

PROJECT MANAGEMENT PLAN COASTAL STORM DAMAGE REDUCTION BARROW, ALASKA

1.0 INTRODUCTION

1.1 Background.

At the request of the sponsor, the North Slope Borough (NSB), a 905(b) Analysis was conducted to determine a Federal interest in constructing storm damage reduction, flood damage reduction, and navigation improvements for Barrow, Alaska. The analysis indicated that storm damage reduction measures, that may incidentally provide improvements to navigation, appeared to be technically and economically feasible, while being environmentally acceptable.

Barrow, the northern most community in North America and the economic center for the North Slope Borough, is located on the Arctic Ocean about 750 miles north of Anchorage, Alaska. Barrow is a first-class city with about 4,400 residents. The North Slope Borough, which includes almost all of Alaska north of the 68th Parallel, has a population of about 9,600 persons spread over 95,000 square miles, an area about the size of the state of Oregon. The majority of residents are Inupiat Eskimos. Barrow is located on a southwest-northeast coastline of the Chukchi Sea about 10 miles southwest of Point Barrow, the northernmost point of land in Alaska. Point Barrow is located on a spit fronting Elson Lagoon and marks the boundary between the Chukchi Sea on the west and the Beaufort Sea on the east.

1.2 Study Purpose.

The purpose of the feasibility study is to further evaluate the 905(b) alternatives, and determine whether a Federal interest exists for financial participation in development of storm damage reduction measures for Barrow, Alaska. The Feasibility Report and Environmental Impact Statement (FR/EIS) will document a detailed analysis of the alternatives and will identify the National Economic Development (NED) Plan, as well as other alternatives, which may include a Locally Preferred Plan (LPP). The FR/EIS should recommend a plan for implementation and provide the Congress a complete decision making document for authorizing construction of a project. The recommended plan must be feasible from an engineering and economic standpoint, have acceptable environmental impacts, and be supported by the sponsor. The FR/EIS also would serve as the foundation for developing further design analyses and the project's Plans and Specifications for project construction.

1.3 Study Authority.

The authority for this General Investigation study is provided by the "Rivers and Harbors in Alaska" study resolution adopted by the U.S. House of Representatives Committee on Public Works on December 2, 1970, which reads 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 reports of the Chief of Engineers on Rivers and Harbors in Alaska, published as House Document Numbered 414, 83rd Congress, 2nd Session; . . .Northwestern Alaska, published as House Document Numbered 99, 86th Congress, 1st Session; ... and other pertinent reports, with a view to

determining whether any modifications of the recommendations contained therein are advisable at the present time.

1.4 Project Management Plan.

This Project Management Plan (PMP) serves to plan, define, and control the development and delivery of work items to be completed during the feasibility study. The PMP includes an estimate of the total study costs, defines the responsibilities of the non-federal sponsor and the Federal Government in completing the study, and will be used as a mechanism to measure progress and performance of all the study efforts. The PMP is usually an Appendix to the Feasibility Cost Sharing Agreement (FCSA) that is executed between the Corps of Engineers and the local sponsor on a study.

1.5 Sponsorship.

The North Slope Borough has agreed to share costs of this feasibility study with the U.S. Army Corps of Engineers, Alaska District, and sign a FCSA. The Borough will provide both cash and in-kind services as described in this document. Acceptance and crediting of the in-kind service products will be the responsibility of the Corps of Engineers' Alaska District.

1.6 Technical Requirements.

The feasibility study report will be a complete decision document, which includes an Environmental Impact Statement, a U. S. Fish and Wildlife Coordination Act Report, and supporting exhibits and appendices documenting work tasks. An Environmental Impact Statement is required due to the potential large volume of material needed for beach stabilization and the large area of coastline involved. In addition, the Barrow area is very rich in cultural resources, and the Steller's eider, a threatened species, nests in the area. There are also socio-cultural aspects of the project that may be significant. It will be used by the non-federal sponsor, the Corps of Engineers, and the U.S. Congress to authorize construction of the recommended plan. The feasibility report will:

- Contain sufficient engineering and design to enable further refinement of project features, preparation of the baseline cost estimate, and development of a design and construction schedule.
- Contain environmental documentation to satisfy all National Environmental Policy Act (NEPA) and other statutory environmental requirements.
- Indicate compliance with all other applicable statutes, executive orders and policies.
- Provide a sound and documented basis for decision-makers at all levels to judge the recommended solution.
- After submission by the Alaska District of the final FR/EIS, allow more refined design work to proceed immediately following receipt of Preconstruction, Engineering, and Design funding and the execution of a follow-up Design Agreement with the local sponsor, the North Slope Borough. The project should be sufficiently developed in the FR/EIS so that design can proceed through Preconstruction, Engineering, and Design without need for reformulation, a Design Memorandum, or post-authorization changes.

2.0 FEASIBILITY STUDY SCOPE

2.1 Introduction.

The feasibility study will focus on meeting the project objectives listed below, primarily through analyzing alternative plans identified in the Barrow 905(b) Analysis. The study will formulate and optimize the alternatives for implementation based on costs, benefits, and other related assessments. The plan that maximizes net national economic development benefits will be identified as the NED plan. Should there be a locally preferred plan, engineering and economic analyses will be conducted to the same level of detail as the NED Plan.

2.2 Project Objectives.

The initial objectives of the study are:

- Provide relief from storm damage and shoreline erosion that threatens homes, shoreline bluffs, and critical community infrastructure.
- Reduce flood damages to critical public and private facilities.
- Improve navigation for lightering barge loading and unloading.
- Protect the sensitive arctic environment and mitigate significant project impacts where reasonable.
- Identify and develop practical ecosystem restoration opportunities

2.3 Project Constraints.

The primary constraint in developing storm damage reduction measures for Barrow is the need to identify an adequate source of sand and gravel (about 4 million cubic yards) and the need to avoid significant adverse impacts to critical arctic environment and traditional subsistence activities. A source of gravel and sand must be found within an economic transport range of the project site. At present, explorations have concentrated in the zone of the offshore bar. Removed material has been about 70% silt and 30% fine sand. Neither material is suitable for beach nourishment at Barrow. Spit growth appears to be a product of sand and gravel transport. Sediment overwash and easterly transport during extreme storm events may have formed gravel and sand deposits at the spit terminus. A potential location of gravel deposits appears to be in Elson Lagoon.

The Barrow area is one of the remaining areas in Alaska where the threatened Steller's eider and Spectacled eider sea ducks are known to nest. Any action in Barrow would require consultation under Section 7 of the Endangered Species Act with the U.S. Fish and Wildlife Service. Elson Lagoon is highly productive for fish and waterfowl. Other marine mammals such as polar bears, seals, walruses, and beluga and bowhead whales are found in nearshore waters at different times of the year. Because of the low tidal action, proposed harbor circulation at the proposed dredging sites would have to be analyzed to assure that normal usage would not pollute the harbor. Determination of the suitability of the dredged material for redepositing into the tidal zone would be required, such as tests for contaminant constituents. Care must be taken in the design of the project such that the project does not significantly interfere with existing subsistence activities critical to the community.

There is one archaeological site along Elson Lagoon, but the Chukchi Sea side has many. Archeological artifacts continue to be uncovered all along the shore. A complete archeological investigation in the project alternatives would be required.

The current Barrow landfill is in the process of being closed. The US Navy, US Air Force, the NSB, the Native Village of Barrow, and the Department of Justice have negotiated a financial plan for the closure of the South Salt Lagoon landfill. The plan provides for the Department of Defense to provide a majority of the funding for the closure, with the proviso that no additional Federal funds be provided to support the landfill. The landfill closure plan includes some minimal measures (such as jersey barriers along the road seaward of the landfill) to reduce flood damages that might be experienced in the future by the landfill. However, these measures are limited and assume that the beach and the road will remain in place and will not be eroded and/or damaged in the future. The feasibility study will consider the coastal erosion problem in its entirety and, if required, consider measures that would address erosion of the beach and road, which could lead to damages to the closed landfill and possible significant environmental harm.

Another potential constraint on project development is the cost sharing requirements for the construction of storm damage reduction projects. Costs assigned to the protection of lands and shores vary by the ownership as follows: Federal lands are 100% Federal cost, private lands are 100% non-Federal cost, private developed lands where criteria for public access to the shores are met are 65% Federal and 35% non-Federal, and non-Federal public shores used for parks and recreation are 50% Federal and 50% non-Federal. The actual shoreline ownership and use, which is not clearly understood at this time, will determine construction cost sharing.

2.4 Alternative Plans. Several alternatives were evaluated during the 905(b) analysis. Preliminary analysis indicated that stand-alone navigation measures would not be economically justified. However, it may be possible to develop navigation improvements incidental to the primary project purpose of storm damage and flood reduction. The analysis developed two alternatives that would provide storm damage and flood reduction. In addition to those alternatives, the FR/EIS will identify the existing condition and determine the No Action (without project condition), and any other reasonable alternatives that develop during the study. Thus, the initial list of alternatives includes the three alternatives presented here:

- **No Action.** Reflects the existing and most probable future conditions, assuming no actions are taken by the Federal government to provide storm damage and flood reduction.
- **Beach Nourishment Alone.** This alternative would add 100 feet of beach width to the beach southwest of Barrow to a point about 500 feet northeast of the Barrow landfill, a total distance of 25,000 lineal feet. The initial nourishment would require 2 million cubic yards of material. In addition to the beach nourishment, the roadway along the shore would be raised to elevation +16 MSL to the same northeast terminus. The roadway would be built with sand and gravel fill from the same source as the beach nourishment. Side slopes on the roadway would be one on three. The roadway top width would be 30 feet. Fill material required for the roadway is estimated to be about 500,000 cubic yards. The annual beach nourishment requirement is estimated to be 10,000 cubic yards per year. Borrow is assumed to be gravel and sand with the same size distribution as the surface beach material. Excavation of borrow material from Elson Lagoon may create a navigation channel for lightering barges.

- **Beach Nourishment with Concrete Mattress Revetment.** This alternative would add 50 feet of beach width to the same length of beach as the nourishment only alternative. The roadway would be raised to elevation +16 MSL with one on three side slopes. The annual nourishment requirement is identical to that of the nourishment only alternative. A concrete mattress revetment would be added to the seaward slope of the roadway and bluffs for the total 25,000 feet. The revetment would be underlain with filter cloth and extend from elevation +16 to mean sea level. Borrow is assumed to be gravel and sand with the same size distribution as the surface beach material. Excavation of borrow material from Elson Lagoon may create a navigation channel for lightering barges.

2.5 Plan Formulation.

The feasibility study will be accomplished with Alaska District resources, with in-kind contributions of the sponsor, and through contracts administered by the Alaska District. Public involvement and study management activities, on the part of the Corps and the sponsor, will occur throughout the study process. The feasibility study will evaluate not only alternatives identified during the 905(b) analysis but also other alternatives developed during the feasibility study. A number of planning criteria will be considered to screen and evaluate alternative plans and to measure each plan's contribution to the NED, Environmental Quality, Regional Economic Development, and Other Social Effects accounts from the Water Resources Council's *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* of March 1983.

2.6 Study Process. The Project Delivery Team (PDT), as defined in Paragraph 3.2, will develop and evaluate the alternatives during a three-phase study process. The Independent Technical Review (ITR) Team, as defined in Paragraph 3.3, will review and comment on the work performed by the PDT. Unless noted otherwise in the description of tasks, all work will be performed by or overseen by the Alaska District. Phases 1 and 2 will culminate in a checkpoint meeting with the study and technical review teams and other Corps representatives to develop a consensus for proceeding into the next phase. Major emphasis in each phase is outlined as follows:

Phase 1. During Phase 1, Project Delivery Team members will visit the study area. The storm damage and flood damage problems will be specifically defined and the without-project condition determined. Planning objectives and constraints will be refined and finalized. Measures to meet objectives will be developed and combined into alternatives. Preliminary screening of potential alternatives will occur. Environmental scoping of issues and concerns will be initiated and the scope of the EIS coordinated with resource agencies. Important elements of this preliminary screening include an initial site visit by key study team members, a public meeting with community members during the site visit, an assessment of without-project conditions to assess economic viability, and a fleet analysis. Planned geotechnical investigations and analyses will determine the location of an adequate supply of sand and gravel for use in the project and provide information necessary to accurately estimate the cost of excavation. The technical evaluation of wind, wave, and water levels, real estate, environmental, and engineering considerations will also be prepared. The wind, wave, and water levels analysis will be used to establish design criteria for Phase 2. Based on information provided by all evaluations, a consensus for Phase 2 planning will be formulated. Phase 1 will conclude with the Checkpoint 1 Meeting similar to a Feasibility Scoping Meeting.

