launch ramp lanes. The launch ramps are designed similarly to those installed at the existing harbor in Whittier. The ramps will have an asphalt turn-around area at the top of the ramp, a parabolic concrete apron, concrete ramp planks, and a pipe-pile supported, articulated boarding float made up of individual modules.

The asphalt turn-around area is the full width of the six ramps or 120 feet wide, providing a turning radius of 60 feet. The turn-around is 100 feet in length or 1.5 times the estimated combined vehicle and trailer length (66 feet). The turn-around will be constructed of a 6-inch layer of roller compacted asphalt on top of a 12-inch layer compacted crushed gravel base course.

The concrete ramp apron will have a parabolic shape to transition from the turnaround to the ramp slope without trailer high centering. The concrete apron will also include wedge shaped

abutments for the connection of the boarding floats. The ramp apron will be constructed of a 9-inch layer of poured concrete on top of a 12-inch layer compacted crushed gravel base course.

The boat launch ramp, including the concrete apron, extends from the existing grade of +18 feet MLLW down to a depth of -6.6 feet MLLW, ensuring that the ramp will be usable during all tide levels. The ramp section will have a 13 percent slope and a length of 156 feet. The ramp section will be constructed of many individual concrete planks that are bolted to a heavy timber sleeper frame that is filled with compacted crushed gravel base course. The 20-foot width of the ramp planks will provide a 16-foot wide launch lane and half of the width, 4 feet, for the three boarding floats. A layer of slope protection rock will extend down from the end of the ramp slope for an additional 10 feet and then continue down to the dredged depth at the standard 1V:2H slope.

Each of the three boarding floats will be 280 feet long and 8 feet in width. Each float will service two launch lanes. The boarding floats will be made up of 14, 20-foot-long floating modules, and every other module will have a pipe pile installed through the module to uniformly support the boarding float from lateral forces such as wind, waves, vessel impacts, etc.

Rubble-mound Breakwater. The breakwater is a three-layer structure made up of primary armor layer, two armor stones thick, a secondary armor layer made of B rock, and a permeable core made up of core rock. The breakwater section is typical of a non-overtopping section. The armor rock extends the full length of the seaward side and the width of the crest, and the B rock extends down from the crest the length of the harbor-side slope.

The layout of the breakwater is designed such that the significant wave height from the 50-year storm is reduced to the maximum allowable wave height at the boat launch. The maximum allowable wave height for the boat launch only alternative is 2 feet. The breakwater begins in a water depth of +8 feet MLLW and extends a total length of 602 feet to the north end of the breakwater at a depth of -11 feet MLLW.

The breakwater layout defines a north facing entrance channel and maneuvering channel. This breakwater alignment is slightly longer and more costly than that of a south facing entrance channel due to the significant wave's southwest angle of incidence. The north breakwater alignment does have the advantage of a lower cost for future mooring basin expansion to the north since less breakwater would have to be demolished for a northward breakwater extension.

Entrance Channel. This alternative has an entrance and maneuvering channel 670 feet in length. Vessels would enter the entrance channel from the northeast and turn roughly 70 degrees to the south to access the boat launch. Due to the channel's northern orientation, the channel's length will be slightly longer and the dredged quantity will be slightly higher than the alternatives with a southern orientation. The design of the entrance channel for this alternative is based on a 37-foot length design vessel, typically the longest boat transported via trailer. The channel depth is -10.5 feet MLLW. The channel width is defined to accommodate two-way

traffic of the design vessel based on percent beam widths as described in Engineering Manual (EM) 1110-2-1615. The channel width is 112 feet.

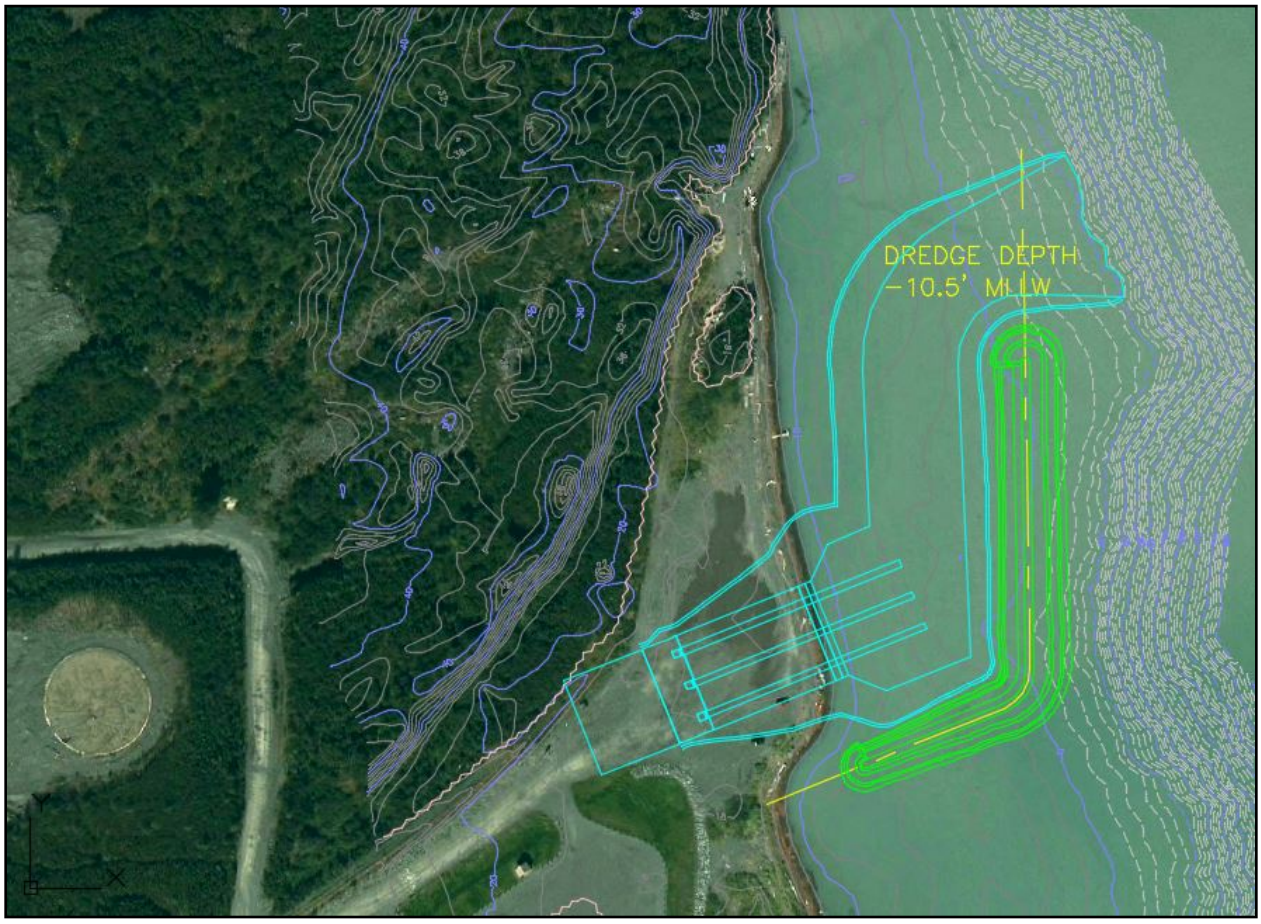


Figure 12. Tentatively Selected Plan, Alternative 7 - 6-lane Boat Launch with North Entrance Channel

7.1.2. Construction of Tentatively Selected Plan

The major harbor construction items for the TSP include the rubble-mound breakwaters, dredging, disposal areas, and boat launches. The sequence of construction will be dictated by the following sequencing requirements. Breakwater construction and dredging can occur simultaneously. Slope protection will have to be placed soon after the dredged slopes have been cut to grade. The constructions of the ramp features will have to take place after those areas are dredged/excavated to grade and wave protection is provided from the completed breakwater.

No environmental windows or administrative restrictions on construction activities have been identified to date that would limit construction operations. Subsequent environmental windows and/or construction restrictions would be detailed in the development of plans and specifications.

The construction duration for the TSP is estimated to be 12 to 24 months from ____ to ____, but it will depend on the timeframe of the contract awarded and the quantity of contaminated

dredging encountered. The contract award and contamination encountered will be determined during PED and construction.

