



**DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, ALASKA
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**NAVIGATION IMPROVEMENTS
FINAL INTERIM FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT**

PORT LIONS, ALASKA

October 2005

EXECUTIVE SUMMARY

This report examines the need for improving navigation at Port Lions, Alaska, and determines the feasibility of Federal participation in potential improvements. The City of Port Lions is located on Kodiak Island, approximately 260 air miles southwest of Anchorage.

The primary problem is the lack of adequate wave protection for the existing inner harbor facilities and moored vessels. The mooring basin is subject to severe damages and undesirable wave conditions from northeast waves entering the basin through the near-shore breach and around the deep-water end of the main breakwater. Damages are also caused by smaller, locally generated waves from the southwest. Wave heights of three to five feet have been observed within the harbor limits. Damage to the float system is especially prevalent on the outer portions of the three main floats due to exposure to higher waves. Significant portions of the mooring floats are unsafe and have been blocked off from public access or removed from the water. Year round use of the basin has been reduced from about 124 to 35 vessels. For the general Kodiak Island area, demand for year around moorage exceeds all planned expansion. A shortage of regional moorage that is both safe and convenient has led to lost income, vessel damages, lost time, and inconvenience.

Three detailed harbor design alternatives were evaluated at Port Lions. Alternative 3B maximized the net National Economic Development (NED) benefits and was selected as the NED Plan. The NED Plan was supported by the local sponsor, the Alaska Department of Transportation and Public Facilities (ADOT&PF) and the city of Port Lions and was carried forward as the Recommended Plan. The Recommended Plan provides a single southwest rubblemound breakwater 1,360 feet in length. The breakwater would protect the design fleet from northeast and southwest waves. The breakwater would not be shore-connected to provide a 150-foot breach for fish passage. The width of the near-shore breach at the existing breakwater will be reduced to 30 feet by extending the existing breakwater shoreward. The breakwaters would provide protection for a 10-acre mooring basin. The entrance channel is 1,100 feet long by 100 feet wide with a depth of -14 feet, MLLW.

The features of the Recommended Plan that contribute to the NED plan have a construction cost of \$9,841,000 (October 2004 price level). The annual investment cost of the project, including the cost of operation and maintenance, is \$610,000 with annual NED benefits of \$884,000. The project's benefit-to-cost-ratio is 1.5 with net annual benefits of \$274,000.

The local sponsor, the ADOT&PF would be required to pay the non-federal share of the costs of construction of general navigation features (GNF) as specified by Section 101 of the Water Resources Development Act of 1986 (Public Law 99-662). The sponsor must also pay the entire cost of the non-GNF, including the float system. The estimated total non-federal share of the project is \$2,797,000, which includes \$1,759,000 for GNF and \$1,038,000 for the float system. The Federal share of the project is \$7,044,000, which includes \$10,000 for navigational aids. The U.S. Coast Guard would provide these navigation aids. The fully funded cost, which is the project cost escalated to the mid-point of construction (July 2008), is \$10,159,000.

PERTINENT DATA**Recommended Plan (Alternative 3B)**

Channel and Basin		Southwest Breakwater		Breach Breakwater Extend Main and Stub Breakwaters	
Entrance channel	14 ft, MLLW	Design wave	8 ft		
Mooring basin	8 to 14 ft, MLLW	Length, total	1,360 ft	Length, total	40 ft
Maneuvering basin	2 ac	Crest elevation	15 to 19 ft, MLLW	Crest elevation	19 ft, MLLW
Mooring basin	10 ac	Crest width	4 to 10 ft	Crest width	10 ft
Total	12.0 ac	Primary armor	30,100 yd ³	Primary armor	900 yd ³
Dredging volume	0	Secondary armor	14,100 yd ³	Secondary armor	850 yd ³
		Core rock	48,800 yd ³	Core rock	1,400 yd ³

Project Cost

Item	Federal (\$)	Non-federal (\$)	Total (\$)
General Navigation Features ^a	7,034,000	1,759,000	8,793,000
Associated costs. local service facilities	0	1,038,000	1,038,000
Lands, Easements, Rights of Way, Relocation, and Disposal (GNF)	0	0	0
Navigation aids. U.S. Coast Guard	10,000	0	10,000
NED Project Cost	7,044,000	2,797,000	9,841,000

Annual cost, benefit, and benefit cost ratio based on a 2004 price level, 5 3/8 %, 50-year project life

NED investment cost (includes interest during construction)	10,088,000
Annual NED cost	585,000
Annual Operation, maintenance, repair, rehabilitation, and replacement	25,000
Total annual NED cost	610,000
Annual NED benefits	884,000
Net annual NED benefits	274,000
Benefit/cost ratio	1.5

^a Cost sharing reflects provisions of the Water Resources Development Act of 1986. non-Federal initial share 10% of GNF plus reimbursement of 10% GNF minus LERRD credit

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Finding of No Significant Impact (FONSI)

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CONVERSION TABLE FOR SI (METRIC) UNITS

Units of measurement used in this report can be converted to SI (metric) units as follows:

Multiply	By	To obtain
cubic yards	0.7646	cubic meters
Acre	0.4049	hectare
Fahrenheit degrees	*	Celsius degrees
Feet	0.3048	meters
feet per second	0.3048	meters per second
Inches	2.5400	centimeters
knots (international)	0.5144	meters per second
miles (U.S. statute)	1.6093	kilometers
miles (nautical)	1.8520	kilometers
miles per hour	1.6093	kilometers per hour
pounds (mass)	0.4536	kilograms

To obtain Celsius (C) temperature readings from Fahrenheit (F) readings, use the following formula: $C = (5/9)(F - 32)$

1.0 INTRODUCTION

1.1 Study Authority

This general investigation study is authorized by the U.S. House of Representatives Public Works Committee Resolution for Rivers and Harbors in Alaska, adopted 2 December 1970. The resolution states in part:

Resolved by the Committee on Public Works of the House of Representatives, United States, that the Board of Engineers for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on Rivers and Harbors in Alaska, published as House Document Number 414, 83d Congress, 2d Session; ... and other pertinent reports with a view to determine whether any modifications of the recommendations contained therein are advisable at the present time.

1.2 Scope of Study

This study investigates the feasibility of navigation improvements at Port Lions, Alaska. The primary areas of opportunity are providing adequate wave protection at the existing small boat harbor to reduce damages to vessels and the inner harbor facilities. Additional areas of opportunity include restoring the intended capacity of the mooring basin, reducing travel costs, and increasing capability for subsistence fishing. The study was conducted and the report prepared in accordance with goals and procedures for water resources planning as contained in Engineer Regulation (ER) 1105-2-100. Alternatives were examined for their feasibility, considering engineering, economic, environmental, and other criteria. A determination of Federal interest, in accordance with present laws and policies, is also included.

1.3 Study Participation

The Alaska District, Corps of Engineers, has primary responsibility for this study. The local sponsor is the Alaska Department of Transportation and Public Utilities (ADOT&PF). The report was prepared with assistance from many individuals, the city of Port Lions, and resource agencies. Resource agencies that participated in the study process were the U.S. Fish and Wildlife Service, National Marine Fisheries Services, and the Alaska Department of Fish and Game.

1.4 Related Reports and Studies

The following studies have examined navigation improvements at Port Lions.

“Section 905(b) (WRDA 86) Analysis, Port Lions Small Boat Harbor, Port Lions, Alaska,” December 1998. USACE, Alaska District. This report presents problems and opportunities for the exiting Port Lions Harbor. Potential harbor improvements and national economic development benefits are described.

“Draft Expedited Reconnaissance Study of Boat Harbor Improvements, Port Lions, Alaska,” August 1998. Prepared by Tryck Nyman Hayes, Inc., in association with ResourceEcon. This report presents problems and opportunities at the existing Port Lions harbor. Potential harbor improvements and National Economic Development benefits are described.

“Small Boat Harbor Preliminary Reconnaissance Report, Port Lions, Alaska,” January 1994. USACE, Alaska District. This report summarizes the harbor protection problems and provides four alternatives for improvement of wave protection facilities. A favorable benefit-cost ratio was determined for the construction of a “spur” breakwater for additional protection from northerly waves. The report recommended proceeding to the feasibility study phase for this project; however, further studies were not done because local sponsor funding was not available at that time.

“Geotechnical Investigation, Port Lions Small Boat Harbor,” July 1985. USACE, Alaska District. This geotechnical investigation concerns a dredging claim after the construction of the original harbor basin in 1981. The document contains information on subsurface conditions that may be expected in the vicinity of the existing harbor and breakwater limits.

“Port Lions, Letter Report No. 1,” June 1982. USACE, Alaska District. This report consists of engineering and cost information and updated National Economic Development benefits for the repair and extension of the original breakwater, which was damaged after construction in 1981. The report contains detailed coastal engineering calculations and determination of diffracted wave heights expected to occur within the harbor basin.

“Detailed Project Report Supplement, Navigation Improvement for Small Boat Harbor, Port Lions, Alaska,” September 1978. USACE, Alaska District. Feasibility level report, which revised the original recommended plan. The revised recommend project consisted of a main and stub breakwaters and entrance channel and anchorage basin at natural depths. Comprehensive information on the project’s design, cost, environmental impacts, and benefit analysis is included.

“Detailed Project Report, Navigation Improvement for Small Boat Harbor, Port Lions, Alaska,” June 1977. USACE, Alaska District. Feasibility level report, which recommended the original recommended plan. This project consisted of two breakwaters, and entrance channel and anchorage basin at natural depths. Comprehensive information on the project’s design, cost, environmental impacts, and benefit analysis is included.

2.0 PROBLEMS AND OPPORTUNITIES

2.1 Problem Description

The primary problem is the lack of adequate wave protection for the inner harbor facilities and moored vessels. The mooring basin is subject to severe damages and undesirable wave conditions from northeast waves entering the basin through the near-shore breach and around the deep-water end of the main breakwater. Damages are also caused by smaller, locally generated waves from the southwest. Wave heights of three to five feet have been observed within the harbor limits. Damage to the float system is especially prevalent on the outer portions of the three main floats due to exposure to higher waves. Significant portions of the mooring floats are unsafe and have been blocked off from public access or removed from the water. Year round use of the basin has been reduced from about 124 to 35 vessels.

For the general Kodiak Island area, demand for year-round moorage exceeds all planned expansion. A shortage of regional moorage that is both safe and convenient has led to lost income, vessel damages, lost time, and inconvenience. In the Kodiak Island area there is a demand for additional moorage of more than 301 vessels of all sizes at peak use periods and 102 at low use periods.

Without constructing harbor improvements, the existing harbor floats will continue to incur costly damages and mooring conditions will remain unsafe. A restriction on the use of the harbor will continue. The harbor has a reputation as a high-risk moorage during storms, and because of that, many fishers will not venture into the harbor. Nevertheless, there are continual inquiries from vessel owners wanting to use the facility to escape storms. Other vessels want to use the harbor year around but can not because of the dangerous moorage conditions.

2.2 National Economic Development Objective

The objective of Federal water and land resources planning is to contribute to the National Economic Development (NED) in a way that protects the Nation's environment and increases the net value of goods and services provided to the economy of the United States as a whole. Only benefits contributing to the NED may be claimed for economic justification of the project.

Commercial navigation improvements at Port Lions represent a high priority under the current administration guidelines. Resource planning must be consistent with the NED objective and consider economic, social, and environmental as well as engineering factors.

2.3 Planning Objectives

The following objectives will be used to develop and evaluate alternative plans:

- Reduce damages to vessels incurred from inadequate protected moorage
- Reduce damages to existing float system incurred from inadequate wave protection
- Reduce travel costs incurred from the overcrowded conditions in the existing harbor

3.0 INVENTORY AND FORECAST CONDITIONS

3.1 Project Area Description

Location. Port Lions is located on Kodiak Island, approximately 30 air-miles northwest of the city of Kodiak and 260 air-miles southwest of Anchorage as show on figure 1.

Infrastructure. Port Lions is accessible by air and water. There is a state-owned 2,200-foot gravel airstrip. Regular and charter flights are available from Kodiak, however, regular air service is frequently cancelled due to visibility limitations. The local gravel airstrip is not suitable for instrument landings or departures, making the water taxi a cost-effective alternative for passenger and freight delivery. Therefore, the local tourist industry depends heavily on being able to use the harbor for transportation of guests, and there is water taxi service provided by several local operators.

The most recent population estimate was 256 and was provided by the Alaska Department of Community and Economic Development in 2000. About two-thirds of the people are classified as Native.

The community has a harbor, partly sheltered by a breakwater, constructed by the Corps of Engineers in 1983. This existing Federal project is described in Section 3.2. The harbor is the community lifeline and cornerstone of the local economy. The fleet needs protected moorage that exceeds the sheltered area behind the breakwater.

The state ferry operates bi-monthly from Kodiak between May and October. Barge service is available from Seattle. The local road network is adequate to travel from the airport to town and to the ferry dock, a total distance of less than 5 miles.

Physical Climate. The area has a maritime climate primarily influenced by strong low-pressure centers generated in the Gulf of Alaska and North Pacific Ocean. Cool summers, mild winters, and year-round rainfall characterize the climate. Average annual precipitation per year is 54 inches. Snow falls primarily between November and April, and the average annual snowfall is 75 inches. Normal winter temperature ranges from 10 to 40 °F, while summer temperatures range from 55 to 70 °F.

The mean tide range at Port Lions is 8.7 feet and the diurnal range is 18.0 feet. Tide level data are shown in appendix A.

In general, the waters in the vicinity of Kodiak Island are ice-free year round. Local icing conditions along the shoreline can occur during extreme cold temperatures. Ice has been reported in the existing harbor area from local freshwater sources but it is relatively short lived due to the moderate temperatures, and wave and current conditions.

