ENVIRONMENTAL ASSESSMENT
AND
FINDING OF NO SIGNIFICANT IMPACT

NAVIGATION IMPROVEMENTS
HAINES, ALASKA

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

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Navigation Improvements
Environmental Assessment
Haines, Alaska

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1.0 PURPOSE AND NEED OF THE PROPOSED ACTION

The City of Haines requested the Corps of Engineers to conduct a feasibility study of navigation improvements to meet additional demand for vessel moorage. This was identified as a critical issue facing the community. The following objectives were identified to accomplish navigation improvements at Haines prior to initiating the engineering analysis:

a. Prevent overcrowding in the existing harbor by providing a safer and more efficient moorage area for the fleet.

b. Provide additional moorage for commercial fishing vessels that have been on the waiting list for mooring space for many years.

The project purpose is to provide a safe and efficient harbor in an economically and environmentally sound manner that satisfies the above objectives.

The environmental objectives identified during scoping and agency coordination were to concentrate harbor development in existing harbor infrastructure areas, maintain/improve water quality and circulation in the moorage basin, minimize fill in the intertidal zone, and construct the structure most environmentally compatible with the marine environment.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The following section discusses the processes that led to the selection of the proposed action. In summary, the proposed action is the expansion of the Haines Harbor alternative 4. This alternative combines the city of Haines' preferred features of a causeway to reach larger vessels outside the harbor, but without excessive cost. This alternative incorporates the fish passage breaches and balances the intertidal fill needed for harbor functions with the need to minimize impacts on important habitats.

2.1 Alternatives Eliminated From Further Study

A wide range of siting and structural alternatives (including floating breakwaters) were considered for navigation improvements at Haines. A matrix of possible sites for consideration was developed in the initial phase of the study and included Letnikof Cove, Paradise Cove, Flat Bay, Lutak Inlet, and two sites in Portage Cove (figure EA-1). This phase narrowed site options to two: one at Letnikof Cove and one adjacent to the existing harbor at Portage Cove.

2.1.1 Floating Breakwaters

This type of wave protection was considered for the Haines area. Floating breakwaters are generally not able to provide adequate wave reduction where wave heights are greater than 1 meter. At Letnikof Cove the wave heights are slightly below 1 meter. In Portage Cove the wave heights range from 1.3 to 2.3 meters. Wave heights and directions are given in table A-4 in

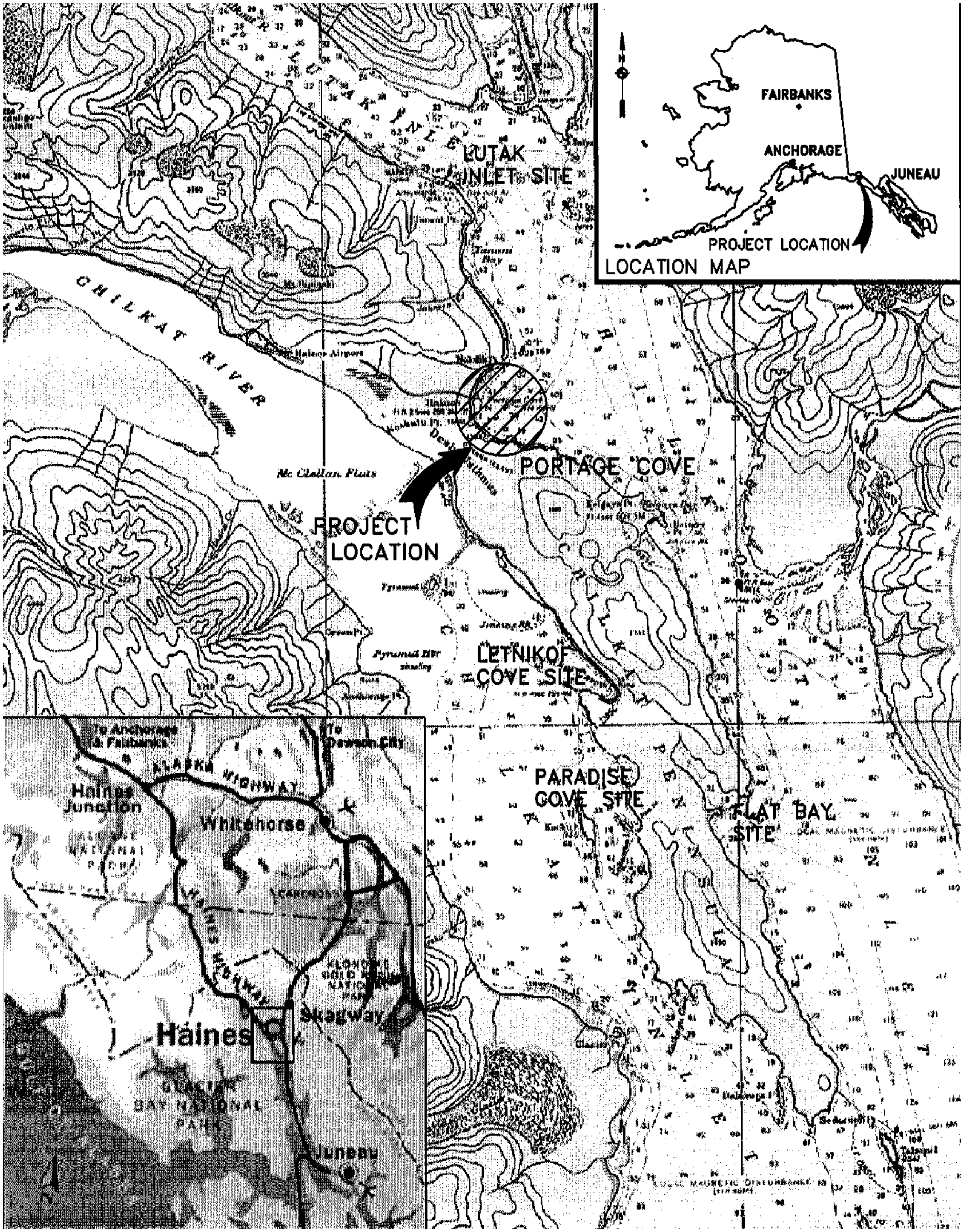

LUTAK INLET SITE
FAIRBANKS
ANCHORAGE
JUNEAU
PROJECT LOCATION
LOCATION MAP
CHILKAT RIVER
PORTAGE COVE
PROJECT LOCATION
LETNIKOF COVE SITE
PARADISE COVE SITE
FLAT BAY SITE
Whitehorse
Haines
Skagway
Juneau

Figure EA-1

appendix A Hydraulic Design. Wave heights were not calculated for the other alternatives. In general floating breakwaters have a lower project life and higher maintenance. In shallow water, rubblemound breakwaters are less costly than floating breakwaters. This construction alternative would be infeasible at any of the sites considered except Letnikof Cove.

2.1.2 Alternative Sites

Letnikof Cove. The State of Alaska constructed protected mooring facilities in Letnikof Cove in the late 1960's. Letnikof Cove does not lend itself to harbor expansion due to extreme depths of water, severe icing conditions during the winter months, and extremely high wind velocities from the Chilkoot River Valley. A floating breakwater configuration in a previous study was selected as the design for this site. The Letnikof Cove float system has been damaged by severe wind and ice in the past.

The existing moorage facilities at Letnikof Cove consist of a pontoon supported floating breakwater and long finger floats in which vessels moor in parallel. The two 46-meter-long main floats can accommodate a small portion of the local fishing fleet. Previously, two additional floats, each 30 meters long, were used at this facility. A severe storm in the mid 1990's destroyed these floats and they have not been replaced. The float system was originally constructed by the State of Alaska during the late 1960's. A launch ramp and small parking area are also located at the site.

Commercial and recreational vessels use the harbor during the summer fishing season due to its proximity to fishing grounds. Generally, however, the floats are not used during the winter months due to the extreme wind and ice conditions and the long distance from town.
Water depths are typically in the 10 to 15-meter range, which can handle the larger commercial fishing vessels that frequent the area. Vessel moorage is limited to rafting along the floats and floating breakwater.

A cannery and private dock are located along the western shoreline of Letnikof Cove. The dock and haul-out are primarily used for transferring fish and loading and offloading fish products. Facilities for mooring vessels are limited and no permanent slips are available.

In a previous study (1988) the USFWS conducted a dive survey in Letnikof Cove. The habitat along the transects was uniform with a predominantly silty/muddy bottom. Brown kelp was attached to suitable substrate. Visibility was difficult because of turbid water. Dredged samples of infauna were low to moderately productive and included several species of clam, gastropods, sea urchins, sea worms, and an octopus. A trawl net was pulled through the area to sample the fish species. The trawl, pulled for 7 minutes, caught walleyed pollock, flathead sole, shortfin eelpout, longsnout prickleback, daubed shanny, *Osmerus* sp., yellowfin sole, coon-striped, pink, dock, and ghost shrimp, *Ctenodiscus crispatus* starfish, tanner crab, hairy tritons, hermit crabs, and an unidentified sole. Juvenile salmon fry were schooled in an around the floats. This site was eliminated from detailed consideration by water depth, distance from population center, and icing potential.

Flat Bay. Flat Bay is on the east side of the Chilkat Peninsula, approximately 10 miles south of the City of Haines. The site was selected from aerial photographs and the nautical chart because it has natural protection from the waves coming directly down Chilkoot Inlet. The site is protected from northerlies by a portion of the natural peninsula. The site is far from the population center and may require the installation of utilities and other harbor infrastructure. This naturally formed cove is more exposed to waves coming directly up Chilkoot Inlet than any other site considered. The site is directly exposed to the prevailing southeast wind and waves. This wind and wave climate would require more costly structures for harbor protection. With significant amounts of freshwater running into the bay, the site would have a tendency to ice up during the winter months, which has the potential to prevent use of the harbor during the winter. The adjacent land is all privately owned with the primary use being residential. This would require extensive costs for land acquisition. It is anticipated that there would be social resistance to any development in this area. The soils at the site are a mix of boulders and silty, loose soils, not suitable for upland development. Fill for uplands would have to be brought in to provide a base for development. The silty, loose soil also poses a stability risk, especially during a seismic event.

Paradise Cove. Paradise Cove is on the west side of the Chilkat Peninsula, approximately 8 miles south of the City of Haines. The site is far from the population center. The existing road to the site would need to be improved from its current condition. The site also would require the installation of utilities and other harbor infrastructure. Although the site is a naturally protected cove, the cove has a limited amount of protected area. The steep drop offshore may make construction more costly. The nearshore area has bedrock that would drive up dredging costs and may require extensive blasting. The adjacent land is all privately owned with the primary use being residential causing land use conflicts.

Lutak Inlet. The existing ferry terminal is located at the edge of Lutak Inlet. This site also is far from the population center, and it would be costly to extend utilities to this site. The mountainous terrain limits the area for upland development. The water in this area is deep, making construction of a rubblemound breakwater too expensive. High wave exposure eliminates the use of a floating breakwater. Construction in the area would impact ferry operations and possibly impact the military tank farm site.

Portage Cove North. This site north of the existing harbor area was constrained by the existence of tide pools that are extensively used by shore birds for foraging. This is a popular bird watching area with a convenient vehicle pullout area. The local preference was to concentrate the development to the south, in and around the existing harbor. This site was eliminated from detailed consideration because it offers no particular advantage over development in the proposed site and would both cost more and adversely affect more valuable habitat.

2.2 Alternatives Considered in Detail

Portage Cove, next to the existing harbor, was the only site selected for detailed consideration. The reasons for the decision were local sponsor preference, existing development at the site, minimal environmental impact, and land use compatibility. Alternative 4 is the locally preferred alternative and is also the NED plan.

2.2.1 Portage Cove Site Alternatives (Expansion of Existing harbor)

The Portage Cove site is immediately adjacent to the existing harbor east of the town of Haines and has natural bottom elevations ranging from +8 meters MLLW to –12 meters MLLW. Such depths in the area of the proposed harbor are suitable for cost effective rubblemound breakwater construction. The wave climates for the various directions of exposure are also suitable for cost effective rubblemound breakwater construction. The southern limit of the site is constrained by the existing cruise ship dock. The northern limit of the site is constrained by several large tide pools that are considered productive marine habitat. A rubblemound breakwater structure would be required for wave protection from the various directions and would make use of the relatively shallow depths offshore. Many different harbor configurations were considered and optimized to find the most effective and least costly alternative at this site. Optimum locations for the breakwaters were determined so that the quantities of material were reasonable for the size of the basin being protected. The alternative plans at this site for a 50-year design life were laid out using breakwater alignments to protect the proposed entrance channel, maneuvering area, and mooring basin. To accomplish the existing harbor expansion, the relocation of the sewage outfall pipe is necessary for all of the alternatives. The outfall line would be moved prior to dredging and breakwater construction and would be placed farther south of the existing harbor.

The existing harbor facilities at Haines are shown in figures 1 and 2 of the feasibility report. The Territory (later the State) of Alaska and the Alaska Public Works Agency constructed the original small boat harbor at Haines in 1958. The U.S. Army Corps of Engineers constructed the expanded harbor at Portage Cove in 1976. The project consisted of demolishing the seaward leg of the original breakwater and constructing a new, longer breakwater farther offshore. Additional dredging was performed to provide an expanded mooring area and entrance channel. The mooring facilities constructed in subsequent years were put in with local funds provided by the State. The previous dredged material disposal site was in deep water approximately 1.2 km offshore of the harbor.

Vessel traffic conditions including cruise ship operations were considered in the layout of proposed alternatives. Development of a new harbor at this site would not impact current operations at the existing cruise ship dock. Large vessels would continue to be able to maneuver and moor at both docks south of the existing harbor and coexist with the increased vessel usage in the area.

The area around the existing harbor site has limited available uplands to designate for harbor-associated use. The city of Haines evaluated the status of lands near the harbor to determine if any lands could be used (letter from Vince Hansen, city administrator, 2001). In summary, land west and south of the harbor is the city's Tlingit Park and the historic Tlingit Park Cemetery. Property to the west is owned by and associated with the historic Presbyterian Mission. Areas north are undeveloped private parcels; however, the terrain is steep making the area impractical for most harbor related uses. The upper intertidal zone can be developed by placing fill to create functional harbor uses. Creation of such uplands from tidelands would require hauling and placing material produced from a quarried rock source. This site also represents the most practical site for harbor development due to its proximity to the core downtown area of Haines. Specific development plans in the tidelands are subject to a Department of the Army permit for which the local sponsor would need to submit an application.

The existing harbor has very limited space for vessels in the existing moorage area and cannot adequately accommodate vessels larger than 18.3 meters in length. The float system is outdated and undersized and the mooring basin is severely overcrowded for the number and size of vessels that moor there. The existing basin area, dredged to a depth of –3.7 and –4.3 meters MLLW, has approximately 2.2 hectares (ha) available for mooring. The existing harbor has limited maneuvering and turning areas.

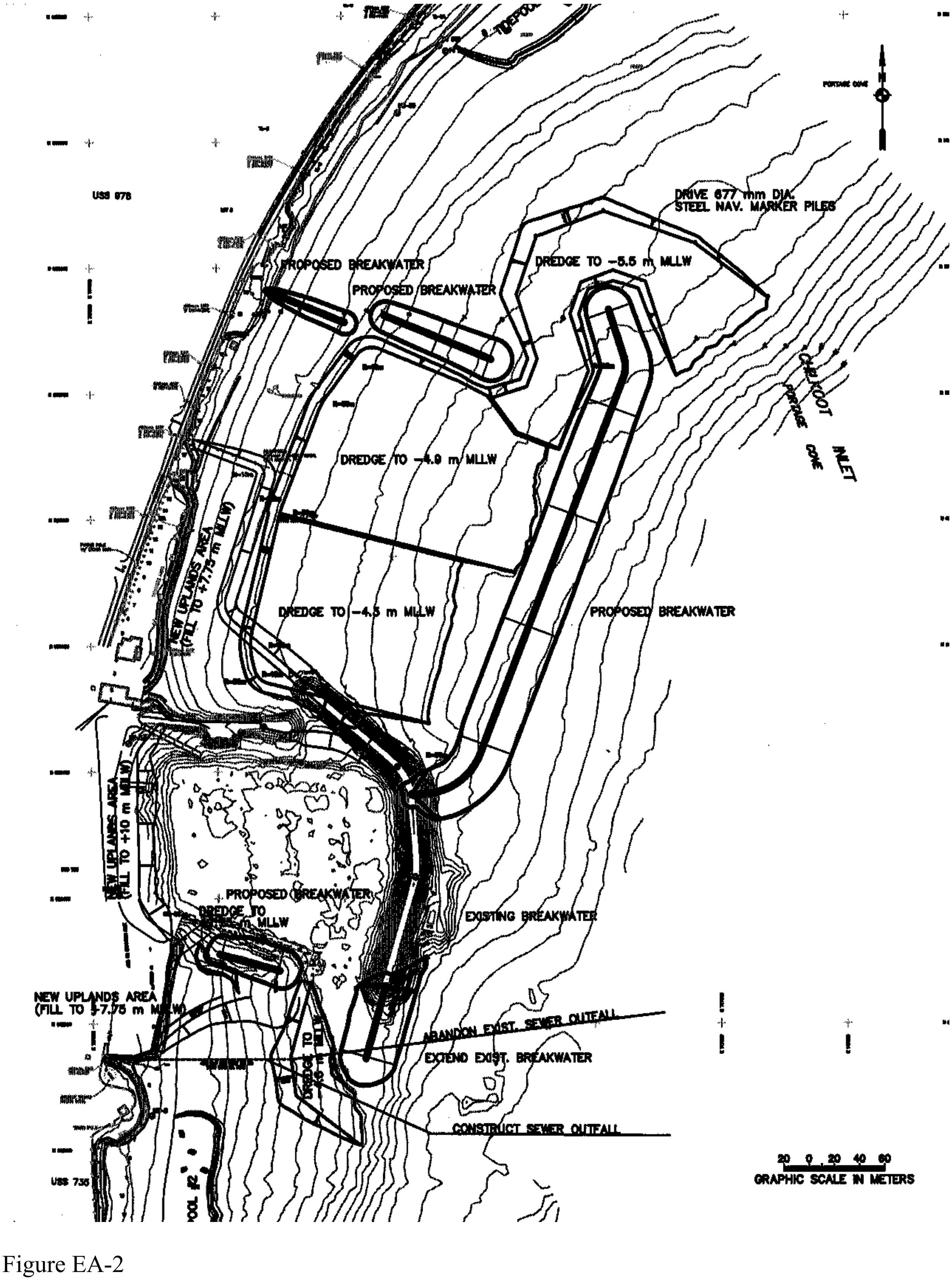
A dredged entrance channel to a depth of –4.6 meters MLLW accommodates access to the harbor around the southern tip of the existing breakwater. The southern limit of the harbor is somewhat open to wave action from the southeast. This exposure has caused damage to vessels and the float system and also has created hazardous navigation conditions inside the harbor during storms.