7.1.3. Dredging & Disposal

Dredged material within the entrance channel should mainly consist of sand and gravels with some silt based on the previous geotechnical borings from the area. Encountering significant numbers of cobbles and boulders should also be expected. The geotechnical borings did not indicate the presence of bedrock, but the borings limited depth did not define the bedrock surface. At this point in the study, it is assumed that all dredged material will be deposited at an adjacent upland placement site (Figure 13) with a small portion being sent to a nearby facility for treatment. This assumption is discussed in more detail in Section 7.3 of this report. Sediment testing to be conducted during PED will determine permissible placement options, including in-water placement. A potential in-water placement site has been identified and is also indicated in Figure 13.

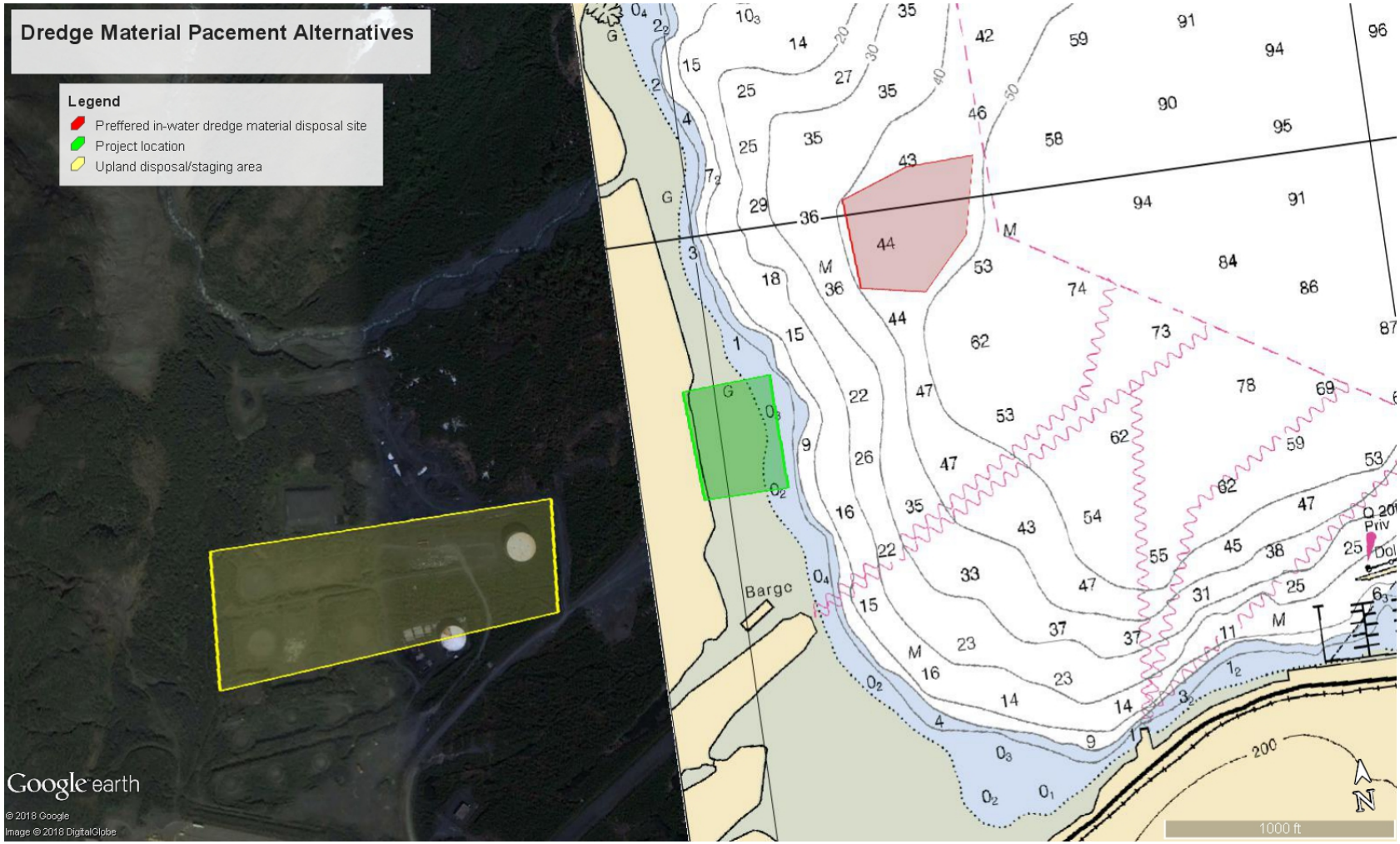


Figure 13. Locations of Potential Upland (Yellow) and In-Water (Red) Dredged Material Placement Sites

7.1.4. Operations & Maintenance

Annual maintenance dredging is not anticipated to be required for this alternative. Shoaling is not expected to be a significant issue with the location of the entrance channel. The lack of changes in the sites bathymetry indicate minimal sediment movement from littoral drift. Fine grained suspended sedimentation does not appear to be significant. The effects of sediment transported into Passage Canal from Learnard Creek appears to be limited to the immediate area of the alluvial fan at the mouth of the creek.

7.1.5. Mitigation Measures

- Consideration of environmental constraints in the selection of the Preferred Alternative to avoid areas likely to have higher levels of contamination.
- Implementation of a combination silt curtain and petroleum absorbent boom during active excavation activities in the vicinity of the boat launch facility. The silt curtain and petroleum absorbent boom shall be properly placed so that impacts to water quality, EFH, and marine habitat are lessened to the greatest degree practicable.
- Implementation of qualified marine mammal monitors for every aspect of in-water work. Each marine mammal observer would be equipped with appropriate two-way radio communication and hold the independent authority to halt project activities should a marine mammal be observed within a 200 meter radius of any in-water work. The qualified monitor would authorize the resumption of in-water work activities once the marine mammal had been witnessed to depart the monitoring radius or within 20 minutes of last sighting.
- Nesting bird surveys will be conducted if vegetation clearing during the USFWS proscribed timeframe of May 1st – July 15th is required.

7.1.6. Integration of Environmental Operating Principles

The USACE Environmental Operating Principles were developed to ensure that USACE missions include totally integrated sustainable environmental practices. The Principles provided direction to ensure the workforce recognized the Corps of Engineers role in, and responsibility for, sustainable use, stewardship, and restoration of natural resources across the nation and through the international reach of its support missions.

The Environmental Operating Principles relate to the human environment and apply to all aspects of business and operations. They apply across Military Programs, Civil Works, Research and Development, and across the USACE. The Principles require a recognition and acceptance of individual responsibility from senior leaders to the newest team members. Re-committing to these principles and environmental stewardship will lead to more efficient and effective solutions, and will enable the USACE to further leverage resources through collaboration. This is essential for successful integrated resources management, restoration of the environment, and

sustainable and energy efficient approaches to all USACE mission areas. It is also an essential component of the USACE's risk management approach in decision making, allowing the organization to offset uncertainty by building flexibility into the management and construction of infrastructure.

The Environmental Operating Principles are:

- Foster sustainability as a way of life throughout the organization.
- Proactively consider environmental consequences of all USACE activities and act accordingly.
- Create mutually supporting economic and environmentally sustainable solutions.
- Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the USACE, which may impact human and natural environments.
- Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs.
- Leverage scientific, economic, and social knowledge to understand the environmental context and effects of USACE actions in a collaborative manner.
- Employ an open, transparent process that respects views of individuals and groups interested in USACE activities.

7.2. Real Estate Considerations

Land, easements, rights-of-way, relocation, and disposals (LERRDS) necessary to implement this project, consist of Navigation Servitude, and Fee lands. The fee land is currently owned by the Department of the Army and have been directed by Congress to be conveyed to the City of Whittier. The City of Whittier owns the tideland and submerged lands (ATS 1545) lying within Navigation Servitude. The Alaska Railroad Corps owns the uplands needed for the LSF, but has been leased to the City of Whittier.

Real estate requirements are shown in Table 14. For additional information please see Appendix F, *Real Estate*.