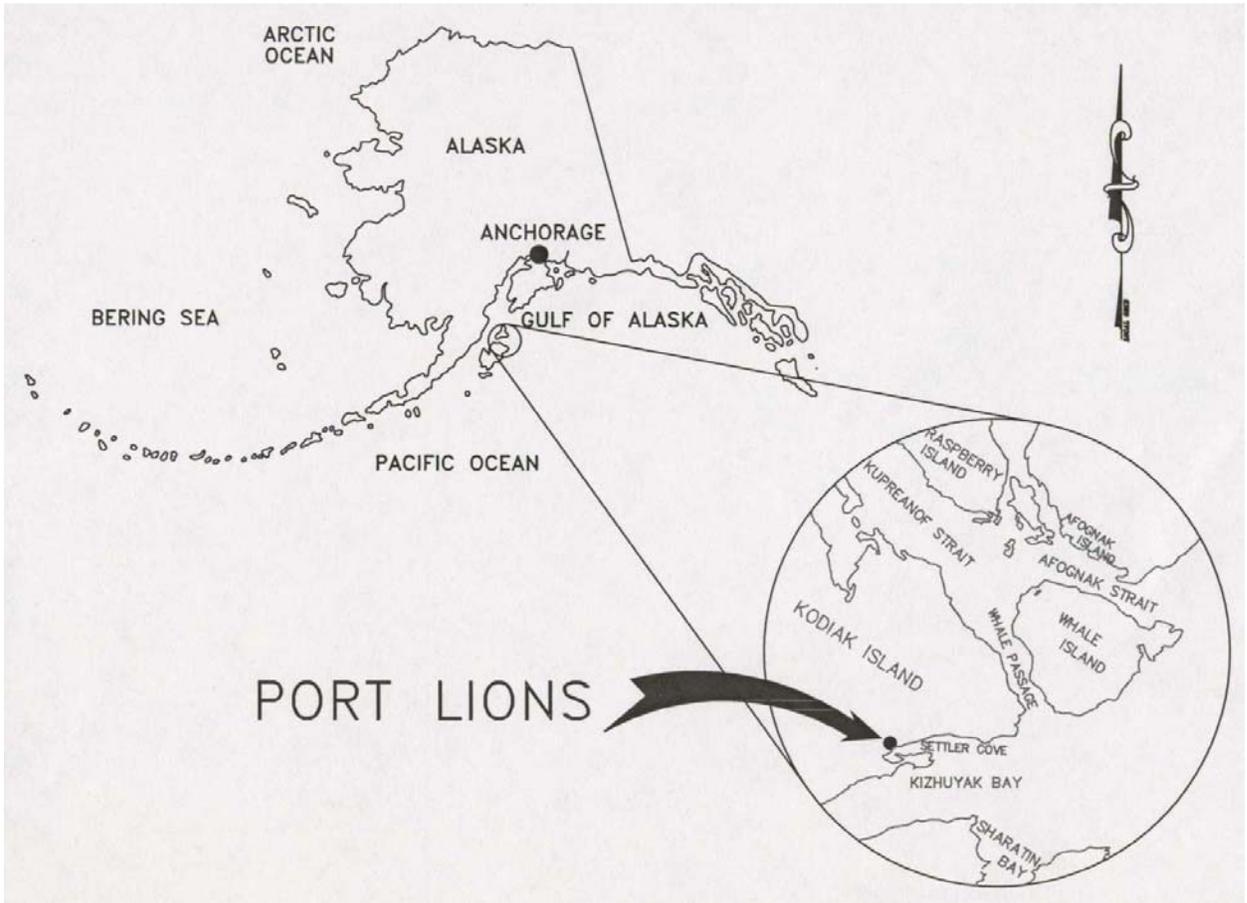


Figure 1. Project Location

3.2 Existing Federal Navigation Project

The existing Federal navigation project at Port Lions was authorized under Section 107 (Public Law 86-645) of the 1960 River and Harbor Act, as amended and approved by the Office of the Chief of Engineers, 9 April 1979. The project initially consisted of a north breakwater 600 feet long and a stub breakwater 170 feet long to protect a five-acre mooring basin. Following completion of the initial project, a severe storm caused extensive damage to the main breakwater. The breakwater was reconstructed and extended for a total length of 725 feet. The authorized depth for the mooring basin and entrance channel is -14 feet, MLLW. The existing Federal project is shown in figure 2.

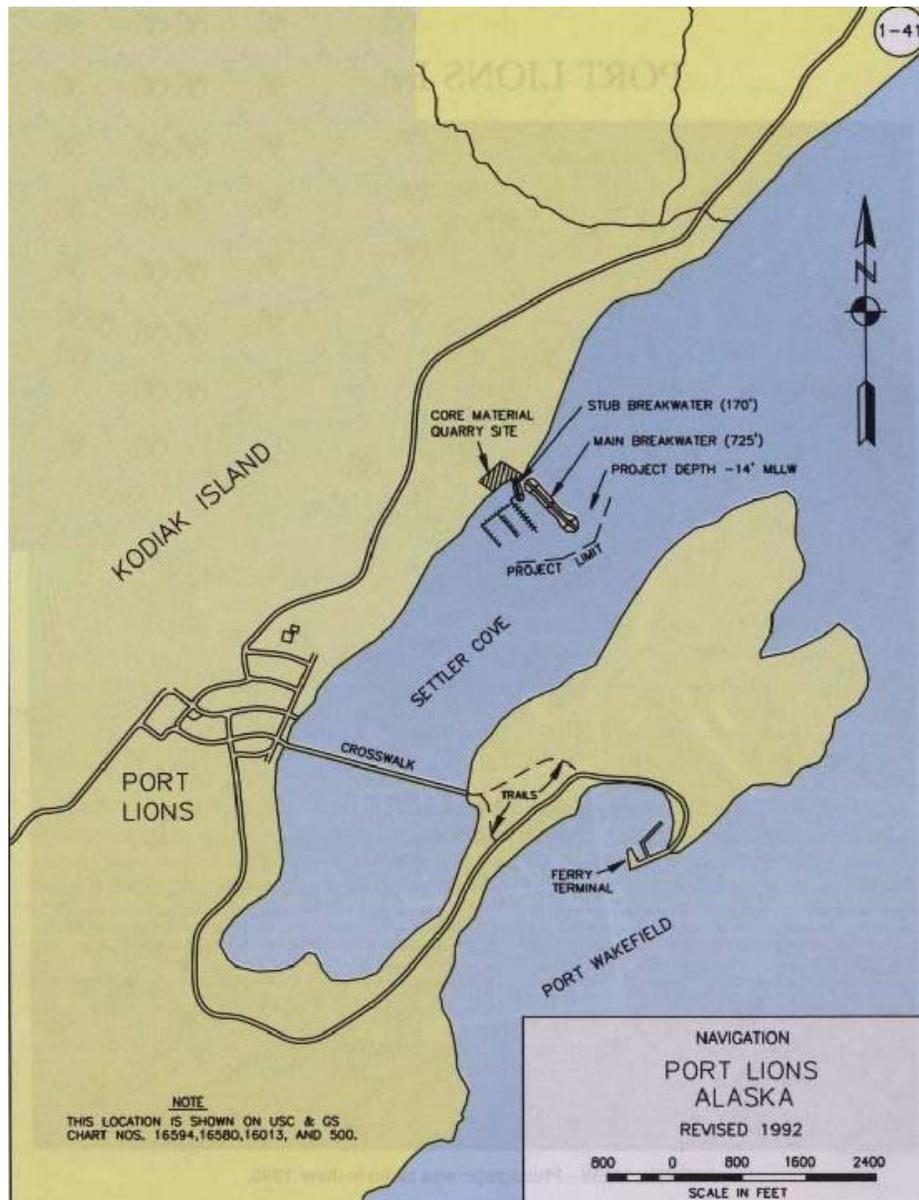


Figure 2. Existing Federal Project

3.3 Biological Resources

Kodiak Island is in the coastal forest zone of Alaska. Sitka spruce, mountain alder, devils club, moss, fern, and grasses characterize the vegetation around Port Lions. Sitka black tailed deer are present during winter along the coastline feeding on the algae. Deer and beaver were introduced into the area. Brown bear and red fox are present as well as small mammals typical of the coastal forest. The Port Lions general area, including the surrounding bays are rich in species diversity and abundance. Sea otters and harbor seals are common in the vicinity of Port Lions. Sea lions, minke and killer whales, and Dall's and harbor porpoises may occur in this area.

Bald eagles, mallards, two species of scaup ducks: the greater and lesser scaup, cormorants, oldsquaw, Harlequin, bufflehead, and golden eye ducks, and red-breasted mergansers are common to this area. The Kittlitz murrelets may inhabit the area. The Kittlitz murrelet is listed as a species of concern. Although Steller's eiders are not known to winter in the immediate Port Lions area, the presence of an occasional eider along the migration route during March or early April should be expected.

The seven species of whale (fin, right, humpback, blue, sperm, sei, and bowhead) listed under the Endangered Species Act are not likely to be found in the shallow water areas of Settler Bay. The western population of the Steller sea lion listed as endangered has been observed in the project area.

3.4 Economic Base

The economy of Port Lions is based primarily on commercial fishing, tourism, and government. There are 22 residents with commercial fishing permits, 5 hold Individual Fishing Quota (IFQ) halibut permits, and there are 17 charter operators. Commercially harvested resources include five species of salmon, halibut, black cod, pacific cod, shrimp, and numerous species of crab, including tanner, dungeness, and varieties of king crab. Other resources include bottom fish such as lingcod, rockfish, flounder and sole. Settler Cove is noted for Pacific herring spawning. All of the residents depend to some extent on subsistence activities for food sources, such as salmon, crab, halibut, shrimp, clams, duck, seal, deer, and rabbit.

3.5 Expected Future Conditions

A continued lack of protected moorage will cause the existing harbor floats and vessels to continue to incur costly damages. Mooring conditions will remain unsafe. A restriction on the use of the harbor will continue. Vessels will be forced to travel to distant harbors for moorage or escape severe weather. The shortage of regional moorage that is both safe and convenient will result in lost income, vessel and float damages, lost time, and inconvenience.

4.0 FORMULATE AND EVALUATE ALTERNATIVES

4.1 Planning Criteria

4.1.1 Plan Formulation

Alternative plans should be formulated to address the study objectives and adhere to study criteria. Each alternative plan shall be formulated in consideration of four criteria: completeness, efficiency, effectiveness, and acceptability. Completeness is the extent to which the alternative plans provide and account for all necessary investments or other actions to ensure the realization of the planning objectives, including actions by other Federal and non-federal entities. Effectiveness is the extent to which the alternative plans contribute to achieve the planning objectives. Efficiency is the extent to which an alternative plan is the most cost-effective means of achieving the objectives. Acceptability is the extent to which the alternative plans are acceptable in terms of applicable laws, regulations, and public policies. Mitigation of adverse effects shall be an integral component of each alternative plan.

4.1.2 Engineering Criteria

Alternative plans should be adequately sized to accommodate user needs and protection against wind-generated waves. Adequate depths and entry should be provided for safe navigation. The plans must also be feasible from an engineering standpoint and capable of being economically constructed. Other considerations include:

- The ratio of upland area to mooring basin area should be at least 0.2 for basic parking and minimal support facilities
- Provide average spatial values greater than 0.30 for acceptable harbor basin flushing with no more than 5 percent of the basin with values less than 0.15. Provide an aspect ratio of 0.3 and less than 3.0
- Provide a maximum distance from farthest parking to farthest berth of no more than 1,000 feet
- Minimize icing effects

4.1.3 Economic Criteria

Principles and guidelines for Federal water resources planning require a plan to be identified that produces the greatest contribution to the NED plan. The NED plan is defined as the plan providing the greatest net benefits as determined by subtracting annual costs from annual benefits. The Corps of Engineers' policy requires recommendation of the NED plan unless there is adequate justification to do otherwise.

Alternatives considered should be presented in quantitative terms where possible. Benefits attributed to a plan must be expressed in terms of a time value of money and must exceed equivalent economic costs for the project. To be economically feasible each separate portion or purpose of the plan must provide benefits at least equal to the cost of that unit. The scope of development must be such that benefits exceed project costs to the maximum extent possible.

4.1.4 Environmental Criteria

Environmental considerations include:

- Identify forms of aquatic life and wildlife that might be impacted by a plan's implementation
- Maintain near-shore fish passage
- Minimize adverse impacts to water circulation and natural resources
- Maintain consistency with the Alaska Coastal Management Program
- Use measures to protect or enhance existing environmental values

4.1.5 Social Criteria

Plans considered must minimize adverse social impacts and must be consistent with state, regional, and local land use and development plans, both public and private. The selected plan must be workable and viable to the non-federal sponsor.

4.2 Description of Alternative Plans

4.2.1 Design Fleet

The design fleet indicated in table 1 was used for the development of preliminary designs of the alternative plan selection process. The design fleet was 124 vessels. The design vessel is 58 feet long with a beam of 19 feet and a draft of 6 feet. From this information the mooring basin and entrance channel were sized and channel depth was calculated.

Table 1. Preliminary Design Fleet Vessel Summary

	Vessel size (ft)				Total
	< 22	23. 36	37. 54	> 55	
Number of Vessels	5	54	56	9	124

4.2.2 Preliminary Annual NED Benefits

Preliminary economic analysis estimated that navigation improvements at Port Lions would provide about \$700,000 in annual benefits as show in table 2. Economic analyses were later refined (see section 4.8) for the detailed evaluation of alternatives.