A dock inside the harbor supports the fishing fleet and transient vessel traffic. Temporary moorage for offloading fish products can occur at this facility. Sufficient space for permanent mooring facilities is not available since high vessel traffic is common throughout the area.

Alternative 1. This alternative is shown on figure EA- 2; detailed information is shown in table 6 of the feasibility report. It incorporates the following rubblemound breakwaters: a 67-meter-long north spur breakwater, a 92-meter-long north breakwater, a 459- meter-long main breakwater, a 62.2-meter-long extension of the existing breakwater to the south, and a 49.9-meter-long south spur breakwater. The existing breakwater would be modified slightly by removing 46 meters of its length at its northern end, but the majority of its length would be unchanged. Two separate mooring basins would be created with this alternative. The 5.19-ha north basin could accommodate the larger range of vessels in the fleet with stalls oriented with the prevailing wind direction. The 2.25-ha south basin (existing) would remain unchanged in size and depth; however, additional wave protection would be provided and the existing float system would be removed and reoriented. Smaller vessels in the fleet would use the south harbor basin. The north harbor entrance would be oriented with an approach around the end of the main breakwater and into the maneuvering area. The local sponsor preferred this entrance channel configuration. Marker pilings would be placed along the outside of the dredged channel limits to guide mariners into the harbor. The entrance channel into the south basin would be dredged and oriented similar to the existing south entrance channel.

North Harbor Basin. The north harbor basin would be step dredged to depths of –4.9 meters and –4.3 meters MLLW. These depths are based on criteria in the Hydraulic Design appendix. The deeper portion of the mooring basin would be located nearest the entrance channel. The shallower portion would be located farther into the harbor away from the entrance channel.

The maneuvering area just inside the basin would be dredged to –4.9 meters MLLW. A total combined maneuvering and mooring basin area of approximately 5.19 ha would be available in the north basin for alternative 1.



USS 878
DRIVE 677 mm DIA.
STEEL NAV. MARKER PILES
PROPOSED BREAKWATER
PROPOSED BREAKWATER
DREDGE TO −5.5 m MLLW
DREDGE TO −4.9 m MLLW
NEW UPLANDS AREA
(FILL TO +7.75 m MLLW)
DREDGE TO −4.5 m MLLW
PROPOSED BREAKWATER
CHILKOOT INLET
PORTAGE COVE
NEW UPLANDS AREA
(FILL TO +10 m MLLW)
PROPOSED BREAKWATER
EXISTING BREAKWATER
NEW UPLANDS AREA
(FILL TO +7.75 m MLLW)
ABANDON EXIST. SEWER OUTFALL
EXTEND EXIST. BREAKWATER
CONSTRUCT SEWER OUTFALL
USS 735
20 0 20 40 60
GRAPHIC SCALE IN METERS

Figure EA-2

South Harbor Basin. The south harbor basin would remain unchanged with respect to area and depth. Currently, the basin has depths of –3.7 meters and –4.3 meters MLLW. The deeper portion of the mooring basin would be located nearest the entrance channel. A total combined maneuvering and mooring basin area of approximately 2.25 ha would be available in the south basin for alternative 1.

Wave Heights. This alternative would meet the wave criteria established in the Hydraulic Design appendix (appendix A) for the floats inside both harbor basins. Breakwaters were positioned to reduce to acceptable levels incident wave heights from the various directions of exposure. The maximum wave heights in the mooring areas, based on the 50-year design incident wave, were calculated to be 0.29 meters and less. Progressively smaller wave heights would occur farther into the harbor mooring areas. All directions of wave exposure were taken into account in determining the highest wave heights in the mooring area.

Circulation. Circulation in the harbor basins would be driven primarily by tidal action and by wind-driven surface water currents that contribute to mixing in the water column. Tides would drive circulation gyres in both basins. This alternative would incorporate basin geometries that would provide for adequate water circulation based on established criteria. Flushing of the water from the basin with outside waters can be evaluated by calculating a ratio of water exchange. A tidal prism ratio is based on the difference in the volume of water in the proposed basin between Mean Higher High Water (MHHW) and MLLW water compared with the volume of MHHW. Values greater than 0.30 are considered adequate. The north and south basins would have tidal prism ratios of 0.53 and 0.55 respectively. The corners (15 percent of the basin's volume) of the north basin were checked as worst-case possible zones of stagnation. The northeast corner had the lowest value tidal prism ratio of 0.46.

Another criterion for water quality and circulation is the aspect ratio of the basin. This value is a measure of the length divided by the width of the basin. Generally, aspect ratios greater than 0.3 and less than 3.0 are desirable. The length to width or aspect ratios of the north and south basins were calculated to be 1.42 and 1.30 respectively. Such geometry will minimize possible zones of stagnation and short-circuiting of circulation cells within the basin. Sufficient aspect ratios for good water quality and circulation are therefore expected in both harbor basins for alternative 1.

Shoaling. Shoaling of both entrance channels is not expected since there is little evidence of significant long-shore transport of sediments at the site. There are no significant sources of sediment such as major rivers or creeks in the area. A small fillet of sandy material is present along the north side of the existing stub breakwater indicating some accumulation of material from the north. The proposed north stub breakwater would likely see a similar accumulation of material but it would not reach the basin or proposed entrance channel. Similarly, the existing entrance channel has not required maintenance dredging and would not be expected to with this alternative.

Construction Dredging. Dredging quantities and material characteristics were estimated from the hydrographic survey performed in August 2000 and the geotechnical investigation was done in September 2000 (appendix C). The dredged material would consist of clay, sand, gravel, cobbles, and boulders to the project limits. Dredging a total of 205,100 cubic meters (m^3) of clay, 5,600 m^3 of harder clay (diamictom), and 2,500 m^3 of boulders would be required for alternative 1. Dredged materials, with the exception of the boulders, would be disposed of in a designated area approximately 1.2 km offshore and east of the harbor.

Dredging work inside the harbor could be accomplished with a large clamshell dredge since clay, sand, and gravel would be encountered. The boulders would likely be removed at low tide with an excavator or dozer. According to the September 2000 geotechnical investigation in appendix C, there would be areas of dredging where hard clay material would be encountered near the existing harbor entrance channel. It is not anticipated that this material would require blasting; however, heavy equipment and extra effort would likely be necessary to remove this material. Dredging equipment and methods would be left as an option for the contractor.

Side slopes for the basin would be dredged to 1 vertical (V):1.5 horizontal (H) and would require rock slope protection. The entrance channel's side slopes would be dredged to 1V:3H and would not require slope protection.

A small channel would be dredged to accommodate fish passage along the shoreward end of the south stub breakwater. This channel would be 5 meters wide by 51 meters long and be dredged to a depth of +1.75 meters MLLW (replicating the elevation and width of the existing fish passage at the northern limit of the existing harbor). This would allow half-tide access for fish through the harbor system.

Maintenance Dredging. Maintenance dredging would be expected to be minimal. Dredging has not been required in the existing harbor since its previous expansion. Littoral transport of sediments appears generally to be from north to south. Some deposition is indicated on the north side of the existing breakwater. After construction, sediment is expected to be deposited in a similar manner north of the north stub breakwater. Maintenance dredging of the new harbor basin would be minimal during the project life. It would depend on storm conditions over the years, but would be very infrequent if necessary at all.

Dredged Material Disposal. The dredged material would be disposed of in a deep-water area approximately 1.2 km east of the basin offshore from the existing harbor (figure EA-3). A total of 210,700 m^3 of dredged material—mostly clay, sand, and gravel—would be deposited in the disposal area. The material could be excavated and transported efficiently a very short distance to the disposal area.

Breakwaters. The positioning of the breakwaters would create entrance channel alignments allowing access from the east to both basins. Maximum depths of water are –6.25 meters MLLW along the alignment of the breakwater. Foundation materials would be clay, sand, and gravel, which would serve as a suitable base for the rubblemound structures. The north stub and north breakwaters were separated by an 11.5 meter-wide gap for fish passage. The gap was sized to replicate the elevation of the fish passage at the existing harbor. The land-connected stub breakwater is offset from the longer breakwater to provide a less visual obstruction to the adjacent landowner.

Rubblemound Breakwater Design. A stone specific gravity of 2.89 was used in the calculations, assuming the local quarry in Haines would be the rock source. Armor stone ("A" rock) with a range of sizes from 1,136 kilograms (kg) maximum to 682 kg

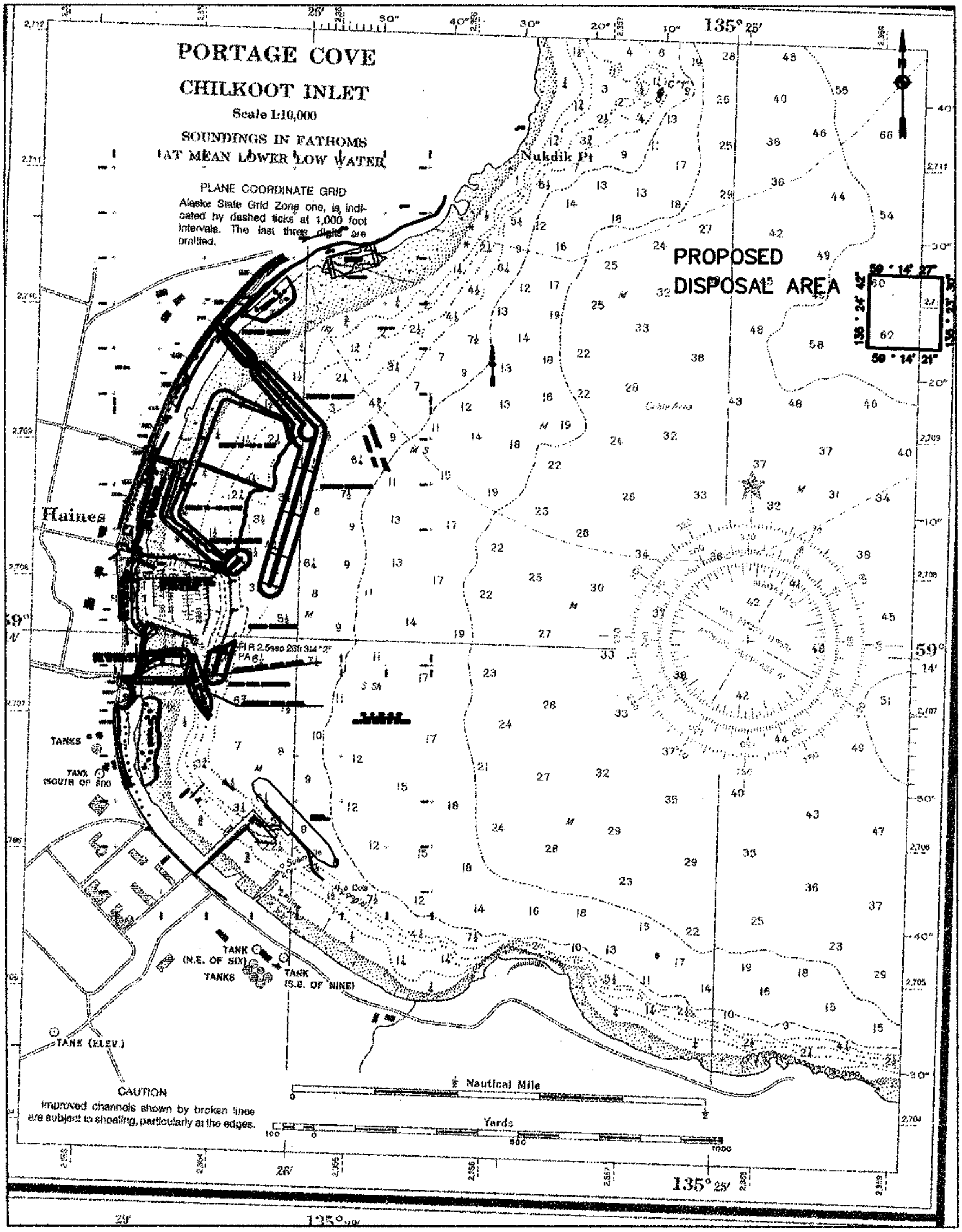

PORTAGE COVE
CHILKOOT INLET
Scale 1:10,000
SOUNDINGS IN FATHOMS
AT MEAN LOWER LOW WATER
PLANE COORDINATE GRID
Alaska State Grid Zone one, is indicated by dashed ticks at 1,000 foot intervals. The last three digits are omitted.
Nukdik Pt
PROPOSED
DISPOSAL AREA
Haines
TANKS
TANK (N.E. OF SIX)
TANK (S.E. OF NINE)
TANK (ELEV.)
CAUTION
Improved channels shown by broken lines are subject to shoaling, particularly at the edges.
½ Nautical Mile
Yards
135° 25′
26′

Figure EA-3

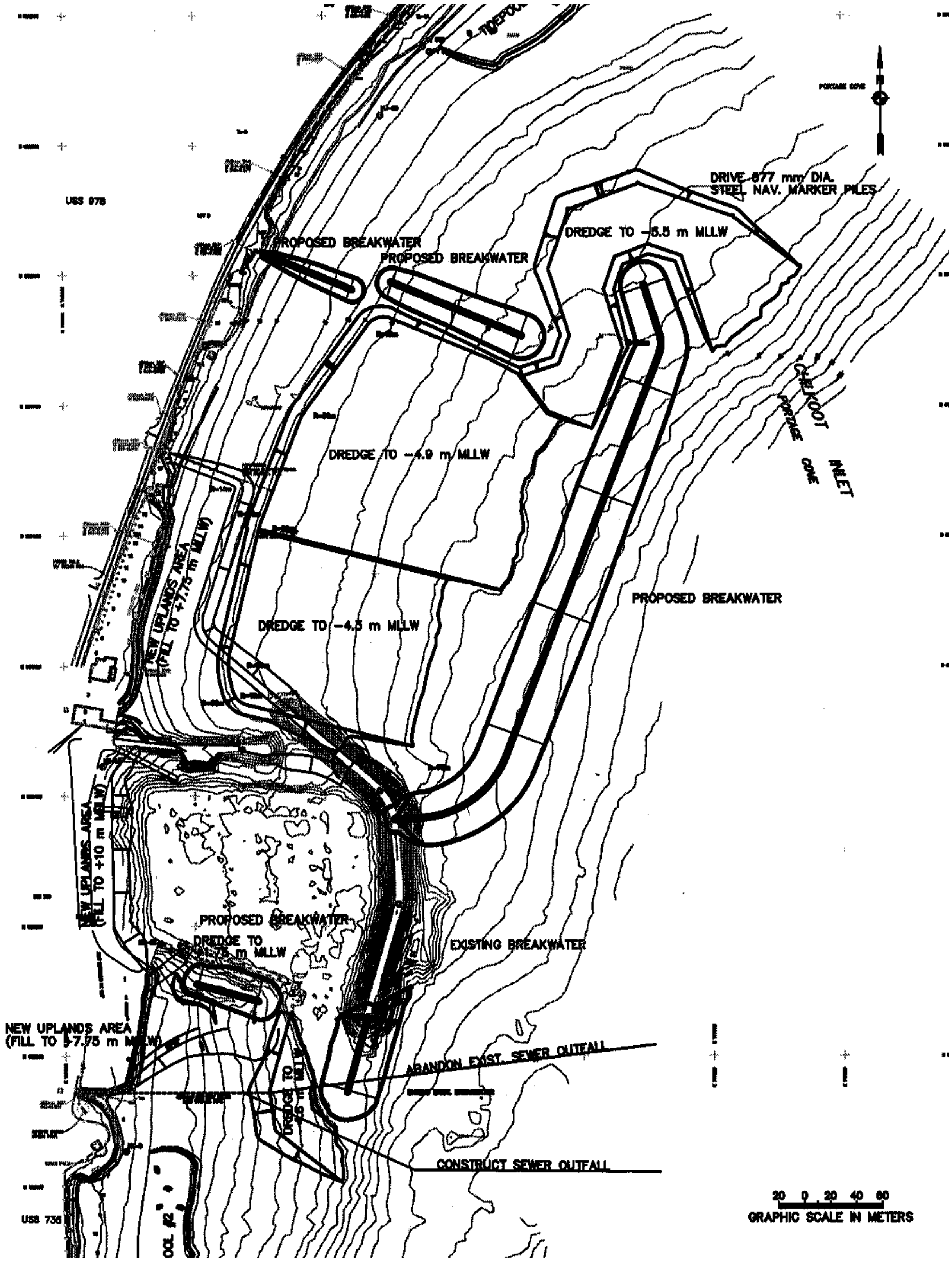
minimum would be used on the face of the breakwaters. Secondary stone would range from 682 kg maximum to 68 kg minimum. Core material would range from 68 kg maximum to 0.5 kg minimum. Armor stone thickness would be 1.52 meters, and secondary stone thickness would be 0.76 meters.

A total of 46,600 m^3 of "A" rock, 29,900 m^3 of "B" rock, and 114,300 m^3 of "core" rock would be required for construction of the breakwaters. Approximately 10,600 m^3 of rock from the existing breakwater would be removed and used as additional "core" rock in the new breakwaters.

Staging Areas. Lands for alternative 1 potentially would be created by filling in tidelands along the shoreline in the new north harbor basin, in the existing basin, and south of the existing basin. Fill material would be derived from waste rock during quarry operations and hauled to the site for placement. A total area of 3.06 ha would be created and available for use. There would be sufficient area associated with alternative 1 to provide the needed facilities to support the harbor. The needed facilities are harbor-house, gangway access, equipment storage and vehicle parking. The tideland fill is a conceptual development scenario requiring more detailed information at the time of permit application by the sponsor.