Table 14. Real Estate Requirements

Features	Owners	Acres	Interest	General Navigation Feature/Local
Entrance Channel, Breakwater, (Portions Below Mean High Water)	City of Whittier	5	Navigation Servitude	General Navigation Feature
Disposal Site (Water)	City of Whittier	TBA	Navigation Servitude	General Navigation Feature
Disposal Site (Upland)	U.S. Army, Alaska	12	Fee	General Navigation Feature
All Launch Alternatives	Alaska Railroad Corp	2	Lease	LSF
TOTAL PROJECT BOUNDARY		19		

7.3. Risk & Uncertainty

A key uncertainty concerns the extent of contamination from the former bulk fuel storage and distributing facility located at the head of Passage Canal. This uncertainty has been reduced with the information available in *Decision Document for the Defense Fuels Support Point – Whittier, Alaska* (ERM Alaska 2015). As illustrated in Figures 14 and 15, the extent of soil and groundwater contamination is better understood. Additionally, USACE conducted comprehensive chemical constituent analyses on sediments collected as part of its geotechnical characterization of the proposed Head of Bay site. Although this additional soil contamination data was collected as part of this effort, as illustrated in Figure 7-5, the location of the samples were based upon the likely areas to be dredged as part of the original larger scale alternatives that provided moorage, not the smaller protected boat launch options. Accordingly, only two representative sediment samples currently exist for the envisioned project footprint.

One of these samples, B07, displayed Diesel Range Organics (DRO) at levels exceeding the ADEC established method—two aggregate score—required for cleanup. 18 AAC 75.341, Table B2 stipulates that DRO compounds in excess of 230 mg/kg occurring at a depth reasonably expected to facilitate migration to groundwater within the over 40 inches of annual precipitation zone are identified for cleanup. Cleanup, as defined by ADEC, is an effort to mitigate environmental damages or threats to human health, safety, or welfare from hazardous substances or oil that may include the removal of hazardous substances from the environment, such as by restoration, remediation, and other measures that are necessary to mitigate or avoid further threat. Because DROs are crude oil distillates, they are specifically excluded from a “hazardous substance” definition in 42 U.S.C 9601 (14), and as such, do not qualify as Hazardous, Toxic, or Radioactive Waste (HTRW) under USACE Civil Works Project planning guidance.

Adequate data characterizing the approximate volume of sediments exceeding ADEC cleanup levels from the dredging prism of the projected project footprint are lacking. Additional sediment chemical constituent analysis efforts are required during PED to determine the level and volume of contamination that exists within the proposed project footprint and to formulate suitable dredged material placement options.

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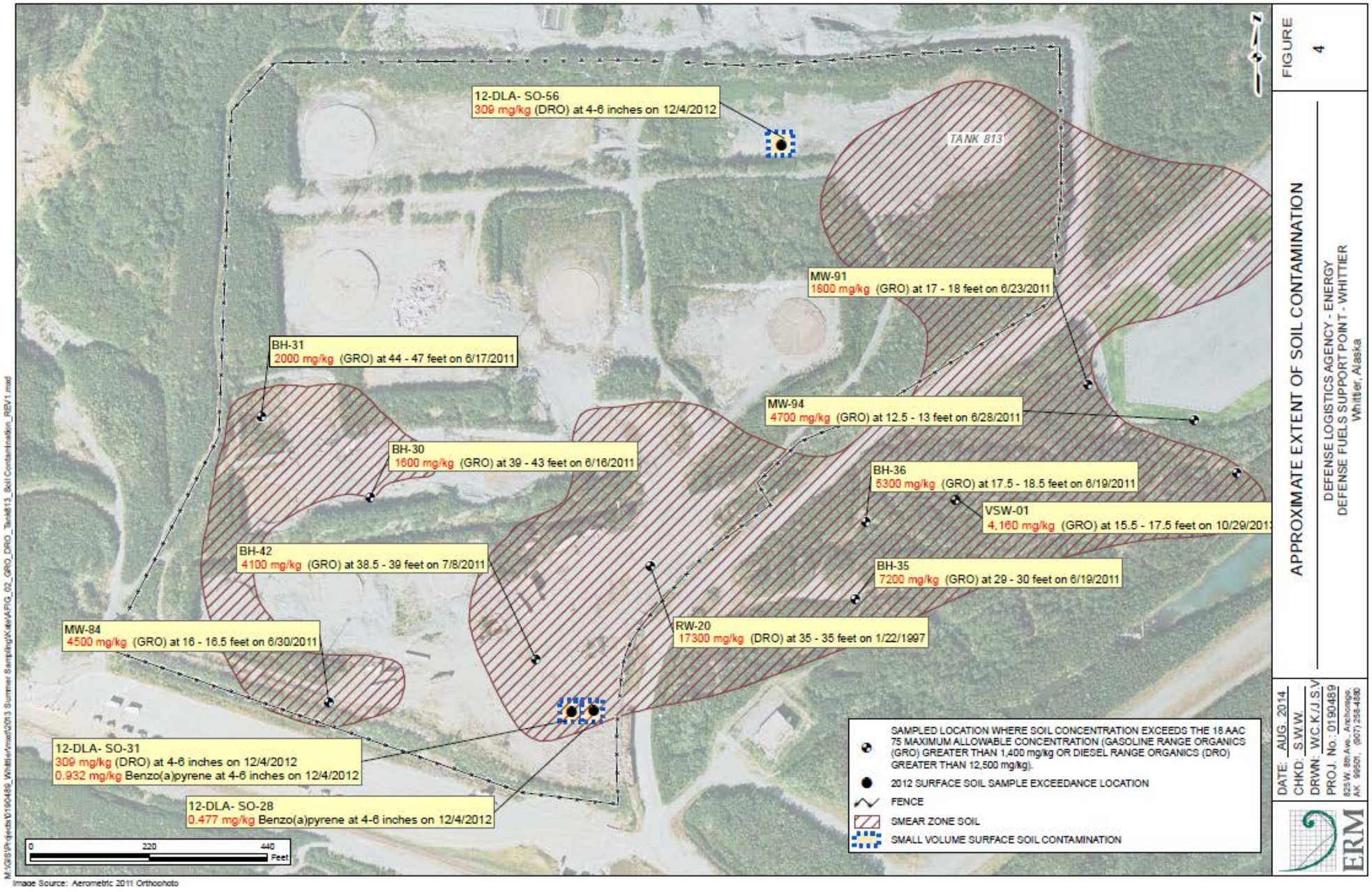

Figure 14. Approximate Extent of Soil Contamination (ERM Alaska 2015)

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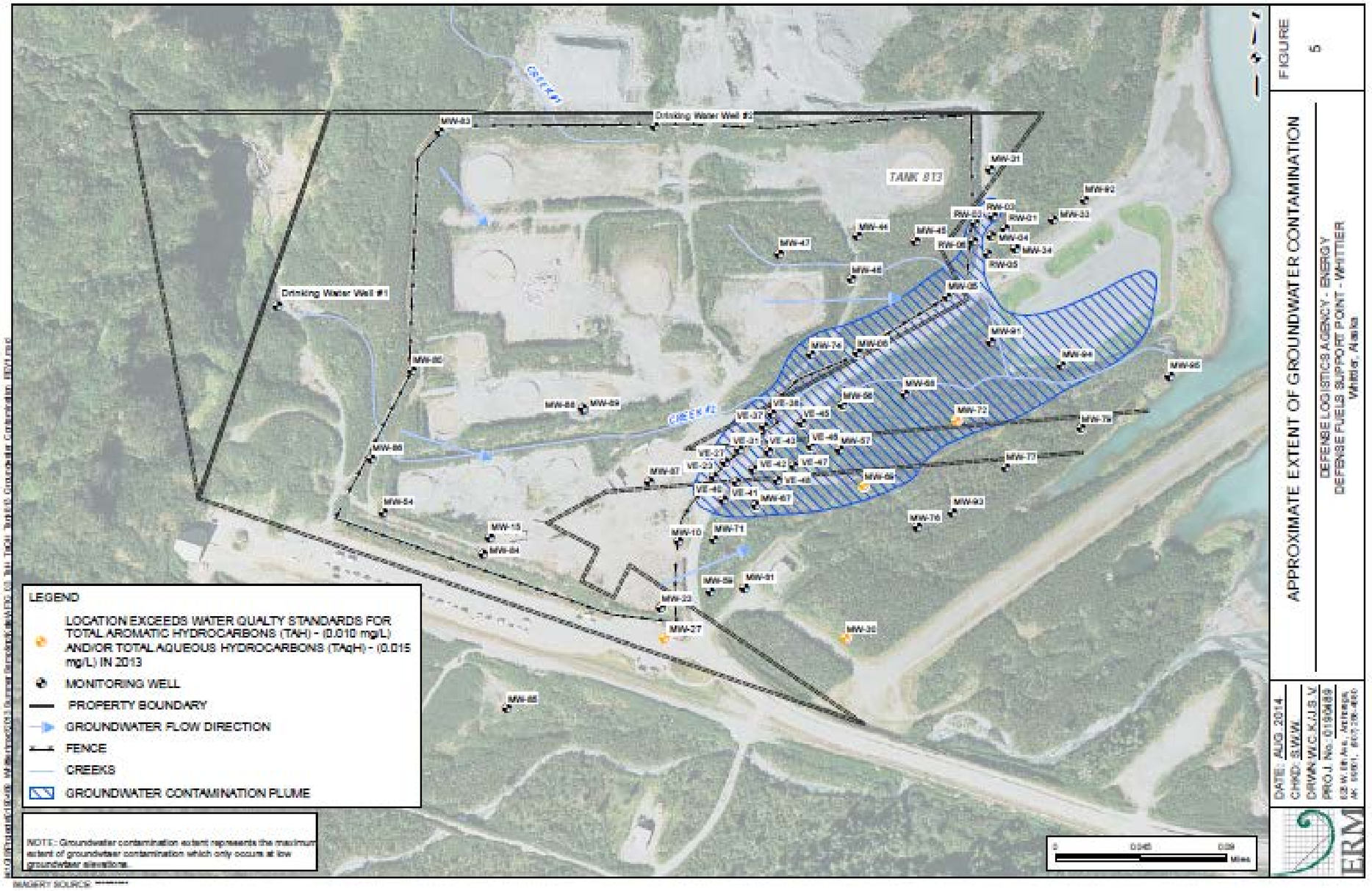