Phase 2. Hydraulic analyses will define physical aspects of the marine setting at the site and provide information necessary to design cost-effective improvements. Economic analyses will determine NED benefits of reducing or eliminating the damages due to storms and flooding and determine if there are any benefits to navigation resulting from any alternative. The objective of Phase 2 is to identify the NED plan. The NED plan reasonably maximizes net NED benefits consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements.

The Checkpoint Meeting 2 will serve as the Alternative Formulation Briefing and will present the NED Plan and identify a locally preferred plan, if applicable. The preliminary draft report, including preliminary drafts of all appendices, such as plan formulation, hydraulics & hydrology, economics, environmental, and cost engineering will be prepared and undergo an Independent Technical Review. The document will then be provided to Headquarters 30 days prior to the Alternative Formulation Briefing. Phase 2 concludes with the preparation of the Project Guidance Memorandum, which summarizes agreements reached at the Alternative Formulation Briefing.

Phase 3. In Phase 3, the draft FR/EIS will be developed, based on the provisions of the Project Guidance Memorandum. A baseline cost estimate will be prepared to support the project scope and schedule for the NED plan. If the sponsor requests a plan differing from the NED plan, detailed cost estimates for both the NED plan and the locally preferred plan will be prepared. Report preparation, review, and approval will be finalized in Phase III. The FR/EIS will be reviewed by an Independent Technical Review Team, before publication of the draft documents for public review. The draft final FR/EIS will then be prepared and issued for a 45-day public review period. After addressing public and agency comments received, the draft final FR/EIS will be prepared, reviewed by the ITR Team, and submitted to the Pacific Ocean Division for review and processing. For the purposes of this PMP, Phase 3 ends with the issuance of the Division Engineer's Notice on the availability of the final FR/EIS for Washington, D.C. level review.

Preconstruction Engineering and Design. At this point, most of the work on the Feasibility Study is completed, but the Feasibility Phase for the project continues. Work involved in supporting the Washington, D.C. level review can continue as an extension of the FCSA or as a part of follow-on work covered by a separate Design Agreement between the Corps and the local sponsor. Typically, further work continues as Preconstruction Engineering and Design under the General Investigation Program in accordance with a Design Agreement (and an updated PMP) with the local sponsor. The work (scope and costs) involved to complete the Washington, D.C. level of review for the Barrow study is not included as part of the scope or costs estimated by this PMP, but are assumed to be part of the work to be covered by a future Design Agreement. Following the "State and Agency" review and public review of the final EIS, the Chief of Engineer's Report will be finalized and signed and the report recommendation package (including the final FR/EIS) will be sent to the Assistant Secretary of Army for Civil Works, who will review the package, obtain the review comments from the Office of Management and Budget, and finally transmit the report and associated documents to Congress for their consideration of the report recommendations and a decision on whether Congress will authorize Federal participation in project construction. The transmittal to Congress concludes the Feasibility Study. PED will continue through any detailed design studies and end with the completion of the Plans & Specifications for the first construction contract., at which time the

General Investigation work is completed. Specific Congressional authorization and funding is then required for the project to proceed into the Construction Phase and execution of the Project Cooperation Agreement (PCA).

3.0 QUALITY CONTROL PLAN

3.1 Quality Control Plan.

The objective of the Quality Control Plan is to insure the successful completion of the study and delivery of a high-quality FR/EIS, within budget and on time. The Quality Control Plan consists of the following elements: PDT, ITR Team, Executive Committee, periodic team meetings, study milestones, baseline estimate of time and costs, technical requirements, and a change management plan. Each of these elements is briefly described below.

3.2. Project Delivery Team. The PDT will collect and analyze data, evaluate the alternatives, identify the NED plan and prepare the FR/EIS. The FR/EIS will be prepared to document study assumptions, data sources, analytical methods employed, evaluations, and identification of the NED Plan, Locally Preferred Plan (LPP), if applicable, and recommended plan. Also, deviations of the Recommended Plan from the NED plan will be documented and the basis for the selection of the Recommended Plan will be explained. Members of the PDT are as follows:

PROJECT DELIVERY TEAM		
Name	Position	Affiliation
Andrea Elconin	Project Manager	CEPOA-PM-C
Forest Brooks	Project Formulator	CEPOA-EN-CW-PF
Curt Thomas	Program Manager	North Slope Borough
Dee Ginter	Hydraulic Engineer	CEPOA-EN-CW-HH
Brian Harper	Economist	CEPOA-EN-CW-EC
Lizette Boyer	Biologist	CEPOA-EN-CW-ER
Diane Hanson	Archaeologist	CEPOA-EN-CW-ER
Richard Ragle	Chemist	CEPOA-EN-ES-M
Al Arruda	Cost Engineer	CEPOA-EN-CE
Steve Henslee	Geotechnical Engineer	CEPOA-EN-ES-SG
Jerry Zuspan	Surveys	CEPOA-EN-ES-SY
Karen Pontius	Realty Specialist	CEPOA-RE-PC
Paul Schneider	Construction & Operations	CEPOA-CO-NRO
Anne Nelson	Attorney	CEPOA-OC
Kerry Walker	Value Engineer	CEPOA-EN-TE

3.3 Independent Technical Review Team. The ITR Team is made up of people with experience in the major disciplines and representatives of the local sponsor. The team's purpose is to provide a technical review of all elements of the feasibility study and to insure that planning, analysis, and design conform to applicable standards, policy, and guidance of the Corps of Engineers. The team will review the AFB submittal package, the draft, and the final FR/EIS before it is submitted to Pacific Ocean Division for approval and processing to Corps higher authority. Members of the ITR Team are as follows:

INDEPENDENT TECHNICAL REVIEW TEAM	
Name	Discipline/Position
Forest Brooks	Team Leader
Carl Borash	Project Formulator
Richard Geiger	Economist
Guy McConnell	Biologist
Chris Floyd	Chemist
Frank Antolin	Cost Engineer
Chuck Wilson	Geotechnical Engineer
Linda Arrington	Realty Specialist
Michael Gilbert	Attorney

3.4. Executive Committee. The Executive Committee is made of senior representatives of the Corps of Engineers and the project sponsor. The committee’s purpose is to provide general oversight and to resolve issues that are brought to it by the PDT. In the event that there are issues that the committee is unable to resolve, those issues will be referred to the Alaska District Engineer together with the committee’s recommendations. The District Engineer will consider such recommendations in good faith, but has the discretion to accept, reject, or modify the committee’s recommendations. The project manager will keep the executive committee advised of issues requiring resolution. Members of the executive committee are as follows:

EXECUTIVE COMMITTEE		
Name	Position	Affiliation
Frank Brown	Project Manager	North Slope Borough
Dave Williams	Act. Chief, Civil Project Mgt. Branch	CEPOA-PM-C
Dennis Hardy	Chief, Civil Works Branch	CEPOA-EN-CW

3.5 Periodic Team Meetings. Meetings of the PDT will be conducted to coordinate the efforts of its members. Meetings are anticipated to be two hours in length or less. The meetings will be used to discuss the study process, issues, budget, and schedules. The project manager will be responsible for scheduling the meetings and providing minutes as needed.

3.6 Study Milestones. The study milestones consist of a listing of the significant elements or phases of the feasibility study and their projected completion dates. The project manager and plan formulator will monitor and report progress on the study to insure that the milestones are accomplished. In the event that any of the milestones cannot be accomplished, the sponsor representative, project manager, and plan formulator will discuss why milestones cannot be accomplished and work with the PDT to take appropriate actions. Study milestones are presented in Section 5. Detailed schedules for specific elements of the study will be developed by the responsible entities and will be used by the PDT for day-to-day management of the study but will not be part of this PMP.

3.7 Baseline Estimate of Time and Costs. The time and cost to complete each study task has been estimated and is included in this PMP as Appendix 1. These estimates are subject to review and revision during the course of the study in accordance with Paragraph 3.8, Change Management Plan.

3.8 Change Management Plan. The project manager is responsible for determining if and when amendments to this project management plan are required. PDT members are responsible for monitoring their work items and identifying when changes are necessary, documenting each change on the Potential Changes form, as shown in Appendix 2, and forwarding the form to the project manager for consideration by the sponsor prior to the start of any of the identified work. The project manager will keep track of the changes, and determine the appropriate time to amend this project management plan and the feasibility agreement. The project manager will perform the coordination activities required to amend the project management plan and feasibility agreement.

3.9 Technical Requirements. All correspondence, reports, and plans and specifications for this project will use English units. Studies that are conducted as part of the overall feasibility study are subject to the technical requirements contained in the following primary references and other appropriate Corps documents, such as Policy Guidance Letters. Most of the documents in the following list can be found on the Corps Headquarters web page at www.usace.army.mil/publications/.

- *Planning Guidance Notebook*, Engineering Regulation (ER) 1105-2-100, U.S. Army Corps of Engineers (Corps), 22 April 2000.
- *U.S. Army Corps of Engineers Business Process*, ER 5-1-11, Corps, 17 August 2001.
- *Digest of Water Resources Policies and Authorities*, Engineering Pamphlet (EP) 1165-2-1, Corps, 30 July 1999.
- *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*, U.S. Water Resources Council, 10 March 1983.
- *Procedures for Implementing NEPA*, ER 200-2-2, Corps, 4 March 1988.
- *Engineering and Design for Civil Works Projects*, ER 1110-2-1150, Corps, 31 August 1999.
- *Civil Works Cost Engineering*, ER 1110-2-1302, Corps, 31 March 1994.
- *Technical and Policy compliance Review*, Engineering Circular (EC) 1165-2-203, Corps.
- *Real Estate Handbook*, ER 405-1-12, Corps, 20 November 1985.
- *Hazardous, Toxic, and Radioactive Waste Guidance for Civil Works*, ER 1165-2-132, Corps, 26 June 1992.
- *Federal Participation in Shore Protection*, ER 1165-2-130, Corps, 15 June 1989.
- *Flood Damage Reduction Measures in Urban Areas*, ER 1165-2-21, Corps, 30 October 1980.
- *Planning and Design Guidance for Small Craft Harbors*, ASCE, 1994.