Alternative 2. This alternative is very similar in configuration to alternative 1. Detailed information about dimensions and construction quantities is provided in table 6 of the feasibility study. The difference between the two is primarily the size of the basin. The breakwaters are slightly farther offshore in deeper water and extend farther to the north on the north side. This alternative, shown in figure EA-4, incorporates the following rubblemound breakwaters: a 72.9-meter-long north spur breakwater, a 109.4-meter-long north breakwater, a 489.1-meter-long main breakwater, a 62.2-meter-long extension of the existing breakwater to the south, and a 49.9-meter-long south spur breakwater. The existing breakwater would be modified slightly by removing 46 meters of its length at its northern end, but the majority of its length would be unchanged. Two separate mooring basins would be created with this alternative. The 6.57-ha north basin could accommodate the larger range of vessels in the fleet with stalls oriented with the prevailing wind direction. The 2.25-ha south basin (existing) would remain unchanged in size and depth; however, additional wave protection would be provided and the existing float system would be removed and reoriented. Smaller vessels in the fleet would use the south harbor basin. The north harbor entrance would be oriented with an approach around the end of the main breakwater and into the maneuvering area. The local sponsor again preferred this entrance channel configuration. Marker pilings would be placed along the outside of the dredged channel limits to guide mariners into the harbor. The entrance channel into the south basin would be dredged and oriented similar to the existing south entrance channel.

North Harbor Basin. The north harbor basin would be step dredged to depths of –4.9 meters and –4.3 meters MLLW. These depths are based on criteria given in appendix A, Hydraulic Design. The deeper portion of the mooring basin would be located nearest the entrance channel. The shallower portion would be located farther into the harbor away from the entrance channel. The maneuvering area just inside the basin would be dredged to –4.9 meters MLLW. A total combined maneuvering and mooring basin area of approximately 6.57 ha would be available in the north basin for alternative 2.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EXISTING BREAKWATER
NEW UPLANDS AREA (FILL TO +7.75 m MLLW)
ABANDON EXIST. SEWER OUTFALL
CONSTRUCT SEWER OUTFALL
CHILKOOT INLET
PORTAGE COVE
USS 978
USS 736
20 0 20 40 60
GRAPHIC SCALE IN METERS

Figure EA-4

South Harbor Basin. The south harbor basin would remain unchanged with respect to area and depth.

Circulation. The north and south basins would have tidal prism ratios of 0.44 and 0.55, respectively. The corners (15 percent of the basin's volume) of the north basin were checked as worst-case possible zones of stagnation. The northeast corner had the lowest value tidal prism ratio of 0.46.

The aspect ratios of the north and south basins were calculated to be 1.46 and 1.30, respectively. Good water quality and circulation are therefore expected in both harbor basins for alternative 2.

Shoaling**.** Shoaling at either entrance channel would not be expected since there is little evidence of significant long-shore transport of sediments at the site.

Construction Dredging. Dredging a total of 223,700 m^3 of clay, 5,600 m^3 of harder clay (diamictom), and 2,800 m^3 of boulders would be required for alternative 2.

A small channel would be dredged to accommodate fish passage along the shoreward end of the south stub breakwater. This channel would be 5 meters wide by 51meters long and be dredged to a depth of +1.75 meters MLLW (replicating the elevation and width at the existing fish passage at the northern limit of the existing harbor). This would allow continuous uninterrupted migration of fish through the harbor system by maintaining the existing condition with respect to elevation and width of passage.

Dredged Material Disposal. A total of 229,300 m^3 of dredged material—mostly clay, sand, and gravel—would be deposited in the disposal area.

Breakwaters. A total of 48,900 m^3 of "A" rock, 32,6 00 m^3 of "B" rock, and 135,000 m^3 of "core" rock would be required for construction of the breakwaters. Approximately 10,600 m^3 of rock from the existing breakwater would be removed and used as additional "core" rock in the new breakwaters.

Staging Areas. Areas for alternative 2 would be created by filling in tidelands along the shoreline in the new north harbor basin, in the existing basin, and south of the existing basin. Fill material would be derived from waste rock during quarry operations and hauled to the site for placement. A total uplands area of 3.06 ha would be created and available for use.

Alternative 3. The local sponsor provided the layout for alternative 3 in coordination with the ADOT/PF (the local sponsor's technical advisor). This alternative was designed to maximize the available mooring area within the north basin and to allow future use of the main breakwater for access to a future dock outside the harbor. The main breakwater is located farther offshore in deeper water and extends farther to the north on the north side than the previous two alternatives. The north spur and first portion of the main breakwater have a widened crest width to accommodate vehicle access for a future dock to be located at the turn-around. The dock would support larger vessels, such as ferries, over 200 feet in length. The causeway would accommodate an access road to the dock. A pile-supported bridge would connect the fish passage breach. Information about the dimensions and construction quantities for this alternative is shown on figure EA-5 and in Table 6 of the feasibility report.

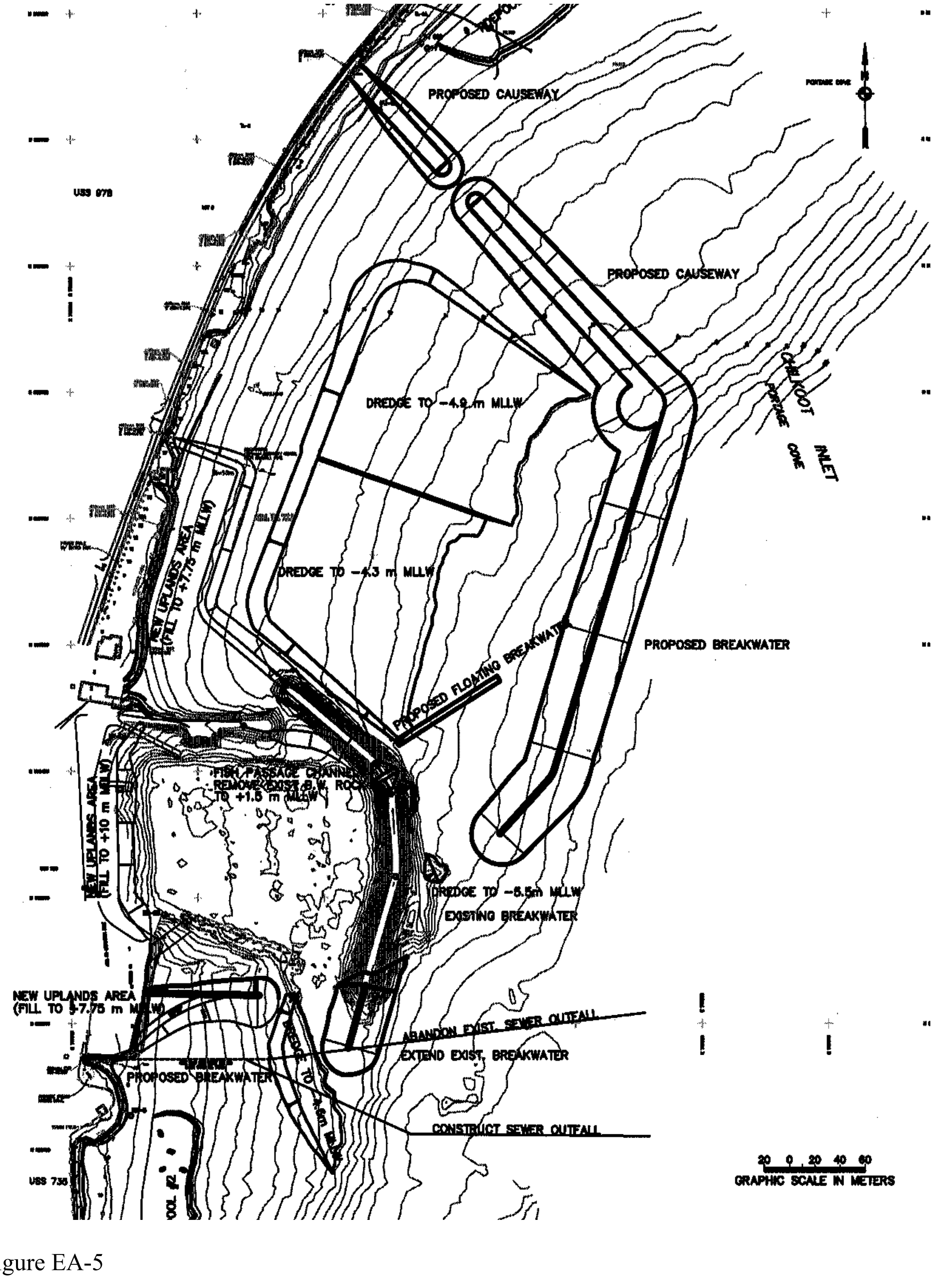

PROPOSED CAUSEWAY
USS 978
PROPOSED CAUSEWAY
DREDGE TO -4.9 m MLLW
CHILKOOT INLET
PORTAGE COVE
NEW UPLANDS AREA (FILL TO +7.75 m MLLW)
DREDGE TO -4.3 m MLLW
PROPOSED BREAKWATER
PROPOSED FLOATING BREAKWATER
FISH PASSAGE CHANNEL
REMOVE EXIST B.W. ROCK
TO +1.5 m MLLW
NEW UPLANDS AREA (FILL TO +10 m MLLW)
DREDGE TO -5.5m MLLW
EXISTING BREAKWATER
NEW UPLANDS AREA
(FILL TO +7.75 m MLLW)
ABANDON EXIST. SEWER OUTFALL
EXTEND EXIST. BREAKWATER
PROPOSED BREAKWATER
CONSTRUCT SEWER OUTFALL
20 0 20 40 60
GRAPHIC SCALE IN METERS
USS 738

Figure EA-5

It incorporates the following rubblemound breakwaters: a 103-meter-long north spur breakwater, a 191-meter-long first portion of the main breakwater, a turn-around portion of the main breakwater with a radius of 18.5 meters, a 325.9-meter-long second portion of the main breakwater, a 51.2-meter-long extension of the existing breakwater to the south, and a 33.3-meter-long south spur breakwater. The existing breakwater would be unchanged except for the extension of the head to the south and the creation of a new fish passage channel near its northern angle point. A concrete floating breakwater would be constructed and placed along the western edge of the new north entrance channel. Two separate mooring basins would be created with this alternative. The 7.02-ha north basin could accommodate the larger range of vessels in the fleet with stalls oriented with the prevailing wind direction. The 2.25-ha south basin (existing) would remain unchanged in size and depth; however, additional wave protection would be provided and the existing float system would be removed and reoriented. Smaller vessels in the fleet would use the south harbor basin. The north harbor entrance would be oriented with an approach around the end of the main breakwater and into the maneuvering area. This entrance channel configuration represents the preference of the local sponsor for this alternative. The entrance channel into the south basin would be dredged and oriented similar to the existing south entrance channel.

North Harbor Basin. The north harbor basin would be step dredged to depths of –4.3 meters and –4.9 meters MLLW, with the deeper portion of the basin in the northern half. These depths are based on the established criteria. The shallower portion of the mooring basin would be located nearest the entrance channel. The maneuvering area just inside the basin would be left un-dredged since natural depths are sufficient for maneuvering. A total combined maneuvering and mooring basin area of approximately 7.02 ha would be available in the north basin for alternative 3.

South Harbor Basin. The south harbor basin would remain unchanged with respect to area and depth.

Circulation. The north and south basins would have tidal prism ratios of 0.49 and 0.55, respectively. The corners (15 percent of the basin's volume) of the north basin were checked as worst-case possible zones of stagnation. The northeast corner had the lowest value tidal prism ratio of 0.46.

The aspect ratios of the north and south basins were calculated to be 1.41 and 1.30, respectively. Good water quality and circulation are therefore expected in both harbor basins for alternative 3.

Construction Dredging. Dredging a total of 142,600 m^3 of clay, 3,300 m^3 of harder clay (diamictom), and 2,200 m^3 of boulders would be required for alternative 3.

A small channel would be excavated through the existing breakwater to accommodate fish passage between the north basin and the south basin. This channel would be 4 meters wide by 22 meters long and be excavated to a depth of +1.5 meters MLLW. Side slopes would be 1V:3H on the inside and 1V:1.5H on the outside. This would allow migration of fish through the harbor system. The existing fish passage would be filled to accommodate harbor access.

Dredged Material Disposal. A total of 146,200 m^3 of dredged material—mostly clay, sand, and gravel—would be deposited in the disposal area.

Breakwaters. Similar breakwater design methodology described for alternatives 1 and 2 was used for alternative 3. This resulted in the same crest height, rock size and layer thicknesses, and toe configurations for the seaside. The crest width for the north spur and first portion of the main breakwater for alternative 3 was widened to 13.8 meters. "A" rock would only extend up to the full crest height of +7.93 meters MLLW on the seaside. The crest itself would be "core" rock and presumably surfaced with sub-base and base course material in the future for vehicle access. The harbor side would have "B" rock only since no overtopping would be anticipated over the widened crest portions. The turn-around portion of the main breakwater would be widened further to a radius of 18.5 meters with a similar cross-section to the north spur and first portion of the main breakwater. The second portion of the main breakwater and south breakwater extensions and south spur breakwaters would use the same cross-section design as those for alternatives 1 and 2.

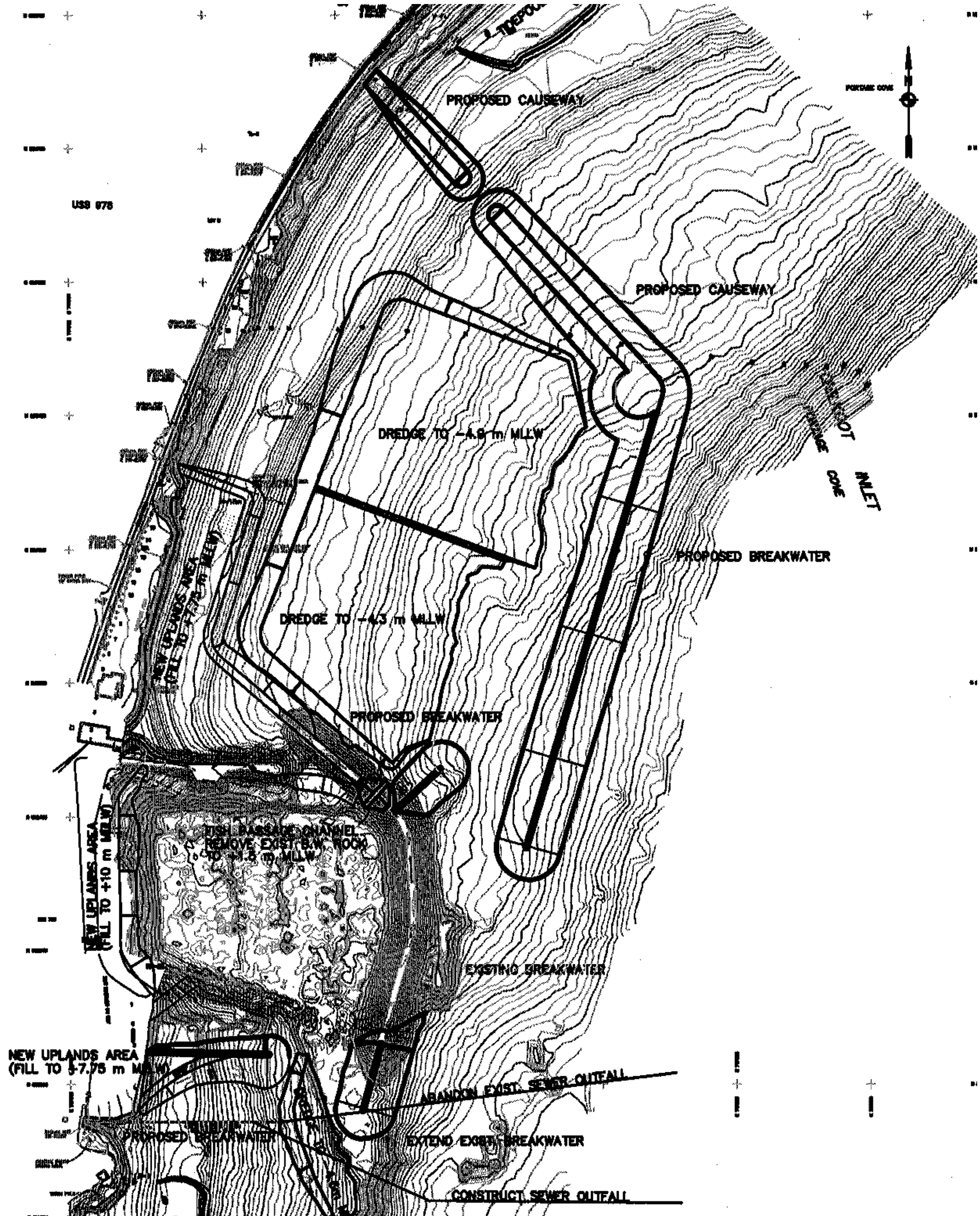
A total of 43,600 m^3 of "A" rock, 44,700 m^3 of "B" rock, and 257,400 m^3 of "core" rock would be required for construction of the breakwaters. Approximately 2,600 m^3 of rock from the existing breakwater would be removed and used as additional "core" rock in the new breakwaters.

Floating Breakwater Design. ADOT/PF designed the floating breakwater for alternative 3. The structure would reduce residual wave heights to acceptable levels inside the harbor by attenuation. Based on wave height reduction criteria in the SPM, the floating breakwater dimensions required were calculated to be 4.88 meters wide and 2.00 meters high (0.6 meter freeboard and 1.4-meter draft). The length of the structure would be 95.72 meters to provide adequate wave protection and allow for use as a mooring float for larger vessels. A concrete box-type design was selected for the structure. It would be supported by steel pilings driven into the existing bottom.

Staging Areas. A total area of 2.66 ha of filled tidelands potentially would be created and available for use.

Alternative 4. The local sponsor also provided the layout for alternative 4 in coordination with the ADOT/PF (the local sponsor's technical advisor). This alternative is very similar to alternative 3; however, it incorporates a smaller mooring basin. It would allow future use of the main breakwater for access to a future dock outside the harbor similar to alternative 3. The main breakwater, however, is located closer inshore and in shallower water. The north spur and first portion of the main breakwater have a widened crest to accommodate vehicle access for a future dock to be located at the turn-around.