Figure 15. Approximate Extent of Groundwater Contamination (ERM Alaska 2015)

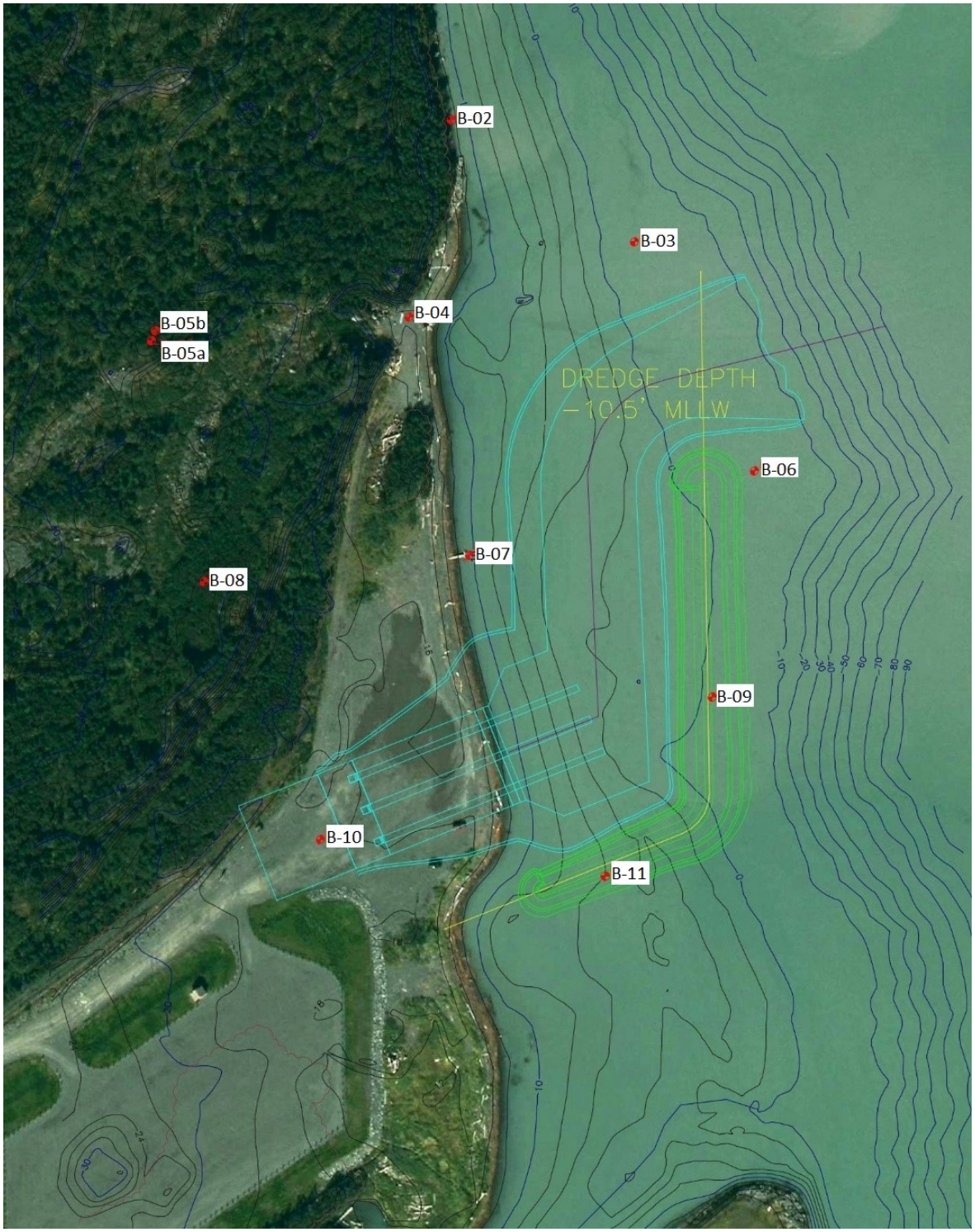

Figure 16. Sediment Sample Locations In Relation to Alternative 7

The results of the soil contamination data to be collected during PED will determine which dredged material placement options (i.e. in-water placement, upland placement, or treatment) are permissible. While a permissible in-water dredged material placement site has been identified

not far from the project site, at the time of the TSP Milestone, the team has assumed upland placement of dredged material at a site adjacent to the Head of the Bay project location. Based on existing information about potential sediment management and dredged material placement options, the north entrance alternatives (Alternatives 6 & 7) are expected to require less sediment treatment off-site than the south entrance alternatives (Alternatives 8 & 9). It is assumed that 5 percent of dredged material would require off-site treatment for the north entrance alternatives, whereas 15 percent of dredged material would require off-site treatment for the south entrance alternatives. These differences are accounted for in the estimated dredge disposal costs for each alternative.

Current estimated costs could exceed actual costs if less material requires remediation and/or in-water placement is permissible. Likewise, current estimated costs could underestimate actual costs if a greater proportion of the dredged material requires remediation. Conducting in-water placement of dredged material would be the least costly disposal option; however, permission from the Alaska Department of Environmental Conservation will be contingent upon collection and testing of soil samples within the proposed project dredging prism. A sensitivity analysis regarding project costs and benefits was conducted in which the percent of dredged material requiring upland treatment was varied from 5 percent to 50 percent for each alternative. Under all scenarios, Alternative 7 is economically justified and reasonably maximizes net benefits, with a benefit cost ratio ranging from 2.8 to 3.5. Please see the Risk and Sensitivity section of the Economics Appendix for more details.

Geotechnical sampling has been conducted in the proposed project area (Shannon and Wilson 2014). It is assumed that the geotechnical properties of the borings conducted are representative of the subsurface conditions throughout the project site. There is always a chance that subsurface conditions may be encountered that are significantly different from those documented in the borings. This could necessitate changes to the project design and result in increased costs and delays. With the information available in Shannon and Wilson 2014, this risk is perceived to be rather low and acceptable. Based on the Shannon and Wilson 2014 report, with a factor of safety less than 1 there is a risk that the rubble mound breakwater will fail during a seismic event however further analysis is needed. Further dynamic slope stability modeling will be required depending on the performance criteria established for the new harbor.

The Alaska Railroad owns much of the uplands adjacent to the proposed project site. The City has had a long-term lease on much of the proposed project site, but the current validity of that lease is of question. If the City cannot acquire permission from the Alaska Railroad, LSF features of the project (boat launches) cannot be constructed. Coordination between the sponsor and the railroad are ongoing.

The currently identified upland disposal site (Figure 13) is located on land currently being conveyed from the Defense Logistics Agency (DLA) to the City of Whittier. If the land conveyance was not completed prior to construction, DLA would have to grant permission for the placement of dredged material on their land. It is anticipated that the conveyance will be completed prior to the initiation of construction, however.

