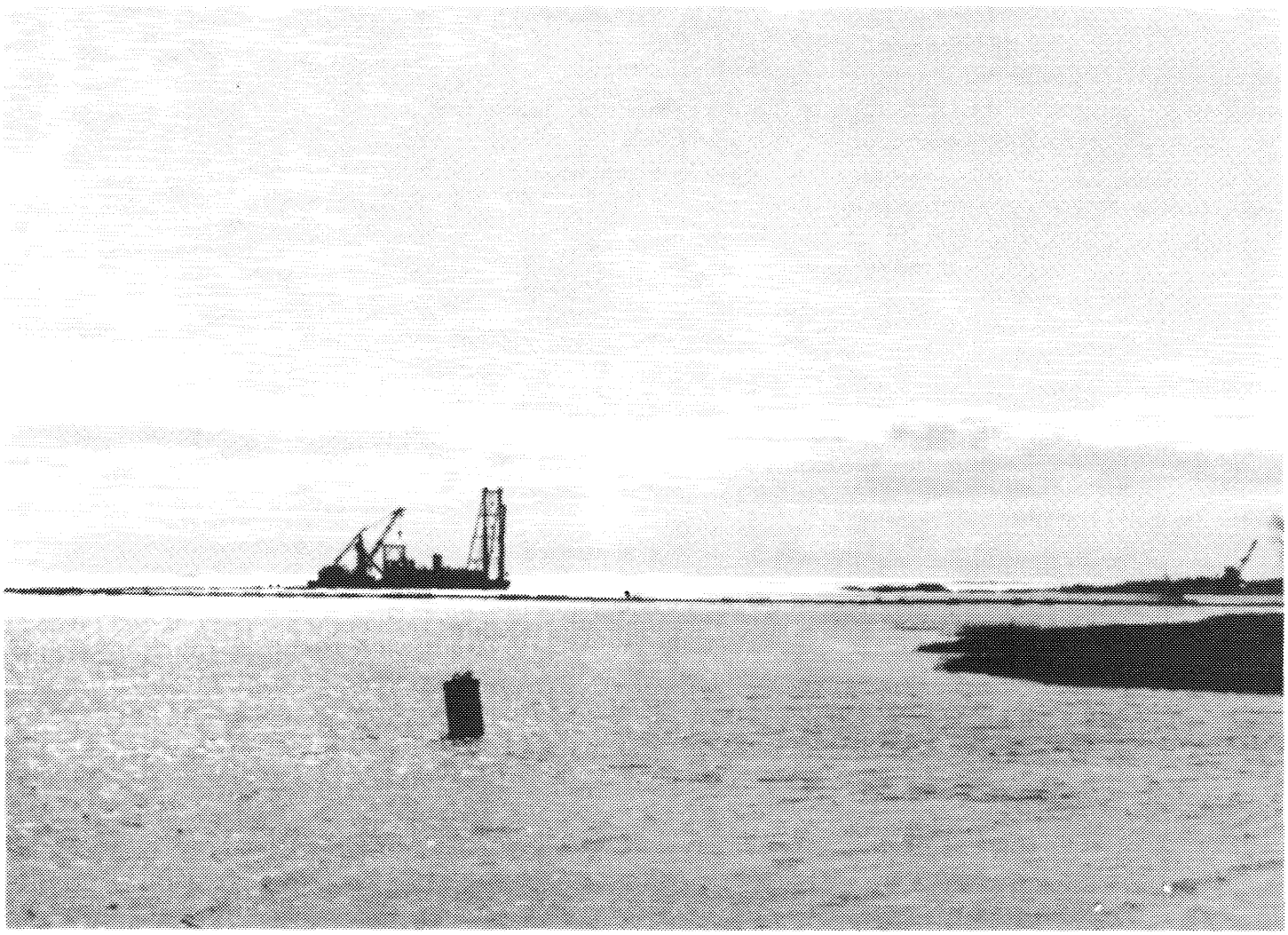
Long Island Sound Studies
Supplemental Data Reports

Dredged Material Containment



June 1985

US Army Corps of Engineers
New England Division

Supplemental Data - Volume 1

Plan Formulation

Interim Siting Analysis

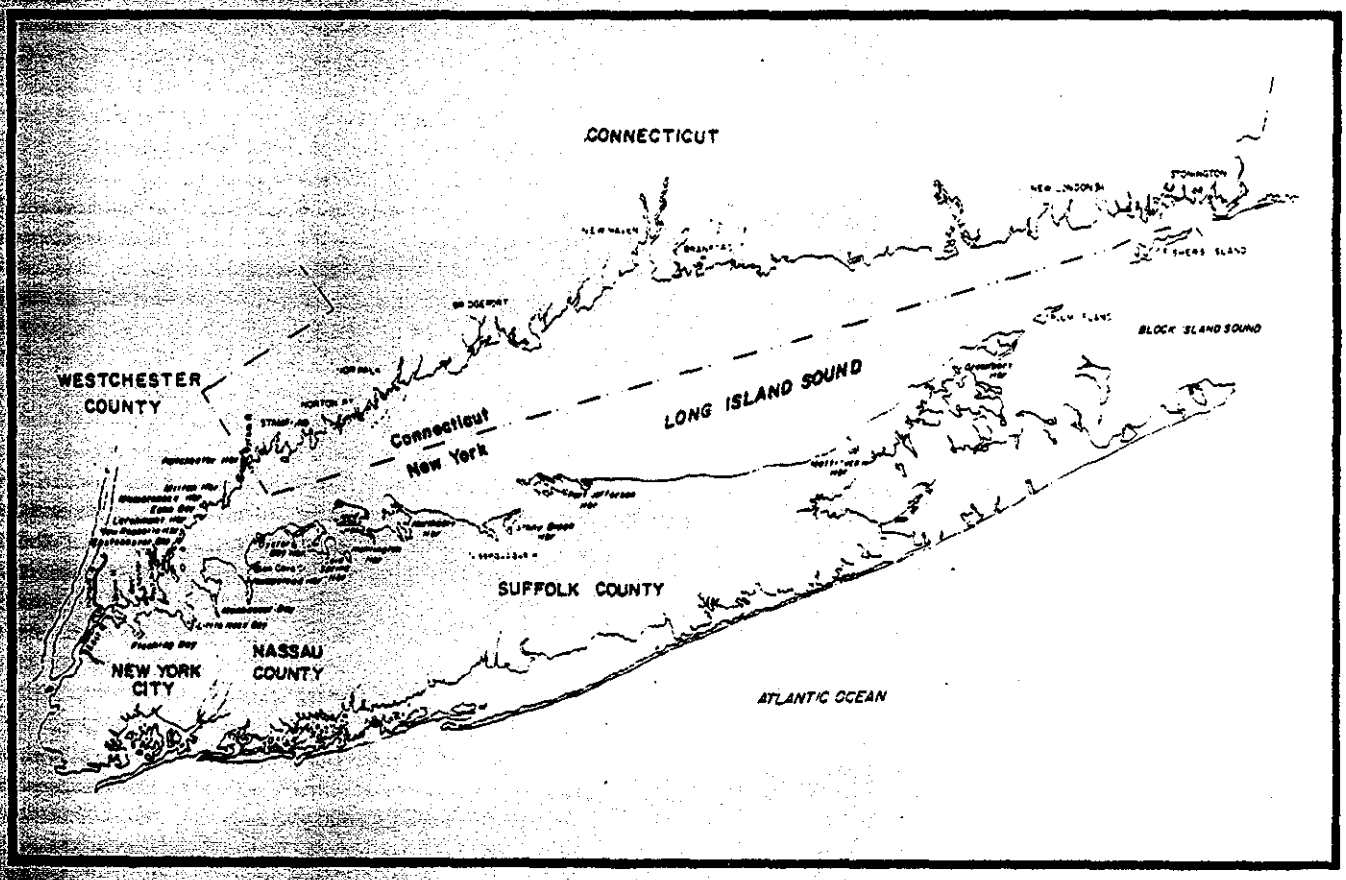
Addendum - Extension of Siting Analysis

Island/Shoal Screening

Interim Report

Dredged Material Containment in Long Island Sound

(With Special Emphasis on Eastern New York Waters)



U.S. ARMY CORPS of ENGINEERS

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JULY, 1980

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Preface and Acknowledgments

This is a report of a Stage 2 study to prepare an overview assessment of the feasibility of containment of material dredged from Connecticut and New York harbors along Long Island Sound. Specifically, containment to create shoreline land extensions in the Sound has been assessed. A primary objective of the study was identification of further work areas to be pursued during remaining Stage 2 and Stage 3 phases of the Long Island Sound containment study.

An overview of Stage 2 has been presented which details planning objectives and approach for the four tasks: (1) problem identification, (2) formulation of alternative containment plans, (3) impact assessment, and (4) evaluation. Problem identification and plan formulation through local public involvement (workshops) interagency coordination, and internal NED planning will be an important part of the early Stage 2 effort.

The study was performed under contract by Tetra Tech, Inc., Melville, New York. The contract was directed by James Pagenkopf, principal investigator, who was assisted by Gary Bigham, Henry Fong, Jack Olsen, James LaMorte, and John Segna.

The study was conducted under the supervision of Raymond Boyd, Planning Division/Coastal Development Branch, New England Division of the Corps of Engineers.

INTERIM REPORT:
DREDGED MATERIAL CONTAINMENT IN LONG ISLAND SOUND
WITH SPECIAL EMPHASIS ON EASTERN NEW YORK WATERS

1. INTRODUCTION

BACKGROUND

1.01 Open water disposal of dredged material and other urban-industrial wastes has occurred in Long Island Sound (LIS) for more than 100 years. Historically, there were 19 dredged material disposal sites in use throughout Long Island Sound, as identified in Figure 1-1. As a result of increased public concern over long term environmental effects of dredged material disposal operations, the number of active disposal sites has been reduced from the original 19 to three - New Haven, Cornfield Shoals, and New London. A fourth site, Eatons Neck, was planned for the western portion of the Sound, but a recent demonstration dumping and monitoring program at this site has been terminated (USCOE, 1977a). Future dredged material management plans will probably be designed to further centralize, as well as minimize, open water disposal in the Sound (Conn. DEP, 1977).

1.02 There are several potential alternatives to open water disposal of dredged material including those listed in Table 1-1. Project-specific factors such as economics, engineering, environmental impacts, public health and welfare, social acceptability, and legal/regulatory considerations determine their feasibility in any given dredging situation. This report, prepared for the New England Division by Tetra Tech, Inc., addresses the feasibility of containment alternatives for material dredged from Connecticut and New York harbors along Long Island Sound. Specifically, containment for the creation of shoreline land extensions has been assessed.

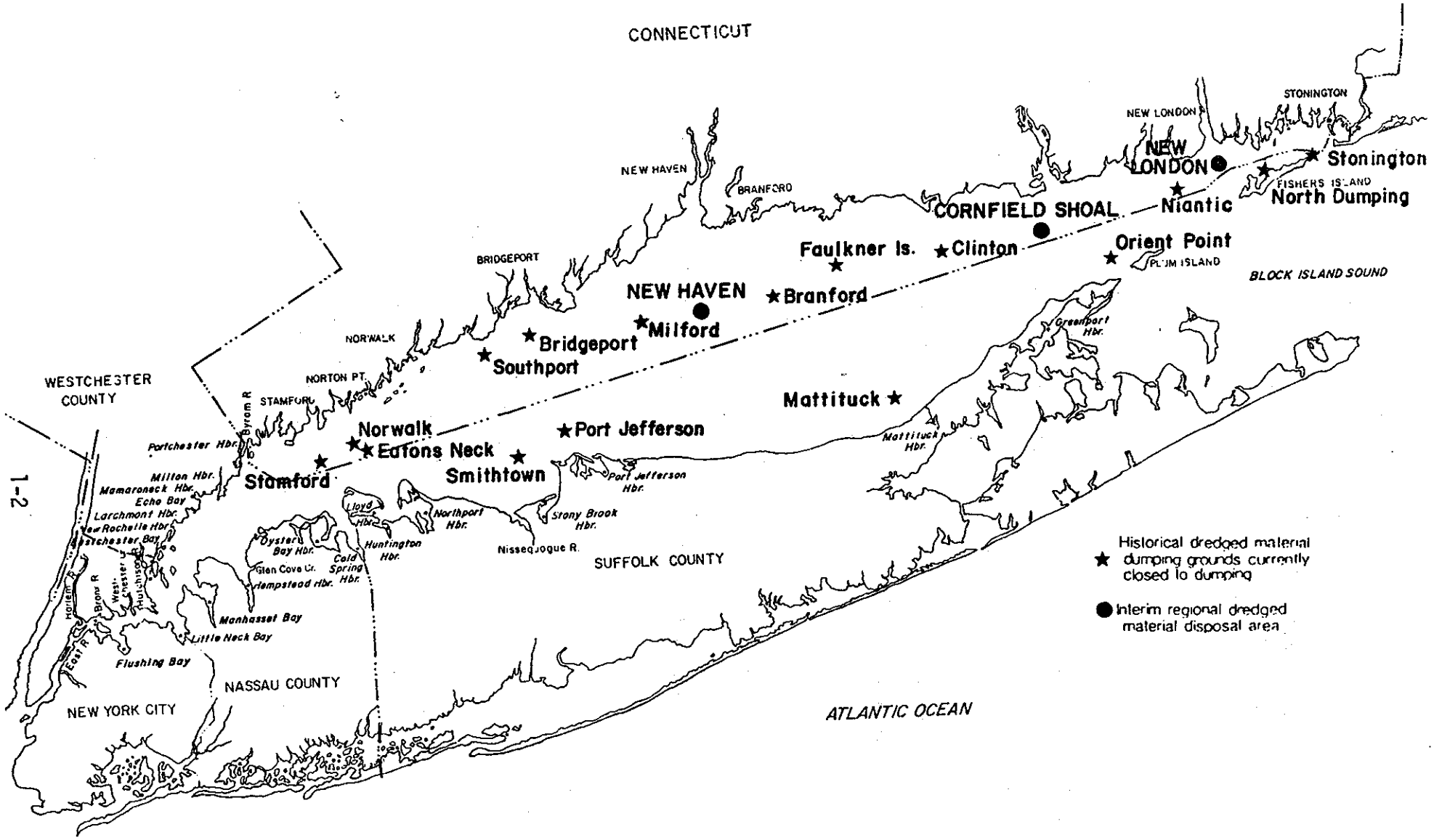


FIGURE 1-1 HISTORICAL DREDGED MATERIAL DISPOSAL GROUNDS IN LONG ISLAND SOUND

TABLE 1-1

DREDGED MATERIAL DISPOSAL ALTERNATIVES

1. Aquatic disposal

   - open ocean dumping (deep/shallow/LIS/Atlantic/Block Is. Sound)
   - subaqueous borrow pits
   - in river/harbor dumping

2. Beach nourishment

3. Habitat development projects

   - marsh creation
   - aquatic habitat
   - terrestrial habitat
   - island habitat

4. Contained disposal

   - rehandling basin prior to use of material in construction or agriculture
   - creation of waterfront land for ultimate development for industrial, recreational, etc. purposes
   - creation of islands for ultimate development for industrial or recreational use
   - creation of "container island" for long-term use as disposal area

5. Other

   - product development
   - strip mine, quarry, or borrow pit reclamation
   - agricultural medium
   - sanitary landfill cover material
   - incineration
   - confined upland disposal
   - selective dredging

PURPOSE AND AUTHORITY

1.03 The project was undertaken as part of the New England Division Corps of Engineers' Stage 1 and Stage 2 planning efforts to develop a plan of study for dredged material containment in LIS. A previous report entitled, "Reconnaissance Report: Dredged Material Containment in Long Island Sound", was completed in January 1979 as part of the initial Stage 1 planning effort. This study was a preliminary evaluation of containment alternatives for disposal of material dredged within the borders of the State of Connecticut. The study made recommendations for more detailed and site-specific analysis of potentially feasible containment options which forms the basis of the present investigation.

1.04 The project was authorized by a Resolution adopted on 10 May 1977 by the Committee on Public Works and Transportation of the U.S. House of Representatives. The Resolution, requested by Connecticut Congressmen McKinney, Giaimo, and Dodd, read as follows:

> *Resolved by the Committee on Public Works and Transportation of the House of Representatives, United States, that the Board of Engineers for Rivers and Harbors is hereby requested to review the reports on the Land and Water Resources of the New England-New York Region, published as Senate Document Numbered 14, Eighty-fifth Congress, First Session, and other pertinent reports, with a view to determining the feasibility and impacts of the treatment and use of the dredged materials to result from the continued maintenance and anticipated improvements of Long Island Sound harbors, as well as from any newly created Federal harbors, to build aritficial islands in Long Island Sound for recreation, conservation, marsh building, development, and other purposes. The study should also consider the utilization of dredged materials*

from projects other than Federal (i.e., State, community, and private), and the feasibility and acceptability of utilizing solid wastes other than dredged materials for island building.

PLANNING OBJECTIVES

1.05 The following planning objectives should be utilized throughout the plan formulation process. In the broadest sense, they are the basis for selection of the dredged material management plan to be recommended.

- Provide a solution to the disposal of dredged material from operation and maintenance of existing channels and anchorages in the LIS area authorized and constructed by the Federal Government.

- Provide a solution to the disposal of dredged material from new channel and anchorage improvements currently under consideration by the Corps of Engineers as Federal projects.

- Provide a solution to the disposal of dredged material from dredging by other Federal agencies, and from non-Federal and private dredging.

- Provide a capacity for the three categories of dredging mentioned above over a 50-year period.

- Minimize the destruction of bottomlands, wetlands, coastal zones, and marine wildlife in the LIS area.

1.06 In addressing these objectives, there are several potential alternatives for the disposal of material dredged in the LIS region.

The findings of this investigation, which focus on containment alternatives (see Table 1-1), are to be eventually coordinated with the findings of other on-going investigations of alternatives such as open-water and upland disposal techniques. A truly meaningful analysis of containment as an alternative cannot be conducted outside the perspective of a comprehensive dredged material management plan for LIS. Presently, the States of New York and Connecticut are finalizing an Interim Plan for the Disposal of Dredged Material in LIS (NERBC, 1980). This document stresses the following views on containment:

- Containment is one of several possible alternatives for the disposal of dredged materials which should be analysed in detail.

- In view of the probably extensive period of time required for siting analysis, feasibility evaluation, environmental review, and design and construction, large-volume containment facilities are not considered a viable alternative for the very near future (next 5-10 years).

- The feasibility of the containment alternative will depend strongly on site availability and the determination of the environmental impacts; costs will be secondary.

- Local agency and public participation will be critical for identification of acceptable containment sites and the potential uses of the facilities.

1.07 Close coordination between the Corps, the appropriate state and local agencies, and the general public is planned throughout the Corps planning process. A detailed discussion of specific planning objectives for Stage 2 and 3 planning is presented in Chapter 6.

FINDINGS OF THE JANUARY 1979 RECONNAISSANCE REPORT

1.08 The previously completed Stage 1 Reconnaissance Report was an overview of dredged material containment in LIS and included an assessment of creating large volume nearshore land extensions, shallow water islands, and deep water islands as containment alternatives. The scope of the project was limited to include consideration of containment of material dredged from Connecticut harbors only. Dredging in New York harbors was not considered. In the preliminary siting of containment facilities, only locations on the Connecticut side of the Sound were included. Historical data on both Federal and non-Federal permitted dredging projects were presented along with projections of dredging volumes for the 50 year period from 1985 to 2035. A preliminary design and sizing analysis of large volume, centralized containment facilities was performed for the three containment alternatives: land extension, shallow water islands, and deep water islands. A preliminary siting exercise for each alternative was performed for the Connecticut shoreline and waters of LIS. Based on the preliminary Stage 1 findings, recommendations were made directing future study under the Stage 1 and Stage 2 Corps planning process. Finally, an overview of Stage 2 planning efforts was presented in terms of plan formulation, plan evaluation, site selection methodology, data requirements, and long term project scheduling. Significant findings of the Reconnaissance Report include the following:

1.09 *The sediments and soils in Connecticut's ports and waterways are predominatly fine-grained sands and organic silts. Based on the present state-of-the-art in dredged material dewatering and densification techniques, creation of useable artificial islands in LIS through dredged material containment will be virtually impossible. Creation of useable shoreline land*

extensions will be feasible, but will require long term planning and continuous area operation and management to facilitate dewatering.

1.10 *In order to convert dredged material islands to some use requiring even low soil bearing capacity, innovative and costly foundation engineering will be needed. Artificial islands can, however, provide a new siting opportunity for water-dependent industrial facilities that have difficulty obtaining sites as developable coastal land inventories decrease. For high revenue-producing land uses, the added construction costs for islands may be less of a development disincentive than would appear to be the case.*

1.11 *Based on preliminary cost and engineering analysis, the simple rock-dike or a sheet pile circular cell dike appear most appropriate for containment facilities in LIS. The rock dike is significantly less expensive in shallow water than the sheet pile dike, has an indefinite design life, and provides rough habitat for marine life. The sheet pile dike, however, would allow for ship access if desired.*

1.12 *A single rock dike containment facility, located in water averaging 36 feet deep at mlw and with capacity to receive all 59 MCY of dredged material projected for Connecticut from 1985 to 2035, would cost in excess of $150,000,000 to design and construct.*

1.13 *For large-volume containment facilities, the potential for siting in shoreline and nearshore locations is very low. Deeper water (say for 30 to 70 feet mlw), offshore locations*

may be feasible for large sites, particularly locations in the vicinity of historical and still active open water dumping grounds.

1.14 *The possibility of small-volume useable land/island creation projects cannot be evaluated without detailed knowledge of the physical and chemical properties of the sediments and soils in the harbors and potential disposal locations. This is true regardless of the ultimate use intended.*

1.15 *A conceivable containment facility alternative would be a material rehandling facility which produces material suitable for inland disposal fill or sanitary landfill cover. The chemical nature of the dewatered sediments, in terms of the leaching potential of salts and other constituents, is unknown at this time.*

1.16 *Decision-making for facility siting should not be made solely on the basis of ecological value. Many technical, environmental, economic, and social tradeoffs will have to be made if alternatives to open water disposal in LIS are to be found.*

1.17 *A truly meaningful analysis of potential containment facility locations cannot be conducted outside the perspective of a comprehensive dredged material management plan for LIS. Basic design parameters (especially material volume, physical/chemical quality, and dredging logistics) must be specified and detailed site-specific data on potential locations must be compiled. A rigorous selection methodology is needed and participation from all government levels is essential. Detailed site selection procedures should be established and carried out during Stage 2 planning.*

1.18 In summary, the Reconnaissance Report has emphasized the need for examination of small-volume, shoreline extension containment facilities as an alternative for dredged material disposal in LIS. This requires development of a site selection methodology which considers technical, economic, environmental, social and legal/regulatory site-specific factors. In addition, emphasis was placed on determination of the characteristics of dredged material, which stongly influence the environmental impacts of a containment facility, the containment design and handling costs, and the potential for use of the facility for commercial, industrial, or recreational purposes.

INTERIM PROJECT SCOPE OF WORK

1.19 As a finalization of Stage 1 planning, the Interim Investigation addresses the following tasks:

- Evaluation of the quantity and quality of material historically dredged along the New York shoreline of LIS;

- Analysis of historical dredging and disposal trends and formulation of projections for the 50 year period 1985-2035.

1.20 The Interim Investigation initiates Stage 2 planning efforts by further addressing the following tasks:

- A discussion of the problems and purposes associated with alternative containment methods for LIS;

- Development of a siting methodology for shoreline extension containment facilities and utilization of this methodology for locating and ranking potential sites on publicly-owned land and existing disposal sites bordering LIS within Connecticut and

New York;

- A discussion of findings and recommendations and development of planning goals and objectives for guidance of further Stage 2 and Stage 3 planning efforts.

1.21 The project study area is defined by the Connecticut and New York coastline bordering LIS. The western boundary is arbitrarily chosen as the Throgs Neck Bridge, and the eastern boundary as the Race or entrance to Block Island Sound. As shown in Figure 1-2, the study area in New York State is divided by county boundaries, and in Connecticut by the three coastal areas previously defined in the Reconnaissance Report.

1.22 Within the study area, dredged material from two types of channel maintenance and construction projects is considered: (1) Federal projects authorized by Congress and (2) other projects allowed under Federal permit. Historical data on both types of projects were compiled from New York District Corps of Engineers files, and projections of future dredged quantities have been made. A summary of similar information compiled for Connecticut during the reconnaissance effort is also presented. Historical dredging costs are analyzed, and a discussion of disposal methods and historical disposal sites is included.

1.23 In the discussion of containment alternatives, emphasis has been placed on the problems related to removal, transport, facility design and operation, and impacts of containing dredged materials in LIS. Major issues include economic, engineering, environmental, social and legal/regulatory factors. Available data describing dredged sediment characteristics in the LIS region are summarized and discussed.

1.24 A siting methodology has been developed based on the identification of major problems and issues of creating shoreline extension

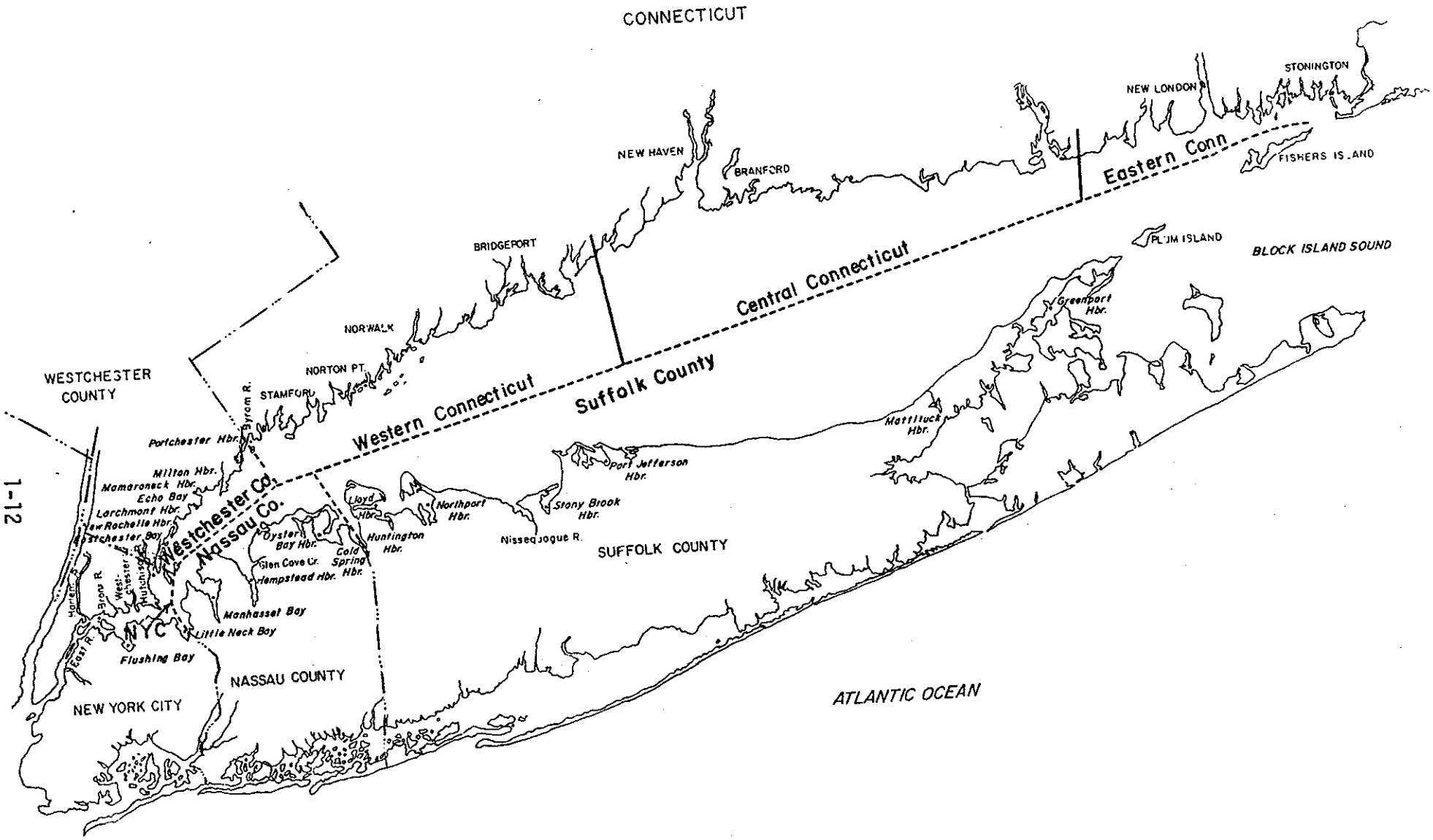


FIGURE 1-2 LONG ISLAND SOUND COASTAL AREAS

containment facilities. Primary and secondary criteria were formulated and used to locate and evaluate, on a preliminary basis, potential sites for small-volume, shoreline extension containment facilities. Detailed, site-specific facility designs and cost analyses are not given at this stage. Recommendations for further direction of effort, data needs, and an overview of remaining Stage 2 and Stage 3 planning are given.

RELEVANT STUDIES AND REPORTS

1.25 Dredged material management in the LIS region has been the subject of considerable study in recent years. Those reports most relevant to the project at hand include:

1. Dowd, R.M., "Dredging on Long Island," prepared for the Marine Resource Council, Nassau-Suffolk Regional Planning Board, Hauppauge, New York, February, 1972.

2. O'Connor, J.S., "Dredging and Spoiling on Long Island," Marine Sciences Research Center, State University of New York, Stony Brook, New York, November, 1973.

3. McAleer, John, "Artificial Islands and Platforms in Long Island Sound," prepared for the Long Island Sound Regional Study, New England River Basins Commission, New Haven, Connecticut, and Boston, Massachusetts, June, 1974.

4. State of Connecticut, Department of Environmental Protection, "Dredging and Dredged Spoil Disposal in Long Island Sound: A Discussion Paper," Hartford, Connecticut, October, 1975.

5. State of Connecticut, Department of Environmental Protection, and State of New York, Department of Environmental Conservation,

"Interim Plan for the Disposal of Dredged Material in Long Island Sound," April, 1977.

6. Department of the Army, Corps of Engineers, New England Division, "Reconnaissance Report: Dredged Material Containment in Long Island Sound," January, 1979.

7. New England River Basins Commission, "Interim Plan and Environmental Impact Statement for the Disposal of Dredged Material in Long Island Sound,'' June, 1980.

8. Long Island Regional Planning Board, "A Comprehensive Dredging Subplan for Nassau and Suffolk Counties," prepared for the New York State Department of State, Hauppauge, New York, November, 1979.

1.26 Scientific papers and reports on the ecology of LIS are abundant in the literature, and harbor-specific environmental assessments and feasibility reports prepared by the New England Division and New York District are also available. However, the literature specifically related to dredged material disposal in LIS is limited to the reports listed above. Many reports published by the Corps of Engineers Waterways Experiment Station in Vicksburg, Mississippi, under the recently concluded Dredged Material Research Program are very useful as state-of-the-art documents on dredged material management.

1.27 There are several other studies currently in progress which are of interest to the dredged material containment study in LIS. Under the Operations Section of the New England Division, an Environmental Impact Statement and siting investigation for open water dumping of dredged material in LIS is being conducted by Dames and Moore, Inc. The NERBC (New England River Basins Commission) is performing a study of

land-based disposal alternatives. Finally, the New York District Corps of Engineers hired MITRE Corp. to investigate the disposal of dredged material within the New York District. Two reports -- "Volume 1: Present Practices and Candidate Alternatives," (May,1979); and "Volume 2: Preliminary Evaluation of Upland Disposal," (February, 1980) -- have been published.

COORDINATION

1.28 During the course of this interim investigation, telephone and/or in-person discussions were held with representatives of several cognizant local, State and Federal agencies. The individuals and/or organizations identified below were contacted for information relating to dredged material containment in LIS:

1. U.S. Department of Defense
   Corps of Engineers
   New York District
   New York, New York

   Thomas Clark, Chief - Operations Division
   Phil McGrade, Regulatory Branch
   William Slezak, Regulatory Branch
   Denis Szukowski, Regulatory Branch

2. U.S. Department of Defense
   Corps of Engineers, Waterways Experiment Station
   Vicksburg, Mississippi

   Raymond Montgomery
   Robert Engler

3. U.S. Environmental Protection Agency
   Region II
   New York, New York

4. State of New York
   Department of Environmental Conservation

   Randy Stelle

5. State of Connecticut
   Department of Environmental Protection

   Robert Leach, Coastal Area Management
   Robert Jones, Marine Regulation

6. Nassau and Suffolk Counties
   Long Island Regional Planning Board
   Hauppauge, New York

   Lee Koppelman, Executive Director
   Dewitt Davies
   Sy Robbins
   Mike Volpe

7. Westchester County
   Westchester Planning
   White Plains, New York

   John Muenzinger
   Steve Goldstein
   Ken Wolfe

8. New York City Department of City Planning
   New York, New York

   Helga Busemann, Coastal Energy Impact Program
   Holly Haff

9. New England River Basins Commission

   Mike Sharples
   Stan Euston

10. Nassau County, New York
    Department of Health

    Frank Pedersen

11. Town of Hempstead, New York
    Department of Environmental Protection

    Harvey Udell, Commissioner

12. Suffolk County, New York
    Department of Public Works

    John R. Guldi, Division of Waterways

13. Town of Huntington, New York
    Department of Environmental Protection

    Richard Cooperman

14. Westchester County, New York
    Department of Health

    Robert Wasp

1.29 As the formulation and evaluation of containment alternatives for LIS proceeds during Stage 2 planning, an extensive public involvement program is envisioned. In addition to public hearings to consider alternative plans, a series of workshops to obtain local input during plan formulation are to be organized. These workshops will enable local governments and the public-at-large to work closely with Corps planners and engineers in evaluating containment as a disposal option.

2. HISTORICAL AND PROJECTED DREDGING ACTIVITY

INTRODUCTION

2.01 Planning for the location and sizing of potential dredged material containment facilities will require reasonably accurate projections of dredging activities in the LIS region. To make these projections, historical dredging statistics, adequate understanding of the reasons and demands for dredging, and consideration of present policies and plans for future dredging in the LIS region are required.

2.02 In developing the historical dredging perspective, the two major classes of dredging activities in the New York vicinity of LIS were analysed. These include: (1) channel maintenance and new construction projects performed by the Corps of Engineers; and, (2) various dredging/disposal projects performed by other government agencies and the general public under Federal permits issued by the Corps. Historical data on Corps and non-Corps permitted dredging and disposal compiled from New York District files are summarized in this section. This historical perspective is then used, along with tentative Corps improvement and maintenance plans, and regional plans for water related development, to estimate future dredged material volumes. Where appropriate, comparisons to dredging statistics summarized from the Reconnaissance Report for Connecticut are made. Information on disposal practices for historical Federal and non-Federal dredging projects as well as disposal site identifications are also given.

FEDERAL PROJECTS

2.03 At present there are 19 Federal projects authorized in the New York State vicinity of LIS as compared to 27 in Connecticut. These projects

are identified in Table 2-1 and their locations are shown in Figure 2-1. Out of the 19 Federal projects shown for New York, only 14 border directly on LIS. Five projects west of the Throgs Neck Bridge in the Upper East River are included since this area has historically seen significant dredging activity and may have bearing on future dredged material disposal operations in western LIS. A complete inventory of Corps of Engineers improvement and maintenance dredging in the LIS, New York area from 1927 through 1979 is provided in Table A-1 of Appendix A.

Improvement Dredging

2.04 Improvement (new work) dredging in New York harbors bordering LIS has varied widely over the past 20 years. A total of 2.5 million cubic yards (MCY) was dredged during the period 1965 through 1968. Since then, no improvement dredging has occurred except west of the Throgs Neck Bridge. The distribution of the improvement dredging projects since 1960 is shown in Table 2-2. Note that there has been no improvement work since 1960 in Nassau County. Also note that of the 5.4 MCY total for the New York study area, about 5.1 MCY, or 94%, was taken from outside LIS, in New York City waters.

2.05 Part of the reason for the scarcity of recent Federal improvement projects has been an apparent slow-down in new shoreline development and water-related commercial/industrial activities in the New York LIS region. To demonstrate this, Figure 2-2 shows the trend in waterborne freight tonnage over the period 1957 through 1976 for several major harbors in Connecticut and New York bordering LIS (USCOE, 1966a and 1976a). Commercial traffic in New York harbors peaked slightly in 1972-73, and since then has decreased to a level in 1976 that is well below that of 1957. In Connecticut, however, New Haven Harbor interests have strongly urged the Corps to deepen the harbor's existing 35-foot navigation project. Corps New Haven Harbor study findings indicate increased project

Table 2-1

FEDERAL PROJECTS ON LONG ISLAND SOUND

NEW YORK	CONNECTICUT
Westchester County	Western Coastal Area
1. Portchester Harbor	1. Greenwich Harbor
2. Milton Harbor	2. Mianus River
3. Mamaroneck Harbor	3. Stamford Harbor
4. Echo Harbor	4. Westcott Cove
5. New Rochelle Harbor	5. Fivemile River Harbor
	6. Wilson Point Harbor
	7. Norwalk Harbor
Nassau County	8. Wesport Harbor and Saugatuck River
6. Hempstead Harbor	9. Southport Harbor
7. Glen Cove Creek	10. Bridgeport Harbor
	11. Housatonic River
Suffolk County	
8. Huntington Harbor	Central Coastal Area
9. Northport Harbor	12. Milford Harbor
10. Port Jefferson Harbor	13. Breakwaters at New Haven
11. Mattituck Harbor	14. New Haven Harbor
12. Greenport Harbor	16. Stony Creek
	17. Guilford Harbor
	18. Clinton Harbor
New York City	19. Duck Island Harbor
13. Eastchester Creek	20. Patchogue River
14. Little Neck Bay	21. Connecticut River below Hartford
15. Westchester Creek (Not on LIS)	
16. Bronx River (Not on LIS)	
17. Flushing Bay and Creek (Not on LIS)	Eastern Coastal Area
18. Harlem River (Not on LIS)	22. Niantic Bay and Harbor
19. East River (Not on LIS)	23. New London Harbor
	24. Thames River
	25. Mystic River
	26. Stonington Harbor
	27. Pawcatuck River

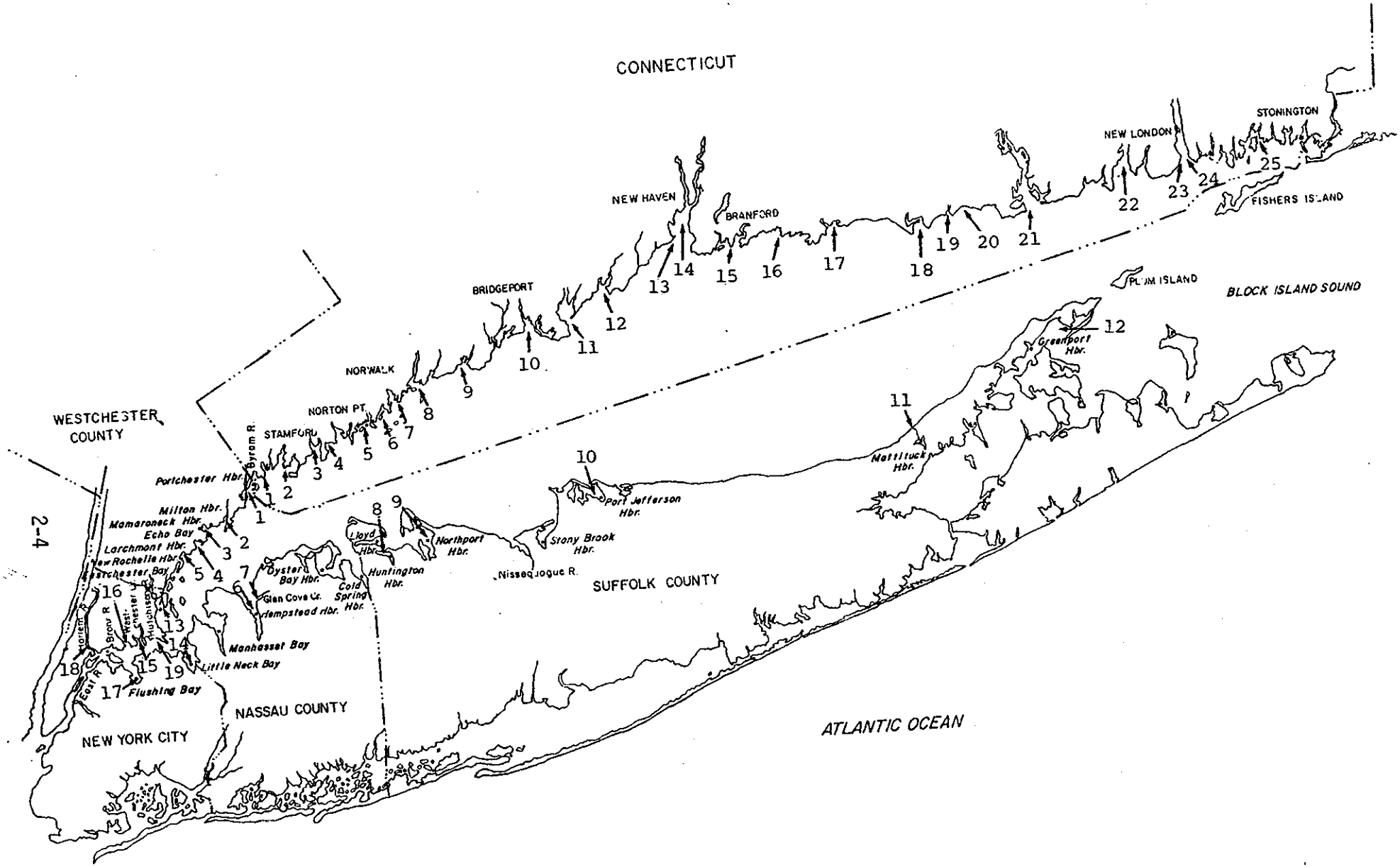


FIGURE 2-1 FEDERAL PROJECTS ON LONG ISLAND SOUND

TABLE 2-2

SUMMARY OF FEDERAL IMPROVEMENT PROJECTS SINCE 1960[a]

LONG ISLAND SOUND NEW YORK AREA	PROJECT (WATERWAY)	DATE	VOLUME (C Y)	TOTALS (C Y)
WESTCHESTER COUNTY	Milton Harbor	1967	147,000	
	Mamaroneck Harbor	1966	144,000	
SUFFOLK COUNTY	Mattituck Harbor	1965	41,000	
NEW YORK CITY (on LIS)	Little Neck Bay	1966	602,000	
	Little Neck Bay	1967	804,000	
	Little Neck Bay	1968	779,000	
LIS NEW YORK SUBTOTAL.				2,517,000
NEW YORK CITY (Upper East River)	Flushing Bay	1963	1,986,000	
	East River	1974	925,000	
UPPER EAST RIVER SUBTOTAL.				2,911,000
TOTAL NEW YORK IMPROVEMENT PROJECTS (1960-1979)				5,428,000
TOTAL CONNECTICUT IMPROVEMENT PROJECTS (1963-1979)				2,907,000[b]

[a] Data provided by Operation s Division, New York District Corps of Engineers

[b] Includes a 2.8 million cubic yard job performed in 1974 by the U.S. Navy in New London.

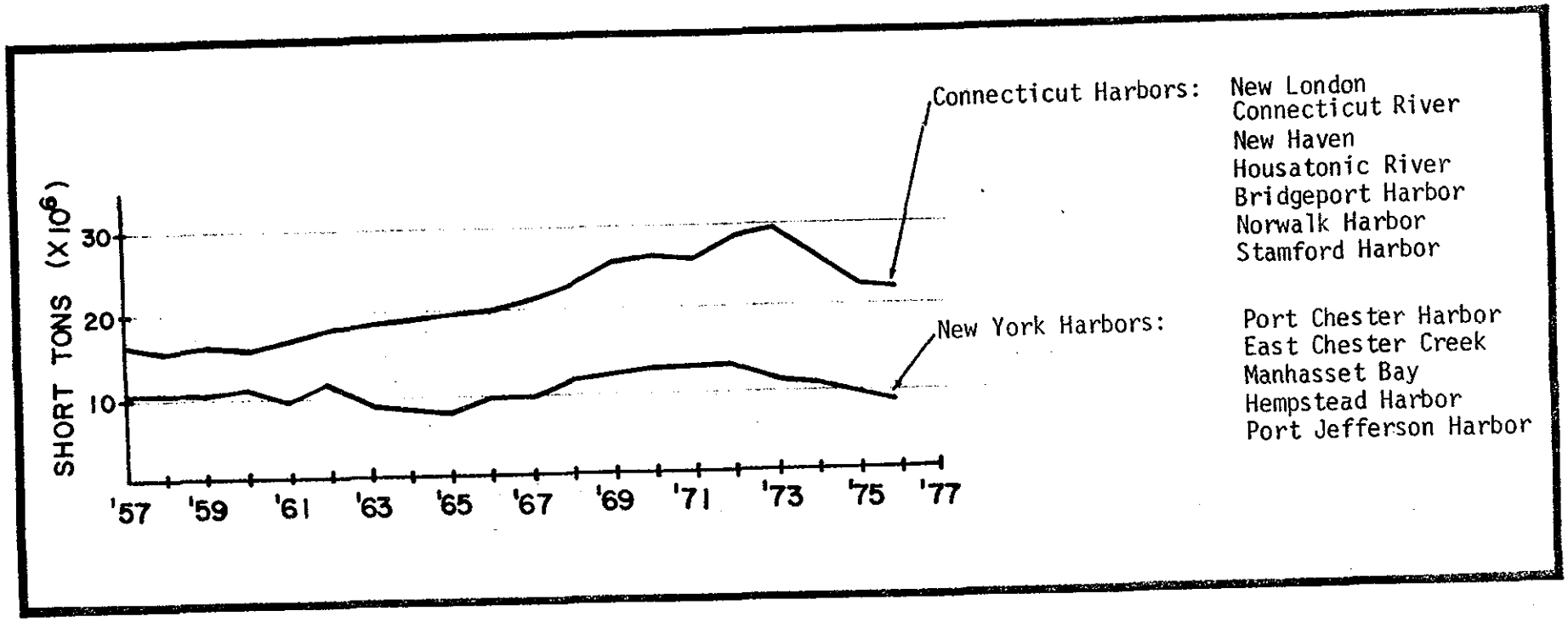


FIGURE 2-2 LONG TERM TRENDS IN WATERBORNE COMMERCE IN LONG ISLAND SOUND

dimensions may be required to safely accommodate expected commercial vessel usage. A 40-foot deep ship channel at MLW over a six mile reach is one alternative under consideration. Such a proposal would generate about 5 MCY of dredged material. The New York District is also considering possible channel improvements in Echo Bay and New Rochelle Harbor in Westchester County. Due to present high costs of dredging and disposal, however, there are no tentative schedules for this new work (USCOE, 1980a). Plans for channel improvement projects previously under consideration in Manhasset Bay, Hempstead Harbor and Port Jefferson Harbor have been shelved indefinitely due to economic, environmental, and social/political problems (USCOE, 1980a).