This alternative, shown on figure EA-6 with dimension and quantity details in table 6 of the feasibility report, incorporates the following rubblemound breakwaters: a 103-meter-long north spur breakwater, a 154-meter-long first portion of the main breakwater, a turn-around portion of the main breakwater with a radius of 18.5 meters, a 316-meter-long second portion of the main breakwater, a 46.7-mete-long stub breakwater attached to the existing breakwater, a 51.2-meter-long extension of the existing breakwater to the south, and a 33.3-meter-long south spur breakwater. The existing breakwater would be unchanged except for the extension of the head



PROPOSED CAUSEWAY
USS 978
PROPOSED CAUSEWAY
DREDGE TO -4.9 m MLLW
PROPOSED BREAKWATER
NEW UPLANDS AREA
DREDGE TO -4.3 m MLLW
PROPOSED BREAKWATER
FISH PASSAGE CHANNEL
REMOVE EXIST B.W. ROCK
NEW UPLANDS AREA
(FILL TO +10 m MLLW)
EXISTING BREAKWATER
NEW UPLANDS AREA
(FILL TO +7.75 m MLLW)
ABANDON EXIST. SEWER OUTFALL
PROPOSED BREAKWATER
EXTEND EXIST. BREAKWATER
CONSTRUCT SEWER OUTFALL
USS 735
20 0 20 40 60
GRAPHIC SCALE IN METERS

Figure EA-6

to the south and the creation of a new fish passage channel near its northern angle point. Two separate mooring basins would be created with this alternative. The 6.60-hectare north basin could accommodate the larger range of vessels in the fleet, with stalls oriented in the prevailing wind direction. The 2.25-hectare south basin (existing) would remain unchanged in size and depth; however, additional wave protection would be provided and the existing float system would be removed and reoriented. Smaller vessels in the fleet would use the south harbor basin. The north harbor entrance would be oriented with an approach around the end of the main breakwater and into the maneuvering area. This entrance channel configuration represents the preference of the local sponsor for this alternative. The entrance channel into the south basin would be dredged and oriented similar to the existing south entrance channel.

North Harbor Basin. The north harbor basin would be step dredged to depths of –4.3 meters and –4.9 meters MLLW with the deeper portion of the basin in the northern half. These depths are based on criteria in Section 5 of the hydraulics appendix. The shallower portion of the mooring basin would be located nearest the entrance channel. The maneuvering area just inside the basin would be left undredged since natural depths are sufficient for maneuvering. A total combined maneuvering and mooring basin area of approximately 6.60 hectares would be available in the north basin for alternative 4.

South Harbor Basin. The south harbor basin would remain unchanged with respect to area and depth.

Circulation. The north and south basins would have tidal prism ratios of 0.53 and 0.55 respectively. The corners (15% of the basin's volume) of the north basin were checked as worst-case possible zones of stagnation. The northeast corner had the lowest value tidal prism ratio of 0.45.

The aspect ratios of the north and south basins were calculated to be 1.67 and 1.30 respectively. Good water quality and circulation are therefore expected in both harbor basins for alternative 4.

Construction Dredging. A total of 156,500 m^3 of clay, 3,300 m^3 of harder clay (diamictom), and 1,900 m^3 of boulders dredging would be required for alternative 4.

A small channel would be excavated through the existing breakwater to accommodate fish passage from the north basin into the south basin and vice versa. This channel would be similar to that for alternative 3.

Dredged Material Disposal. A total of 163,200 m^3 of dredged material—mostly clay, sand, and gravel—would be deposited in the disposal area.

Breakwaters. Similar breakwater design methodology described for alternatives 1, 2, and 3 was used for alternative 4.

A total of 38,500 m^3 of "A" rock, 39,100 m^3 of "B" rock, and 191,100 m^3 of "Core" rock would be required for construction of the breakwaters. Approximately 2,600 m^3 of rock from the existing breakwater would be removed and used as additional core rock in the new breakwaters.

Staging Areas. Upland support areas for alternative 4, which are typical for all the alternatives, would potentially be created by placing fill in tidelands along the shoreline in the new north harbor basin, in the existing basin, and south of the existing basin to an elevation of 7.95 MLLW. The existing fish passage channel would be filled in as well. Fill material would be derived from waste rock during quarry operations and hauled to the site for placement. A total area of 2.66 ha would be created and available for use. Specific information about the fill development is required for the Department of the Army 404 permit application. Following are the concept uses for the fill:

- Roads and walkways to access harbor facilities
- Boat launch ramp
- Buildings required to operate the harbor, including harbormaster's office and associated parking and storage
- Public restrooms, showers, and associated facilities
- Buildings for oil spill response equipment
- Collection points for used oil, antifreeze and trash
- Parking for harbor users
- Building for fire safety and snow removal equipment
- Harbor-related commercial development
- Fishing industry support facilities, including: ice plant, backup generator, cold storage facilities, transfer and staging area
- Non-point source pollution buffer, landscaping. And pubic information areas

2.3 No Action

The no-action alternative would leave the site in its present condition. The identified purpose and need would not be fulfilled. The harbor would continue to be used beyond its designed capacity. Damage to vessels and docking facilities from overcrowding would continue; economic benefits to the fleet from improved and expanded harbor facilities would not be achieved; and vessels unable to secure moorage in the harbor would continue seeking refuge at other ports.

3.0 AFFECTED ENVIRONMENT

3.1 Physical Environment

Haines is on the western shore of Lynn Canal between the Chilkoot and Chilkat Rivers. It is 80 air miles northwest of Juneau, just south of the Canadian border at British Columbia. It is approximately 59°14' N latitude, 135° 26' W longitude (Sec. 34, T030S, R059E, Copper River Meridian). The community is in the Haines Recording District encompassing 8 square miles of land and 7 square miles of water.

3.1.1Climate

Haines has a maritime climate characterized by cool summers and mild winters. Summer temperatures range from 46 to 66 °F and winters range from 10 to 36 °F. Temperature extremes have been recorded from -16 to 90 °F. Total precipitation averages 52 inches a year, with 133 inches of snowfall. Prevailing winds are from the southeast at about 10 miles per hour Maximum winds are from the northeast at about 42 miles per hour. Although prevailing winds

at Haines are not necessarily severe; the winds funneling down the Chilkat valley can become severe and cause property damage in Letnikof Cove (COE 1974).

3.1.2 Topography

The topography surrounding the Haines area is mountainous. Formation of the present landscape in southeast Alaska, including the Haines area, took place during the Quaternary period. The two most active processes were glaciation and volcanism. Haines is on the west shore of Lynn Canal, a deep glacial fjord heading to the northeast of Haines at Skagway, Alaska. Haines is bordered to the east by the coastal foothills of the Coast Range Mountains and the Alaska Range on the west. A highway leads northwest from Haines up the Chilkat River valley and over a relatively low, currently unglaciated pass to the Yukon and interior Alaska.

3.1.3 Geology

The Haines area is underlain with slate, quartzite, and schist, inter-layered with beds of marble and gneiss, and bordered by intrusive granitic igneous rocks of Cretaceous age. The Chilkat River Fault originates (on land) at Haines and continues north into the Yukon to the south end of Kluane Lake, and farther northwest into eastern Alaska as the Denali Fault. This major fault, and associated smaller faults, are active and cause a steady stream of small earthquakes. The Haines area is on the border between seismic risk zones 3 and 4 and has had at least one earthquake of magnitude ≥ 5 but < 6 between 1899 and 1972. There are no records of tsunamis observed at Haines between 1845 and 1964, but the 1964 earthquake in Prince William Sound produced a tsunami that was observed at nearby Juneau, Alaska.

3.1.4 Soils

Much of lowland southeast Alaska, including the Haines area, is overlain with unconsolidated glacial deposits on surface bedrock. Deposits of sand, silt, clay, and gravel occur along streambeds, while a complex mixture of poorly draining gravel, sand, silt and clay, known as glacial tills, cover much of the lowlands. Common landforms in southeast Alaska are several types of glacial moraines that are composed mostly of poorly sorted soils, gravel, and rocks. Many glacial moraines and glacial deposits are currently submerged. Shoreline processes have actively shifted and redeposited sediments producing interstratified alluvial and marine deposits. Some poorly drained areas that have been vegetated for longer periods are developing muskeg bogs and localized areas of peat. A thin layer of organic material overlays bedrock and till in other vegetated areas.

3.1.5 Marine Substrate

Dive surveys were conducted along about 200-meter transects at several locations in Portage Cove. No dive transects were surveyed at the alternate site, Letnikof Cove. The marine substrate at the Portage Cove sites was primarily boulder or cobble from the MHHW seaward to about 50 yards before changing to sand, then to mud or a mixture of sand and mud (FWS 2000). Although unconfirmed, aerial photographs of Letnikof Cove at low tide suggest that the subtidal substrate in Letnikof Cove is similar to that found in Portage Cove.

3.1.6 Sediment Characterization

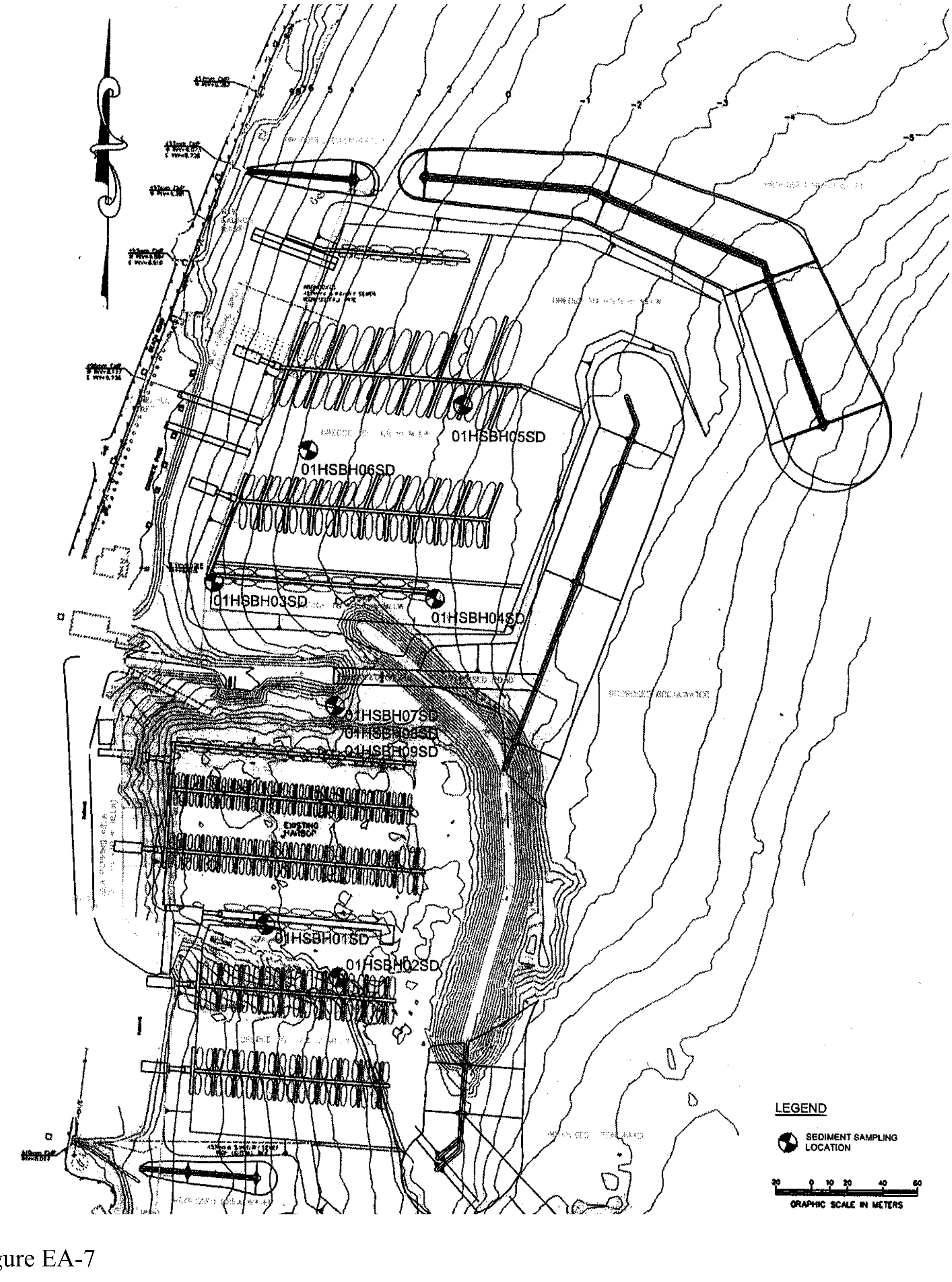
Nearshore core testing was done in 2001 to determine the presence of bedrock, to characterize the sediment gradations, and to chemically characterize the sediments for the presence of contaminants. Sediments were collected on May 24 and 25, 2001, from within the harbor and the proposed disposal site. Samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), PCB's, pesticides, gasoline range organics (GRO), diesel rang organics (DRO), residual range organics (RRO), the 8 RCRA metals plus antimony, copper, nickel, and zinc, tributyltin (TBT), and total organic carbon (TOC). Analytical results were compared to the State of Washington Sediment Management Standards Puget Sound Dredged Disposal Analysis, Lower Columbia River Management Area guidance documents for in water disposal options, as the State of Alaska does not have sediment standards to regulate disposal of dredged material. Analytical results were also compared with the State of Alaska Contaminated Sites 18 AAC 75 regulations for upland disposal.

The proposed dredged material from all locations except the existing fuel dock area and the boat grid area are suitable for unconfined ocean disposal. These areas are not within the proposed dredging areas but were sampled because these activities in boat harbors are typically pollution sources.

VOCs were not detected in the seven primary sediment samples. SVOCs were detected in three of the seven samples. The sediments collected from the fuel dock and the boat grid contained measurable amounts or combustion derived polyaromatic hydrocarbons. Trace amounts were detected in the adjacent sediments. No analyte was detected above screening levels.

No PCBs or pesticides were detected in the samples. GRO was not detected in any of the sediment samples. RRO was detected in the near harbor area and at the boat grid. The highest levels of petroleum hydrocarbons were measured in the sample collected near the fuel dock. None of the results were above the State of Alaska AAC 75 cleanup levels.

RCRA Metals. Mercury was measured in one sediment sample from the fuel dock at 2.9mg/kg, above the screening criteria of 2.3mg/kg. Mercury was measured at 1.4 mg/kg at the boat grid. Silver was measured at 11 mg/kg at the fuel dock, above the 6.1 mg/kg screening level. According to the guidance document, sediments from these areas would likely fail the standard suite of biological tests and are probably not suitable for unconfined aquatic disposal. Arsenic was above State of Alaska regulatory limits in all sediments analyzed, except the sample collected from the boat grid. Arsenic was not above the other screening levels and, although background levels have not been established at this time, may be representative of this area. Chromium and selenium were detected above State of Alaska regulatory limits at the fuel dock and the boat grid. Other guidelines have not been established for these two elements, except under State of Washington Sediment Management Standards. Marine Sediment Quality Standard Chemical Criteria recommend a chromium limit of 260 mg/kg, well above the 29.4 mg/kg average of the collected concentration. There would be no dredging at the fuel dock or boat grid. There would be no dredging in the existing harbor except for a small amount of dredging at the existing harbor entrance channel approximately 160 meters from the fuel dock. Contamination of this material is not expected. The majority of project dredging would occur at the new harbor location where sampling indicated the material is suitable for water disposal. The sampling locations are shown in figure EA-7.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LEGEND
SEDIMENT SAMPLING LOCATION
GRAPHIC SCALE IN METERS

Figure EA-7

Sediment Gradations. Surface samples within the harbor area and at the disposal site were classified for sediment size. The material ranged from silt to well-graded sand as shown in the table below.

Table 1. Engineering Classification and Percent Sand in Haines Harbor Sediments			
Sample 1HSBH-	Sample Location	Engineering Classification	Percent Sand by Weight
01SD	Fuel Dock	Silt, ML	7.6
02SD	Float Plane Dock	Poorly graded sand, SP	68
03SD	Inner Harbor Near	Poorly graded sand, SP	63
04SD	Outer Harbor Near	Poorly graded sand, SP	96
05SD	Outer harbor Far	Well graded sand with silt, SW-SM	86
06SD	Inner Harbor Far	Silt, ML	30
07SD	Boat Grid	Silt, ML	22
10SD	Disposal Site	Silt, ML	9.4

3.1.7 Hydrology/Water Quality

Most of southeast Alaska is characterized by high amounts of precipitation and correspondingly, high and rapid runoff. Runoff in southeast Alaska is influenced largely by daily weather conditions, while elevation of the basin, lakes, and contributions of glaciers affect daily flow and runoff patterns. Major rivers in the Haines area, the Chilkat and Chilkoot, originate at glaciers. The larger, Chilkat River, is a typical braided glacial river, while the smaller, Chilkoot River, has a large lake, Chilkoot Lake, to buffer the effects of runoff from glacial melt. Although some wells in glacial till near Juneau produce large volumes, ground water from wells is typically low in volume or not available, and like many other southeast Alaska communities, Haines gets its water supply from local lakes and from a spring. Surface water is generally of the calcium bicarbonate type, of acceptable quality, and low in total dissolved solids.

3.1.8 Tides and Currents

The tidal range at Haines is approximately 4.3 meters with a MHHW of 5.1 meters and a mean tide of 2.6 meters). Currents in Chilkoot Inlet fronting Portage Cove are weak and variable. U.S. Fish and Wildlife Service (USFWS) divers reported that there was little current during their dive surveys (USFWS 2000).

3.2 Biological Resources

3.2.1 Terrestrial Resources

Vegetation. Southeast Alaska is characterized by the coastal western hemlock-Sitka spruce ecosystem from sea level to the tree line. The densest stands of timber are near tidewater, becoming less dense near the tree line. The tree line in southern southeast is at about 2,500 feet and about 1,000 feet in northern southeast Alaska. Typical trees include western hemlock, Sitka spruce, western red cedar, Alaska cedar, red alder, cottonwood, mountain hemlock, alpine fir, Pacific fir, and lodge pole pine. Shrubs include blueberry, huckleberry, copperbush, Sitka alder, devils club, and juniper. Other vegetation characteristic of the coastal western hemlock-Sitka spruce ecosystem includes skunk cabbage, ferns, mosses, and grasses. The city of Haines is within this coastal western hemlock-Sitka spruce vegetation zone.