Benefit data specific to small boat harbors is generally sparse or non-existent, making it difficult to accurately quantify project benefits. Project benefits could be over or under estimated. For this project, the best available data supplemented with an economic survey was used to estimate project benefits. Alaska District is experienced in conducting economic surveys for small boat harbors. The survey for this project was successfully completed. Uncertainty related to estimating project benefits are within an acceptable level.

Completion of an Environmental Assessment has been assumed to be sufficient for this project and is currently being drafted. During public and agency review it is possible, but unlikely, that sufficient concerns could be voiced to warrant the completion of an Environmental Impact Statement. This would add considerable cost and time to the completion of the final report. Coordination has been initiated with ADEC, Alaska Department of Fish & Game, USFWS, NMFS, NOAA Protected Resources Division, and the City of Whittier. Coordination with ADEC and the USEPA regarding dredged material placement has been initiated. Close coordination with agencies and stakeholders will continue.

Concerns have been expressed in the past regarding the negative cumulative impacts of increased access to Prince William Sound. These concerns were not solely in response to the potential expansion of harbor facilities in Whittier, however. In 2000, the Anton Anderson Memorial was converted from a rail-only tunnel to a combined rail-vehicle tunnel. Prior to this expansion, Whittier was only vehicle accessible if the vehicle was transported via train. Similar concerns could be raised during public and agency review of the draft report but are not anticipated to be significant.

7.4. Cost Sharing

Table 15 shows preliminary cost sharing estimates. Per USACE guidance, Aids to Navigation and construction of LSFs are not included in the cost apportionment calculation. These totals will be updated prior to the Agency Decision Milestone.

Table 15. Estimated Cost Sharing for Tentatively Selected Plan

Description	Total (<20 Feet)	Federal (90%)	Non-Federal (10%)
Mobilization and Demobilization	$959,000	$863,100	$95,900
GNF	$14,914,000	$13,422,600	$1,491,400
LERR	$345,000	$0	$345,000
Project Cost Apportionment	**$16,218,000**	**$14,285,700**	**$1,932,300**
Aids to Navigation	$58,000	$58,000	$0
Local Service Facilities	$6,697,000	$0	$6,697,000
10% over time adjustment (less LERR)		($1,242,300)	$1,242,300
Final Allocation of Costs	**$22,973,000**	**$13,101,400**	**$9,871,600**

*10% over time adjustment: $959,000 mob/demob + $14,914,000

GNF = $15,873,000 x 10% = $1,587,300 - $345,000 = $1,242,300

8. ENVIRONMENTAL CONSEQUENCES*

Existing terrestrial, intertidal, and subtidal habitat quality and complexity do not vary amongst proposed footprints of the alternatives carried forward. Neither does the requirement for chemical characterization of representative volumes of the dredge prism amongst each alternative carried forward. It is presumed also, that dredging and disposal methodology would not differ between alternatives once the results of the sediment characterization are known. Each alternative carried forward requires dredging to target depths of -11.5 ft MLLW. Similarly, amongst the alternatives carried forward, the greatest divergence in overall dredge volume is 16 percent (between Alternatives 7 and 8). Therefore, it is reasonably expected that because all alternatives carried forward do not differ in location, habitat type, or constraining environmental factors, and only slightly in orientation and relative size, that environmental impacts for each alternative carried forward would be so similar, as to be best presented in a single analysis, of the Preferred Alternative with specific call-outs where this application of analysis was not inclusive enough. A No-Action Alternative is also carried forward in the following text.

8.1. Physical Environment

8.1.1. Water Quality

Under the No-Action Alternative, water quality at the head of Passage Canal would not be negatively impacted. Whether or not increased navigational congestion would result in an increased risk of environmental degradation is discussed in Section 4.3.

Under the Preferred Alternative, water quality in the vicinity of the proposed project footprint (including the open water placement area) would necessarily be impacted both spatially and temporally. Plumes of finer sediment will be mobilized as a function of both material excavation and placement activities. Excavation of the sediments, likely by a barge mounted excavator, will liberate finer sediments throughout the water column and increase localized turbidity levels for an unknown period of time. To best contain the effects of sediment excavation activities, a silt curtain, suspended through the water column, in conjunction with a petroleum absorbent boom shall be emplaced to encircle those excavation activities to the greatest extent practicable. Sediments liberated by dredging activities would most closely resemble the sediments of the surrounding areas and would not be disproportionately injurious to those benthic habitat areas adjacent to the proposed project footprint. The degree of increased turbidity is a function of the amount of time required to dredge the project's required volume of material, the physical characteristics of the sediment itself, and the wind, tidal and localized current energies acting upon them.

After dredge prism sediments have been characterized and deemed appropriate for open water disposal by ADEC and USEPA, disposal activities, likely via open-bottomed scow, in 40-50 feet of water will cause lighter sediments to dissociate and suspend throughout the entirety of the water column. Heavier sediments, boulders and cobbles, impacting bottom may have the propensity to mobilize finer sediments from the surface of the substratum. Suspended sediments

will be mobilized and settled by the prevailing currents of upper Passage Canal, and although their ultimate fate cannot be modeled at this time, USACE believes that because the sediments would be known to not be contaminated, and most closely resembling the sediments of the immediate area, the impact upon water quality would be temporary in nature and would not be significant.

Should dredge prism sediments be characterized as unsuitable for open water disposal, sediments shall be transferred to the identified upland placement area for dewatering before being remanded to their final fate; upland placement or thermal remediation. Dewatering activities shall include an appropriate treatment train so that surface water discharge standards are achieved. With the implementation of a silt curtain to contain fugitive sediment during in-water excavation activities, these actions do not constitute a significant impact upon water quality.

Placement of clean armor and core rock, presumably newly mined granitic rock, will not negatively affect short or long-term water quality parameters at the head of Passage Canal, and do not constitute a significant impact to water quality.

8.1.2. Air Quality

Under the No-Action Alternative, air quality in the vicinity of Whittier and at the head of Passage Canal would not be impacted.

The City of Whittier is not in or near a “non-attainment”, “maintenance”, or Class I area as defined by the Clean Air Act. Gaseous or particulate degradation to the immediate air quality resulting from preparatory and construction activities associated with the Preferred Alternative would not contribute to, or violate any existing standard, and due to the region’s vigorous atmospheric conditions, would rapidly return to ambient conditions. Impacts to air quality at the City of Whittier, or the surrounding head of Passage Canal would not be significant.

8.2. Biological Resources

8.2.1. Terrestrial Habitat

Under the No-Action Alternative, terrestrial habitat at the head of Passage Canal would not be developed to alleviate navigational constraints currently experienced at the Whittier small boat harbor. It is presumed that these lands would be managed for future recreational access in the same manner as they are currently managed. Thus, there will be no impact to the current terrestrial habitat as a result of the No-Action Alternative.

Under the Preferred Alternative, fewer than 2 acres of heavily disturbed, unvegetated and unimproved roadway and parking area would be graded to specifications and converted to impervious concrete and asphalt surfacing that would comprise the majority portion of the boat launch facilities. These features would be bound by successional mixed deciduous-spruce woodland and shrub thicket-type vegetation communities to the north and northwest. The permanent conversion of anthropogenically managed barren ground-type habitat like the

unimproved roadway and parking area at the head of Passage Canal do not represent a significant impact.

The area identified for upland dredge material placement is also heavily disturbed, having been managed as a fuel tank facility for decades. Although all fuel storage tanks have been removed from the site, the area still bears the circular scars of their containment areas: flattened, gravel pads, devoid of all vegetation, interspersed with unimproved roads and camping pull-outs. In their current state, these upland habitats retain little ecological value. Placement of suitable dredged materials in the former fuel storage lands does not constitute a significant impact to terrestrial habitat within the Preferred Alternative's envisioned footprint.

8.2.2. Birds

Under the No-Action Alternative, birds, or any aspect of their preferred habitats that currently occur at the head of Passage Canal would not be impacted.

Under the Preferred Alternative, habitats currently being utilized by birds in the envisioned footprint would change. Conversion of shoreline habitat would preclude foraging opportunities for shore- and wading birds. Increased vehicle traffic and human presence as a function of regular operation of the boat launch facility could deter birds from utilizing nearby wooded and rocky beach habitats. Coincidentally, anthropogenic facilities may also serve as an attractant to gulls and corvids, bird families known for their kleptoparasitic and nest depredation behavior. On the other hand, emplacement of the breakwater structure will result in biological encrustation of the armor rock by mussels and barnacles, which, in time, may present increased foraging opportunities for diving ducks that do not currently utilize this particular area. Eagles too, may be attracted to the facility by the probability of increased foraging or perching opportunities.