2.06 Of further significance in projecting Federal improvement dredging activity in New York is the recently revised dredging/spoiling policy of Nassau and Suffolk Counties, Long Island (LIRPB, 1979a) which calls for minimization of new dredging projects through the following proposed steps:

- De-authorization of Federal projects in Manhasset Bay, Hempstead Harbor, Huntington Harbor and Northport Harbor through phase-outs of petroleum terminals and commercial aggregate activities;

- Construction of new offshore pipeline oil tanker terminals for consolidated petroleum activities in Hempstead Harbor and Port Jefferson Harbor; and,

- Consolidation of and limitation of the number of deep-draft vessel facilities by using existing deep water ports and channels such as at Glen Cove Creek, Huntington Harbor, Port Jefferson, and Greenport Harbor.

2.07 It is noted that the proposed policies for port consolidation and dredging minimization may or may not be implemented depending on acceptance by local (town), state and federal agencies and cooperation by the affected industries and commercial interests. It is likely, however, that the trend in channel improvement activity will conform, at least in part, to this policy resulting in a further slow down in channel improvement dredging.

2.08 For purposes of this study, the projection of improvement dredging activity for New York Harbors bordering on LIS is expressed as a range over the 50-year projection period from 1985 to 2035. For the total New York study area, the projected range is zero to 10.3 MCY. A breakdown of each projection by New York coastal area is given in Table 2-3. The conservative end of the range for each coastal area is assumed to be zero improvement dredging, based on the trends and reasons discussed previously. It is recognized, however, that realistically some amount of future improvement dredging will probably take place. The liberal end of the projected range is based on average annual improvement dredged volumes over the historical period of record (1927-1979). This average is assumed to extend through the 50 year projection period. Actual future dredged material quantities from Federal improvement projects are likely to fall within this range. Also shown in Table 2-3 are the estimated average annual maintenance volumes associates with the improvement dredging.

2.09 For comparison to Connecticut, the Reconnaissance Report presented a projection of about 11.5 MCY for improvement projects and a corresponding average annual maintenance volume of 152,500 cubic yards (CY) for the same 50-year period in Connecticut (USCOE, 1979a). These figures are based on tentative new work projects by the New England Division Corps of Engineers.

TABLE 2-3

PROJECTED FEDERAL IMPROVEMENT DREDGING, 1985-2035

COASTAL AREA	PROJECTED RANGE (Thousand CY)	AVG ANNUAL MAINTENANCE (Thousand CY)	PERCENT
Westchester Co.	0 - 826	0 - 8.3	8
Nassau Co.	0 - 186	0 - 1.9	2
Suffolk Co.	0 - 420	0 - 4.2	4
LIS-New York City	0 - 2,573	0 - 25.7	25
LIS-New York Sub-total	0 - 4,005	0 - 40.1	39
New York City (Upper East River)	0 - 6,341	0 - 63.4	61
Total New York Improvement	0 - 10,346	0 - 103.5	100
Total Connecticut Improvement[a]	11,450.0	152.5	100

[a]Data from Table 2-2, Reconnaissance Report (USCOE, 1979a)

Maintenance Dredging

2.10 The Corps of Engineers maintenance dredging program in the LIS/New York study area has historically involved a much greater number of projects than under the improvement program but has resulted in less overall dredged volumes. Over the last 20 years, a total of 1.64 MCY has been dredged through maintenance as opposed to 5.43 MCY (Table 2-2) under the improvement program. For the 53-year period 1927-1979, Corps total maintenance dredging has been distributed as follows:

Westchester County	508,000 CY	13% of total
Nassau County	182,000 CY	5% of total
Suffolk County	338,000 CY	8% of total
LIS New York Subtotal	1,028,000 CY	26% of total
New York City	2,874,000 CY	74% of total
TOTAL	3,902,000	100% of total

2.11 Following the same trend, according to tentative plans for maintenance during the four years from 1979 to 1982, the total maintenance volume distribution becomes:

Westchester County	160,000 CY	17% of total
Nassau County	7,000 CY	1% of total
Suffolk County	70,000 CY	7% of total
LIS New York Subtotal	237,000 CY	25% of total
New York City	730,000 CY	75% of total
TOTAL	967,000	100% of total

2.12 To make valid projections for maintenance dredging activities beyond 1982, it is of interest to consider the main factors that have

regulated past maintenance work. Periodic maintenance dredging by the Corps of Engineers is necessary primarily to remove the sediment and silt that gradually accumulate in existing navigation channels. This sediment is derived from both marine and upland sources. Bottom sediments within LIS are continuously stirred up by storm induced waves and currents. The suspended sediments are transported into protected harbor areas (where most navigation channels exist) and settling occurs. Upland sources of sediment are derived from soil erosion and eventual transport through streams and rivers into the harbors of LIS. This source is considerably more important for Connecticut, where the estimated annual soil erosion loss to marine waters is about 80,000 tons, as opposed to about 35,000 tons for the entire New York vicinity of LIS (NERBC, 1973a).

2.13 The rate of sediment accumulation in the Harbors of LIS can be expected to remain roughly constant over time, as the sediment sources and transport processes are controlled by relatively repetitive seasonal climatological phenomena. Actual plans by the Corps of Engineers to perform a maintenance dredging project are determined through periodic channel bathymetry surveys and by consideration of the navigation difficulties and related complaints received from vessel operators and shorefront facility owners. Actual execution of a project depends on the available federal funds and approval by environmental regulatory agencies, i.e., EPA, based on a review of sediment quality characteristics.

2.14 Based on the importance of most existing Federal navigation channels for present and future vessel usage, the maintenance of these channels is expected to continue at about the same level of frequency as in the past (USCOE, 1980b).

2.15 The data on historical and planned maintenance activity for each Federal project in the New York study area, along with the long-term projections are presented in Table 2-4. In making projections for the

TABLE 2.4

FEDERAL PROJECT MAINTENANCE: HISTORICAL, PLANNED AND PROJECTED FROM 1985 TO 2035

		HISTORICAL MAINTENANCE (1927-1976)					PLANNED MAINTENANCE[a] (1979-1982)		PROJECTION PERIOD					
LONG ISLAND SOUND NEW YORK AREA	PROJECT (WATERWAY)	NO. OF PROJECTS	FREQ. (YEAR)	AVG. VOL./ PROJECT	AVG. ANNUAL VOLUME	LAST YEAR DREDGED	YEAR	VOLUME	NO. OF PROJECTS	YEAR OF 1st PROJECT (LAST PROJECT)	AVG. VOL./ PROJECT	AVG. ANNUAL VOLUME	CUMMULATIVE QUANTITY OVER PROJECTION PERIOD	YEARS BETWEEN PROJECTS
WESTCHESTER COUNTY	Portchester Harbor	5	10	38540	5750	1966	None		7	1983 (2038)	59142	5750	287500	10
	Milton Harbor	1	-	72600	-	1976	1981	15000	10	1986 (2030)	15000	3000	150000	6
	Mamaronack Harbor	5	15	27240	4050	1966	1980	145000	5	1994 (2040)	48600	4050	202500	15
	Echo Bay Harbor	1	-	7000	-	1931	None		None					
	New Rochelle Harbor	3	20[b]	33000	1640	1971	None		3	1990 (2047)	41547	1640	82000	20
Total					11440			160000	25			14440	722000	
NEW YORK CITY	Eastchester Creek	6	10	36820	4052	1974	None		7	1983 (2038)	37048	4052	202600	10
Outside LIS	Westchester Creek	8	5	119900	22067	1973	1980	150000	13	1984 (2032)	88268	22067	1103350	5
	Bronx River	7	6	72820	9842	1972	1980	80000	10	1985 (2030)	49210	9842	492100	6
	Flushing Bay & Creek	5	12[b]	113200	10807	1973	1981	450000	6	1984 (2039)	118877	10807	540350	12
	Harlem River	7	7	43130	5907	1973	82	50000	8	1988 (2030)	35440	5907	295350	7
	East River	8	8	39550	7140	1976	None		8	1983 (2032)	49980	7140	357000	8
Total					59815			730000	57			59815	2990750	

TABLE 2.4 (Continued)

LONG ISLAND SOUND NEW YORK AREA	PROJECT (WATERWAY)	HISTORICAL MAINTENANCE (1927-1976) NO. OF PROJECTS	FREQ. (YEAR)	AVG.VOL./ PROJECT	AVG. ANNUAL VOLUME	LAST YEAR DREDGED	PLANNED MAINTENANCE[a] (1979-1982) YEAR	VOLUME	PROJECTION PERIOD (1983-2033) NO. OF PROJECTS	YEAR OF 1st PROJECT (LAST PROJECT)	AVG. VOL./ PROJECT	AVG. ANNUAL VOLUME	CUMMULATIVE QUANTITY OVER PROJECTION PERIOD	YEARS BETWEEN PROJECTS
NASSAU COUNTY	Hempstead Harbor	3	11	40440	2337	1950	None		6	1983 (2033)	32333	2337	116850	11
	Glen Cove Creek	3	13	20140	1995	1965	79	7000	5	1991 (2039)	23944	1995	99750	13
Total					4332			7000	11			4332	216600	
SUFFOLK COUNTY	Huntington Harbor	2	6	12250	-	1941	None		None					
	Port Jefferson Harbor	1	-	37500	-	1945	None		None					
	Mattituck Harbor	8	5	34560	5980	1965	80	70000	13	1984 (2032)	23920	5980	299000	5
Total					5980			70000	13			5980	299000	

[a] Data provided by the Corps of Engineers, New York District.

[b] Calculated by dividing the number of years between the 1st and the last project by the number of intervals between the projects.

period 1985 to 2035, estimates of the number of maintenance projects to be undertaken in each Federal navigation project and the average volume dredged per maintenance project were made based on the historical data as indicated in Table 2-4. One case in exception is Milton Harbor in which planned maintenance data is used for projection due to lack of historical data. In addition, the annual average volume of dredged material removed through maintenance was estimated for each Federal navigation project from historical and planned projects. These figures were used to estimate the cumulative quantity expected to be dredged over the 50 year projection period for each Federal project.

Summary - Projected Federal Dredging

2.16 The Federal portion of the dredged material expected to be generated in the New York vicinity of LIS during the 50-year period from 1985 to 2035 is estimated to range between 4.2 and 17.2 MCY. Over 70% of this volume will originate in the New York City area. A complete breakdown of the projected Federal dredging is given in Table 2-5. The trend of the distribution of the projected total dredging volumes is the same as that for the historical and planned maintenance data. The large range in projected volumes reflects the uncertainty in the performance of future improvement projects (and associated maintenance work) for the reasons discussed earlier. Also shown in Table 2-5 are summary figures of projected Federal dredging for Connecticut harbors taken from the Reconnaissance Report. The Federal portion of the dredged material expected to be generated in Connecticut during the 50-year projection period is estimated to be about 39 MCY, as compared to about 1.4 to 6.4 MCY projected for New York harbors directly located on LIS.

Federal Disposal Methods

2.17 Analysis of the disposal methods data in Table A-1, Appendix A,

TABLE 2-5

PROJECTED FEDERAL DREDGING, 1985-2035

(Thousand CY)

COASTAL AREA	IMPROVEMENT RANGE	MAINTENANCE RANGE	TOTAL RANGE	PERCENT TOTAL RANGE
Westchester Co.	0 - 826	722 - 929	722 - 1,755	17 - 10
Nassau Co.	0 - 186	217 - 264	217 - 450	5 - 3
Suffolk Co.	0 - 420	299 - 404	299 - 824	7 - 5
LIS-New York City	0 - 2,573	203 - 846	203 - 3,419	5 - 20
LIS-New York Subtotal	0 - 4,005	1,441 - 2,443	1,441 - 6,448	34 - 38
New York City (Upper East River)	0 - 6,341	2,788 - 4,374	2,788 - 10,715	66 - 62
Total New York	0 -10,346	4,229 - 6,817	4,229 - 17,163	100 -100
Total Connecticut[a]	11,450	27,365	38,815	100

[a]Data from Table 2-4, Reconnaissance Report (USCOE, 1979a)

reveals that open water disposal has been preferred in most Federal projects in Westchester County, New York City, and Nassau County since 1926. Upland disposal had been utilized for these areas only before 1950. A summary of the disposal method used since 1961 is given in Table 2-6. In the almost 20-year period from 1961 to 1979, all of the material dredged from Federal projects in Westchester County, New York City, and Nassau County was disposed of in open water. Long Island Sound dumping grounds were frequently employed by these Federal projects for open water disposal except for the East River projects which utilized the Mud Dump site in the Atlantic Ocean. Suffolk County has used upland disposal (50% of which is for beach nourishment) since 1927 for all Federal projects except one (Huntington Harbor in 1935) which used open water disposal.

2.18 Similar to New York disposal, the disposal method most often utilized for Connecticut Federal projects was open water disposal, as shown in Table 2-6 for the period 1968 to 1977 (USCOE, 1979a).

2.19 During the data collection phase of this study, an effort was made to pinpoint the historical land disposal sites for each Federal project in the New York study area. Records indicating upland disposal location were very sketchy and incomplete. Five sites, however, have been identified at Eastchester Creek, Glen Cove Creek, Huntington Harbor, Northport Harbor, and Mattituck Inlet and are located on maps presented in Section 4. In addition, six land disposal sites used for Federal projects in Connecticut were given in Appendix B of the Reconnaissance Report.

Federal Dredging/Disposal Costs

2.20 The costs of Federal improvement and maintenance dredging projects, as indicated by contractor cost data obtained from Corps files, have risen steadily since the 1930's for both open water and upland

TABLE 2-6

DISPOSAL METHODS FOR CORPS OF ENGINEERS

DREDGING IN LONG ISLAND SOUND (1961-1979)

COASTAL AREA	TOTAL VOLUME[a]	DISPOSAL METHOD AND PERCENT OF TOTAL					
				OPEN WATER			
		LAND	%	LIS	%	MUD DUMP	%
WESTCHESTER CO	583	0	0	511	87.5	73	12.5
NASSAU CO.	7	0	0	7	100.0	0	0
SUFFOLK CO.	108	108	100.0	0	0	0	0
Subtotal	698	108	15.5	518	74.0	73	10.5
NEW YORK CITY	6,270	0	0	4,544	72.5	1,725	27.5
TOTAL NEW YORK	6,968	108	1.5	5,062	72.7	1,798	25.8
TOTAL CONNECTICUT[b]	3,024	1,171	39	1,821	60.0	0	0

[a] Volumes are in thousand cubic yards

[b] Data for Connecticut for period 1968-1977, from Table 2-5 of Reconnaissance Report .

disposal methods. This trend is shown in Table 2-7 on a per cubic yard basis. Project-specific cost data are included in Table A-1 of Appendix A.

2.21 Two important observations are apparent from the trends shown in Table 2-7. Firstly, costs for upland disposal have averaged about 30% to 50% of the costs for open water disposal. Secondly, the costs of open water disposal have more than doubled since the mid 1960's. This is primarily due to the necessity of transporting dredged material from LIS through the East River and New York Harbor to the Mud Dump in the New York Bight. For example, an improvement project (147,330 CY), in Milton Harbor in 1966 reporting a cost of $1.60/CY for material dumped in LIS over a transport distance of about 12 miles, or about 13 cents/CY/mile. A maintenance project (72,600 CY) in Milton Harbor in 1976 reported a cost of $6.69/CY for material dumped at the Mud Dump over a transport distance of about 47 miles, or about 14 cents/CY/mile. Transport distance is thus identified as a major consideration in controlling dredging/disposal costs for projects in LIS.

NON-FEDERAL PROJECTS

Historical Dredging

2.22 For purposes of comparison, over the 10 year period from 1968-1977, non-Corps dredging activity in the entire New York vicinity of LIS displaced about the same material volume attributable to the Corps, with 2.35 MCY and 2.53 MCY being dredged, respectively. Out of the total 2.35 MCY for non-Corps dredging, about 1.3 MCY was dredged from harbors directly located on LIS. This compares to a total of about 6.90 MCY dredged over the same 10 year period in Connecticut for non-Corps projects. A summary of the permitted dredging/disposal activity

TABLE 2-7

COSTS OF FEDERAL DREDGING IN LIS-NEW YORK[a] (1927-1976)

TIME PERIOD	# OF PROJECTS		COST PER CY				
	OPEN WATER	UPLAND	OPEN WATER AVERAGE	OPEN WATER RANGE	UPLAND AVERAGE	UPLAND RANGE	
1927-36	1[b]	5[b]	$1.52	NA	$0.39	$0.10-0.61	IMPROVEMENT
1937-46	1	4[b]	6.68[c]	NA	0.38	0.17-0.89	
1947-56	-	1	NA	NA	1.17	NA	
1957-66	2	1	1.64	1.21-2.06	1.59	NA	
1967-76	-	-	NA	NA	NA	NA	
1927-36	5[b]	7[b]	$0.65	$0.51-0.91	$0.54	$0.24-0.93	MAINTENANCE
1937-46	1	3	0.94	NA	0.46	0.16-0.78	
1947-56	3	4	1.97	1.24-3.00	0.98	0.62-1.31	
1957-66	7	3	2.24	1.60-2.73	1.10	0.81-1.23	
1967-76	3	-	5.10	2.64-6.69	NA	NA	

[a] Data from Table A-1, Appendix A

[b] Projects without cost data or disposal method are not included

[c] Unusually high cost for a 2700 CY project in Port Chester Harbor (1938)

since 1959 is given in Table 2-8 and a complete inventory of projects is provided in Table B-2 in Appendix B.

Projected Dredging

2.23 The data summarized in Table 2-8 can be used to identify trends in non-Corps dredging activities from which realistic projections can be made. Figure 2-3 presents a graph of annual total volumes dredged between 1959 and 1979 for New York harbors directly on LIS. Additional plots (Figures B-1 and B-2) showing temporal trends for each New York county bordering LIS are given in Appendix B. On each plot, dredged volumes associated with "new work" type projects are compared to volumes associated with maintenance type projects. For new work dredging, there is an obvious and significant trend of decreasing activity over time in each New York county. For maintenance dredging, however, the rate of dredging activity appears to have remained roughly constant over time, with a slight down turn noticeable in the mid to late 1970's.

2.24 There are at least two major factors contributing to the downward trend in improvement dredging. Firstly, by examining the reasons for dredging, it is apparent that during the 1960's significant shoreline development was taking place in the form of new and larger marinas, sewage treatment plants, and other waterfront industrial and commercial concerns. In fact, 84% of the improvement dredging that took place between 1959 and 1969 can be attributed to the following 11 projects:

YEAR	COUNTY	PROJECT	VOLUME (Thousand CY)
1963	Westchester	Pelham Bay Park	184
1959	New York City	Eastchester Creek-Co-op City	700
1959	" " "	College Pt. Yacht Club	1,260

TABLE 2-8

SUMMARY OF DREDGING/DISPOSAL IN LONG ISLAND SOUND COASTAL AREAS UNDER FEDERAL PERMIT, BY YEAR AND USGS QUADRANGAL (1959-1979)

LONG ISLAND SOUND NEW YORK AREA	USGS QUADRANGLE	YEAR AND PERMITTED VOLUME[a] (THOUSAND CY)																						ANNUAL AVERAGE	
		1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	TOTALS	1959-1979	(1969-1979)
WESTCHESTER COUNTY	Mt. Vernon		35.0	12.0	6.5	184.4	2.5	6.5	2.0	-	-	0.5	-	19.0	-	-	2.4	1.0	4.0	4.0	1.0	-	280.8		
	Mamaroneck	-	-	-	-	0.6	6.1	-	-	1.9	11.7	5.5	20.0	-	-	-	-	1.5	0.3	14.7	40.0	16.6	118.9		
	Glenville	12.0	-	-	-	4.5	-	-	-	17.4	-	12.4	-	-	1.0	7.5	-	-	-	-	-	-	54.8		
Totals	Improvement	12.0	35.0	12.0	-	184.4	-	6.5	-	17.0	-	-	20.0	4.0	1.0	-	-	1.0	0.3	4.0	10.0	11.6	318.8	15.18	(4.72)
	Maintenance	-	-	-	6.5	5.1	8.6	-	2.0	2.3	11.7	18.4	-	15.0	-	7.5	2.4	1.5	4.0	14.7	31.0	5.0	135.7	6.46	(9.05)
NASSAU COUNTY	Sea Cliff	32.7	10.5	22.9	10.0	-	177.5	6.8	4.0	117.7	87.5	-	-	1.6	4.0	4.0	1.2	0.3	-	14.0	22.6	0.23	517.5		
	Bayville	-	-	-	-	-	-	-	-	-	-	-	-	-	1.2	-	-	-	-	-	-	-	1.2		
Totals	Improvement	32.7	5.7	15.0	10.0	-	177.5	-	4.0	115.3	87.5	-	-	1.6	5.2	4.0	-	-	-	-	22.0	0.23	480.73	22.89	(3.00)
	Maintenance	-	4.8	7.9	-	-	-	6.8	-	2.4	-	-	-	-	-	-	1.2	0.3	-	14.0	0.6	-	38.0	1.81	(1.46)
SUFFOLK COUNTY	Lloyd Harbor	-	-	535.6	-	-	-	4.0	-	2.0	190.0	5.5	-	-	0.7	10.0	-	.44	21.4	-	-	1.2	770.84		
	Northport	700.0	3.0	-	603.5	9.0	1.2	19.25	32.0	-	7.5	-	-	35.0	-	-	-	-	65.0	7.1	-	2.5	1485.05		
	Mattituck Hills	-	0.5	-	0.5	-	-	20.0	22.5	-	-	-	-	-	-	-	-	-	0.05	-	0.1	2.6	45.65		
	Port Jefferson	347.0	53.83	50.3	-	59.65	1.0	-	9.7	104.5	17.0	-	-	-	0.8	-	-	31.3	8.2	-	-	-	683.28		
	Northport & St.James	-	70.0	766.0	-	-	-	207.1	-	-	-	-	42.0	200.0	-	-	-	-	-	-	-	-	1285.1		
	St. James	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	35.4	35.5		
	Wading River	-	-	-	-	-	-	-	-	-	441.5	-	-	-	-	-	-	-	-	-	-	-	441.5		
	Southold	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	-	-	-	.4	1.9		
Totals	Improvement	1047.0	119.3	535.9	4.0	2.0	1.2	24.0	42.7	102.0	616.5	5.5	-	-	-	-	-	1.3	3.2	-	0.1	0.6	2505.3	119.3	(0.98)
	Maintenance	-	8.0	816.0	600.0	66.65	1.0	226.4	21.5	4.5	39.5	-	42.0	235.0	1.5	10.0	-	32.04	91.45	7.1	-	40.9	2243.54	106.84	(41.81)
NEW YORK CITY[c]	Flushing (LIS)	700.0	-	-	-	-	-	0.85	-	-	1.3	-	4.1	2.0	-	8.0	5.0	-	2.1	-	0.4	-	723.75		
Totals	Improvement	700.0	-	-	-	-	-	0.85	-	-	1.3	-	4.1	2.0	-	-	5.0	-	2.1	-	0.4	-	715.75	34.08	(1.23)
	Maintenance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.0	-	-	-	-	-	-	8.00	0.38	(0.73)
SUB-TOTAL LIS, NEW YORK STUDY AREA	Improvement	1791.7	160.0	562.9	14.0	186.4	178.7	31.35	46.7	234.3	705.3	5.5	24.1	7.6	6.2	4.0	5.0	2.3	5.6	4.0	32.5	12.43	4020.58	191.46	(9.92)
	Maintenance	-	12.8	823.9	606.5	71.75	9.6	233.2	23.5	9.2	51.2	18.4	42.0	250.0	1.5	25.5	3.6	33.84	95.45	35.8	31.6	45.9	2425.24	115.49	(53.05)
NEW YORK CITY	Flushing (not on LIS)	1261.5	15.0	152	28.5	2023.0	50.5	-	13.7	11.5	-	155.0	218.3	55.0	-	1.2	499.4	95.0	-	-	-	0.8	4530.4		
Totals	Improvement	1260.0	-	132.0	13.5	2000.0	33.0	-	11.3	9.1	-	155.0	-	-	-	-	471.0	-	-	-	-	0.8	4085.7	194.56	(56.98)
	Maintenance	1.5	15.0	20.0	15.0	23.0	17.5	-	2.4	2.4	-	-	218.3	55.0	-	1.2	28.4	95.0	-	-	-	-	494.7	23.56	(36.17)
TOTAL OF N.Y. STUDY AREAS	Improvement	3051.7	160.0	694.9	27.5	2186.4	211.7	31.35	58.0	243.4	705.3	160.5	24.1	7.6	6.2	4.0	76.0	2.3	5.6	4.0	32.5	13.23	8106.28	386.01	(66.91)
	Maintenance	1.5	27.8	843.9	621.5	94.75	27.1	233.2	25.9	11.6	51.2	18.4	260.3	305.0	1.5	26.7	32.0	128.84	95.45	35.8	31.6	45.9	2919.94	139.04	(89.23)
CONNECTICUT TOTAL[b]		NA	NA	NA	NA	NA	NA	NA	NA	NA	85.3	652.5	1303.5	156.8	287.5	621.7	3029.0	165.7	113.4	482.8	-	-	6898.0		

[a] Does not include dredging projects having unspecified volumes.

[b] Data for Connecticut for 1968-1977, Table 2-7 of Reconnaissance Report.

[c] Data only for projects located east of Throgs Neck Bridge.

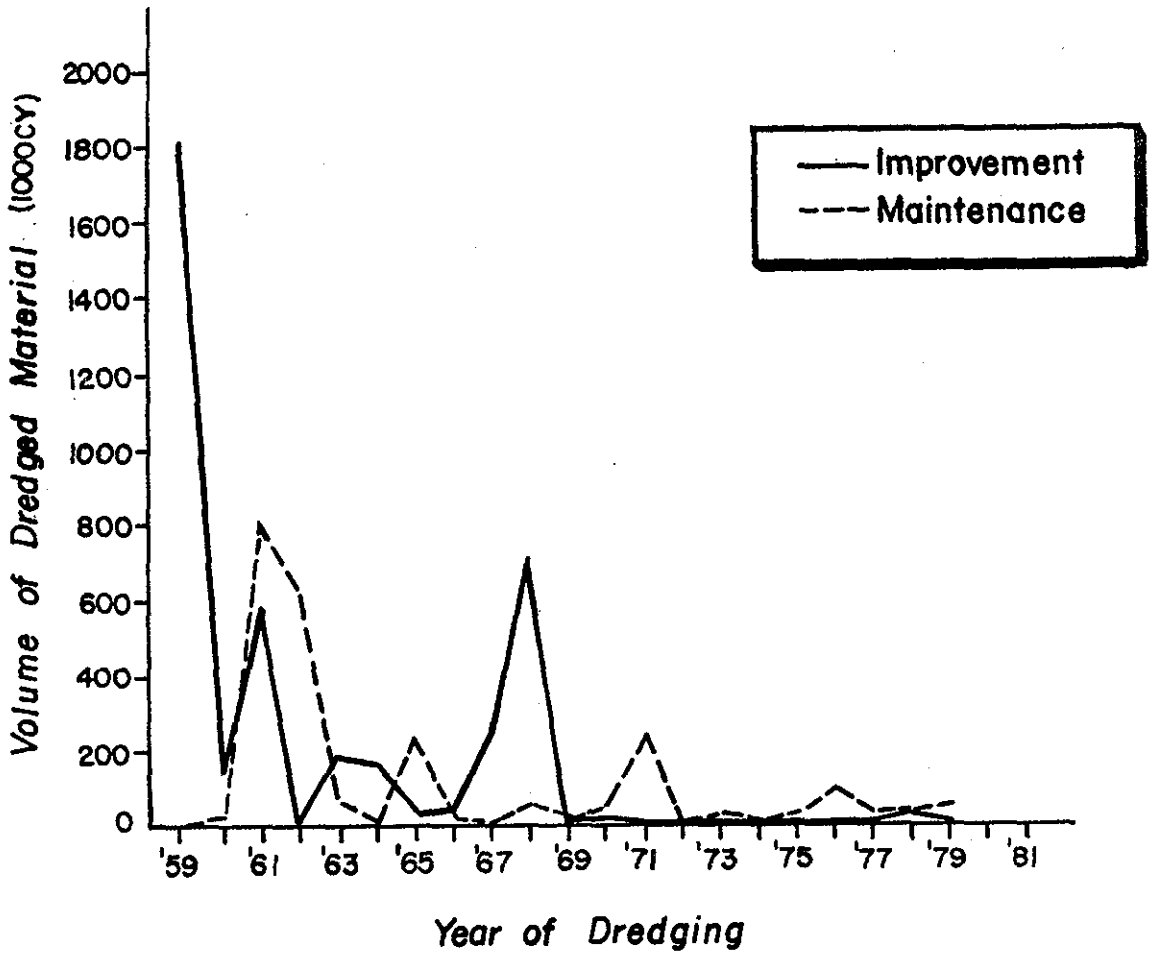


FIGURE 2-3 NON-FEDERAL DREDGING IN LIS-NEW YORK (1959-1979)

YEAR	COUNTY	PROJECT	VOLUME (Thousand CY)
1963	New York City	LaGuardia Airport	2,000
1964	Nassau Co.	Hempstead Harbor-Tappen Beach Park	170
1967	" "	Manhasset Bay-Town Park & Marina	70
1968	Nassau Co.	Hempstead Harbor-Roslyn Viaduct	50
1959	Suffolk Co.	Port Jeff Marina	347
1959	" "	Northport Bay Sand & Gravel	700
1961	" "	Huntington Harbor	500
1968	" "	Centerport Harbor	175

Improvement dredging since 1969 reflects a slow down in new major shoreline development. The largest improvement work project (22,000 CY) since 1969 in the New York vicinity of LIS occurred in 1978 in Nassau County in the Glen Cove Creek area of Hempstead Harbor. The second major factor affecting new work dredging appears to be a combination of recent high costs in dredging/disposal, lack of a convenient open water disposal site, and increasing environmental awareness, similar to that which has affected the Federal channel improvement program.

2.25 As discussed previously under Federal dredging projections, the present policies of the counties of Nassau and Suffolk on Long Island to minimize future dredging may further contribute to the establishment of a long term trend in lower dredging activity. This policy calls for consolidation of port facilities and maximum utilization of existing Federal channels and deep water areas along the north shore of Long Island.

2.26 In consideration of the uncertainty in future non-Federal improvement dredging activity, and in examining the trends in Table 2-8,

it appears appropriate to express projections of future non-Federal dredging activity as a range, similar to that done for Federal dredging projections. For improvement dredging, the conservative end of the range for each coastal area is based on annual average dredged volumes over the 11 year period from 1969 through 1979 (see Table 2-9). The liberal end of the range is based on annual average volumes over the 21 year period from 1959 through 1979. These annual averages (shown in Table 2-8) are assumed to extend through the 50 year projection period. An associated range in annual average maintenance volume has also been estimated as shown in Table 2-9. In addition, the projection of non-Federal maintenance dredging is determined based on the annual average maintenance dredged volumes over the 21 year period from 1959 through 1979 (see Table 2-8). As with Federal maintenance dredging, non-Federal maintenance dredging is expected to continue at roughly the same pace as in the past, for the same reasons discussed earlier.

2.27 For the total New York study area, the projected range of non-Federal dredging for the 50 year period from 1985 to 2035 is 11.1 to 31.1 MCY. As for Federal projects, the projected non-Federal dredging activity is highest in the New York City area, ranging from 4.7 to 13.3 MCY. A breakdown by New York coastal area is given in Table 2-9. Actual future dredged material quantities from non-Federal projects are likely to fall within these ranges.

2.28 For comparison to Connecticut, the Reconnaissance Report presented a projection of about 20.1 MCY for non-Federal projects for the same 50-year period in Connecticut, based on annual average dredged volumes figured over the 10 year period 1968 to 1977. This compares to a projected range of 6.4 to 17.7 MCY for New York harbors bordering directly on LIS (see Table 2-9).

TABLE 2-9

PROJECTED NON-CORPS DREDGING, 1985 to 2035
(Thousand CY)

COASTAL AREA	IMPROVEMENT		MAINTE-NANCE	TOTAL PROJECTED RANGE	PERCENT RANGE
	IMPROVEMENT RANGE	ASSOCIATED ANNUAL MAINTENANCE			
Westchester County	236 - 759	2.4 - 7.6	323	619 - 1,272	5.5 - 4
Nassau County	150 - 1,145	1.5 - 11.5	91	279 - 1,524	2.5 - 5
Suffolk County	49 - 5,965	.5 - 59.7	5,342	5,404 -12,800	48.5 - 41
New York City (LIS)	62 - 1,704	.6 - 17.0	19	96 - 2,148	1 - 7
Sub-Total-LIS	497 - 9,573	5.0 - 95.7	5,775	6,397 -17,741	57.5 - 57
New York City (Upper East River)	2,849- 9,728	28.5 - 97.3	1,178	4,740 -13,339	42.5 - 43
Total New York	3,346-19,301	33.5 -193.0	6,953	11,137 -31,080	100 -100
Connecticut[a]	NA	NA	NA	20,100	100

[a]Data from Table 2-8, Reconnaissance Report

Disposal Methods

2.29 In contrast to Federal dredging projects (see Table 2-6), the preferred disposal method for permitted non-Federal projects since 1959 has been land disposal. As Table 2-10 demonstrates, this is especially true for Suffolk County, where over 90% of material dredged since 1959 has been disposed of on land. In contrast, open water disposal has been favored in the New York City area.

TABLE 2-10

DISPOSAL METHODS FOR DREDGING IN NEW YORK

COASTAL AREAS ON LIS UNDER FEDERAL PERMIT (1959-1979)[a]

COASTAL AREA	TOTAL VOLUME[b]	DISPOSAL METHOD AND PERCENT OF TOTAL			
		LAND	%	WATER	%
Westchester County	455	354	77.8	101	22.2
Nassau County	518	399	77.0	119	23.0
Suffolk County	4,738	4,483	94.5	255	5.5
Subtotal	5,711	5,236	92.0	475	8.0
New York City	5,304	843	15.9	4,461	84.1
Total New York	11,015	6,079	55.0	4,936	45.0
Total Connecticut	4,018	2,259	56.0	1,759	44.0

[a] Does not include projects with unspecified volume

[b] Volumes are in thousand cubic yards

[c] Data for Connecticut for period 1968-1977, from Table 2-9 of Reconnaissance Report .

3. CONTAINMENT OPPORTUNITIES AND ALTERNATIVES

INTRODUCTION

3.01 The Reconnaissance Report presents useful information through a preliminary design analysis of large volume containment facilities as shoreline extensions, nearshore islands, and offshore islands. The present Interim Study supplements this information with a view towards identifying concerns related to DM characteristics, removal and transport of DM, engineering and design of reusable containment facilities, and environmental impacts of constructing and operating a containment facility.

3.02 A significant finding of the reconnaissance investigation was in regard to the relative potential of centralized, large-volume containment facilities designed to hold 50 years worth of dredged material projected for Connecticut Harbors. It was concluded that such containment islands would not generally be feasible for several reasons. Because sediments dredged from Connecticut harbors are predominately fine-grained sand and organic silts, considerable consolidation and dewatering within the containment facility would be necessary to create useable land. However, such a dewatering process would not be feasible for a deep water or offshore containment structure. The high cost of constructing and building upon such a facility would have to be justified by high revenue producing land uses that could greatly benefit from an offshore location. Also, because of the large surface area that would be required for a centralized containment facility in a nearshore or shoreline extension location, siting of such a facility in the nearshore region would be highly unlikely. Also of concern in shoreline and nearshore areas is the potentially adverse impact of constructing and operating a containment facility on the productive and sensitive ecological habitats typical of shallow nearshore coastal zones.

3.03 The reconnaissance investigation stressed that the feasibility of small-volume, localized shoreline extension containment facilities should be analysed in detail. Possible advantages of these types of facilities include: (1) high potential for site reuse for industrial, commercial or recreational expansion, (2) lower construction costs for smaller dikes, (3) greater engineering feasibility, although being costly, for design of a dewatering/densification program, (4) minimization of barge transport of dredged material, and (5) greater potential for siting a facility which requires less overall surface area. Possible disadvantages include: (1) higher overall cost of building several smaller containment facilities compared to one or two centrally located large-volume facilities, (2) difficulty in locating sites due to the ecological value of shallow, shoreline areas, and (3) need for compatibility for adjacent shore land use.

3.04 The remainder of the interim analysis presented herein focuses on opportunities and factors related to small-volume shoreline extension containment facilities for LIS. Detailed facility designs are not given at this time nor is it appropriate to do so. Instead, concerns related to the transport, placement, material consolidation, containment operation and associated environmental impacts are identified. Of special interest is the concept of reusable containment sites and material rehandling, with the desire to maximise economic and/or social benefits from such a facility operation. Section 4 of this report also presents an analysis of the feasibility of siting shoreline extension containment sites on publicly owned shorefront property and existing shoreline dredged material disposal sites along LIS in New York and Connecticut.

DREDGED MATERIAL CHARACTERISTICS

Importance of Physical and Chemical Characteristics of Dredged Material

3.05 The characteristics of dredged material (DM) determine sediment physical behavior during containment processing, define possible DM products

(rehandling), and determine the environmental impacts of containment. Sediment characteristics must be known adequately for proper location and design of containment facilities. This will require analysis of dredged materials and harbor bottom sediments on a case-by-case basis due to the high variability expected to occur from location to location.

3.06 The physical characteristics of dredged material are of interest mainly in the design and operation of containment facilities. These effects are presented in detail in the literature - Raster, et. al., 1978; Montgomery, et. al., 1978; Palermo, et. al., 1978 - and are briefly discussed below. The sediment particle size distribution establishes settling characteristics and, hence, required containment area dimensions. The specific gravity of solids affects settling and scour velocity of particles and, hence, settling basin design area and depth. This information, as well as the inflow rate of DM, are major data requirements for proper weir design and containment sizing. Moreover, the above factors (particle size distribution, specific gravities) are also needed to determine other properties of DM such as plasticity, shear strength, compressibility and permeability. These properties are important in estimating the foundation bearing capacity within the containment area. To obtain adequate foundation strength to support various possible reuses of the facility (parks, industry, commercial) will require considerable enhancement of sediment consolidation within the containment area. Dewatering and densification problems and techniques are discussed later in this section. The applicability of each technique depends largely on the DM characteristics, operational cost of the technique, and the rate of consolidation required.

3.07 The chemical characteristics of DM are of prime concern for environmental impact potential through plant uptake of toxic substances, contamination of groundwater and surface receiving waters from leachate and dewatering effluents, and direct contact with biological organisms due to

DM containment operations. Typical chemical/biological testing of DM characteristics includes (1) bulk sediment analyses, (2) elutriate tests, and (3) bioassay tests for selected marine species of local importance. The bulk sediment analysis (1) is used as an indicator of solids or soil quality after sediment solidification within the containment area. The soil quality, in turn, affects plant uptake of trace metals, nutrients, and other substances. The bulk sediment analysis also indicates the degree of effluent quality for weir overflow water, which determines the impact on surface receiving water quality. The elutriate test (2) determines the concentration of the soluble portion of the contaminants in the DM. Such information is useful in predicting groundwater contamination due to infiltration and quality of the weir overflow effluent. Since this study mainly concerns the shoreline extension containment alternative, wherein groundwater table head gradients are favorable for inducing flow away from potable water supplies, the problem of infiltration is not considered significant (except for reuse of dredged material for upland purposes). The bioassay test (3) involves the determination of the impact of DM disposal on sensitive local organisms. This impact is possible even for confined containment due to the dewatering processes. For a detailed description of the above tests and their limitation, see reports by MITRE, 1979 and Raster, et. al., 1978.

3.08 The physical and chemical characteristics of DM also determine the marketing potential of the material. The concept of dredged material rehandling has attractive advantages. For example, the DM (most likely through some processing) can conserve existing supplies of certain raw materials by serving as a supplemental or replacement source. In such instances, DM products can provide a financial return to partially offset the costs of the disposal operation. Table 3-1 is a list of typical major customers for DM products. Marketing potential also makes possible a smaller containment site due to reduced DM quantity. Such a reduction in quantity is important when selecting containment sites, especially when large sites are not available.

Table 3-1

Potential Major Customers For
Dredged Material Products

Customer	Typical Needs
Raw material suppliers (sand and gravel mining and processing operations)	Material needs dictated by consumer being served. Requirements might be as simple as clean, organically-free material; or as stringent as separated coarses with a particular grain-size cutoff.
Developers, construction firms	Landfill (classified and unclassified) subsidence fill, road embankments, earthfill dams, levees, shoreline restoration, aesthetic treatments (mounding, soil conditioner).
Mining industry	Fill and nutrient-rich cover for strip mines, quarries, underground mines.
Highway departments	Material for road base; fill for embankments; sand to spread on icy roads.
Asphalt and concrete plants	Sand for portland cement and asphaltic concrete mixes.
Solid waste agencies and private firms	Cover for sanitary landfill operations.
Environmental organizations and agencies (Corps, State environmental and natural resources bodies)	Material for wildlife habitat creation (wetlands, bird island).
Recreation agencies (local parks and recreation departments, Corps)	Fill for parkland development; beach nourishment.
Agricultural interests	Soil conditioner, nutrient-rich cover; fill for erosion-prone fields and streambanks.

(after Raster, et al. (1978))

Characteristics of Materials Dredged in LIS Waterways

3.09 The observed physical and chemical characteristics of sediments dredged within the harbors bordering LIS vary widely with location and time. Harbor sediments receive contamination from treated and untreated sewage discharges, industrial discharges, oil spills, urban runoff, and river discharges, depending on location. Within any given year, runoff from spring snowmelt or isolated precipitation events can drastically alter the sediment picture. Normal or low flows might be capable of moving only fine-grained particles; but the high discharges during floods can scour a river or estuary bed and transport even coarse-grained material long distances. Chemical/organic characteristics also will vary, but on a more predictable seasonal basis. Fertilizers, herbicides, and pesticides, for example, will be introduced into the sediments via runoff from agricultural areas.

3.10 The high variability in DM characteristics within LIS is demonstrated in Tables 3-2 to 3-5. Table 3-2 summarizes results of bulk sediment analyses for sediment samples from Connecticut coastal waterways. As shown, the range of the data is wide for each parameter of interest. Similarly, high variability is observed in Table 3-3 for New York waterways. Also shown in Table 3-3 is a comparison of bulk sediment analyses for Connecticut and New York areas. The Connecticut mean concentrations of trace metals are consistently much higher than those observed in New York sediments. This is probably due to the greater annual runoff and sediment loads that occur to Connecticut Harbors as opposed to New York Harbors, especially those on the north shore of Long Island where drainage basin size is relatively minor. Table 3-4 presents elutriate analyses for a number of New York harbors while Table 3-5 contains sediment distribution information in six Long Island north shore harbors. It is difficult to draw firm conclusions or trends from this very limited data set, but it appears in general that the percentage of sediment in the form of coarse sand and gravel tends to increase

Table 3-2

PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE DREDGED MATERIAL FROM CONNECTICUT COASTAL WATERWAYS[a] (BULK ANALYSIS)

PROJECT WATERWAYS ( )†	PHYSICAL PROPERTIES[b,c] SILT & CLAY,%	SAND & GRAVEL,%	METALS[c] PPM A_s	C_d	C_r	C_u	P_b	H_g	N_i	Z_n	V	OTHER ANALYSES[c] PPM OIL & GREASE	COD	TKN	PCB
Brandford Harbor (2,17)	100(C)	--	18.0	2.5	182.3	222.0	95.7	0.52	45.9	506.9	83.3	5080.0	100400.0	2640.0	=0
Bridgeport Harbor (2,23)	90(C)	10(B)	12.7	6.7	497.0	766.0	239.0	1.10	110.6	551.1	112.8	9232.0	149038.0	4725.0	0.08
Clinton Harbor (2,10)	40(C)	60(A)	7.9	3.9	89.6	173.5	253.5	1.30	56.2	1212.0	90.0	5293.5	115735.0	3264.0	=0
Connecticut River (7,32)	70(C)	30(B)	5.6	5.0	80.0	96.2	83.3	0.82	58.1	207.6	57.5	2396.0	102480.0	2540.0	0.112
Five Mile River (1,6)	100(C)	--	7.5	7.4	167.2	200.3	29.6	0.68	58.0	304.3	101.3	6988.0	137883.0	4268.0	0.3
Greenwich Harbor (1,6)	100(C)	--	7.8	10.1	137.5	302.9	345.3	1.87	99.4	518.6	133.7	9853.0	200800.0	5968.0	1.6
Guilford Harbor (2,13)	100(C)	--	10.6	3.1	100.0	122.0	76.0	0.41	79.2	223.0	78.0	7782.0	110446.0	3211.0	=0
Housatonic River (1,14)	10(C)	90(A)	402.7	--*	--	--	62.7	0.15	--	316.5	--	4944.0	220926.0	4207.0	--
Mianus River (1,5)	100(C)	--	18.2	16.0	153.5	305.6	372.6	1.37	110.0	443.0	112.5	5938.0	275825.0	5838.0	--
Milford Harbor (2,12)	75(C)	75(B)	16.9	11.2	202.4	409.0	213.3	1.10	88.4	433.2	77.0	7590.0	187113.0	4774.0	=0
New Haven Harbor (5,53)	80(C)	20(B)	8.5	3.6	198.0	260.0	136.5	0.82	65.6	306.7	71.1	4413.0	110767.0	4543.0	--
New London Harbor (3,39)	90(C)	10(B)	16.5	6.7	71.2	183.0	1265.0	1.93	67.9	658.8	88.7	6819.0	141659.0	2487.0	--
Thames River (2,17)	75(C)	25(B)	14.9	7.7	241.2	200.2	232.9	1.20	82.9	431.1	163.4	8118.0	238608.0	4435.0	0.65
Niantic Bay (1,7)	15(C)	85(B)	5.6	2.9	66.3	42.9	56.0	0.78	19.0	139.2	42.5	1515.0	57625.0	31180.0	0.3
Norwalk Harbor (4,43)	90(C)	10(B)	9.6	6.84	184.5	360.0	356.6	2.51	89.1	540.8	90.8	11313.0	215770.0	4255.0	--
Stoney Creek (1,3)	100(C)	--	5.2	1.8	61.0	85.3	49.7	0.243	38.5	160.0	62.2	693.0	56833.0	1433.0	0.0001
Westcott Cove	30(C)	70(A)	6.5	8.2	150.0	189.0	115.3	0.75	82.7	256.6	85.8	2886.0	94251.0	2295.0	0.90
Stanford Harbor (4,80)	90(C)	10(B)	14.7	36.4	367.6	1082.5	841.2	3.34	148.4	1630.0	102.7	27055.0	351000.0	8214.0	0.34
Patchogue River (2,14)	75(C)	25(B)	10.7	4.4	131.0	131.2	63.7	0.46	119.7	141.8	108.6	4382.0	131538.0	3665.0	--
Southport Harbor (1,5)	50(C)	50(A)	9.6	3.7	195.2	473.2	341.8	0.6	99.5	244.0	56.1	4505.0	138833.0	3147.0	--
Pawcatuck River (1,14)	70(C)	30(B)	--	--	--	--	215.5	1.61	--	275.9	--	2885.2	341000.0	69060.0	--
Range:			5.2-402.7	1.8-36.4	61.0-497.0	42.9-1082.5	29.6-1265.0	0.15-3.34	19.0-148.4	139.2-1630.0	42.5-163.4	693.0-27055.0	56833.0-351000.0	1433.0-69060.0	0.0-1.6

† (Number of Projects, Number of Samples)

a Data from Corps of Engineers, New England

b (A) Predominantly sands and gravels with less than 20% fines passing the No. 200 sieve with low organic contents,
(B) Predominantly sands and gravels with more than 20% fines passing the No. 200 sieve with minor organic contents, and
(C) Predominantly organic silts and clays.

c Values are averages for individual projects.