- *Shore Protection Manual, Corps.*
- *Coastal Project Monitoring, Engineering Manual (EM) 1110-2-1004, Corps, 30 November 1993.*
- *Environmental Engineering for Coastal Shore Protection, Corps, EM 1110-2-1204.*
- *Environmental Engineering for Small Boat Basins, EM 1110-2-1206, Corps, 31 Oct 1993.*
- *Storm Surge Analysis and Design Water Level Determination, EM 1110-2-1412, 15 April 1986.*
- *Water Levels and Wave Heights for Coastal Engineering Design, EM 1110-2-1414, Corps, 7 July 1989.*
- ER 1110-2-1457, Hydraulic Design of Small Boat Navigation Projects
- *Coastal Littoral Transport, EM 1110-2-1502, Corps, 20 August 1992.*
- *Tidal Hydraulics, EM 1110-2-1607, Corps, 15 March 1991.*
- *Layout and Design of Shallow Draft Waterways, EM-1110-2-1611, Corps, 31 December 1980.*
- *Ice Engineering, EM 1110-2-1612, Corps, 30 April 1999.*
- *Design of Coastal Revetments, Seawalls, and Bulkheads, EM 1110-2-1614, Corps, 30 June 1995.*
- *Hydraulic Design of Small Boat Harbors, EM 1110-2-1615, Corps, 25 September 1984.*
- *Sand Bypassing System Selection, EM 110-2-1616, corps, 31 January 1991.*
- *Coastal Groins and Nearshore Breakwaters, EM 1110-2-1617, Corps, 20 August 1992.*
- *Coastal Inlet Hydraulics and Sedimentation, EM 1110-2-1618, Corps, 28 April 1995.*
- *Design of Breakwaters and Jetties, EM 1110-2-2904, Corps, 8 August 1986.*
- *Design of Beach Fills, EM 1110-2-3301, Corps, 31 May 1995.*
- *Dredging and Dredged Material Disposal, EM 1110-2-5025, Corps, 25 March 1983.*
- *Beneficial Uses of Dredged Material, EM 1110-2-5026, Corps, 30 June 1987.*
- *Confined Disposal of Dredged Material, EM 1110-2-5027, Corps, 30 September 1987.*

4.0 WORK BREAKDOWN STRUCTURE

Work can begin on the feasibility study only when the funds are available from both Federal and non-Federal sources and a Feasibility Cost Sharing Agreement (FCSA) has been executed. Initiation of the three-stage study is by allocation of funds and notification by the project manager to the PDT of the study start. The overall planning study process is in accordance with the *Planning Guidance Notebook* ER 1105-2-100.

The study costs for work described in this section, based on January 2002 price levels, are summarized in the cost estimate in Appendix 1. The listing of costs in Appendix 1 is in the same order as the tasks in the following subsections. The following tasks define the scope of studies in terms of content and level of detail required for feasibility-level effort. These requirements apply equally to products developed by or for the Corps and to those developed by the sponsor.

4.1 Phase I—DEVELOPMENT/SCREENING OF PRELIMINARY ALTERNATIVES

4.1.1 Coordination. Coordination between the Corps of Engineers and the sponsor is vital to a successful project. The project manager will be the Corps' primary point of contact with the sponsor for project related discussions. Other project delivery team members will coordinate with the sponsor, state, and federal agencies as required by their technical tasks. Environmental resources staff will be the primary point of contact for the EIS with the agencies and the sponsor. The project manager is also responsible for coordinating the Corps' efforts with nearby tribes, and if required, for conducting government-to-government consultations.

4.1.2 Project Management

Project Management Work—Alaska District Project Management. The project manager will initiate the study by establishing the funding accounts and notifying the PDT members and their branch chiefs of the study start. PDT members will attend an initial team meeting to discuss the scope and objectives of the project and review this PMP. PDT members will discuss the alternatives, identify any changed conditions or new developments, review the study schedule, and make appropriate adjustments to the PMP. The project manager has overall responsibility for monitoring the scope, schedule, and budget throughout all phases of the feasibility study. The project manager will work closely with the plan formulator to determine the status of the budget and schedule, and to track all changes as discussed in Paragraph 3.8, Change Management Plan. The project manager will prepare schedule and budget updates monthly for the use of the PDT. The project manager is the primary point of contact for the sponsor, concerning all management activities. Travel to Barrow is estimated at 6 trips for a total of 16 days. The project manager has the lead responsibility for chairing PDT meetings, conferences, and workshops that address issues affecting the overall study scope, schedule, or budget. The project manager is responsible for ensuring agreements and plans requiring concurrence, approval, and signature by higher authority or the sponsor, are properly drafted, reviewed, submitted, and executed. The project manager is responsible for the proper conduct of "Government-to-Government Consultation" with Native governments. The project manager will ensure appropriate audit and proper closeout of the study.

Project Management Work—Sponsor In-Kind. The sponsor likewise uses a Sponsor's Project Manager to plan, coordinate, and monitor the cash contributions and in-kind services,

which the sponsor has agreed to undertake as part of the this study. The Sponsor's PM will be responsible for assembling the sponsor's portion of the study team, including sponsor in-house or contractor personnel. Periodically, the Sponsor's PM provides the Corps' PM updates on the progress of the in-kind work items in respect to the established scope, schedule, and budget. The Sponsors' PM will receive requests for funds from the Corps' PM, and processes them in accordance with the terms of the FCSA. The Sponsor's PM insures that proper legal review is undertaken to insure sponsor's activities proceed in accordance with applicable Federal, State, and local laws, policies, and procedures. The Sponsor's PM participates, as appropriate, in meetings, workshops, and conferences that address issues affecting the overall scope, schedule, or budget of the study. The Sponsor's PM is responsible for insuring proper audit and financial closeout of the in-kind work items and provides necessary documentation to the Corps' PM for proper study closeout.

4.1.3 Project Formulation.

Technical Coordination and Study Team Meetings. The Plan Formulator, is responsible for the detailed day-to-day oversight of all technical aspects of the study. This responsibility includes the resolution of schedule conflicts, delays, and any other types of problems that are technical in nature. Routine technical study team meetings are scheduled and conducted by the Plan Formulator. The PDT members will identify any issues affecting the scope or schedule of technical studies and will bring them to the attention of the Plan Formulator for resolution. The Plan Formulator also is responsible for monitoring and maintaining product quality and insuring that the final products meet all Corps' policy and technical requirements. Project expenditures are monitored by the Plan Formulator to the extent necessary to ensure that expenditures reflect completion of appropriate work products.

Alternative Development. The Plan Formulator will work with the PDT to develop and evaluate measures and alternatives for refinement and coordinate the preparation of preliminary cost estimates. Plan Formulator will travel with members of the PDT to Barrow (3 three-day trips for a total 9 days) and to the Coastal and Hydraulics Laboratory in Vicksburg, Mississippi to review progress by WES and refine potential project alternatives (2 five-day trips for a total 10 days).

Checkpoint 1 (Feasibility Scoping) Meeting. Checkpoint 1 Meeting will serve as the Phase I review meeting and be similar to a Feasibility Scoping Meeting. The Plan Formulator will have the lead in organizing and conducting the meeting. A public workshop to discuss study results to date and planned Phase II studies will be held in Barrow to provide public input prior to the Checkpoint Meeting. The Plan Formulator will develop the Checkpoint 1 Meeting Package which will include information on: the existing and without-project conditions at Barrow, the technical evaluation of wind, wave, and water levels related to the erosion and flooding problems, the results of the preliminary measure/alternative screening, and any significant real estate, design, environmental and cultural considerations.

Independent Technical Review. The Plan Formulator will be the leader of the ITR Team. The Checkpoint 1 Meeting Package will be provided to the ITR project formulation team member for review. The Plan Formulator will provide responses to ITR team comments and/or concerns and revise sections of the documents, as appropriate. Based on information provided by all evaluations, a consensus for Phase 2 planning will be formulated and presented at the Checkpoint 1 Meeting. Plan Formulator will document the Checkpoint 1 Meeting issues and resolutions with a memorandum for record.

4.1.4 Hydraulic Studies. The coastal and hydraulic design for the Barrow study requires a collaborative effort between the Alaska District Hydraulics and Hydrology Section (H&H), experts at the Coastal and Hydraulics Laboratory (CHL) in Vicksburg, Mississippi, and personnel at the University of Alaska Anchorage (UAA). In addition, the sponsor will perform some of the H&H field tasks. The following tasks form the necessary hydraulic studies:

Hydraulics Work—Coastal & Hydraulics Laboratory (Vicksburg, Mississippi)

Site Visit, Management, Review and Report. A visit to Barrow to observe conditions and talk with elders is required. Overall management of the CHL work items is required, including development of a schedule identifying the links between the work items. Written reports on each of the work items, including overall study results, will be prepared and provided to the Alaska District H&H.

Instrumentation. Instrumentation will be required to measure wave height, period, and direction and the current velocity and direction. The instruments will be deployed at Barrow for at least two field seasons. Results obtained will be used to verify the wave and current models.

Wind and Wave Hindcast. A 20-year wind and wave hindcast for the months of June through November will be developed. The hindcast will include extreme probability for wave height, period, and direction along with event duration statistics. A joint probability analysis of wave and storm surge is also required. The hindcast waves will be transformed to shore to support current and sediment transport modeling.

Storm Surge/ Current Modeling. An ADCIRC grid will need to be set up to reflect the model currents at Barrow. Since the average tidal range is 0.3 feet, tidal currents should be minimal. Currents appear to be primarily wind driven. The current modeling will probably have to be performed in conjunction with the wave model.

Sediment Transport Analysis. The sediment study will address sediment movement by wind/wave action in the nearshore zone (i.e., breaker zone, surf zone, and swash zone). The sediment study is essential because the key to project feasibility is finding a source of coarse sand or gravel and quantifying the volumes of material that would be needed for maintenance of the beach fill profiles. The maintenance requirement will be determined by the rate of sediment transport during both average yearly conditions and storm events.

Preliminary Beach Fill Profiles. Beach fill profiles that will provide protection and possibly lessen sediment transport movement will be generated for the coastline area southwest of Barrow to the landfill northeast of Barrow. This assumes that a sufficient supply of gravel or coarse sand will be found that can be used for beach nourishment.

Hydraulics Work--Alaska District H&H

Coordination on CHL Work Items. The Alaska District H&H staff is responsible for all coastal and hydraulic design, including all work done by CHL. Coordination will be maintained with the CHL personnel over a period of about three years. Alaska District H&H personnel will visit CHL periodically to work with modelers, review modeling results, check how actual results fit with earlier assumptions, and discuss maintenance scenarios and the project's economic analysis (16 five-day trips for a total 80 days). This work will include any necessary coordination before or during deployment of the required instrumentation at Barrow.

Review of Existing Information, Coordination, and Site Visits. H&H staff will review applicable previous studies and reports, including all applicable Corps regulations. Staff will visit the University of Alaska Fairbanks to review their files containing information generated by the Naval Arctic Research Laboratory (2 five-day trips for a total 10 days). H&H staff will participate in site visits to Barrow (15 trips for a total 33 days). H&H staff will maintain coordination with representatives of the North Slope Borough as the project alternatives are developed, refined, and evaluated.

Ice cover Analysis. An ice cover analysis for the Chukchi and the Bering Seas. Percent ice concentrations are needed on a weekly basis for the years 1972 through 2000 for the study area. Ice concentrations will be recorded for 10%, 50%, and 90% cover, with the data provided electronically in x,y,z format (x=longitude, y=latitude, z=% ice concentration. Ice concentrations during five storm events before 1972 are required. A written report will be prepared documenting the earliest, the latest, and average occurrence of ice in the Barrow area for 1972 to 2000, with sample ice maps displaying data. The report will address the apparent growth of ice in the area of Barrow (i.e., old ice carried over from the Russian coast, versus new ice).

Beach Loss. H&H staff will analyze the rate of beach loss, develop past shoreline profiles over time, and overlay the information on current aerial photographs.

Beach Profiles. H&H staff will prepare anticipated beach profiles based on the CHL work.

Maintenance Options. H&H staff will prepare beach maintenance options based on the results of the CHL sediment transport work and the Geotechnical investigations.

Review of Navigation Options. Based on the selected borrow area(s) identified for the initial project construction and necessary project maintenance, review and identify any resulting improvements to navigation that would occur incidentally. Review and determine if any additional work would be useful in further improving navigation for Barrow.

Flood Analysis. H&H staff will evaluate the occurrence of flooding in the study area.

Checkpoint 1 Meeting Package: H&H staff will prepare and put together the H&H portion of the Checkpoint 1 Meeting Package that will be provided to the sponsor, Division, and Headquarters prior to the meeting. The existing H&H conditions will be described along with the probable without-project conditions and an H&H evaluation and comparison of measures and alternatives developed during Phase 1.

Independent Technical Review. The Checkpoint 1 Meeting Package will be provided to the ITR H&H team member for review. H&H staff will provide responses to ITR team comments and/or concerns and revise sections of the documents, as appropriate.

Hydraulics Work---Sponsor In-kind

Survey – Beach Transects. Surveys along the beach will need to be conducted to determine elevations at points along the beach and in the intertidal zone. Also, after a storm, beach surveys may be needed to determine the amount of sediment transport. The Corps Hydraulics and Hydrology team member will work with the sponsor to specify the requirements for contracts for the survey work.