Wet tundra or muskeg in southeast Alaska is found in some areas of low relief and poor drainage. Plants typical of these areas are willows, dwarf birch, cinquefoil, bur weed, pondweed, pendant grass, mare's tail, blue joint, cottongrass, beach rye, and sedges and mosses.

The alpine tundra consists of open areas, barren rock, and rubble interspersed with low-growing plants and mats. Typical plants include Cassiopeia, mountain heath dwarf blueberry and willow, alpine azalea, lichens, and mosses.

3.2.2 Wildlife

Terrestrial mammals in the Haines area include brown and black bear, gray wolf, red fox, wolverine, Sitka deer, moose, mountain goat, marten, mink, land otter, beaver, weasels, muskrats, hares, squirrels, and small rodents such as voles and shrews. Hoary marmots are present in some alpine areas near Haines.

Terrestrial birds in the Haines area include grouse and ptarmigan depending on elevation and habitat. Bald eagles are very common, particularly during winter, when large numbers migrate to winter on the nearby Chilkat River. Other raptors include peregrine falcon and horned owl. Perching and songbirds include Steller jay, northwestern crow, magpie, and common raven.

The USFWS bald eagle nest web site atlas lists two bald eagle nests in the vicinity of the project site (FWS 2001b). The atlas lists one nest in Portage Cove (nest number 28) and one nest in Letnikof Cove (nest number 16). The respective survey dates for the nests are 1994 and 1979, and it is assumed they are no longer active because the draft U.S. Fish and Wildlife Coordination Act Report (FWS 2000) for this project states that there are no bald eagle nests in the project vicinity.

3.2.3 Marine Resources

Marine Vegetation. Rockweed (*Fucus*) and brown algae (*Phaeophyta*) are the dominant marine vegetation common to the upper intertidal zones of Portage Cove. Algaes are only attached to the occasional boulder scattered on the beach north of the existing harbor. The intertidal zone south of the existing harbor consists of boulders taken originally from the dredged harbor. These boulders were covered with abundant algaes. A small creeklet drains this area creating a small wetland in the supralittoral zone vegetated with sedges and grasses. Laminaria kelp, sea lettuce (*Ulva and Monostroma sp.*), sea hair (*Enteromorpha intestinalis*), witch's hair (*Desmarestria aculeata*), and the saucer shaped red algae, *Constantinea* were found in subtidal areas. The existing breakwaters in Haines were densely populated with primarily brown algaes. It is apparent that any available attachment substrate was colonized heavily.

Intertidal/Subtidal Resources. North of the existing Haines Harbor, the beach line above extreme high tide (about + 7 meters MLLW) is sand gravel and coarser material with enough fines and loam to support terrestrial vegetation along most of the upper beach. Beach ryegrass and in sandier areas, beach sandwort were primary species present. The upper-most inter-tidal is largely barren but supports small patches of beach sandwort. Downslope from the most seaward of the terrestrial vegetation, the beach predominately is wave-washed cobbles, gravels, and patches of sand and silt. This zone above about +4 meters MLLW is almost totally barren of attached algae, vascular plants, and marine invertebrates. Very small acorn barnacles pioneer the next lower zone, which begins at an estimated + 3.5 to 4 meters MLLW. The barnacle assemblage becomes more populous and the individual barnacles are progressively larger down slope in this zone, at around +3 meters MLLW. Judged by size and shell thickness, these small barnacles became established earlier in the survey year. This zone contained none of the older, heavier barnacles of the mid and lower intertidal that apparently over-winter successfully. The sparseness and early stage of the barnacle assemblage in this zone strongly suggests that harsh winter conditions or other factors prevent successful perennial colonization of this zone above about +2.5 meters MLLW.

Farther down slope, into the mid intertidal range beginning at about +2 meters MLLW, there is more area of fine silt and clay. The scattered rocks that are exposed host denser barnacle populations that include larger, overwintering individuals . Rockweed and other marine macrophytes begin to commonly appear in this zone, as do small mussels. Populations of barnacles, mussels, rockweed, and other macrophytes become denser on hard surfaces in the deeper reaches of this zone.

Most of the mid and lower intertidal substrate in the area that would be inside the proposed harbor is soft gray substrate underlain by darker soft material that may be anaerobic. One exceptional area is a patch of accreted sand that has partially filled a few hundred square meters in the corner formed where the existing breakwater connects to the shore. The breakwater itself forms a rocky intrusion into this mid-to-upper level of the intertidal zone and hosts the densest assemblages of the middle intertidal zone. Infauna is very sparse in the fine, soft material that makes up most of the substrate north of the existing harbor. Scattered burrows of a few polychaetes and other infaunal invertebrates were noted. The sandy accreted area in the corner outside the breakwater showed more borrows and casts, indicating that the infauna were somewhat richer there than in the softer bottom that predominates the middle intertidal zone.

The beach south of the existing harbor is more diverse because of the primarily rocky habitat providing attachment for dense colonies of blue mussels. The outfall pipeline is in this area, also encrusted with mussels. The existing breakwater is colonized with mussels, anemone and other sessile organisms.

The USFWS conducted a dive survey in Portage Cove in June 2001. The acorn barnacle dominated the invertebrate fauna of the intertidal zone out to about 100 meters followed by blue mussel. Outward of about 100 meters, the invertebrate fauna was dominated by the 6-armed sea star followed by the acorn barnacle and blue mussel. Sole, snake pricklebacks, and sculpins represented the fish species. Sculpin and sole were dominant depending on local habitat. The nearshore zone throughout Portage Cove is composed of unconsolidated sandy bottom habitat. Further details are contained in the U.S. Fish and Wildlife Coordination Act Report, EA Appendix 2.

Five species of Pacific salmon and steelhead trout, *Oncorhynchus sp.,* are found in marine waters near Haines. These anadromous species also ascend many of the freshwater rivers of southeast Alaska. The Chilkat River near Haines is famous for late runs of chum salmon that attract large numbers of wintering bald eagles. Pacific salmon are present in the Haines area both as adults and juveniles. Salmon streams in the area include the Chilkoot, Chilkat, Ferebee, Katzehin, Takhin, and the Kicking Horse rivers among smaller creeks and drainages. Sawmill creek is the primary drainage of significance within the city of Haines. The creek has associated wetlands used by fish and nesting waterfowl. Historically, coho, cutthroat, and Dolly Varden have used the upper reaches of the stream, which is still used as rearing habitat by these species. In recent years spawning has been eliminated because of barriers introduced by drainage ditch realignment and culvert installation. Juvenile salmon are present in marine waters during the spring and summer, while the adults of some species are present during the summer and fall. Sub-adult Chinook salmon are likely to be present in Lynn Canal waters year round. Salmon juveniles were abundant in the existing Haines Harbor as observed in May 2001. They schooled throughout the harbor and hundreds were also observed using the breakwater breach during tidal changes.

Dolly Varden char and cutthroat trout are other salmonid species common to southeast Alaska. In addition to the salmonid species mentioned, the marine waters of Lynn Canal support species of cod, flatfish including Pacific halibut, sculpins, greenlings including ling cod, herring and other forage fish, and a variety of invertebrates including king, tanner and Dungeness crabs and shrimp. Mollusks including many species of clams, mussels, barnacles and the giant Pacific octopus, abound.

3.3 Marine Mammals

Upper Lynn Canal is home to a variety of marine mammals but not in the abundance sometimes found in the outer coastal areas. Marine mammals could include sea otter, sea lion, harbor seal, Dall porpoise, and whales including the humpback whale, Minke whale, and orca whale. Specific observations of these mammals in the harbor area were not made.

3.4 Waterfowl/Seabirds

The Haines area is not considered high-density waterfowl habitat, but many species of ducks and a few species geese are at least seasonally common. Ducks and geese such as the mallard and Canada goose typically winter in many southeast areas. Numerous species of birds including sea ducks and seabirds also inhabit the Lynn Canal area. These include the harlequin duck, old squaw duck, scoters, murrelets, murres, auklets, cormorants, loons, grebes, gulls, and shorebirds such as the black oystercatcher and great blue heron. Some species are more abundant during the winter months while some are present year around. There are no seabird colonies in the Haines area listed on the U. S. Fish and Wildlife Seabird colony atlas (FWS 2001a).

3.5 Threatened and Endangered Species

There are no known endangered or threatened species managed by the U. S. Fish and Wildlife Service in the project vicinity (USFWS 2000). Steller sea lions east of 144º W longitude are listed as threatened. Although individual Steller sea lions may occasionally visit upper Lynn Canal waters, the closest listed rookery to the Haines Harbor project site is at Graves Rocks several miles north of the entrance to Cross Sound and about 80 miles southwest of Haines. Several species of whales including the endangered humpback whale may occasionally ascend Lynn Canal as far as Haines. This species is common in an adjacent fjord, Glacier Bay, where it is the subject of viewing excursions by tourist vessels, but uncommon in upper Lynn Canal. Vessels involved in the Glacier Bay whale-watching industry are generally large cruise vessels or tour boats from Juneau, and expansion of the small boat harbor at Haines is not likely to contribute to this effort because of low customer availability.

No Alaska salmon stocks are listed as endangered or threatened and the likelihood of ESA-listed salmon species from Puget Sound, Washington occurring in upper Lynn Canal waters is very small.

3.6 Essential Fish Habitat

3.6.1 Essential Fish Habitat

The 1996 reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) amendments mandate that Federal agencies assess the effects of Federal projects on essential fish habitat (EFH [commercial fish stocks in all life stages and associated habitats]) and consult with the Department of Commerce (50 CFR 600.905-930). The Gulf of Alaska Fishery Management Plan (FMP) lists four species in the groundfish category and the forage fish category. The four categories are the target species category (pollock, cod, etc.); the other species category (sculpins, skates, etc.); the prohibited species category (halibut, herring, etc.); and the nonspecified species category (urchin, rattails, etc.). EFH must be described and identified for those species listed in the target species and the other species categories only. The prohibited species and the nonspecified species categories are outside the groundfish FMP and will not be considered EFH for the purposes of sections 303(a)(7) and 305(b) of the MSA. The other FMPs pertinent here include those for salmon and scallops. Habitats of particular concern are areas known to be important to species in need of additional levels of protection from adverse effects. In determining habitat types of particular concern, consideration should be given to the sensitivity, exposure, rarity, and the importance of the ecological function of the habitat. Habitat areas of particular concern include nearshore areas of intertidal and submerged vegetation, rock, and other substrates. These areas provide food and rearing habitat for juvenile groundfish and spawning areas for some species. All nearshore marine and estuarine habitats used by Pacific salmon, such as eelgrass beds, submerged aquatic vegetation (seaweeds), emergent vegetated wetlands, and certain intertidal zones, are sensitive to natural or human induced environmental degradation, especially in urban areas and in other areas adjacent to intensive human-induced developmental activities.

Essential fish habitat means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of essential fish habitat: “waters” include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; “substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities; “necessary” means the habitat required to support a sustainable fishery and a healthy ecosystem; and “spawning, breading, feeding, or growth to maturity” covers a species’ full life cycle.

The Chilkoot Inlet arm of Lynn Canal that fronts the Haines area is not listed as essential habitat for any species of forage fish (NOAA 2001). The only fish listed for the general Haines area is several species of groundfish and only a few of the listed species would be common to the Haines area. Vessels using the harbor site, however, may transit habitat occupied by some of the listed groundfish.

No rockfish were documented by USFWS divers surveying the project area, and it is undetermined if the immediate Haines area could be included as essential fish habitat; the general Lynn Canal area south of Haines could be considered essential fish habitat for several species of rockfish. These rockfish include species such as the yelloweye rockfish and dusky rockfish. The younger juveniles of many rockfish species use shallow-water habitats for nursery areas, while the older juveniles are known to concentrate along vertical faces in fjord areas.

The USFWS divers did observe sculpins (*Myoxocephalus sp*.) in the project area. Sculpins inhabit a variety of habitats from tide pools as juveniles and adults of smaller-sized species to deeper, offshore waters. Sculpins have an ecological importance in all areas and recreational and commercial importance in some areas of their range. Some sculpin species are versatile and can survive in variety of habitats that provide the necessary cover and food resources. Sculpins were among the dominant species in rocky habitats near the project site.

Pacific cod juveniles are also common in some nearshore areas, and although USFWS survey divers did not document cod, it does not mean that they may not be seasonally present. This assumption may also be true for several species of juvenile salmon, as there are several salmon spawning streams farther up the Chilkoot and Skagway arms of Lynn Canal.

Deeper waters of fjords like Lynn Canal are also important habitat to fish such as the sablefish (a.k.a. black cod). The juveniles of this important commercial species inhabit soft bottom demersal areas of the Alaska coast.

Pacific Salmon. They migrate, spawn, and rear in the nearshore area and in streams that drain into Lynn Canal. Juvenile salmon use nearshore migration corridors and are expected to be in the project site seasonally. Loss of a small amount of intertidal and subtidal habitat and placement of the detached breakwater is not expected to have a significant impact on salmon. Juvenile salmon are common in harbors because of their protected waters simulating embayments.

Pacific Cod. Pacific cod is a transoceanic species, occurring at depths from shoreline to 500 meters and associated with mud/silt/clay to gravel substrate. Adults are demersal and form aggregations during the peak spawning season, which extends approximately from January through May. Eggs are demersal and adhesive and hatch in about 15 to 20 days. The next life stage is larval, which undergoes metamorphosis at about 25 to 35 millimeters (mm). Small cod mainly feed on invertebrates while the large adults are mainly piscivorous.

Sculpin. This is a large circumboreal family of demersal fishes inhabiting a wide range of habitats in the North Pacific Ocean and Bering Sea. Habitats range from tide pools to water depths of 1,000 meters. Adult and juvenile sculpins are mainly known to be associated with substrates from mud/silt/clay to gravel. Most sculpins spawn in the winter. All species lay eggs, but some general fertilization is internal. Eggs are generally laid amongst rocks and are guarded by the males. The larval stage is found across broad areas of the shelf and slope. Sculpins generally eat small invertebrates. Sculpins are present at the proposed harbor site, and placing a harbor at the proposed site would displace them during construction. They would re-establish themselves after construction and little overall habitat loss is expected.

Forage Fish. Eulachon are found pelagically from the middle shelf to over the slope on unconsolidated bottom. They spawn in rivers on coarse sandy bottom. The larvae drift and develop at sea. Capelin is a coastal fish rarely found in waters deeper than 200 meters. Spawning occurs in spring and summer on coarse sand and fine gravel beaches. Sand lance is an inner shelf (1 to 50 meters) and middle shelf (50 to 100 meters) semi-demersal species occurring in sand and gravel habitats.

3.7 Dredged Material Disposal Site

Three bottom samples were obtained from the deep-water disposal area to characterize the bottom habitat. The samples were taken from depths ranging from 40 to 60 fathoms. Sediment characterizations indicated the area to be primarily mud/silt. This type of habitat would support soft bottom adapted benthos such bivalves, anemones, sea pens and polychaetes. There is a wide variety of fish that occur in this habitat type. The sediments in the proposed dredging area were tested for chemical constituents and found to be suitable for water disposal. The Haines Harbor Chemical Data Report prepared by the Alaska District Corps of Engineers, 2001 is available upon request. The dredged material composition is mud/silt/sand on the surface underlain with cohesive clays. The similarity of the dredged material to the disposal site bottom substrate is likely which would tend to have less environmental alteration. In 1976 approximately 6,000 cubic yards of material dredged from the existing harbor was disposed of in the general area.

3.8 Historical and Archaeological Resources

3.8.1 Pre-contact

Moss (1998) divided the prehistory of southeast Alaska into an Early Period (10,000 – 5,000 years before present (BP), a Middle Period (5,000 to 1,500 BP) and a Later Period (1,500 BP to Contact). No sites have been discovered to date in southeast Alaska that are older than 10,000 BP. The earliest sites are at Ground Hog Bay 2 in Icy Strait near Juneau, and Hidden Falls on Baranof Island. These both are North Coast Microblade tradition sites, and their artifact assemblage includes microblade cores and microblades, bifaces, and choppers (Ackerman 1996). Rice Creek (CRG-235) on Heceta Island, west of Prince of Wales Island, dates from approximately 9,000 BP. The discovery of 9,700-year-old human remains at PET-408, a cave site on Prince of Wales Island, provided additional information about early adaptations to the region. Watercraft were required 9,000 years ago to reach the island, and carbon isotopic analyses demonstrate that this man got most of his protein from marine foods (Dixon 1998). Chuck Lake (CRG-237) on Heceta Island is a later site within the Early Period. Locality 1 dates to about 8,200 to 7,300 BP, and the artifact assemblage includes microblade technology. It has one of the earliest shell-bearing components on the Northwest Coast and is indicative of the early coastal adaptations (Ackerman *et al.* 1985). Later sites include the upper components of the Chuck Lake site, the Thorne River site (CRG-177) on Prince of Wales Island, and Irish Creek (PET-160) on Kupreanof Island. Moss (1998) noted that there are no well-described sites between 6,500 and 5,000 BP, making it difficult to understand the transition to the Middle Period.

Moss *et al.* (1996) used technological similarities since the Middle Period to argue that Tlingit culture developed in southeast Alaska and is not a recent arrival from elsewhere. Moss' (1998) Middle Period is based on Components II and III at Hidden Falls. Wood-stake fishing weirs were introduced during this time. Stakes from the Snoose Creek weir (PET-206) range in age from 2,340 $\pm$ 50 and 3,440 $\pm$ 70 BP, and in Whale Pass one stake was dated to 2,910 $\pm$ 70 BP (Putnam 1995:6). Rosie's Rockshelter (CRG-236) on Heceta Island and Coffman Cove (PET-067) on the east coast of Prince of Wales Island are also Middle Period sites (Ackerman *et al.* 1985, Reger 1995). Shell middens, or shell-bearing sites are more common during this time, allowing for more environmental and subsistence information from this period. Because the shell allows for better preservation of bone, bone and antler artifacts are also more frequently represented and bone harpoons and shell beads become more common.

Moss (1998) placed the beginning of the Late Period at 1,500 BP, although she does note that there is a cultural continuity with sites from the Middle Period and that some sites span both periods. Sites from the Late Period are abundant along central southeast Alaska. In general, there were more fortification sites, indicating increasing warfare. This is a pattern seen throughout the Northwest Coast during this period and is not unique to southeast Alaska. Houses tended to be larger as did village sites (Davis 1990). Copper artifacts appear in these late sites and are indicative of trade networks connecting the Tlingit to Athabascans living near copper sources in the interior. The Late Period is usually identified with the ethnohistoric cultures of the region.