* Means N/A

Table 3-3

PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE DREDGED MATERIAL FROM NEW YORK VICINITY OF LIS (BULK ANALYSIS)

PROJECT WATERWAY ( )[c]	PHYSICAL PROPERTIES SILT & CLAY,%	SAND & GRAVEL,%	METALS PPM A_s	C_d	C_r	C_u	P_b	H_g	N_i	Z_n	OTHERS PPM OIL & GREASE	TOC	PCB
Eastchester Creek * ( )	56.0	44.0	7.2	2.7	79.4	153.8	263.2	1.1	40.1	267.1	5096.0	32500.0	0.1
Mamaroneck Harbor * ( )	79.4	20.6	8.8	2.6	73.7	171.7	226.0	1.3	37.5	308.2	48148.0	35600.0	-[a]
Milton Harbor * ( )	30.3	69.7	0.2	5.7	37.1	158.5	183.7	0.8	51.7	262.5	2483.0	31700.0	-
Hempstead Harbor (1,3)†	-	-	0.18	0.08	-	14.2	19.0	0.3	-	23.0	417.0	3900.0	-
Centerport Harbor (1,3)†	24.0	76.0	-	5.9	-	91.3	60.5	1.0	-	745.7	-	-	1.0
Old Glen Cove Creek (1,__)†	-	-	-	9.0	132.0	898.0	449.0	-	67.0	299.0	-	-	-
Manhasset Bay (Inner) (1,3)†	-	-	-	2.3	32.0	79.0	210.0	0.13	-	188.0	-	-	-
Mean, New York			4.1	4.0	70.8	224	202	0.8	49.0	299.0	14036.0	26175.0	-
Mean, Connecticut[b]			30.5	7.8	172.4	295.0	259.3	1.12	80.0	452.4	6650	-	0.33
Average Range, New York			0.18 8.8	0.08- 9.0	32.0- 132.0	14.2- 898.0	19.0- 449.0	0.13- 1.3	37.5- 67.0	23.0- 745.7	417.0- 48148.0	3900.0- 36600.0	- -
Average Range, Connecticut[b]			5.2 402.7	1.8- 36.4	61.0- 497.0	42.9- 1082.5	29.6- 1265.0	0.15- 3.34	19.0- 148.4	139.2- 1630.0	693.0- 27055.0	- -	0.0- 1.6

[a]-Indicates Unknown

[b] Source, Table 4.1

[c] (Number of Projects, Number of Samples)

* MITRE (1979)

† Source, Nassau and Suffolk Co., DPW

Table 3-4

PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE DREDGED MATERIAL FROM NEW YORK VICINITY OF LIS† (ELUTRIATE TEST)

PROJECT WATERWAY ( )[c]	PHYSICAL PROPERTIES SILT & CLAY,%	SAND & GRAVEL,%	METALS mg/l As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	OTHERS mg/l OIL & GREASE	TOC	PCB
Centerport Harbor (1, 3)	24	76	-[a]	0.04	-	-	-	0.001	-	-	-	-	0.001
Northport Harbor (1, -)	80	20	0.02	0.1	0.1	0.6	0.1	0.001	0.1	0.2	-	-	1.0
Nissequoque River (1, -)	2	98	0.02	0.1	0.1	-	0.5	*	0.1	0.2	-	-	-
Porpoise Channel (1, -)	*	100	0.02	0.1	0.1	0.1	0.5	*	0.25	0.25	-	-	-
Stony Brook Harbor (1, -)	*	100	0.02	0.1	0.1	0.1	0.5	*	0.25	0.25	-	-	-
Manhasset Bay (Outer) (1, 3)	-	-	0.002	0.001	0.01	0.003	0.01	*	0.025	0.01	-	-	-
Hempstead Harbor (1, 3)	-	-	0.002	0.001	0.005	0.004	0.008	*	0.006	0.003	-	-	-
Glen Cove Cr. (1,2)	-	-	0.002	0.021	0.05	0.083	0.143	0.004	0.115	0.052	36.0	-	-
Mean			0.012	0.008	0.07	0.15	0.25	-	0.12	0.14	-	-	-
Average Range			0.002-0.02	0.001-0.1	0.005-0.1	0.003-0.6	0.008-0.5	-	0.006-0.25	0.003-0.25	-	-	-

[a] -Indicates Unknown
[c] (# of Projects, # of samples)
* Insignificant
† Source, Suffolk Co. DPW and Nassau Co. DPH

Table 3-5

PHYSICAL CHARACTERISTICS OF SEDIMENTS IN NORTH SHORE BAYS OF NASSAU AND SUFFOLK COUNTIES, LONG ISLAND, NEW YORK

	Sediment Distribution (Bottom Deposits), % of Bay Area			
	Sediment Grain (Diameter)			
Waterways	Very Coarse Sand (1mm-2mm)	Coarse Sand (.25mm-1mm)	Fine Sand (.062mm-.25mm)	Mud ($\leq$ .062mm)
Little Neck Bay	3	3	4	90
Manhasset Bay	0	5	15	80
Hempstead Harbor	3	80	3	14
Huntington Harbor	30	0	35	35
Port Jefferson Harbor	10	40	5	45
Mt. Sinai Harbor	15	35	35	15

Source , Gross, et al. (1976)

from west to east along the north shore of Long Island. Also, on the average, sediments in Connecticut harbors are comprised of a much greater percentage of silt and clay when compared to New York harbor sediments. Again, it is stressed that results contained in Tables 3-2 to 3-5 are based on a severely limited data set. Only very general trends, as discussed above, can be drawn on the basis of these data.

3.11 It is strongly advised that more data be collected at all locations where major dredging activities are expected to occur. The sampling program must be planned carefully to ensure that the samples are representative and statistically significant. No final evaluation of the physical or chemical characteristics of DM can be made before an adequate data base is available. The undertaking of a detailed analysis of sediment characteristics and a market user's survey to determine the potential for rehandling and marketing of DM from LIS harbors will be of prime concern under further Stage 2 planning efforts.

REMOVAL AND TRANSPORT OF DREDGED MATERIAL

3.12 Past Federal dredging operations along the Connecticut coast have utilized Clamshell, Dipper, Hopper, Sidecast and Hydraulic dredge plants for removal of bottom sediments. Hydraulic dredge plants have been used exclusively for land disposal operations, usually over relatively short pumping distances (under two miles). All other types of equipment are normally used for open water disposal by barge or hopper ship. According to personnel in the Operation Division of the New York District Corps of Engineers, hydraulic dredges are utilized greater than 90% of the time for Federal projects within the New York District. Hopper dredges are primarily used which operate hydraulically with the dredged material pumped into bins aboard ship and then transported to an open water disposal site for dumping. Several major private dredging companies additionally operate in the LIS

area, using both mechanical and hydraulic dredges. These companies perform dredging under contract for Federal, State, Municipal, and private concerns.

3.13 Selection of dredging equipment and the transport mode to the containment facility can strongly influence the location and design of the site. The selection of the most appropriate dredge plant method for use in a program of containment operation in LIS includes the following considerations:

- Availability of Equipment;
- Production Capability/Operation Costs;
- Compatibility with Local LIS Conditions (sediment types, weather);
- Proven Experience Under Similar Operating Conditions;
- Removal Efficiency and Amount of Sediment Loss;
- Transport System Requirements; and
- Compatibility with Containment Disposal Operation.

As discussed in the Reconnaissance Report, hydraulic dredging with barge transport will be most compatible with containment operations. Hydraulic dredge plants utilizing floating pipelines are generally limited to about a 2-mile radius and would require the siting of a disposal site near each dredging project, which appears highly unlikely. The hydraulic pumping technique allows relatively efficient movement of DM from the dredge plant to a barge, and from the barge to a containment facility. The containment facility, in turn, must be designed to receive and process a sediment slurry of over 80% water content which is typical with the hydraulic dredging technique. Availability of hydraulic pumping equipment could pose a problem in that much of the appropriate equipment is foreign made and all Federal contracts require domestic equipment (USCOE, 1979a).

3.14 Dredge plant production capability and operating costs are extremely difficult to estimate due to variability in sediment consistency, depth of material dredged, distances covered, energy costs, weather effects,

varying loss rates of material, and quantity versus time requirements. Recent dredging/disposal costs for barge transport were quoted in the Reconnaissance Report as ranging from $3 to $5 per cubic yard in 1978 dollars for a haul distance of 30 miles. An increase in haul distance from about 15 miles to about 50 miles would result in an increase in cost from 15 to 20 percent. Historical dredging and disposal costs presented in Appendix A for Federal projects in New York generally support this finding.

3.15 Because of the number of interdependent variables associated with dredge plant operation and disposal transport, a systems approach is needed which can optimize and compare alternative combinations of dredge plant equipment, transport techniques, and disposal site locations. Techniques are available (USCOE, 1974) which could assist in identifying the least-cost system. These models consider existing and alternative dredge containment sites, present plant capabilities, and effects of increasing present plant capabilities and/or open selection of dredging equipment.

ENGINEERING AND DESIGN CONSIDERATIONS

3.16 The Reconnaissance Report has discussed the design of containment areas with emphasis on containment dikes. Preliminary cost and engineering analysis were presented for rock and sheet-pile circular-cell dikes which were considered to be most appropriate for the LIS region. It is assumed in this report that retaining dikes for land-extension type containment areas will be of rock or sheet-pile circular-cell construction or a combination of the two. Earth embankment dikes will probably be most cost-effective for interior cross or spur dikes and for any diking required on land.

3.17 The purpose of this section is to provide a cursory description of DM behavior during disposal, compaction and dewatering in a confined disposal area. It is essential to understand the behavior of DM after disposal so that optimum use of available containment area can be made and

environmental impacts of DM disposal can be minimized.

3.18 In past years, the design of DM containment facilities was based largely on local experience. Potential disposal sites were generally available and environmental impacts of disposal operations received little attention. Over the past 10 years, this situation has changed dramatically, particularly in the LIS region. Potential disposal sites are difficult to find and disposal operations must now be carefully planned to avoid major environmental impacts.

3.19 Availability of accepted methodologies has lagged behind the need. During 1976 to 1979, methodologies were developed for dealing with dredging and disposal problems. These methodologies are the results of the Corps of Engineers' Dredged Material Research Program.

3.20 The discussion presented in the following pages is a brief summary of many research tasks. The discussion in no way should be construed as a procedural method for designing containment areas. The discussion is designed to identify and roughly quantify the processes to be observed during disposal and dewatering operations and to present a brief summary of sizing techniques.

3.21 Once candidate disposal sites are selected, a detailed evaluation must be made of likely volumetric and temporal dredging scenarios and the physical characteristics of the sediments to be dredged. Containment facilities can then be designed employing the available state-of-the-art methodologies. The result will be well-planned disposal facilities with minimal environmental impact.

Bulking Factor vs. Detailed Design

3.22 The traditional method for estimating the required containment

volume of a confined disposal site is by the use of a bulking factor. This factor is simply the ratio of volume occupied by the in situ channel sediment to the volume that will be occupied by the same sediment in the disposal area. The bulking factor is thus an empirical estimate of: (1) the volume increase of the DM due to dredging, (2) the subsidence of the deposited DM surface due to consolidation, and (3) the subsidence of the containment area foundation soils.

3.23 The use of a bulking factor is not recommended for containment area design. The bulking factor does not consider effective site management, ambient climatological conditions, or the implementation of proposed dewatering techniques. Sizing of a containment area to accommodate the ultimate (dewatered) volume of DM precludes sizing from efficient solids removal and maintenance of low effluent suspended solids concentrations.

Containment Area Design for a Single Disposal Operation

3.24 The principle objectives in designing a DM containment area are: (1) to provide adequate storage capacity to meet dredging requirements, and (2) to maximize solids retention during the dredging operation in order to meet effluent suspended solids requirements. The following discussion of containment area design is based upon procedures developed by the Corps of Engineers Waterways Experiment Station as presented by Palermo, et al., 1978, and Montgomery, 1978. The method for area computation should provide removal efficiencies to produce an effluent suspended solids concentration of 1 to 2 grams/litre. The procedure results in the determination of:

- Design sediment concentration
- Area required for sedimentation
- Volume required for dredged material
- Thickness of dredged material at the end of the disposal operation
- Containment dike height
- Dredged material settlement due to consolidation.

Design Concentration

3.25 The design concentration C_d is defined as the average concentration of the DM in the containment area at the end of the disposal activity. The design concentration depends upon the settling characteristics of the DM and the average time for DM consolidation. The average time for consolidation is equal to one half the number of days of a disposal operation.

3.26 An example of the relationship of design concentration with time determined for a fine-grained sediment by Montgomery, 1978, is shown in Figure 3-1. The relationship must be prepared from sedimentation test data of the material to be dredged. The design concentration can be determined by entering Figure 3-1 with the average time for consideration.

3.27 The average time for consolidation depends upon the length of time of the dredging operation. This depends, of course, on the volume of sediment to be dredged, the size and type of dredge plant used, the production rate of the dredge plant, and the operating time per day. The length of time for a dredging operation should be estimated from records of past project dredging. If records are not available, the operating characteristics of the largest dredge plant which might be available for the project should be used to estimate the time requirement.

3.28 This method of estimating design concentration is most applicable to projects where a hydraulic dredge plant is used or where the DM is hydraulicly pumped from a barge to the containment area. For mechanical dredging operations, the actual sediment concentration in the disposal area should be higher than predicted. The following hypothetical example may apply to LIS.

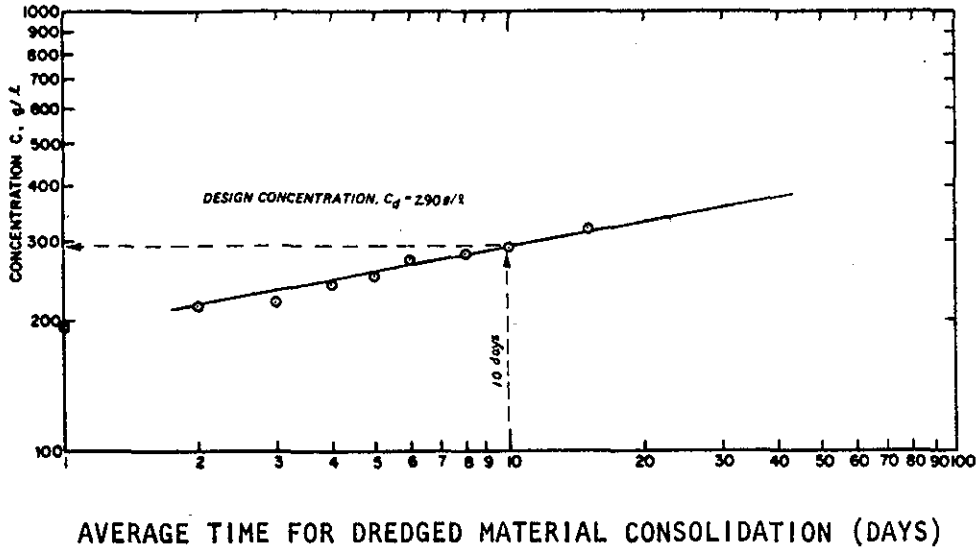


FIGURE 3-1 CONCENTRATION VERSUS TIME

- Project size 96,000 yd^3
- Dredge production rate 400 yd^3/hr
- Dredging time 240 hr
- Operating time per day 12 hr
- Operating days 20 days
- Average time for dredged material consolidation 10 days
- From Figure 3-1:
  Design concentration = 290 g/l or 18 lb/ft^3

Area Required for Sedimentation

3.29 The containment surface area required is computed by equation 3-1 (Palermo, 1978).

$$A = \frac{Q_i \; C_i}{S_d} \qquad (3\text{-}1)$$

where

A = containment surface area requirement, ft^2
Q_i = influent rate, ft^3/hr
C_i = influent solids concentration, lb/ft^3
S_d = design solids loading, $lb/hr\text{-}ft^2$

The design solids loading S_d is determined from the plot shown in Figure 3-2. The figure is constructed with data from settling velocity (v_s) test of sediments to be dredged. The figure is entered at the design solids concentration, previously determined. A line tangent to the curve is drawn from the design solids concentration value to an intersection with a solids loading value as shown in Figure 3-2.

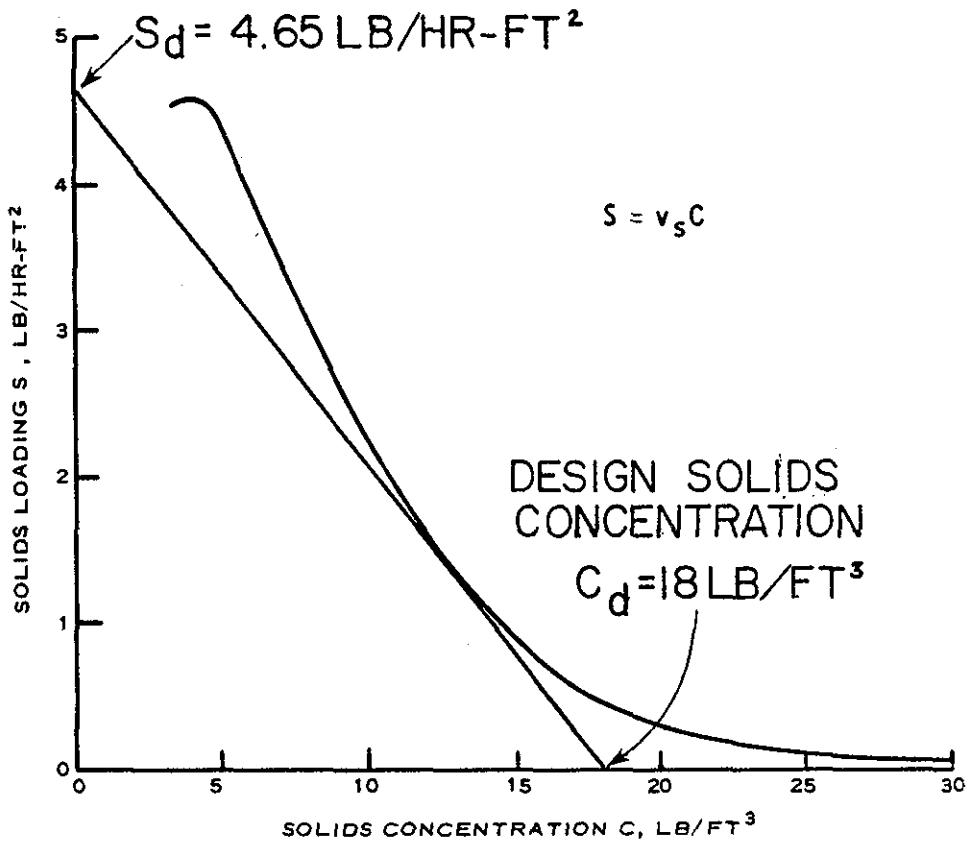


FIGURE 3-2 TYPICAL SOLIDS LOADING CURVE FOR DREDGED MATERIAL

3.31 The influent rate Q_i is determined from

$$Q_i = A_p V_d$$

where

A_p = cross-sectional area of the dredge pipeline, ft^2
V_d = velocity of the dredge discharge, ft/sec

Palermo, et al., 1978, also suggest C_i = 145 g/l or 9.2 lb/ft^3 in the absence of data.

Returning to equation 3-1:

$$Q_i = A_p V_d$$

V_d = 15 ft/sec
C_i = 9.2 lb/ft^3
S_d = 4.65 $lb/hr\text{-}ft^2$

$$Q_i = \frac{\left(\frac{14 \text{ in}}{12}\right)^2 \pi}{4} \times 15 \text{ ft/sec} = 16.04 \text{ ft}^3/\text{sec}$$

$$Q_i = 57{,}744 \text{ ft}^3/\text{hr}$$

$$A = \frac{57{,}744 \text{ ft}^3/\text{hr } (9.2 \text{ lb/ft}^3)}{4.65 \text{ lb/hr-ft}^2}$$

$$= 114{,}246 \text{ ft}^2$$

$$A = \frac{114{,}246}{43{,}560} = 2.62 \text{ acres}$$

3.32 Palermo, et al., 1978, caution that the initial calculated surface area is based upon laboratory data and must be modified to account for "nonideal" behavior of full-scale containment areas. For example, actual containment areas may have dead zones, as shown in Figure 3-3, that do not behave as effective surface areas. A correction factor of 2.25 is recommended to account for "nonideal" behavior. This factor is based upon dye tracer investigations performed in active containment areas (Montgomery, 1978, and Gallaghar, 1978). The design basin surface area becomes:

$$A_d = 2.25\ A = 5.9 \text{ acres} \qquad (3\text{-}2)$$

where

A_d = design basin surface area
A = area determined from equation 3-1

Estimate the Volume Required for Dredged Material

3.33 The surface area required for adequate solids removal has been determined. The total volume requirement must now be determined that will allow for DM storage, volume for sedimentation (ponding depth) and freeboard, as shown in Figure 3-3. The volume required for storage of the coarse-grained (> No. 40 sieve) material must be determined separately as this material behaves independently of the fine-grained (< No. 40 sieve) material in hydraulically-dredged sediments. The volume requirement computed below is for one particular dredging activity only. Additional computations are required to estimate the long-term volume for multiple-disposal activities.

3.34 The volume requirement is estimated with the following three steps:

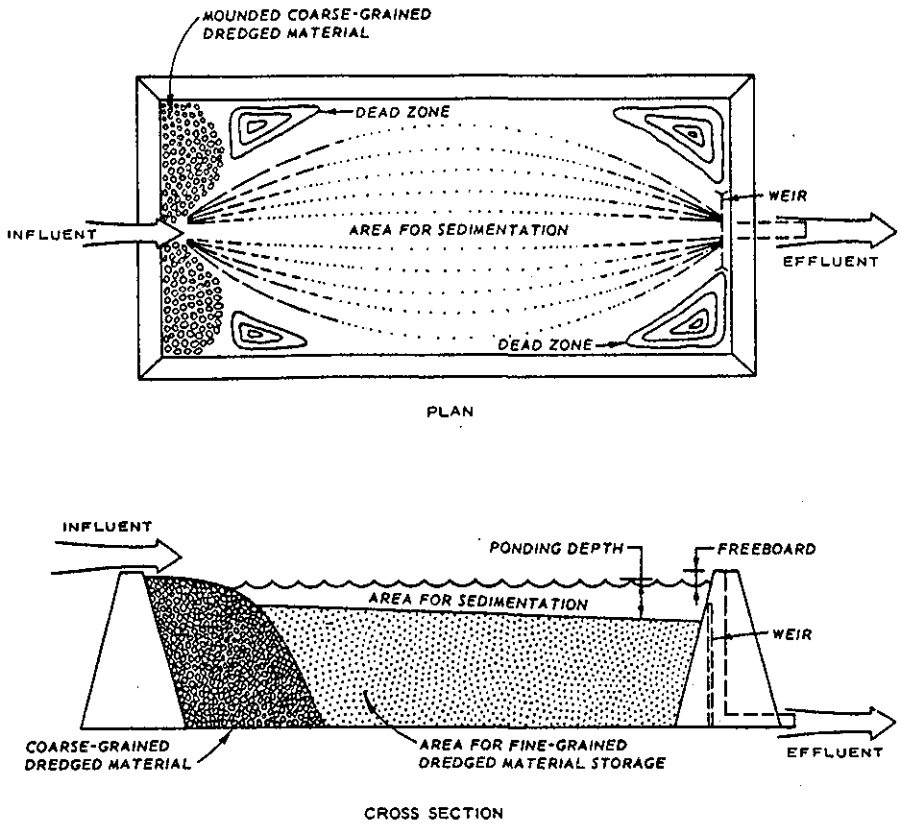


FIGURE 3-3 CONCEPTUAL DIAGRAM OF A DREDGED MATERIAL CONTAINMENT AREA

Step 1 - compute average void ratio by

$$e_o = \frac{G_s \gamma_w}{\gamma_d} - 1 \qquad (3\text{-}3)$$

where

e_o = average void ratio of the DM in the containment area after completion of the dredging operation

γ_w = density of water, g/ℓ

γ_d = dry density of solids, g/ℓ = design concentration C_d

G_s = specific gravity of solids

$$e_o = \frac{2.71\ (1{,}020\ g/\ell)}{340} - 1$$

$$e_o = 7.13$$

Step 2 - compute the change in volume of the fine-grained sediments after disposal in the containment area by

$$\Delta V = V_i \frac{e_o - e_i}{1 - e_i} \qquad (3\text{-}4)$$

where

ΔV = change in volume, yd^3

V_i = volume of fine-grained sediment to be dredged, yd^3 (estimated as 80% of project volume)

e_o = void ratio computed in Step 2

e_i = void ratio of sediment before dredging, estimated here as 2.5

$$\Delta V = (76{,}800)\ \frac{7.13 - 2.5}{1 + 2.5}$$

$$= 101{,}595\ yd^3$$

Step 3 - compute containment area volume requirement by

$$V = V_i + \Delta V + V_{sd}$$

where

V = volume requirement, yd^3

V_i = volume of fine-grained sediment, yd^3

ΔV = change in volume of fine-grained sediment determined in Step 2, yd^3

V_{sd} = volume of sand-sized sediment, yd^3

$$v = 76{,}800 + 101{,}595 + 19{,}200$$
$$= 197{,}595 \text{ yd}^3$$

Estimate the Thickness of the Dredged Material at the end of the Disposal Operation

3.35 The thickness of the DM at the end of the disposal operation can now be estimated simply by

$$H_{dm} = \frac{V}{A_d} \qquad (3\text{-}5)$$

where

H_{dm} = thickness of DM, ft

V = volume of DM in the containment area, ft^3

A_d = design surface area, ft^2

$$H_{dm} = \frac{197{,}595 \text{ yd}^3 \ (27)}{5.9 \text{ acres } (43{,}560)}$$

$$= 20.8 \text{ ft}$$

An allowance for ponding depth and freeboard (Figure 3-3) must be added to the thickness of the DM to determine containment dike height. Palermo, et al., 1978, recommend a minimum ponding depth of 2 feet and a minimum freeboard of

2 feet. The containment dike height in this example is, therefore, approximately 25 feet. Constraints may exist on the allowable dike height. The surface area must then be increased or the volume limited.

Dredged Material Settlement Due to Consolidation

3.36 Sediments deposited in a containment area have a relatively low density and high void ratio upon completion of sedimentation. Further decrease in void ratio is impeded due to excess pore water pressure in the sediment. The pressure will dissipate eventually and allow for further consolidation. The consolidation from dissipation of excess pore water pressures is referred to as primary consolidation.

3.37 Palermo, et al., 1978, present a method to compute settlement due to consolidation by estimating the change of void ratio due to self-weight loading. The average load is assumed to act at mid-height of the DM layer and is equal to the effective stress due to buoy and weight of the overlying material and is calculated by:

$$\overline{P}_f = \frac{H_{dm} (\gamma_w) \frac{G_s - 1}{1 + e_o}}{2} \qquad (3\text{-}6)$$

where

$\overline{P}_f$ = average effective stress acting at mid-height of the layer of DM solids, lb/ft^2

H_{dm} = thickness of the DM layer at the end of the dredging operation, ft

γ_w = density of water, lb/ft^3

G_s = specific gravity of solids

e_o = average void ratio of the DM in the containment area at the completion of the dredging operation.

3.38 The change in thickness of the DM in the containment area due to primary consolidation can be estimated using the following expression:

$$\Delta H = H_{dm} \frac{e_o - e_f}{1 + e_o} \qquad (3\text{-}7)$$

where

ΔH = change in thickness of the layer at the completion of primary consolidation, ft

e_f = average void ratio at the completion of primary consolidation.

3.39 The void ratio e_f corresponding to the effective stress $\overline{P}_f$ is determined from a plot of e versus log P as shown in Figure 3-4. The plot is constructed from the results of consolidation tests performed on the material to be dredged.

3.40 Solving equations 3-6 and 3-7 with values from the hypothetical example and a plot of e versus log P presented in Palermo, et al., 1978, gives a ΔH of 9.8 feet for settlement due to consolidation of the DM.

3.41 Additional settlement of the DM will be experienced due to settlement of foundation soil on which the containment area is placed. Foundation settlement can also be estimated by equations 3-6 and 3-7.

Determination of Long-Term Storage Capacity

3.42 The above design procedure can be applied to design a containment area with capacity and settling efficiency to accommodate one dredging event. For long-term storage for multiple dredging events, a phased disposal operation should be planned or a different sizing procedure must be applied to determine containment area requirements.

Phased Disposal

3.43 The concept of phased disposal is to completely contain the sediments from one or more dredging events within a portion of the total available

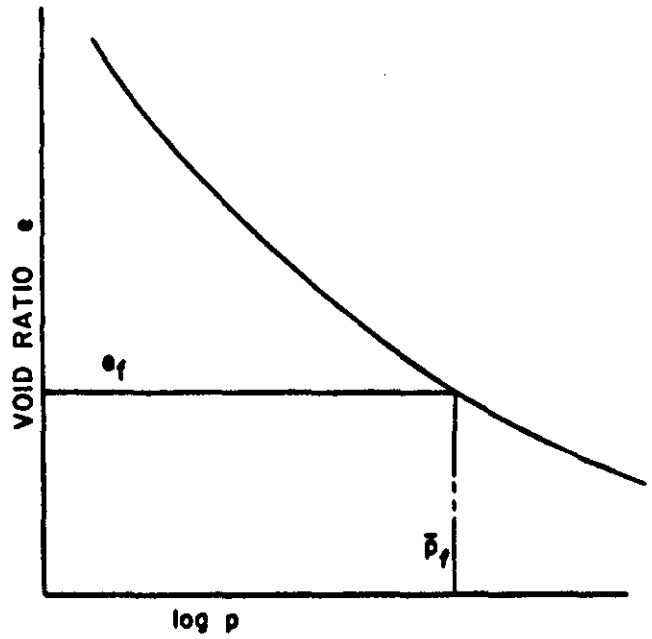


FIGURE 3-4 ILLUSTRATIVE PLOT OF VOID RATIO VERSUS LOG OF PRESSURE FOR NEWLY-PLACED DREDGED MATERIAL

containment area. The concept, as presented by Mann, et al., 1975, is shown in Figure 3-5. Spur or cross dikes are constructed within the disposal area so that one compartment is completely filled at the end of some specific time, such as one year or one dredging event.

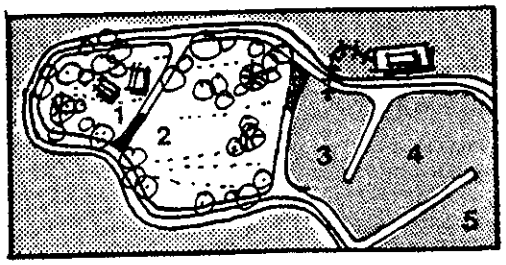


Figure 3-5 Illustration of Phased Disposal

3.44 Some advantages of phased disposal as compared to a single, large containment area are:

- Dewatering and area reuse can begin sooner
- Problems with ponded water are reduced.

Estimation of Long-Term Capacity

3.45 Where multiple dredgings are planned to be contained in one area, the minimum surface area computed for one dredging will not meet the long-term requirement. Either the containment dike height or surface area must be increased. Planning for greater surface area is generally more feasible than increasing dike height. Increasing the surface area in use will result in decreased sediment layer thicknesses, resulting in a greater degree of sediment consolidation between dredging operations. Palermo, et al., 1978, point out that the optimum surface area for long-term storage cannot be determined directly since the degree of consolidation is dependent upon layer thickness and loading, which is also a function of surface area. The solution must, therefore, be determined by trial.

3.46 Palermo, et al., 1978, recommend the use of a computer model developed by Johnson, 1976, to calculate the DM thickness (consolidation) over time with trial surface areas. The final result of the model runs is a plot of surface area versus service life as shown in Figure 3-6. The optimum surface area for a desired service life may be estimated from the plot. Also, if surface area has been constrained by land availability, the service life of the containment area can be estimated.

3.47 The advantage of a single containment area as compared to phased development is lower cost. The cost of spur and cross dikes is eliminated. The unit cost of the containment site must be increased to account for the volume occupied by the interior dikes.

Shape of Containment Areas

3.48 The shape and dimensions of a containment area must be considered from two aspects: (1) containment efficiency, and (2) the aesthetic quality of overall site development.

3.49 Short-circuiting is the most common and significant problem in DM containment areas. Short-circuiting reduces the effective residence time and settling area and increases the suspended solids concentration in the effluent. Insufficient ponding depth or improper location of the DM inlet pipe is generally the cause of short-circuiting.

3.50 Figure 3-7, from Walski and Schroeder, 1978, illustrates the problem of short-circuiting and possible solutions employing multiple weirs and spur dikes. Increased ponding depth will also increase containment area efficiency.

3.51 The most economical disposal site to construct is a large, square-shaped area. This shape is hydraulically inefficient; however, unless

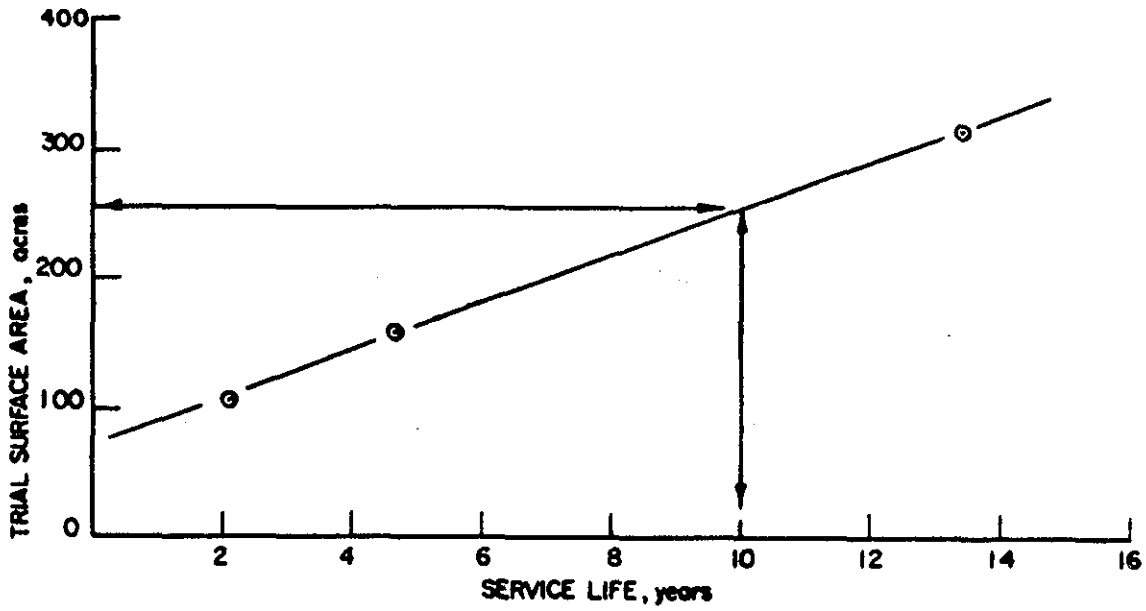


FIGURE 3-6 TRIAL SURFACE AREA VERSUS SERVICE LIFE

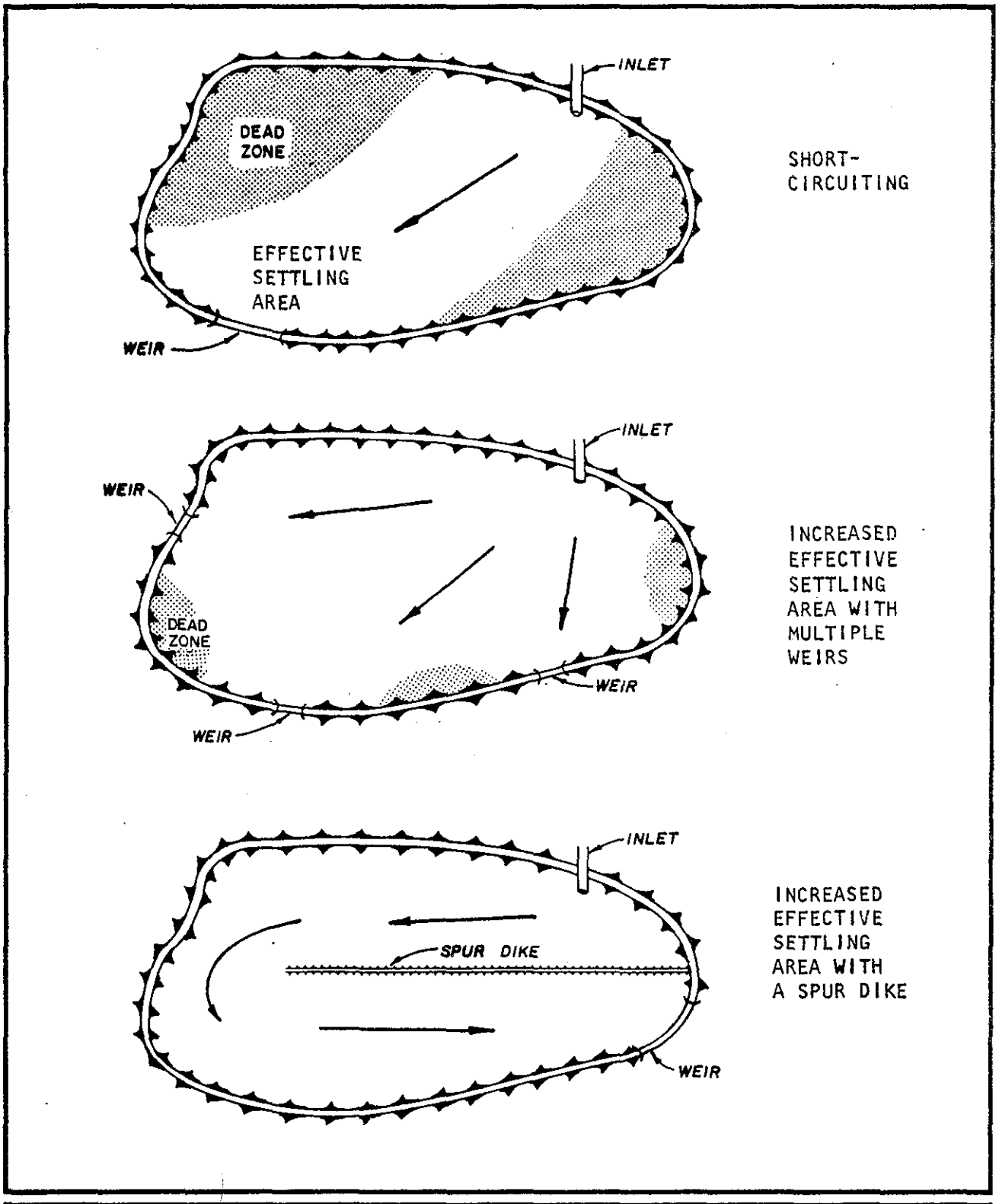


FIGURE 3-7 SHORT-CIRCUITING AND DEAD ZONES

modified by internal dikes. The most hydraulically efficient containment area is an elongated rectangular shape with flow paths parallel to the longer side of the rectangle. Hydraulically inefficient shapes (low length-to-width ratios) can be modified with spur dikes to maximize the effective surface area. Gallagher, 1978, cautions that care should be taken to guarantee that the spur dikes do not result in excessive localized contraction of flow. This condition increases flow velocity and disturbs the settling process.

3.52 Mann, et al., 1975, have evaluated aesthetic and design concepts applicable to confined disposal areas and develop guidelines and recommendations applicable to shoreline extension and island creation cases. Figure 3-8 presents some of the recommendations. The design quality and aesthetic character of the disposal area should be considered along with its engineering efficiency.

Containment Area Operation

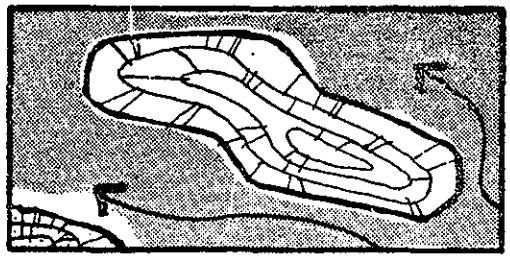
3.53 Adequate ponding and operation of the containment area during disposal is controlled by the outlet weir crest elevation. Palermo, et al., 1978, present six basic guidelines for weir operation to maintain adequate effluent quality.

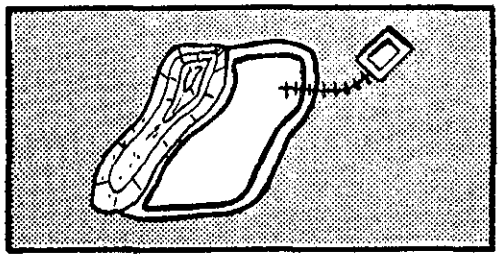
- If the weir is properly designed, intermittent operation should not become necessary until the required ponding depth cannot be maintained.

- The weir crest should be maintained at the highest feasible elevation to ensure maximum effluent quality.

- While operating the weir, floating debris should be periodically removed from the front of the weir to prevent increased withdrawal flows from greater depths.

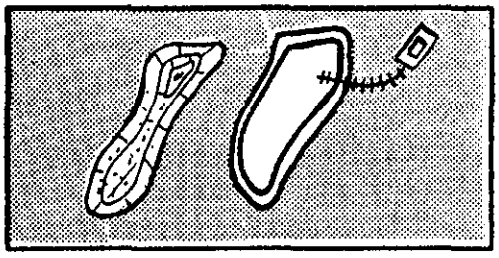
EMPLOY SIMPLE NATURALIZED PERIMETER TO ENHANCE VISUAL BLENDINGS OR SIMILARITY WITH ISLANDS AND SHORELINES.





Improper siting

WHERE CONDITIONS ALLOW, CONSTRUCT DISPOSAL FACILITY AT SUFFICIENT DISTANCE FROM NATURAL ISLAND TO AVOID DAMAGING AESTHETIC WILDLIFE, OR RECREATIONAL QUALITIES.



Proper siting

USE LEE OF EXISTING BREAK-WATER FOR PROTECTED DISPOSAL MATERIAL RETENTION STRUCTURE.

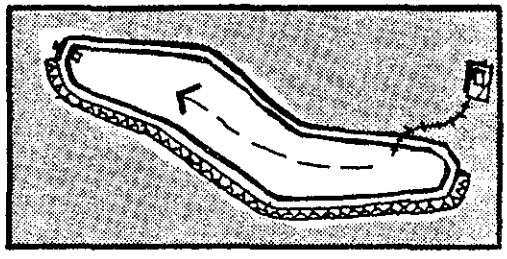
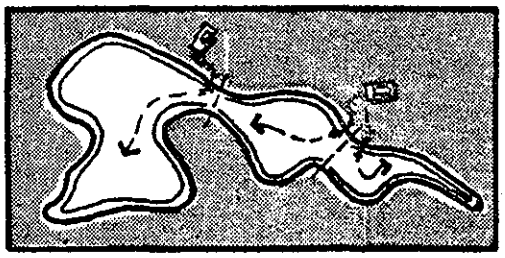
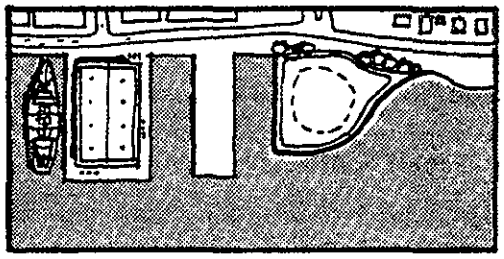


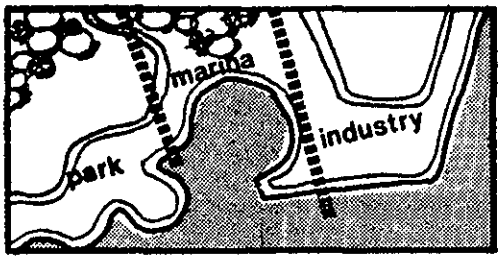
FIGURE 3-8 CONTAINMENT AREA DESIGN, CONCEPTS PRESENTED BY MANN, ET AL. 1975



DEVELOP ISLAND WITH COMPLEX, NATURALISTIC FORM FOR SPECIFIED REUSE PURPOSE.

USE MODIFIED NATURAL FORMS TO HARMONIZE WITH EXISTING BULKHEADS IN MIXED-USE WATERFRONT AREA.





PLAN PERIMETER CONFIGURATION AND SEGMENT AREA SIZES TO MEET INTENDED REUSE PLANS FOR MULTIPLE ACTIVITIES.

EMPLOY PERIMETER FORM CAREFULLY DESIGNED TO COMPLEMENT RECTILINEAR EDGES OF MIXED OR URBAN/INDUSTRIAL WITHOUT COPYING ITS RIGIDITY.