Table 2. Preliminary Annual Economic Benefits

Benefit Category	Annual NED Benefit
Reduced vessel damages	100,000
Reduced mooring basin damages	300,000
Reduced travel to alternative harbors	200,000
Reduced local emergency cost	50,000
Reduced transportation	<u>50,000</u>
Preliminay NED Benefits	\$700,000

4.2.3 No Action

If no Federal action is taken, commercial vessels and the mooring system will continue to incur significant annual operating and maintenance expenses associated with inadequate wave protection at the existing harbor. Year round use of the basin will continue to be significantly reduced from its intended design. These same over-crowded conditions will continue to cause increased operating and maintenance costs for the existing harbor. Vessels will continue to be turned away, incurring significant expenses associated with travel to alternate harbors.

4.2.4 Nonstructural Alternatives

There are two main alternatives for operators of commercial and recreational vessels unable to secure moorage space:

- A. Remove vessels from the water. Dry storage can potentially damage vessels and is a costly expense. These vessels would have to be hauled to and stored at sites other than near the harbor because of lack of existing upland space for this purpose. In addition, the vessels are not readily available for use.
- B. Seek shelter in other harbors. Other harbors in southcentral Alaska also experience overcrowded conditions with long wait lists. The cost of traveling is high, and the vessels cannot be readily available.

4.2.5 Structural Alternatives

Consideration was given to the different methods for wave attenuation. Wave barriers would not be cost effective due to the high winds, water depths, and tidal range and shallow bedrock where these structures would be placed. A floating breakwater is preferred with regard to marine habitat and may be suited for the smaller southwest waves at Port Lions. A floating breakwater would be inadequate against ocean waves from the northeast. A rubblemound structure would function adequately against the larger northeast waves and may be more cost-effective than a floating breakwater for protection from the southwest waves given the shallow water depths.

4.2.6 Preliminary Alternative Sites

The seven preliminary alternatives presented herein were originally evaluated in the 1977 DPR. No additional sites were evaluated. Information gathered from the 1977 study was verified and updated as necessary. The locations of these sites are shown on figure 3.

Port Wakefield. This site would require two breakwaters to protect from east and southeast waves. Extreme water depths would require extensive fill material for the breakwaters. Use of the existing ferry dock would be inhibited. Thus, this site lacks both engineering and economic feasibility and was eliminated from further consideration.

Peregrebni Cove. Peregrebni Cove is a small cove, which would be enclosed to provide a three-acre basin. This basin would be insufficient in size to accommodate the design fleet. Also, water depths present similar problem to those at Wakefield Cove. This site was eliminated from further consideration.

Settler Cove (airport). This site could provide the necessary mooring area and depths conducive to breakwater construction. However, the basin would require extensive dredging of rock material. This site was eliminated from further consideration.

Settler Cove (town site). The town site location would require minimal breakwater construction. Extensive dredging for the entrance channel and mooring basin would be required. Also, the site is located in an area of densely vegetated eelgrass. Eelgrass is a marine grass, which grows in soft sediments and provides habitat for diverse and abundant marine organisms and waterfowl. This site was eliminated from further consideration.

Settler Cove (east). This site would require extensive dredging. Shoaling patterns within Settler Cove indicate that extensive maintenance dredging would be required. This site is located in an area of patchy eelgrass. There is no land access to this site. This site was eliminated from further consideration.

Settler Cove (northeast). The northeast site would require one breakwater and no dredging. There is no land access to this site.

Settler Cove (northwest- existing project site). This site is the location of the existing project, which consists of a breakwater, entrance channel and mooring basin, and inner harbor facilities such as floats and harbormaster's office. The site would require construction of one breakwater. No dredging would be required.

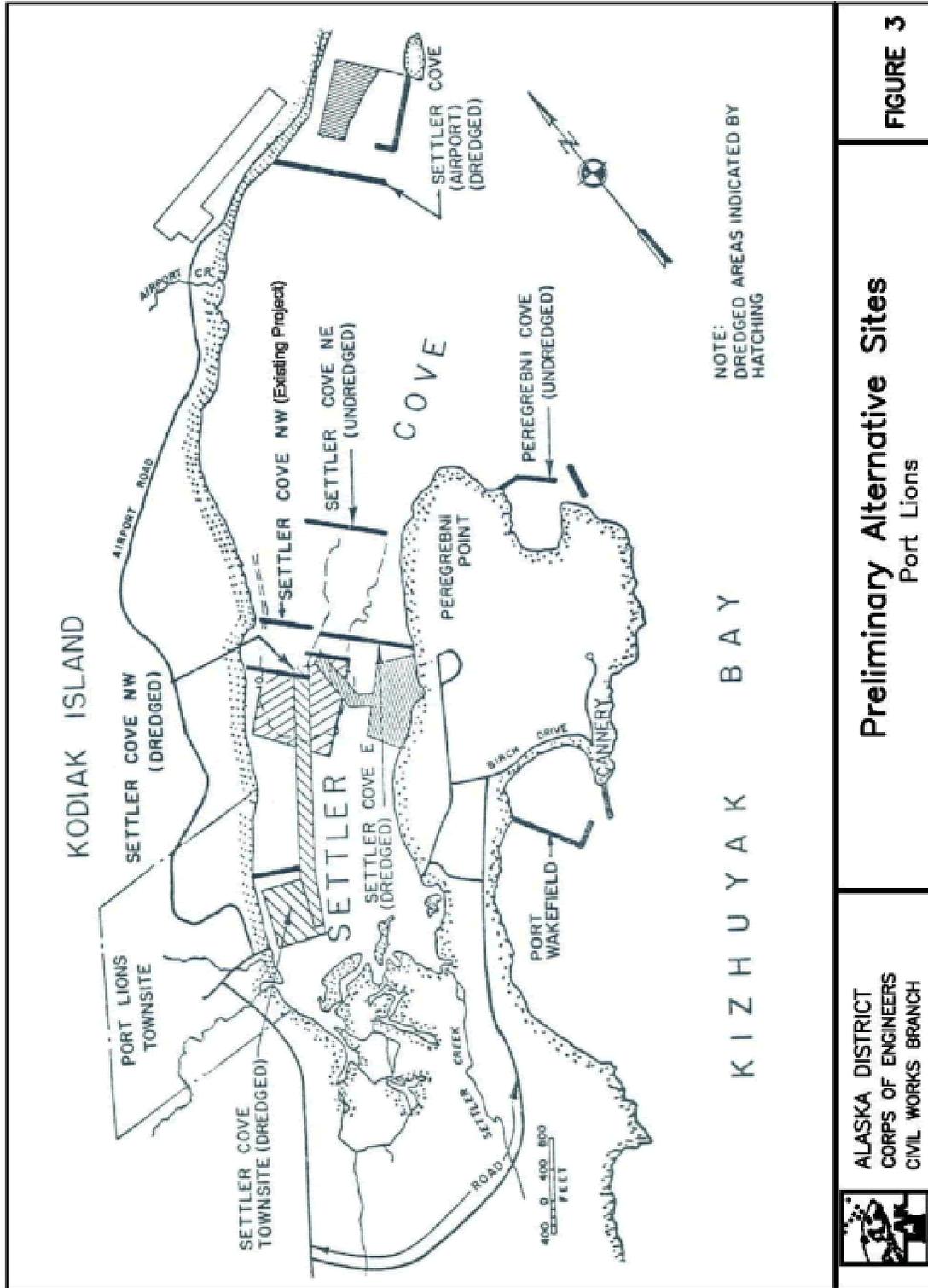


Figure 3. Preliminary Alternative Site

<p>Preliminary Alternative Sites Port Lions</p>	<p>ALASKA DISTRICT CORPS OF ENGINEERS CIVIL WORKS BRANCH</p> 
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FIGURE 3

4.3 Sites Considered in Further Detail

Based on the preliminary assessment of alternative sites, the Settler Cove northeast and northwest sites were considered in further detail. The other sites were eliminated because of anticipated high project cost associated with deep-water construction, public access, or extensive mitigation due to adverse impacts of critical marine habitat. Both sites were configured to provide protected moorage for the preliminary design fleet. National economic benefits derived from both sites were considered to be equal (\$700,000). Project cost and physical characteristics are provided on table 3. The Settler Cove (northwest) site maximizes the net NED benefits and was chosen as the selected site.

Settler Cove (northeast). A 1000-foot breakwater would begin 100 feet offshore and extend into Settler Cove. A 400-foot breakwater south of the basin would provide protection from southerly waves. An entrance channel and 5-acre mooring basin would be provided at natural depths ranging from -10 to -20 feet, MLLW. Access to the site would be via a new 3,500-foot road beginning at Kizhuyak Drive. The breakwater and inner harbor facilities would have a project cost of \$8,940,000. Mitigation features to offset loss of eelgrass habitat were not included at this level. If project costs for the two sites are close enough to warrant a more detailed look, an estimate of the features and cost will be determined.

Settler Cove (northwest—existing project site). The northwest site has a distinct advantage over the northeast site because of the extent of the existing harbor facilities. The existing small boat harbor consists of breakwaters, entrance channel, mooring basin, float system, and harbormaster’s office. A 600-foot breakwater would overlap the existing breakwater. A 400-foot breakwater south of the basin would provide protection from southerly waves. Project cost for the breakwaters, rehabilitation and replacement of the existing float system to provide protected moorage at the existing project site for the design fleet would be \$5,750,000 with a benefit to cost ratio of 1.5 and \$312,000 in annual net benefits.

Table 3. Comparison of Project Cost and Physical Characteristics

Item	Unit	Unit Price (\$)	Settler Cove (NE)		Settler Cove (NW) Existing Project	
			Quantity	Total (\$)	Quantity	Total (\$)
Mobilization and Demobilization	LS	250,000	1	250,000	1	250,000
Breakwater - Armor rock	yd ³	80	42,000	3,360,000	30,000	2,400,000
(B) rock	yd ³	60	28,000	1,680,000	20,000	1,200,000
Core	yd ³	40	49,000	1,960,000	35,000	1,400,000
Road Access	Mile	200,000	0.7	140,000	0	0
Real Estate		200,000	0.7	140,000	0	0
Inner Harbor Facilities						
Float System (new)	LS	1,500,000	1	<u>1,500,000</u>		
Float System (repair)	LS	500,000			1	<u>500,000</u>
Project Cost				\$9,030,000		\$5,750,000
Annual NED Cost				563,000		358,000
Annual OMRRR				30,000		30,000
Total Annual NED Cost				593,000		388,000
Average Annual NED Benefits				700,000		700,000
Net NED Benefits				\$107,000		\$312,000

4.4 Preliminary Design Alternatives

All alternatives provide wave protection for the design fleet from northerly and local southwesterly waves and consisted of various configurations and combinations of rubblemound and floating breakwaters. Estimation of incremental damages for each wave direction was not feasible. Therefore, an incremental evaluation of each alternative feature was not performed. Incremental evaluation was limited to selection of the optimum size and depth of the harbor. The alternatives are shown in figures 4 thru 11.

4.5 Evaluation of Preliminary Design Alternatives

Evaluation of the alternatives based on functional and environmental design criteria is shown on table 4. The scoring was based on “very good” (VG) receiving 5 points, “good” (G) receiving 4 points, “fair” (F) receiving 3 points, “poor” receiving 2 points, and “very poor” (VP) receiving 1 point. The total points were then averaged for each alternative. A cost and benefit evaluation of the alternatives is shown on table 5. Evaluation of the alternatives was based on information provided in tables 4 and 5.

Table 4. Alternative Evaluation Criteria (Higher score is preferred)

Ranking	Alt. 1a	Alt. 1b	Alt. 2a	Alt. 2b	Alt. 3a	Alt. 3b	Alt. 4a	Alt. 4b
<u>Functional Design</u>								
Moorage Capacity	G	G	G	G	G	G	G	G
Basin Depths	G	G	G	G	G	G	G	G
Boat Ramps	G	G	G	G	G	G	G	G
<u>Wind Wave Protection</u>								
Basin 2	G	VG	G	VG	G	VG	G	VG
Basin 3	G	G	G	G	G	G	G	G
Basin 4	F	F	F	F	F	F	F	F
Transient float	G	VG	G	VG	G	VG	G	VG
Currents	P	P	F	F	F	G	F	G
Ease of Navigation (vessels)	G	G	G	G	F	F	G	G
Ease of Navigations (float planes)	G	G	G	G	F	F	G	G
Reduction of Hazards	F	G	F	G	P	F	P	F
Wind Protection	P	F	F	G	F	G	F	G
<u>Environmental Design</u>								
Water Quality (fish habitat)	F	P	F	P	P	F	VP	P
Fish Migration	G	G	G	G	G	G	G	G
Sub-aquatic Vegetation	G	G	G	G	G	G	G	G
Rock Blasting	VG	VG	VG	VG	VG	VG	F	F
Uplands	P	P	P	P	P	P	P	P
Access	F	F	F	F	F	F	F	F
Security Operations	F	F	F	F	F	F	F	F
Changes to Flow Patterns	F	F	G	G	G	G	G	G
Existing Breach	G	G	G	G	G	G	G	G
Score	3.5	3.6	3.6	3.8	3.4	3.7	3.4	3.7