Instrumentation Deployment and Retrieval. The local sponsor will provide captain and crew for, and use of a dredge tender twice a year for two years (4 times total) for deployment and retrieval of instrumentation.

Instrumentation Indoor Staging Area . The local sponsor will provide an area for staging materials and equipment for the instrumentation effort. The staging area should be a garage type area for the instrumentation crew to work and ready instruments for deployment. The staging area will be needed for 1 month twice a year (1 month for deployment and 1 month for retrieval) for two years.

Forklift and Operator Load/Unload Tender. The local sponsor will provide a forklift and operator at the beginning and end of two sampling seasons to help load and unload the instrumentation mounts onto and off of the dredge tender. Forklift will be required four times: Two loading events and two unloading events.

Indoor Storage Area. The local sponsor will provide indoor storage for 1 season. The storage facility should be able to accommodate approximately 5 pallet loads of equipment. One closet sized area of warm storage will also be necessary.

Permits. The local sponsor will provide all necessary local permits for working at the site and deploying the instrumentation.

Monitoring Storms with Video Camera During storm events at Barrow, the local sponsor will record the storm with a video camera. The video recording of the storm will provide video footage of waves at the same location for at least 5 minutes during the storm. Footage will cover bluffs in front of the city, the beach in front of the landfill and the beach fronting the NARL camp area (if possible). For purposes of estimating, 6 events are assumed.

4.1.5 Economics. The following tasks are associated with this work:

Economics Work—Alaska District Economics

Coordination, Meetings, Review of Existing Information, and Site Visits. Economics staff will participate in the periodic project delivery team meetings and maintain close coordination with H&H staff and other team members throughout the study and with the sponsor. Economics staff will conduct research locally in Anchorage, in Barrow (12 two-day trips and 2 five-day trips for a total 34 days), and at the University of Alaska in Fairbanks (2 five-day trips for a total 10 days) to collect possible existing data relevant to the economic analysis on Barrow. Project delivery team meetings are expected to be conducted in both Anchorage and Barrow.

Contract Development and Administration: Economics staff will prepare a scope for professional services to provide a technical expert to provide technical guidance throughout the study as needed. The Alaska District negotiator will negotiate and award the contract. After the contract is awarded, the Economics staff will monitor the contract, review work products, and attend meetings as needed. Economics staff will also develop scopes of work for work to be performed by the local sponsor as in-kind services, including determining the value of structures and contents, first floor elevations, and utilidor data. In coordination with Real Estate, the sponsor will collect data on value of structures and contents for residential, commercial, public and private properties in areas to be determined by the hydraulics and hydrology analysis. Also, the sponsor will obtain elevation data for the first floor of all structures and utilidor data for

Economics staff to develop damage estimates during different storm events for structures in areas determined by the hydraulics and hydrology analysis.

Socioeconomic Base Study: A socioeconomic base study will be prepared to support the study method, assumptions and conclusions. Historical and current information on employment, income, government, services, and economic activities relevant to Barrow will be identified. Information will be collected from local and State officials and from the Alaska Department of Community and Regional Affairs Community Database.

Determine Existing Conditions: The existing condition will be described. An explanation of the current condition and a projection of the parameters most likely to change in the future will be prepared.

Develop Utilidor Information: Economics staff will need to collect detailed information about the utilidor including cost data, existing plan information, and future utilidor related information, such as sponsor plans for operation and maintenance, repair and rehabilitation.

Evaluate Alternatives w/ H&H at CHL: Economics staff with travel to the Coastal Hydraulics Lab in Vicksburg, MS to work with Hydraulics and Hydrology team and Plan Formulator to analyze economic impacts associated with the suggested alternatives.

- (a) Evaluation of Alternatives for Storm Damage Reduction: Evaluate various alternatives for economic efficiency. Value of damages prevented, and other potential savings will be compared to project cost to determine the NED plan.
- (b) Evaluation of Alternatives for Beach Erosion: Evaluate various alternatives for economic efficiency. Value of damages prevented, and other potential savings will be compared to project cost to determine the NED plan.

Determine Without Project Conditions: Conduct research to determine costs associated with each of the following:

- (a) Costs of a Breach to the Sewage Lagoon: The impacts to the environment and subsistence fishing resulting from a breach to the sewage lagoon as a result of erosion, storm damage, and flooding will be estimated. Without-project costs will be identified. The Economics staff, through interviews, will obtain information from local community officials.
- (b) Erosion to Other Areas: The impacts of erosion to other areas will be estimated. Costs will be measured by the cost of alternatives required for reparation of affected areas. With- and without-project estimates of damage reduction and cost savings will be used to determine benefits. The Econ staff, through interviews, will obtain information from local community officials.
- (c) Damages to the Utilidor: The damages to the utilidor as a result of flooding and storm damage will be estimated. With- and without-project estimates of damage reduction and cost savings will be used to determine benefits. The Economics staff, through interviews, will obtain information from local community officials.
- (d) Destruction of Homes and Businesses: The damages to homes and businesses as a result of flooding and storm damage will be estimated. With- and without-project estimates of damage reduction and cost savings will be used to determine benefits.

The Economics staff, through interviews, will obtain information from local community members, primarily North Slope Borough staff.

- (e) Flood Damages to Public and Private Facilities: The damages to public and private facilities as a result of flooding and storm damage will be estimated. With- and without-project estimates of damage reduction and cost savings will be used to determine benefits. The Economics staff, through interviews, will obtain information from local community members.
- (f) Damages to the Road: The damages to the road as a result of erosion, storm damages and flooding will be estimated. Without-project costs will be identified. The Economics staff, through interviews, will obtain information from local community officials.

Preliminary Alternative Annual Cost Computation: Annual costs will also be calculated for each alternative, including construction costs, interest during construction, real estate, operation and maintenance, etc. Costs will be converted to annual figures using the appropriate discount rate.

Preliminary Benefit Analysis: An analysis of potential economic benefits to be realized with the plan under consideration will be developed.

- (a) Beach Nourishment Benefits. Each category of benefits resulting from beach nourishment will be evaluated and presented to support project justification.
- (b) Storm Damage Reduction. Each category of benefits resulting from storm damage reduction will be evaluated and presented to support project justification.
- (c) Flood Damage Reduction Benefits. Each category of benefits resulting from flood damage reduction and beach erosion prevention will be evaluated and presented to support project justification.
- (d) Other Benefits. Econ staff will estimate potential benefits based on cost of damages to sewage lagoon, landfill, utilidor, and other facilities in Barrow.
- (e) Total Project Benefits: Econ staff will prepare and develop data to determine total project benefits.

Specific benefit categories to be considered include:

1. Elimination of erosion to Other Areas: With-project estimates of damage reduction and cost savings will be used to determine benefits. The Econ staff, through interviews, will obtain information from local community officials.
2. Elimination of Damages to the Utilidor: With-project estimates of damage reduction and cost savings will be used to determine benefits. The Econ staff, through interviews, will obtain information from local community officials.
3. Elimination of the Destruction of Homes and Businesses: With-project estimates of damage reduction and cost savings will be used to determine benefits. The Economics staff, through interviews, will obtain information from local community members, primarily North Slope Borough staff.

4. Reduction of Damages to Public and Private Facilities: With-project estimates of damage reduction and cost savings will be used to determine benefits. The Econ staff, through interviews, will obtain information from local community members.
5. Elimination of Damages to the Road: With-project estimates of damage reduction and cost savings will be used to determine benefits. The Economics staff, through interviews, will obtain information from local community members.

Checkpoint 1 Meeting Package: Economics staff will prepare and put together the economics portion of the Checkpoint 1 Meeting Package that will be provided to the sponsor, Division, and Headquarters prior to the meeting. The existing economic conditions will be described along with the probable without-project conditions and an economic evaluation and comparison of measures and alternatives developed during Phase 1.

Independent Technical Review. The Checkpoint 1 Meeting Package will be provided to the ITR economic team member for review. Economics staff will provide responses to ITR team comments and/or concerns and revise sections of the documents, as appropriate.

Economic Work—Sponsor In-kind Services

Survey Structures and Contents. The local sponsor will conduct a survey of all existing structures identified as damageable by storm action, storm surge, flooding, or erosion and provide a listing of pertinent information on each structure as specified by district Economics personnel.

Survey First Floor Elevations. The local sponsor will provide a survey of first floor elevations to the nearest tenth of foot for structures in an area to be determined by the PDT's economist and hydraulics and hydrology team members. The data will be provided on maps.

Survey Utilidor. The utilidor needs to be located horizontally and vertically on a map. Segments with low spots need to be identified. The sponsor needs to describe what is in the utilidor, what events will trigger the utilidor to flood, and what happens when the utilidor floods. This work has already been undertaken by the NSB, but is data needed for the study.

GIS Development. Products and data which would be useful to the Corps economists, including maps of building outlines, roads, and utilities; beach surveys and transects; topographic layers; and maps showing damages to structures at different storm frequencies, if possible, should be added into the sponsor's GIS system.

4.1.6 Environmental and Cultural Studies. The following tasks are associated with this work:

Environmental and Cultural Work—Alaska District Environmental

The environmental resources (ER) team member will perform initial scoping and issue identification, and begin work with other agencies in accordance with State and Federal laws to assess the quality of the environment. That work will begin with a general letter that explains the plans and potential issues and solicits comments. ER will coordinate with the archeological team member and the U.S. Fish and Wildlife Service (USFWS). The Fish and Wildlife

Coordination Act of 1958 requires equal treatment of wildlife conservation with other project features for water resource programs. That act authorizes Federal agencies to transfer project funds to the USFWS, which is required by the act to perform certain investigations. ER will make arrangements for initial investigations, as follows:

- Discuss scope of work for study with USFWS
- Prepare scope and transmit funds to USFWS for investigative work and reports (Planning Aid Letter and draft and final Coordination Act Report)
- Schedule field visit with USFWS
- Contact other agencies and individuals knowledgeable about the site location under consideration to get more data
- Assemble known information on environmental and cultural resources
- Assess potential sites for environmental problems associated with plan development
- Identify needed field studies to provide for coverage of information gaps. There are no specific field studies planned at this time. Funds listed in the cost estimate for Phase 2 would provide only a minimal coverage of critical resources. The need for specific field studies will be resolved before or at the Feasibility Scoping Meeting and appropriate adjustments made in the PMP.
- Perform coordination under Section 106 of the National Historic Preservation Act, including notification of a Federal Undertaking.
- Identify historic properties (including archaeological sites) in the project area; this includes the assumed borrow source of Elson Lagoon.
- Assess effects on historic properties
- Prepare a Memorandum of Agreement if the work affects a historic site(s).
- Prepare environmental and cultural resources information for inclusion in the Checkpoint 1 Meeting Package. The Checkpoint 1 Meeting Package will be provided to the ITR environmental/cultural team member for review. Environmental staff will provide responses to ITR team comments and/or concerns and revise sections of the documents, as appropriate.
- Provide an archeological monitor during field investigations, as appropriate.

4.1.7 Real Estate.

Real Estate Work—Alaska District Real Estate

Real estate (RE) PDT member will conduct site visits (2 five-day trips for a total 10 days), obtain and review preliminary real estate maps from the sponsor, and determine the ownership of parcels. Real estate will coordinate with team members on potential site layouts and coordinate with the sponsor to identify project real estate boundaries and necessary easements. Real estate will obtain right-of-entry, as required, to cover the field activities of other project delivery team members (geotechnical, archeology, etc.). Real Estate will provide appropriate

input to the Checkpoint 1 Review Package. The Checkpoint 1 Meeting Package will be provided to the ITR RE team member for review. RE staff will provide responses to ITR team comments and/or concerns and revise sections of the documents, as appropriate.

Real Estate Work—Sponsor In-kind

Real Estate Records: The local sponsor will provide available real estate records and assessors records for property values as needed by real estate. The sponsor will research, prepare, and develop GIS-based real estate mapping for the project site.