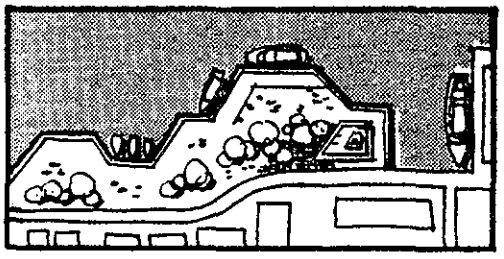


FIGURE 3-8 (CONTINUED)

- If multiple weirs or a weir with several sections is used in a basin, the crests of all weirs or weir sections should be maintained at the same elevation.

- If the effluent suspended solids concentration rises above acceptable limits, the ponding depth should be increased by raising the elevation of the weir crest. However, if the weir crest is at the maximum ponding elevation and the effluent quality is still unacceptable, the flow into the basin must be decreased by operating intermittently.

- The weir may be controlled in the field by using the head over the weir as an operational parameter since the actual flow over the weir cannot easily be measured.

Dewatering/Densifying of Confined Dredged Material

3.54 Upon completion of disposal operations, the DM continues settlement during primary consolidation. Water is brought to the surface of the consolidating material at a faster rate than can normally be evaporated. It is important that decant water and precipitation drainage through the outlet weir continue. Weir elevations may have to be lowered periodically as the surface of the DM subsides.

3.55 During this initial dewatering, the DM appears and behaves like a liquid. At some time, the rate at which water is brought to the surface will become smaller than the rate of evaporation. At this point, a thin drying crust or skin will form on the newly deposited DM. The crust will be less than an inch in thickness and exhibit drying cracks. This skin formation marks the end of the passive or decant phase of dewatering as described by Haliburton, 1978. Once the crust has formed, active dewatering can be initiated to improve surface drainage and accelerate dewatering.

3.56 If active dewatering is not initiated, a crust of a few inches in thickness will form and impede further dewatering. The purpose of dewatering is to create drainage channels through which water under the crust can be drained away. As the crust becomes thicker, the channels are deepened.

3.57 Complete dewatering of the dredged sediments area is not necessary if the site is to be used as a natural habitat or structures built on the site utilize pile foundations. Dewatering is necessary if the dredged material is intended for reuse. Dewatering increases settlement of the DM providing additional containment capacity.

3.58 Haliburton, 1978, has evaluated techniques for DM dewatering and recommends the progressive trenching method. The initial phase of this method employs one of three possible techniques and is started as soon as a crust forms on the DM.

- Periodic perimeter trenching by dragline
- Periodic interior site trenching by a Riverine Utility Craft
- Combination of the two procedures.

3.59 Dragline construction of trenches around the inside perimeter of confined disposal sites has been used for many years. This technique accelerates dewatering at the perimeter of the disposal site but is not effective in the center of the site. Also, the containment dikes must be designed to accommodate the dragline.

3.60 The Riverine utility craft, shown in Figure 3-9, or similar craft, is recommended for interior trench construction. During the initial phase, conventional low-ground pressure construction equipment cannot operate in the disposal area. The fluid consistency of the DM also prohibits trench construction to any significant depth. Forward or reverse motion of the Riverine utility craft causes two shallow depressions to be formed by the

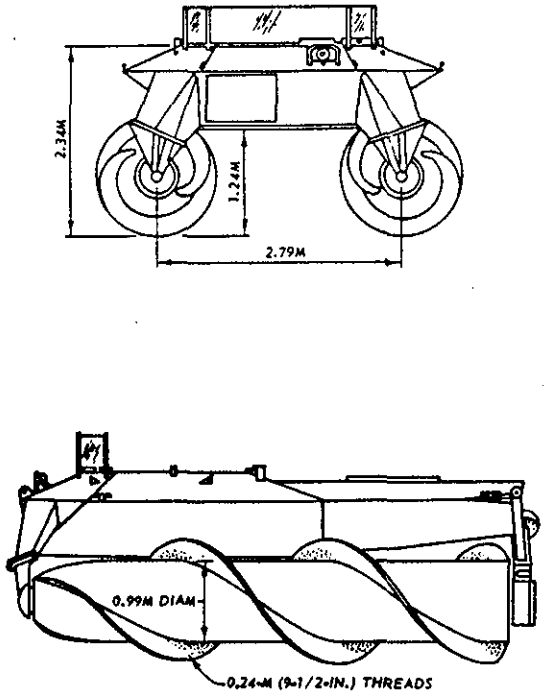


FIGURE 3-9 RIVERINE UTILITY CRAFT

twin archimedean screws. These depressions serve as effective drainage trenches. The vehicle conducts optimum trenching when it breaks through the surface crust and floats in the semi-liquid subcrust. The utility craft is effective for trenching until the crust is about 12 inches thick.

3.61 Once the surface crust thickness in the disposal site interior has reached 12 inches or more, it is usually possible for small conventional draglines on mats to traverse the disposal area.

3.62 It is important that an effective trenching program be followed until the desired depth of dewatering has been achieved. If the trenching program is continued, expressions developed by Haliburton, 1978, can be applied to estimate the depth to which DM will be dewatered H_i, the subsidence in the disposal area due to dewatering H_s, and the crust thickness H_{cr}. The formulations are based upon the water content of the DM and the evaporative water loss.

3.63 The depth of material that will be dewatered in a 12-month period can be estimated by:

$$H_i = \frac{W_{cd}}{W_{cr}} \left(\frac{\Delta W}{\frac{W_{cd}}{W_{cr}} - 1} \right) \left(1 + \frac{1}{0.01\, W_{cd}\, G_s^{\,2}} \right)$$

where

H_i = the depth to which the DM will be dewatered, inches

W_{cd} = average water content of the DM at the end of primary consolidation, percent

W_{cr} = average water content of the dewatered DM (crust), percent

ΔW = evaporative water loss, inches (equal to about 35 percent of annual pan evaporation which is about 40 inches in the LIS region)

G_s = specific gravity of the DM

The settlement experienced over the one-year period is given by:

$$H_s = \frac{\Delta W}{1 + \frac{P_{dc}}{100}}$$

where

H_s = depth of settlement, inches

P_{dc} = the percentage of total dewatering volume gain due to the volume of the space between desiccation cracks (in the absence of better data, assume 20 percent)

The crust thickness H_{cr} is then given by:

$$H_{cr} = H_i - H_s$$

3.64 Using data for a hypothetical fine-grained sediment and an annual evaporation rate of 40 inches, the following values are obtained. These values are a rough approximation of the result of a dewatering program at the end of one year.

- Dewatering depth, H_i - 22 inches
- Subsidence, H_s - 12 inches
- Crust Thickness, H_{cr} - 10 inches

This rough approximation indicates that DM deposited at an initial thickness of about 22 inches could be dewatered after one year. DM deposited in greater thickness will have a surface crust approximately 10 inches thick. The procedure given by Haliburton, 1978, can be used to estimate the total time required to dewater DM of greater depth.

ENVIRONMENTAL IMPACTS OF CONTAINMENT

3.65 The purpose of this section is to identify and discuss potential

environmental impacts associated with DM containment. The discussion is centered on the effects of containing polluted sediments and how these pollutants affect containment area effluent. The ramifications of sediment contaminants on area and material reuse are also discussed.

3.66 Data on the chemical characteristics of sediment to be dredged from the New York and Connecticut project areas are limited. Results of elutriate analyses are particularly limited. The elutriate test is designed to simulate the hydraulic dredging process and estimate the quality of a containment area influent. Chemical data from dredging projects located outside of the LIS region are, therefore, utilized to help estimate the quality of dredged sediments and containment area effluents.

Containment Area Effluent

3.67 The process of hydraulic dredging produces a slurry that is composed of approximately four parts water for each one part sediment. Thus, for each one million cubic yards of sediment dredged, five million cubic yards of slurry are pumped into a confined disposal area. About 60 percent of the slurry will leave the containment area over the effluent weir. The solids removal efficiency for a well designed containment area should be 99 percent. For fine-grained sediments, a volume of water approximately equal to the volume of sediments dredged will remain in the containment area. Figure 3-10 shows an idealized short-term water budget for a containment area.

3.68 After completion of dredging, some additional effluent will be generated during primary consolidation. Primary consolidation may continue for a period of a few weeks to months depending upon the nature of the material and climatic conditions.

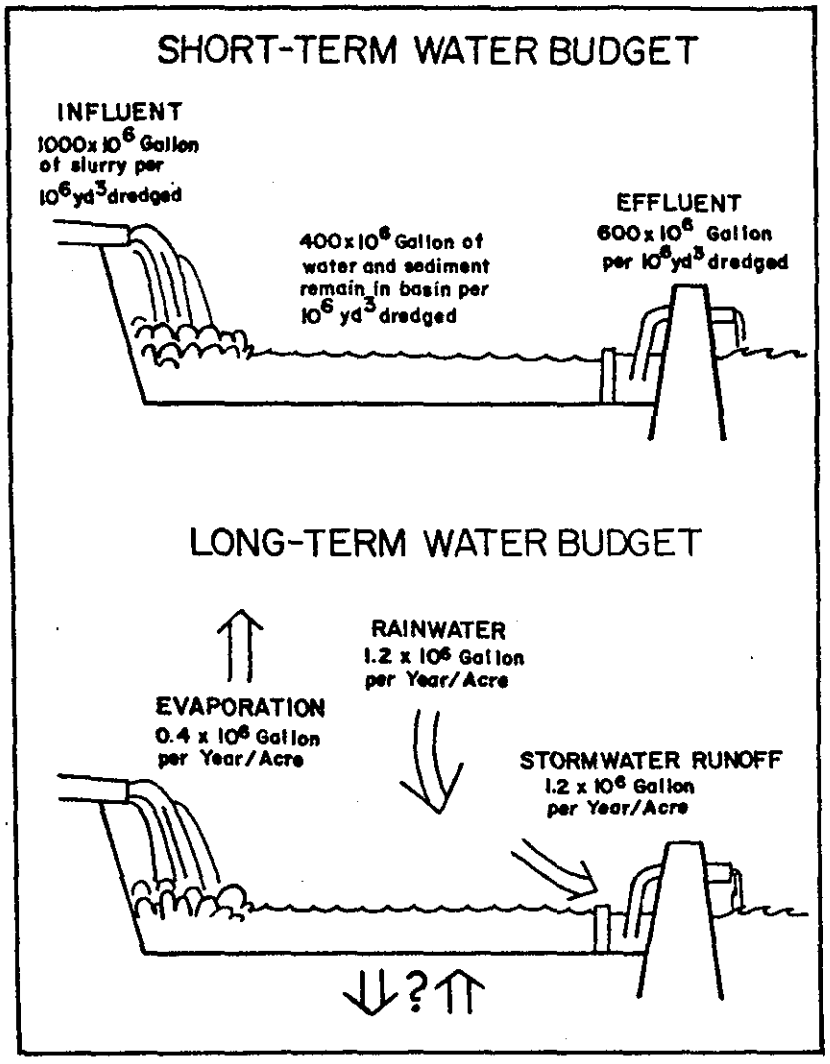


FIGURE 3-10 SHORT AND LONG TERM WATER BUDGETS FOR DREDGED MATERIAL CONTAINMENT STRUCTURE

3.69 Once primary consolidation is complete, loss of interstitial water will be by evaporation and percolation. Assuming an effective dewatering program is implemented, evaporative water loss equal to about 35 percent of Class A pan evaporation can be expected. Downward percolation of interstitial water is highly variable from site to site depending on local foundation soil and water table conditions. For shoreline extension projects, little percolation can be expected because of a water table controlled by sea surface elevation.

3.70 Runoff of rainfall will constitute a containment area effluent during the life of the containment area. As dewatering proceeds in the deposited DM, an intricate network of dessication cracks develops in the crust. Saturated DM lies at the base of the cracks. Rainfall flows through the crack network to the channels maintained by the dewatering program. Most of the rainfall can be expected to run off because of the saturated soil condition. Figure 3-10 also illustrates the long-term water budget for the containment site.

Effluent Quality

3.71 Pollutants in DM can be present in a variety of geochemical forms. Pollutants can be dissolved in the slurry discharged to the containment area, absorbed to mineral or organic sediment components, or incorporated into the crystal lattice of sediment mineral components.

3.72 The presence of contaminants in a sediment is not a direct indicator of the impact of containment area effluent disposal on water quality and aquatic organisms. Brannon, et al., 1976, have shown that nutrients and organics in sediment interstitial waters or absorbed by cation exchange and trace metals associated with poorly crystalline, amorphous Mn and Fe oxides, are the most mobile and potentially available contaminants in dredged material.

The elutriate test procedure which was developed to simulate the dredging process and measure these mobile forms is a useful tool for evaluating the potential for water quality impacts.

3.73 Some elutriate test results were presented earlier in this report for sediments from some Long Island, NY project areas. These sediments are mostly sand and gravel and, as such, are not representative of most sediments to be disposed of in containment areas. Data have been presented by Chen, et al., 1978, comparing containment area influent and effluent quality from seven DM containment areas across the country. DM influent to the sites ranged from 96 to 75 percent silt and clay size particles. These data are discussed below to provide an order-of-magnitude estimate of effluent pollutant concentrations. Large differences in pollutant concentrations can be expected where channel sediments have accumulated industrial wastes.

3.74 Table 3-6 presents the averaged influent and effluent concentrations and containment area removal efficiencies presented by Chen, et al., 1978. Effluent concentrations can also be compared to marine receiving water quality criteria recommended by EPA. While the pollutant concentrations may not be representative of New York and Connecticut channel sediments, the containment area removal efficiencies are indicative of the performance that can be expected. The following general statements can be made from the data presented in Table 3-6.

- The majority of the pollutant mass is associated with DM solids. Control of suspended solids is the most effective means of controlling effluent pollutant concentrations.

- Dissolved total phosphorus, iron, manganese, and oil and grease concentrations are reduced in the containment area. Removal rates for other constituents are low or concentrations increase.

TABLE 3-6 COMPARISON OF CONTAINMENT AREA INFLUENT AND EFFLUENT (from Chen, et al., 1978)

Parameter	Influent*		Effluent*		Removal Efficiency**		EPA* Criteria
	Total	Dissolved	Total	Dissolved	Total	Dissolved	
pH	-	-	7.5	-	-	-	6.5-8.5
Dissolved Oxygen	-	-	4.8	-	-	-	6.0
Nitrate-N	-	0.084	-	0.16	-	-90	-
Ammonia-N	-	21.6	-	15.1	-	30	0.4
Total-P	160	1.28	21.7	0.55	86	57	0.01
DDT	3.36	-	0.42	-	88	-	-
PCB's	3.75	-	0.15	-	96	-	-
Arsenic	0.73	0.0032	0.079	0.0046	89	-44	0.2
Cadmium	0.78	0.0047	0.032	0.0046	96	2	0.1
Chromium	-	-	0.032	0.025	-	-	0.1
Copper	4.99	0.020	0.48	0.021	90	-5	-
Iron	3,640	3.72	423	1.21	88	67	0.3
Lead	14.2	0.0032	1.82	0.0026	87	19	0.05
Manganese	59.4	2.86	13.2	1.95	78	32	0.1
Mercury	0.035	0.0017	0.0083	0.0012	76	29	0.1
Nickel	4.4	0.016	0.416	0.015	91	6	0.1
Selenium	3.10	0.0033	1.89	0.0026	39	21	0.01
Vanadium	3.98	0.018	1.15	0.013	71	28	0.5
Zinc	23.0	0.065	2.63	0.061	89	6	0.1
Oil and Grease	552	9.7	37	5.3	93	45	-
Organic Carbon	3,130	28.6	152	20.4	95	29	-

*Expressed in mg/ℓ (except pH)

$$** = \frac{\text{influent conc. - effluent conc.}}{\text{influent conc. x 100}}$$

- Concentrations of dissolved ammonia, total phosphorus, iron and manganese exceed EPA receiving water criteria.

- The average effluent dissolved oxygen concentration is below EPA marine receiving water criteria.

3.75 The actual impact and concentration of effluent dissolved pollutant loadings in the receiving water will depend upon tidal exchange at the containment site. Calculations by Weyl, 1976, indicate that the tidal exchange (flushing) maximum at the eastern end of LIS is 60 times greater than the minimum at the western end of the Sound. Local tidal exchange and flushing rates can vary considerably within the harbors and inlets along the coast of LIS, as well. Pollutants bound to suspended solids and discharged in the effluent will settle out at some distance from the containment area. The distance of particle transport will depend upon particle settling velocity, horizontal transport velocity and direction.

3.76 The data presented in Table 3-6 suggest that dissolved ammonia, total phosphorus, iron, manganese, oil and grease and organic carbon may represent the major pollutant loadings to LIS. The most significant of these pollutants is probably ammonia. Along with nitrate, ammonia is a nutrient element which may determine the total amount of phytoplankton in LIS (Pagenkopf and Bigham, 1977). Western LIS, which exhibits relatively low flushing and the largest municipal and industrial wastewater loading (Pagenkopf and Bigham, 1977), shows stressful levels of phytoplankton and nutrients. It will, therefore, be important to analyze for nutrient compounds in the elutriate test. The impact of nutrient loadings in containment area effluent can then be estimated for specific sites.

Containment Area Reuse

3.77 Walsh and Malkasian, 1978, evaluated the land usage of past DM containment areas. Examples were cited of former containment areas now being utilized as follows:

- Recreational (commercial and noncommercial)
- Industrial/commercial (including port development and residential)
- Agricultural
- Institutional
- Multiple purpose.

Recreational use and development of wildlife habitat was the most common type of area reuse cited.

3.78 The main constraint to area reuse will be determined by the engineering properties of the DM. In general, the higher the percent of clay-size material present, the lower the engineering quality of the DM will be. DM has been characterized in general by Bartos, 1977, as having a high water content, low dry density and low shear strength. Properties improve slowly with time and are generally better near the influent pipe than near the outlet. The engineering suitability of DM must be determined on a site-specific basis.

3.79 The potential for small volume, shoreline extension containment facilities as reusable sites appear to be more favorable than for offshore islands for several reasons. Firstly, since the containment site will be located in relatively shallow water (<15-20 ft. MLW), consolidation and de-watering of the confined sediments will be facilitated due to the reduction of "ponded water". Secondly, the option to create individual compartments within the overall diked containment area is realized. This will allow for

relatively fast turn-over of the containment area for other uses, with new compartments being continually added on to gradually expand the reusable area. Thirdly, adding additional and readily accessible shorefront land, in theory, should be especially desirable for expansion of existing water-related industry and ports (commercial or recreational), or for creating new or larger recreational lands in urban areas (Nassau County, New York City, Westchester County, Connecticut) where recreational facilities are limited.

3.80 Determination of the reuse potential of containment areas at any given location will involve consideration of local land use zoning, adjacent land use compatibility, industrial/commercial/recreational needs, transportation (ingress/egress) conditions, and the various potential economic, environmental and social beneficial and adverse impacts on the surrounding community. In a later section of this report, a preliminary siting methodology identifies factors related to area reuse potential, which are then included in a preliminary site screening and ranking exercise for publicly owned shorefront land on LIS.

3.81 Agricultural reuse of a containment area will be most sensitive to the quality of the sediments to be dredged. High soil salinity will probably preclude agricultural reuse for sediments dredged in LIS waterways.

Dredged Material Reuse

3.82 The possible rehandling and reuse of DM deposited in containment areas should be considered for each specific site. Potential reuse alternatives were discussed previously in Section 3, however most of these uses will probably be limited in the LIS area because of the fine-grained nature of sediments that may be placed in the containment area and the quality thereof. As in the case of area reuse, the engineering properties

and salinity of the soil will determine their potential usefulness as structural or agricultural fill.

3.83 The potential for DM reuse within LIS cannot firmly be determined without more thorough knowledge of sediment characteristics and existence of a market for material. Both of these factors are strongly interdependent in determining the reuse potential of DM, however each task can be executed independently, if necessary.

Selective Dredging and Reuse

3.84 The potential for area and material reuse may be increased by selective dredging or selective reuse of the dredged material. A variety of sediment types is generally encountered in any dredging project. In selective dredging, the sediments with the highest reuse potential are disposed of separately. In a confined disposal area, higher quality material can be deposited at one end, isolated by cross dikes or removed prior to deposition of lower quality material.

3.85 Selective reuse of dredged material can take advantage of the natural gradation of material in a disposal site. Coarser-grained particles will settle out rapidly and build up near the influent pipe. Thus, a relatively small volume of reusable material may be found in almost any containment area.

3.86 It is important to note that the concept of selective dredging is already in use to a great extent in LIS in terms of the beach nourishment disposal method. Simply put, areas dredged that are primarily coarse, clean sand are typically pumped by hydraulic pipeline to a nearby beach. The beach nourishment disposal method is especially predominant along the shoreline of Suffolk County, Long Island and will probably continue for future dredging operations in these and other areas.

4. PRELIMINARY SITING ANALYSIS

INTRODUCTION

4.01 Previous sections of this study have examined historical dredging operations, dredging projections, and issues determining the overall feasibility of dredged material containment in LIS. Perhaps the most critical issue, and the one that is most difficult to analyze, is the location of a containment facility. The Reconnaissance Report recognized severe engineering and economic limitations in the design and operation of large-volume, offshore (deep water) containment structures. The need for determining the merit of small-volume shoreline containment facilities was stressed. This section presents a preliminary siting analysis for shoreline extension containment opportunities in LIS. A review of alternative siting methodologies is given and a preliminary technique consisting of primary and secondary screening (ranking) criteria is developed. These criteria consider engineering, economic, environmental, social (public health, welfare, acceptability, etc.) and legal/regulatory factors. The methodology is applied to LIS, limited to consideration of relatively small-volume shoreline extension containment facilities adjacent to publicly-owned shoreline.

It is recognized that the results of the siting analysis are mainly for demonstration purposes since the private shoreline (i.e., primarily industrial and commercial) has not been considered. Based on results of this study, recommendations for further modification of the siting methodology will be made for detailed application during the Stage 2 Corps planning process.

GOALS AND OBJECTIVES

4.02 Planners often use the terms "goal" and "objective" interchangeably, though they both represent distinct concepts in the planning process.

In this study, the word "goal" is used to signify the largest set of purposes to which the decision-makers are committed and is usually considered an abstract statement of values. Objectives comprise subsets of the goal and serve to clarify, delineate, and support the stated purposes. Additional stages of specificity make up, in turn, the objective, stated in terms of "principles" and standards. The matched set of planners' jargon resembles a pyramid, from which all future planning flows, as shown below:

GOAL

OBJECTIVES

PRINCIPLES

STANDARDS

4.03 The single all-encompassing goal of COE responsibility in LIS is the maintenance of navigable waterways, as stated in the River and Harbor Act. This goal is broad enough to suggest a great many alternative actions, some of which may be too hastily discarded before receiving a thorough evaluation. It is important to keep in mind the scope of the overall goal and to bring decisions back to this comprehensive level as frequently as possible. All too often, poor decisions are made on a localized level without the benefit of the big picture.

4.04 A number of sub-goals attend the grand goal, of which this study addresses one: to maintain navigable LIS waterways by dredging. The activity of dredging creates an additional problem of disposal: where should the dredge material be placed after being removed from navigable waters? Tentative objectives addressing this problem consider engineering, economic, environmental, social, and legal/regulatory issues. Principles and standards are discussed below under each objective for illustrative purposes; it is still too early in the planning process to confidently present a complete list of principles and standards. The

finalization of project goals should be a primary activity of Stage 2 planning.

Engineering Feasibility

4.05 Construction planning should include considerations of:

- Containment Capacity and Life Expectancy;
- Access (ingress and egress conditions);
- Structural Foundations/Site Stability;
- Treatment of Dredged Material;
- Time to Implement; and
- Maintenance and Monitoring.

Optimize Net Economic Benefits

4.06 Principles addressing the reasonableness of costs with respect to expected benefits include:

- Minimize Construction Costs and Capital Investment;
- Minimize Operations and Maintenance Costs;
- Ensure that Services and Benefits will Justify Costs; and
- Maximize Indirect Economic Benefits, Where Possible.

Protection of the Natural Environment

4.07 Principles related to the determination of adverse environmental impacts include:

- Physical Environment (shoreline erosion, physical alteration, navigation);
- Biological Environment (finfish, shellfish, lobsters, etc.); and

- Chemical Environment (water quality, air quality, toxicity).

Protect the Overall Public Interest

4.08 Public interest factors include two broad categories: (1) public health and welfare considerations, and (2) social acceptability considerations. Public interest factors under these categories include:

(1) Public Health and Welfare;
- Nuisance Factors (odors, noise, night lights, and indirect disturbances);
- Public Safety;
- Impacts on Air and Water Quality;
- Direct or Indirect Exposure to Contaminants (bathing, shellfish/ fish consumption, etc.);

(2) Social Acceptability;
- Impact on Property Values;
- Land Use Compatability;
- Impact on Cultural Resources;
- Impact on Employment Levels; and
- Energy Consumption.

Address Legal/Regulatory Considerations

4.09 Primary applicable Federal statutes which apply to dredging, transport, and disposal of dredged material include:

- Section 404 of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500; 33 U.S. C. 1344);

- Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (PL 92-532; U.S.C. 1413);

- The River and Harbor Act of 1899 (33 U.S.C. 401, et seq.); and

- The Fish and Wildlife Coordination Act (16 U.S.C. 742a, et seq.).

4.10 Reviewing and selecting objectives, principles, and standards requires a great deal of coordination (i.e., workshops) among concerned agencies, institutions, groups, and individuals. Including potential opponents to the project is especially important at this early stage of planning because of the value of their input and possibly of avoiding future conflict. The Council of Environmental Quality has stated the need for early coordination of planning in the Environmental Impact Statement process and has designated "scoping" procedures as a means of identifying conflicting objectives, principles, and standards.

REVIEW OF SITE-SELECTION METHODOLOGY

4.11 The goals and objectives will guide the selection of a suitable plan for dredge material containment in LIS through a review of candidate sites. Alternative sites can be identified using a large variety of proven methods, each with its own set of benefits and drawbacks. Selection of an appropriate review method is the next step in the planning process, for which simple guidelines have been drawn. A number of characteristics which the chosen methodology should possess have been identified.

4.12 The site-selection method should be comprehensive, addressing those concerns contained within the stated goals and objectives. It is important to consider the viewpoints of all concerned with dredge spoil containment and to approach the problem at a level that will not overlook potential solutions. The methodology must also be reproducible, allowing diverse groups to systematically follow the logic and reasoning behind a proposed plan. Under apparently similar circumstances, two decision-makers might make very different locational choices without the benefit

of knowing how each was derived. The selection method should be simple in concept, possessing a level of complexity suitable to the problem and be specific to that problem. Finally, the method should rely upon verified techniques that have been accepted by the scientific community as being appropriate to the problem at hand. In sum, the site-selection methodology adopted for this study should be:

- Comprehensive;
- Reproducible;
- Appropriate in complexity;
- Problem-specific; and
- Proven.

4.13 The problem of finding the best location for containment facilities in LIS is familiar to market analysts who deal with questions of location and allocation. The siting of hospitals, shopping centers, and wastewater facilities to name a few examples, deal with similar objectives and constraints. The problem is seemingly straightforward in the fact that the desired plan will locate facilities so as to limit construction and travel costs, protect the environment, and assure human safety.

4.14 The difficulty in siting a containment facility(ies) lies in the existence of several interdependent variables and/or alternatives. The types of disposal facilities appropriate to dredge spoil containment have been discussed elsewhere and may range in a comprehensive view from open ocean containers to upland disposal. The number of facilities can also vary. At an extreme, one structure could be designed to receive material from all public and private dredging within LIS. At the other extreme, hundreds of containment facilities could be located very close to the sites of dredging. The size of the facilities could vary and would likely be proportional to the number of structures proposed to handle the future volumes of material. Finally, the location of the facilities could

conceivably vary throughout the LIS region, depending upon the type of facility selected. The problem of location, then, is linked with four interdependent variables:

- Type of facility;
- Number;
- Size; and
- Location.

The methodology selected to answer the question of the best location must deal effectively with these variables.

4.15 A brief review of site-selection methods and tools available for use in this study is given below, ranging from the simple to the complex. For the sake of brevity, no attempt has been made to include all pertinent methods. Such a discussion rightfully belongs in a Methods Trade Study, recommended for Stage 2 planning. The purpose here is to acquaint the reader with the tools available for identifying and evaluating potential sites.

Trial and Error

4.16 A number of alternative conditions may be derived by trial and error that address the variables involved. Each may be tested until an apparently satisfactory solution is achieved. Trial and error methods may be acceptable if it can first be shown that only a few combinations of types, number, sizes, and locations comprise the set of solutions. Demonstrating this fact may involve further, more complex analysis. Alternatives are tested by seeing which best fits the objectives established for the program, and a ranking of the options would result. Construction of a partial facility may be acceptable on a trial and error basis, with additional structures being built at a later date to satisfy project objectives.

The trial and error approach has the advantage of limiting up-front expenditures for comprehensive planning, and simplifying the site selection process. The method has been used extensively by public and private concerns. For example, sound business practice has frequently called for locating a facility close to another of the same type with the aim of taking advantage of the same locational attributes.

4.17 While being simple and economical, trial and error methods fail to satisfy most concerned groups and agencies when dealing with large-scale, permanent structures. Results can rarely be reproduced and may come under fire from opponents rightfully wishing to see a comprehensive approach. Unforeseen problems may require additional expenditures for correction, which will reduce the net benefits of the trial and error method. Most importantly, standard procedures for COE-sponsored projects emphasize comprehensiveness not available with the trial and error technique.

Intermediate Tools

4.18 Techniques are available for transforming geographical data into more useful information for analytical studies. Decision-makers are less interested in exact distances and routes of transport, for example, than they are in the aggregate transport costs or net benefits of various options. Several tools can be used in the search for the best location, and most traditionally deal with the economic characteristics of the options.

4.19 Transport costs vary with distance from the dredging site and may be represented by concentric lines according to established or projected costs. Lines of equal transport cost -- called isotims -- can be assigned to each site, as shown in Figure 4-1a. In the illustration, the isotims are concentric and equally spaced, although under non-linear transport conditions they may be warped and not equidistant. Under

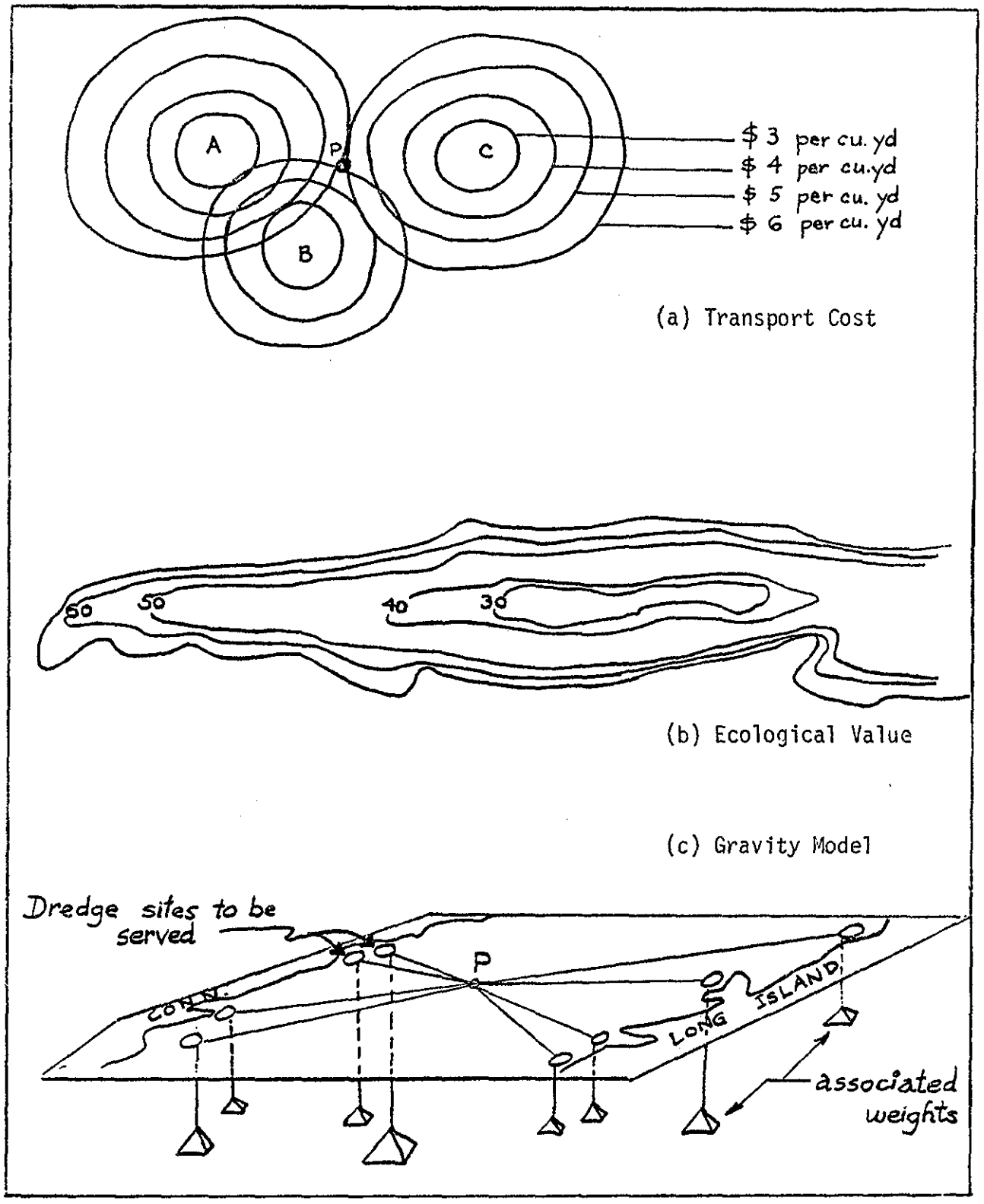


FIGURE 4-1 OPTIMIZATION OF CONTAINMENT LOCATION - INTERMEDIATE TOOLS

ideal assumptions (ignoring other constraints) a dredge material containment facility could be located at point (P) that minimizes net transport costs.

4.20 Environmental constraints could be incorporated using lines of net ecological value for a blanket set of simple points throughout Long Island Sound, shown in Figure 4-1b. Such lines of equal value could be established for all pertinent biological resources determined from existing information. From the illustration, the potential for damaging valuable resources with a containment facility could be quickly estimated and included in an assessment of alternative sites.

4.21 In problems of the best location, the concepts of site suitability and the factor of distance are related to the gravity laws of physics and are expressed in the simple Gravity Model. The model suggests that two sites (a dredge location and a containment facility) would interact with each other in proportion to the product of their importance (volumes involved), and inversely proportional to the distance between them squared:

$$F = K \frac{I_d I_c}{D^2}$$

where:

F = force of attaction
K = a constant of proportionality
I = importance value for dredging (d) and containment (c) sites
D = the distance between the two

4.22 The Gravity Model assumes that the effect cf distance varies smoothly and continuously over geographic space. However, political boundaries, established ship traffic lanes, public recreation areas, and other factors may necessitate adjustments in the Gravity Model if used in LIS.

4.23 A practical application of the Gravity Model is demonstrated with the use of Weber's weight triangle, a mechanical model for locating a single facility to serve many other points. The optimum site is not necessarily located at the geographic center of the projected dredge sites, for example, because of the disproportionate amounts of material excavated annually from each site. Weights are assigned to each dredge location to represent the volumes expected. The position of the central knot when gravity forces are allowed to distribute the weights indicates an optimum location for dredge spoil containment (P), as shown in Figure 4-1c.

Overlays

4.24 An effective and proven technique for locating facilities makes use of mapped data on transparencies. Environmental characteristics of the general area are summarized on scaled maps, which are placed one on top of another to show special relationships and interactions. Overlays have the advantage of simplicity and ease, especially where baseline environmental data are available, as with LIS. They can be manipulated readily to reflect a range of analytical needs, such as localities that would benefit from the existence of a containment facility and those that would suffer. Overlays are particularly adaptable to changes in evaluation constraints, with the addition or deletion of assessment criteria. Environmental factors represented on overlays may also be subjected to ranking factors designating relative importance.

4.25 Because of the simplicity of overlay evaluation, the technique can be misapplied to the disadvantage of the decision-maker. Overlay data could be collected for the entire LIS and Connecticut and New York coastlines, covering all environmental factors even remotely related to the project. Such an exercise would be costly and present a massive data management problem, with questionable results. It is possible that 30 or

40 overlays could be produced, offering more confusion than insight in an attempt to locate containment facilities. If applied with restraint, overlays provide a comprehensive, reproducible, and reliable method of identifying potential sites.

Optimization Techniques

4.26 Optimization techniques seek to obtain the optimum value of mathematically expressed objectives considering a variety of policy options and constraints. Such techniques are especially useful in evaluating capital budgeting or system operating programs to obtain the maximum benefits from limited financial, manpower, or raw material resources. The techniques are less useful in complex policy analysis problems where decision-makers face conflicting objectives and value oriented constraints that are difficult to express mathematically.

Grid and Search

4.27 The grid and search method of finding the optimum location was pioneered by Gunnar Tornqvist using simple computer programming and limited data input (Abler, et.al.1971). Applied to LIS for the location of containment facilities, the approach would give the best solutions for two of the four variables: location and number of structures. The size and type of facility would be assumed as constant. First the Sound would be divided into approximately 500 grid-coordinated cells. Each of the cells would then be characterized in terms of potential construction costs, sensitive environmental factors, and the total cost of transporting material from all of the dredging locations. Two potential sites would be arbitrarily located in the grid cells at the eastern and western extremes of the Sound, and the overall cost values would be calculated for the entire system. A pattern of search would begin with the easternmost cell, which would search in turn one cell to the north,

south, east, and west. At each new position, the overall costs would be recalculated and examined for some improvement. The westermost cell would begin the search in the same manner and would relocate in a cell that results in further reduced costs. The process would continue until overall costs were minimized.

4.28 Transportation costs could be greatly reduced with the construction of additional facilities. The same process of grid and search can be used with any number of initial sites being tested for the lowest overall cost. However, with more facilities the savings in operation costs may be eliminated by the costs of building numerous containment structures. The grid and search method could be used to identify the optimum number and locations of required sites.

4.29 Disadvantages of this method of site-selection include the high initial cost of setting up the grid-evaluation system. Each cell would have to be characterized in terms of construction suitability, navigation, ecological sensitivity, and a number of other factors that may be difficult to quantify in useful terms. While comprehensive, reliable, and reproducible, the approach is not a simple task and may prove to be inordinately expensive in comparison with other methods.

PRELIMINARY SITING METHOD FOR LIS

4.30 Effective planning traditionally allows consideration of the broadest range of alternatives for achieving project objectives. Because of the large area encompassed by LIS, however, a narrowing process is needed to identify a manageable number of alternative containment sites. To carry out the narrowing process a systematic technique, involving a number of general criteria, is needed to judge the suitability of shoreline areas for a containment facility.

4.31 Following is a four step, preliminary siting method that is designed to produce a collection of potential sites for detailed review and evaluation. While each of the steps is performed sequentially, the the first two or three steps may be repeated several times before the preliminary siting method is completed. Repetition of the steps could result from the need to reduce or expand the number of potential sites, or to incorporate new information about the physical constraints or intended operation of the disposal sites. The reexamination and reassessment process that occurs during the repetition of the preliminary siting method may actually be desirable as a means of acquainting the planning team with the characteristics of the project and to confirm the validity of sites originally identified. Results of the preliminary siting method should be virtually the same for investigators provided with the same background information and project objectives. The four steps referred to are:

1) Identify and rank primary screening criteria for selecting alternative sites.

2) Apply the criteria to LIS to obtain specific site alternatives.

3) Preliminarily rank the alternative sites in relative order of desirability (secondary screening).

4) Investigate the use of sites individually or in combinations to determine the potential of using more than one site.

4.32 The purpose of Steps 1 and 2 is to eliminate from further consideration coastal areas of LIS clearly not feasible for containment siting opportunities. If a careful effort is made, Steps 1 and 2 will accomplish a major reduction in sites by eliminating the most infeasible, but also will preserve the most valuable for more detailed, site specific analysis. Step 3

applies additional, more specific criteria to areas surviving Steps 1 and 2. This step may further eliminate some sites and categorize remaining alternative sites in preliminary order of desirability. Step 4 takes the alternative sites, having been carefully screened and ranked, and formulates preliminary designs of projects considering site specific issues, construction feasibility, operational logistics and other factors. This step constitutes the beginning of conventional project planning and design, and is recommended for inclusion in Stage 2 final planning.

Step 1 - Identify and Rank Primary Screening Criteria for Selecting Alternative Sites

4.33 Planning for spoil containment facilities in Long Island Sound involves a number of conflicting goals which complicate an otherwise straightforward design problem. The ultimate design should minimize construction costs (indicating one large facility) while also minimizing transportation costs (calling for a number of smaller facilities close to dredge sites). The plan should be cost effective in terms of the physical characteristics of the construction areas, such as avoiding deep water sites, and also reflect ecological sensitivity by avoiding nearshore habitat. The goal of lowest achievable cost also conflicts with factors of navigation safety, public health, commercial fisheries, recreation, and potential land use. All such conflicts must be recognized and dealt with in the adopted site-selection method.

4.34 Several primary screening criteria pertaining to the selection of alternative containment sites have been identified, and are briefly discussed in terms of their positive and/or negative aspects. Additional criteria and categories could be added to the list as detailed consideration of the siting process continues. In fact, experience suggests that exhaustive lists of criteria can be developed depending on the interests and inclination of the planning and review team. Experience also suggests that some criteria are

more important than others, and it is the most important, and generally applicable criteria that are needed for Step 1. For use in Step 2, the appropriate criteria are noted on overlay maps of Long Island Sound, and then ranked so as to address the most strongly limiting criteria first. Other (secondary) criteria which may be more site specific are reserved for Step 3.

(1) Bathymetry/Available Containment Volume

4.35 Bathymetry has several important effects on containment siting feasibility. The Reconnaissance Report demonstrated that design costs of a rock retaining dike increase nonlinearly with increasing depth. Likewise, larger dikes would exert greater foundation forces inducing various rates of settlement throughout the design life of the structure, depending on the soil bearing capacity at a given site. Dewatering and densifying procedures become inherently more difficult as the amount of "ponded" water increases. For purposes of this preliminary investigation and in consideration of small-volume shoreline extension sites only, a limit of 20 ft MLW has been arbitrarily specified for primary screening purposes. Thus, only areas between the 20 ft depth contour and the shoreline are presently under consideration.

(2) Shoreline Ownership and Existing Disposal Sites

4.36 For the present investigation, private and semi-private shorelines (excepting areas used for dredged material disposal) have been eliminated from consideration, leaving Federal, State, and Local publicly-owned shorefront sites, and existing and historical dredged material disposal sites. The potential advantages of a public site include minimization of adverse impacts on private (residential) property values, minimizing land acquisition costs and social/political opposition. The disadvantage is that, compared to privately-owned shoreline along Long Island Sound, public shoreline is severely limited in extent, such that the number of potential alternatives for consideration is also limited. It is

recognized that certain privately-owned waterfront areas, especially in heavily urbanized or industrial areas, may have high potential for locating a reusable containment facility, and should be considered carefully under the Stage 2 planning process.

4.37 Areas that have already been disturbed by previous dredged material disposal may or may not exhibit attributes favorable for containment siting. These areas may include beaches nourished with dredged material, bulkheads along industrial or commercial waterfronts, previously low-lying (wetland) areas filled in for urban expansion, or existing containment facilities. Areas where beach nourishment has occurred are obviously not to be included due to the non-compatibility between a beach and a containment operation, as previously discussed. Areas where dredged material has been used to permanently alter the shorefront for industrial or commercial purposes, however, should be given greater consideration in the siting process.

(3) Significant Ecological Areas

4.38 The potential ecological impacts of constructing and operating a containment facility were discussed in Section 3. These potential impacts stem primarily from: (1) short-term disturbance of the existing ecosystem due to construction, and (2) long-term effects of dewatering effluent and leachate from operation of the facility. In order to minimize potential environmental conflicts, areas identified through available data which are known to exhibit significant concentrations of shellfish beds, lobster beds, crab habitats, waterfowl feeding/nesting, and finfish spawning/migration, are eliminated from further consideration.

(4) Wetlands

4.39 Wetlands have been identified as a significant ecological resource and recently enacted Federal, State, and Local laws prohibit

the degradation or destruction of these zones. Confined disposal is not considered to be compatible with existing wetlands, and these areas are excluded from further consideration.

(5) Major Public Beaches

4.40 A large number of publicly-owned shorefront lands around LIS are public beaches. In general, an existing public beach would be highly undesirable for shoreline extension containment opportunities due to: (1) public and political opposition, (2) impacts on public health and welfare, and (3) incompatibility with the need for public recreation facilities, especially in highly urbanized areas. Public sites known to be used for bathing beaches are excluded under these criteria.

(6) Wave Energy

4.41 Wave energy effects are of concern in the engineering design of containment facilities in relation to structure configuration and orientation, reinforcement size (height), type of rip-rap, and outboard slope of the material. Areas of very high energy will require containment structures with inordinately high construction costs. Shoreline sites located in high wave energy zones are eliminated under this criterion, favoring those sites located in moderate or low energy zones.

(7) Land Use Compatibility/Reuse Potential

4.42 The concept of containment site reuse is an important one and was discussed in Section 3. A reusable containment facility can be defined as: (1) one at which dredged material is continuously or periodically removed (for other uses) in order to maintain disposal capacity, or (2) one which, when completely built to capacity, can be used as industrial, commercial, recreational or other purposes as most compatible with adjacent or

contiguous land use. Key sub-criteria which help identify reuse potential of a given site include:

- Existence of Waterfront Industrial or Commercial Facilities;
- Existence of Urban Structures (roads, bridges, buildings, pipelines, outfalls);
- Recognized Need for Industrial/Commercial/Recreational Expansion;
- Existence of a Market for Reuse of Dredged Material; and
- Ingress/Egress Conditions

Shoreline areas exhibiting one or more of the above criteria are given priority in siting consideration.

4.43 The ranking of the above eight primary screening criteria is an iterative process beginning with the selection of one, two, or three criteria that are considered imperatives; proceeding through Step 2 to determine the extent of shoreline area remaining for consideration, returning to Step 1 and adding the next stronger set of criteria; proceeding again to Step 2 to determine if the alternatives had been adequately narrowed, and so forth until the criteria had been exhausted or the number of alternative disposal areas are reduced to a manageable number for Steps 3 and 4, and final evaluation.