3.8.2 Ethnohistoric and Post-Contact Period

The Chilkat and Chilkoot Tlingit live in the Lynn Canal area of southeast Alaska (Goldschmidt and Haas 1998:111). De Laguna (1990) identified them as the Northern Tlingit based on subdialectical differences with their neighbors. The Northern Tlingit also include the Hoonah, Auk, Taku, Sumdum, Sitka, and Hutsnuwu (Angoon). The Chilkat live in more interior areas around the village of Klukwan on the upper Chilkat Inlet, Chilkat River and the upper reaches of the Chilkoot River, and into the interior mountains. The Chilkoot occupy the area around Lynn Canal up toward Haines and Skagway and into the interior (Goldschmidt and Haas 1998). The Chilkat people have fishing rights in Lynn Canal, however. At one time they were one group but appear to have separated since European Contact (Goldschmidt and Haas 1998).

Originally, the village of Dei-shu ("end of the trail/road"; SKG-00054) occupied the area now called Haines. Dei-shu was part of the trail between Klukwan and Chilkoot Village. The portion from Klukwan to Dei-shu was traveled on foot, and then a boat was taken from there to Chilkoot Village (Sackett 1979). Hakkinen (1979) stated that there were no permanent buildings at Dei-shu but it was used as a portage from the river to Chilkoot Inlet (hence "Portage Cove"). Paddy Goenette and Mildred Sparks reported that there had been a cemetery site (SKG-00071) and a habitation site in the area of the army post. Goenette saw the remains of the houses and reported that the name of the village was Xaclanauk'a'an* (in: Goldschmidt and Haas 1998: 108). This was also a hemlock bark gathering location.

Another nearby site was Yindastuki or Yeindust'ak̲ye ("where everything from afar drifts on shore"; SKG-00054) to the north of the Haines airport. At the time of the Goldschmidt and Haas' survey in the 1940s, houses were still standing; but by the time Sackett (1979) had conducted a building survey in 1978, only one community house remained standing and three house ruins were still visible. The associated cemetery is marked on the USGS map.

The first contact with the Tlingit in the Lynn Canal area was by Captain George Vancouver in 1794. Most contact afterward was brief, but European trade goods probably made their way to the Chilkat/Chilkoot area from Russian and Hudson's Bay trading posts elsewhere (Sackett 1979). Attempts to circumvent the Tlingit monopoly on interior trade were not successful. Within 5 years of its construction, the Tlingit destroyed Fort Selkirk, established by the Hudson's Bay Company to trade with interior groups in 1852, (Sackett 1979). By the late 1800s, more outsiders began arriving and the Tlingit were not able to prevent them from traveling through their lands. Instead, they began hiring out as guides and packers for expeditions and gold prospectors

The arrival of European and American fur traders and prospectors caused considerable conflict because of misunderstandings and violations of trade agreements. The Navy got involved in arbitration between Chilkat and Chilkoot leaders in August 1880. During the negotiations, Mr. Vanderbuilt, the owner of the schooner that the naval commander and a customs officer were traveling on, promised that he would build a schoolhouse by the trading post (Emmons 1991). That year, Sarah Dickinson, a Tsimshian teacher left her teaching position in Wrangell to work at the new schoolhouse, while her husband George Dickinson set up a store for the Northwest Trading Company (Hakkinen 1979).

Earlier, in 1879, a council was held at Yindastuki to discuss an appeal by Sheldon Jackson for a location for a Presbyterian mission in the area. The council decided to provide Dei-shu to the missionaries and the Chilkat people held a presentation ceremony for members of the Presbyterian Church soon afterward. Caroline Willard and Reverend Eugene Willard arrived from Pennsylvania to start the Presbyterian Mission in 1881. They renamed Dei-shu to the Haines Mission after a Mrs. Haines, secretary of the Woman's Executive Committee of Home Missions (Willard 1995:19). Some of the residents of Yindastuki moved nearer the mission but Haines Mission and Yindastuki remained separate villages until approximately 1930 when Yindastuki was abandoned as families moved closer to job opportunities (Sackett 1979).

Gold rushes began with the Klondike discovery in 1897, and Haines was at the head of the Chilkat Pass Trail or the Dalton Trail (SKG-00052; Hakkinen 1979). With the influx of miners to the area also came new conflicts. The U.S. Army helped with law enforcement after their arrival in 1898. Transients brought numerous diseases with them that devastated the resident population. More recently, the 1918 influenza epidemic caused two major Chilkat villages to be abandoned and may have contributed to the eventual abandonment of Yindastuki (Sackett 1979).

The U.S. Government School (SKG-00075) was built in Haines in 1905 and replaced the boarding school built by the mission, which had burned down in 1895. A salmon cannery (SKG-000053) was built at Letnikof Cove in 1917 by Tim Vogel and was operating as the Haines Packing Company until 1970. By the late 1980s it was a storage and repair facility owned by Ward Cove Packing and was still in good condition (Boyer and Reynolds 1988). The gold rushes and the expansion of commercial fishing, mining, and the lumber industry contributed to the influx of American settlers at the beginning of the 20th century. By 1910, Haines was incorporated as a municipality.

Fort William H. Seward (SKG-00007) was built between 1902 and 1907, although Army personnel had been stationed at Haines Mission since 1898. The fort had approximately 40 buildings placed around a parade ground. It was originally built in response to border disputes with Canada and to maintain order during the gold rushes in southeast Alaska. Additional settlers came to Haines attracted by construction jobs at the base or as military personnel. New buildings were built in town in response to the increasing population and the business they brought. In 1922, the name of the fort was changed to Chilkoot Barracks. Between 1925 and World War II, all other military posts in Alaska were abandoned except Fort Seward. The fort was decommissioned at the end of World War II and auctioned off for $105,000 to the Port Chilkoot Company to start a community of artists but relatively few people participated. Fort William H. Seward is now a National Historic Landmark. (NHL; Antonson 1976, Allan 2000), and some of the buildings are commercial establishments.

The closing of Fort Seward caused financial hardship to the town of Haines, but some of the burden was relieved with the introduction of a ferry service in 1948 to Skagway and Juneau. This service was expanded in 1963 when the system included the major towns in southeast Alaska (Hakkinen 1979). Tourism and its position at the head of the Haines Highway, which connects the Alaska State Ferry System with the Alaska Highway, supplements an economy based largely on commercial fishing and the timber industry (Alaska Department of Community and Economic Development 2000).

3.8.3 Previous Archaeological Surveys

Several archaeological surveys were undertaken in the 1970s or early 1980s associated with road realignments in the Haines area. Gibson et al. surveyed along the Haines Highway and right-of-way from milepost 4 to milepost 26 along the McClellan flats. They found no new cultural sites that had not already been documented. Sorenson (1979) surveyed the highway north of Haines from mile 4.6 to 10.6 (from the ferry terminal to Chilkoot Lake) in September 1979, and described Chilkoot Village on Lutak Inlet and the main Chilkoot Village on South Chilkoot Lake. Gibson and Choate (1982) surveyed Mud Bay Road in August 1981 from just north of Tower Road near Haines down to an area between Letnikof Cove and Flat Bay. They identified the former military cemetery associated with Fort William H. Seward, which had been moved elsewhere, the village of Chilkat (SKG-00005) near the remains of the Chilkat Canning Company, a cemetery overlooking Chilkat Inlet (SKG-00010), and the Haines Packing Company (SKG-00053). These surveys were all conducted outside the project area.

A historic building survey was conducted in the town of Haines in the early 1980s (Upper 1983). The survey report focused on buildings more than 50 years old that were still standing, and the researchers interviewed residents to try to learn more about the age of the buildings and the people who occupied them. The building survey provides insight to the history of Haines during the past century. Suttles (1979) also described the buildings and other structures at Yindastuki and Tanani, among other places, for the Cooperative Parks Studies Unit.

Georgeanne Reynolds (U.S. Army Corps of Engineers) conducted an archaeological survey of Letnikof Cove during the summer of 1988. Letnikof Cove is the site of the Old Haines Packing Company cannery. She also tested the point near the lighthouse west of Letnikof Cove in the Chilkat Inlet, but the test pits did not indicate a site was located there. She did recommend additional testing, however (Boyer and Reynolds 1988).

In 1988 the Office of History and Archaeology conducted an archaeological survey at the airport, which was built in 1941 near the village of Yindastuki in response to a planned airport expansion. Based on archival research and the fieldwork, McMahan and Holmes (1989) concluded that the village was north of the modern runway and the site was not affected by the construction.

In the summer and fall of 1997, Northern Land Use Research, Inc. (1998) conducted a survey of an abandoned Army fuel terminal at Tanani Point north of Haines and southeast of the ferry terminal. This was a Tlingit settlement until it was abandoned in approximately 1895. In 1915, the Allen family started a homestead just south of the point. Part was sold in 1925 to Arthur Stanfield, who started a mink and fox farm, and another portion was sold to Owen and Virle Lewis in 1940 (Northern Land Use Research, Inc. 1997). The Army bought the Lewis farm and built the Haines Fuel Terminal. The point is well outside the Haines harbor project area.

3.8.4 Cultural Resources Near the Project Area

There are three historic buildings along the boundary of the project area. These are the Harbor Bar, the Louise Williams House, and the Raven House. The Harbor Bar (SKG-00041) is east of the intersection of Front and Main Street. It was built in 1907 and was originally called the Gateway. It was a bar until prohibition and then became a "card room." In the 1940s it was a commissary and in the 1950s it was a grocery store. After this it was returned to its original function and converted back into a bar (Upper 1983:40).

The Louise Williams house (SKG-00111) is believed to have been built some time around 1904 for Andre Dreher. He occupied the house until his death in the 1920s. It was bought by Louise Williams, who was still the land owner at the time the Haines historic buildings survey was conducted in the 1980s, although the building was vacant (Upper 1983:55).

The Raven House (SKG-00110) is on the west side of Front Street and south of View Street. It is made up of one house named the Two Door House, and the Raven's Wing House . The Two Door House portion of the Raven House was built in 1898 at the village of Kluctoo (Kalwattu). A mudslide covered the village shortly after it was built. The building was taken apart and rebuilt at Yindastuki on the west side of Haines where the Haines Municipal Airport is. Yindastuki had been abandoned by the 1930s and the Two Door House was again dismantled and attached to the Raven's Wing House in Haines with the assistance of the Eagle Clan. The Raven house was given its new name in the 1960s (Upper 1983:53). Upper and her colleagues noted that the Raven House may be the oldest building in Haines (1983:53).

Fort William H. Seward has been listed as an NHL since April 1972 (Antonson 1976). Within the landmark, 27 contributing buildings remain of the original 40 that were once included within the fort. Additional buildings have since been built within the fort grounds and are not contributing resources to the NHL. The revised boundary and contributing properties are shown in the enclosed figure (site map in Allan 2000).

3.9 Socio-economics

3.9.1 Community Profile

The current population of Haines, as certified December 2000 by Alaska Department of Community and Economic Development (DCED), is 1,808 persons. Haines is incorporated as a 1st Class City in the Haines Borough. The Haines Borough School District operates public schools in the borough. Haines is not included in a Regional Native Corporation. Historically Chilkat Indian territory, Haines is now predominantly a non-Native community. There are two Chilkat Indian Villages in the area—the Chilkoot, in Haines and the Chilkat, in Klukwan. Haines is home to the world's largest winter congregation of bald eagles, which feed from the spring-fed rivers. The Chilkat Bald Eagle Reserve, located 18 miles from Haines, is a major attraction in southeast Alaska.

Commercial fishing, timber, government, tourism, and transportation are the primary employers. One hundred and thirty-one area residents hold commercial fishing permits. Many jobs are seasonal. Tourism businesses, crafts, and the traffic Haines draws as a result of its road connection to the State Ferry have become increasingly important. Many cruise ship passengers are expected to visit Haines this summer, and an additional 100,000 independent travelers will arrive via car, ferry, or air. Cruise ships inject $10 million into the local economy annually. Water is derived from local lakes and springs, and is treated and stored in a 500,000-gallon tank before being distributed throughout Haines. Sewage is collected by a piped system and receives primary treatment before discharge through two ocean outfalls. Over 95 percent of homes are fully plumbed. A few homes use septic tanks. Haines Sanitation Inc., a private firm, collects refuse and owns the permitted landfill. The city participates in recycling and hazardous waste disposal programs.

Haines is a major shipment hub because of its ice-free, deep-water port and dock, and year-round road access to Canada and interior Alaska on the Haines and Alaska Highways. It is a northern terminus of the Alaska Marine Highway (ferry) System, a cruise ship port-of-call, and a hub for transportation to and from southeast Alaska. Haines has a State-owned 4,600-foot paved runway, with daily scheduled flights to Juneau by small aircraft. There is also a State-owned seaplane base, two small boat harbors with a total of 190 moorage slips, a State Ferry terminal, and a cruise ship dock. Freight arrives by ship, barge, plane, and truck.

3.9.2 Subsistence

Subsistence Use in Alaska. Under current Alaska and Federal law, subsistence is defined as customary and traditional, non-commercial uses of wild resources for a variety of purposes. The uses include harvest and processing of wild resources for food, clothing, fuel, transportation, construction, arts, crafts, sharing and customary trade.

Alaska has a subsistence law because subsistence supports a major part of the State's economy and culture. Alaska is unique in this regard. Traditional cultures and economies co-exist with the industrial-capitalism of Alaska's urban centers. The intent of the Federal and State subsistence laws was to provide the opportunity for the traditional cultures and economies to co-exist.

While subsistence is important to the Native population, it represents a comparatively small portion of wild resources harvested annually in Alaska. In the salmon fishery, subsistence represents less than one percent of the total harvest. Of all fish and game harvested in the state less than 4 percent goes to subsistence.

Subsistence use of fish and wildlife continues to be an important component of the economies of southeast Alaska communities. In Native communities, harvest and use of wild resources supported the *subsistence-based economy* that predated the introduction of cash income. In the modern era, beginning in the late 1700s, the economies of Native communities have undergone a progressive transformation, incorporating cash income into the subsistence-based system. Southeast Alaska communities settled primarily by non-Native immigrants have also depended on a mix of subsistence use of wild resources and cash income.

Cash income in most southeast Alaska rural communities is limited and intermittent; this cash income frequently supports the purchase of fuel and equipment that are part of subsistence harvest technology. Subsistence harvests have been found to fill essential food needs in most rural communities in the region. These harvests are also customarily shared among community residents and between members of different communities. Some subsistence products are traded and bartered within the region. Subsistence harvests are not geared toward market sale or accumulated profit. A *mixed subsistence-market economy* in which subsistence harvests and cash income is complementary characterizes the economies of most of the region's rural communities.

The foregoing information was excerpted from the Economic Appendix B.

3.10 Coastal Zone Management

The Coastal Zone Management Act requires states to make consistency determinations for any federally constructed, licensed, or permitted activity affecting the coastal zone of a state with an approved coastal zone management program (CZMP). Under the Act the applicants must submit a statement that the proposed activity complies with the state's approved CZMP and will be conducted in a manner consistent with the CZMP. The state then has the responsibility to either concur or object to the consistency determination. Consistency certifications must include the following information:

- A detailed description of the proposed activity and its associated facilities.

- An assessment relating to the probable effects of the proposed and associated facilities to relevant elements of the CZMP.

- A set of findings indicating that the proposed activity, its associated facilities, and their effects are consistent with relevant provisions of the CZMP.

The U.S. Department of Commerce in 1979 approved the Alaska Coastal Management Program (ACMP). The state coastal management policies and guidelines included in the ACMP are intended to be refined by local districts preparing district coastal management plans (CMP). Completed district CMP's must be approved first by the Alaska Coastal Policy Council and then by the U.S. Department of Commerce, either as a routine program implementation or as an amendment to the ACMP. Once approved by the U.S. Department of Commerce, district CMP's become the basis for Federal consistency determinations. The City of Haines Coastal Management Plan published in 1979 was consulted in preparation of this evaluation.

3.10.1 Consistency Evaluation

Alaska Coastal Management Program requirements (6 AAC 80)
<u>Uses and Activities.</u>

040. Coastal development

Development approvals are given priority in the following order:

1. water-dependent uses and activities
2. water-related uses and activities; and
3. uses and activities which are neither water-dependent nor water-related for which there is no feasible and prudent inland alternative to meet the public need for the use or activity.

The Haines harbor's purpose and need (section 1) is to provide expanded moorage for the local fishing and regional transient fishing fleet. This is a water dependent use and activity. The harbor would be altered from sandy flat to deeper water. Breakwaters would provide attachment substrate for colonizing organisms. The staging area is ancillary to the harbor's function and is considered water-related. These uses may include access to the inner harbor float system, harbor house, boatlift, boat ramp, fishing gear storage, etc. The shortage of available adjacent upland areas in Haines to meet the ancillary needs such as parking come under priority 3. The existing parking area would be expanded into the upper intertidal. The intertidal fill has been minimized and concentrated around the existing parking lot as much as possible. Upland areas near the harbor are designated as Tlingit Park and Cemetery property, Presbyterian Mission, and a museum. Open areas are within a residential area and are on hillsides with a 15 percent grade. Land use on the beach road has been designated as waterfront commercial/light industrial.

050. Geophysical hazard areas

Haines is within an earthquake hazard area.

060. Recreation

The proposed Haines harbor would attract and service recreational vessels. The harbor would increase public access to the rich physical and biological resources of the area.

080. Transportation and utilities

The proposed harbor expansion would better serve as a navigation service location providing fuel, communications, limited amenities, and refuge from storms.

100.Timber harvest and processing

Not Applicable

110. Mining and mineral processing

Not Applicable

120. Subsistence

The proposed Haines Harbor would benefit local subsistence by providing expanded vessel moorage and a launch ramp.

Resources and Habitats

130. Habitats

(1) Offshore areas
(2) Estuaries
(3) Wetlands and tide flats

The proposed Haines harbor alternatives are in intertidal unconsolidated tide flats and within subtidal zones scattered with boulders. Resources in these habitats are discussed in Section 3. Environmental consequences are discussed in Section 4. The harbor project would unavoidably impact habitat through dredging and breakwater construction. The small amount of habitat loss would not adversely affect the surrounding habitat productivity and nutrient cycling. Water quality in the immediate area would be reduced during construction and operation. Tidal exchange would dilute petroleum products released into the harbor. Oxygen levels in the harbor because of the good tidal exchange would not be significantly reduced within or outside the harbor. Hydrology and water quality are discussed in Sections 3 and 4.