Survey Land Corners: Some property corners may require surveying to determine the physical location of lots. Real Estate will identify for the sponsor to physically locate a listing of the needed land corners.

4.1.8 Geotechnical. The primary task is to identify a sufficient supply of gravel and/or coarse sand to make the beach nourishment alternative practical. The following tasks are associated with this work.

Literature Search. The geotechnical team member (Soils & Geology Section) will conduct extensive literature search, by examining available information from previous Corps of Engineers studies, U.S. Geological Survey reports, studies for nearby facilities, if any, information at UAF, past investigators (such as Bob Lewellyn in Palmer). Areas underlain by favorable bedrock associated with gravel, including favorable bedrock areas located offshore should be identified. Existing drill logs should be examined along with published geologic/airborne magnetic mapping. A memorandum for record will be prepared detailing the results of the literature search.

Potential Source Identification. SG staff will perform aerial geology and landform study to identify potential sources. The mined out portion of the existing Barrow city gravel pit will be mapped to determine the occurrence's original geometry and axis. A geophysical signature of the remaining gravel deposit would be obtained using a proton precession magnetometer. Orientation signatures of other observable features (such as bay mouth bars) would be obtained along with reported occurrences of poor gravel (such as the sandstone derived gravel). The gravel would be examined with a view of determining its provenance(matching bedrock) area for rock types represented in the gravel.

Initial Field Exploration. SG staff will identify drilling targets by conducting magnetometer surveys in areas underlain by or adjacent to favorable bedrock types. The surveys can be controlled by GPS or topofile string measurement. In addition to the magnetometer carried in the field, a second stationary magnetometer will detect the effects of solar magnetic activity with a view to filtering solar data from field station readings. The spacing of the traverse lines will be 2/3 of the minimum width displayed by the geometry of the known occurrence. Discovery drilling will be performed on targets with appropriate attributes (magnetic signature, axis, and size) similar to the known deposit. SG staff will sample existing beach material at 6 locations. The identified potential source areas will be drilled and sampled. Laboratory testing of the materials will be performed. SG staff will prepare a report of findings with maps, boring logs, photos, laboratory results, and estimates of material quantities in each potential source area.

Detailed Geotechnical Investigations. SG will conduct detailed geotechnical investigations and analyses in support of the project alternatives. SG will arrange for the geophysical investigation

at the selected site to more accurately describe the subsurface conditions. Development and production drilling (25 holes) will be performed to identify a mining plan, to confirm the economics of the gravel deposit, to investigate road access and foundations for fuel storage facilities. Phase I detailed geotechnical tasks include the following:

- Development and production drilling.
- Preparation of a geotechnical report detailing the results of the above investigation in a format suitable for use as a Feasibility Report appendix.
- Participation in various team meetings and reviews, including the Checkpoint 1 Meeting.
- Preparation of geotechnical information for inclusion in the Checkpoint 1 Meeting Package. The Checkpoint 1 Meeting Package will be provided to the ITR geotechnical team member for review. SG staff will provide responses to ITR team comments and/or concerns and revise sections of the documents, as appropriate.

Geotechnical Work – Sponsor In-Kind

Local equipment such as four-wheelers, Nodwells with tracks, trucks and trailers are expected to be needed to support the geotechnical field investigations. Once the literature search is complete and the work plan prepared, equipment will be identified and agreements made for its use.

4.1.9 Surveys. Surveying and mapping are required along the beach in Barrow, identifying the existing beach profiles and contours. The survey and mapping will be conducted by the Sponsor. This team member will be available to provide technical assistance and reviews as necessary during the survey work, and participate in various team meetings and reviews.

4.1.10 Cost Engineering. The cost engineering (CE) team member will estimate preliminary cost for each alternative. Preliminary estimates will be in accordance with ER 1110-2-1302, EI 01D010, and ER 1110-1-1300 for comparison of alternative plans. Tasks include review of information for completeness and identification of data gaps, determine construction methods for each alternative, estimate construction costs for each feature of the alternatives, and provide preliminary estimated costs for 3 alternatives to PF for ultimate use in the Checkpoint 1 Meeting Package. CE member will attend periodic project delivery team meetings and the checkpoint 1 meeting. The Checkpoint 1 Meeting Package will be provided to the ITR cost engineering team member for review. Cost Engineering staff will provide responses to ITR team comments and/or concerns and revise sections of the documents, as appropriate.

4.1.11 Contracting. Throughout the study a contract specialist (CS) is used whenever consultants are hired by technical elements. The CS prepares and processes the appropriate documents to obtain the necessary work products from consultants as identified in this PMP. Upon completion of the contract, the CS closes out each contracting action. Contracting is funded directly for their work on a specific contract action by the District organizational unit requesting the contract action.

4.1.12 Office of Counsel. District counsel reviews all legal documents, agreements and reports for their legal sufficiency. During the study, counsel provides clarification and direction, when necessary, regarding application of Federal laws, policies, and procedures and recommendations regarding State and local laws. At the appropriate time, counsel will review and certify documents as being legally sufficient. For the purposes of the PMP cost estimate, work

performed by the Office of Counsel is not direct charged to projects, but is accounted for as part of the district overhead burden that is included in the rates used by all direct charge personnel.

4.2 Phase 2—DETAILED ALTERNATIVE ANALYSIS & OPTIMIZATION

The PDT will have the concurrence of the sponsor to proceed into Phase 2. PDT members will continue to develop information for a more detailed analysis of the alternatives.

4.2.1 Project Management—Corps and Sponsor. Project management by both the Alaska district and the local sponsor will continue in accordance with Paragraph 4.1.2. Coordination with the sponsor, and other agencies will continue as described in Paragraph 4.1.1.

4.2.2 Project Formulation. The following tasks are associated with the plan formulation:

Project Formulation Work—Alaska District Project Formulation

Technical Coordination. The Plan Formulator will continue the oversight of technical aspects of the study in accordance with Paragraph 4.1.3.

Assist in Optimization and Risk and Uncertainty. The Plan Formulator will work with other members of the PDT to develop an effective project optimization analysis to determine the NED plan and a sufficient risk and uncertainty analysis to satisfy the review process. PF will travel to Barrow to coordinate with sponsor on alternative options (4 two-day trips for a total 8 days).

Preparation and ITR of Preliminary Draft Documents. Ultimately, the Plan Formulator generates the Plan Formulation Appendix and the main FR, identifies the optimum scale of the project features, performs the cost apportionment analysis, and assembles the final FR/EIS along with all other feasibility level submittals required by headquarters, including responses to comments, questions, and concerns. Near the end of Phase 2 the preliminary drafts of the H&H and Economic Appendices, EIS, and cost estimates will be prepared by the respective technical elements. PF will prepare the preliminary draft plan formulation section of the main report and combine it with the other preliminary drafts to form the Alternative Formulation Briefing package. The package will undergo a team and Independent Technical Review prior to being distributed to Division, Headquarters, the local sponsor, and other interests participating in the Alternative Formulation Briefing. The District review should be complete with all known issues resolved prior to submitting the Alternative Formulation Briefing package. The plan formulator will submit the Alternative Formulation Briefing package to Corps Headquarters for review 30 days prior to the Alternative Formulation Briefing.

Checkpoint 2 Meeting (Alternative Formulation Briefing). The plan formulator will have the lead for the Alternative Formulation Briefing and will present the study findings and the NED Plan with the support of the PDT. The plan formulator and other appropriate team members will prepare responses to the Headquarters' comments on policy issues, which will be discussed at the Alternative Formulation Briefing. A draft Project Guidance Memorandum will be developed during the Alternative Formulation Briefing. Team members will be prepared to discuss assumptions and methodology of study work. Headquarters' staff will be responsible for finalizing the Project Guidance Memorandum.

Project Formulation Work—Sponsor In-Kind Services

Public Involvement. The sponsor PM is responsible for developing a formal Public Involvement Plan (PIP) identifying the needed public involvement activities during Phase 2 and 3 of the study. The PIP defines the roles and responsibilities of the Corps, the sponsor, cooperating agencies, and public participants. The means and methods to provide information to the public, receive their questions and concerns, and close the feedback loop are identified. These means

may include publishing periodic newsletters or brochures, conducting public meetings, workshops, and/or open houses, using radio, television, and/or internet facilities.

4.2.3 Hydraulic Analyses and Design. The following tasks are included in the hydraulic analyses and design:

Project Optimization. H&H staff will work with Economics staff to develop a project optimization analysis to determine the NED Plan.

Risk and Uncertainty Analysis. H&H staff will work with Economics staff to prepare a risk and uncertainty analysis, concentrating on a sensitivity analysis of the critical factors (probably maintenance assumptions) that affect the project's B/C ratio.

Preliminary Draft Report Preparation. H&H staff will take the report prepared by CHL combined with the results of their own project studies and prepare a draft H&H feasibility report section and H&H Appendix, including all appropriate figures and drawings. H&H staff will participate in the preparation of the review package developed for the AFB, the AFB itself, and the preparation of the PGM. H&H staff will revise its portion of the project documents for public review to reflect instructions contained in the Project Guidance Memorandum.

Independent Technical Review. The Checkpoint 2 Meeting Package will be provided to the ITR H&H team member for review. H&H staff will provide responses to ITR team comments and/or concerns and revise sections of the documents, as appropriate.

4.2.4 Economic Studies. The following tasks are associated with the economics study:

Storm Damage and Flood Damage Component

Alternative Evaluation: Econ staff will travel to CHL in Vicksburg, Mississippi to work with H&H staff and other project delivery team members to analyze economic impacts associated with developed alternatives.

- (a) With Project Condition. Describe the economic impacts of the alternative plans proposed by the plan formulator to solve the problems at Barrow. Determine the economic effects of implementing the best alternative recommended by the plan formulator.
- (b) Evaluation of Alternatives for Beach Erosion: Evaluate various alternatives for economic efficiency. Value of damages prevented, and other potential savings will be compared to project cost to determine the NED plan.
- (c) Evaluation of Alternatives for Storm Damage Reduction: Evaluate various alternatives for economic efficiency. Value of damages prevented, and other potential savings will be compared to project cost to determine the NED plan.
- (d) Flood Control: Evaluate various alternatives for economic efficiency. Value of damages prevented, and other potential savings will be compared to project cost to determine the NED plan.

Benefit Analysis: An analysis of potential economic benefits to be realized with the plan under consideration will be developed.

- (a) Beach Nourishment Benefits. Each category of benefits resulting from beach nourishment will be evaluated and presented to support project justification.
- (b) Storm Damage Reduction Benefits. Each category of benefits resulting from storm damage reduction will be evaluated and presented to support project justification.
- (c) Flood Damage Reduction Benefits. Each category of benefits resulting from flood damage reduction will be evaluated and presented to support project justification.
- (e) Other Benefits. Econ staff will estimate potential benefits based on cost of damages to sewage lagoon, utilidor, and other facilities in Barrow.
- (f) Total Project Benefits: Econ staff will prepare and develop data to determine total project benefits.

Specific benefit categories that will be considered include the following:

1. Elimination of erosion to Other Areas: With-project estimates of damage reduction and cost savings will be used to determine benefits. The Economics staff, through interviews, will obtain information from local community officials.
2. Elimination of Damages to the Utilidor: With-project estimates of damage reduction and cost savings will be used to determine benefits. The Economics staff, through interviews, will obtain information from local community officials.
3. Elimination of the Destruction of Homes and Businesses: With-project estimates of damage reduction and cost savings will be used to determine benefits. The Economics staff, through interviews, will obtain information from local community members, primarily North Slope Borough staff.
4. Reduction of Damages to Public and Private Facilities: With-project estimates of damage reduction and cost savings will be used to determine benefits. The Economics staff, through interviews, will obtain information from local community members.
5. Elimination of Damages to the Road: With-project estimates of damage reduction and cost savings will be used to determine benefits. The Economics staff, through interviews, will obtain information from local community members.

Description of the with project condition: Describe the economic impacts of the alternative plans proposed by the plan formulator to solve the problems at Barrow. Determine the economic effects of implementing the best alternative recommended by the plan formulator. The Economics staff will perform this task.