Figure 4. Preliminary Alternative 1A



Figure 5. Preliminary Alternative 1B



Figure 6. Preliminary Alternative 2A



Figure 7. Preliminary Alternative 2B



Figure 8. Preliminary Alternative 3A



Figure 9. Preliminary Alternative 3B



Figure 10. Preliminary Alternative 4A

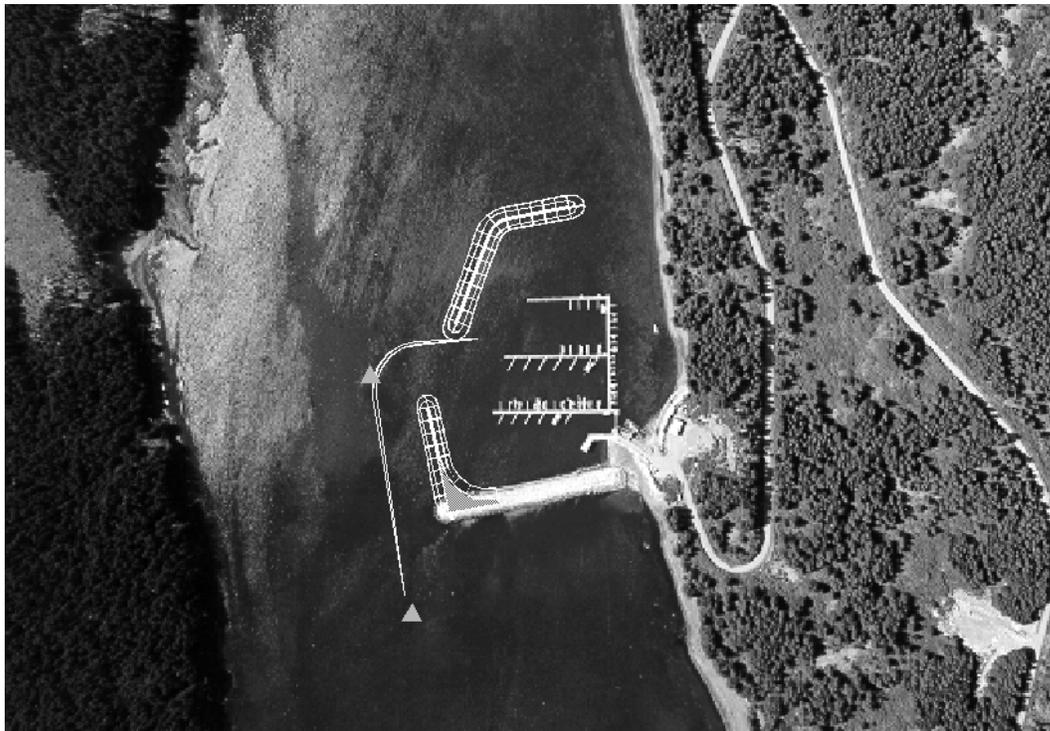


Figure 11. Preliminary Alternative 4B

Table 5. Comparison Of NED Costs And Benefits For Preliminary Design Alternatives (\$000)

	Alt. 1A	Alt. 1B	Alt. 2A	Alt. 2B	Alt. 3A	Alt. 3B	Alt. 4A	Alt. 4B
Mob/demobilization	250	250	250	250	250	250	400	400
Rubblemound Breakwater	3,535	5,015	3,828	5,308	3,718	4,816	2,646	4,126
Floating Breakwater	2,622	0	2,622	0	2,622	0	2,622	0
Dredging	0	0	0	0	0	0	1,475	1,729
Upland Disposal	0	0	0	0	0	0	30	30
Inner Harbor Facilities	600	600	600	600	600	600	600	600
Hydrographic Surveys	24	24	24	24	24	24	24	24
Construction Cost	7,056	5,914	7,349	6,207	7,239	5,715	7,797	6,909
PED	564	473	588	497	579	457	858	760
S&A	564	473	588	497	579	457	624	553
Lands and Damages	13	13	13	13	13	13	13	13
Subtotal	1,142	959	1,189	1,006	1,171	927	1,494	1,326
Project Cost	8,198	6,873	8,538	7,213	8,410	6,642	9,291	8,235
Interest During Construction	236	198	246	208	242	191	272	241
NED Investment Cost	8,434	7,071	8,783	7,421	8,652	6,834	9,563	8,476
Annual NED Cost	526	441	548	463	539	426	596	528
Annual OMRRR	20	20	20	20	20	20	30	30
Total Annual NED Cost	546	461	568	483	559	446	626	558
Average Annual Benefits	700	700	700	700	700	700	700	700
Benefits to Cost Ratio	1.1	1.3	1.1	1.2	1.1	1.3	1.0	1.1
Net Annual Benefits	\$154	\$239	\$132	\$217	\$141	\$254	\$74	\$142

4.6 Comparison of Preliminary Alternatives

Alternatives 2B and 3B were similar in design, cost, benefit, and environmental impact. Alternative 3B was considered representative of both alternatives and provided better wave protection for the basin; therefore, Alternative 2B was dropped from further consideration. Comparison of the remaining alternatives showed that 1A, 1B, and 3B were the most economically efficient plans, which satisfied the planning objectives. Benefit to cost ratios for these alternatives ranged from 1.1 to 1.3 with net annual NED benefits of \$154,000 to \$254,000. These three alternatives were carried forward for detailed design and cost estimating.

4.7 Comparison of Breach Alternatives

Two breach alternatives were design to reduce ocean waves, to prevent debris (drift logs) from entering the mooring basin, and to permit continued near-shore fish passage. The alternatives would provide the same level of protection from ocean waves and debris. Alternative B was carried forward into detailed evaluation of basin alternatives because it was the most cost effective and had the least environmental impact.

4.7.1 Breach Alternative A

Breach alternative A (figure 12) would consist of a 150-foot-long detached breakwater and a 75-foot extension of the stub breakwater. The opening between the detached breakwater and shoreline would form a 30-foot breach. The opening between the main and stub breakwaters would be reduced from 65 to 30 feet. The invert elevation through the breach would remain +5 feet, MLLW. No dredging would be required. Cost of this alternative is \$1,500,000.

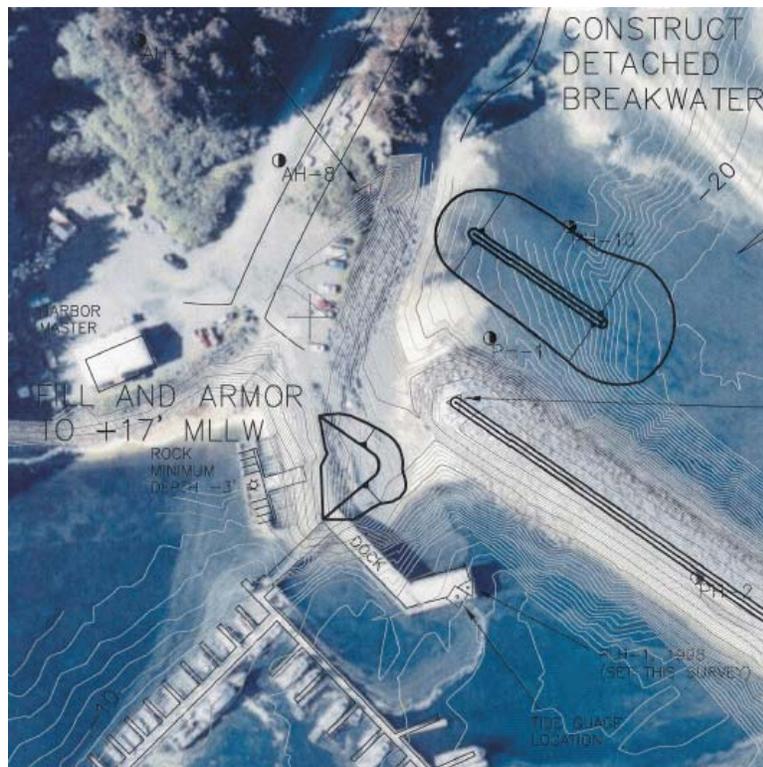


Figure 12. Breach Alternative A

4.7.2 Breach Alternative B

Breach alternative B (figure 13) would consist of a 40-foot-long extension of the main breakwater and a 75-foot-long extension of the stub breakwater. The breach width would be reduced from 65 to 30 feet. The invert elevation through the breach would remain +5 feet, MLLW. No dredging would be required. Cost of this alternative is \$250,000.



Figure 13. Breach Alternative B

4.8 Detailed Evaluation of Alternatives

Detailed engineering designs and cost estimates were prepared to evaluate and compare the final array of alternatives. The alternatives include a variety of wave protection measures using rubblemound and floating breakwaters as discussed herein. The alternatives were configured to accommodate the design fleet, which was based upon the moorage demand analysis presented in appendix B.

4.8.1 Alternative 1A

A 700-linear foot detached rubblemound breakwater would be located seaward of the existing breakwater to provide protection from northeast waves. A 732-linear foot floating breakwater would provide protection for the small waves generated within Settlers Cove. The width of the near-shore breach at the existing breakwater would be reduced to 30 feet by extending the breakwater 40 feet shoreward. The existing stub breakwater would be extended seaward 75 feet. All other features of the existing project will remain the same. The breakwaters would provide protection for the mooring basin, which is -14 feet, MLLW. The entrance channel is 1,030 feet long by 150 feet wide with a depth of -14 feet, MLLW. This alternative is shown in figure 14.

Sedimentation within the entrance channel or mooring basin would be minimal. Maintenance dredging would depend on storm conditions over the years but is expected to be infrequent if necessary at all.

4.8.2 Alternative 1B

This alternative incorporates the same northeast breakwater but would use an 860-linear foot rubblemound breakwater to provide protection from southwest waves. The southwest breakwater would not be shore-connected to allow near-shore fish passage. All other features remain the same as described for Alternative 1A. This alternative is shown in figure 15.

Sedimentation within the entrance channel or mooring basin would be minimal. Maintenance dredging would depend on storm conditions over the years but is expected to be infrequent if necessary at all.

4.8.3 Alternative 3B

The alternative would consist of a single southwest rubblemound breakwater 1,360 feet in length. The breakwater would be located landward of the existing breakwater and wrap around the deep-water side of the mooring basin to provide protection from northeast and southwest waves. The breakwater would not be shore-connected to provide a 150-foot wide breach for fish passage. The entrance channel would be 100-feet wide and would accommodate two-way vessel traffic. All other features remain the same as described for Alternative 1A. This alternative is shown in figure 16.

Sedimentation within the entrance channel or mooring basin would be minimal. Maintenance dredging would depend on storm conditions over the years but is expected to be infrequent if necessary at all.