In summary, an unknown number of passerine and shorebirds may be affected by the conversion of shoreline habitat and increase in anthropogenic traffic, in, and adjacent to, the area of the envisioned Preferred Alternative's footprint. However, similar habitat of much higher quality exists in adjacent areas of Passage Canal. Although no impacts to nesting birds are anticipated as a function of this project, nesting bird surveys will be conducted if vegetation clearing during the USFWS proscribed timeframe of May 1st – July 15th is required. Implementation of the Preferred Alternative does not represent a significant impact upon birds or their habitats in Passage Canal or the greater Prince William Sound ecotone.

8.2.3. Terrestrial Mammals

Under the No-Action Alternative, terrestrial mammals or any aspects of their preferred habitats that currently occur at the head of Passage Canal would not be impacted.

Existing habitat quality within the Preferred Alternative's footprint is exceedingly poor for terrestrial mammals. Limited foraging opportunities occur at the shoreline and there exists little to no cover for smaller mammals against raptors or larger mammals. Similarly, unvegetated, unimproved gravel roads, parking areas, and former fuel tank containment pads that constitute

the majority of the terrestrial habitat within the envisioned project footprint do not offer quality foraging or sheltering opportunities for terrestrial mammals. Conversion of these habitats and an increased anthropogenic influence on the landscape may affect terrestrial mammal distribution within the immediate area of influence, but likely not as much as the long-term exposure to poor habitat quality that is the existing condition of the area in question. A plausible scenario as a result of project implementation may include an increase in nuisance foraging attempts by bears and foxes that are attracted to anthropogenic refuse. In turn, these attempts could lead to management actions or institutional controls that are designed to reduce human-wildlife interactions.

Terrestrial mammal habitat in the vicinity of the Preferred Alternative's footprint has been heavily disturbed for decades. Anthropogenic disturbance has been relatively high in this area of upper Passage Canal since the 1940's. Fuel spills, fires, vegetation clearing, road maintenance, rail yard operations, and recreation have degraded the terrestrial mammal habitat in the vicinity of the Preferred Alternative's footprint to the extent that it exists today. Therefore, terrestrial mammals or their preferred areas of habitat will not be significantly impacted by the implementation of the Preferred Alternative.

8.2.4. Freshwater Fish

Under the No-Action Alternative scenario, no obligate freshwater fishes or their respective habitats would be impacted by its implementation.

Similarly, implementation of the Preferred Alternative would not impact obligate freshwater fishes or their respective habitats.

8.2.5. Marine Habitat

Under the No-Action Alternative, intertidal, subtidal, benthic, and open water marine habitats would not be impacted by its implementation.

Intertidal, nearshore subtidal, benthic, and open water marine habitats will be impacted to some degree by implementation of the Preferred Alternative.

Intertidal marine habitat will be permanently altered in the vicinity of the boat launch ramp. Cobble and boulder strewn pebble beach will be replaced with contoured concrete, representing a reduction in habitat complexity and function. Alternatives 6 and 8 slightly reduce the overall area of intertidal habitat lost to project implementation, but not by any significant measure.

Nearshore subtidal marine habitat will be permanently altered in the vicinity of the dredged maneuvering basin and breakwater structure. Although some loss of benthic habitat complexity will occur within the basin itself, implementation of the breakwater structure represents a significant increase in habitat quality and complexity. Complex three-dimensional anthropogenic structures are well known for serving as important fish habitat. Encrusting invertebrate communities will quickly establish themselves and provide foraging opportunities for fishes.

Juvenile fishes and crustaceans seek cover in the interstitial crevices, which in turn attracts larger predators. At 602 linear feet in distance, the breakwater design for Alternatives 6 and 7 is 26 percent and 20 percent longer than Alternatives 8 and 9, respectively.

Benthic habitat will be temporarily disturbed and permanently altered in the vicinity of the open water dredge material placement site. Although substrate conditions at the placement area are expected to closely resemble the dredge material composition from the project footprint, the pre-existing bathymetric contour will ultimately have changed. Temporary disturbance resulting from the placement of dredge sediments at this site may cause fish and motile invertebrates to temporarily abandon preferential habitat within the area of influence. Increased turbidity in the immediately adjacent waters may also deter marine organisms from utilizing this habitat while the disturbance is ongoing.

Open water marine habitat will be temporarily disturbed, primarily through increased turbidity in the immediate vicinity of the dredge excavation area, and throughout the water column at the dredge material placement site. Increased turbidity may deter fishes or marine mammals from actively foraging in the area of influence. The length and frequency of the disturbance is related to the physical characteristics of the dredge sediments, dredge equipment, and the wave, wind, and current energies prevalent in the area at the time.

Overall, impacts to marine habitats as a result implementing the Preferred Alternative will be both destructive and beneficial. However, when compared to the quality, quantity, and complexity of existing marine habitats in Passage Canal, actions associated with USACE's Preferred Alternative do not represent a significant impact.

8.2.6. Submerged Marine Vegetation

Under the No-Action Alternative, submerged vegetation at the head of Passage Canal would not be significantly impacted by its implementation.

Under the Preferred Alternative, a small portion of *Fucus*, the only species of submerged vegetation observed during field surveys would be impacted (refer to Figure 3-3). Cobbles and boulders with attached *Fucus* would be roughly gathered by an excavator, placed aboard a scow, and dropped to the seafloor in much deeper water than it originated in. Subsequent scow deliveries would likely entirely cover these cobbles and boulders. While the presence of *Fucus* increases habitat complexity in the intertidal and nearshore submerged marine habitat areas, *Fucus* also displays a geographically wide distribution, from Cook Inlet and Kodiak Island to Southeast Alaska. Loss of the portion located within the Preferred Alternative's footprint does not constitute a significant impact. Furthermore, it is likely that armor rock of the breakwater structure would be colonized by *Fucus* shortly after its placement in the marine environment.

8.2.7. Marine Fish

Under the No-Action Alternative, marine fishes at the head of Passage Canal would not be significantly impacted by its implementation.

Under the Preferred Alternative, marine fishes would be impacted through localized habitat loss, habitat conversion, construction noise, and temporarily increased turbidity levels. In an effort to minimize these impacts, it is likely that all dredging activities will require placement of an encompassing silt barrier curtain suspended through throughout the water column to reduce the impacts of fugitive sediments upon the adjacent subtidal habitat. Also likely is that marine fishes occurring within the project footprint will not tolerate such a level of disturbance, they will seek refuge in immediately adjacent similar habitats.

Marine fish species and life history specific habitat analyses will be included in the final EFH assessment once characterization of the dredge prism sediments is complete and the overall fate of the dredge material is decided. However, at this time it is believed that the additional increased complexity of the subtidal and intertidal habitat as a result of the construction of the breakwater structure offsets the permanent loss of the nearshore rocky benthic habitat within the project footprint. Therefore, no significant impact to marine fishes will result from the implementation of this project.

8.2.8. Marine Mammals

Under the No-Action Alternative, marine mammals occurring at the head of Passage Canal would not be significantly impacted by its implementation.

Under the preferred alternative, every practical effort shall be taken to eliminate potential impacts to marine mammals. Specifically, that qualified marine mammal monitors would be in place for every aspect of in-water work. Each marine mammal observer would be equipped with appropriate two-way radio communication and hold the independent authority to halt project activities should a marine mammal be observed within a 200 meter radius of any in-water work. The qualified monitor would authorize the resumption of in-water work activities once the marine mammal had been witnessed to depart the monitoring radius or within 20 minutes of last sighting.

Long-term impacts to marine mammals as a result of the construction of the preferred project are more difficult to forecast. Sea otters forage, take shelter, and congregate in and around man-made protected basins. Pinnipeds also, are known to haul out on man-made structures, which increases their probability of anthropogenic interaction. Large cetaceans generally avoid waters as shallow as those included within the project footprint, while small cetaceans are known to traverse waters in close proximity to breakwater features. Public outreach through the use of signage and pamphlets describing methods of appropriate and safe interaction with marine mammals would be one way to reduce the probability of future anthropogenic-marine mammal interactions.

Through the incorporation of rigorous monitoring and avoidance protocols, it is believed that implementation of the preferred alternative will not have a significant impact upon marine mammals in upper Passage Canal or within the greater Prince William Sound.