Regional Impacts: Economics staff will evaluate and describe the effects of flooding and storm damages on the town of Barrow to determine whether the project creates the opportunity for diversification by creating another industry base for the community, increased revenue to the community, reduced cost of living, positive effect on State or local revenues. The social acceptance and integration of the project with cultural patterns of economic activity and livelihood of Barrow will be assessed. Whether the project is an aid to industries involved in providing value-added processing will be determined.

Project Optimization. Econ staff will work with H&H staff to develop a project optimization analysis to determine the NED Plan.

- (a) Beach Nourishment. The selected plan will be optimized comparing initial costs against annual operations and maintenance costs and different levels of nourishment.
- (b) Storm Damage Reduction. The selected plan will be optimized at different levels of protection comparing for example a 50-year storm with a 75-year storm.
- (c) Flood Damage Reduction. The selected plan will be optimized at different levels of protection comparing for example 1-, 5-, 10-, 50-, 75-, 100- and 500-year floods.
- (d) Navigation (incidental). The selected plan will be optimized at different levels comparing for example initial costs with annual operations and maintenance costs.

Risk and Uncertainty Analysis. Economics staff will work with H&H staff to prepare a risk and uncertainty analysis, concentrating on a sensitivity analysis of the critical factors (probably maintenance assumptions) that affect the project's B/C ratio.

Navigation Component

Determine Existing Conditions and Without Project Conditions: The existing condition and most likely condition to exist without a project will be described. An explanation of the current condition and a projection of the most likely future condition without the project will be accomplished. This information will be used as the analytical framework within which the estimate of navigation savings will be made. Interviews with local officials, the harbormaster, local businesses, fishermen, charter vessel operators, and cruise ship operators will provide the information to accomplish this task.

Evaluate Existing and Without Project Conditions: The existing condition and most likely condition to exist without a project will be evaluated. The following tasks will be conducted to complete the evaluation.

- a) Recreation Analysis. Econ staff will coordinate with local experts on recreation benefits of various scenarios and analyze recreational features as separable increments to determine benefits and costs.
- b) Subsistence Analysis: Local residents' historical subsistence harvest patterns and eligibility will be evaluated. Any affects on the ability to harvest subsistence foods due to breach of the sewage lagoon will be determined. Using the Department of Fish and Game, Division of Subsistence data, Fish and Wildlife data, and interviews with local residents, the number of residents using subsistence fish resources will be estimated. How the community and neighboring communities participate in the subsistence fishery will be described. The benefits related to continued fishing, hunting and gathering activities that provide residents the opportunity to maintain or possibly increase the percentage of the subsistence resource will be described and an estimate prepared.
- c) Operating and Opportunity Cost Savings: The barge delivery delays experienced at Barrow each year under current conditions will be determined. Local records will be used as the primary source of information. The evaluation will include an analysis of barge deliveries and lightering operations at Barrow. This information will be obtained

from interviews with local businessmen and barge operators. The savings in barge operating expenses associated with improvements will be estimated.

- d) Marine Assessment: A study of the management and development of the fishery resources in the study area will be developed. The study will include institutional considerations, an examination of the permits system, description of various fisheries, harvesting methods, historical landings and value. In addition, the study will examine historical information on catch by species, an analysis of the existing condition, resource management and an evaluation of the future conditions of the marine resource.
- e) Moorage Demand Analysis: An analysis will be developed to identify the demand for commercial and recreational moorage. The analysis will include current information on existing moorage and projected demand. Projected demand will be determined by identifying alternate moorage facilities for transient users and boat owning residents not currently moored in Barrow. A sample of these individuals will be interviewed to estimate demand of the facility.

Determine With Project Conditions: The alternative plans proposed to solve the problems at Barrow will be described and the effects of implementing the best alternative will be determined.

Alternative Evaluation: Evaluate various alternatives for economic efficiency.

- a) Navigation Alternative Evaluation: Various alternatives will be evaluated and value of damages prevented, and other potential savings will be compared to project cost to determine the NED plan.
- b) Navigation Project Optimization: The selected plan will be optimized at different levels comparing for example initial costs with annual operations and maintenance costs.
- c) Navigation Benefit Analysis: Economics staff will analyze the storm/flood reduction alternatives to determine whether there appear to be incidental benefits to navigation and/or opportunities for formal navigation measures. If so, an analysis of appropriate harbor benefits will be prepared.
- d) Navigation Sensitivity Analysis: Sensitivity of variables in the cost benefit analysis will be discussed.

Report Preparation Component

Preliminary Draft Report Preparation. Economics staff will prepare a draft Economics feasibility report section and economics Appendix, including all appropriate figures and drawings. Econ staff will participate in the preparation of the review package developed for the AFB, the AFB itself, and the preparation of the AFB Project Guidance Memorandum

Independent Technical Review. The preliminary draft FR/EIS will be provided to the ITR team for their review. Econ staff will provide responses to ITR team comments and/or concerns and participate in the resolution of any issues.

4.2.5 Environmental and Cultural Studies. Environmental assessment of all project alternatives is part of the planning process. Detailed studies include issue identification;

coordination with the USFWS and other resource agencies and interested public; and field investigations in association with the USFWS to identify significant resources and evaluate and mitigate impacts. Field investigation involves a cultural resources survey. Environmental Resources staff will evaluate the results of any sampling, testing, and characterization of dredged material and potential disposal sites under Section 404(b)(1) of the Clean Water Act. The Environmental Impact Statement report preparation will incorporate technical reviews. USFWS will prepare the draft Coordination Act Report. Environmental Resources will evaluate affects to endangered species and prepare a biological assessment. No noise field studies are planned.

4.2.6 Real Estate. Real estate will conduct a site visit, determine boundaries and ownership of surface and subsurface lands, necessary estates and interests for the project, and prepare the Gross Appraisal. Real estate will develop maps showing the lands required for the project and identify lands needed for temporary versus permanent use.

Real estate will coordinate with the sponsor, explain the real estate responsibilities for the project, and complete the sponsor's Real Estate Capability Evaluation. Part of this coordination will be to provide the sponsor with the Real Estate Partner Packet and explain the navigational servitude, Public Law 91-646, and the acquisition, land certification, and record keeping processes for crediting purposes. Coordination with the sponsor will be required to obtain their estimated costs for appraisal, acquisition, relocations, and other related actions for preparation of the real estate cost estimate.

4.2.9 Chemical Investigations. It is anticipated that chemical investigations of the potential borrow source will be conducted as part of the study. Materials staff will conduct sampling, testing, and characterization of dredging materials to determine suitability for beneficial use as borrow material and/or potential disposal sites under Section 404(b)(1) of the Clean Water Act. Materials staff will attend periodic team meetings. The preliminary draft FR/EIS will be provided to the ITR team for their review. Materials staff will provide responses to ITR team comments and/or concerns and participate in the resolution of any issues.

4.2.8 Geotechnical Studies. SG will refine the geotechnical analyses developed during Phase 1 to reflect the changes in the alternatives identified in Phase 2. The geotechnical report detailing the results of the above investigation will be revised in a format suitable for use as a Feasibility Report appendix. The preliminary draft FR/EIS will be provided to the ITR team for their review. SG staff will provide responses to ITR team comments and/or concerns and participate in the resolution of any issues.

4.2.9 Cost Engineering. No more than three cost estimates will be prepared at an appropriate level of detail to support evaluation of the alternatives. The estimates will be used in selecting the NED plan and must be prepared to at least the sub-feature level. It is assumed that three estimates may be prepared for alternatives. Cost engineering staff will perform this task. The preliminary draft FR/EIS will be provided to the ITR team for their review. Cost Engineering staff will provide responses to ITR team comments and/or concerns and participate in the resolution of any issues.

4.2.10 Constructability. The Northern Area Construction office will review and provide comments on the designs developed in this phase for constructability.

4.3 Phase 3—REPORT REVIEW PROCESS

The team will complete the report and study process during this stage. The report will go through a draft with several reviews before becoming a final document. The final report will go through the Chief of Engineers, Office of Management and Budget, and Secretary of the Army's Office before going to Congress.

4.3.1 Project Management—Corps and Sponsor In-Kind. Project management by both the Alaska District and the local sponsor will continue in accordance with Paragraph 4.1.2. Coordination with the sponsor, and other agencies will continue as described in Paragraph 4.1.1. The Project Manager will handle the allocation of resources to complete the study and will monitor the remaining funds and schedule. Coordination with public officials will occur to help clarify study conclusions, financial obligations, schedules, and understanding of study conclusions, recommendations, authorization, and funding. A final public meeting will be held to discussing the findings and recommendations of the draft report. PM and PF will coordinate the schedule of the meeting with the sponsor. A revised PMP will be developed to cover scope, schedule, and estimated cost for the PED and/or construction phases of the project and a draft Design Agreement prepared.

4.3.2 Project Formulation.

Technical Coordination. The Plan Formulator will continue the oversight of technical aspects of the study in accordance with Paragraph 4.1.3. The PF will travel to Barrow to coordinate final project configuration with local sponsor (2 two-day trips for a total 4 days).

Report Preparation and Editing. PF will have the overall lead in finalizing the draft report based upon comments generated from the District review, the AFB, and resulting PGM. Team members will complete their appendices and other written input for use in the report. The main report will be finalized near the end of Phase 3 and serve as a complete decision making document including the study findings and recommendations. The main report will be direct, concise, without unnecessary repetition, and written in an easy-to-understand style using ample graphics, illustrations, and photographs. This document will consist of a preliminary draft main report, EIS, USFWS Coordination Act Report, Cultural Resource Assessment, exhibits, and appendices.

Independent Technical Review & Draft, Draft Final, and Final Report Preparation. The preliminary draft FR/EIS will be provided to the ITR team for their review. PF will consolidate PDT responses and provide coordinated responses to ITR team comments and/or concerns and revise appropriate sections of the FR/EIS and/or Appendices to create the draft FR/EIS for public review. During public review, PF will participate in public workshop/meeting(s) on project in Barrow (2 two-day trips for a total 4 days). Following public review, PF will revise appropriate sections of the FR/EIS to create the draft final FR/EIS. As directed by Headquarters, PF will revise appropriate sections of the documents to form the final FR/EIS.

4.3.3 Hydraulic Analyses and Design

Independent Technical Review & Draft, Draft Final, and Final Report Preparation. The preliminary draft FR/EIS will be provided to the ITR team for their review. H&H staff will provide responses to ITR team comments and/or concerns and revise appropriate sections of the

FR/EIS and/or Appendices to create the draft FR/EIS for public review. Following public review, H&H staff will revise appropriate sections of the FR/EIS to create the draft final FR/EIS.

4.3.4 Economic Studies

Sponsor's Preliminary Financial Analysis. PF, PM, and EC will work with the sponsor to develop its preliminary financial analysis, which specifies how the sponsor will fund its share of construction costs. The preliminary draft Project Cooperation Agreement (PCA), the preliminary Financial Capability Statement (FCS), and supporting financial information will be developed by the SM team. The preliminary FCS will consist of the following items: (1) sponsor's project-related yearly cash flows (including provisions for major rehabilitation, operational contingencies, and anticipated but uncertain repair costs), (2) sponsor's current and projected ability to finance its share of project cost and to carry out project implementation operation, Maintenance, and repair/rehabilitation responsibilities, (3) the means for raising additional non-Federal financial resources (i.e. special assessment districts, fees, etc.), and (4) the steps the sponsor will take to ensure it will be prepared to execute its project-related responsibilities at the time of project implementation. Corps staff will review the preliminary FCS to insure that the sponsor has a clear understanding of the type of agreement they will be required to sign in the future. This information is not included in the FR or Appendices, but will be further refined in Phase 3 as the FR/EIS move to completion.