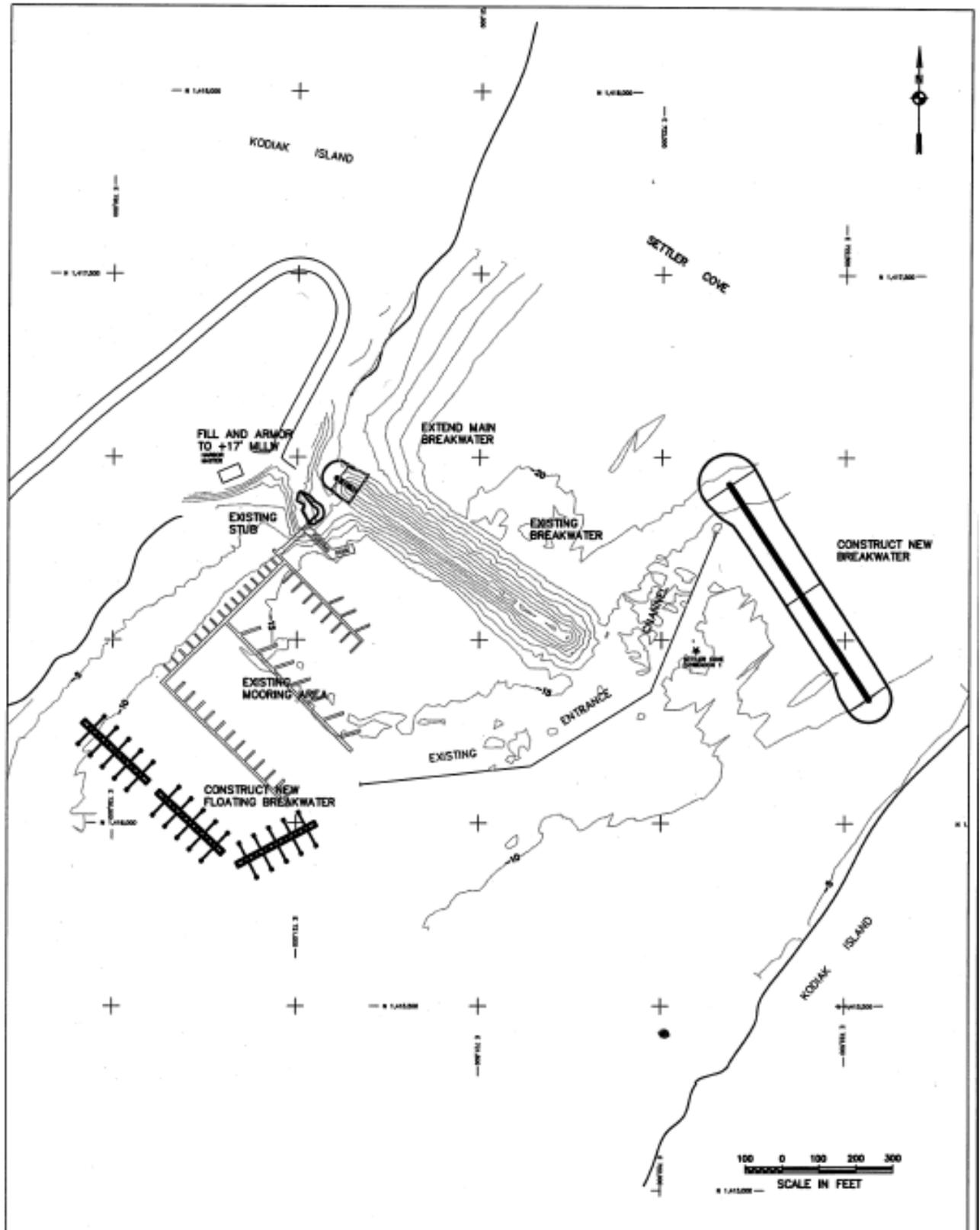


Figure 14. Alternative 1A

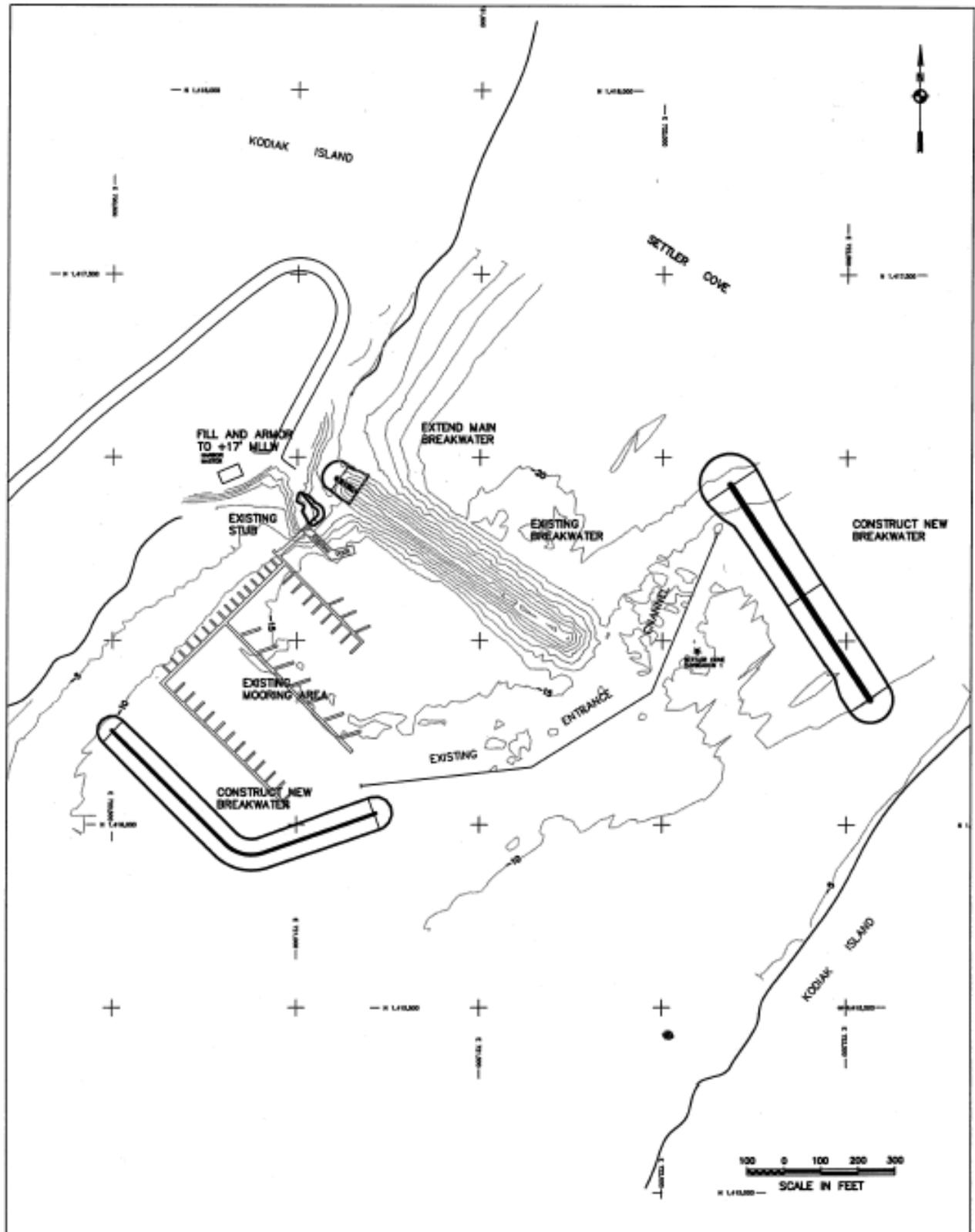


Figure 15. Alternative 1B

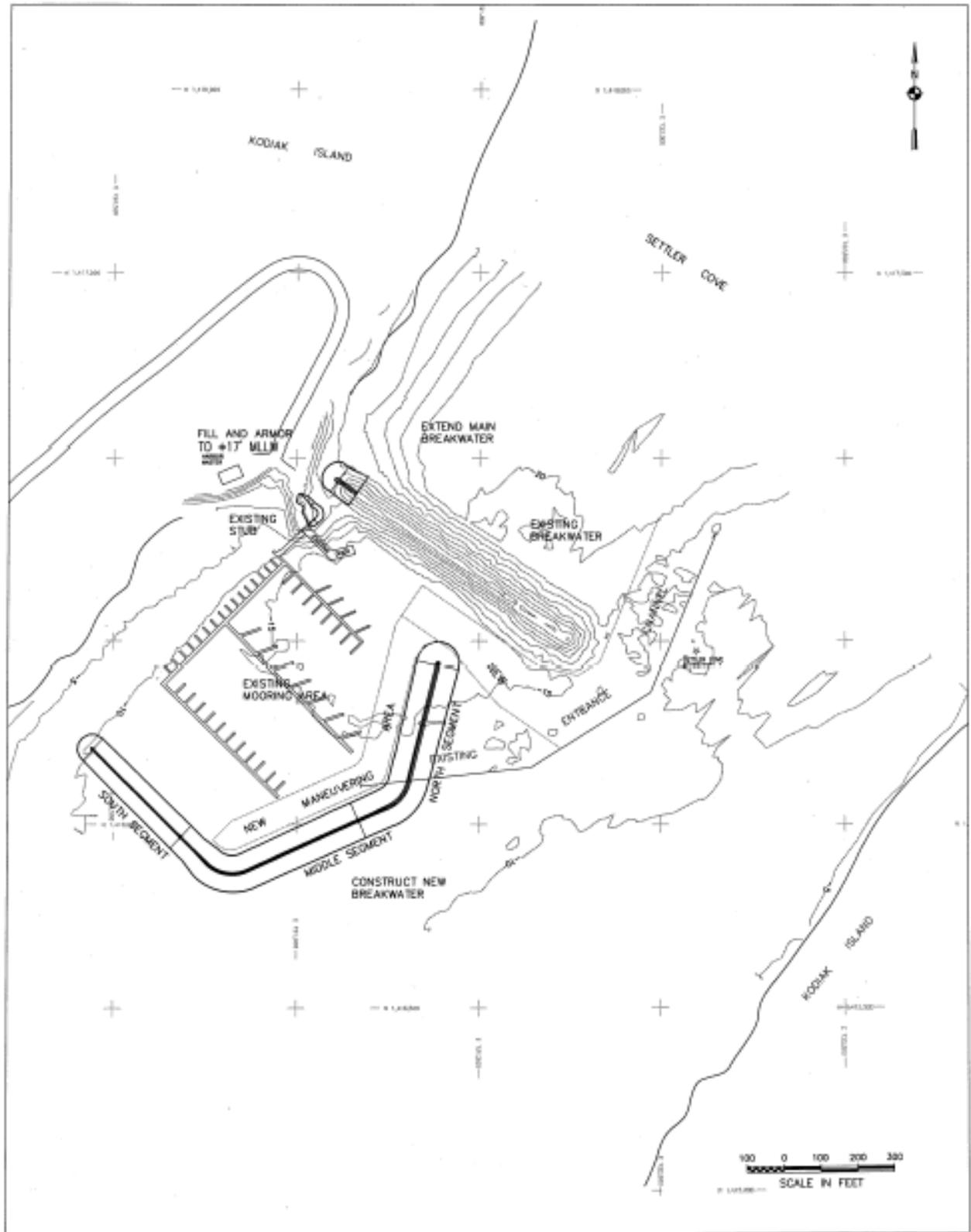


Figure 16. Alternative 3B (Recommended Plan)

4.9 Detailed Economic Analysis

The benefit table represents the results of improvements at Port Lions, which would provide protected moorage for a fleet of up to 124 full-time vessels. Navigation improvements at Port Lions would provide \$884,000 in annual NED benefits as shown in table 6. Economic benefit categories are summarized below. Details of the economic analyses are provided in appendix B.

Table 6. Annual NED Benefits

Benefit Category	Annual NED Benefit
Preventable Marina Damage	253,000
Local Emergency Cost	18,000
Damage to Skiffs	16,000
Beaching Damage	4,000
Large Vessels Set Adrift	14,000
Lines and Cleats	9,000
Vessel Damage at Docks	7,000
Reduction in Harvest Cost	362,000
Water Taxi Service	49,000
Subsistence (other direct benefit)	54,000
Harbor of Refuge (other direct benefit)	26,000
Search and Rescue (other direct benefit)	<u>73,000</u>
Annual NED Benefit (rounded)	\$884,000

Preventable Marina Damage. Significant damage occurs each year to the docks. Movement of the floating docks causes them to come loose from their anchor system and causes some vessels to break their lines, bang against the docks, and chafe at their fender systems; the vessels would be in danger if not attended. Annual marina damages saved is \$253,000.

Local Emergency Cost. The Kodiak Harbor maintenance staff and the Port Lions Harbormaster have been performing maintenance on the harbor, but they are not adequately funded to keep up with the annual damages. In addition to the budgeted amount, a great deal of donated labor is required in order to maintain the system even in its underdeveloped state. The local people donate as much time as necessary for emergency action, needed to protect their way of life and preserve the harbor. Local emergency cost saved on an annual basis is \$18,000.

Damage to Skiffs. There are about 20 other skiffs stored on trailers in the vicinity of Port Lions. They are all occasional users of the marina although they are not renters of permanent moorage. They are usually launched, used, and then removed from the water as the weather demands. If the marina had adequate protected moorage, the skiffs could be left in the water, saving the launch and retrieval time, and related wear and tear on skiff, trailer, and vehicle. If the skiff has to be tied at one of the high risk slips, it may not be accessible due to tossing and shifting motion of the dock. If this is the case the skiff is sure to experience broken lines, scuffs, probably broken deck hardware, and maybe loss of the vessel by having it sunk at the

moorage, or blown ashore or into another vessel causing damage to both. Annual damage savings for skiffs is \$16,000.

Beaching Damage. On occasions owners who are unable to haul out must beach their vessel. Owners who make this choice are those who are unable to get one of the few well-protected moorage slips and are forced to take a lesser damage by running the vessel onto the beach. Economic consequences of emergency grounding can be high but applies to only a few vessels each year. Experiences recounted included extreme cases of vessels being swamped and those experiencing less severe damage related to bottom contact with the drive unit while the prop is engaged and impact damage to the hull itself. Estimated annual damage savings is \$4,000.

Large Vessels Set Adrift. There have been several incidents of vessels that have broken loose and collided with others or blown ashore resulting in damage ranging from minor scratches to complete hull penetration and other major damage. At or near Port Lions at least one vessel is grounded each year by storm conditions that cause them to break lines or cause them to pull cleats out of the deck or out of the dock. Though not always possible due to absentee ownership, or sea conditions, owners have adopted a practice of boarding the vessels and securing them or moving them to other locations during storms. The crew tending the vessel will stay with it for the duration to keep the vessel out of danger.

Typically the larger vessels subject to grounding by storms are owned by absentees and are assumed to be a combination fishing vessel in the 45'- 58' class. Replacement cost would average about \$239,500 so the estimated annual expected loss from preventing large vessels from being set adrift with subsequent grounding damage is \$14,000. Given that the purpose of the harbor is to prevent such losses by providing a safe year around moorage, the project will be able to prevent all damages to large vessels set adrift.

Lines and cleats. Port Lions vessel owners generally replace all lines every year although in many quiet moorages, dock lines can be used for several years. The amount spent on new lines will vary with the size of the vessel. If moorage lines do not break the shock is transferred to the vessel and to the dock causing failures at other points of the moorage arrangement. Such events lead to cleats breaking off or pulling out of the deck. Related to failure of deck cleats is damage to the surrounding mounting area. Consequences of these failures can involve major repair cost if aluminum welding or fiberglass repair is required. In the with-project condition the number of annual line and cleat replacements will be reduced by \$9,000.

Vessel Tending. Storm tending of large vessels is required several times per year. The larger vessels sometimes require more than one person to secure the vessel and sometimes require around the clock attention during storms. For evaluating the economic aspects of vessel tending there is only an anecdotal database. It is nearly impossible to separate the time spent on watch of large vessels from other storm related response activities. For example, the time value associated with emergency activity at the marina related to protection of the dock system and protection of skiffs has already been estimated but there is a separate set of concerns related to safety of larger vessels. There is a risk of double counting of economic costs if the time for caretakers of larger vessels is added to the total time related to securing the marina itself. Both sets of events are concurrent and if one is removed from a typical scenario the same number of people are likely to be involved in sacrifice of their time for the

other event. The need for vessel tending is genuine. However quantification of the economic value was not pursued because a separate estimate of effects would probably lead to some unidentifiable amount of double counting.

Vessel Damage at the Docks. Many vessels show visible damage from hulls rubbing against the docks or contact with other vessels. Overall the damage appears to be minor and some vessels show none at all. This is because most of the potential damage is prevented by the many hours of vessel tending that go on at the marina during storms. In addition, when damage is incurred it is repaired as soon as possible due to the need to provide charter customers with the visual assurance that vessels are well taken care of and sea worthy.