4.44 Based on the cost analysis and other work described in the Reconnaissance Report, as well as findings of the present investigation, the ranking of the above criteria appears appropriate. The relative importance of each criterion may exert a major influence on site selection and is a key element of future public participation efforts. Debate over the criteria ranking is understandable, and even desirable, if the criteria are thereby improved. A restatement of the criteria ranking does not change the preliminary siting method herein described.

Step 2 - Applying the Criteria to LIS to Obtain Specific Site Alternatives

4.45 The purpose of this second step is to systematically eliminate from further consideration potential containment sites clearly not feasible based on the criteria outlined in Step 1. Base maps of LIS are first prepared which summarize available information on ecological, physical (exposure), land-use, etc. Primary screening criteria are then plotted on separate overlays. The overlays are applied to the base maps in order of importance, removing more sites with each application until a manageable number of potential sites is obtained. The sites surviving the initial cut are subjected to further evaluation in Step 3.

Step 3 - Preliminary Ranking of the Alternative Sites in Order of Desirability (Secondary Screening)

4.46 Sites or general areas obtained from the screening process comprised of Steps 1 and 2 can be further ranked by other criteria to characterize the desirability of each site. The ranking can include the criteria identified in Step 1 that were not applied because the criteria would have been too restrictive. Other more site-specific criteria include the following categories, excepting those aspects already screened in Step 1:

1. Engineering Feasibility;
2. Economic Value or Cost of Construction, Operation;
3. Environmental Compatibility;
4. Social Acceptability/Public Health and Welfare; and
5. Legal or regulatory requirements.

Detailed site-specific information is collected for each of the sites surviving Step 2. The data are converted to representative numerical values for easy comparison with the aid of a point system, which is tabulated

within a summary matrix (refer to Appendix C). The matrix incorporates an independent weighting system that lends emphasis to site-specific data of particular importance.

4.47 The siting criteria used for Step 3 evaluations were selected and weighted for importance by the planning team, and include:

Site Specific Criterion	Weighting Factor
1. Proximity of Site to Significant Ecological Areas	10
2. Bathymetry of Site/Available Volume	9
3. Exposure Considerations	7
4. Soil/Foundation Characteristics of Site	7
5. Existing and Potential Land Use	6
6. Volume and Types of Dredged Material Available for Containment	4
7. Compatibility with Adjacent Land/Re-use Potential	2
8. Proximity of Site to Cultural Resources	2
9. Use of Site for Existing or Historic Dredged Material Disposal	1

The potential sites receive a thorough evaluation (see Table 4-1) for each of the factors listed above, and are assigned criteria points according to a sliding scale from 0 to 10, with 10 representing the most desirable characteristics. For example, each site is examined for exposure conditions, such as erosion, wave energy, flooding potential and the existence of endangered structures. If conditions at a given site are found to be mostly suitable, but not perfect, the site may be assigned 8 points in the exposure category. This numerical value is recorded in a summary matrix table, which keeps track of total points for each potential site.

4.48 Step 3 uses two distinct sets of numerical values and care should be taken not to confuse them. Weighting Factors are assigned to the criteria listed above, according to the importance of each factor. Criteria

TABLE 4-1 SITE-SPECIFIC SECONDARY SCREENING CRITERIA

Siting Criteria

Name:_____ County:_____ Map #_____ Location#_____

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: ____ miles
   b. Lobster Locations: ____ miles
   c. Finfish Concentrations: ____ miles
   d. Waterfowl Areas: ____ miles
   e. Wetland Areas: ____ miles
   f. Water Quality Conditions: poor/fair/good

3. Bathymetry
   a. Nearshore Slope: ____ ft/mile
   b. Available Surface Area: ____ acres
   c. Available Volume Below MSL: ____ cu. yards

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: ____ %
   c. Flood Zone Area: ____ %
   d. Endangered Structures: (buildings, homes, jetties, etc.)
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: ____
   b. Permeability: ____

6. Existing and Projected Land Use (within 1 mile radius of site)
   a. Residential: ____ % ____ %
   b. Recreational: ____ % ____ %
   c. Commercial: ____ % ____ %
   d. Industrial: ____ % ____ %
   e. Wetlands: ____ % ____ %
   f. Public: ____ % ____ %
   g. Open Space: ____ % ____ %
   h. Agricultural: ____ % ____ %

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: ____ CY/year
      Within Surrounding Quads: ____ CY/year
   c. General Characteristics of Material (Phys-chem): ____

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities)
   e. Access by Land: (roads/bridges)
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation)
      (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: (closest) miles ____ (number) ____ 10 mile radius
   b. Types: (historical, archaeological, etc.)

10. Existing and Historical Spoil Disposal Location
    a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions)
    b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.)
    c. Volume of Material Previously Disposed: ____ CY

Points represent the physical and geographic characteristics of the alternative sites, in relation to optimal conditions. In the summary matrix, these two numbers are multiplied for each entry for the respective alternatives. Details of the criteria point calculation system are presented in Appendix C.

4.49 The summary matrix table gives point totals for each of the alternative sites, which reflect the suitability of each site for dredged material containment and provide the basis for ranking sites. Step 3 concludes at this point, and signals the end of Stage 1 planning.

Step 4 - Investigate the Use of Sites Individually or In Combinations to Determine the Potential of Using More than One Site

4.50 To this point in the planning methodology, little attention has been paid to variables other than location. The type of facility has been designated by the scope of this work as a shoreline containment structure. The size and number of facilities has not yet been addressed. Step 4 is scheduled within Stage 2 planning and involves a preliminary design of project alternatives to determine, in greater detail than Step 3, the approximate cost, site-specific features and operational practicality. Consideration is given to using several smaller disposal facilities if such a configuration appears to have advantages over a single large disposal facility.

4.51 Step 4 is the conventional beginning point for project development; the preceeding three steps being required for the LIS disposal site location because of the large area involved. The alternatives developed in Step 4 would be those described as project alternatives in an Environmental Impact Statement. Items to consider in Step 4 are facility size, consideration of deferred scheduling, nature of the design and materials to be used, and other aspects specific to each alternative. There may be more than one alternative configuration at the same site.

PRELIMINARY APPLICATION OF SITING METHODOLOGY TO LIS

4.52 The previously described methodology was applied to LIS limited to consideration of relatively small-volume (one to five million CY) shoreline extension containment facilities at public sites in Connecticut and New York. This preliminary siting analysis, which is based on macro-level environmental resource and land use data, should be considered as a demonstration of the siting methodology, rather than a recommendation for specific containment sites. It is stressed that further refinement of the methodology will be addressed under Stage 2 planning, where a more detailed and thorough siting analysis (not limited to public sites) will be executed.

Data Sources

4.53 The siting analysis began with the collection and review of data to be used in describing primary and secondary screening criteria. The data collected at this preliminary stage are macro-level data, which were available from several sources, including the following:

1. NOAA nautical charts for LIS @ scale 1:20,000.
2. U.S.G.S. standard topographic maps for both Connecticut and New York coastal quadrangles @ scale 1:24,000.
3. Connecticut Coastal Area Management (CAM) Program resource factor maps @ scale 1:24,000:

    - Shellfish concentration areas
    - Coastal Land Use maps (1975)
    - Coastal Soil Survey maps
    - Coastal zoning maps (1970)
    - Tidal Wetlands Areas
    - Industrial/commercial zone sites along the coast

4. Connecticut Coastal Area Management Program maps @ scale 1:125,000:

   - State owned lands
   - Federally owned lands
   - Shellfish areas

5. Westchester County Dept. of Planning maps:

   - Major open space areas (1" = 10,000')
   - County sewer districts (1" = 3 miles)
   - Generalized soil maps (1" = 1 mile)
   - Zoning maps (1:1,000)
   - Land use maps (1:1,000)
   - Generalized land use maps (1:1,000)

6. City of New York Department of City Planning maps of New York City @ scale 1:600:

   - Land use maps

7. Long Island Regional Planning Board land resource maps for Nassau and Suffolk Counties @ scale 1:2,000:

   - Existing Coastal Land Use (1977)
   - Future Coastal Land Use (1995)
   - Coastal Land & Water Capability
   - Coastal Natural Resource Inventory
   - Coastal Developmental Contraints

8. Long Island Regional Planning Board maps of Long Island Coastal Region @ scale 1" = 5 miles:

   - Habitat Distribution
   - Shellfish Distribution

- Major Waterfowl Feeding & Nesting Areas
- Lobster Fishery Activity
- Erosion areas
- Historical Sites
- Point Source Discharge to Surface Waters (1975)
- Areas closed to Shellfishing (1979)
- Federal, State and Local ownership including submerged lands

9. Soil Survey map of Nassau County (SCSWCD, July, 1976).

10. Soil Survey map of Suffolk County (U.S.D.A.SCS, April 1975).

4.54 Additional information including:

- Historical and present dredged material disposal areas;
- Locations of major dredging;
- Shoreline use maps;
- Public beach sites;
- Shellfish locations;
- Wetlands locations;
- Shoreline characteristics and erosion conditions;
- Seaport locations;
- Industrial locations;
- Municipal and industrial point sources; and
- Flood damage areas;

were obtained from the following references:

1. Reconnaissance Report Dredged Material Containment in Long Island Sound, U.S.C.O.E., 1979.

2. "Dredging on Long Island", Dowd, R.M., 1972.
3. "People and the Sound", Summary, NERBC, 1975.
4. "The Urban Sea: Long Island Sound", Koppelman, et al., 1976.
5. "Erosion and Sedimentation", NERBC, 1973.
6. "Long Island Sound: An Atlas of Natural Resources", Conn. DEP, 1977.
7. "Ecological Studies", NERBC, 1974.
8. "Water Quality", NERBC, 1974.
9. "A Comprehensive Dredging Subplan for Nassau and Suffolk Counties", LIRPB, 1979.
10. "Flood Plains", NERBC, 1973.

Step 1 (Development of Site Screening Maps)

4.55 In order to facilitate the siting analysis, base maps (scale, 1:250,000) were prepared exhibiting important geographical variables. Figure 4-2 acts as a guide for the orientation of subsequently more detailed maps. For convenience, the LIS region is split into four separate sections. Also indicated on these maps are USGS topographic quadrangle maps, which are used in the analysis to determine the relationship between transport distance vs. projected dredged material volumes for each potential containment site. For convenience and clarity, geographic siting data are plotted on four separate sets of maps, which are briefly described as follows.

4.56 The first set of maps is presented in Figure 4-3, which shows the locations of Federal, State, and Local public shorefront lands as well as Federal and non-Federal sites used for existing or historical land disposal of dredged material. There are literally hundreds of sites where very small volumes of locally-dredged material have been disposed of, usually as uncontained fill behind a bulkhead or to raise ground level for construction purposes. Only sites at which at least 30,000 CY of dredged material have been deposited are indicated in Figure 4-3. Tables

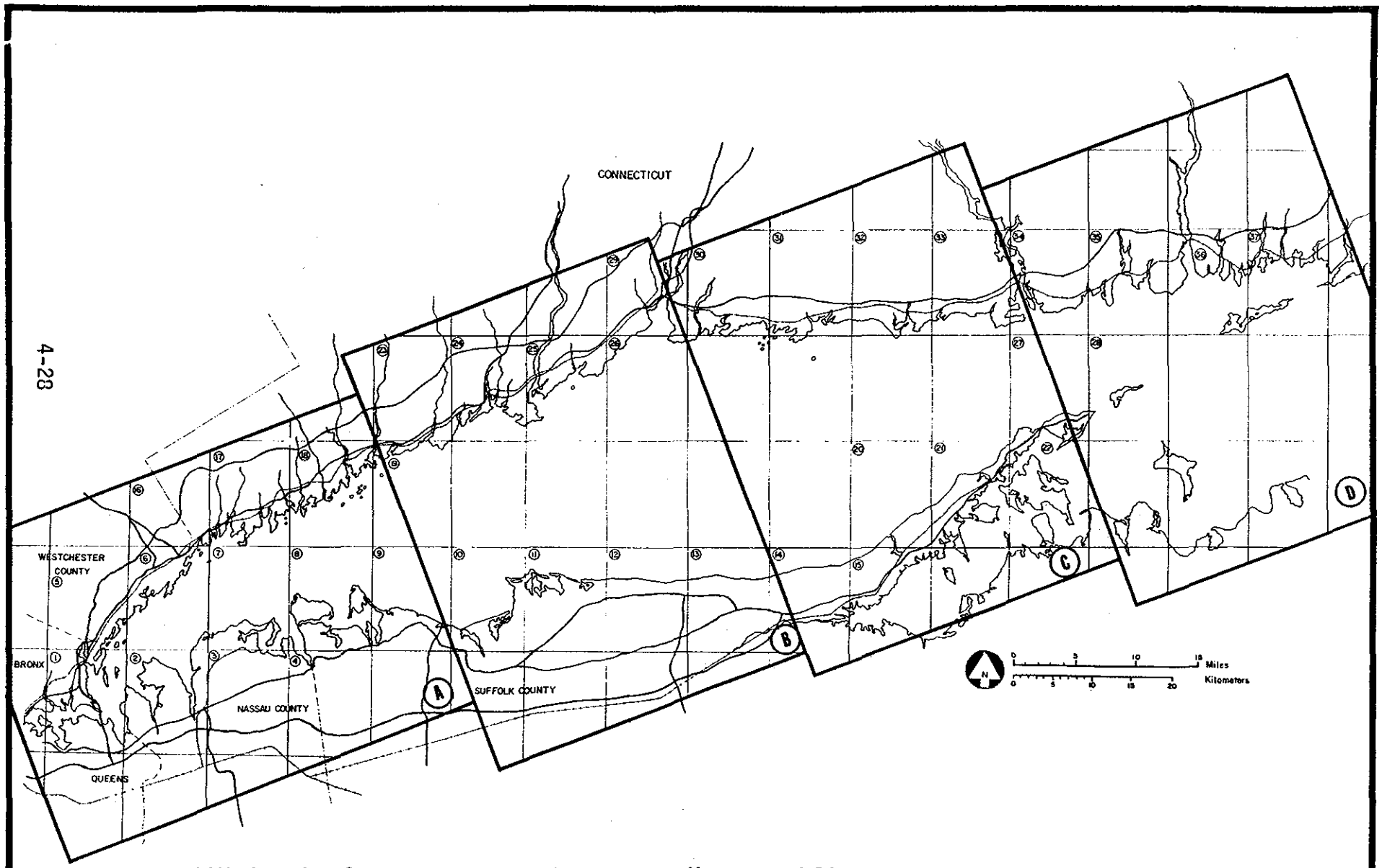


FIGURE 4-2 GUIDE FOR SITE SCREENING MAPS OF LIS

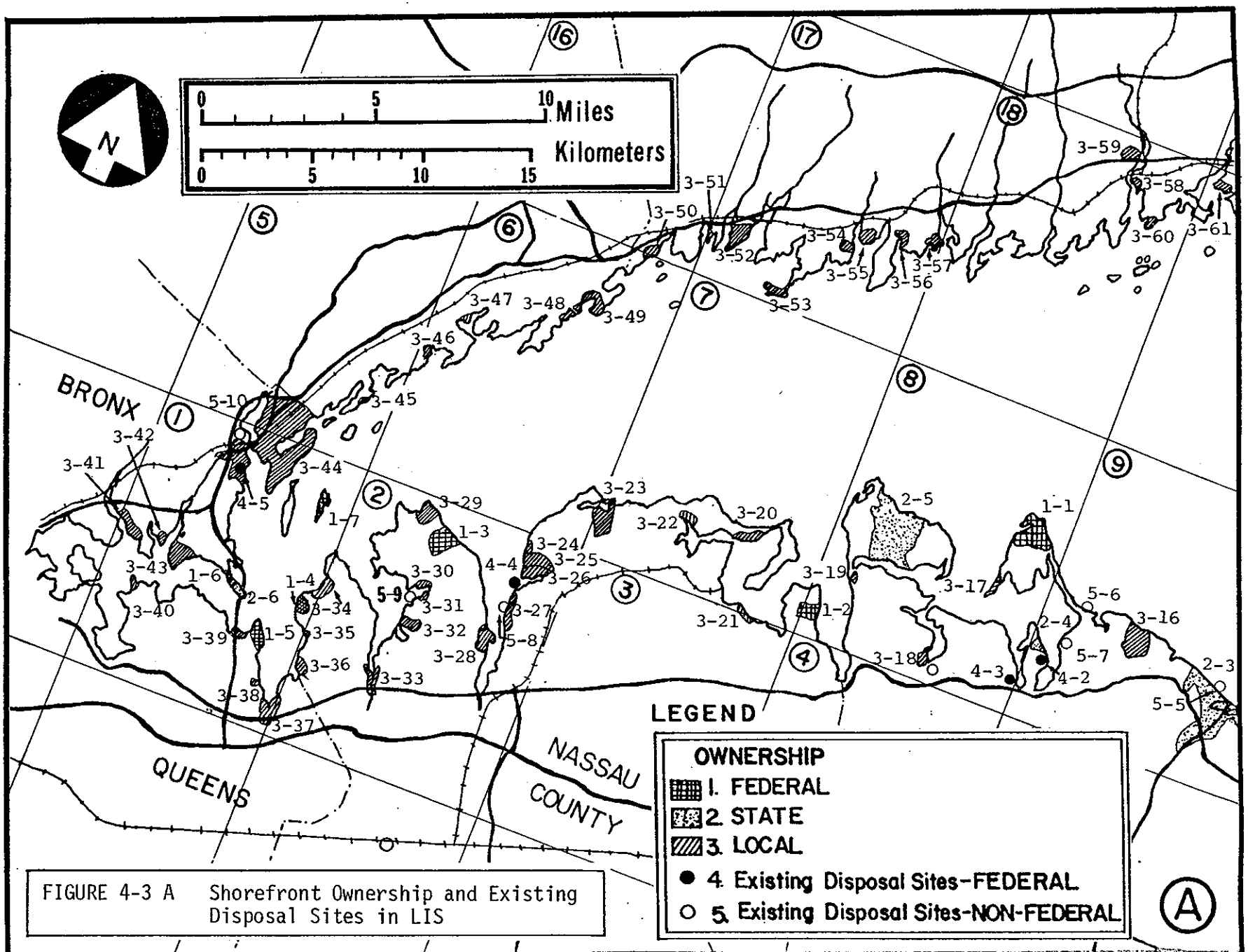


FIGURE 4-3 A Shorefront Ownership and Existing Disposal Sites in LIS

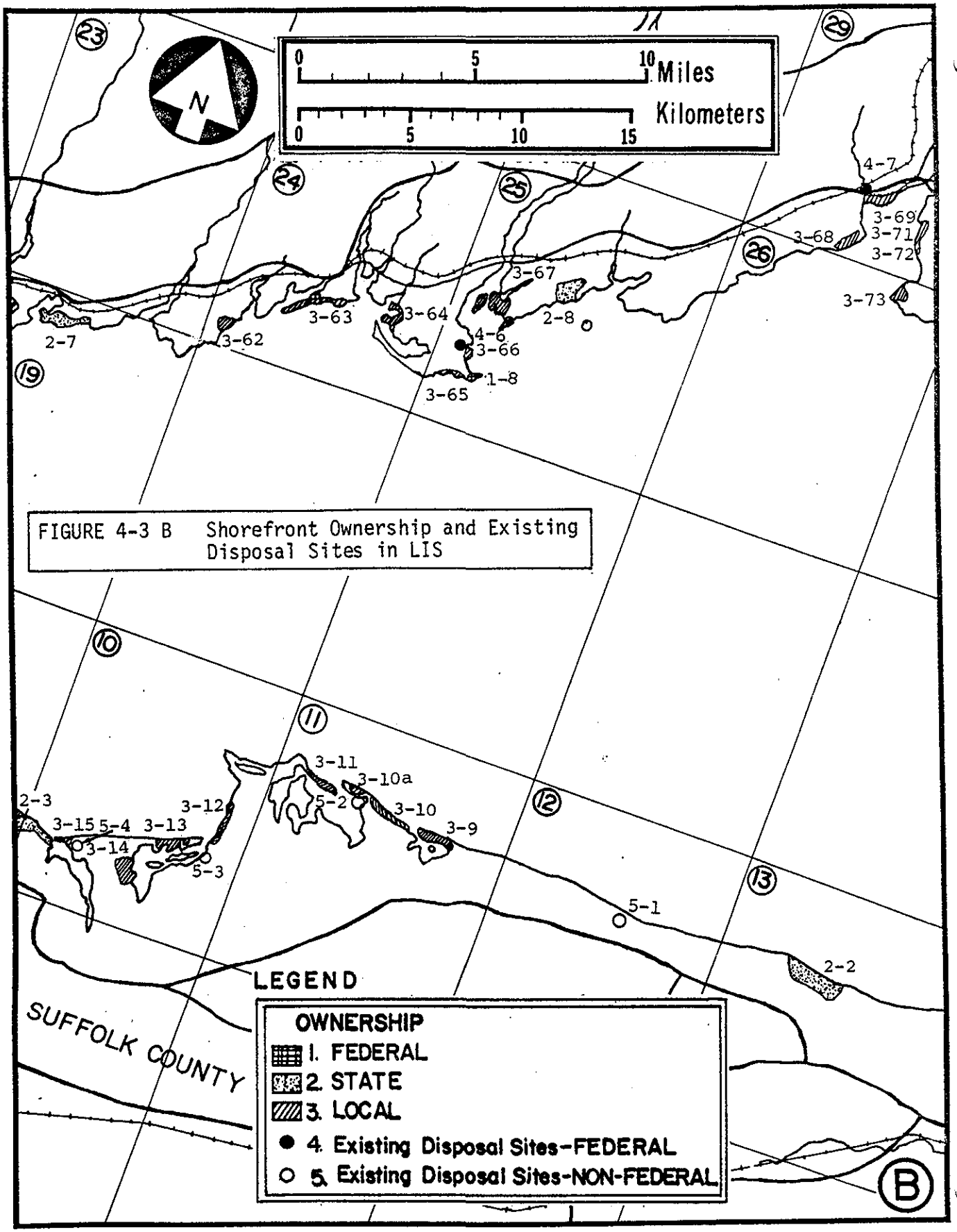


FIGURE 4-3 B Shorefront Ownership and Existing Disposal Sites in LIS

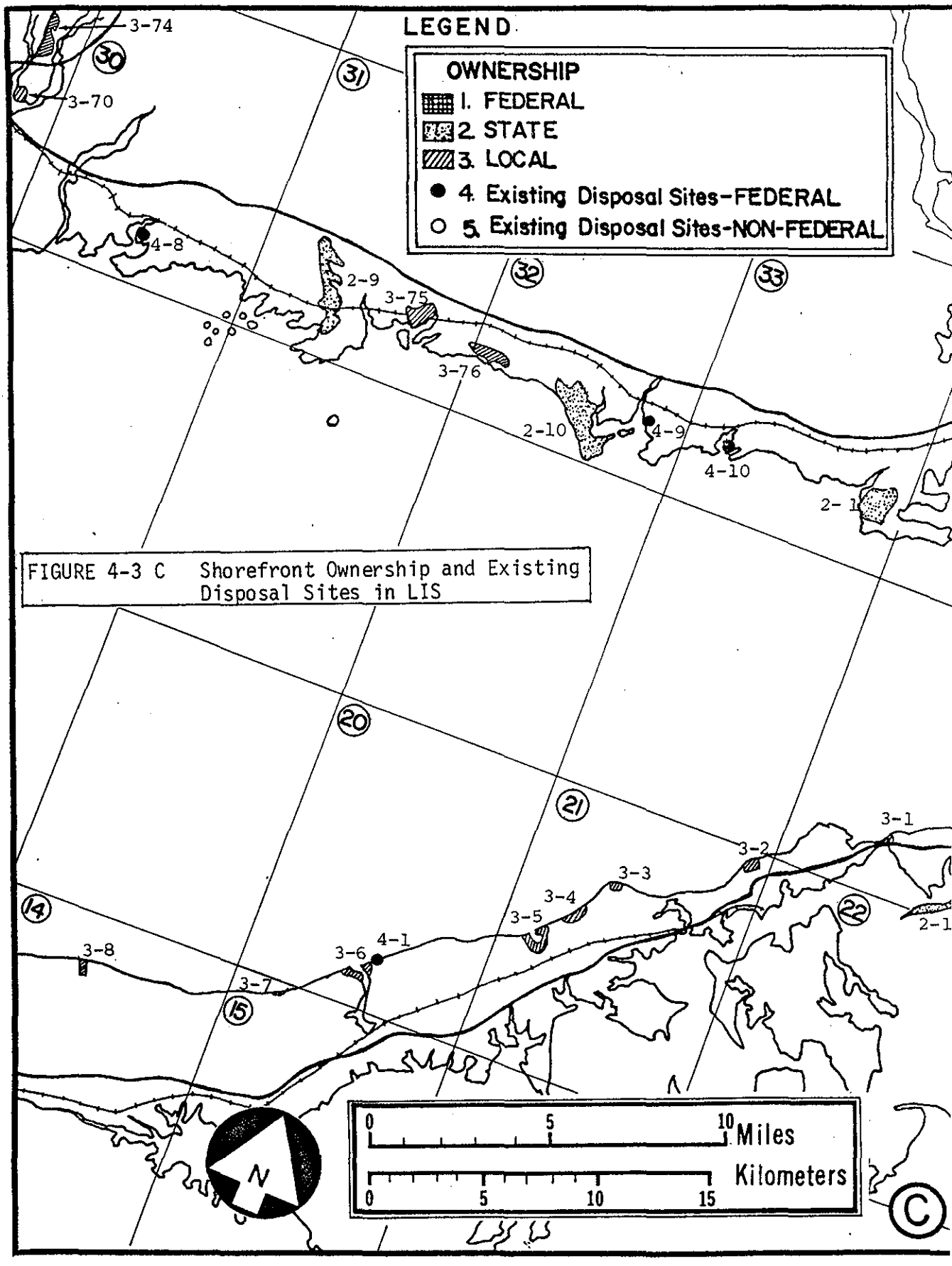


FIGURE 4-3 C Shorefront Ownership and Existing Disposal Sites in LIS

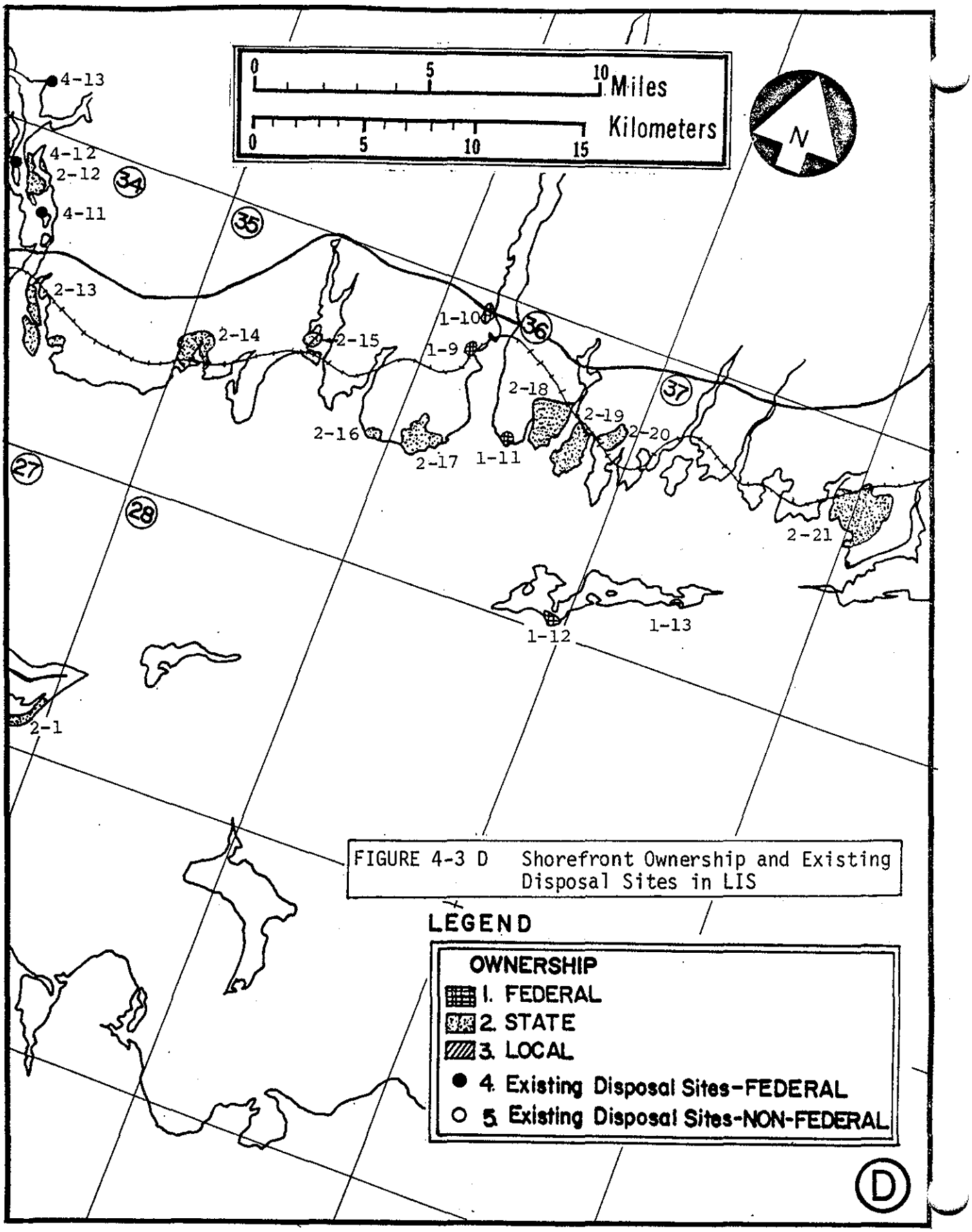


FIGURE 4-3 D Shorefront Ownership and Existing Disposal Sites in LIS

TABLE 4-2

Federally-Owned Shorefront Sites

Name of Location	Location Number	Quad No.
U.S. Coast Guard Station	1-1	8
Sagamore Hill National Historical Site	1-2	8
U.S. Naval Reservation	1-3	2
U.S. Merchant Marine Academy	1-4	1
Fort Totten Military Reservation	1-5	1
U.S. Naval Reservation	1-6	1
U.S. Military Reservation	1-7	1
U.S. Coast Guard Station	1-8	25
Fort Trumbell U.S.N. Reservation	1-9	36
U.S. Coast Guard Academy	1-10	36
U.S. Coast Guard Training Station	1-11	36
U.S. Coast Guard Station	1-12	37

TABLE 4-3

State-Owned Shorefront Sites

Name of Location	Location Number	Quad No.
Orient Beach State Park	2-1	27
Wildwood State Park	2-2	13
Sunken Meadow State Park	2-3	9-10
Vanderbilt Museum	2-4	9
Caumsett State Park	2-5	8
New York State Merchant Marine Academy	2-6	1
Sherwood Island State Park	2-7	19
Silversands State Park	2-8	25
Cockaponset State Park	2-9	31
Hammonasset State Park	2-10	32
Plum Bank State Fish & Wildlife Area	2-11	33
Lord Cove State Fish & Wildlife Area	2-12	34
Great Island State Fish & Wildlife Area	2-13	34
Rocky Neck State Park	2-14	35
State Military Camp	2-15	35
State Sanitarium	2-16	35
Harkness Memorial State Park	2-17	36
Trumbull Airport	2-18	36
Bluff Point State Seashore Reserve	2-19	36
Harley Farm State Seashore Reserve	2-20	36
Barn Island Hunting Area	2-21	37
Elizabeth Airfield	2-22	36

Table 4-4

Local/County-Owned Shorefront Sites

Name of Location	Location Number	Quad No.
East Marion Orient Park	3-1	27
Greenport Park	3-2	21
Horton Neck Town Park & Museum	3-3	21
Great Pond County Park	3-4	21
Goldsmith Inlet County Park	3-5	21
Mattituck Inlet Park	3-6	20
Public Beach	3-7	15
H.M. Reeve Park	3-8	14
Cedar Beach	3-9	11
White Beach	3-10	11
Mt. Misery Point	3-10a	11
Old Field Beach	3-11	11
West Meadow Beach	3-12	10
Long Beach	3-13	10
Nissequogue Golf Course	3-14	10
Short Beach Town Park	3-15	10
Crab Meadow Beach & Park	3-16	9
West Beach	3-17	8
Mill Dam View Park	3-18	8
Lloyd Harbor Village Park	3-19	8
Bayville Park	3-20	7
Roosevelt Memorial Park	3-21	7
Mill Neck Preserve	3-22	7
Glen Cove City Park	3-23	6-7
Morgan Memorial Park	3-24	2
Garvies Point Preserve	3-25	2
Garvies Point Park	3-26	2
Tappen Beach	3-27	2
Hempstead Harbor Park	3-28	2
Sands Point County Park & Preserve	3-29	2
Manor Haven Park	3-30	2
Sunset Park	3-31	2
Leed Pond Park	3-32	2
Manhasset Valley Park	3-33	2
Stepping Stones Park	3-34	1
Grist Mill Pond Park & Museum	3-35	1
Great Neck Estates Park	3-36	1
Alley Park	3-37	1
Golden & Crocheron Park	3-38	1
Little Bay Park	3-39	1
College Point Short Front Park	3-40	1
Sound View Park	3-41	1
Castle Hill Point Park	3-42	1
Ferry Point Park	3-43	1
Pelham Bay Park	3-44	1
Hudson Park	3-45	5
Flint Park	3-46	6

Table 4-4 (cont'd.)

Name of Location	Location Number	Quad No.
Harbor Island Park	3-47	6
Milton Town Park	3-48	6
Manursing Island Park	3-49	6
Byran Park	3-50	16
Greenwich Park	3-51	16
Bruce Park	3-52	17
Greenwich Point Park	3-53	17
Southfield Park	3-54	17
Dyke Park	3-55	17
Cummings Park	3-56	17
Cove Island Park	3-57	17
Seaview Park	3-58	18
Norwalk Memorial Park	3-59	18
East Norwalk City Park	3-60	18
Westport Longshore Club Park	3-61	19
Jenning Beach & Park	3-62	24
Seaside Park	3-63	24
Pleasure & Long Beaches	3-64	24
Lordship Beach & Park	3-65	25
Short Beach	3-66	25
C.E. Wheeler Fish & Wildlife Area	3-67	25
Morse Park	3-68	29
Bayview Park	3-69	29
Quinnipiac Park	3-70	29
East Shore Park	3-71	29
Nathan Hale Park	3-72	29
Lighthouse Point Park	3-73	29
East Rock Park	3-74	29
East River Fish & Wildlife Area	3-75	31
Madison Golf Course	3-76	32

TABLE 4-5

EXISTING AND HISTORICAL LAND DISPOSAL SITES

Site Number	State	Name of Location	Land Ownership	Quad. Map	Cu.Yds. Disposal (years)	Purpose of Disposal
4-1(3-6)	NY	Mattituck Inlet	Local-Public	20	320,000 1927-1965	Beach Nourishment
4-2	NY	Northport Harbor	Private	9	80,000 (1956)	Wetland Fill
4-3	NY	Centerport Harbor (Mill Pond)	Private	8-9	220,000 (1941)	Wetland Fill
4-4	NY	Glen Cove	Private	2	250,000 (1933-'48, '60)	Wetland & Construction Fill
4-5 (3-44)	NY	Pelham Bay Park (Bronx)	Local-Public	1	697,000 (1930-1952)	Wetland & Construction Fill
4-6 (3-66)	Conn.	Near Bridge-port Airport	Local-Public Beach (not on shore-line)	25	No Data (1976)	Wetland Fill
4-7	Conn.	New Haven West River	Transporta-tion Corridor (not on shore-line)	29	88,000 (1977)	Wetland Fill
4-8	Conn.	Branford River	Private (not on shoreline)	30	62,000 (1976)	Upland River bank fill
4-9	Conn.	Clinton Harbor	Private	32	31,000 (1972)	Wetland & Construction Fill
4-10	Conn.	Patchogue R. Westbrook	Private	33	79,000 (1972,'76)	Wetland Fill
4-11	Conn.	Calves Is. Conn. River	Not on shoreline	34	200,000 (1976)	Bank Fill
4-12	Conn.	Notts Is. Conn.River	Not on shoreline	34	196,000 (1964,'75)	Waterfowl Area

TABLE 4-5 (Continued)

Site Number	State	Name of Location	Land Ownership	Quad Map	Cu.Yds. Disposal (years)	Purpose of Disposal
4-13	Conn.	Brockway Conn. River	Not on Shoreline	34	No Data (1976)	Bank Fill
5-1	NY	Wading River (Shoreham)	Private	12	517,000 (1968)	Beach Nourishment
5-2 (3-10a)	NY	Mt. Misery Point (sand pit)	Public	11	38,000 (1945)	Bank Fill
5-3	NY	Porpoise Channel, Stony Brook	Private	10	207,000 (1965)	Bank Fill
5-4 (3-15)	NY	Nissequogue River, Smithtown	Public	10	800,000 (1958,'61, '79)	Beach Nourishment
5-5 (2-3)	NY	Sunken Meadow Park	Public	9	200,000 (1971)	Beach Nourishment
5-6	NY	Asharoken Beach	Private	9	690,000 (1962,'71, '76)	Beach Nourishment
5-7	NY	Steers Sand & Gravel (Northport)	Private	9	700,000 (1959)	Construction Fill
5-8 (3-27)	NY	Tappan Beach (Hempstead H.)	Public	2	170,000 (1964)	Bulkhead Fill
5-9 (3-31)	NY	Manhasset Bay Town Dock	Public	2	70,000 (1967)	Bulkhead Fill
5-10 (3-44)	NY	Givans Creek (Eastchester Co-op City)	Private (Not on shoreline)	1	700,000 (1959)	Wetland Construction Fill

4-2 through 4-5 summarize information on the Federal, State, and Local lands and disposal sites, respectively.

4.57 The available biological resource data for LIS includes major shellfish beds, lobster beds, crab concentrations, finfish concentrations, waterfowl areas, and wetlands which were plotted as shown in Figure 4-4. It is recognized that data plotted on such a gross level may be misleading for site-specific analyses and thus is intended only for preliminary siting purposes. Each potential containment site screened in this preliminary planning stage must undergo a very detailed, site-specific environmental review during Stage 2 planning before any firm siting decisions can be made.

4.58 Exposure conditions (wave energy) and physical shoreline characteristics that indicate exposure conditions (bluffs, erosion-prone areas) are plotted as shown in Figure 4-5. As previously discussed, placement of a containment facility in a high wave energy zone can significantly increase the cost of dike construction and maintenance. Likewise, shoreline characterized by high littoral transport should be avoided since a shoreline extension containment facility (without some type of sand bypassing operation) could act like a jetty creating updrift accretion and downdrift erosion along the beach.

4.59 Wave energy is a function of wind velocity and duration, water depth, and fetch. The greatest wave energy is expected to occur within the "Race" between Long Island and Fishers Island due to the southeasterly fetch of several thousand miles. Waves within Central and Eastern LIS, while typically not of as great a height or period as those approaching the Race from the Southeast, occur at higher frequency intervals out of the Southwest-to-Northwest quadrant due to the predominating wind climate which is represented in Figure 4-6. Shoreline areas in the Western to Central regions of LIS are typically characterized by low wave energy due to lack