8.2.9. Marine Invertebrates & Associated Habitat

Under the No-Action Alternative, marine invertebrates and their associated habitats would not be significantly impacted by its implementation.

Under the preferred alternative, marine invertebrates in the intertidal and subtidal project footprint will be necessarily disrupted and lost due to construction activities. However, colonization of hard intertidal and subtidal structure by opportunistic marine invertebrates occurs rapidly. Successional stratification of encrusting microbenthic invertebrate colonies over the breakwater would be fully mature in under 5 years. It is expected that the construction of the breakwater will facilitate greater invertebrate diversity than currently exists within the existing project footprint. Sediments at the dredge material disposal site will also be rapidly colonized by benthic invertebrates, may of the encrusting varieties of marine invertebrates respond with vigor to physical environmental disruption and the exposure of unoccupied habitat. USACE believes that there will not be a significant impact to marine invertebrates and their associated habitats within the envisioned preferred alternative's footprint.

8.2.10. Federal & State Threatened & Endangered Species

Under the No-Action Alternative, threatened and endangered species would not be affected by its implementation.

Because all threatened and endangered species that may occur within the waters of Passage Canal are marine mammals, under the preferred alternative's implementation of qualified marine mammal monitors for all in-water work, USACE believes that there will be no effect to threatened and endangered species as a result of the implementation of the preferred alternative. Furthermore, no critical habitat exists within or adjacent to the project footprint.

8.2.11. Essential Fish Habitat

Under the No-Action Alternative, EFH will not be significantly impacted by its implementation. USACE is currently coordinating with NMFS with regard to its proposed project impacts to EFH. It is envisioned that EFH coordination will be concluded during or just after the PED phase of this project once the in-water dredge material placement volumes have been calculated following sediment characterization efforts. However, USACE believes that the preferred alternative will not significantly impact EFH within the proposed project footprint.

8.3. Historical, Cultural, & Archeological Resources

Cultural resources have been identified within the area of potential effect (APE), however, none of them are considered eligible for the National Register of Historical Places. Archaeological

surveys have been conducted in the area in 1985, 1993, and 1994 and have reported no known cultural resources along the shoreline in the proposed project area. All access routes will be on already established road systems and will be used in a manner consistent with their historic use. It is not likely that the proposed undertaking will adversely affect any historical, archaeological, or cultural resources. Formal consultation between the USACE and SHPO resulting in a finding of no historic properties affected per 36 CFR 800.4(d)(1) in a letter dated received by the SHPO on June 08, 2018. For additional information, please consult Appendix E, *Cultural Resources.*

8.4. Environmental Justice and Protection of Children

Under the No-Action Alternative, peoples of lower income, ethnic minorities, and children would not be significantly impacted.

Under the Preferred Action Alternative, peoples of lower income, ethnic minorities and children would not be significantly impacted by its implementation. Conversely, economic opportunity is projected to increase under the preferred alternative. Employment opportunities would be generated in a variety of fields from design and construction, facility management and maintenance, to sporting good sales. There will be no disproportionate adverse human health or environmental effects on low income or ethnic minority communities as a result of implementation of the preferred alternative. Furthermore, the implementation of the preferred alternative will not result in environmental health and safety risks that might disproportionately affect children.

8.5. Unavoidable Adverse Impacts

- Permanent loss of shallow alluvial rocky shoreline habitat.
- Conversion of a small portion of intertidal and subtidal rocky habitat to contoured concrete and breakwater structure.
- Temporary disturbance to water quality in the vicinity of the proposed boat launch facility and in the dredge material placement site.

Although unavoidable, these adverse impacts, whether considered individually or collectively, are not significant.

8.6. Cumulative Impacts

“Cumulative impacts” are the impacts on the environment that result from the incremental impact of the action when added to past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individual minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

Very much like the public demand to access Whittier and the natural resources of Prince William Sound that spurred the Alaska State Department of Transportation & Public Facilities to connect Whittier to the Alaska Highway System, this preferred alternative is spurred by public demand

directly resulting from that increased access. Being the closest point of access to Prince William Sound for the State's largest population center ensures that this existing condition will perpetuate. Public comments from the Whittier tunnel expansion project indicated serious concern over the perceived impacts to natural resources as a result of this increased access.

Originally envisioned as a much larger project that supported protective moorage for as many as 300 vessels, this preferred alternative is designed in such a manner as to serve as the template for that level of expansion. Future navigational improvement projects at Whittier will likely include expansion of the boat launch facility outlined in this preferred alternative, into a protected mooring basin. Foreseeable impacts from this possible action are likely to be temporary in nature, highly localized, and similar to those described for the Preferred Alternative in terms of excavating in areas of poor to marginal upland habitat, with the similar caveat of the potential presence of contaminated sediments. However, these actions could be accomplished in such a manner that preclude potential impacts to water quality (i.e. excavation of the mooring basin behind a semi-permanent barrier that excludes the surface waters of Passage Canal). Comprehensive analyses would have to be conducted as to whether the increase in use and access to Prince William Sound would represent a significant impact to its natural resources as a result of such a project.

8.7. Summary of Mitigation Measures

- Implementation of a combination silt curtain and petroleum absorbent boom during active excavation activities in the vicinity of the boat launch facility. The silt curtain and petroleum absorbent boom shall be properly placed so that impacts to water quality, EFH, and marine habitat are lessened to the greatest degree practicable.
- Implementation of qualified marine mammal monitors for every aspect of in-water work. Each marine mammal observer would be equipped with appropriate two-way radio communication and hold the independent authority to halt project activities should a marine mammal be observed within a 200 meter radius of any in-water work. The qualified monitor would authorize the resumption of in-water work activities once the marine mammal had been witnessed to depart the monitoring radius or within 20 minutes of last sighting.
- Nesting bird surveys will be conducted if vegetation clearing during the USFWS proscribed timeframe of May 1st – July 15th is required.

9. PUBLIC AND AGENCY INVOLVEMENT*

9.1. Public / Scoping Meetings

Two public scoping meetings occurred in the early development of this project. The first was held in the town of Whittier on February 19, 2009. The second was held in Anchorage on May 7, 2009. As noted in the preceding text, navigational improvements at Whittier originally envisioned a protected harbor site that provide moorage for as many as 300 vessels. After a pause in the study, a re-scoping meeting was conducted on February 20 through 22, 2013, in

Whittier. The re-scoping meeting validated that the previously developed problems and opportunities, without project conditions, objectives and constraints, and preliminary array of alternatives as being appropriate for use in continuation of the study. A public scoping meeting is planned for the summer of 2018 concurrent with the release of the Draft Integrated Feasibility Report for concurrent review.

9.2. Federal & State Agency Coordination

- National Marine Fisheries Service
- U.S. Fish and Wildlife Service
- U.S. Environmental Protection Agency
- Defense Logistics Agency
- Alaska Department of Environmental Conservation – Division of Water
- Alaska Department of Environmental Conservation – Contaminated Sites Division
- Alaska Department of Fish and Game
- Alaska Railroad Corporation

9.3. Status of Environmental Compliance (Table 16)

Table 16. Compliance With Environmental Protection Statutes and Other Requirements

Federal Statutory Authority	Compliance Status	Compliance Date/Comment
Clean Air Act	FC	This project is not reasonably expected to negatively impact air quality, nor is it in a non-attainment area.
Clean Water Act	PC	Upon receipt of 401 certification, pending dredge prism characterization for DRO, GRO, RRO, and Metals.
Coastal Zone Management Act	N/A	As of July 1, 2011, the CZMA Federal consistency provision no longer applies in Alaska. Federal agencies shall no longer provide the State of Alaska with CZMA Consistency Determinations or Negative Determinations pursuant to 16 U.S.C 1456(c)(1), and (2), and 15 CFR part 930, subpart C.
Endangered Species Act	FC	Implementation of conservation measures ensure a "no effect" determination to threatened or endangered species. Formal coordination under Section 7 of the ESA was not requested from NMFS or USFWS.
Marine Mammal Protection Act	FC	Marine mammal monitors with the authority to enforce work stoppage radii are required for all in-water work.
Magnuson-Stevens Fishery Conservation and Management Act	PC	Pending EFH dredge prism sediment sampling and effects determination- dredge material disposal volumes and methods are not decided at this point.
Fish and Wildlife Coordination Act	PC	USACE expects only information communication form USFWS regarding this project.
Marine Protection, Research and Sanctuaries Act	N/A	Act is not applicable, no disposal of dredge materials will occur within waters regulated under this act.
Migratory Bird Treaty Act	FC	Nest monitoring during USFWS proscriptive dates if vegetation clearance is required.
National Historic Preservation Act	PC	National Historic Preservation Act- Received concurrence of "no historic properties affected" per 36 CFR 800.4(d)(1) on June 14, 2018. USACE has no received any other comments regarding cultural resources as of June 15, 2018. The 30 day consultation period ends on July 07, 2018.
National Environmental Policy Act	PC	Pending signature of the FONSI.
EO 11990: Protection of Wetlands	FC	Proposed mitigation measures protect all wetlands adjacent to the project footprint.
EO 12898: Environmental Justice	FC	Does not disproportionately affect underserved communities or individuals.
EO 13045: Protection of Children from Environmental Health Risks and Safety Risks	FC	Does not disproportionately affect the health or well-being of children.
EO 13186: Protection of Migratory Birds	FC	Nest monitoring during USFWS proscriptive dates if vegetation clearance is required.