Even damage that appears to be a minor paint scratch can add up to a significant dollar amount when expressed in terms of impact on sale value. This is because when vessels are for sale they are expected to fetch a higher price if they are in “Bristol” or like new condition. Such reconditioning is very costly even if a vessel only shows minor blemishes. Vessel repair cost is very high because there is no repair yard facility at Port Lions. Subjects interviewed maintained that these cosmetic damages are generally a deferred or overlooked cost but owners are aware with certainty that they will eventually realize losses when vessels are sold if repairs are not made.

Vessel damages that have been allowed to accrue however generally become a major expense either to the seller or the buyer regardless of how complete the cosmetic detailing is. Accrued damage is considered minor with regard to safety and operation of the vessel but ordinarily reduce by 5% to 15% the value of a vessel in top condition. Annual savings for reduced vessel damages is \$7,000.

Reduction in Harvest Cost. Because of the unmet regional demand for moorage, and the proximity to the fishing grounds, a properly functioning breakwater would result in all 124 of the slips being rented to fishers. In contrast to this, the without-project condition would accommodate only 35 vessels.

Proximity to the fishing grounds is a major economic factor in determining the economic advantage of a given port. Therefore, of the 89 vessels that could relocate to new slips at Port Lions from virtually any other location (based on improved moorage space that could be provided in a with-project condition) virtually all of them would enjoy an economic advantage of being closer to the fishing grounds. Logically those, which would enjoy the largest increase in net income by operating out of Port Lions, would be among the first to relocate. It is clear that the 89 vacancies would be filled from the 462 potential cost savers well before running out of net income beneficiaries.

In the with-project condition, when not fishing, vessels could be moored at Port Lions and the crews wanting to go to Kodiak could be returned to Kodiak by water taxi via Anton Larson Bay. The water taxi service would add some time and cost but even with this cost included the net operating cost is lower than running the vessel back to Kodiak through Narrow Strait

The annual savings resulting from taking vessels to Port Lions instead of Kodiak is estimated to range from \$195,100 to \$698,100. From this, one needs to subtract crew water taxi service at \$96 to Kodiak for an estimated third of the trips amounting to \$73,800 and \$88,200 respectively. This expense is to allow for crew members desiring to make a short visit to

Kodiak instead of taking advantage of accommodations aboard the vessel. The mid-range estimate for the location advantage realized from expanded moorage capacity is \$362,000.

Water Taxi Service. In the without-project condition, moorage is inadequate to assure water taxi availability more than about once per week. This is because the few larger vessels that home port at Port Lions will double as charter operators and commercial fishers and may be out fishing for days. In such cases, people weathered in at Port Lions due to unsuitable flying weather and without water taxi service may wait several days for suitable flying conditions. This wait for safe flying conditions also involves passengers at Kodiak who are unable to get to Port Lions. For many stranded passengers the lost time is actually lost earnings not merely lost leisure time. Lost earnings appropriately measure the opportunity cost of lost time because often the stranding happens at the end of fishing or hunting vacation when the stranded passenger is trying to return to work.

Protected moorage would provide year-around moorage for additional vessels thereby increasing the chances that a vessel would be available as a dedicated water taxi service. With a harbor there are two ways that goods are shipped into Port Lions from Kodiak; by schedule or charter air service and by water taxi. Reliable water taxi service will not develop without fully protected moorage and freight service will also be unreliable.

Having without-project information available on three of the local water taxi operations it was concluded that in the with-project condition the taxi operations could take place at least three times a week, year around. The trips are usually a mix of passenger and cargo. The residents of Port Lions prefer the water taxi to air travel and use it regularly. Three trips weekly, year-around equates to 156 trips per year. Each trip with 6 passengers saves \$200 over the cost of air travel. With half the trips being for cargo at a saving of \$430 per trip, and half for passengers with a saving of \$200 per trip, the water taxi service provides a potential annual saving is \$49,000.

Alternative Port Impacts. Modification of the breakwater and moorage area at Port Lions will add up to 89 well protected moorage slips to the Kodiak Island area. Because there is a shortage of protected moorage, vessels crowd into the protected harbors with crowding becoming excessive just before the salmon season opens and near the end of the season. It happens again during two months of mid winter when fishers of other species tend to avoid the worst of the winter storms and traditionally take their holidays. Periodic crowding is also a problem when extended fishing closures happen during the May. September period.

At practically any Alaska harbor, after the slips are full additional customers raft together and this crowding leads to damages in the harbors as vessels come in contact with one another. Another concern is the inconvenience and lost time that happens when the rafts have to be reconfigured to accommodate arriving or departing vessels. For some marina operations, under-capacity has been a major complaint, and the basis for costly expansion plans. For others, it has been considered a way of assuring that there will not be a shortage of moorage customers. Some marina operators prefer a harbor with a wait list while the customers that use the over crowded harbor dread the inevitable frayed tempers, collisions, and inconvenience.

Modification of Port Lions will probably alleviate some of the wait list at Kodiak. To some extent, it will reduce crowding and over-capacity use at Kodiak, Larsen Bay, Ouzinkie, Old

Harbor, and Port Lions itself. If it reduces the wait list at Kodiak or other places too much, or if it causes Kodiak or others to lose customers, there will be an adverse financial impact. This is not anticipated as a most likely future scenario; however local financial impacts related to loss of moorage revenue is a transfer, which balances increased moorage revenue at Port Lions. The reduction in damages and reduction of inconvenience due to alleviation of crowding however is beneficial NED effect. The beneficial NED effects on harbors other than Port Lions have not been evaluated in the interest of demonstrating that the proposed project can stand on its own.

Other Direct Benefits. The “other direct benefits” are those, which are incidental to the purpose of the project in the sense that the plan formulation pivots on the separable justification of higher priority NED benefits and costs. Because the NED Plan navigation improvements are justified on the merits of narrowly defined net income effects alone, the effects such as subsistence, harbor of refuge, and search and rescue are incidental in the sense that they have no incremental cost. Transportation savings and other net income gains constitute annual benefits of \$847,400 while other direct benefits are \$153,000.

Subsistence Opportunity. In 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. As such subsistence cuts across the native culture and is significant to survival well beyond basic food needs. Port Lions residents follow a seasonal harvest round based on historic use and resource availability, harvesting different resources throughout the year. Generally among the coastal rural villages most marine mammal harvests occur in the winter when the animals float better after being shot and hides are marketable, or in spring when new pups are available. Black bears are taken in the fall and spring. Summer is characterized by salmon and berry harvests. Locations of harvests are tied to access by vessel

Availability of a harbor capable of protecting vessels used for subsistence harvests will make vessels immediately available for increased subsistence use. Without an improved harbor some harvest trips will not be made because vessels will not be useable. Ability to depart and return to a sheltered harbor will extend the time available for harvesting thereby increasing the number of trips that can be made and also increasing distances that can be traveled. The effect of the harbor will be to enhance opportunities and increase subsistence harvest toward the ideal goal of self-reliance, which is a theoretical maximum that in practical terms may be undesirable and unattainable. Replacement value represents a mid range benefit estimate of \$54,000.

Harbor of Refuge. When the safety of a vessel is threatened due to situations such as failure of pumps, power, through hull fittings, navigational equipment, steering, auxiliary systems, electronics, shifting load, debris collision, sea conditions, grounding, electrical problems, cooling systems, fire, hydraulic failure, injury accident on board, etc. professional mariners contacted claimed that a prudent operator will seek shelter so that the problem can be corrected before it becomes an at sea emergency. Increasing the opportunities to access an all weather moorage will enhance prospects that a vessel in danger will be able to perform self-rescue through accessibility of a safe haven.

The NED benefit estimate is based on the assumption that there is a tie between available safe havens and success of self rescue activity from an at-sea vessel emergency or from less dire events that eventually could lead to one. Presence of a safe haven in close proximity to the vessel is presumed to reduce the risk of loss below the threshold of total casualty loss. The hypothesis is that a 15% increase in protected moorage at the nearest harbor to the fishing grounds will reduce risk of preventable casualty loss to vessels in the immediate vicinity by an equal amount when the above risk factors are accounted for. The lower range loss reduction credited to Port Lions improvements is estimated at \$26,000 annually.

Search and Rescue (SAR). The continuing circumstance is that on average 114 search and rescue missions happen in Kodiak area waters every year and related rescue attempts place a tremendous economic burden on taxpayers and presents a persistent risk to the rescuers. The average cost of an SAR mission in Alaska is \$6,800. SAR missions in Alaska average 1,100 each year, so the average annual statewide cost is nearly \$7.5 million. In addition to the USCG SAR costs there are other costs, which need to be considered to arrive at the societal cost of SAR. Looking only at SAR costs related to problems of the salmon fleet during the salmon season. Preventable SAR costs for the salmon fleet are \$73,000.

5.0 COMPARE ALTERNATIVES

The alternatives were designed to meet the planning objectives and criteria and were evaluated based on environmental, economic, and engineering considerations. The physical characteristics of the alternatives are shown in table 7. Unit prices used in the calculation of the project cost are shown in table 8. For alternative 3b the main breakwater is composed of 3 segments, which are each designed to a different wave climate. Although the rock sizes differ in these segments, the methods of rock production, transport, and placement are the same, which resulted in relatively equal unit prices for the different rock sizes. The use of concrete armor units may be an option if the cost of armor stone is cost prohibitive.

A comparison of the NED costs and benefits for the alternatives is shown in table 9. Interest during construction (IDC) was added to the initial cost to account for the opportunity cost incurred during the time after the funds have been spent, but before the benefits begin to accrue. Preconstruction, engineering, and design (PED) was assumed to take nine months and construction assumed to take 24 months.

Table 7. Comparison Of Alternatives: Physical Characteristics

	Alternative 1a	Alternative 1b	Alternative 3b
Northwest Breakwater			
Length (ft)	700	700	-
Armor rock (yd ³), Avg. wt. 4,900 lbs	19,600	19,600	-
Secondary rock (yd ³), Avg. wt. 490 lbs	12,900	12,900	-
Core rock (yd ³), Avg. wt. 49 lbs	25,900	25,900	-
Southwest Breakwater. contains 3 segments for Alt 3b			
Length (ft)	-	860	1,360
Armor rock (yd ³), Avg. weight 4,900, 2,000, and 350 lbs	-	7,100	30,100
Secondary rock (yd ³), Avg. weight 490 and 200 lbs.	-	-	14,100
No B rock for segment 3 of Alt 3b			
Core rock (yd ³), Avg. weight 49, 20, and 4 lbs	-	31,400	48,800
North Breach. Main and stub breakwater extension			
Length (ft)	40	40	40
Armor rock (yd ³), Avg. wt. 4,900 lbs	900	900	900
Secondary rock (yd ³), Avg. wt. 490 lbs	850	850	850
Core rock (yd ³), Avg. wt. 49 lbs	1,400	1,400	1,400
Floating Breakwater length (ft)	732	-	-

Table 8. Cost Estimate Unit Price Data

Item	Unit	Unit Price (\$)
Mobilization and Demobilization	LS	793,000
Breakwater		
Armor rock	yd ³	73
Secondary rock	yd ³	52
Core rock	yd ³	44

Unit prices (rounded) do not include contingency

Table 9. Comparison Of NED Costs And Benefits For Alternatives

Item	Alternative 1A (\$)	Alternative 1B (\$)	Alternative 3B (\$)
Mobilization and Demobilization	946,000	946,000	946,000
Breakwaters	6,771,000	6,606,000	6,552,000
Inner Harbor Development	<u>1,038,000</u>	<u>1,038,000</u>	<u>1,038,000</u>
Construction Contract Cost	8,755,000	8,590,000	8,536,000
Engineering and Design	597,000	597,000	597,000
Construction Management	697,000	697,000	697,000
Lands and Damages	<u>1,000</u>	<u>1,000</u>	<u>1,000</u>
Subtotal	1,295,000	1,295,000	1,295,000
Project Cost	10,050,000	9,885,000	9,831,000
Interest During Construction	262,000	258,000	257,000
NED Investment Cost	10,312,000	10,143,000	10,088,000
Annual NED Cost (50 years at 5 3/8%)	598,000	588,000	585,000
Annual OMRRR	35,000	25,000	25,000
Total Annual NED Cost	633,000	613,000	610,000
Annual Benefits	884,000	884,000	884,000
Average Annual Net Benefits	251,000	271,000	274,000
Benefits to Cost Ratio	1.4	1.4	1.5

5.1 Environmental Considerations

5.1.1 Harbor Circulation and Water Exchange

No-Action Alternative. A model study was used to characterize the existing condition against the recommended plan alternative 3B (ADOT&PF 2003). The model showed that the existing harbor basin water does not have strong enough momentum during the flood tide to efficiently flush all water out of the basin to exchange with water outside the basin. As the tide ebbs, most of the basin water that flows along the shoreline is re-entrained back into the basin area. However, the strong winds and large tidal range contribute to the circulation of water in the area. There are no sewage outfalls into Settler Cove that would degrade the water quality. Fuel is not dispensed at the harbor.

General. Construction of breakwaters would increase water turbidity temporarily near the project area. Tidal current and action could cause any loosened fine-grained material to form a sediment plume over an undetermined area. Since the material at Settler Bay is primarily sand and gravel, suspended sediment plumes would be small but could temporarily lessen light penetration and photosynthesis and disturb filter feeders. Mixing and dilution in the overlying water would be expected to decrease turbidity levels in a short time.

Harbor operation and harbor-related activities historically degrade water quality by dumping petroleum products, human refuse, and fish wastes into the harbor area. Unburned lubricants from outboard exhausts and accidental fuel spills contribute to the contamination of harbor waters. Leaching vessel paints and preservatives also slowly degrade the water. Harbors with

good circulation and flushing characteristics quickly disperse pollutants and prevent them from accumulating in sediments and depleting the dissolved oxygen in the water.