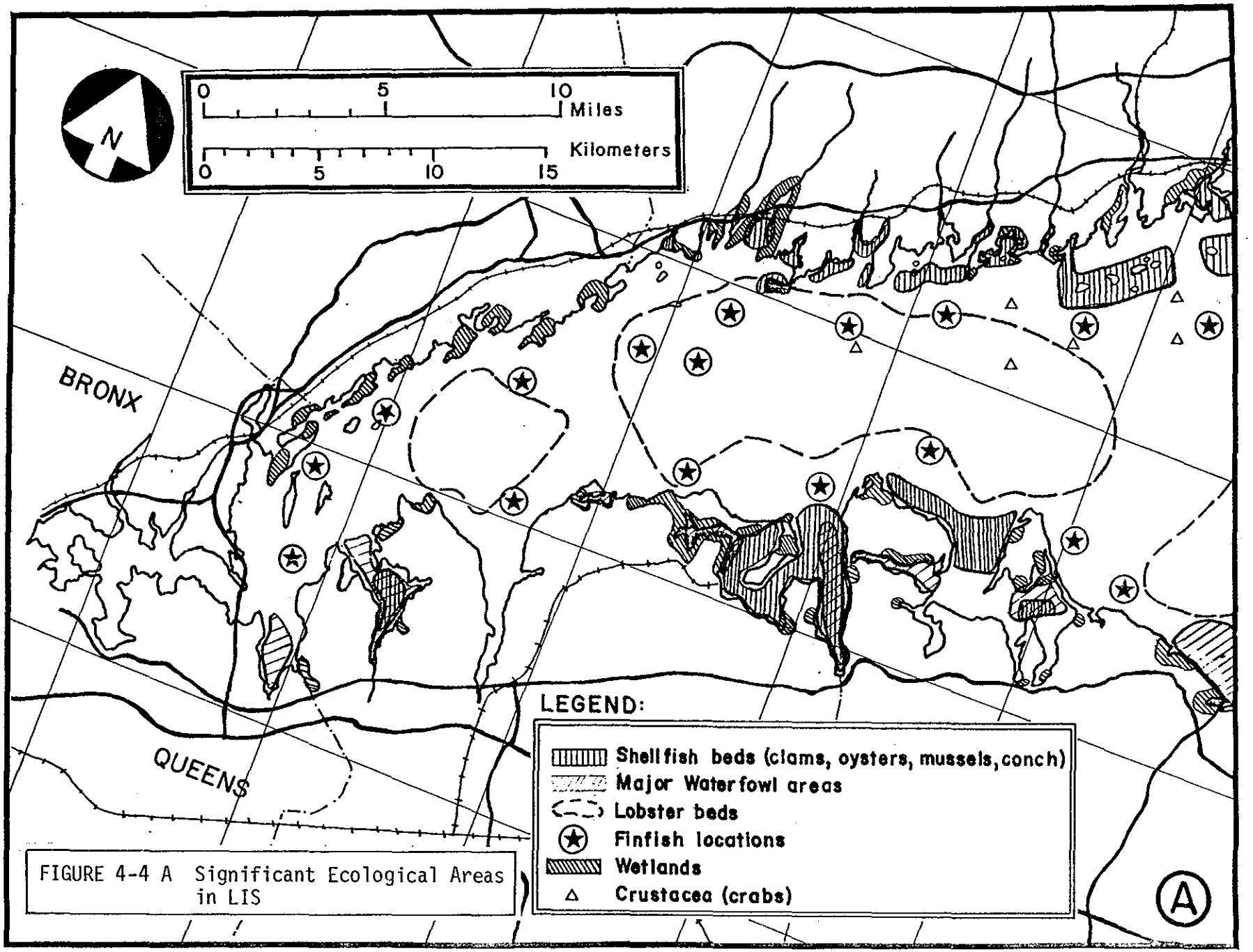


FIGURE 4-4 A Significant Ecological Areas in LIS

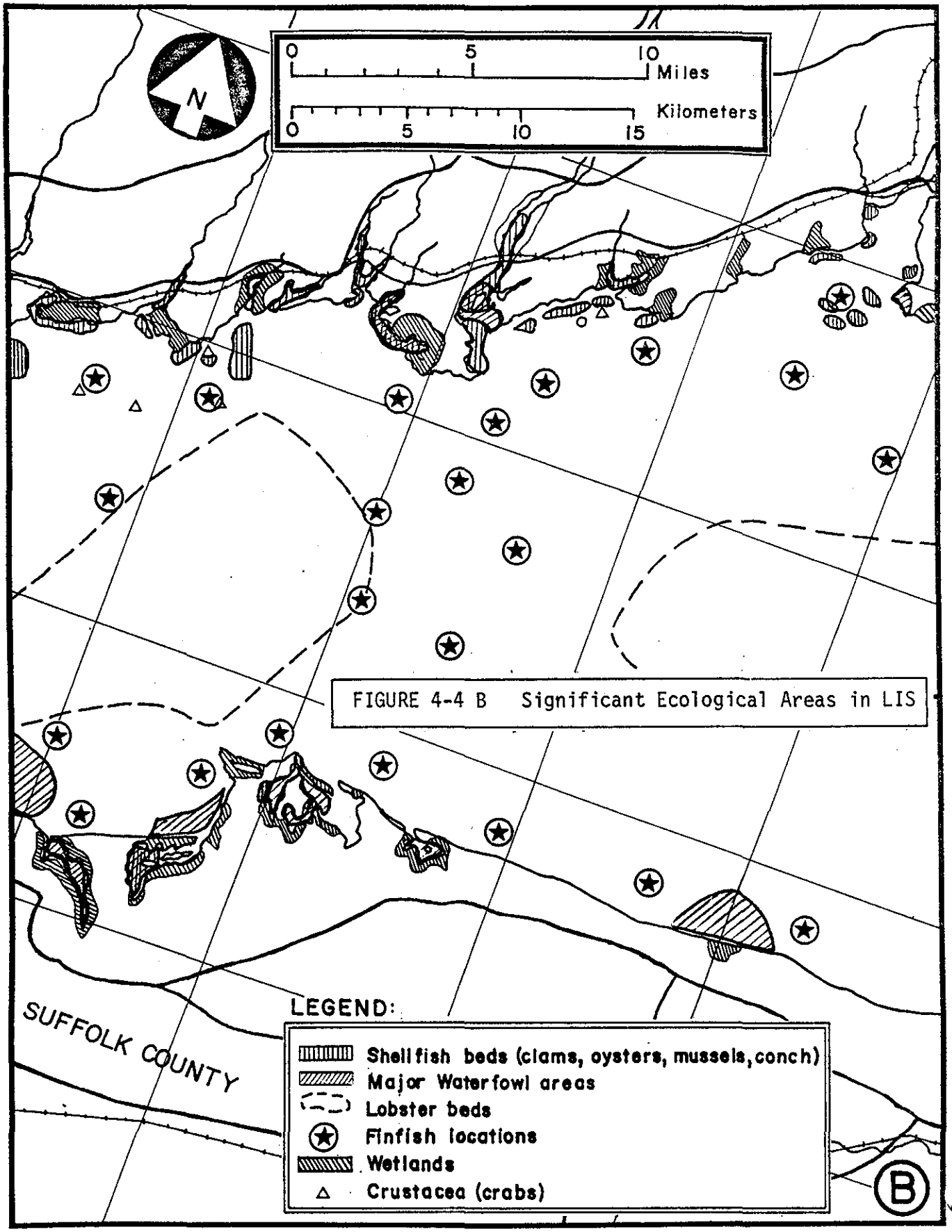


FIGURE 4-4 B Significant Ecological Areas in LIS

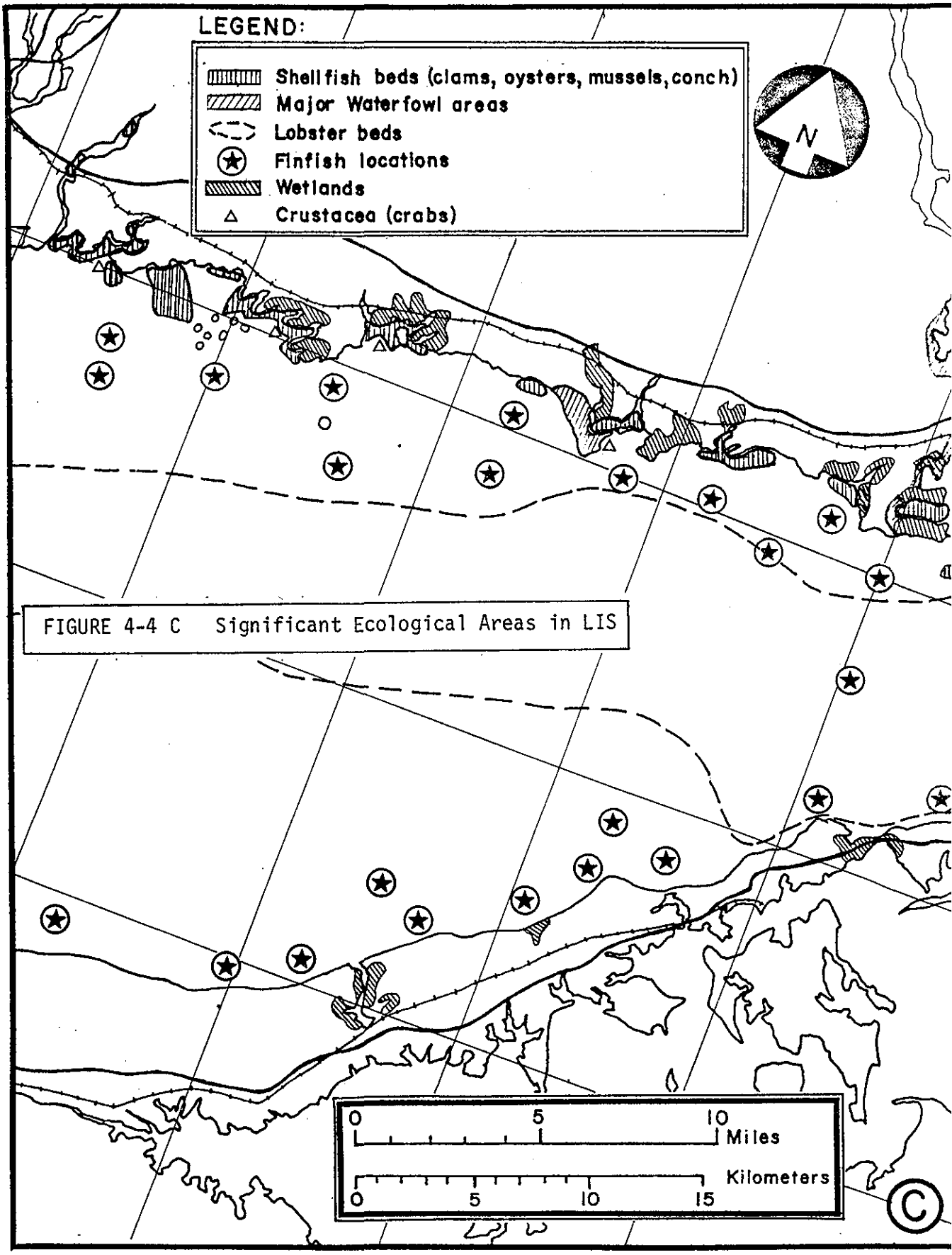


FIGURE 4-4 C Significant Ecological Areas in LIS

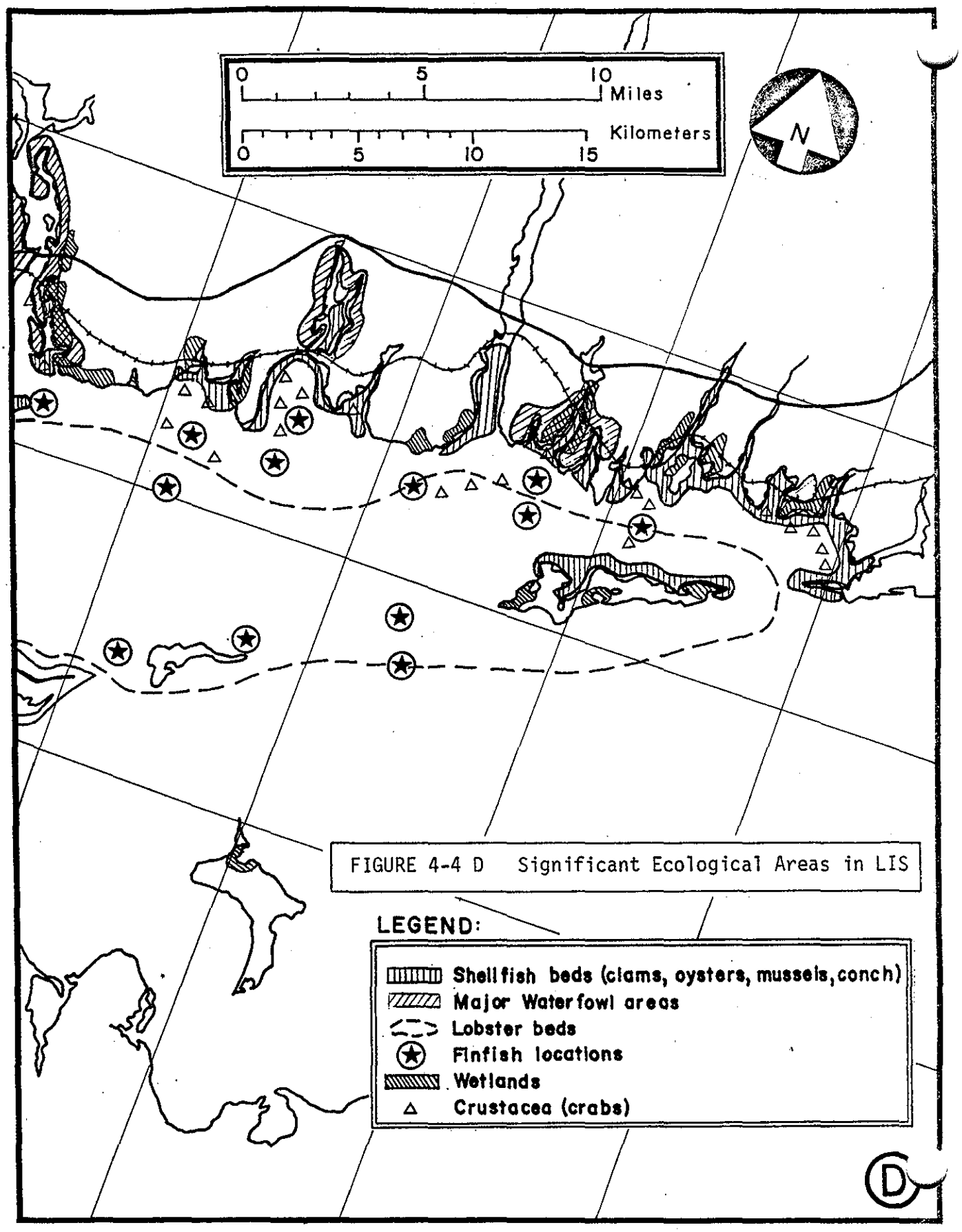


FIGURE 4-4 D Significant Ecological Areas in LIS

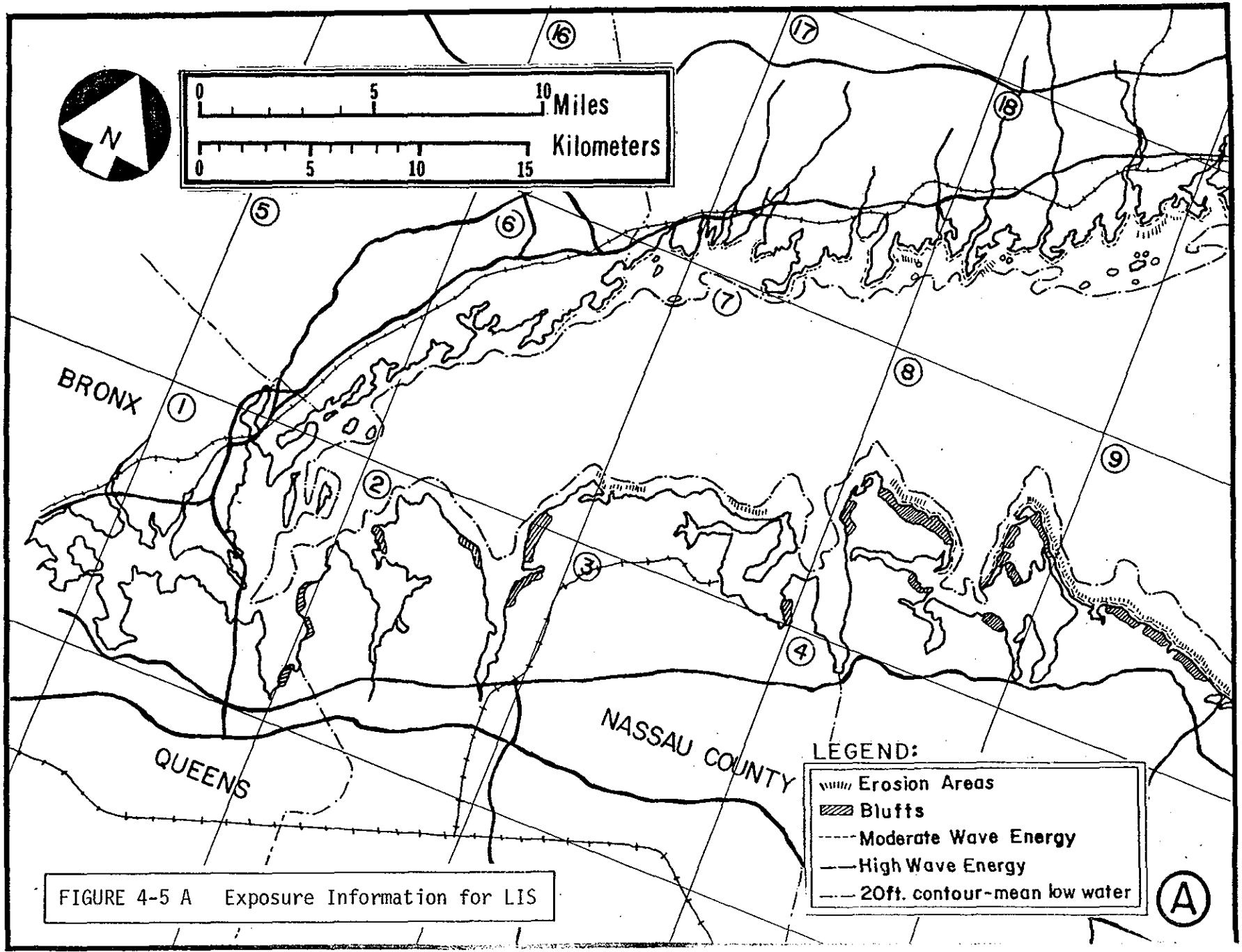


FIGURE 4-5 A Exposure Information for LIS

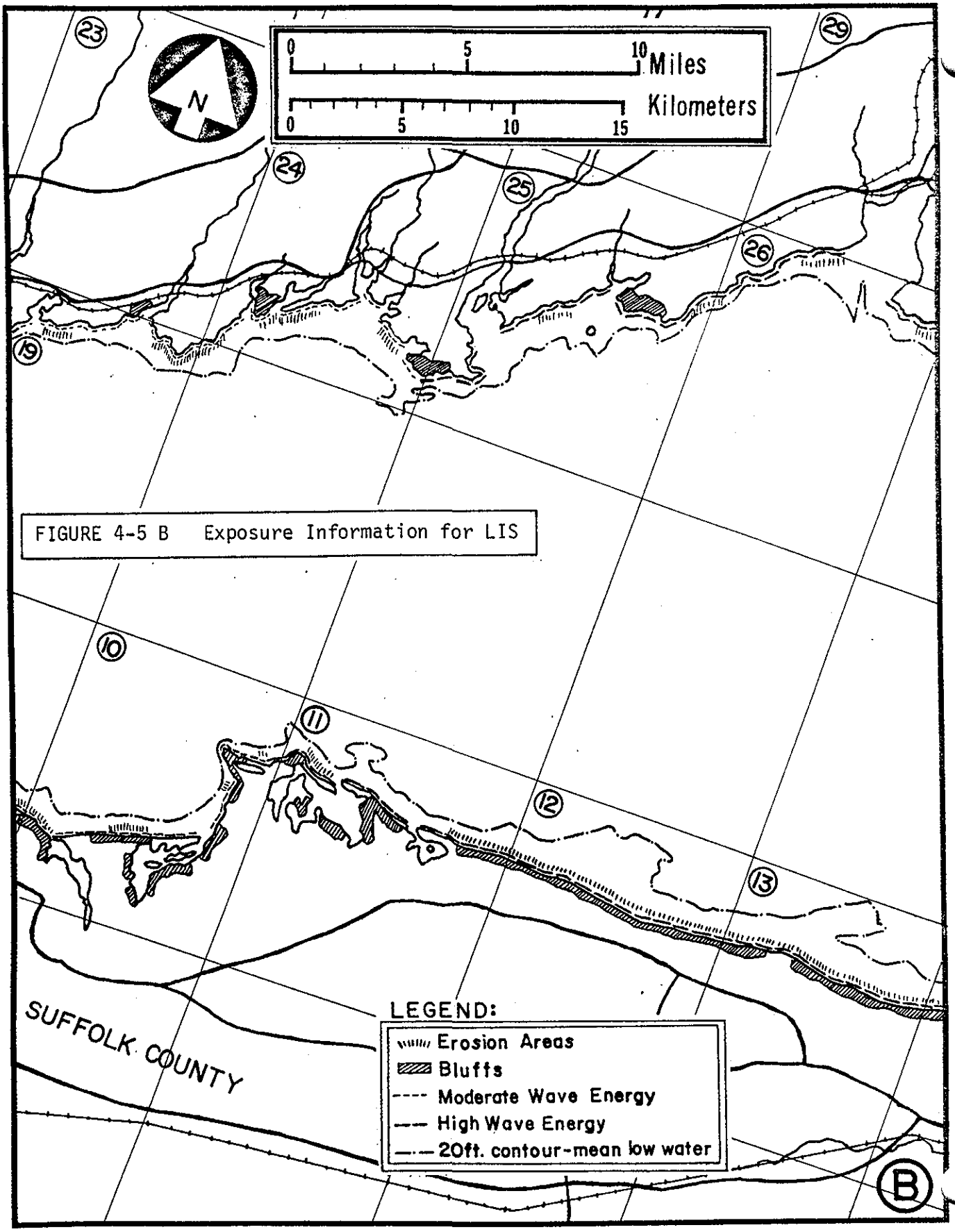


FIGURE 4-5 B Exposure Information for LIS

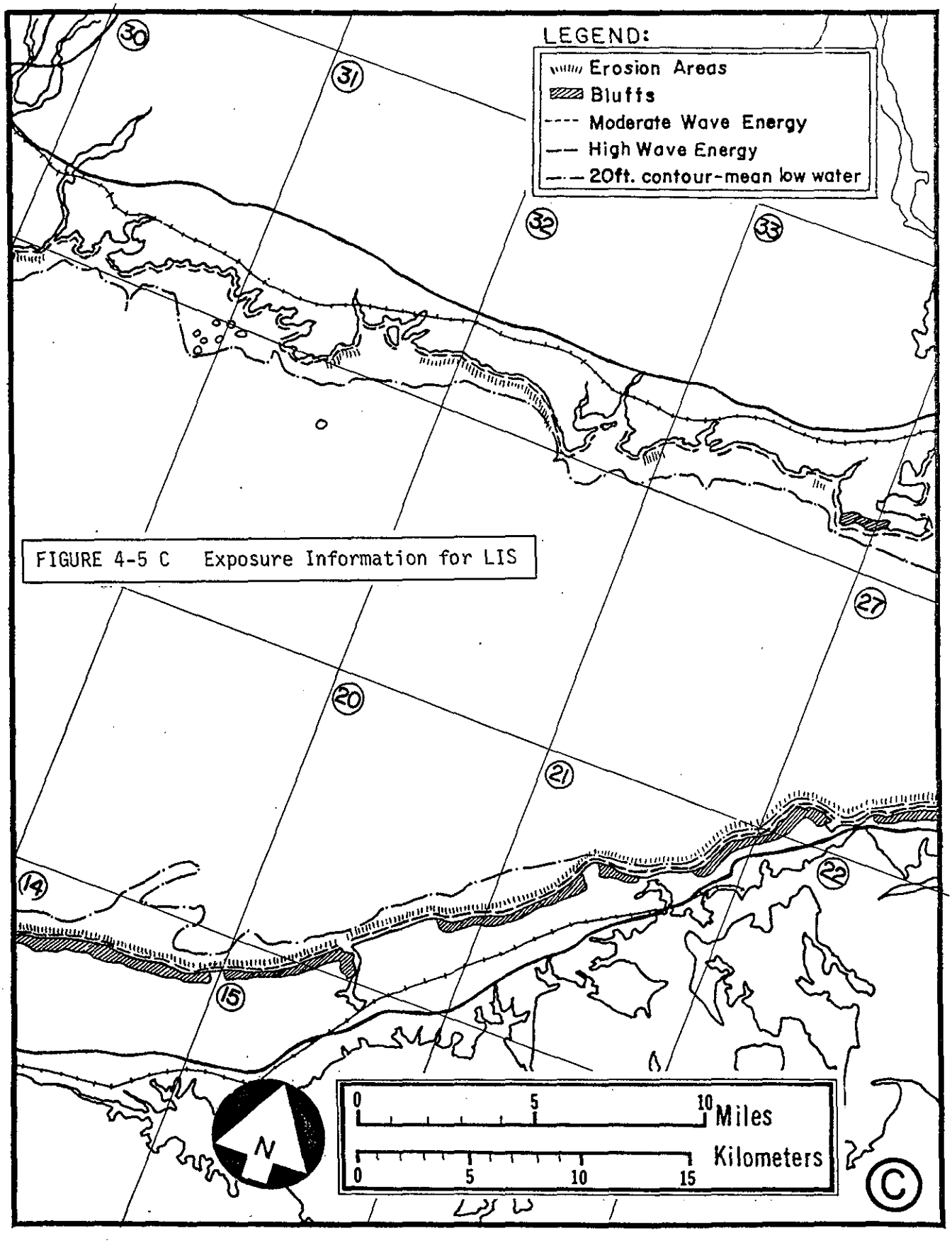


FIGURE 4-5 C Exposure Information for LIS

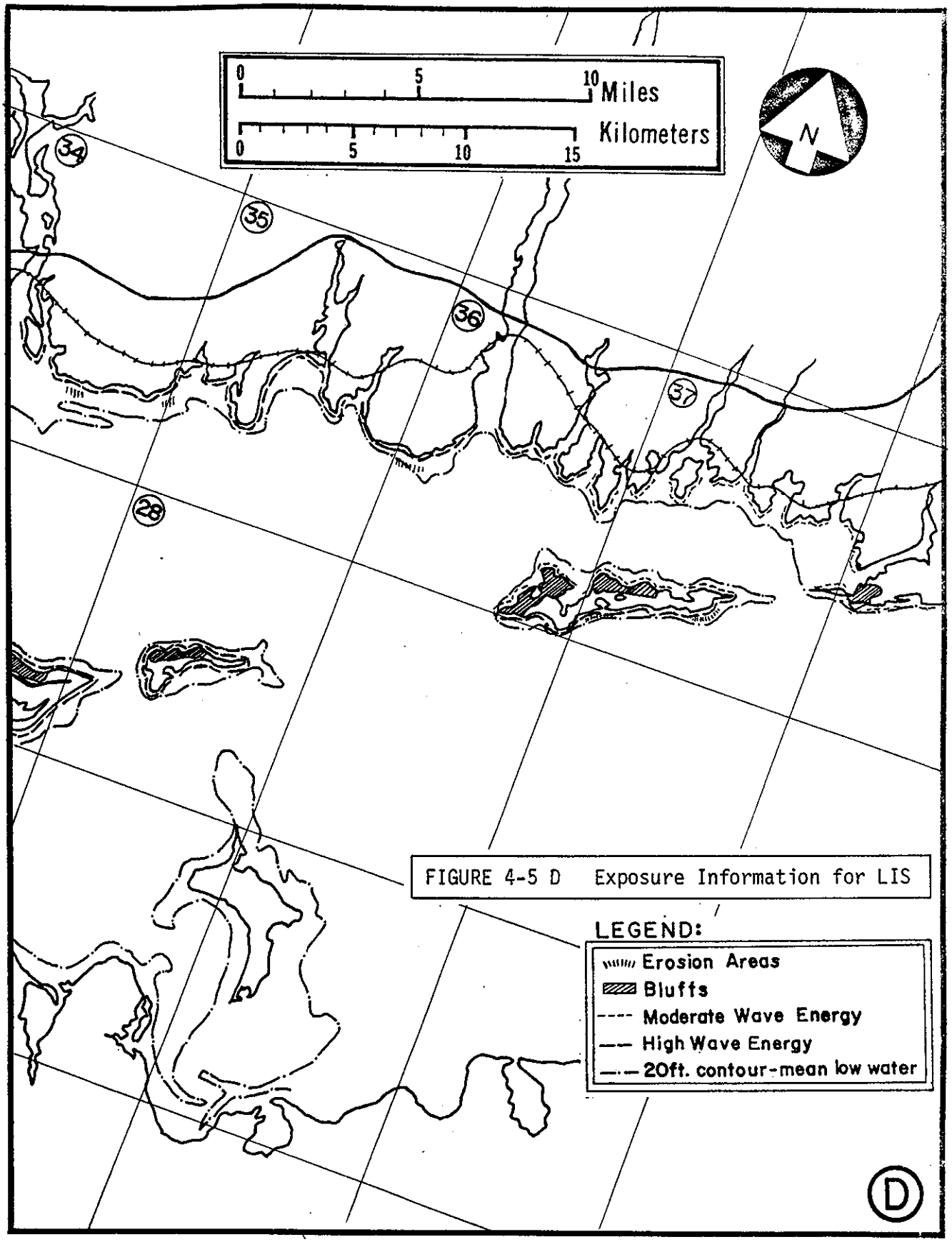


FIGURE 4-5 D Exposure Information for LIS

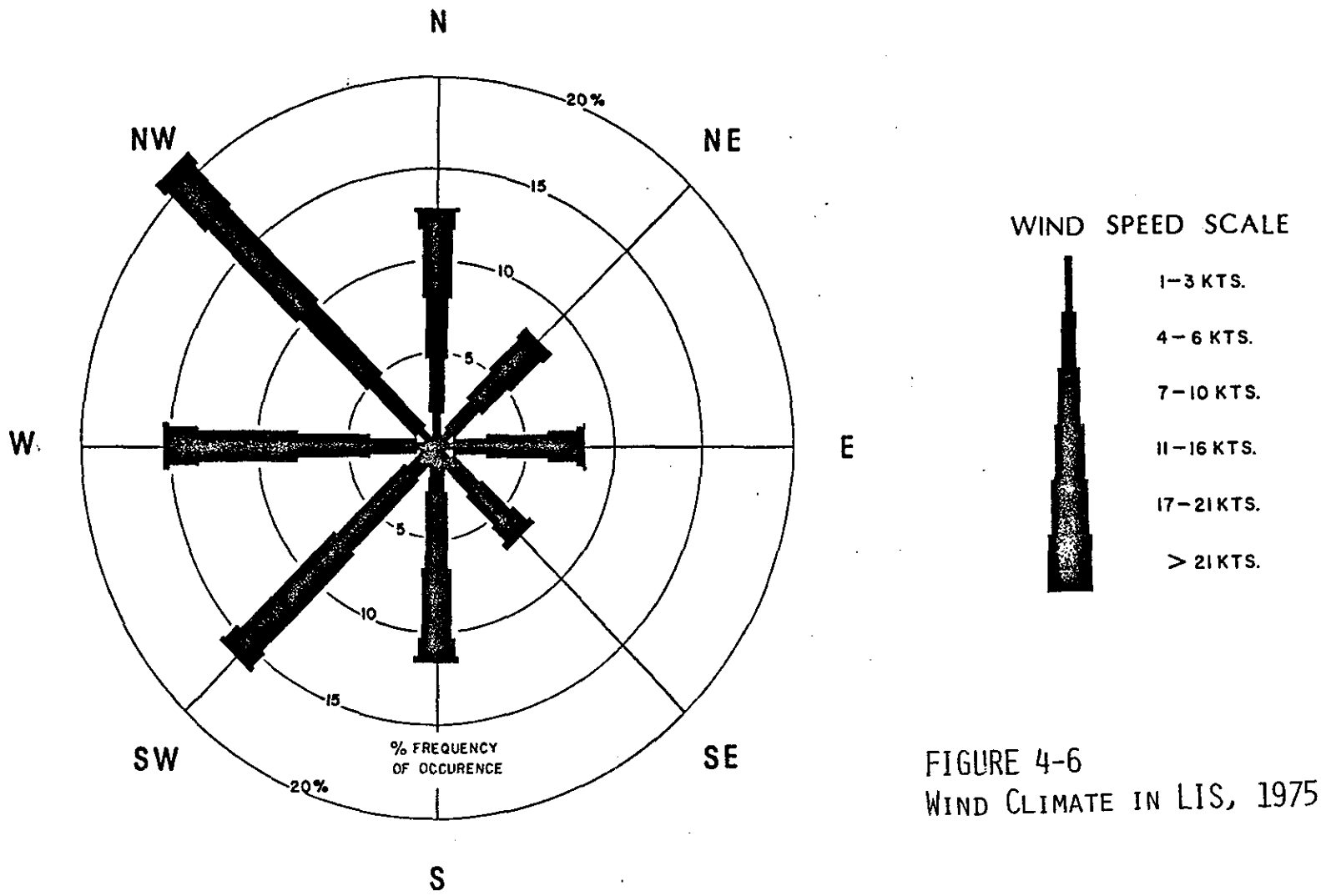


FIGURE 4-6
WIND CLIMATE IN LIS, 1975

of significant fetch in the direction of predominating winds. Due to the significant wave energy along the north shore of Suffolk County, Long Island (east of Huntington Bay), the exposed beaches exhibit relatively large sediment transport rates and most of this area has been designated as having critical erosion potential (LIRPB, 1979a).

4.60 Again, it is stressed that the purpose of the present analysis is to identify, on a preliminary basis, potential containment sites which are then ranked for relative desirability based on macro-level data, as shown. Much more detailed, site-specific analysis of wave energy, currents (scour), and erosion potential will be required to determine the design, costs, and impacts of the facility at a specific location.

4.61 Also shown in Figure 4-5 is the 20 ft. depth contour at MLW which arbitrarily defines the seaward limit for constructing a shoreline extension containment facility. Shoreline areas where the offshore bottom slope is steep are generally not desirable for siting a containment facility due to the lack of adequate surface area available as well as the need for building large, expensive dikes.

4.62 The fourth and final siting map stresses land use compatibility and reuse potential of a containment facility. Located on Figure 4-7 are discharge outfalls, major industrial/commercial/recreational waterfronts, power plants, petroleum facilities, sand and gravel operations, and cultural resources along the coast of LIS. Also indicated on these maps are major land transportation routes along the coast available to heavy vehicular traffic. Major navigational channels are shown to indicate areas of frequent dredging and waterborne traffic. This information is used to judge the potential for compatibility and reuse of a containment facility with existing uses of the LIS shoreline. It was not possible to plot all relevant compatibility information on Figure 4-7. Additional information (detailed existing and planned land use, zoning plans, coastal development

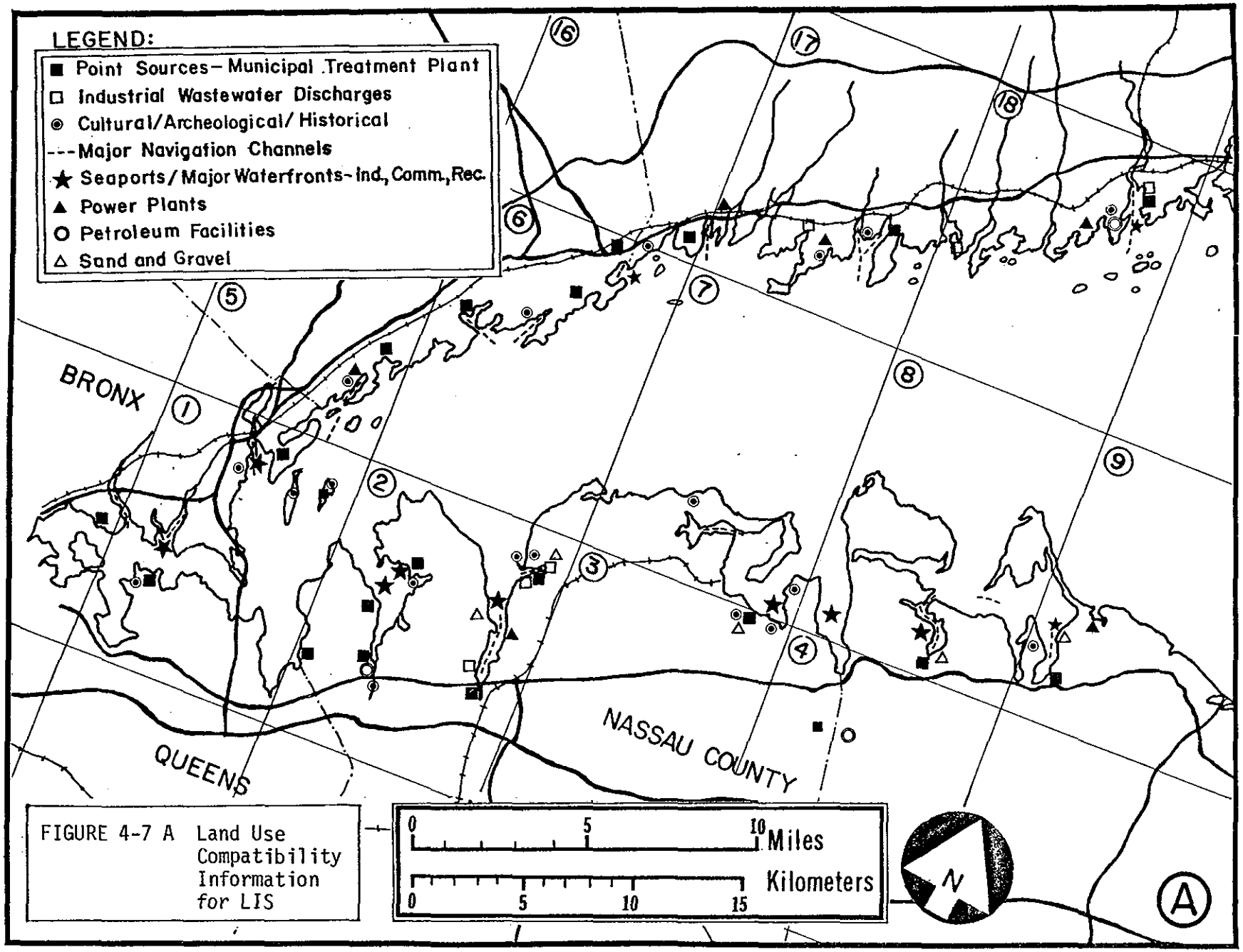


FIGURE 4-7 A Land Use Compatibility Information for LIS

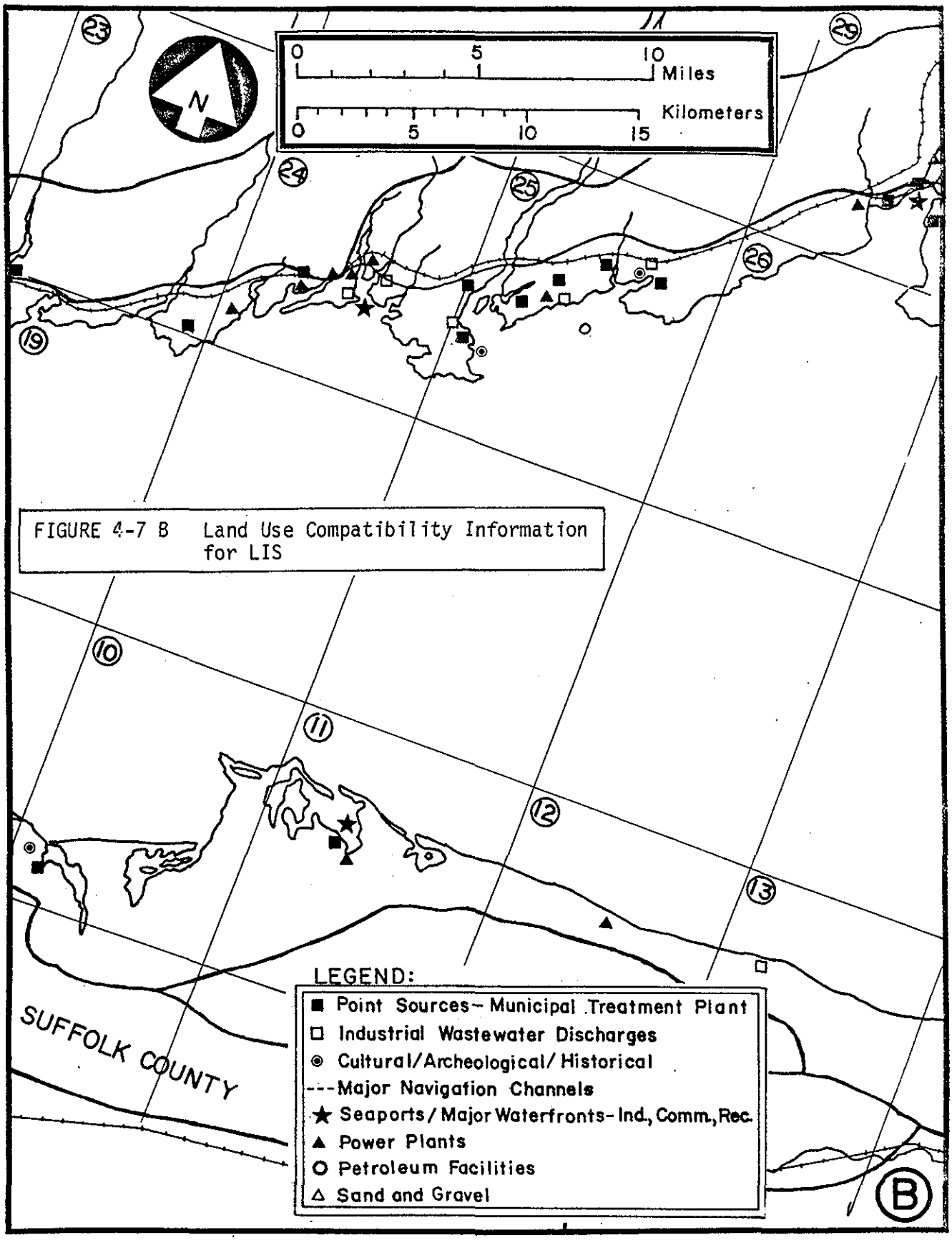


FIGURE 4-7 B Land Use Compatibility Information for LIS

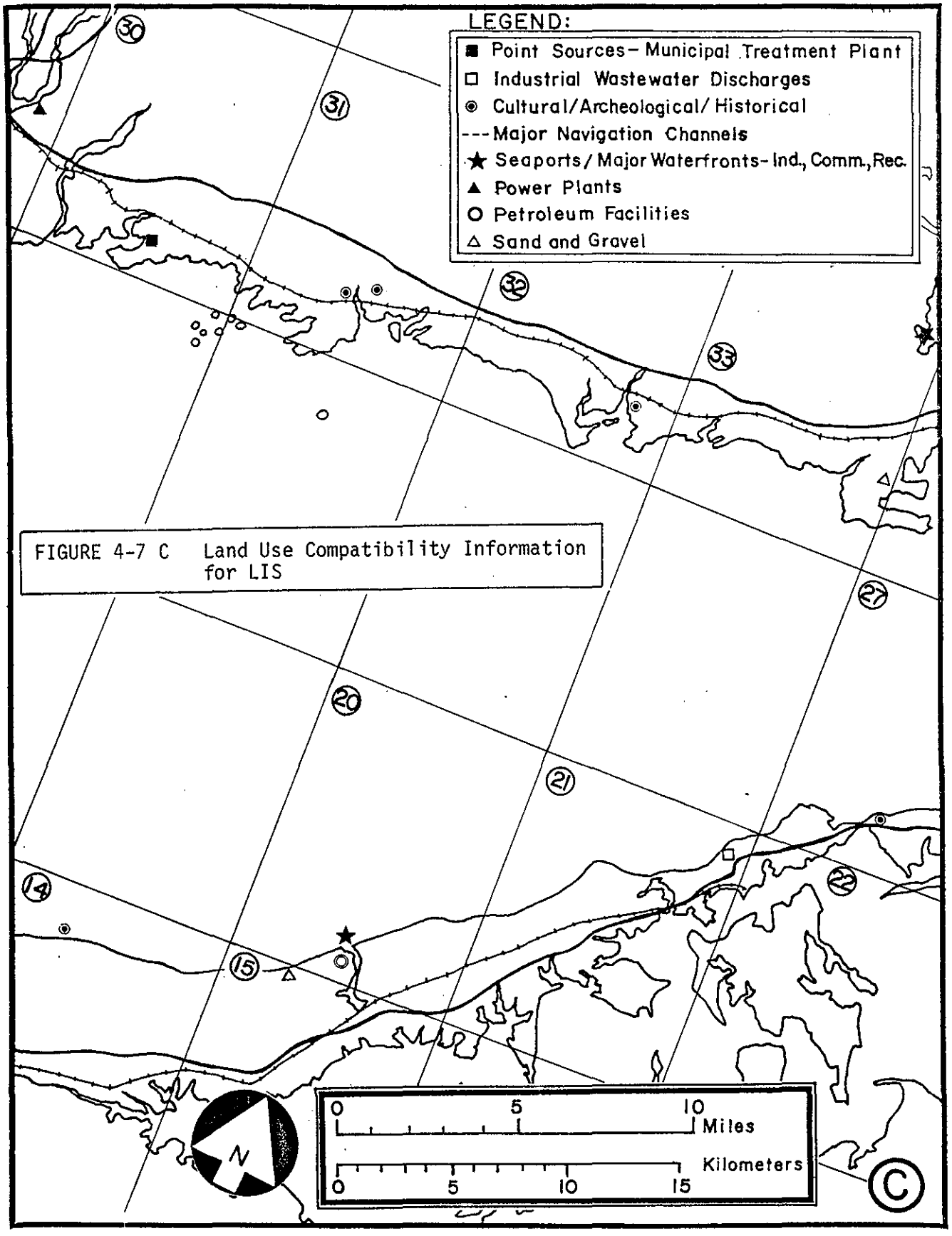


FIGURE 4-7 C Land Use Compatibility Information for LIS

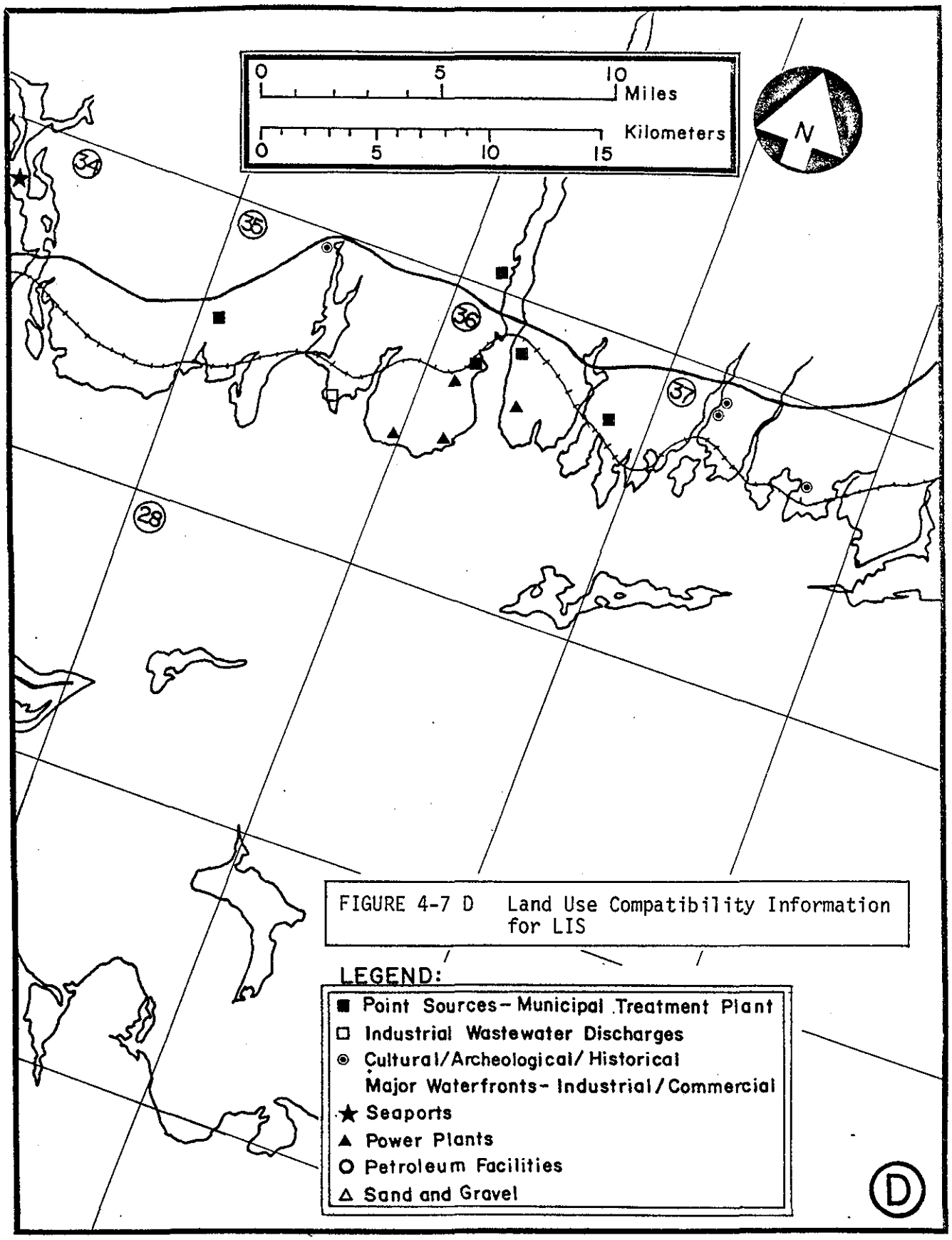


FIGURE 4-7 D Land Use Compatibility Information for LIS

plans, areas identified as significant historic or ecological resources, or urban areas identified as having a need for new public recreational facilities, etc.) is available from the respective State, County, and City planning commissions, and was consulted during the preliminary siting analysis for public shorefront lands.

Step 2 (Application of Overlays)

4.63 Figures 4-8 through 4-15 illustrate the step-by-step application of the primary screening criteria to the shoreline region of western LIS (Map A). For the sake of brevity, only the end results of grid overlay applications for Maps B, C, and D are presented herein. With each successive application of the overlay criteria, the number of clear grid boxes is reduced, along with the number of potential sites left for further consideration. Using a grid size of 1/2 mile, each box represents approximately 160 acres surface area. For each criteria overlay, grid boxes were shaded in only if the entire area represented by the box was negative in terms of the criteria definition. Conversely, if even a small portion of a box was positive (for example, a portion of shoreline within the box was publicly-owned), the entire box was left clear.

4.64 Table 4-6 summarizes the application of the primary screening criteria overlays for Maps A, B, C, and D. From Table 4-6, it is observed that the most limiting criteria for potential sites on Map A (non-compatible areas) is also the last criteria (#7) in order of importance. If this criteria is included, 19 sites survive within Map A for further analysis. In order to be consistent with the remaining map areas, criteria #7 is also included for consideration in Maps B, C, and D. The number of sites remaining after application of seven criteria are 19, 3, 0, and 2 for Maps A, B, C, and D, respectively. Out of the remaining 24 sites, 7 are in Connecticut, 1 in Westchester County, 8 in New York City, 7 in Nassau County, and 1 in Suffolk County.