(4) Rocky islands and sea cliffs
(5) Barrier islands and lagoons
(6) Exposed high-energy coasts
(7) Rivers, streams, and lakes
(8) Important upland habitat

140. Air, land, and water quality

The proposed project would be managed to comply with air and water quality. A harbor management plan would be prepared that enforces Best Management Practices to minimize chronic water pollution. Petroleum spill prevention and containment would be part of the harbor management plan. The plan would also include the containment and disposal of trash and wastes.

150. Historic, prehistoric, and archeological resources

The proposed harbor would have no affect on cultural resources. See Sections 3 and 4.

Other Standards

070. Energy facilities

Not Applicable

090. Fish and Seafood

The proposed harbor would benefit the local commercial fishing fleet and the transient regional fishing fleet by providing moorage and services.

3.11 Quarry Sites

The Corps of Engineers would not designate the breakwater material source. The contractor would be responsible for selecting a quarry site and providing rock to meet design specifications. Pre-project planning, including National Environmental Policy Act investigations and documentation, assumes that the contractor would use only an existing quarry as a rock source. Borrow materials (gravel, sand, classified material, etc.) would continue to come from a permitted borrow source designated by the government. A rock quarry is considered to be existing if there has ever been mining at the site, and it has not been restored. An existing quarry may be “operating” or “non-operating” (abandoned, idle, not currently used). A review of the selected site would determine if environmental issues exist and if a more thorough evaluation would take place. Upon selection of a quarry site, the contractor would submit a quarry development plan for that site to the Corps of Engineers. A coordinated agency review of the plan would be conducted, thus providing for state and federal agencies to place stipulations on the use of the site. The development plan would include limits of construction, disposal of quarry waste, necessary access roads and traffic routes, quarry stockpile area(s), and other stockpile areas for material to be used for quarry restoration. Other requirements include a blasting plan, an outline of excavation methods, and a restoration plan, if applicable.

The Haines area has an operating quarry that appears suitable for the armor, secondary and core rock for the breakwaters. This quarry is approximately 5 km from the harbor site.

4.0 ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

4.1 No-Action Alternative

Under this alternative neither beneficial nor adverse effects from construction and use of the harbor would occur. The community would not experience beneficial socio-economic effects from the development, such as increased employment opportunities during construction and operation of the harbor.

4.2 Plans 1 through 4 at Portage Cove

Table 2 compares the design alternatives quantifying the amount of intertidal/subtidal fill, dredging, and basin circulation values.

Alternative 1 is very similar to alternative 2 except it provides for fewer vessels in the moorage basin. Alternative 4 is the locally preferred plan and the National Economic Development Plan and allows for future expansion by moving the main breakwater seaward. Alternative 3 is the larger version of alternative 4. The seaward shift of alternatives 3 and 4 moves the moorage basin into deeper water, thereby reducing dredging quantities. Alternatives 3 and 4 move the entrance channel to the north so that the main breakwater can be bridged for a causeway. The causeway would allow for future docking of larger vessels such as cruise ships or the fast ferry system. Areas that would be directly affected by the four alternatives considered in detail are summarized in chapter 3. All four alternatives are sited in about the same location and would affect similar resources. Alternatives 1 and 4 would encompass less area than the other two, but differences are relatively minor (less than 25 percent in most areas and in most construction quantities). The four alternatives would dredge 4 to 6 ha of subtidal habitat, destroying sessile and infaunal organisms associated with this sand/clay/ soft bottom habitat. The habitat after dredging would be deeper but is expected to be similar to pre-dredging material and habitat a few years after harbor construction. Biomass and diversity might not return to pre-dredging levels because shading, contamination, and other factors could depress population levels.

Areas covered by breakwaters would be lost as soft bottom habitat, which was found to contain comparatively few fish and invertebrate species and relatively sparse populations of both (USFWS 2002). Breakwaters, within a few years following construction, would be covered by the same assemblages of macrophytes, barnacles, mussels, and associated biota that now covers the existing Haines Harbor breakwaters.

Table 2: Comparative Impact Of Alternatives

Harbor Features	Alternative 1 FootPrint Areas and Quantities	Alternative 2 FootPrint Areas and Quantities	Alternative 3 FootPrint Areas and Quantities	Alternative 4 FootPrint Areas and Quantities
Breakwater Rock Fill (Ha)				
North Spur Breakwater	0.10	0.11	***0.29	***0.29
North Breakwater	0.33	0.39	***1.27	***1.08
Main Breakwater	1.93	2.27	***1.90	***1.68
South Breakwater Extension	0.40	0.40	0.36	0.36
South Spur Breakwater	0.20	0.20	0.22	0.38
Stub Breakwater	N/A	N/A	N/A	N/A
Dredging (Ha)				
North Entrance Channel	2.04	2.05	0.03	0
Maneuvering Area	0.48	0.71	***0	***0
Mooring Area	4.37	5.82	5.13	5.05
South Entrance Channel	0.48	0.48	0.40	0.40
South Fish Passage	****0.03	****0.03	N/A	N/A
Total Dredging FootPrint (Ha)	7.37	9.06	5.56	5.45
Upland Area Fill (Ha)				
North Fill	1.44	1.44	***1.99	***1.99
Existing Harbor Fill South Fill	0.21	0.21	0.21	0.21
	0.70	0.70	0.17	0.17
Total Fill FootPrint (Ha)	2.35	2.35	2.37	2.37
Total FootPrint	**12.71 Ha**	**14.81 Ha**	**12.13 Ha**	**11.82 Ha**
Breakwater Quantities (M^3)				
Armor Rock	45,600	48,900	38,600	38,500
Secondary Rock	29,900	32,600	39,300	39,100
Core Material	114,300	135,000	225,300	191,100
Conc. Floating Breakwater 4.88m x 2.00m Quantity (LM)	N/A	N/A	95.72	N/A
Total Dredging Quantities (M^3)	213,200	232,100	148,100	165,100
Basin Circulation Values				
* North Harbor Tidal Prism Ratio	0.53	0.44	0.49	0.53
South Harbor Tidal Prism Ratio	0.55	0.55	0.55	0.55
**North Harbor Aspect Ratio	1.42	1.46	1.41	1.67
South Harbor Aspect Ratio	1.30	1.30	1.30	1.30

* If ratio is above 0.3 water exchange will meet minimum criteria.
** If ratio is less the 3.0, and greater than 0.33 circulation and flushing will meet minimum criteria.
*** Alternatives 3 and 4 includes more fill for a causeway, providing 3:1 slope on south breakwater for fish passage, requires filling in existing fish passage breach and dredging fish passage channel through existing breakwater. Maneuvering area for alternatives 3 and 4 has sufficient natural death such that no dredging is required.
**** Creates new fish passage breach at south spur breakwater

Changes in biomass, total productively, species diversity, and other metrics of habitat function and importance have not been estimated for the change in habitat that would follow breakwater construction. It appears that the new breakwater would introduce some degree of habitat diversity into the soft-bottom community and at least partially compensate for losses and impact caused by breakwater placement.

Uplands potentially created by fill placement would cover a small area of existing uplands, but almost all of the approximately 2.4 ha. proposed for the created uplands would be in the intertidal zone. Habitat losses caused by this proposed fill can be estimated from field observations of this area because tidal zonation was readily observed at the proposed fill site. Project dimensions were over laid on a computer-based contour chart of the intertidal and adjacent uplands to determine which of the intertidal zones would be affected by fill to create uplands. About 0.35 ha. of the proposed fill would be placed on the bottom deeper than +1.75 meters MLLW. This fill would cover part of the sandy substrate that has formed outside the existing north harbor breakwater where it meets the shore. Most of this .35 ha. of fill would cover the soft bottom/exposed rock mixed habitat in the upper part of the mid-intertidal zone. Soft bottom substrate in this zone may be moderately productive and is typical of this zone in the Haines area. The rocks that would be covered are well populated with barnacles, rockweed, and probably other organisms of this zone. Part of the rocky habitat that would be covered would be replaced by the seaward edge of the fill, which would form a narrow band of rocky substrate at its toe in this zone.

Most of the fill (about 2.1 ha.) would be over the mixed soft-bottom/rocky habitat above the + 1.75 MLLW contour. With occasional exceptions, this zone is populated by barnacles on hard surfaces. Density of the barnacles diminishes in the upper part of the zone. They are denser, but rarely very large, in the lower elevations near the +1.75 MLLW contour. The soft bottom in this zone appears to contain a sparse infaunal community, which would be destroyed. Altogether, the larger part of the fill would eliminate habitat that is not very diverse.

Staging area fill for alternatives 1 and 2 are the same. The goal was to keep intertidal fill to a minimum for harbor related uses. The fill for alternatives 3 and 4 is the same total amount but is concentrated in the new harbor area. Intertidal impacts from fill can be minimized by limiting the fill as much as possible to the upper tidal above approximately 2 meters MLLW. The diversity and abundance of biota is low. The fill is required to access the gangway to the floats and would require filling in the existing fish passage and creating another opening farther out for fish passage. Specific development details for the fill would be required for the Department of the Army permit application submitted by the local sponsor.

Construction Scenarios. There are two general concepts for constructing the breakwaters, one is barge placement of rock, and the other is truck hauling from the Haines quarry site. The Haines quarry site is approximately 5 km outside of town. To construct the breakwater from shore many truck-loads of rock from the quarry through town are required. The breakwater would be built continuously out from shore. The breaches in the breakwaters would be temporarily filled to accomplish this construction method. Fill for the staging areas also would be imported from a local quarry. The dredged material was determined unsuitable for use as fill.

4.2.1 Water Quality

Adequate flushing and circulation and best management practices by users are vital for maintaining good water quality within a harbor. Several studies in the Pacific Northwest have been performed to determine boat harbor configurations with optimal circulation and flushing (Cardwell and Koons, 1981, and Neece, et al., 1979). The studies derived an optimum quantity for the exchange coefficient and harbor aspect ratio. The exchange coefficient measures the relative exchange of water within a harbor basin with ambient water due to tidal flushing of the basin. The coefficient indicates that fraction of water in a basin or segment of the basin that is removed (flushed out) and replaced with ambient water during each tidal cycle. Ideally, for adequate flushing, a gross exchange coefficient should be greater than 0.30. The exchange coefficient can be reliably estimated by the tidal prism ratio when a physical model is not used. The tidal prism ratio is calculated by subtracting the basin volume at MLLW from the basin volume at mean higher high water (MHHW) and then dividing the difference by the basin volume at MHHW. The harbor aspect ratio is the relationship between the length of the basin and its width. The ratio is calculated by dividing the basin length by its width. The aspect ratio affects the angular momentum, which allows inflowing ambient water to sweep past a major portion of the basin's interior boundaries without losing its identity by diffusion. Factors that contribute to increased angular momentum improve overall flushing. This ratio should be greater than 0.33 and less than 3.0 for adequate flushing.

Overall, water quality within the alternative harbor designs is considered to be fairly good, primarily due to tidal exchange. Circulation in the new harbor configurations would be driven by a gyre set up in the basin by tidal action. The breaches at each end of the harbor would be expected to reduce the gyre effect slightly.

Dredging the basin and discharges associated with construction of the breakwater would temporarily increase turbidity near the project. Tidal current and action would cause any loosened fine-grained material to form a sediment plume. Suspended sediments would temporarily decrease light penetration, primary productivity, and dissolved oxygen levels. Sediment constituents would be released into the water column, where they are more readily available to organisms. Mixing and dilution in the overlying water would be expected to decrease turbidity levels. To reduce sedimentation and turbidity during dredging, USFWS has recommended sediment containment either by silt curtains or other means. If this cannot be accomplished, they recommend dredging from July 1 through March 31 to avoid sensitive fish migration periods. Building the breakwaters in the summer before dredging the basin could be an effective containment solution.

Deep-water disposal of dredged materials would increase turbidity and suspended particulate levels at the discharge site during periods of work. To the extent practicable, dredged materials would be discharged below the water surface to minimize wind driven dispersion. As with the dredging operations, the suspended plume associated with the disposal of the dredged material would be short-lived and localized.

Based on an analysis of long-shore transport of sediment, shoaling, and historical information on conditions in the area, sedimentation would present no major problems. Maintenance dredging would be minimal during the life of the project. Impacts from maintenance dredging would be similar to those from original dredging activities, but to a lesser degree.

Placement of fill in the water is regulated under the Clean Water Act and evaluated in the 404 (b)(1) guidelines, appendix EA-2. The fill for the breakwaters is water dependent. The fill for harbor access such as the gangway and float system is water related. Other uses that have been proposed are neither water-dependent nor water-related. Specific details for the fill (a local feature) and justification for placement would be evaluated when the local sponsor submits an application for a Department of the Army 404 permit.

Harbor operation and harbor-related activities historically degrade water quality. Incidental discharges of pollutants such as paints, fuel, oil, human refuse, fish wastes, and discarded debris contribute to poor water quality. Harbors with good circulation and flushing characteristics quickly disperse pollutants, preventing them from accumulating locally. Preventing pollution from entering the water is the goal. There are best management practices compiled by the State of Alaska (Neil Ross Consultants, 1995) for managing harbors to prevent fuel spills and inhibit pollution. Another compilation of best management practices was put together (ABR, 2000) under contract to the Corps of Engineers. A harbor management plan for Haines instituting best management practices that are effective and enforceable would mitigate impacts to water quality and to the nearshore habitat. Management and enforcement are a local responsibility.

4.2.2 Terrestrial Resources

The harbor construction staging area would temporarily disturb uplands. The uplands are adjacent to existing development and would have minimal impact on terrestrial resources. The area would be used temporarily to stage construction equipment.

4.2.3 Marine Resources

Constructing a boat harbor by placing breakwaters and dredging to the required depths or any other construction associated activity would disturb bottom sediments and impact bottom-dwelling aquatic organisms, remove submerged vegetation beds, drive away fish and other mobile organisms, and permanently alter the existing habitat. The resultant turbidity plume could affect fish gills and sediments could accrete down current of the project. Ecosystem effects include the direct elimination of organisms, the reduction of primary and secondary production, and changes in hydrology and sedimentology within and adjacent to the harbor. Recolonization after dredging would depend on adjacent undisturbed communities providing a source of replacement organisms capable of recolonizing the site by adult migration or larval settlement, water quality, and substrate quality. Time frame and degree of habitat reclamation are unknown. Marine organisms may go through a successional process, with the more resilient organisms acting as the pioneer species. Breakwaters would provide attachment substrate for sessile organisms. This would change the sandy bottom habitat to more of a rocky reef habitat inhabited by different organisms. The degree to which the breakwaters would recolonize is variable, with some harbor areas colonized more densely than others. The existing Haines breakwater appeared to be densely colonized.

All the harbor designs would create uplands in the intertidal zone within the moorage area. Fill would be brought in because the dredged material is unsuitable. Tidelands up to +1.75 meters would be permanently altered for harbor related uses. Land would be required for the harbor house, gangways, equipment storage, and vehicle parking. Uplands across the street in the vicinity of the harbor were not considered feasible due to land use constraints. Intertidal fill was minimized as much as possible. The upper tidelands were determined to be of low productivity.

Alternative 1 would affect 12.71 ha. of sea bottom, which includes the intertidal fill, dredging of the entrance channel and moorage basin, and breakwater placement. The biota in this area would be displaced or destroyed. As described in Section 3, the sandy intertidal is sparsely populated and blue mussels attach to the rocky habitat. In the deeper subtidal the substrate is predominantly sand and is moderately productive with starfish and algae growth. Similar habitat exists in the general Portage Cove area. No blasting would be required. The substrate after dredging would be similar, thus increasing the chance of recolonization. The protected water within the moorage basin would favor organisms adapted to low-energy conditions. The pilings and float system would colonize with sessile organisms. Breaches on either side of the breakwaters would provide a corridor for fish passage.

Alternative 2 is larger, affecting 14.81 ha. of sea bottom, but is similar in layout to alternative 1. The plans occupy the same general area with similar physical and biological affects. However, plan 2 requires a larger volume (approximately 18,600 m^3) of dredging than alternative 1.

Alternative 3 would affect 12.31 ha. of sea bottom. The moorage basin would be larger but in deeper water, reducing the dredging quantity. This alternative includes the greater width of the breakwater to accommodate the causeway and the bulkhead fill. The local sponsor would be responsible for the causeway-bridge and bulkhead. The additional fill would have incremental effects to the environment but would provide users with future expansion options.

Alternative 4 is the recommended plan and would affect 11.82 ha. of sea bottom. This plan is a smaller version of alternative 3, and is more affordable. This alternative is also the National Economic Development Plan.

All the harbor plans would use the deep-water (approximately 62 fathoms) disposal site, approximately 1.2 km east and offshore of the existing harbor in Portage Cove. The proposed action, alternative 4, would dispose up to 165,100 m^3 of dredged material consisting primarily of surficial silts, sands and organics underlain with thick deposits of clay. This is assumed to be typical unconsolidated material common in the bay, including the disposal site. This amount of material would cover approximately 2.37 ha. of sea bottom. The variables include the amount of material and number of barge dumps, type of material, depth of the disposal site, and water currents and bathymetric conditions at the disposal site. The material would be deposited in a mound for the least impact on the sea bottom. The mound, if dumped on continuously, would be approximately 29 meters high with side slopes of approximately 1 vertical:2 horizontal to 1 vertical to 3 horizontal.

The mechanics of the behavior of dredged material placed at an open-water site by instantaneous discharge from a barge have been described and/or modeled by a number of investigators (Koh and Chang, 1973) and others. When dredged material is released from a barge, it descends through the water column as a dense fluid-like jet. Within this well-defined jet, there may be solid blocks or clods of very dense cohesive material. Large columns of site water are entrained in the jet. Depending on the properties of the sediment and currents, some material is separated from the jet and remains in the upper portion of the water column. The descending jet collapses, usually as a result of impact on the bottom. The discharge that is not deposited when it impacts moves radially outward as a density/momentum-driven surge until sufficient energy is dissipated and the material begins to rapidly settle to the bottom. The suspended solids form a turbidity plume. The short-term impacts resulting from suspended solids are confined to a well-defined layer near the bottom. A thickness above the bottom equal to 15 to 20 percent of the total water depth was observed in the majority of studies. Above this bottom layer, suspended concentrations are one to two orders of magnitude less, and the total amount of solids dispersed over long distances is 1 to 5 percent of the original material.