Water quality and circulation criteria were established to minimize environmental degradation associated with harbor improvements. The conventional method for estimating harbor basin flushing is to use an average exchange coefficient for one tidal cycle. Flushing coefficients can be approximated by the tidal prism ratio: the difference in basin volume at high tide and low tide divided by the basin volume at high tide. It has been determined that average spatial values greater than 0.30 will provide for acceptable harbor basin flushing. It is also recommended that no more than 5 percent of the basin have values less than 0.15.

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. Such geometry minimizes possible zones of stagnation and short-circuiting of circulation cells within the basin.

For proposed harbor improvements with floating breakwaters, the above criteria do not directly apply since the mooring area would not be fully enclosed and would not impede circulation except to reduce wave heights.

Alternative 1A . Circulation in the harbor basin would be driven primarily by tidal action and by wind-driven surface water currents that contribute to mixing in the water column. Flood and ebb tides would drive the circulation patterns in the mooring basin and the back portion of Settler Cove. This alternative would not enclose a basin proper; however, adequate water circulation based on existing conditions would be expected. The high tidal ranges in this area would promote good water exchange in the basin. To control accumulation of refuse in the water, refuse collection and disposal would be part of the harbor management plan. A fuel spill containment plan would also be part of the harbor management plan.

Although water quality would not be a significant issue in the harbor area, the issue of the overall circulation, flushing and deposition changes caused by the additional breakwater is unknown within Settler's Cove especially at the head of the cove. The U.S.FWS has recommended further studies to determine environmental impacts. The scope and cost of these studies would be determined if this alternative is selected as the recommended plan.

Impacts are comparable between all alternatives aside from the unknown adverse impacts of the circulation patterns within the cove. Since Alternative 3B was selected as the recommended plan further study of these impacts were not conducted.

Alternative 1B. Circulation in the harbor basin would be similar to Alternative 1A. Flood and ebb tides would drive the circulation patterns in the mooring basin. This alternative would not fully enclose a harbor basin proper; however, it would somewhat restrict water circulation patterns in the mooring area due to the new southwest rubblemound breakwater. Circulation in the basin would be similar to Alternative 1A since the breach between the existing breakwater and the new southwest breakwater would be very large (700 feet). The basin would have a tidal prism ratio of 0.39. The aspect ratio of the basin was calculated to be 0.86. Good water quality and circulation are therefore expected in the harbor basin for Alternative 1A. The potential for altered circulation patterns within Settler's Cove as discussed in Alternative 1A also applies to Alternative 1B.

Alternative 3B. Alternative 3B results from the model study done by ADOT&PF indicate more flow exchange than the existing condition. During the flood phase of the tide, there is a strong flow through the main channel into the basin and somewhat lesser flow out of the breach. The flow through the breach moves toward the shoreline and is re-entrained back into the basin, which lowers the overall water exchange ratio. The curved breakwater works as a steering vane so that more of the flow is carried through the basin area. Circulation in the harbor basin would be driven primarily by tidal action and by wind-driven surface water currents that contribute to mixing in the water column. This alternative would more fully enclose a harbor basin proper and it would tend to drive water circulation patterns in the mooring area due to geometry of the basin and breakwaters. The basin would have tidal prism ratio of 0.46. The aspect ratio of the basin was calculated to be 0.81. Good water quality and circulation would therefore be expected in the harbor basin for alternative 3B.

5.1.2 Environmental Assessment

The Environmental Assessment is located in the environmental documents section of this report. Resource agencies and Corps biologist expressed concern of impacts to circulation patterns within Settler Cove for Alternatives 1A and 1B. Impacts are comparable between all alternatives aside from the unknown adverse impacts of the circulation patterns within the cove. Since Alternative 3B was selected as the recommended plan further study of these impacts were not conducted.

The EA concluded that Alternative 3B would minimize adverse impacts to the environment. The alternative was designed to avoid eelgrass beds and potential impacts to water circulation within Settler Cove. Alternative 3B maximized the net NED benefits and was carried forward as the Recommended Plan. Thus, further evaluation of environmental impacts of Alternatives 1A and 1B was not performed. Should either alternative be selected as a locally preferred plan, additional studies will be required to evaluate impacts to the environment.

The threatened Steller's eider is known to be present during the winter season in the Kodiak Island archipelago. Surveys were conducted in January and March 2002 to determine presence and habitat use. No eiders were observed during the January survey. Local knowledge is that this species does not inhabit waters near Port Lions. Only one eider was seen during the March survey. A principal reason eiders do not winter in the Port Lions area could be because of the type of shoreline that dominates the area. Excluding Settler Cove, the shoreline near Port Lions is mostly steep with almost none of the shoal-type habitat eiders prefer.

Construction would not affect any sites eligible for inclusion in the National Register of Historic Places or any threatened or endangered species, or their critical habitat, or essential fish habitat. The Recommended Plan is consistent with the State of Alaska and Alaska 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 has been prepared.

5.1.3 Project Mitigation

The mitigation plan has been coordinated with resource agencies including U.S. Fish and Wildlife Service, National Marine Fisheries Service, and Alaska Department of Fish and Game. The mitigation plan was designed to address concerns of fish migration and adverse impacts during construction and operation of the harbor. No real estate acquisition is required as part of the mitigation plan. The mitigation features are as follows:

- Near-shore breaches. Although the existing breach opening will be reduced to limit wave energy from entering the harbor, the breach will remain open to allow the near-shore fish passage. The new breakwater will not be shore connected to provide near-shore fish passage. The Federal government is responsible for this feature.
- Breakwater construction window. Fill activities will be timed to avoid the juvenile salmon out-migration period of March 15 through June 15. The Federal government is responsible for this feature.
- Sediment containment. Methods will be implemented to isolate the in-water work area from other marine waters and to filter or settle out silt-laden water (i.e., the use of silt curtains) during breakwater construction to maintain Alaska water quality standards. The Federal government is responsible for this feature.
- Stationary light shields. Harbor lighting will be shielded downward to minimize the hazard of disorienting flying birds and causing them to strike fixed objects. The local sponsor is responsible for this feature.
- Harbor signage. Signage stating the facts and dangers of hydrocarbons will be installed at the harbor where it is highly visible to the public. The sign should discuss hydrocarbon impacts to fish and wildlife in the marine environment and provide tips to help boaters prevent and report fuel spills. The signage text will be coordinated with the USFWS. The local sponsor is responsible for this feature.
- Harbor Management Plan. A harbor management plan will be developed, which will identify best management practices (BMP) for harbor operation. The plan will describe practices; to minimize or prevent environmental impacts from vessel maintenance, conduct spill response, handle and dispose of solid and sanitary waste, handle and dispose of hazardous waste, and manage bilge and storm water effluent. The local sponsor is responsible for this feature.
- ADOT&PF floating breakwater. The floating breakwater will not be removed while any Arctic terns are nesting (approximately April 15 through August 1).

5.1.4 Environmental Compliance Checklist

A checklist of project compliance with relevant Federal, state, and local statutes and regulations is shown in table 10.

Table 10. Environmental Compliance Checklist

FEDERAL	Compliance
Archeological & Historical Preservation Act of 1974	FC
Clean Air Act	FC
Clean Water Act	FC
Coastal Zone Management Act of 1972 *	PC
Endangered Species Act of 1973	FC
Estuary Protection Act	FC
Federal Water Project Recreation Act	FC
Fish and Wildlife Coordination Act	FC
National Environmental Policy Act *	PC
Land and Water Conservation Fund Act	FC
Marine Protection, Research & Sanctuaries Act of 1972	FC
National Historic Preservation Act of 1972	FC
River and Harbors Act of 1899	FC
Magnuson-Stevens Fishery Conservation & Management Act *	PC
Marine Mammal Protection Act	FC
Bald Eagle Protection Act	FC
Watershed Protection and Flood Preservation Act	FC
Wild & Scenic Rivers Act	N/A
Executive Order 11593, Protection of Cultural Environment	FC
Executive Order 11988, Flood Plain Management	FC
Executive Order 11990, Protection of Wetlands	FC
Executive Order 12898, Environmental Justice	FC
Executive Order 13045, Protection of Children	FC
STATE AND LOCAL	
State Water Quality Certification *	PC
Alaska Coastal Management Program *	PC

PC = Partial compliance, FC = Full compliance

*Full compliance will be attained upon completion of the Public Review process.

5.2 Economic Considerations

Economic considerations in the selection process included a comparison of the costs of the alternatives. A summary of the costs and benefits based on a 2004 price level for the alternatives is shown in table 9. Cost components include the costs of construction, engineering and design, supervision and administration, navigation aids, interest during construction, and operation and maintenance based on a discount rate of 5-3/8 percent and a 24-month construction period. The project cost was reduced to an equivalent annual cost based on a project life of 50 years. This cost was added to the annual operation and maintenance, repair, replacement, and rehabilitation (OMRRR) cost to determine the total

annual cost. This number was subtracted from the annual NED benefits to arrive at the net NED benefits.

Alternative 3B maximized the net NED benefits and was designated as the NED plan and ultimately the Recommended Plan. The plan is discussed in more detail in Section 6. The economic benefits of the navigation improvements are discussed in detail in appendix B.

5.3 Selection of Optimum Basin Size

Optimization of the mooring basin, see table 11, showed that the NED benefits are maximized with the design fleet of 124 vessels. Alternative design fleets included in the analysis were 62 and 186 vessel fleets.

Table 11. Basin Size Optimization

Basin Size (# of vessels)	Project Cost (\$)	Annual O&M (\$)	Total Annual Project Cost (\$)	Annual Benefits (\$)	Net Benefits (\$)
0	0	0	0	0	0
62	8,830,000	25,000	537,000	700,000	163,000
124	10,088,000	25,000	610,000	884,000	274,000
186	11,525,000	25,000	693,000	924,000	231,000

5.4 Optimization of Entrance Channel

The existing project provides depths of -10 to -20 feet, MLLW with depths in the entrance channel between -15 and -20 feet, MLLW. These depths provide adequate safety clearance after allowing for normal movement of a vessel underway. Therefore, an analysis of incremental project depths was not conducted, as it is not possible to provide the estimated project benefits for the optimum fleet at any less cost.

6.0 SELECT RECOMMENDED PLAN

6.1 Plan Components

Alternative 3B, see figure 16, maximized the net NED benefits and was selected as the NED Plan. This plan was acceptable to the local sponsor and the city of Port Lions and became the Recommended Plan. Major construction items include a rubblemound breakwater and moorage float system. No dredging would be required to construct the project.

6.1.1 Rubblemound Breakwater

A single rubblemound breakwater 1,360 feet in length would protect the basin from northeast and southwest waves. The breakwater would be located landward of the existing breakwater and wrap around the deep-water side of the mooring basin. The breakwater would not be shore-connected to provide a 150-foot wide breach for fish passage. The existing breach opening would be reduced by extending the existing breakwater 40 feet shoreward and extending the existing stub breakwater 75 feet resulting in a breach 30-foot wide.

6.1.2 Entrance Channel and Maneuvering Basin

The entrance channel accommodates two-way vessel traffic. The channel width is 100 feet at an existing depth of -14 feet, MLLW. The entrance channel and maneuvering basin would encompass 2 acres at an existing depth of -14 feet, MLLW.

Minimal sedimentation within the entrance channel or mooring basin is expected.

Maintenance dredging would depend on storm conditions over the years but is expected to be infrequent if necessary at all.

6.1.3 Inner Harbor Facilities

The existing float system would be repaired and/or replaced as necessary and additional floats added to accommodate the design fleet. The project does not require dredging since the existing depths are adequate to accommodate the design fleet. The mooring area would encompass 10 acres.

6.1.4 Mitigation

- Near-shore breaches. Although the existing breach opening will be reduced to limit wave energy from entering the harbor, the breach will remain open to allow the near-shore fish passage. The new breakwater will not be shore connected to provide near-shore fish passage. The Federal government is responsible for this feature.
- Breakwater construction window. Fill activities will be timed to avoid the juvenile salmon out-migration period of March 15 through May 15. The Federal government is responsible for this feature.
- Sediment containment. Methods will be implemented to isolate the in-water work area from other marine waters and to filter or settle out silt-laden water (i.e., the use of silt curtains) during breakwater construction to maintain Alaska water quality standards. The Federal government is responsible for this feature.

- Stationary light shields. Harbor lighting will be shielded downward to minimize the hazard of disorienting flying birds and causing them to strike fixed objects. The non-Federal sponsor is responsible for this feature.
- Harbor signage. Signage stating the facts and dangers of hydrocarbons will be installed at the harbor where it is highly visible to the public. The sign should discuss hydrocarbon impacts to fish and wildlife in the marine environment and provide tips to help boaters prevent and report fuel spills. The signage text will be coordinated with the USFWS. The non-Federal sponsor is responsible for this feature.
- Harbor Management Plan. A harbor management plan will be developed, which will identify best management practices (BMP) for harbor operation. The plan will describe practices; to minimize or prevent environmental impacts from vessel maintenance, conduct spill response, handle and dispose of solid and sanitary waste, handle and dispose of hazardous waste, and manage bilge and storm water effluent. The non-Federal sponsor is responsible for this feature.
- ADOT&PF floating breakwater. The floating breakwater will not be removed while any Arctic terns are nesting (approximately April 15 through August 1).

6.2 Plan Benefits

As shown in table 6, the Recommended Plan provides annual navigation benefits of \$884,000. The annual cost is \$610,000 with net annual benefits of \$274,000 and a benefit to cost ratio of 1.5. Economic analyses are based on a 2004 price level.