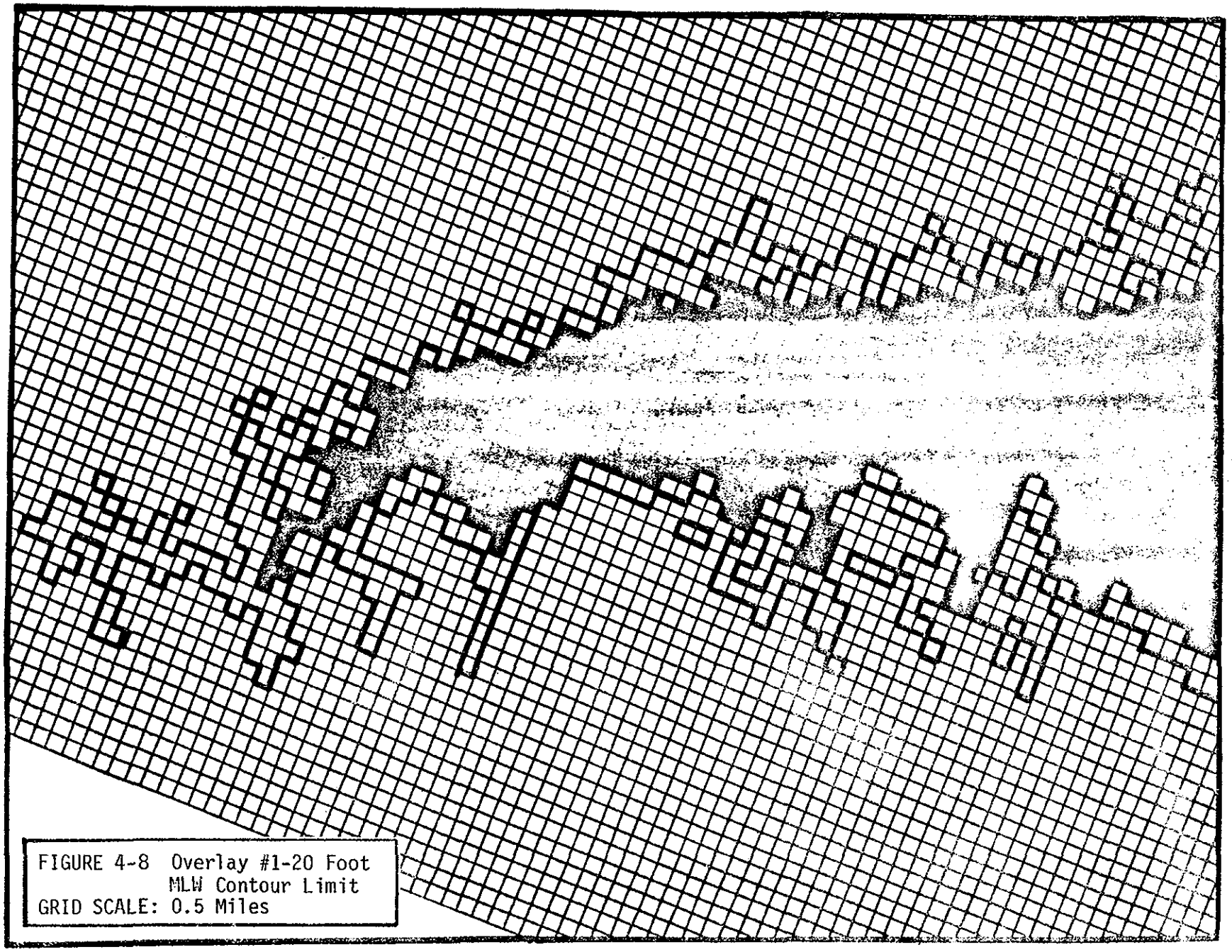


FIGURE 4-8 Overlay #1-20 Foot MLW Contour Limit
GRID SCALE: 0.5 Miles

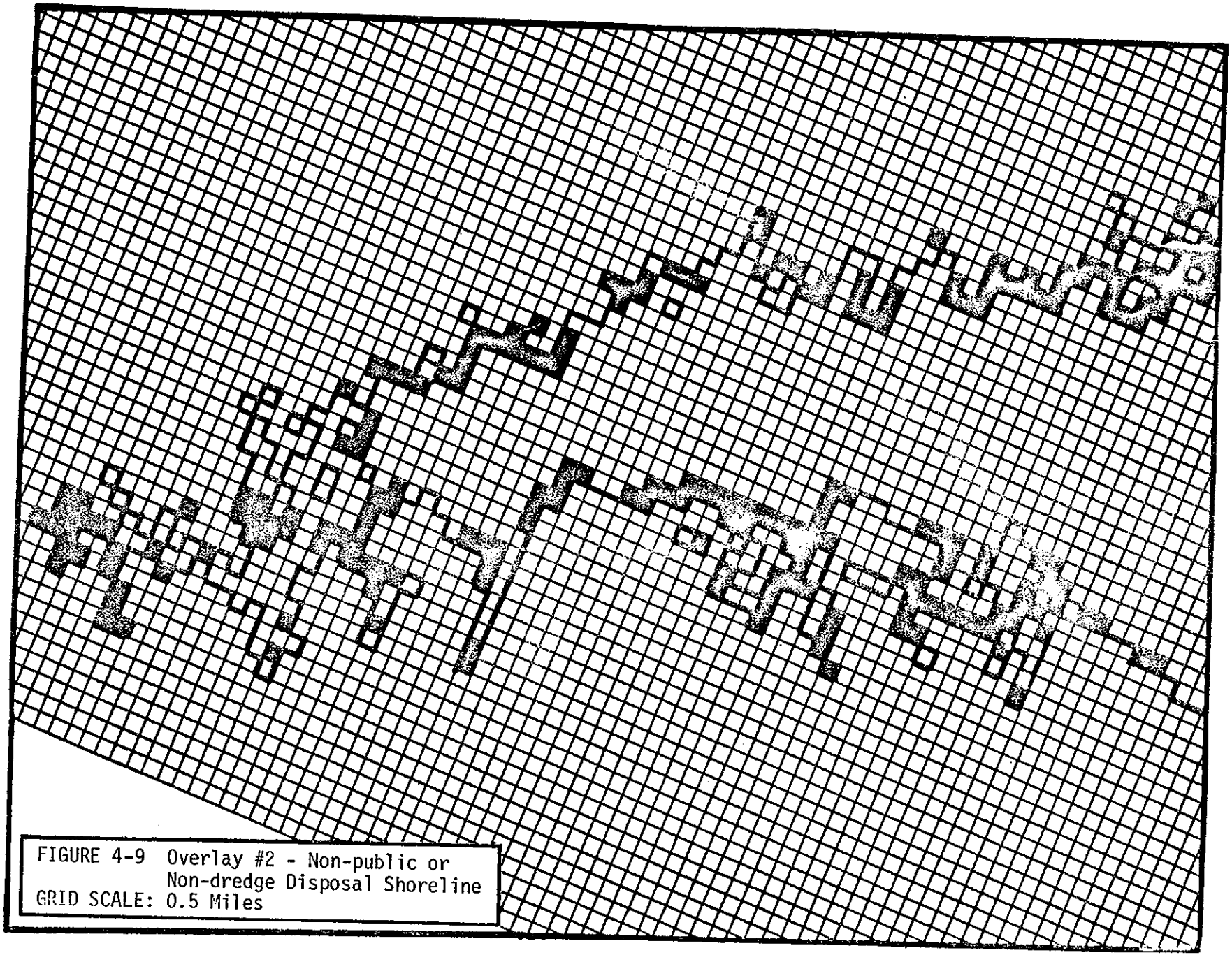


FIGURE 4-9 Overlay #2 - Non-public or Non-dredge Disposal Shoreline
GRID SCALE: 0.5 Miles

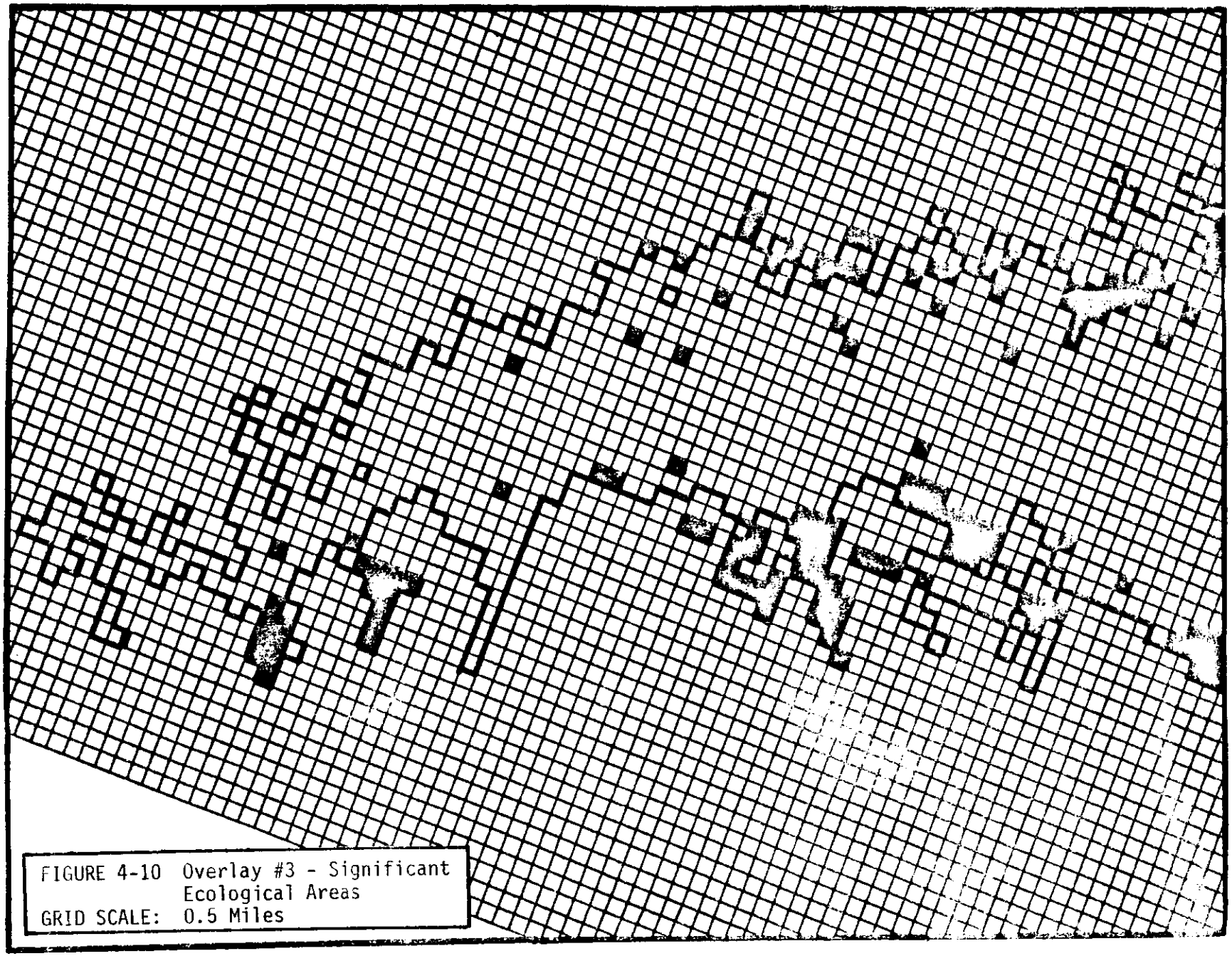


FIGURE 4-10 Overlay #3 - Significant Ecological Areas
GRID SCALE: 0.5 Miles

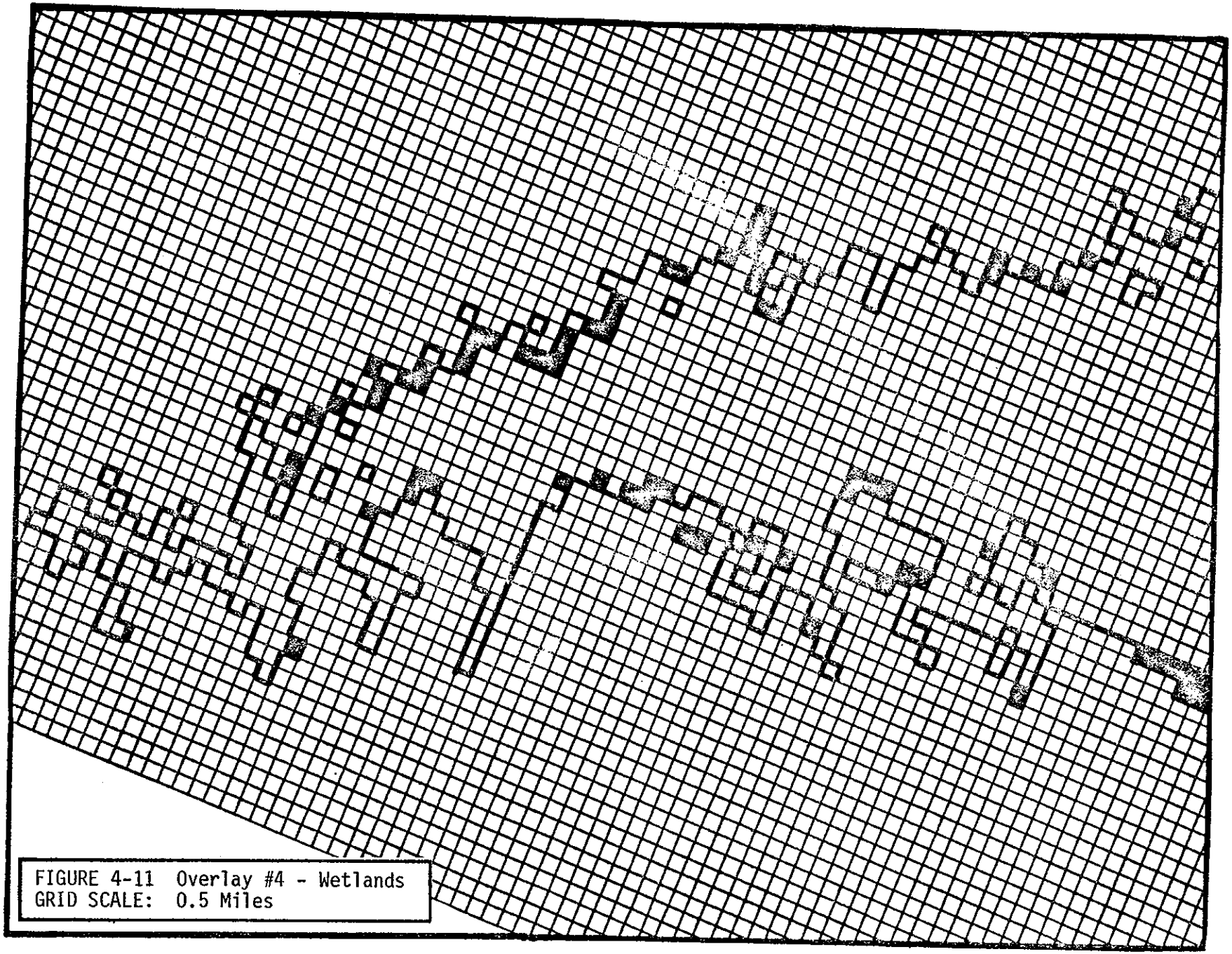


FIGURE 4-11 Overlay #4 - Wetlands
GRID SCALE: 0.5 Miles

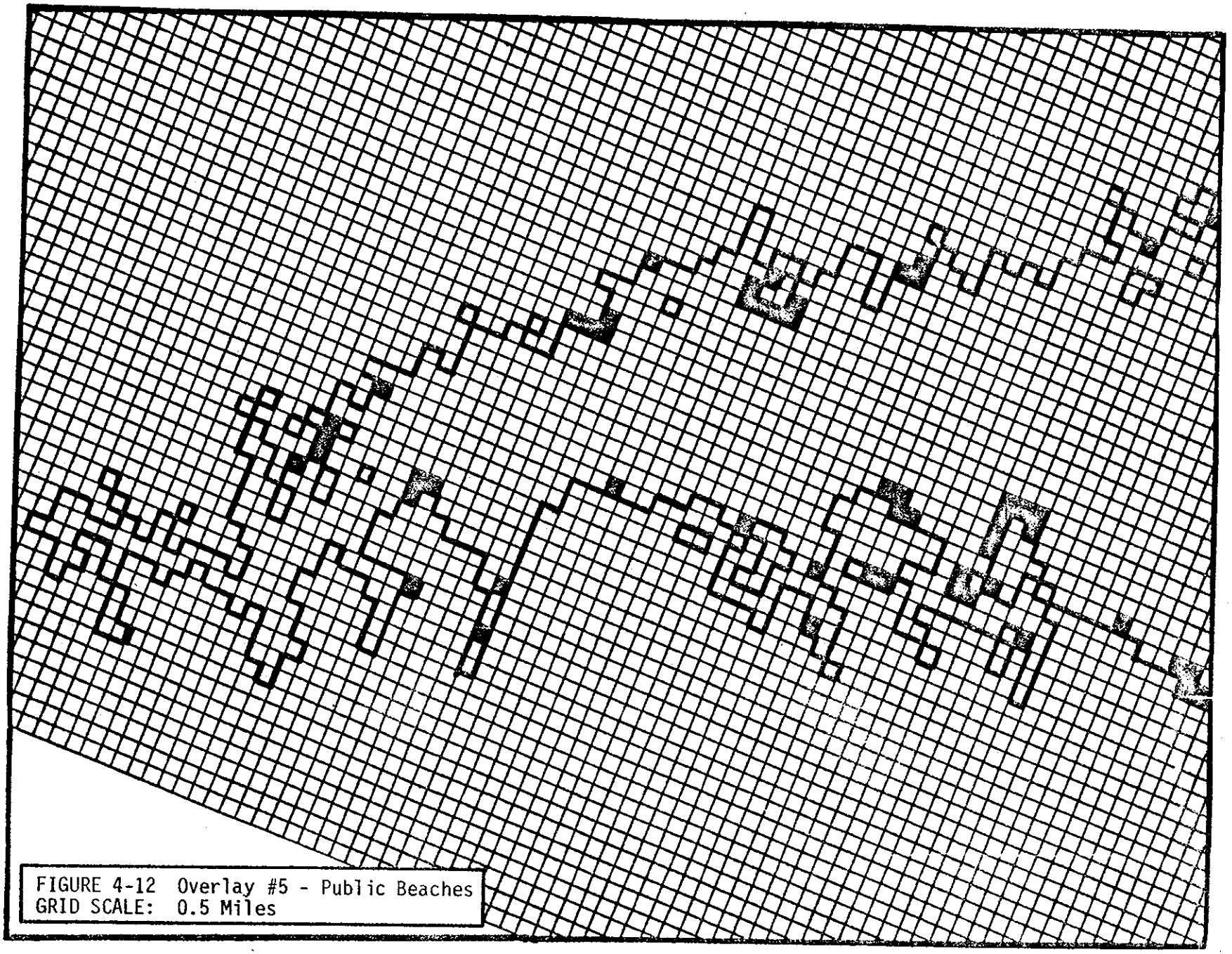


FIGURE 4-12 Overlay #5 - Public Beaches
GRID SCALE: 0.5 Miles

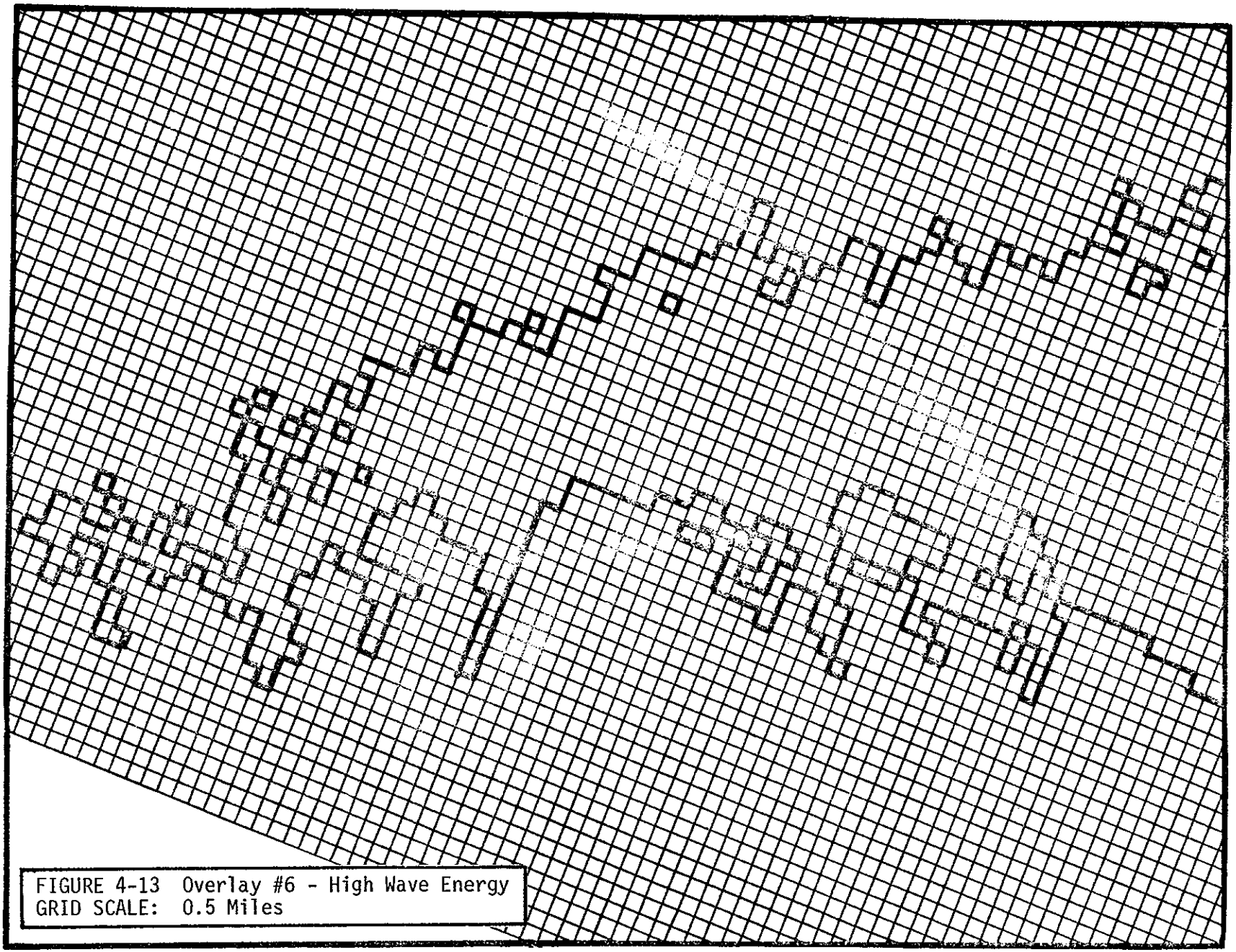


FIGURE 4-13 Overlay #6 - High Wave Energy
GRID SCALE: 0.5 Miles

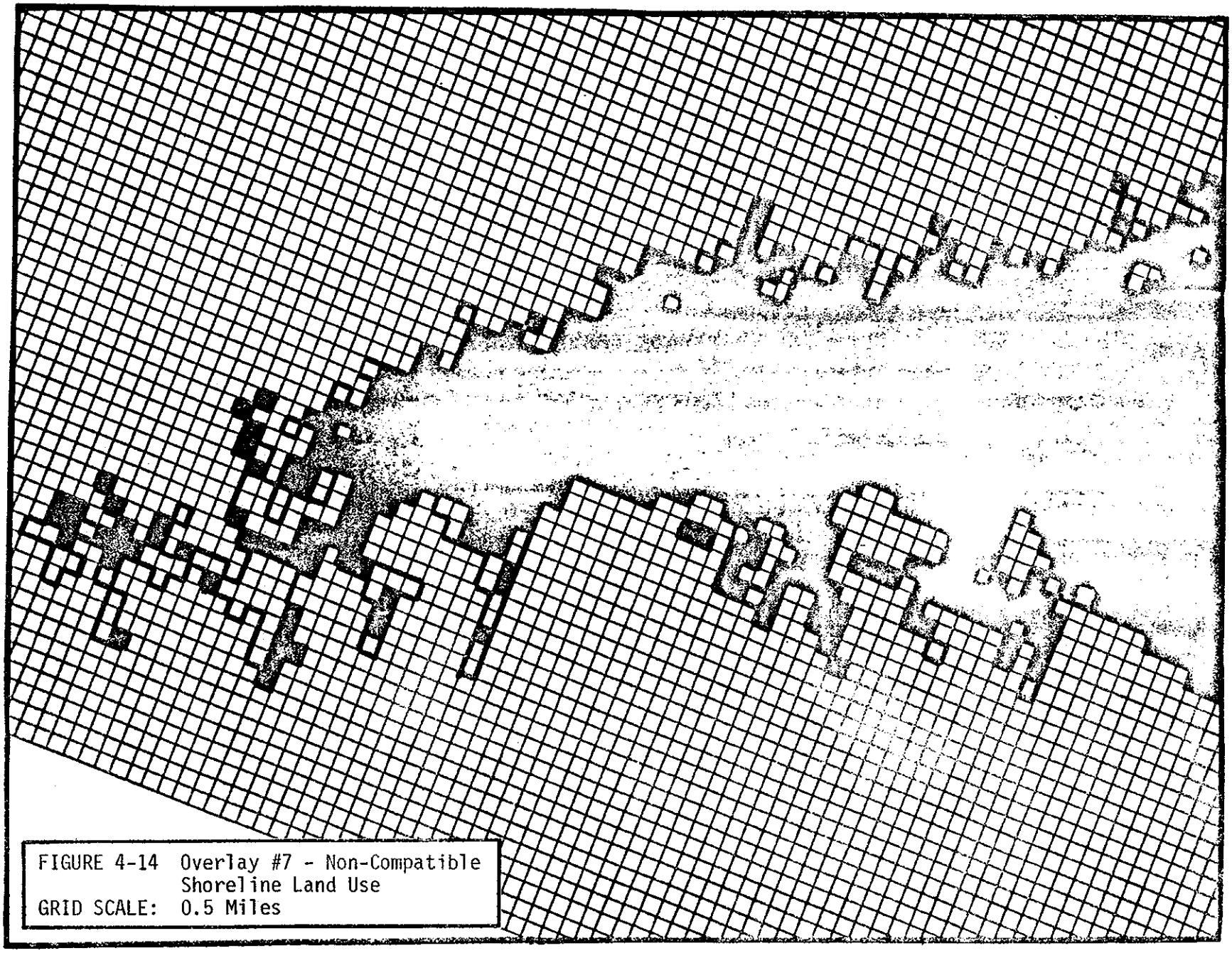


FIGURE 4-14 Overlay #7 - Non-Compatible Shoreline Land Use
GRID SCALE: 0.5 Miles

TABLE 4-6

SUMMARY APPLICATION OF PRIMARY SCREENING ANALYSIS

Primary Criteria in Order of Importance	Remaining Available Sites							
	A		B		C		D	
	Boxes	Sites	Boxes	Sites	Boxes	Sites	Boxes	Sites
Total Shore Sites	395	- NA	228	- NA	218	- NA	247	- NA
20 Foot Contour Level	317	- NA	215	- NA	198	- NA	243	- NA
Non-public or dredge disposal	140	- 70	86	- 30	52	- 22	60	- 18
Ecological Areas	101	- 54	60	- 24	42	- 16	33	- 14
Wetlands	85	- 48	52	- 20	35	14	24	- 11
Major Public Beaches	67	- 40	10	- 8	8	- 5	12	- 6
High Wave Energy	67	40	9	8	1	1	4	2
Non-Compatible Areas	28	19	3	3	0	0	4	2

4.65 It is important to point out that, at any level of criteria overlay beyond criteria #2 (public ownership and existing disposal sites), the number of remaining sites can be preserved for further, more detailed analysis under Step 3. This is so because the remaining criteria are considered again in ranking the sites in order of desirability. However, it is judged that only sites surviving criteria #1 to #7 will have reasonable enough potential as containment sites to undergo further analysis. Figure 4-15 locates potential sites for ranking under Step 3.

Step 3 (Ranking of Alternative Sites)

4.66 The 24 potential containment sites in New York and Connecticut identified above share certain attributes: they are all public shoreline or existing dredge material disposal sites, outside of significant ecological areas, in low wave energy zones, are not used for public recreation (bathing), and are in regions where land use compatibility is likely to be favorable. Additional site-specific information can be used (see Table 4-1) to further characterize the desirability of each site. Appendix D presents the summaries of the site-specific data for each of the screened alternative sites according to Table 4-1. The purpose of Step 3 is to rank the potential sites in terms of suitability for containment of dredged material. For purposes of this preliminary analysis, New York and Connecticut sites will be ranked separately.

4.67 According to the secondary siting criteria previously presented and discussed (see page 4-21 and the criteria point system in Appendix C), total points were determined for each site and were entered in summary matrix tables for Connecticut and New York, which are subsequently presented. Tables 4-7 and 4-8 more specifically present the results of applying secondary criteria #6 (Volume and Types of Dredged Material Available for Containment) to the alternative sites for New York and Connecticut , respectively. Using the modified gravity model concept, the force of

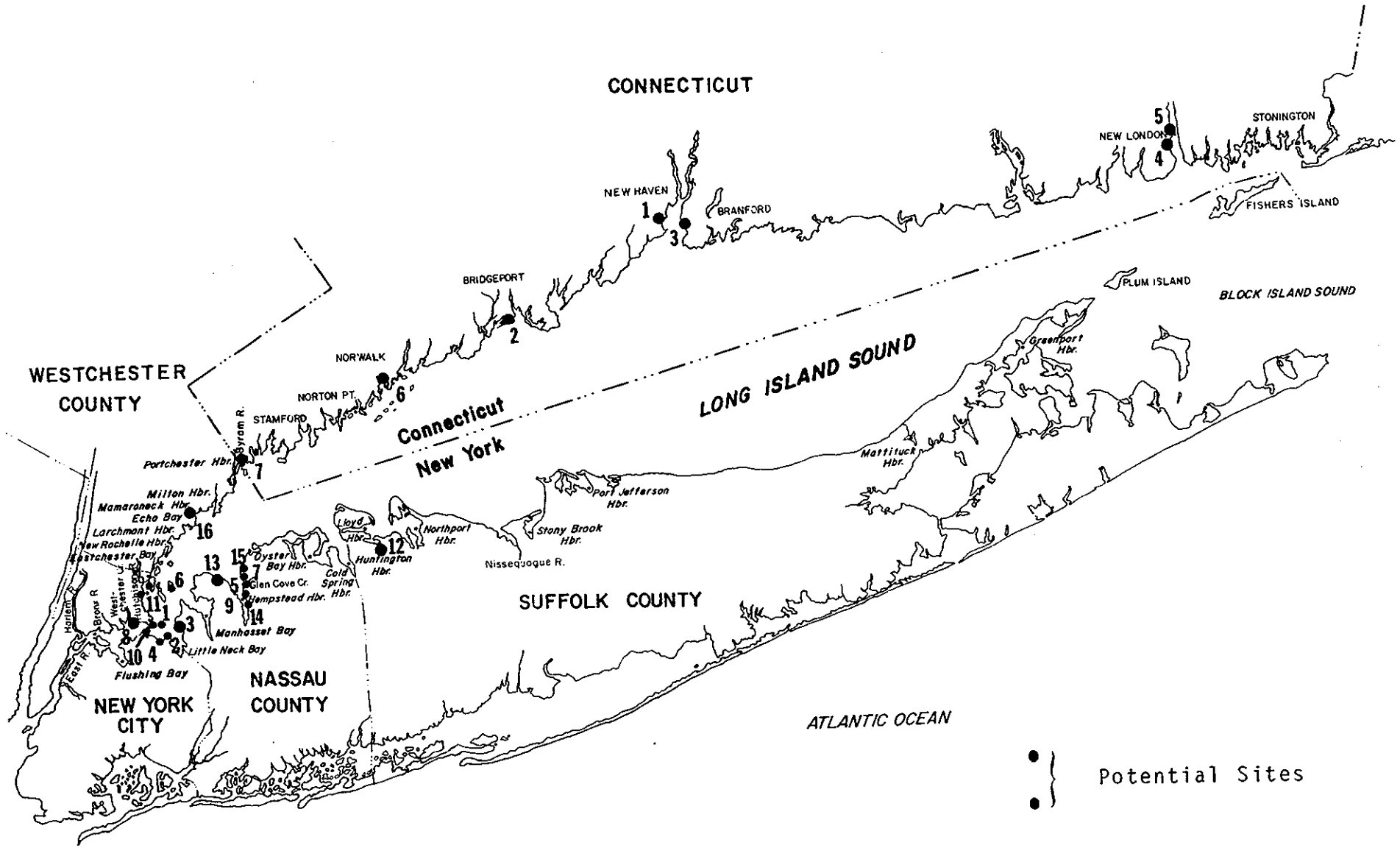


FIGURE 4-15 LOCATIONS OF POTENTIAL SITES SURVIVING PRIMARY SCREENING

Table 4-7

RANKING OF NEW YORK SITES BASED ON AVAILABLE DREDGED MATERIAL VOLUME VS. DISTANCE FROM SITE

Quad Map	Volume(v) cy/year(10^3)	% Needing Containment	NEW YORK SITES DISTANCE(D) IN MILES																
			1-3	1-4	1-5	1-6	1-7	2-6	3-18	3-24	3-25	3-26	3-28	3-39	3-43	3-47	4-4	4-5	5-8
Southold	1.0- 1.6	1.0	67	70	74	73	69	73	58	70	71	71	73	75	77	67	71	77	72
Mattituck Hills	6.2- 9.3	0.0	60	64	67	66	62	66	51	62	63	63	65	68	70	60	63	70	64
Nading River	21.0-36.8	0.10	49	53	56	55	51	55	38	48	49	49	51	57	57	49	49	57	50
Port Jefferson	4.8-33.3	0.65	35	39	42	41	37	41	24	33	34	34	36	43	43	35	34	43	35
Saint James	21.9-64.2	0.25	28	33	36	35	31	35	18	27	28	28	30	37	36	29	28	36	29
Northport	9.8-70.7	0.50	22	27	30	29	25	29	12	21	22	22	24	31	31	23	22	31	23
Lloyd Harbor	19.3-44.7	0.96	18	22	25	24	20	24	3	16	17	17	19	26	25	18	17	25	18
Bayville	0.10	1.0	13	19	16	15	11	15	13	8	9	9	11	17	17	9	9	17	10
Sea Cliff	13.2-34.5	.95	1	8	10	8	6	8	20	1	1	1	3	11	14	7	5	14	1.5
Flushing	48.7-231.3	1.0	9	3	2	1	4	1	27	9	10	10	12	2.5	3	10	10	3	11
Mt. Vernon	2.7-13.4	1.0	5	4	7	6	3	6	25	6	7	7	9	7.5	9	5	7	5	8
Mamaroneck	18.5-46.8	1.0	6	10	12	11	7	11	20	6	7	7	9	12.5	12	2	7	12	8

Table 4-7 (Cont.)

MATRIX FOR V/2D ATTRACTION NEW YORK

	V/2D NEW YORK SITES																
Quad Map	1-3	1-4	1-5	1-6	1-7	2-6	3-18	3-24	3-25	3-26	3-28	3-39	3-43	3-44	3-47	4-4	5-8
Southold	10	9	9	9	9	9	11	9	9	9	9	9	8	8	10	9	9
Mattituck Hills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wading River	29	27	26	26	28	26	38	30	30	30	28	22	25	25	29	29	29
Port Jefferson	177	159	148	151	167	151	258	188	182	182	172	144	144	144	177	182	177
Saint James	192	163	150	154	174	154	299	199	192	192	180	145	150	150	186	192	186
Northport	458	373	336	347	403	347	834	479	458	458	420	325	325	325	438	457	438
Lloyd Harbor	853	698	614	640	768	640	5120	960	903	903	808	591	614	614	668	904	853
Bayville	4	3	3	3	5	3	4	6	6	6	5	3	3	3	6	6	5
Sea Cliff	11,329	1416	1133	1416	1889	1416	566	11,329	11,329	11,329	3776	1030	809	809	1618	22,658	7553
Flushing	7778	23,333	35,000	70,000	17,500	7000	2593	7778	7000	7000	5833	28,000	23,333	23,333	7000	7000	6364
Mt. Vernon	805	1006	575	671	1342	671	161	671	575	575	447	537	447	805	805	575	503
Mamaroneck	2720	1633	1360	1484	2332	1484	816	2721	2332	2332	1814	1306	1360	1360	8163	2332	2041
Total	24,355	28,820	39,354	73,485	24,617	73,485	10,700	24,370	23,016	23,016	13,492	32,112	27,218	27,576	19,100	34,344	18,158
Points	3	6	8	10	4	10	0	3	2	2	0	7	5	5	1	7	1

Table 4-8

RANKING OF CONNECTICUT SITES BASED ON AVAILABLE DREDGED MATERIAL VOLUME VS. DISTANCE FROM SITE

Quad Map	Volume(v) cy/year(10^3)	DISTANCE(D) IN MILES TO SITE CONNECTICUT 1-9	1-10	3-50	3-58	3-63	3-69	3-71
Glenville	4.2	87	89	1	16	25	42	43
Stanford	35.4	82	84	7	12	20	37	38
Norwalk South	42.2	76	78	13	4	14	31	32
Westport	17.7	71	73	22	10	11	25	26
Bridgeport	88.1	62	64	28	16	1	18	19
Milford	48.6	57	59	35	22	9	10	11
New Haven	347.9	53	55	45	33	20	2	1
Branford	28.8	45	47	47	36	22	8	7.5
Guilford	26.8	37	39	54	43	29	16	15.5
Clinton	47.2	29	31	62	50	36	23	22.5
Essex	51.1	24	26	70	56	42	28	27.5
Old Lyme	205.7	17	19	75	62	48	34	33.5
Niantic	18.0	10	12	84	71	59	44	43.5
New London	161.9	2	4	90	73	63	48	47.5
Mystic	16.4	11	13	98	81	69	55	54.5
Watch Hill	7.0	15	17	102	86	73	58	57.5

Table 4-8 (Cont.)

MATRIX FOR V/2D ATTRACTION CONNECTICUT

Quad Map	I-9	I-10	3-50	V/2D CONNECTICUT SITES 3-58	3-63	3-69	3-71
Glenville	24	24	4200	131	84	50	49
Stanford	216	211	2529	1475	885	478	466
Norwalk South	278	271	1623	5275	1507	681	659
Westport	125	121	402	885	805	354	340
Bridgeport	710	688	1573	2753	88,100	2447	2318
Milford	426	412	694	1105	2700	2430	2209
New Haven	3282	3163	3866	5271	8698	86,975	173,950
Branford	389	424	267	335	497	900	1920
Guilford	362	344	248	312	462	838	865
Clinton	814	761	381	472	656	1026	1049
Essex	1065	983	365	456	608	913	929
Old Lyme	6050	5413	1371	1659	2143	3025	3070
Niantic	900	750	107	127	153	205	207
New London	40,475	20,238	899	1109	1285	1686	1704
Mystic	745	631	84	101	118	149	150
Watch Hill	233	206	34	41	48	60	61
Total	56,094	34,648	18,643	21,507	108,749	102,217	189,946
Points	5	3	0	1	8	7	10

attraction (V/2D) was calculated for each site based on: (1) the average annual projected dredged material volume (V) within each quadrangle map, and (2) the approximate distance (D) between the shoreline area centroid of each quadrangle map and the site. Thus, for each site in question, points representing the projected annual dredged material volume (V in CY) divided by distance traveled by barge both to and from the site (2D in miles), i.e., annual CY per barge mile, are totaled. Since New York and Connecticut sites are ranked separately, it was assumed that no dredged material would be transported across state lines.

4.68 Results of the site ranking analysis are summarized in matrix form in Tables 4-9 and 4-10 for New York and Connecticut, respectively. Total points for each alternative site reflect the suitability of that site for locating a small-volume containment facility and provide the basis for site ranking, with the greatest number of points being most suitable, relatively speaking.

4.69 Of the sixteen alternative sites screened in New York, eight are clustered in a small area in the Throgs Neck Bridge vicinity at the western extreme end of LIS. Included in these eight sites are the four ranking highest in terms of shoreline extension containment potential. Of the remaining eight sites in New York, six are located in Hempstead Harbor, one in Mamaroneck Harbor, and one in Huntington Harbor (see Figures 4-3 and 4-15).

4.70 Of the seven sites screened in Connecticut, two (ranked #1 and #3) are located in New Haven Harbor, one near Bridgeport Harbor (ranked #2), two in New London (ranked #4 and #5), one each in Norwalk Harbor (#6) and Byram Harbor (#7).

4.71 As shown in Tables 4-9 and 4-10, a perfect score for the criteria point evaluation is 480. In principle, sites scoring near this total should have reasonable potential for locating a shoreline containment facility. Sites in New York generally scored well, with three sites scoring greater

Table 4-9

SUMMARY MATRIX FOR SITE-SPECIFIC EVALUATION OF POTENTIAL SITES IN NEW YORK

CRITERIA	(Weight Factor)	Sub-Criteria	Total Pts. Possible	NEW YORK SITES 1-3	1-4	1-5	1-6	1-7	2-6	3-18	3-24	3-25	3-26
Proximity to Sensitive Ecological Areas (SEA's)	(10)	A	(2)	1x10=10	1x10=10	2x10=20	2x10=20	2x10=20	2x10=20	1x10=10	2x10=20	2x10=20	2x10=20
		B	(2)	1x10=10	2x10=20	2x10=20	2x10=20	2x10=20	2x10=20	2x10=20	2x10=20	2x10=20	2x10=20
		C	(2)	1x10=10	0x10=0	1x10=10	1x10=10	1x10=10	1x10=20	2x10=20	1x10=10	1x10=10	1x10=10
		D	(2)	1x10=10	1x10=10	0x10=0	1x10=10	1x10=10	1x10=20	1x10=10	1x10=10	1x10=10	1x10=10
		E	(2)	1x10=10	2x10=20	2x10=20	2x10=20	2x10=20	2x10=20	2x10=20	2x10=20	2x10=20	2x10=20
		Subtotal	(10)	5x10=50	6x10=60	7x10=70	8x10=80	8x10=80	8x10=80	8x10=80	8x10=80	8x10=80	8x10=80
Bathymetry of Site	(9)	A	(10)	2x 9=18	7x 9=63	7x 9=63	1x 9=9	7x 9=63	10x 9=90	0x 9=0	1x 9=9	6x 9=54	7x 9=63
Exposure Considerations	(7)	A	(3)	3x 7=21	3x 7=21	3x 7=21	3x 7=21	3x 7=21	3x 7=21	3x 7=21	3x 7=21	3x 7=21	3x 7=21
		B	(3)	3x 7=21	3x 7=21	3x 7=21	3x 7=21	3x 7=21	3x 7=21	3x 7=21	3x 7=21	3x 7=21	3x 7=21
		C	(2)	2x 7=14	2x 7=14	2x 7=14	2x 7=14	2x 7=14	2x 7=14	2x 7=14	0x 7=0	2x 7=14	2x 7=14
		D	(2)	0x 7=0	2x 7=14	0x 7=0	1x 7=7	0x 7=0	1x 7=7	0x 7=0	1x 7=7	1x 7=7	1x 7=7
		Subtotal	(10)	8x 7=56	10x 7=70	8x 7=56	9x 7=63	8x 7=56	9x 7=63	8x 7=56	7x 7=49	9x 7=63	9x 7=63
Soil/Foundation Characteristics	(7)	A	(9)	9x 7=63	9x 7=63	9x 7=63	3x 7=21	6x 7=42	6x 7=42	9x 7=63	6x 7=42	6x 7=42	6x 7=42
		B	(1)	0x 7=0	1x 7=7	1x 7=7	0x 7=0	0x 7=0	0x 7=0	0x 7=0	0x 7=0	0x 7=0	0x 7=0
		Subtotal	(10)	9x 7=63	10x 7=70	10x 7=70	3x 7=21	6x 7=42	6x 7=42	9x 7=63	6x 7=42	6x 7=42	6x 7=42
Existing and Potential Land Use	(6)	A	(2)	1x 6=6	1x 6=6	1x 6=6	1x 6=6	1x 6=6	0x 6=0	1x 6=6	1x 6=6	0x 6=0	1x 6=6
		B	(2)	1x 6=6	1x 6=6	1x 6=6	1x 6=6	1x 6=6	2x 6=12	1x 6=6	2x 6=12	2x 6=12	0x 6=0
		C	(2)	2x 6=12	1x 6=6	2x 6=12	1x 6=6	2x 6=12	2x 6=12	1x 6=6	2x 6=12	2x 6=12	2x 6=12
		D	(2)	0x 6=0	0x 6=0	0x 6=0	0x 6=0	1x 6=6	0x 6=0	1x 6=6	0x 6=0	0x 6=0	1x 6=6
		E	(2)	1x 6=6	1x 6=6	2x 6=12	1x 6=6	0x 6=0	1x 6=6	1x 6=6	2x 6=12	0x 6=0	2x 6=12
		Subtotal	(10)	5x 6=30	4x 6=24	6x 6=36	4x 6=24	5x 6=30	5x 6=30	5x 6=30	7x 6=42	4x 6=24	6x 6=36
Volume and Types of Dredged Material Available (see Table 4-7)	(4)	A	(10)	3x 4=12	6x 4=24	8x 4=32	10x 4=40	4x 4=16	10x 4=40	0x 0=0	3x 4=12	2x 4=8	2x 4=8
Proximity to Cultural Resources	(2)	A	(10)	10x 2=20	10x 2=20	10x 2=20	10x 2=20	1x 2=2	10x 2=20	10x 2=20	0x 2=0	0x 2=0	1x 2=2
Land Reuse Potential	(2)	A	(2)	1x 2=2	1x 2=2	0x 2=0	1x 2=2	1x 2=2	1x 2=2	0x 2=0	1x 2=2	1x 2=2	1x 2=2
		B	(3)	2x 2=4	2x 2=4	3x 2=6	2x 2=4	0x 2=0	2x 2=4	2x 2=4	2x 2=4	2x 2=2	2x 2=4
		C	(3)	0x 2=0	1x 2=2	0x 2=0	1x 2=2	1x 2=2	0x 2=0	1x 2=2	0x 2=0	0x 2=0	1x 2=2
		D	(2)	1x 2=2	1x 2=2	2x 2=4	1x 2=2	1x 2=2	1x 2=2	2x 2=4	0x 2=0	0x 2=0	0x 2=0
		Subtotal	(10)	4x 2=8	5x 2=10	5x 2=10	5x 2=10	3x 2=6	4x 2=8	5x 2=10	3x 2=6	3x 2=6	4x 2=8
Use of Site for Existing or Historical Spoil Disposal	(1)	A	(7)	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0	4x 1=4	4x 1=4
		B	(3)	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0	2x 1=2	2x 1=2
		Subtotal	(10)	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0	6x 1=6	6x 1=6
Total Points	(480)			257	341	357	267	295	373	259	240	283	308
Ranking				13	3	2	10	6	1	12	15	7	5

Table 4-9 (Cont.)