The major factor affecting the dispersion of the dredged material at the Haines site is the large percentage of clay material. The cohesive nature of the clay would cause large blocks of material to rapidly drop to the bottom, reducing the suspended sediments. A relatively small quantity of fines including silts and sands, however, would be suspended and transported by prevailing currents in the form of a plume. Calculations on this plume size indicate that its maximum extent would be approximately 750 meters to the south on an ebb tide and 465 meters to the north on the flood tide. These extents assumed that the material would be dumped during maximum tidal currents. If the material were dumped during days with lower tide ranges or at slack water, the extent of the plume would be considerably less. Some mixing could occur if wind velocities are high at the time of disposal, however, wind generated currents are relatively insignificant with depth in the water column.

The most apparent impact associated with dredged material disposal is the smothering and/or burying of aquatic organisms. This site is well below the photic zone, which avoids impacts to most aquatic vegetation. The smothering and destruction of organisms does not necessarily mean there is a loss or a change of habitat type. The disposal of uncontaminated material on a substrate of similar or equal grain size would recover in time and eventually with the same species. It is likely that the grain size in the deep-water area is similar to the dredged material. Samples in the disposal site indicated fine-grained material on the surface. A reduction in net primary and secondary production is likely at this site until recolonization can take place. Non-motile and slow moving organisms would be smothered by the dredged material. Most groundfish and other highly motile organisms would be expected to avoid the area during the disposal. Since the material is composed of cohesive clays, a significant sediment plume would not be created by the disposal. However, the water is clear in the bay and a plume during disposal would be noticed. The currents and tides would disperse the suspended material over a wide area. A bottom dump barge that holds about 2,294 m^3 would dispose of the dredged material.

4.3 Essential Fish Habitat

The harbor project would alter the nearshore fairly shallow habitat into a deeper water protected embayment. The organic/sandy layer would be removed but might reestablish over time. The breakwaters would colonize with algaes and sessile organisms providing food and cover for fish. The dredged material composed of silt/clay/ boulder material would cover approximately 2.37 ha. of sea bottom at the disposal site. This deep-water site is likely to have similar sized material and no vegetation.

4.3.1 Salmon

All five species of Pacific salmon are present in Lynn Canal. Juvenile salmon use shallow water corridors during spring migrations. Adult salmon are also near shore during the seasonal migration to spawn in their natal streams. The harbor operation would not affect salmon. Construction activities causing water turbidity would have an impact. Construction timing to avoid fish migration periods reduces adverse effects.

4.3.2 Sablefish

Juveniles may be inshore but are not likely to use habitats in the harbor site area. Adults use deep-water habitats and may occur in the disposal site area. The disposal mound would cover some fish foraging habitat; however, abundant adjacent habitat exists in Portage Cove.

4.3.3 Pacific Cod

Spawning for this species takes place in the sublittoral-bathyal zone (40 to 290 meters) near bottom. The semi-adhesive eggs sink to the bottom after fertilization. Juveniles occur mostly over the inner continental shelf at depths of 60 to 150 meters. Adults occur in depths from shoreline to 500 meters. Mature fish concentrate on the outer continental shelf. Soft sediment, from mud and clay to sand, is the preferred substrate for all life levels except for the pelagic larvae form. Pacific cod probably occur at the harbor location and disposal site. The small amount of habitat disruption would not affect the species.

4.3.4 Sculpins spp.

Sculpins are found throughout the project area. They prefer a mud to sandy bottom. There would be a minor amount of habitat lost in the harbor and temporarily at the disposal site until recolonization could take place. The loss of habitat appears to be minor considering the variety of habitats the species uses.

4.3.5 Forage Fish

Forage fish (eulachon, capelin, and sand lance) use habitat types found in the harbor site. A mostly sand habitat would remain after dredging and may be used by these fish.

4.4 Threatened and Endangered Species

No species listed under the Endangered Species Act or their critical habitat exists in the project area. Consultation documentation is in the correspondence appendix.

4.5 Cultural Resources

A cultural properties inventory was conducted for the project. There would be no effect on the historic buildings near the harbor. The National Historic Landmark is not adjacent to the project area and also would not be affected by the work. If there were discoveries of historic properties or unanticipated effects, the U.S. Army Corps of Engineers and their contractors would act in a manner consistent with 36 CFR 800.13(b).

4.6 Noise and Air Quality

There would be a minor increase in noise levels and air emissions from the operation of heavy equipment during periods of work. No emission standards would be violated. The project site is distant from residential areas. The harbor would increase the activity in the area. The additional boats, people, and vehicles would increase the noise levels. This area is zoned for this activity and the increases should be within acceptable levels.

4.7 Socio-economics

The proposed project would provide needed transient and permanent moorage. The community would benefit economically from the harbor facility by increased employment and the harbor would provide a stable base for the fishing industry. Adjacent infrastructure development may also be promoted, such as the land-based cannery.

The economic analysis indicated that the harbor project would be beneficial for accommodating the present local and transient users. The harbor is not expected to bring additional users to the area.

On February 11,1994, Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations was issued. The purpose of the order is to avoid the disproportionate placement of Federal actions and policies having adverse environmental, economic, social, or health effects on minority and low-income populations.

Construction of the proposed harbor would have beneficial effects on the entire population of Haines, not just on one demographic or economic group. The harbor would not be sited in a low income or minority area of town. It would be in an area away from residences. Contrary to resulting in a disproportionate placement of adverse environmental, economic, social or health effects on minority and low-income populations, the proposed action would result in economic and social benefits to the community as a whole.

On April 21,1997, Executive Order 13045, Protection of Children From Environmental Health Risks and Safety Risks was issued to identify and assess environmental health and safety risks that may disproportionately affect children. The proposed action would affect the community as a whole. There would be no environmental health or safety risks associated with the action that would disproportionately affect children. There are no schools in the immediate area. There are parks and a mission within the area. The harbor project would not affect the use of the park or the mission.

Subsistence. Economic benefits anticipated as a result of the navigation improvements for Haines would come from increased subsistence production by residents of the community. Because subsistence production is consumed in the household, there is no market value associated with this subsistence production. In this aspect of their economy, Haines is similar to many rural communities in Alaska. The subsistence benefit depends on what changes in harvest practices and success rates villagers realize as a result of a boat harbor. Another point of view treats the harvest as a multi-purpose resource. The rationale is that the harvest represents goods such as clothing, fuel, transportation, construction, arts, crafts, and trade in addition to the household needs for the kitchen table. As shown in table 3, salmon was harvested the most in the community in both 1983 and 1987.

Table 3. Greatest Quantity of Fish Harvested (in edible amounts)		
	1983	**1987**
Salmon	Sockeye, Chum, Chinook	Sockeye, Chinook
Non-Salmon	Halibut, Hooligan, Trout, Char	Trout, Char, Halibut
Game	Moose	Deer, Moose
Marine Mammals	Seal	Harbor Seal
Birds and Eggs	Ducks	Upland Game Birds
Marine Invertebrates	Tanner Crab	Dungeness, Tanner Crab
Plants and Berries	Berries	Berries, Seaweed/Kelp

Source: Subsistence Resource Use Patterns in Southeast Alaska: Summaries of 30 Communities (Haines). Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska. Revised January 1998.

Problems associated with the existing small boat harbor restrict access to the water during peak periods. July, August and September are perhaps the most important times for subsistence production. During those months, there is congestion and overcrowding at the small boat harbor (existing conditions) that may occur up to 30 percent of the time. Therefore, with a new harbor, 30 percent is the maximum that is anticipated for increased subsistence harvests.

4.8 Quarry Site

No significant effects would be expected if an existing quarry site is selected; however, the contractor must submit to the Corps of Engineers for review a quarry development plan for the selected site. A coordinated agency review would also be conducted. The development plan would include limits of construction, disposal of quarry waste, necessary access roads, and traffic routes, quarry stockpile area(s), and other information such as a blasting plan, sediment retention/drainage plan, excavation methods, and a restoration plan, if applicable. The review may call for a separate National Environmental Policy Act document for evaluation of the quarry effects.

An existing quarry in Haines may contain suitable rock quality and quantity for use in the breakwaters. This quarry is accessible by road deliverable to the harbor site.

4.9 Mitigation Plan

The proposed mitigation plan is as follows:

Mitigation has been defined by the President's Council on Environmental Quality to include (1) avoiding an impact by not taking an action or parts of an action, (2) minimizing impacts by limiting the degree or magnitude of the action, (3) rectifying an impact by repairing, rehabilitating, or restoring the affected environment, (4) reducing impact over time by preservation and maintenance operations and (5) compensating for the impact by replacing or providing substitute resources or environments (40 CFR 1508.20). These elements are listed and represent a sequence of steps that are generally taken in the planning of a project. Thus, compensation is to be used only as a last resort after opportunities to avoid, minimize, rectify, and reduce impacts have been exhausted.

Following is a discussion of the mitigation opportunities that have been employed in this project:

- Timing of construction from July 1 through March 31 will minimize disturbance to fish, seabirds, bald eagles, and marine mammals. Construction of the breakwaters prior to dredging will confine the sediment plumes and therefore reduce the restrictive construction windows.

- Use of silt curtains during dredging will be done to contain suspended sediments. In-water disposal below the water surface will reduce sediment plumes.

- No pentachlorophenol preservatives will be used on pilings and wooden structures in marine waters. Any other preservative on pilings and wooden structures, including creosote, must be applied by pressure injection.

- Reasonable precautions and controls must be used to prevent incidental and accidental discharge of petroleum products.

- Material such as sorbent pads and booms must be available onsite, and must be used to contain and clean up any petroleum product spilled as a result of construction activity.

- Signs must be installed at the small boat harbor notifying harbor users that garbage, sewage, petroleum products, and fish viscera must not be discharged into the harbor.

- To protect water quality from pollutants generated from vessel maintenance and use, the constructed harbor must provide an adequate waste collection area that includes solid waste receptacles that are designed to prevent ravens and other wildlife from dispersing the waste material; a hazardous materials containment area located within a covered revetment that includes at a minimum a 300-gallon used oil tank and specific areas designated for oily rags/absorbent pads, oil/gas filters, anti-freeze, paints and solvents, batteries, transmission fluid, and bad fuel; and a receptacle for used commercial fishnets.

- Shorelines must be provided in the harbor area for cleanup of non-hazardous debris such as plastic/nylon mesh recovery.

- Eye bolts will be installed at entrance channels and breaches for rapid attachment of fuel spill containment booms.

- A waste oil recovery system will be on site to recover oils from vessels.

- Fish passage breaches will be installed in the breakwaters.

4.9.1 Compensatory Mitigation

The proposed action, alternative 4, would disturb 11.82 ha. of marine habitat in order to construct and operate the harbor. This nearshore habitat is used by anadromous salmon as feeding and rearing habitat and as a migration corridor. The harbor project would provide breaches to pass fish through the harbor. Migration through a harbor would still cause potential impacts to salmon such as chronic water quality degradations from harbor operation and vessel and float related obstructions. The harbor also would eliminate some of the nearshore habitat. To mitigate for the salmon impact, Sawmill Creek, an anadromous stream, would be restored in three areas to more fully support salmon spawning and rearing habitat (figure 8). The benefit would be more salmon production in the system. Perched culverts totally block salmon from reaching potential spawning habitat. Several culverts would be replaced, splash pools created, and stream banks revegetated to correct drainage, fish passage, and habitat deficiencies. This would be a cooperative program with the city of Haines and Alaska Department of Fish and Game. Restoration of Sawmill creek is a goal in the Haines Coastal Management Program. Following are the specific restoration actions:

1. Union Street/6th Avenue Culvert.
   This old culvert traverses Union Street and 6th Street. The action would be to replace the culvert by placing two smaller culverts of larger diameter, regrading to allow for daylighting cascading pools with a 2 percent grade, and ditching next to the road for runoff control. The perched culverts block cutthroat and coho salmon migration. This action would restore several hundred yards of spawning habitat that is not being used.

2. Replace culvert at the Haines Highway/Eagle nest Motel, creek bank revegetation, and trash removal. Restoration of the riparian zone would benefit fish rearing and wildlife habitat.

3. Replace perched culverts at Comstock Road and create stepping pools. The perched culverts block cutthroat trout migration. This action would restore several hundred feet of spawning habitat not being used.

4.10 Required Permits and Authorizations

Pertinent federal and state laws and statutes have been reviewed for the proposed project. The USFWS and the National Marine Fisheries Service have been involved with project planning throughout the project life. A Section 404(b)(1) of the Clean Water Act evaluation, which discusses discharge of dredged or fill material, has been prepared for the proposed action (alternative 4) in EA-Appendix 1. The USFWS Coordination Act Report is in EA-Appendix 2. Coordination correspondence is in EA-Appendix 3. Coordination and review under the State Coastal Management Program will be concurrent with review under the National Environmental Policy Act public review. A certificate of Reasonable Assurance under Section 401 of the Clean Water Act is required and will be received after the public notice and review of the project.

Locally funded features, such as the inner harbor dredging, bulkhead fill, tideland fill for staging, and float system, require the sponsor to apply for a Department of the Army 404 permit under the Clean Water Act. The Regulatory Branch of the Corps of Engineers may require additional details on the tideland fill functional layout and justification for use and inner harbor float layout during permit application.

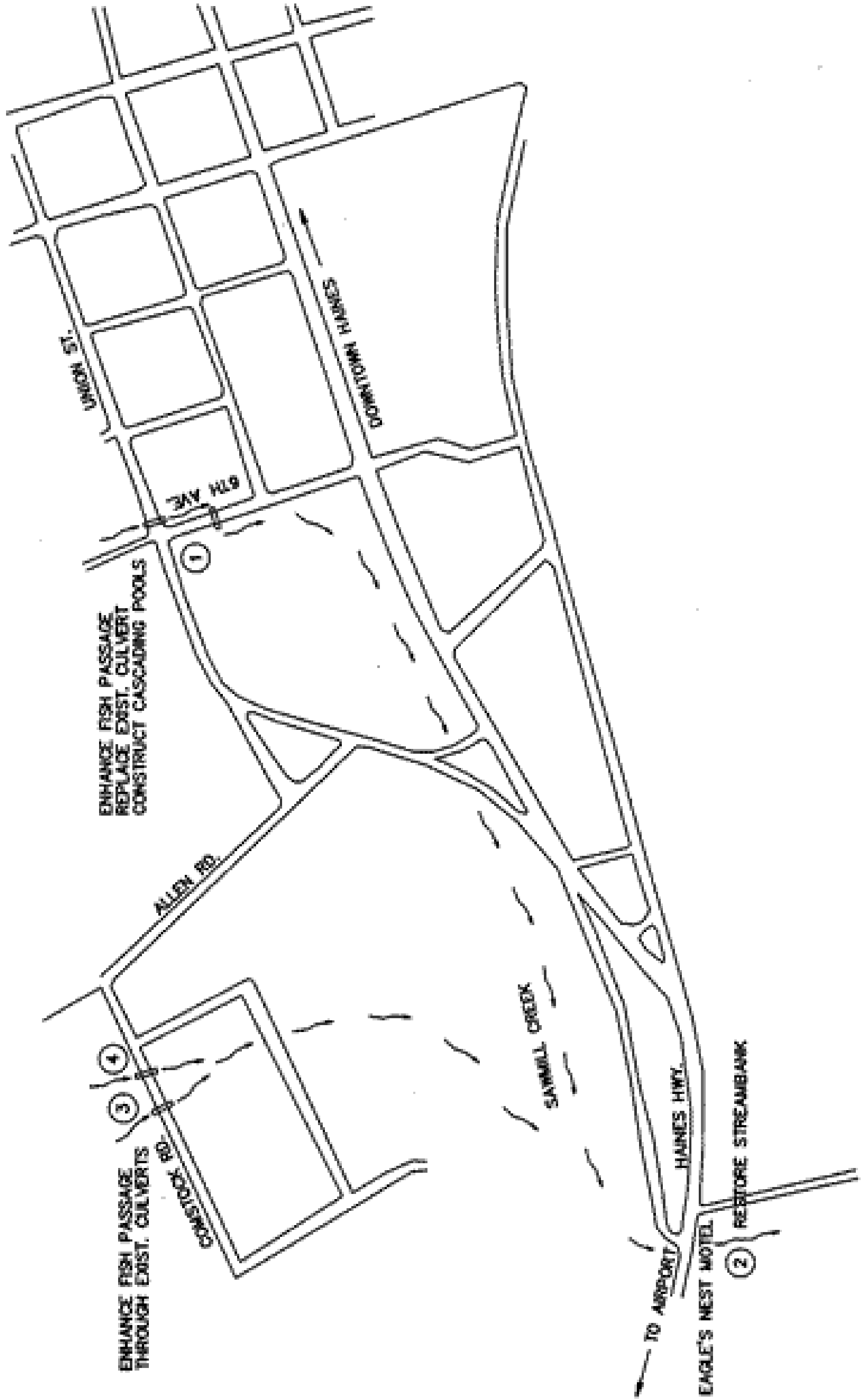
UNION ST.
6TH AVE.
DOWNTOWN HAINES
1
ENHANCE FISH PASSAGE
REPLACE EXIST. CULVERT
CONSTRUCT CASCADING POOLS
ALLEN RD.
SAWMILL CREEK
HAINES HWY.
4
3
ENHANCE FISH PASSAGE
THROUGH EXIST. CULVERTS
COMSTOCK RD.
TO AIRPORT
EAGLE'S NEST MOTEL
2
RESTORE STREAMBANK

Figure EA-8

5.0 Document Preparers

The names of the persons involved in preparing this document are being omitted in compliance with the Department of the Army directive on web security.

6.0 CONCLUSION

Construction and operation of the Haines small boat harbor in Haines, Alaska, alternative 4, as discussed in this document, would not cause significant impacts to the environment. The proposed action is consistent with the State of Alaska and Haines Coastal Management Programs to the maximum extent practicable. This assessment supports the conclusion that the proposed project does not constitute a major Federal action significantly affecting the quality of the human environment; therefore, a finding of no significant impact will be prepared.

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