9.4. Views of the Sponsor

"As a land-locked City with very few places of development within our control, we are very excited about the opportunity at the head of the bay. Communities prize economic development opportunities and for Whittier, Alaska, this one is eagerly anticipated. Development at the head of the bay will not only alleviate congestion and safety concerns at our current harbor location, it will allow the City to grow, attract, and develop genuine economic growth opportunities. Due to a lack of economic development opportunities, we have not been able to fully realize our potential. As our community considers our evolution from being a "gateway to Prince William Sound" to a destination in our own right. This opportunity to change and grow has an impact not only on our city but one on the state and nation as a whole. Being better able to increase and support commercial fishing industries, inter- and intra-state commerce interests (through shipping industries), and tourism will be a boon not only for Whittier but for many, especially as we look towards a future where we can build upon the current project."

10 CONCLUSIONS & RECOMMENDATIONS

10.1. Conclusions

Analyses completed thus far confirm that construction of the TSP will effectively meet the identified objectives of decreasing navigation delays including boat launch delays, decreasing damages to vessels and harbor infrastructure related to congestion, and providing for separation of different harbor users. The TSP is also capable to being expanded relatively easily to meet the additional objective of increasing moorage at Whittier. The unavoidable adverse impacts of construction and operation of the TSP are minor in nature and not considered significant. As the proposed project does not constitute a major Federal action significantly affecting the quality of the environment, a Finding of No Significant Impact has been prepared. The Alaska District Office of Counsel has reviewed this document and has issued a certification of legal sufficiency.

10.2. Recommendations

I recommend that the navigational improvements at Whittier, Alaska, be constructed generally in accordance with the plan herein, and with such modifications thereof as in the discretion of the Chief of Engineers may be advisable at an estimated total Federal cost of $14.3 million provided that prior to construction the local sponsor agrees to the following:

a. Provide, during the period of design, 10 percent of design costs allocated by the Government to commercial navigation in accordance with the terms of a design agreement entered into prior to commencement of design work for the project; and provide, during the first year of construction, any additional funds necessary to pay the full non-Federal share of design costs allocated to the Government to commercial navigation in accordance with the cost sharing as set out in paragraph b., below;

b. Provide, during construction, 10 percent of the total cost of construction of the general navigation features attributable to dredging to a depth not in excess of 20 feet; plus 25 percent of the total cost of construction of the general navigation features attributable to dredging to a depth in excess of 20 feet but not in excess of 45 feet; plus 50 percent of the total cost of construction of the general navigation features attributable to dredging to a depth in excess of 45 feet;

c. Pay with interest, over a period not to exceed 30 years following completion of the period of construction of the project, up to an additional 10 percent of the total cost of construction of the general navigation features. The value of lands, easements, rights-of-way, and relocations provided by the non-Federal sponsor for the general navigation features, described below, may be credited toward this required payment. If the amount of credit exceeds 10 percent of the total cost of construction of the general navigation features, the non-Federal sponsor 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 in excess of 10 percent of the total cost of construction of the general navigation features;

d. Provide all lands, easements, and rights-of-way, and perform or ensure the performance of all relocations determined by the Federal Government to be necessary for the construction or operation and maintenance of the general navigation features (including all lands, easements, and right-of-way, and relocations necessary for dredged material disposal facilities);

e. Accomplish all removals determined necessary by the Federal Government other than those removals specifically assigned to the Federal Government;

f. Provide, operate, maintain, repair, replace, and rehabilitate, at its own expense, the local service facilities consisting of the 6-lane boat ramp 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.

g. Shall not use funds from other Federal programs, including any non-Federal contribution required as a matching share thereof, to meet any of the non-Federal obligations for the project unless the Federal agency providing the Federal portion of such funds verifies in writing that expenditure of such funds for such purpose is authorized;

h. Shall prepare and implement a harbor management plan that incorporates best management practices to control water pollution at the project site and to coordinate such plan with local interests;

i. Comply with all 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 Par 24, in acquiring lands, easements, and rights-of-way required for construction or operation and maintenance of the general navigation features and the local service facilities, including those necessary for relocations, the

borrowing of materials, or the disposal of dredged or excavated material and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act;

j. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor owns or controls for access to the project for the purpose of operating and maintaining the general navigation features;

k. Hold and save the United States 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 United States or its contractors;

l. Keep and maintain books, records, documents, or 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, or other evidence are required, to the extent and in such detail as will properly reflect total costs of construction of the general navigation features, 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;

m. 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 substantial 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 *et seq.*);

n. 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), Public Law 96-520, as amended (42 U.S.C. 9601-9675), that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction or operation and maintenance of the general navigation features. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-Federal sponsor with prior specific written direction, in which case the non-Federal sponsor shall perform such investigations in accordance with such written direction;

o. Assume, as between the Federal Government and the non-Federal sponsor, complete financial responsibility for necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under lands, easements, or rights-of-way that

the Federal Government determines to be required for construction or operation and maintenance of the general navigation features;

p. To the maximum extent practicable, perform its obligations in a manner that will not cause liability to arise under CERCLA; and

q. 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 Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 2211), which provides that the Secretary of the Army shall not commence the construction of any water resources project, or separable element thereof, until each non-Federal sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element.

The recommendations for implementation of navigation improvements at Whittier, Alaska reflect the policies governing formulation of individual projects and the information available at this time. They do not necessarily reflect the program and budgeting priorities inherent in the local and State programs or the formulation of a national civil works water resources program. Consequently, the recommendations may be changed at higher review levels of the executive branch outside Alaska before they are used to support funding.

_____ _____

PHILLIP J. BORDERS Date
COL, EN
Commanding

11 REFERENCES

ADOTPF and Federal Highway Administration (FAA). 1995. Revised Draft Environmental Impact Statement and Revised Draft Section 4(f) Evaluation, Whittier Access Project.

Isleib, M.E., and Kessel, B. 1974. Birds of the North Gulf Coast – Prince William Sound Region, Alaska. Biological Papers of the University of Alaska. Number 14.

Harney, J.N., Morris, M., Lindeberg, M.R., ShoreZone Coastal Habitat Mapping for Prince William Sound. Exxon Valdez Oil Spill Restoration Project Final Report. March 2009.

Kachadoorian, Reuben. 1965. Effects of the Earthquake of March 27, 1964 at Whittier, Alaska.

Lethcoe, Jim. 1990. An Observer's Guide to the Geology of Prince William Sound.

National Oceanic and Atmospheric Administration (NOAA). 2015. Navigation Chart 16706: Passage Canal, Including Port of Whittier.

NMFS 2009, A Survey of Fish Assemblages in Nearshore Waters of Passage Canal, Alaska, Trip Report for August 21, 2009. Alaska Fisheries Science Center, Auke Bay Laboratories.

U.S. Army Corps of Engineers (USACE). 1986. Memorandum NPAEN-FM-S dated 6 May 1986, Subject: Whittier Small Boat Harbor.

USACE. 2009. Draft Feasibility Scoping Meeting Report, Navigation Improvements, Whittier, Alaska. July 2009.

U.S. Climate Data, Accessed February 2018. https://www.usclimatedata.com/climate/whittier/alaska/united-states/usak0266

Whittier. 2017. Preliminary Geotechnical Engineering Report, Navigational Improvements Study, Head of Passage Canal, Whittier, Alaska. Prepared by Shannon & Wilson, Inc. Finalized August 2017.