Independent Technical Review & Draft, Draft Final, and Final Report Preparation. Econ staff will revise its portion of the project documents for public review to reflect instructions contained in the Project Guidance Memorandum. The preliminary draft FR/EIS will be provided to the ITR team for their review. Econ staff will provide responses to ITR team comments and/or concerns and revise appropriate sections of the FR/EIS and/or Appendices to create the draft FR/EIS for public review. Following public review, Econ staff will revise appropriate sections of the FR/EIS to create the draft final FR/EIS. As directed by Headquarters, Econ staff will revise appropriate sections of the documents to form the final FR/EIS.

4.3.5 Environmental and Cultural Studies

Independent Technical Review & Draft, Draft Final, and Final Report Preparation. The preliminary draft FR/EIS will be provided to the ITR team for their review. ER staff will provide responses to ITR team comments and/or concerns and revise appropriate sections of the FR/EIS and/or Appendices to create the draft FR/EIS for public review. Following public review, ER staff will revise appropriate sections of the FR/EIS to create the draft final FR/EIS. As directed by Headquarters, Environmental Resources staff will revise appropriate sections of the documents to form the final FR/EIS. The USFWS will prepare the final Coordination Act Report. The USFWS will prepare a biological opinion under the Endangered Species Act.

4.3.6 Real Estate

Independent Technical Review & Draft, Draft Final, and Final Report Preparation. The preliminary draft FR/EIS will be provided to the ITR team for their review. RE staff will provide responses to ITR team comments and/or concerns and revise appropriate sections of the FR/EIS and/or Appendices to create the draft FR/EIS for public review. Following public review, RE staff will revise appropriate sections of the FR/EIS to create the draft final FR/EIS. As directed by Headquarters, RE staff will revise appropriate sections of the documents to form the final FR/EIS.

4.3.7 Materials.

Independent Technical Review & Draft, Draft Final, and Final Report Preparation. The preliminary draft FR/EIS will be provided to the ITR team for their review. Materials staff will provide responses to ITR team comments and/or concerns and revise appropriate sections of the FR/EIS and/or Appendices to create the draft FR/EIS for public review. Following public review, Materials staff will revise appropriate sections of the FR/EIS to create the draft final FR/EIS. As directed by Headquarters, Materials staff will revise appropriate sections of the documents to form the final FR/EIS.

4.3.8 Geotechnical.

Independent Technical Review & Draft, Draft Final, and Final Report Preparation. The preliminary draft FR/EIS will be provided to the ITR team for their review. SG staff will provide responses to ITR team comments and/or concerns and revise appropriate sections of the FR/EIS and/or Appendices to create the draft FR/EIS for public review. Following public review, SG staff will revise appropriate sections of the FR/EIS to create the draft final FR/EIS. As directed by Headquarters, SG staff will revise appropriate sections of the documents to form the final FR/EIS.

4.3.9 Cost Engineering.

Baseline cost Estimate. Cost Engineering will prepare a detailed M-CACES baseline cost estimate for the NED and the locally preferred plan. Detailed estimates will be developed by detailing anticipated construction methods, developing construction crews and expected production rates, and obtaining specific pricing data.

Independent Technical Review & Draft, Draft Final, and Final Report Preparation. The preliminary draft FR/EIS will be provided to the ITR team for their review. Cost Engineering staff will provide responses to ITR team comments and/or concerns and revise appropriate sections of the FR/EIS and/or Appendices to create the draft FR/EIS for public review. Following public review, CE staff will revise appropriate sections of the FR/EIS to create the draft final FR/EIS. As directed by Headquarters, Cost Engineering staff will revise appropriate sections of the documents to form the final FR/EIS.

4.3.10 Constructability.

The Northern Area Construction office will review and provide comments on the recommended designs developed in this phase for constructability.

4.4 Preconstruction Engineering and Design—WASHINGTON, D.C. LEVEL REVIEW

The PDT, including the sponsor's personnel, will support Washington, D.C. level review of the final FR/EIS and Appendices. This review by Corps of Engineers Headquarters offices, other Federal Departments and agency headquarters will require time and resources for both the Alaska District and local sponsor personnel to communicate with reviewers, receive their comments, and to refine the previous draft of the report. Review support is required to ensure that the non-federal sponsor is afforded an opportunity to participate in any significant decisions as a result of Washington-level review. This task includes District and non-federal sponsor costs. These costs, including any necessary travel, will be limited to those reasonable costs

associated with the review and processing of the feasibility report. Following completion of “State and Agency” review and public review of the final EIS, the documents will undergo sequential review by the Chief of Engineers, who will publish his report on the project, the Assistant Secretary of Army for Civil Works, and the Office of Management and Budget, prior to being transmitted to Congress for consideration of the report recommendations. This process typically takes between 6 and 18 months. The costs involved in all work after the Division Engineer’s Notice is issued are not currently included as part of the cost estimate for this feasibility study, but will be added later as a revision to this PMP and an amendment to the Feasibility Cost Sharing Agreement. Total costs for Washington, D.C. level review typically range from about \$30,000 to \$300,000.

5.0 COST ESTIMATE

Estimated feasibility study costs are based on an analysis of the tasks to be accomplished by the Alaska District technical offices, the Waterways Experiment Station, other Corps Districts, Corps consultants and the local sponsor. Baseline cost estimates are included in “Attachment 1: Baseline Estimates of Time and Costs.” These estimates include consideration of in-house labor (Corps and sponsor), estimated travel, reproduction, supervision and administration, indirect and overhead charges, and an overall study contingency. The feasibility phase study currently is estimated to cost \$7,232,000, of which \$3,616,000 is the Federal cash contribution, \$2,009,000 is the non-federal sponsor’s cash contribution, and \$1,607,000 is the non-federal sponsor's planned in-kind services contribution that applies in direct support of the federal study scope requirements. The estimated Federal and non-Federal cash and in-kind funding requirements by Federal fiscal year are displayed in the following table.

Table 5-1. Federal and non-Federal Cost Sharing

Fiscal Year	Federal Cash (\$)¹	Non-Federal Cash (\$)	Non-Federal In-Kind Services (\$)	Total Study (\$)
2003	\$900,000²	\$550,000	\$350,000	\$1,800,000
2004	\$850,000³	\$550,000	\$300,000	\$1,700,000
2005	\$650,000	\$350,000	\$300,000	\$1,300,000
2006	\$500,000	\$250,000	\$250,000	\$1,000,000
2007	\$500,000	\$250,000	\$250,000	\$1,000,000
2008	\$216,000	\$59,000	\$157,000	\$432,000
TOTALS	\$3,616,000	\$2,009,000	\$1,607,000	\$7,232,000

- 1 The Federal Cash outlay for future Fiscal Years is an expressed capability and does not necessarily reflect the actual amount that may be included in the Administration's budget and is subject to budgetary constraints, priorities, and policies.
- 2 The FY2003 Administration's Budget included \$200,000 for this project. The additional \$700,000 is an expressed capability.
- 3 The FY2004 Administration's Budget includes \$200,000 for this project. The additional \$650,000 is an expressed capability.

6.0 SCHEDULE AND MILESTONES

A schedule of the milestones for the feasibility study is presented in Table 6-1. A baseline schedule of tasks for the feasibility study is presented in Table 6-2. The feasibility study will be initiated with the signing of the Feasibility Cost Sharing Agreement.

Table 6-1 Schedule of Major Milestones

<u>Milestone</u>	<u>Date</u>
Sign FCSA	February 2003
Start Phase 1 Activities	March 2003
Phase 1 Checkpoint Meeting (Feasibility Scoping Meeting)	September 2005
Start Phase 2 Activities	October 2005
Phase 2 Checkpoint Meeting (Alternative Formulation Briefing)	January 2007
Start Phase 3 Activities	January 2007
Draft Report/EIS for Public Review	May 2007
Final Report/EIS to HQ / Division Engineer Public Notice	January 2008
Start PED Activities	January 2008
Chief of Engineers Report Signed	June 2008
Report/EIS Sent by Assistant Secretary of Army to Congress	December 2008

TABLE 6-2. DETAILED SCHEDULE OF FEASIBILITY STUDY TASKS

<u>PHASE 1</u>	<u>Start</u>	<u>End</u>
Environmental Resources - Scoping for EIS	15 Mar 2003	30 Aug 2003
Real Estate – Identify Land Ownership	15 Mar 2003	31 May 2003
Geotechnical Field Work – Geophysical Investigation	15 Mar 2003	31 May 2003
Geotechnical Field Work – Summer Drilling	1 Jul 2003	30 Sep 2003
Geotechnical Field Work – Spring Drilling	10 Jan 2004	31 Mar 2004
Geotechnical Field Work – Summer Drilling	1 Jul 2004	30 Sep 2004
Coastal & Hydraulics Laboratory Studies	1 May 2003	1 May 2005
Hydraulics & Hydrology Data Available	1 Dec 2003	1 Jun 2005
Economics Draft Data	1 Dec 2003	1 Jun 2005
Checkpoint 1 Package to Plan Formulator	-----	1 Jun 2005
Project Delivery Team Review of Checkpoint 1 Package	1 Jul 2005	15 Jul 2005
Independent Technical Review of CK 1 Package	15 Jul 2005	15 Aug 2005
30- Day Headquarters & Division Review	15 Aug 2005	15 Sep 2005
Checkpoint 1 Meeting (Feasibility Scoping Meeting)	-----	15 Sep 2005
Guidance Memorandum approved by HQ	15 Sep 2005	30 Sep 2005

<u>Phase 2</u>	<u>Start</u>	<u>End</u>
Detailed Alternative Evaluation & Comparison	1 Oct 2005	31 May 2006
Detailed Alternative Analysis & Appendix Preparation	1 Mar 2006	31 July 2006
Draft Appendices to PF	-----	31 Aug 2006
PDT Review of Preliminary Draft Report & EIS	1 Sep 2006	30 Sep 2006
ITR Review of Preliminary Draft Report & EIS	1 Oct 2006	31 Oct 2006
PDT Answer and Incorporate Comments	1 Nov 2006	30 Nov 2006
30 Day Headquarters and Division Review	1 Dec 2006	31 Dec 2006
Checkpoint 2 Meeting (Alternative Formulation Briefing)	-----	7 Jan 2007
Project Guidance Memorandum Approved by HQ	-----	21 Jan 2007

<u>PHASE 3</u>	<u>Start</u>	<u>End</u>
PGM Responses	22 Jan 2007	14 Feb 2007
Incorporate Comments in Report and answer PGM questions	15 Feb 2007	28 Feb 2007
Independent Technical Review of Draft Report & EIS	1 Mar 2007	31 Mar 2007
Finalize Report	1 Apr 2007	30 Apr 2007
30 Day Policy Compliance Review at Headquarters and Public Review (45 days) of Draft Report & EIS	15 May 2007	30 Jun 2007
PDT Incorporate Comments & Refine Report & EIS	1 Jul 2007	14 Nov 2007
ITR of Final Report & EIS	15 Nov 2007	15 Dec 2007
Final Report Submitted to Division	-----	15 Dec 2007
Final Report Submitted to HQ and Division Engineer's Notice	-----	15 Jan 2008

<u>Feasibility Phase Tasks Done Concurrently with Preconstruction Engineering & Design Phase</u>	<u>Start</u>	<u>End</u>
Draft Chief's Report	15 Jan 2008	15 Mar 2008
State and Agency Review of Draft Chief's Report & EIS	15 Mar 2008	15 Apr 2008
Public Review of Final EIS (30 days)	15 Mar 2008	15 Apr 2008
Final Chief's Report	15 Apr 2008	30 Apr 2008
Chief's Report Signed	-----	30 Apr 2008
ASA Review	1 May 2008	31 May 2008
OMB Review	1 Jun 2008	30 Jul 2008
Congressional Transmittal Package	1 Aug 2008	15 Oct 2008
Report Sent to Congress by ASA(CW)	-----	31 Oct 2008

POTENTIAL CHANGE TO BARROW SDR FEASIBILITY AGREEMENT

CHANGE NUMBER: CHANGE DATE:

CHANGE NAME:

SUBMITTED BY:

SCOPE OF POTENTIAL CHANGE:

SCHEDULE IMPACTS OF POTENTIAL CHANGE:

ESTIMATED COST IMPACT:

	FY 03	FY04	FY05	FY06	FY07	FY 08
Cash						
In-Kind						

	FY03	FY04	FY05	FY06	FY07	FY 08
CW-EC						
CW-ER						
CW-ER						
CW-HH						
CW-PF						
PM-C						

Approval (Initials and Date):

FIGURES

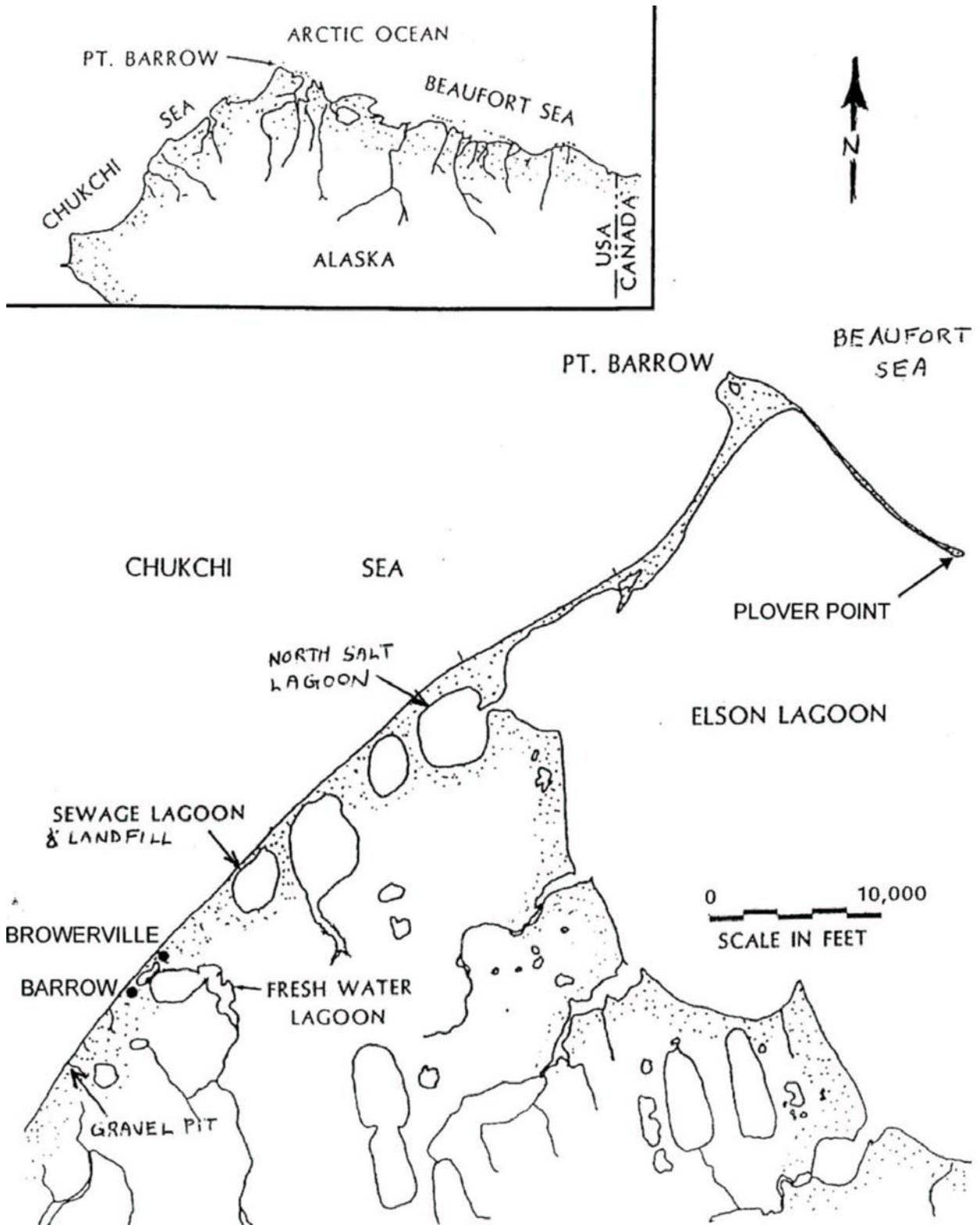


Figure 1. Location Map (from Techmarine Bluff And Shoreline Protection study for Barrow, AK, 1987)

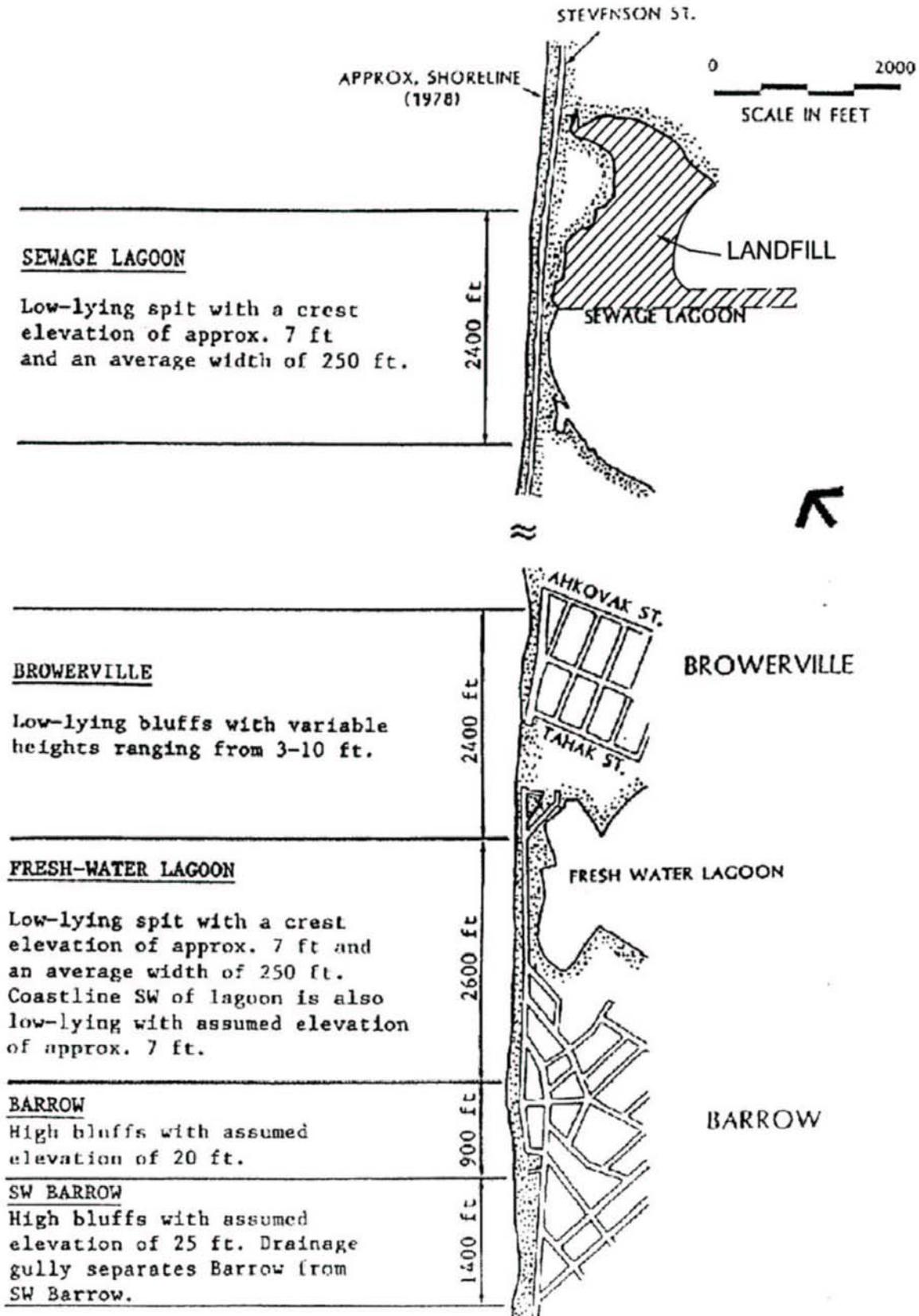


Figure 2. (from Techmarine Bluff And Shoreline Protection study for Barrow, AK, 1987)

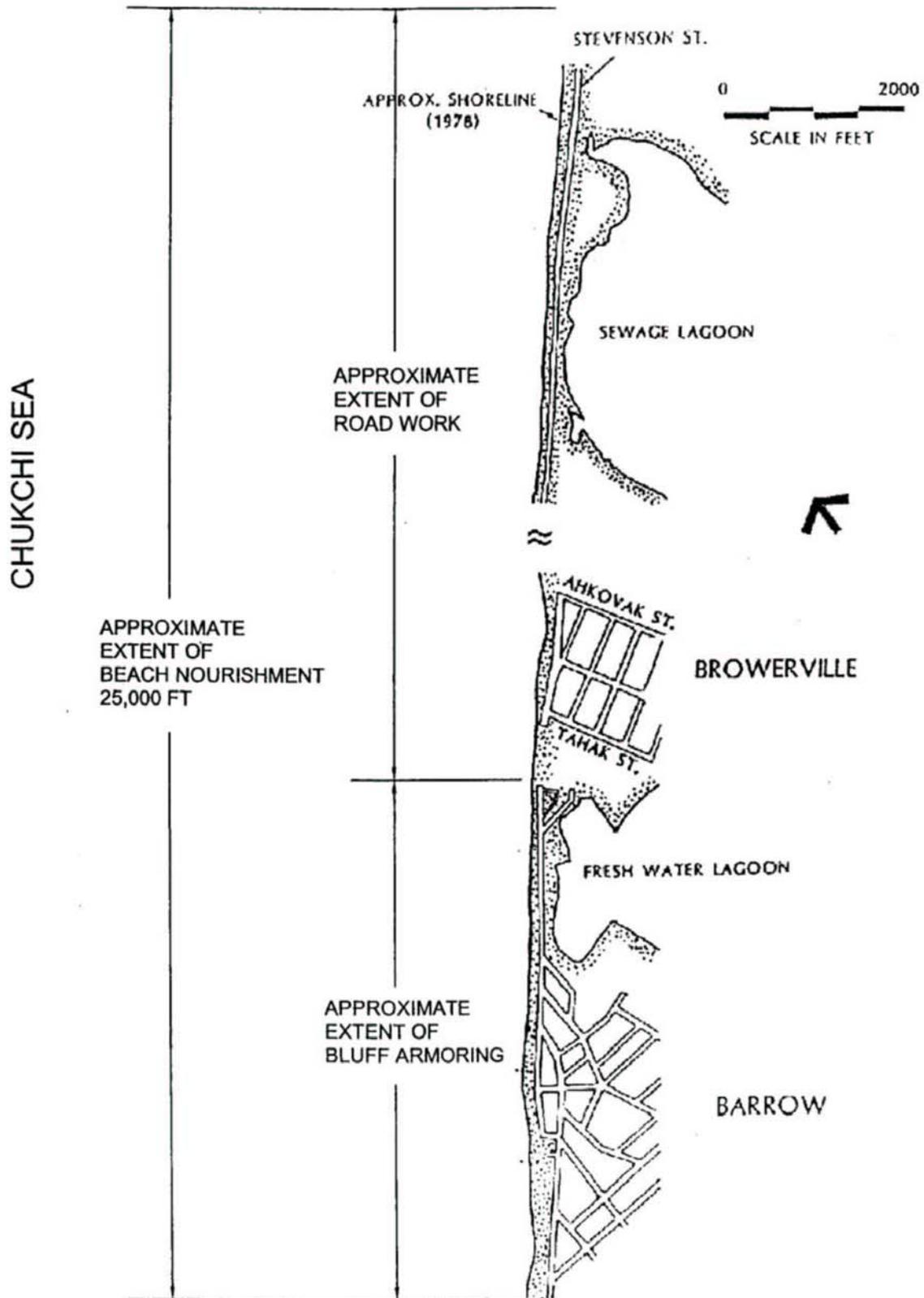


Figure 3. (from Techmarine Bluff And Shoreline Protection study for Barrow, AK, 1987)