6.3 Plan Costs

Interest during the development of plans and specifications (P&S) and during construction (IDC) was added to the initial cost to account for the opportunity cost incurred during the time after the funds have been spent, but before the benefits begin to accrue. IDC was calculated by matching the construction expenditure flow with the interest the funds would have accumulated had they been deposited in an interest-bearing account. Preconstruction, engineering, and design (PED) was assumed to take a minimum of nine months. Construction is expected to last for 24 months. For this analysis, level monthly expenditures were assumed.

The initial cost is \$9,841,000, which includes \$10,000 for navigational aids to be provided by the U.S. Coast Guard. Including the interest during P&S and IDC and the annual operation and maintenance cost of \$25,000, the total annual project cost is \$610,000. Detailed M-CACES cost estimates are provided in appendix E.

6.4 Risk and Uncertainty

As in any planning process, some of the estimates made in this report are uncertain. Elements of risk and uncertainty could affect the design and performance of the project, cost, and benefits. A risk and uncertainty analysis is included in appendix B.

6.5 Plan Accomplishment

The Recommended Plan would meet the planning objectives in the following ways:

- Construct additional breakwater to reduce damages to commercial fishing and subsistence vessels incurred by the current lack of protection in the existing harbor
- Construct additional breakwater to reduce float maintenance costs incurred by the current lack of protection in the existing harbor
- Provide additional protected moorage to reduce travel costs incurred from the overcrowded conditions
- Construction breakwater breaches to maintain near-shore fish passage
- Design and construction breakwater to minimize adverse impacts to water circulation and environmental resources

6.6 Plan Implementation

6.6.1 Construction

Federal. The Corps of Engineers would be responsible for construction of the breakwaters and entrance channel. The U.S. Coast Guard would be responsible for installing aids to navigation.

Local. The sponsor would be responsible for rehabilitation or replacement of the existing float system and providing all lands, easements, and rights-of-way and relocations necessary for the project. The sponsor would also be responsible for utility service to the harbor and for funding its share of the Federal general navigational features (GNF).

6.6.2 Operation, Maintenance, Repair, Replacement, and Rehabilitation (OMRRR)

Federal. The Corps of Engineers would maintain the breakwaters and entrance and maneuvering channels as needed and would conduct periodic hydrographic surveys to determine if or when maintenance dredging is required. The U.S. Coast Guard would maintain navigational aids. Table 12 indicates OMRRR intervals and costs, including mobilization and demobilization.

Local. The non-Federal sponsor would perform maintenance dredging of the mooring basin if necessary, maintain the floats, utilities, etc., and operate the completed project.

Table 12. Annual NED Costs Of OMRRR

	Interval (yr)	Equivalent Annual Cost			Total
		Corps	Other Federal	Local Sponsor	
Replace 3% armor on breakwater	15	3,000			\$3,000
Maintenance dredging	25	3,000		3,000	6,000
Conduct hydrographic surveys	5	5,000			5,000
Maintain navigation aids	5		1,000		1,000
Replace floats, stalls, and piles	30			10,000	10,000
TOTAL OMRRR COSTS		\$11,000	\$1,000	\$13,000	\$25,000

6.6.3 Real Property Interests

The Real Estate Plan and Assessment of Non-Federal Sponsor's Real Estate Acquisition Capability are provided in appendix F. Table 13 lists the project's real estate costs for both the Federal and the non-federal portions.

Table 13. Real Estate Costs

Item	Federal (\$)	Local (\$)	Subtotal (\$)
Federal project portions (GNF)			
Administration	1,000	0	1,000
Payments for Real Estate	0	0	0
Relocations	0	0	0
Non-Federal project portions			
Administration	0	0	0
Payments for Real Estate	0	0	0
Total	\$1,000	\$0	\$1,000

6.6.4 Cost Apportionment

Construction costs for the project would be apportioned in accordance with the Water Resources Development Act of 1986. The fully funded cost apportionment for the project features is summarized in table 14.

Table 14. Apportionment Of Construction Costs

Portion of project	Construction cost contribution (%)	
	Federal	Local
General navigation features (includes entrance channel, maneuvering basin, and breakwaters)	80	20 ^a
Local Service Facilities (includes floats and mooring basin)	0	100
Coast Guard navigation aids	100	0

^aNon-federal interests must provide cash contributions toward the costs for construction of the general navigation features (GNF) of the project, paid during construction (PDC) as follows: For project depths of up to 20 ft—10%; for project depths over 20 ft and up to 45 ft—25%, and for project depths exceeding 45 ft—50%. For all depths, they must provide an additional cash contribution equal to 10% of GNF costs (which may be financed over a period not exceeding 30 years), against which the sponsor's costs for LERRD (except utilities) shall be credited. *Note:* Costs for general navigation features include associated costs, such as mobilization.

Table 15 provides a breakdown of the initial Federal and non-Federal costs of the project of the Recommended Plan. The fully funded cost, escalated to the mid-point of construction (August 2008) is \$10,159,000.

The Federal government would assume 100 percent of the operation and maintenance costs for the breakwaters and entrance channel. The non-Federal sponsor would assume all other operation and maintenance costs. The sponsor would be responsible for providing LERRD for construction and future maintenance of the inner harbor facilities.

The non-Federal sponsor is responsible for its share of the GNF costs and 100 percent of the non-GNF costs. The pertinent data table in the front of this report provides a summary of all shared costs.

Table 15. Federal/Non-Federal Initial Cost Apportionment for NED Plan

(October 2004 price level)

Items	Total Project Cost (\$000)	Implementation Costs (\$000)			
		Federal	%	Non-Federal	%
General Navigation Features (GNF):					
Mobilization/demobilization	946	851		95	
Breakwaters	6,552	5,897		655	
Preconstruction, engineering, & design	597	537		60	
Construction management (S&A)	697	627		90	
LERRD (GNF). Administrative costs	1	1		0	
Subtotal GNF	8,793	7,914	90	879	10
Additional Funding Requirement					
10% of GNF		-879		879	
GNF LERRD credit		0		0	
Adjustment for GNF LERRD credit		-879		879	
Relocations (GNF not creditable)					
Subtotal of GNF Related Items	8,793	7,034		1,759	
LERRD (GNF). Acquisition credit		0	0	0	100
Aids to navigation	10	10	100	0	0
Local Service Facilities					
Floats (includes design cost)	1,038	0		1,038	
LERRD (LSF)	0	0		0	
TOTAL LOCAL SERVICE FACILITIES	1,038	0		1,038	100
FINAL INITIAL COST REQUIREMENTS	9,841	7,044		2,797	

The initial construction cost of the general navigation features is 90 percent for the initial Federal investment and 10 percent for the initial local share because all dredging is less than 20 feet. The non-federal sponsor must also contribute an additional 10 percent, plus interest, during a period not to exceed 30 years after completion of the general navigation features. The sponsor would be credited toward this 10-percent cost with the value of LERRD necessary for construction, operation, and maintenance of the general navigation features. This post construction contribution is currently estimated at \$879,000 as shown below.

Total GNF	10 % of GNF	LERRD Credit	Non-federal post construction contribution
\$8,793,000	\$879,000	0	\$879,000

6.6.5 Financial Analysis

The ADOT&PF will request funds from the state legislature to cover its share of project costs. The District completed an assessment of the sponsor's finance plan and determined the sponsor to be fully capable of meeting its funding requirements. The assessment and sponsor's finance plan is enclosed in appendix D.

6.7 Public Involvement

Since initiation of this feasibility study, the city administrator, city council representatives, and community individuals, have worked closely with the study team, and local concerns have been addressed. Cooperation between the staffs of the Corps of Engineers, ADOT&PF, USFWS, NMFS, and ADF&G, together with input from the city of Port Lions, resulted in the selection of the NED and its selection as the Recommended Plan. Letters of support from the ADOT&PF and the City of Port Lions for the Recommended Plan are provided in appendix D.

6.8 Consultation Requirements

This study has been coordinated with all relevant Federal and state agencies, including the USFWS. Information on this coordination is provided in the EA. It is anticipated that the project will receive an Alaska Coastal Management Program consistency determination and a State Certificate of Reasonable Assurance under the Clean Water Act upon submittal.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

The studies documented in this report indicate that Federal construction of navigational improvements with rubblemound breakwaters, as described in the Recommended Plan, is technically possible, economically justified, and environmentally and socially acceptable. Of the alternatives evaluated in this study, Alternative 3B was found to maximize the net NED benefits and was designated the NED plan. The ADOT&PF is willing to act as the non-Federal sponsor for the project and fulfill all the necessary local cooperation requirements. Thus it is concluded that the navigation improvements described herein should be pursued by the Federal government in cooperation with the ADOT&PF.

7.2 Recommendations

I recommend that the navigational improvements at Port Lions, Alaska, be constructed generally in accordance with the plan herein, and with such modifications thereof as in the discretion of the Chief of Engineers may be advisable at an estimated total Federal cost of \$7,044,000 and \$12,000 annually for Federal maintenance provided that prior to construction the local sponsor agrees to the following:

- A.** Enter into an agreement, which provides, prior to execution of the project cooperation agreement, 25 percent of design costs;
- B.** Provide, during construction, any additional funds needed to cover the non-federal share of design costs;
- C.** Provide, during the period of construction, a cash contribution equal to the following percentages of the total cost of construction of the general navigation features (which include the construction of land-based and aquatic dredged material disposal facilities that are necessary for the disposal of dredged material required for project construction, operation, or maintenance and for which a contract for the Federal facility's construction or improvement was not awarded on or before October 12, 1996;):
 - 10 percent of the costs attributable to dredging to a depth not in excess of 20 feet; plus
 - 25 percent of the costs attributable to dredging to a depth in excess of 20 feet but not in excess of 45 feet; plus
 - 50 percent of the costs attributable to dredging to a depth in excess of 45 feet;
- D.** Pay with interest, over a period not to exceed 30 years following completion of the period of construction of the project, up to an additional 10 percent of the total cost of construction of general navigation features. The value of lands, easements, rights-of-way, and relocations provided by the non-Federal sponsor for the general navigation features, described below, may be credited toward this required payment. If the amount of credit exceeds 10 percent of the total cost of construction of the general navigation features, the non-Federal sponsor shall not be required to make any contribution under this paragraph, nor shall it be entitled to any refund for the value of lands, easements,

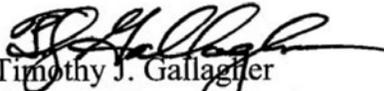
rights-of-way, and relocations in excess of 10 percent of the total cost of construction of the general navigation features;

- E.** Provide all lands, easements, and rights-of-way, and perform or ensure the performance of all relocations determined by the Federal Government to be necessary for the construction, operation, maintenance, repair, replacement, and rehabilitation of the general navigation features (including all lands, easements, and rights-of-way, and relocations necessary for dredged material disposal facilities).
- F.** Provide, operate, maintain, repair, replace, and rehabilitate, at its own expense, the local service facilities consisting of the new mooring basin, all moorage facilities in addition to the area designated as betterment on the north breakwater; in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government;
- G.** Accomplish all removals determined necessary by the Federal Government other than those removals specifically assigned to the Federal Government;
- H.** Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor owns or controls for access to the general navigation features for the purpose of inspection, and, if necessary, for the purpose of operating, maintaining, repairing, replacing, and rehabilitating the general navigation features;
- I.** Hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, replacement, and rehabilitation of the project, any betterments, and the local service facilities, except for damages due to the fault or negligence of the United States or its contractors;
- J.** Keep, and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, and other evidence is required, to the extent and in such detail as will properly reflect total cost of construction of the general navigation features, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and local governments at 32 CFR, Section 33.20;
- K.** Perform, or cause to be performed, any investigations for hazardous substances as are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601-9675, that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be necessary for the construction, operation, maintenance, repair, replacement, or rehabilitation of the general navigation features. However, for lands that the Government determines to be subject to the navigation servitude, only the Government shall perform such investigation unless the Federal Government provides the non-Federal sponsor with prior specific written direction, in which case the non-Federal sponsor shall perform such investigations in accordance with such written direction;

- L.** Assume complete financial responsibility, as between the Federal Government and the non-Federal sponsor, for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be necessary for the construction, operation, maintenance, repair, replacement, and rehabilitation of the general navigation features;
- M.** To the maximum extent practicable, perform its obligations in a manner that will not cause liability to arise under CERCLA;
- N.** Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987, and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way, required for construction, operation, maintenance, repair, replacement, and rehabilitation of the general navigation features, and inform all affected persons of applicable benefits, policies, and procedures in connection with said act;
- O.** Comply with all applicable Federal and State laws and regulations, including, but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 (revising, codifying and enacting without substantive change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a et seq.), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 et seq.) and the Copeland Anti-Kickback Act (formerly 40 U.S.C 276c)).
- P.** Provide the non-Federal share of that portion of the costs of archeological data recovery activities associated with historic preservation, that are in excess of 1 percent of the total amount authorized to be appropriated for the project, in accordance with the cost sharing provisions of the agreement;
- Q.** Do not use Federal funds to meet the non-Federal sponsor's share of total project costs unless the Federal granting agency verifies in writing that the expenditure of such funds is authorized;
- R.** Prepare and implement a harbor management plan to be coordinated with local interest. The harbor management plan shall incorporate best management practices to control water pollution at the project site.
- S.** Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. 1962d-5b), and Section 101 of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 2211), which require that the Secretary of the Army not commence construction of the project, or separable element thereof, until the non-Federal sponsor enters in a written agreement to furnish its required cooperation for the project or separable element.

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

Date: 29 Sep 2005


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