NEW YORK SITES

CRITERIA	(Weight Factor)	Sub-Criteria	Total Pts. Possible	3-39	3-43	3-44 & 4-5	3-47	4-4	5-8
Proximity to Sensitive Ecological Areas (SEA's)	(10)	A	(2)	2x10=20	2x10=20	2x10=20	2x10=20	2x10=20	2x10=20
		B	(2)	2x10=20	2x10=20	2x10=20	1x10=10	2x10=20	2x10=20
		C	(2)	1x10=10	1x10=10	1x10=10	1x10=10	1x10=10	1x10=10
		D	(2)	1x10=10	1x10=10	1x10=10	2x10=20	1x10=10	1x10=10
		E	(2)	2x10 20	2x10=20	1x10=10	1x10=10	2x10=20	2x10=20
		Subtotal	(10)	8x10=80	8x10=80	7x10=70	7x10=70	8x10=80	8x10=80
Bathymetry of Site	(9)	A	(10)	8x 9=72	4x 9=36	4x 9=36	0x 9=0	0x 9=0	0x 9=0
Exposure Considerations	(7)	A	(3)	3x 7=21	3x 7=21	3x 7=21	3x 7=21	3x 7=21	3x 7=21
		B	(3)	3x 7=21	3x 7=21	3x 7=21	3x 7=21	3x 7=21	3x 7=21
		C	(2)	2x 7=14	2x 7=14	2x 7=14	2x 7=14	2x 7=14	3x 7=21
		D	(2)	1x 7=7	0x 7=0	0x 7=0	1x 7=7	1x 7=7	0x 7=0
		Subtotal	(10)	9x 7=63	8x 7=63	8x 7=56	9x 7=63	9x 7=63	8x 7=56
Soil/Foundation Characteristics	(7)	A	(9)	3x 7=21	3x 7=21	3x 7=21	0x 7=0	6x 7=42	6x 7=42
		B	(1)	1x 7=7	0x 7=0	0x 7=0	1x 7=7	0x 7=0	0x 7=0
		Subtotal	(10)	4x 7=28	3x 7=21	3x 7=21	1x 7=7	6x 7=42	6x 7=42
Existing and Potential Land Use	(6)	A	(2)	0x 6=0	2x 6=12	1x 6=6	1x 6=6	1x 6=6	1x 6=6
		B	(2)	0x 6=0	0x 6=0	1x 6=6	1x 6=6	0x 6=0	0x 6=0
		C	(2)	1x 6=6	2x 6=12	2x 6=12	2x 6=12	1x 6=6	1x 6=6
		D	(2)	1x 6=6	0x 6=12	1x 6=6	0x 6=0	1x 6=6	1x 6=6
		E	(2)	2x 6=12	2x 6=12	0x 6=0	2x 6=12	1x 6=6	1x 6=6
		Subtotal	(10)	4x 6=24	6x 6=36	5x 6=30	6x 6=36	4x 6=24	4x 6=24
Volume and Types of Dredged Material Available (see Table 4-7)	(4)	A	(10)	7x 4=28	5x 4=20	5x 4=20	1x 4=4	7x 4=28	1x 4=4
Proximity to Cultural Resources	(2)	A	(10)	10x 2=20	5x 2=10	5x 2=10	5x 2=10	10x 2=20	10x 2=20
Land Reuse Potential	(2)	A	(2)	1x 2=2	2x 2=4	0x 2=0	1x 2=2	0x 2=0	1x 2=2
		B	(3)	3x 2=6	3x 2=6	3x 2=6	3x 2=6	2x 2=4	2x 2=4
		C	(3)	1x 2=2	0x 2=0	1x 2=2	0x 2=0	1x 2=2	1x 2=2
		D	(2)	2x 2=4	0x 2=0	1x 2=2	0x 2=0	2x 2=4	2x 2=4
		Subtotal	(10)	7x 2=14	5x 2=10	5x 2=10	4x 2=8	5x 2=10	6x 2=12
Use of Site for Existing or Historical Spoil Disposal	(1)	A	(7)	0x 1=0	0x 1=0	4x 1=4	0x 1=0	4x 1=4	4x 1=4
		B	(3)	0x 1=0	0x 1=0	3x 1=3	0x 1=0	2x 1=2	1x 1=1
		Subtotal	(10)	0x 1=0	0x 1=0	7x 1=7	0x 1=0	6x 1=6	5x 1=5
Total Points	(480)			329	276	260	198	273	243
Ranking				4	8	11	16	9	14

Table 4-10

SUMMARY MATRIX FOR SITE-SPECIFIC EVALUATION OF POTENTIAL SITES IN CONNECTICUT

CRITERIA	(Weight Factor)	Sub-Criteria	Total Pts. Possible	CONNECTICUT SITES 1-9	1-10	3-50	3-58	3-63	3-69	3-71
Proximity to Sensitive Ecological Areas (SEA's)	(10)	A	(2)	0x10=0	0x10=0	0x10=0	1x10=10	0x10=0	0x10=0	0x10=0
		B	(2)	2x10=10	2x10=20	2x10=20	2x10=20	1x10=10	2x10=20	2x10=20
		C	(2)	1x10=10	2x10=20	1x10=10	1x10=10	1x10=10	1x10=10	1x10=10
		D	(2)	1x10=10	1x10=10	2x10=20	2x10=20	1x10=10	1x10=10	1x10=10
		E	(2)	2x10=10	2x10=20	1x10=10	1x10=10	2x10=20	2x10=20	2x10=20
		Subtotal	(10)	6x10=60	7x10=70	6x10=60	7x10=70	5x10=50	6x10=60	6x10=60
Bathymetry of Site	(9)	A	(10)	6x 9=54	1x 9=9	0x 9=0	1x 9=9	6x 9=54	5x 9=45	3x 9=27
Exposure Considerations	(7)	A	(3)	3x 7=21	3x 7=21	2x 7=14	2x 7=14	2x 7=14	3x 7=21	3x 7=21
		B	(3)	3x 7=21	3x 7=21	3x 7=21	2x 7=14	2x 7=14	3x 7=21	3x 7=21
		C	(2)	2x 7=14	2x 7=14	0x 7=0	1x 7=7	2x 7=14	2x 7=14	2x 7=14
		D	(2)	1x 7=14	1x 7=7	1x 7=7	0x 7=0	1x 7=7	1x 7=7	0x 7=0
		Subtotal	(10)	9x 7=63	9x 7=63	6x 7=42	5x 7=35	7x 7=49	9x 7=63	8x 7=56
Soil/Foundation Characteristics	(7)	A	(9)	0x 7=0	0x 7=0	0x 7=0	0x 7=0	6x 7=42	3x 7=21	3x 7=21
		B	(1)	0x 7=0	0x 7=0	0x 7=0	0x 7=0	0x 7=0	0x 7=0	0x 7=0
		Subtotal	(10)	0x 7=0	0x 7=0	0x 7=0	0x 7=0	6x 7=42	3x 7=21	3x 7=21
Existing and Potential Land Use	(6)	A	(2)	1x 6=6	1x 6-6	1x 6-6	2x 6=12	1x 6=6	1x 6=6	1x 6=6
		B	(2)	1x 6=6	1x 6=6	0x 6=0	0x 6=0	0x 6=0	0x 6=0	0x 6=0
		C	(2)	1x 6=6	1x 6=6	1x 6=6	2x 6=12	1x 6=6	1x 6=6	1x 6=6
		D	(2)	1x 6=6	1x 6=6	2x 6=12	0x 6=0	1x 6=6	1x 6=6	2x 6=12
		E	(2)	0x 6=0	1x 6=6	1x 6=6	2x 6=12	0x 6-0	1x 6=6	1x 6=6
		Subtotal	(10)	4x 6=24	5x 6=30	5x 6=30	6x 6=36	3x 6=18	4x 6=24	5x 6=30
Volume and Types of Dredged Material Available (see Table 4-7)	(4)	A	(10)	6x 4=24	5x 4=20	1x 4=4	3x 4=12	8x 4=32	7x 4=28	10x 4=40
Proximity to Cultural Resources	(2)	A	(10)	10x 2=20	10x 2=20	1x 2=2	5x 2=10	10x 2=20	10x 2=20	10x 2=20
Land Reuse Potential	(2)	A	(2)	2x 2=4	1x 2=2	1x 2=2	1x 2=2	0x 2=0	0x 2=0	2x 2=4
		B	(3)	3x 2=6	3x 2=6	3x 2=6	3x 2=6	2x 2=4	3x 2=6	3x 2=6
		C	(3)	3x 2=6	1x 2=2	3x 2=6	0x 2=0	1x 2=2	3x 2=6	3x 2=6
		D	(2)	1x 2=2	1x 2=2	1x 2=2	0x 2=0	2x 2=4	2x 2=4	1x 6=6
		Subtotal	(10)	9x 2=18	6x 2=12	8x 2=16	4x 2=8	5x 2=10	8x 2=16	9x 6=18
Use of Site for Existing or Historical Spoil Disposal	(1)	A	(7)	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0
		B	(3)	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0
		Subtotal	(10)	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0	0x 1=0
Total Points	(480)			263	224	154	180	275	277	272
Ranking				4	5	7	6	2	1	3

than 70% of the total possible, and 15 of the 16 sites scoring greater than 50%. In comparison, none of the seven sites in Connecticut scored greater than 60%, while only four scored greater than 50%. As previously discussed in this section, the purpose of the preliminary siting exercise is to screen a large number of public and existing disposal sites using general criteria and macro-scale data. The criteria point evaluation is mainly used to rank sites surviving primary screening for relative acceptability. A more detailed review of each of the remaining sites is necessary, therefore, to determine if any sites are clearly not acceptable for further analysis during Stage 2 planning.

4.72 Starting with the lowest in priority, each of the screened sites was again examined for site-specific factors according to the screening criteria. In New York, sites ranked #16, 14, 13, 12, 11, and 9 were dropped out due mainly to the lack of adequate available surface area for a containment operation. The site ranked #3 (site 1-4) is a U.S. Merchant Marine Academy at Kings Point in Nassau County. Although this site scored relatively high, the existence of docking facilities along the entire shoreline length of the site, as well as nearby residential land, is considered undesirable for compatibility requirements. Five sites (or groups of sites) remain and are recommended for further study in Stage 2 planning. These include: sites 1-6 (#10) and 2-6 (#1), a U.S. Naval Reservation and the New York State Merchant Marine Academy on Throgs Point; sites 3-39 (#4) and 1-5 (#2), Little Bay Park and the Fort Totten Military Reservation on Willets Point; sites 3-24 (#15), 3-25 (#7) and 3-26 (#5), Morgan Memorial Park, Garvies Point Preserve, and Garvies Point Park on the east site of Hempstead Harbor near Glen Cove Creek; site 1-7 (#6), a U.S. Military Reservation on Hart Island; and 3-43 (#8), Ferry Point Park in the Upper East River.

4.73 Connecticut sites were similarly reviewed and sites ranked #7, 6, 5, and 4 were dropped again primarily due to lack of adequate available

surface area. Sites recommended for further Stage 2 analysis include: site 3-69 (#1), Bayview Park in New Haven Harbor; site 3-63 (#2), Seaside Park in Bridgeport; and site 3-71 (#3), East Shore Park in New Haven Harbor.

Analysis of the Highest Ranked Sites in New York and Connecticut

4.74 The use of the primary screening analysis (Step 2) reduced the number of public and existing dredged disposal sites from over 140 to only 24 for secondary analysis. The secondary analysis (Step 3) ranked the selected alternatives in the order of desirability and chose the following sites as the best available containment areas on public lands for New York and Connecticut:

New York: State Maritime College (2-6)
Connecticut: Bayview Park (3-69)

The purpose of this analysis is to review the factors involved in the secondary analysis and why the above two sites were selected as highly desirable areas.

Location

4.75 The New York State Maritime College (2-6) is shown in Figure 4-16. Located in the Bronx County of New York City, it is on the western border of the LIS study area. The geographical location of site 2-6 is feasible for dredge material containment because: (1) it is located away from high residential areas, (2) it does not obstruct main navigation channels, and (3) it is located under the large structure of the Throgs Neck Bridge.

4.76 Bayview Park (3-69) and adjacent area are shown in Figure 4-17. Bayview Park is located in New Haven Harbor on the Connecticut side of the

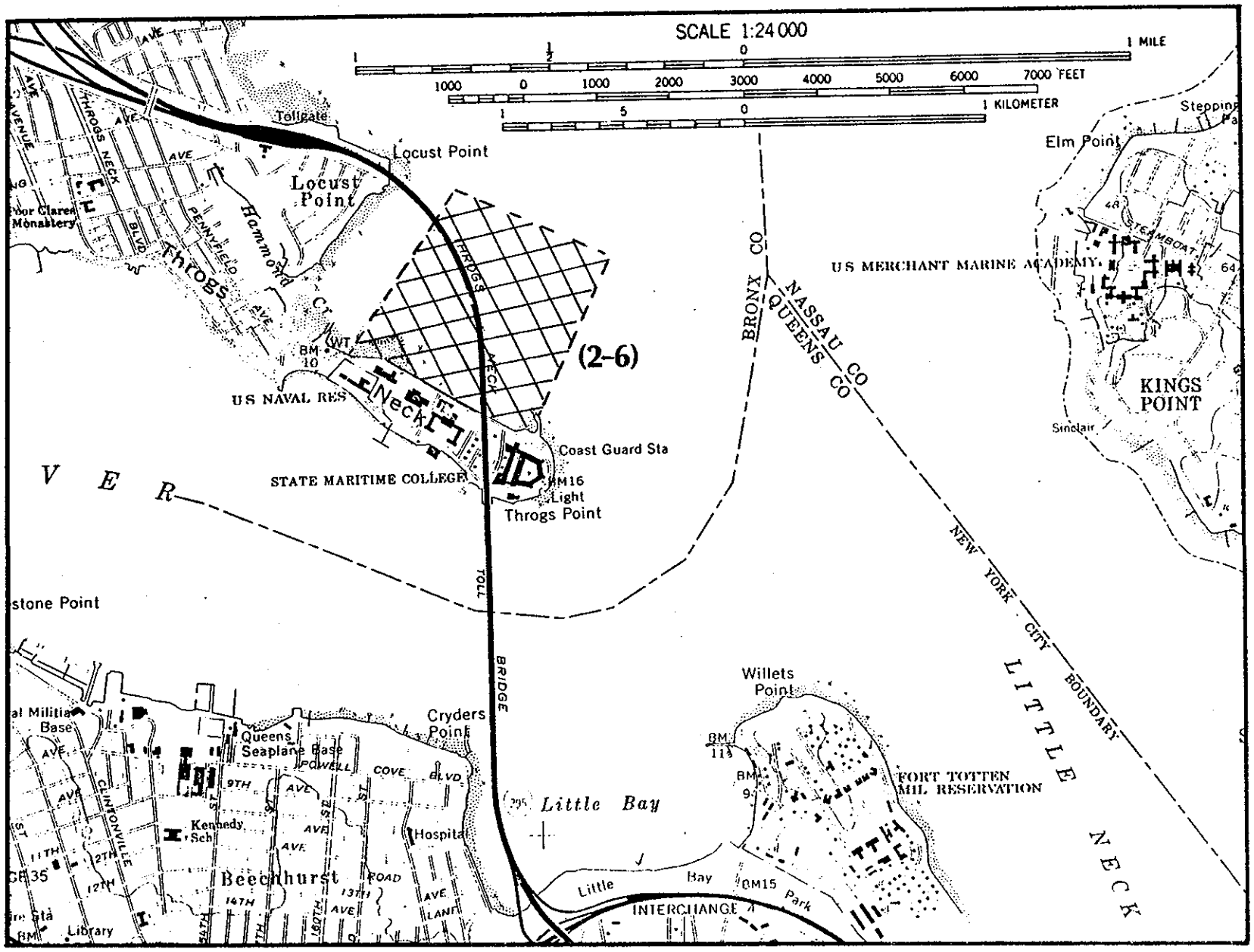


FIGURE 4-16 TOP RANKING NEW YORK SITE AT THROGS NECK

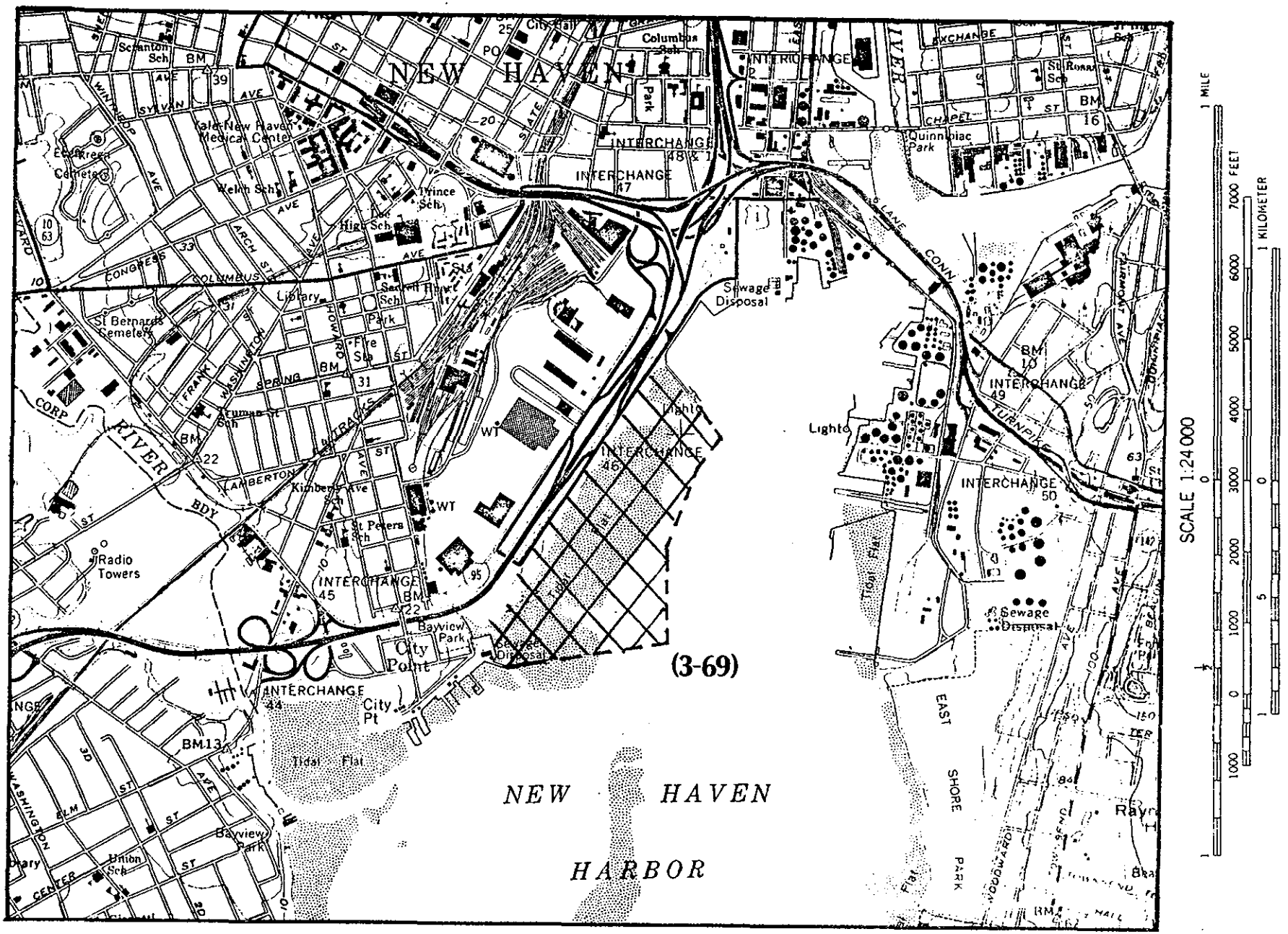


FIGURE 4-17 TOP RANKING CONNECTICUT SITE IN NEW HAVEN HARBOR

LIS study area. Geographically, Bayview Park is located away from residential areas and is surrounded by major roadways. The potential containment facility at Bayview Park would be positioned between three sewage disposal plants located in the harbor. The containment area would be near but would not interfere with the major navigation channel in the harbor and anchorage areas.

Ecological Areas

4.77 The potential impact of dredge material containment on the ecological environment surrounding the New York State Maritime College on Throgs Point is considered minor. Areas of shellfish, lobster, and wetland locations are beyond critical range and each received the maximum allowable 2 criteria points. Waterfowl areas are approximately 5 miles from the site, while the finfish locations are within a 2-mile distance. The last two factors received 1 point apiece, with total points given for the New York site at 8 out of a possible 10.

4.78 The ecological areas surrounding the Connecticut site of Bayview Park were considered more significant. Lobster and wetland locations were the only two factors beyond the critical range and, therefore, received the maximum allowable two points each. Location of finfish and waterfowl received 1 point each, while zero points were assigned to the shellfish category since this met the worst case condition of less than 1 mile. Total points given for the Connecticut site were 6 out of a possible 10.

Bathymetry

4.79 The importance of bathymetry ranks second to ecological areas in determining dredge containment site desirability. If the site has too small a volume available for containment, the site becomes economically undesirable. The bathymetry surrounding the New York site indicated a

slope of 40 ft/mile and a water surface area of about 100 acres. Computing the available containment volume below MSL gives the New York site (2-6) an approximate volume of 5,170,000 cubic yards, which rated a maximum of 10 points under this criteria.

4.80 The Bayview Park site indicated a slope of 6 ft/mile and a surface area of 225 acres. Although the surface area was greater at the Connecticut site when compared to the New York site, the shallow depth produced a volume of only 1,740,000 cubic yards below MSL. The computed volume for Bayview Park rated 5 out of a possible 10 points.

Exposure Consideration

4.81 The New York and Connecticut sites rank high for the Exposure factors. This is due primarily to: (a) low wave energy in the area, (b) no critical erosion problems associated with the site, and (c) neither site being in a flood plain zone. The major bridge structure located at the New York site would allow the containment site to protect the bridge's structural footings and, therefore, rated a maximum of 10 points under this criteria. The Connecticut site of Bayview Park would also protect a section of the sewage disposal area and the bulk head and navigation light located at the northern end of the site. The Bayview Park site was rated 9 out of a maximum of 10 points.

Soil/Foundation Characteristics

4.82 Soil chararacteristics located at the New York site consist of a fine and coarse sand mixture. The shoreline area adjacent to the site is covered with large boulders to protect against shoreline erosion. Based on available soil survey maps, the permeability of the site was estimated between 2 and 6 in/hr given the type of material located at the site. The total points allocated for this site was 6 out of a possible 10.

4.83 The sediment characteristics at the Bayview Park site consist of a fine sand and silt mixture. The foundation bearing capacity of such material is relatively poor. The site is located in a tidal flat area where much of the adjacent shore is composed of cut and fill. Soil permeability was estimated at >2 in/hr. 3 out of a possible 10 points were scored under this category.

Land Use

4.84 The land use category associated with the New York site within a 1-mile radius consisted of the following: 70% residential, 20% open space, and 10% institutional. Residential shoreline use and the absence of industrial area generated zero points, since both are negative features of the New York site. The residential area located at Locust Point may play an important opposing role in a containment structure at site 2-6. Much of the shoreline area at Locust Point is used for small boat piers and may interfere with the construction of containment in the area. However, compatibility with the Locust Point residents may be realized by constructing additional facilities and piers for boats along the containment dike which would enhance the future value of the surrounding lands. The lack of recreational land, commercial areas, and open space inland make up the 5 points which were given to the New York site.

4.85 The land use associated with the Connecticut site within a 1-mile radius of the site consisted of the following: 30% residential, 10% recreational, 10% commercial, 20% industrial, 10% wetland, and 20% open space. Unlike the New York site, the Bayview Park area is isolated from the residential community by large interstate highways, institutional and open lands. The lack of piers for small boat use due to the tidal flat location would make the containment dike an ideal small boat facility. Containment construction would generally be compatible with the existing adjacent sewage disposal plant. The containment site might benefit the surrounding community by creating new recreational area on unused and un-

navigable waters. Adjacent recreational shoreline use was considered a negative factor and was given zero points. Inland development of residential, commercial, industrial and open space were given one point each. Total points for the Connecticut site were 4 out of a possible 10 points.

4.86 The proximity of the containment site to areas where major dredging are likely or have occurred is an important economical consideration. Potential sites located near major dredging will rate higher than sites farther away. The top New York site is located in the Flushing Quad map (#1) which has the highest volume of projected dredged material per year for all the New York Quad Map areas. Site 2-6 is ideally centered in the Flushing Quad map, and therefore, received the highest point rating (10) for this category. The Connecticut site of Bayview Park is located in the New Haven Quad (#29) which contains the highest projected volume of dredged material for all the Connecticut Quad areas along the LIS coast. The Bayview Park site received a 7 point rating for this category, since other sites located in the same vicinity were somewhat closer to the dredging locations.

Land Reuse Potential

4.87 The potential reuse of the constructed containment facility is an important factor affecting the economic benefits of the total plan. The land reuse potential for New York State Maritime College (2-6) has pro and con aspects. The New York location is characterized by: (1) a lack of adjacent industrial or commercial use in the immediate area, (2) although Route 295 is nearby, immediate site access is by secondary roads through residential areas, and (3) small boat docking facilities are located nearby. The areawide plan for this section of the Bronx (District 10) has identified the need for additional industrial area. The scarcity of industrial lands makes the development of light industry conceivable for containment area reuse. The potential use of the site for industrial purposes would also help improve employment opportunities in this

highly urbanized region.

4.88 The land reuse potential for the Connecticut site of Bayview Park scored considerably higher. The only drawback for this location was the absence of ports and docking facilities. Major roadways are in close proximity to the site as well as heavy water related industrial uses located nearby. The areawide plan indicates the need for a recreation facility near the containment site. Land use potential rated 8 out of 10 points for the Bayview Park site.

Proximity to Cultural Resources

4.89 There are over thirty cultural areas along the LIS shorefront. Cultural resources should be avoided to reduce any possible damage or obstruction due to containment construction. In the case of both the New York and Connecticut sites, the cultural resources are beyond the 2-mile radius. Both sites received a score of 10 for this category.

Use of Site for Existing or Historical Dredged Material Disposal

4.90 Although both sites are located near historical dredge disposal locations (New York - Pelham Bay (4-5) and Connecticut - West River (4-7)), neither site was given any points under this category.

4.91 The Connecticut site at Bayview Park (3-69) was previously identified as a potential site in the Reconnaissance Report. In the Reconnaissance Report, the site area was described as a "tidal flat area near Long Wharf and adjacent to the Connecticut Turnpike on the west side of New Haven Harbor." The Bayview site was determined to be in proximity to shellfish habitats and, therefore, a poor site location. The analysis which was performed in this section dealt directly with the ecological problems associated with all the secondary siting areas. The present

attempt to deal comprehensively with containment facility siting has been based on the many conflicting factors and categories. Although the nearby shellfish area is a negative feature of the site, many other positive features have made this site stand out.

4.92 Again, it is pointed out that the present analysis has been limited to publicly-owned shorefront land and existing shorefront disposal sites. In view of the very limited potential of suitable public sites around LIS, it is strongly recommended to include privately-owned shorefront, especially water-related industrial and commercial areas, in on-going Stage 2 planning.

5. FINDINGS OF THE INTERIM EFFORT

5.01 This study has been concerned with the small-volume, localized shoreline extension containment alternative for long-term dredged material (DM) disposal in LIS. In the immediate future, the Corps of Engineers and both Connecticut and New York will attempt to formulate a dredged material management plan for LIS that will effectively balance the competing economic, social, and environmental forces. The selected plan will most likely incorporate several disposal alternatives (see Table 1-1), and will not depend exclusively on either contained or open water disposal. The continued investigation of the proper role for containment alternatives can benefit from the previous finds of the Reconnaissance Investigation (see Section 1), and from the additional findings of the Interim Investigation listed below:

5.02 There is considerable uncertainty in current projections of dredging activities in the LIS region. Recent trends have shown a sharp down-turn in both Federal and non-Federal dredging since the late 1960's. Causes appear to stem from environmental opposition to disposal of DM, increased cost of DM disposal, and a decrease in water-related commercial and industrial activity. In view of very recent trends in the national energy picture, however, it is possible that water-borne coal transport and coal handling will significantly increase channel maintenance requirements and possibly the need for channel improvements, especially in Connecticut. The development of environmentally acceptable and more convenient dredge disposal methods would also relax the economic disincentives (i.e., transport of material to Mud Dump) to maintenance dredging that presently exist. The present uncertainty in the dredging picture is reflected in the range of DM volumes projected to be dredged in the New York vicinity of LIS between 1985 and 2035 - 7.8 to 24.2 MCY. If the Upper East River activity is included (Hell's Gate to Throg's Neck Bridge) the range is 15.4 to 48.2 MCY, almost twice as high. This compares to a total

volume of 58.9 MCY projected for the same period of time in Connecticut harbors (USCOE, 1979).

5.03 Available data on the characteristics of DM in Connecticut and New York harbors bordering LIS are very limited. Data that do exist indicate high variability in concentrations of heavy metals and organics. On the average, concentrations of the above constituents tend to be considerably greater in sediments sampled in Connecticut harbors than in those from New York harbors. Data reviewed on physical characteristics of DM support the Reconnaissance Report statement that sediments in Connecticut harbors are predominantly fine-grained sands and organic silts. Data collected in harbor sediments along the north shore of Long Island indicate, on the average, a progressive increase in the percentage of coarser material in sediments sampled from western to eastern Long Island. This supports the finding that a significant portion of material historically dredged in Suffolk County has been disposed of as beach nourishment material.

5.04 Several important factors which determine feasibility of the containment method hinge on the physical and chemical characteristics of DM. The proper sizing (surface area vs. depth requirements) of a containment facility depends upon the sediment particle size distribution and settling velocities. The physical characteristics also determine the amount of dewatering and consolidation required and the ultimate foundation capacity of the containment area. Chemical characteristics determine containment dewatering effluent characteristics and associated environmental impacts. Both physical and chemical characteristics determine the potential, if any, for rehandling and marketing DM products. As such, the need for additional sediment data in LIS waterways cannot be overemphasized.

5.05 Due primarily to the high salt content within sediments dredged in LIS waterways, the marketing of dredged materials for upland uses such as landfill cover or agricultural purposes will be limited in consideration of groundwater infiltration and subsequent contamination. Nevertheless, the

potential for DM reuse within LIS cannot firmly be determined without more thorough knowledge of sediment characteristics and the existence of a market for material. A Market User's Survey should be performed to determine local demands for various raw materials that could be produced from a containment re-handling facility.

5.06 Depending upon location, a shoreline extension containment facility can offer new opportunities for industrial, commercial or recreational expansion, especially in the highly urbanized areas along LIS. The reuse potential for shoreline extension containment facilities in LIS appears very favorable, despite the fine-grained nature of the dredged sediments. Through proper containment design and operation, adequate sediment consolidation should be achievable for ultimate light use such as parkland. Structures built upon a containment site, however, would most likely require pile supported foundations. The use of several individual compartments which are filled with DM over relatively short time periods would allow faster turnaround of the containment site for reuse. Again, if the DM characteristics are known, state of the art techniques are available for optimum design of a reusable containment facility.

5.07 Based on the limited chemical (elutriate) data for sediments within the harbors of LIS, it is difficult to assess the potential environmental impacts of a DM containment operation. In general, however, the majority of the pollutants observed are associated with DM solids. Control of suspended solids by proper sedimentation and dewatering techniques is the most effective means of controlling effluent pollutant concentration. Determination of the ultimate impacts on receiving water quality will depend strongly on the location of the site, the optimum site being in an area of maximum tidal flushing and away from sensitive ecological zones.

5.08 A preliminary siting methodology for locating potential small-volume shoreline extension containment facilities has been developed and

used to examine the feasibility of using publicly owned shorefront land and existing DM disposal sites along the LIS coast. The methodology consists of primary and secondary screening (ranking) criteria, which consider a comprehensive set of engineering, economic, environmental, social (public health, welfare, acceptability) and legal/regulatory factors. In the preliminary application of this methodology, it became clear that the prioritizing of screening criteria, i.e., the weighting of criteria importance, should be based on a joint effort between the Corps and the various concerned agencies, institutions, environmental groups and individuals. It is therefore stressed that public workshops be organized as soon as possible to determine acceptable trade-offs for facility siting.

5.09 Approximately 140 public shorefront sites and existing DM disposal sites along the coast of LIS in New York and Connecticut have been examined for feasibility as shoreline extension containment areas. These areas mainly consist of parks, beaches, transportation corridors, and military and institutional sites. Of the 140 initial sites, only 24 survived the initial screening analysis in which obvious or gross inadequacies of each site were identified (i.e., proximity to highly sensitive ecological areas, public bathing beaches, high wave energy, land use incompatibility). The remaining 24 sites were examined on the basis of more site-specific criteria and data, and were ranked in relative order of desirability, independently for New York and Connecticut sites. Of these sites, all but nine in New York and three in Connecticut were dropped primarily due to lack of sufficient surface area for a containment facility. Most of the highest ranking New York sites are located in a tight cluster at the extreme western end of LIS. An additional cluster of three sites is located in Hempstead Harbor in Nassau County. In Connecticut, two of the three remaining sites are located in New Haven Harbor, while the third is located near Bridgeport Harbor. These sites have been recommended for further site-specific environmental, engineering, economic, social and legal analysis during on-going Stage 2 planning.

5.10 In general, shorefront public and existing disposal sites appear to have very limited possibilities for shoreline extension containment sites. Most of these sites are simply not compatible due to land use, surface area availability, and proximity to important ecological areas. When one considers that the total percentage of publicly owned shoreline around the Sound amounts to less than 5% of the entire shoreline, it is not surprising that such a limited selection of sites does not offer a wide selection of alternatives. During Stage 2 planning, the siting methodology should be modified to include consideration of privately owned shorefront, especially industrial or water-related commercial shorefront areas.

5.11 Because of the complexities involved in determining the optimum number and locations of containment facilities, facility design and sizing to receive material from multiple dredging events, dredge plant and transport requirements, DM characteristics, scheduling of dredging events, etc., a systems approach is recommended for guiding Stage 2 and 3 planning. Optimization techniques are available (USCOE, 1974 and Johnson, 1976), which can be applied or modified for the LIS study needs. These techniques (see Chapter 3) will help to guide specification of basic facility design parameters, dredging logistics, dredge plant and transport requirements, etc.

6. OVERVIEW OF CORPS PLANNING STAGES

6.01 The planning for feasibility studies is specifically directed through Corps planning regulations, the ER 1105-2-200 series. General activities are mandated which address the Corps' legal responsibilities. Feasibility planning is described in progressively detailed terms of 1) stages, 2) tasks, and 3) activities. There are three major steps of planning:

Stage 1 - Reconnaissance and Development of Plan Study;
Stage 2 - Development of Intermediate Plans;
Stage 3 - Development of Detailed Plans;

Within <u>each</u> stage, four functional tasks are required:

Task 1 - Problem Identification;
Task 2 - Formulation of Alternative Plans;
Task 3 - Impact Assessment;
Task 4 - Evaluation.

All three stages involve each of the four tasks to some degree, although the level of effort will vary greatly from one stage to the next. For example, Task 1 - Problem Identification, will receive much more attention during Stage 1 than in Stage 3. Task 4 - Evaluation, will gradually increase in importance through the stages, becoming most critical in Stage 3.

6.02 The previously completed Reconnaissance Report formed a preliminary Stage 1 iteration of the above four major tasks to determine the feasibility of containment as an alternative for the disposal of DM in LIS. The output of this effort was the identification of problems related to containment and a plan for initiating subsequent, more tightly defined and detailed analysis of containment alternatives for Stage 2 and 3 planning.

A specific directive of the Reconnaissance Investigation was the need to assess opportunities for small-volume, localized containment alternatives for waterfront land creation, marsh creation, and dredged material re-handling. Underscoring the above is the necessity to evaluate the role of containment within a multi-purpose, long-range DM management plan for LIS.

6.03 The present Interim Investigation is a second and final iteration of the Stage 1 task analyses. Information on dredging and disposal requirements in LIS have been supplemented by data for New York harbors. In addition, the following tasks have been performed in initiation of Stage 2 planning:

- Identification of problems and purposes associated with alternative containment methods for LIS;
- Development of a preliminary siting methodology for shoreline extension containment facilities and utilization of this methodology for locating and ranking potential sites on publicly-owned land and existing disposal sites bordering LIS within Connecticut and New York;
- A discussion of findings and recommendations and development of planning goals and objectives for guidance of further Stage 2 and Stage 3 planning efforts.

OVERVIEW OF STAGE 2 EFFORT

6.04 In order to proceed toward a definitive Stage 3 evaluation of dredged material containment in LIS, the Stage 2 planning effort will identify and evaluate a broad range of possible containment concepts. The emphasis during Stage 2 will be on plan formulation and evaluation. At the end of Stage 2, a set of realistic, well-defined containment alternatives will be designated for detailed study in Stage 3.

6.05 General objectives of Stage 2 planning include the following:

- *Define the Role of Containment Within the Overall Comprehensive Dredged Material Management Plan for LIS, i.e., coordinate evaluation of containment alternatives with (1) the presently on-going development of the LIS interim dredged material disposal policy of Connecticut and New York, and (2) analyses of open-water and upland disposal alternatives now under study;*

- *Formulate Alternative Plans for Dredged Material Containment and Define the Purpose and/or Objective of Each Possible Containment Alternative, i.e., isolation of contaminated sediments, creation of reusable shoreline or island land, material rehandling, or marsh/terrestrial habitat creation;*

- *Develop Site-Specific Containment Plans for Impact Assessment and Evaluation, including specification of basic design features (volume, surface area, material characteristics, facility design life) and facility operation, maintenance, and eventual use;*

- *Develop a Sufficiently Detailed Methodology to Allow for Responsive and Meaningful Review by Public and Official Authorities, i.e., provide detailed consideration of all engineering, environmental, economic and institutional factors associated with each alternative;*

- *Identify as Early as Possible Critical Issues (Concerns) and the Corresponding Agencies or Public Groups in order to assure that alternative containment plan evaluations and impact assessements reflect a broad spectrum of public and agency concerns;*

- *Focus on the Productive Development Potential of Alternative Containment Plans, i.e., containment plan evaluation should emphasize the reuse potential or productive use (industrial/commercial/recreational) of shoreline/island creation; and*

- *Address the Overall Plan Implementation Factors (see Table 6-1), i.e., ensure that the full range of substantive and procedural considerations affecting the feasibility of alternative containment plans is addressed.*

6.06 Public participation and coordination with review, regulatory and planning agencies will be extensive during both Stages 2 and 3. An early and active program of public involvement and interagency coordination is recognized as essential to the success of the entire planning effort and, ultimately to plan implementation. Public and agency perceptions will be fully reflected in the formulation and evaluation of alternative containment plans. In fact, plan formulation at the start of Stage 2 will be based, in part, on potential containment opportunities identified through local workshops.

6.07 The four planning tasks listed at the beginning of this section are iterated in Stage 2, with the intention of adding detail to public needs, objectives, alternatives, and evaluation. Gaps in baseline data are identified and filled. Attention is given to refining the stated planning objectives and adding depth to alternatives retained for evaluation. Public input is continued with a comprehensive public involvement program involving brochures and public meetings to present progress summaries. A Stage 2 Project Notebook will be prepared which presents the methodologies, rationale, and technical backup for the planning process. Specific Stage 2 activities are recommended below:

6.08 Activities for Task 1, Stage 2

1. Collect more specific baseline data and describe baseline conditions in a brief and relevant summary of climate, geology, topography, human and natural resources, physical and biological resources, demography, culture and aesthetics, flood plain, transportation,

Table 6-1

FACTORS AFFECTING CONTAINMENT PLAN
FEASIBILITY AND IMPLEMENTATION*

ENVIRONMENTAL

1. Ecological characteristics of proposed containment facility location
2. Environmental impacts of dredging and land/island creation
3. Dredged material pollution properties

TECHNICAL

1. Dredged material structural properties
2. Containment area sub-surface conditions
3. Containment facility design and operating characteristics
4. Site size and configuration (as related to productive use)
5. Technical coordination of disposal plan with productive use plan

ECONOMIC/FINANCIAL

1. Economic or social benefits (costs) of the plan
2. Engineering and construction costs
3. Dredged material transport costs
4. Fees or taxes on dredged material
5. Project sponsor or site owner capability to assume financial responsibilities

Table 6-1 (Cont.)

LEGAL

1. Conformance with regulatory requirements
2. Adequacy of environmental impact statement
3. Disposal rights to the site
4. Site ownership authorities (as related to productive use)
5. Land use restrictions

INSTITUTIONAL

1. Public participation in plan formulation and evaluation
2. Coordination with local project sponsor
3. Coordination with review/regulatory agencies
4. Coordination with planning agencies
5. Procedures for identifying and resolving objections to the plan
6. Corps and other participant attitudes
7. Political, business, and public support

PLANNING/IMPLEMENTATION

1. Relationship to comprehensive LIS dredged material management plan
2. Relationship to long-range environmental plan for LIS
3. Dredging project specification
4. Temporal coordination of disposal plan with productive use plan
5. Availability of environmental data
6. Impacts of land/island creation project on existing water uses
7. Proposed use compatibility with adjacent land uses and local master plans
8. Proposed use compatibility with available transportation systems and infrastructure (if appropriate)
9. Proposed site plan compatibility with site physical features and user requirements (if appropriate)
10. Commitment to proposed land use plan

* (USCOE, 1979)

financial resources, economic activity, soils, water, environmentally sensitive areas, exposure conditions, cities, townships, and other important and sensitive resources.

2. Identify data gaps for important information and design programs to fill these gaps. Specific areas identified requiring attention in Stage 2 include:

   - Refinement of DM projections in the LIS region through detailed analysis of population trends, industrial and commercial activities, effects of energy trends (oil and coal shipping and handling), and coastal zone plans for the states of Connecticut and New York.

   - Enlarge the data base and knowledge on DM physical and chemical characteristics for waterways frequently dredged. The importance of DM characteristics in determining containment design, containment area reuse potential, environmental impacts, and DM rehandling and marketing potential cannot be overemphasized. A commentary on marine sediments could be prepared for use at public workshops.

   - In tandem with the study on sediment characteristics, a Market Users Survey should be performed to determine local demands for various raw materials that might be produced from a containment rehandling facility. Until this task is done, the feasibility for constructing and operating a containment rehandling facility cannot be adequately assessed.

3. Incorporate public and agency input on critical issues in the early development of containment alternatives assessment and plan formulation. Prepare a tentative list of problems and obtain public

feedback to ascertain their relevance and completeness. Refine and clarify public needs/problems with their input in the LIS coastal region. Public workshops should be conducted and information booklets prepared which would include:

- Clear definition of the needs, problems and objectives for dredging and disposal in LIS;
- A commentary on marine harbor sediments
- Explanation of the available alternatives - advantages and disadvantages of each;
- Presentation of detailed examples or scenarios for DM containment, including containment operations and uses in other regions, and artist renditions of hypothetical containment sites under various phases of before, during and after construction.

4. Project future DM management program conditions in terms of economic, demographic, environmental and technological trends. Collect and use projection information compiled by Federal, State and local planning agencies. Predict most probable future without a project, including basic demographic, economic, environmental and social parameters.

5. Redefine planning objectives based on public feedback during Stage 1. Evaluate objectives to identify and exclude independent objectives that are not within COE authority to implement. Determine if conflicting objectives can be fully or partially met and trade-offs that can be made.

6. Continue with public involvement program and request alternatives from different interest groups, public and private organizations, and Federal, state and local agencies.

6.09 Activities for Task 2, Stage 2

1. Review methodologies appropriate for identifying alternative DM disposal management measures, programs, sites, disposal methods, and combinations of these to satisfy revised program objectives.

2. Apply appropriate methods to develop, formulate and add substance to alternative plans outlined in Stage 1 (Table 1-1). Develop a set of realistic, well-defined containment alternatives for further consideration under Stage 3 efforts.

3. Examine alternative solutions suggested by different interest groups and public contacts. The process of formulating alternatives will include a series of local-level workshops to solicit local official and citizen input into the containment facility planning and siting process. Develop and identify plans which appear to represent the preferences of the various publics.

4. Identify plans which support national economic development (NED).

5. Identify plans which support environmental quality (EQ).

6. Develop specific alternative containment plans, including required containment volume/surface area, active disposal life, material characteristics, facility operation, maintenance and eventual reuse. All engineering/economic, environmental and institutional factors associated with each alternative will be developed in sufficient detail to allow adequate understanding and constructive review by public and official authorities.

7. Specifically focus alternative plans on containment productive use concepts, i.e., industrial, commercial, institutional and recreational needs and opportunities. This will require specific scenarios of containment facilities and sites demonstrating productive use potential as affected by facility design, location, local access, compatibility with adjacent land and water uses, and relation to area-wide master plans, community needs and zoning regulations.

8. Identify alternative plans which address more than one planning objective. Identify conflicts between measures and combine compatible options which address only one planning objective.

9. Test and evaluate effectiveness of methodologies in generating alternatives which satisfy planning objectives.

10. Refine the list of alternatives to eliminate options which lack significant public support.

11. Develop documentation of alternative plans considered and the rationale for dropping or retaining each for further consideration.

6.10 Activities for Task 3, Stage 2

1. Determine the general impacts of the "no action" alternative and relate it to the identified public needs, i.e., in the absence of containment opportunities, what are the potential economic, environmental and social impacts of DM management in LIS.

2. Determine major impacts and expected changes for each alternative for DM management as compared with the no-action option.

3. Expand and detail the no-action alternative to the level required for explicit impact evaluation. Assessment should be commensurate with level of detail required for other alternatives.

4. Identify inputs (material, financial, energy, manpower requirements) and outputs (services, provisions, utility) of each alternative in a general discussion.

5. Compare inputs and outputs of each alternative against the no-action condition.

6. Trace each impacting action to determine its significant effects. Measure, specify the incidence of, and summarize impacts to economic, social and ecological environments.

7. Determine location, timing, and duration of each significant impact.

8. Prepare an environmental working paper which summarizes the expected impacts of each alternative (including no-action), suitable for circulation among public and private agencies, groups and individuals.

6.11 Activities for Task 4, Stage 2

1. The preliminary siting methodology developed in Stage 1 will be refined for more comprehensive consideration of locational factors. The siting analysis will be expanded to include the entire LIS shoreline (both public and private), to ensure thorough consideration of all potential alternative sites.

2. The prioritization of site screening criteria (economic, engineering, environmental, social and legal regulatory factors) i.e., the

weighting of criteria importance, will be guided by public and official agency review and input to identify acceptable alternative trade-offs.

3. Conduct sensitivity analysis to establish relationship of alternative plans to the probable future.

4. Subject all alternative plans for evaluation of acceptability, completeness, effectiveness, efficiency, certainty, geographic scope, general benefits and costs, reversibility and stability.

5. Rank alternatives in terms of impacts and trade-offs based on professional judgement and public and agency perceptions.

6. Provide detailed description of rationale behind the methodologies used for selecting plans for evaluation.

7. Evaluate alternatives with respect to the revised planning objectives. Determine the degree of satisfaction of the objectives for each alternative.

8. Identify actual and potential impacts of beneficial and adverse nature.

9. Display alternative plans in comparative form within the environmental working paper.

PRELIMINARY STAGE 3 OVERVIEW

The final planning stage will emphasize the formulation, assessment, and evaluation of detailed dredged material management programs with complete technical designs, institutional arrangements, and operational plans, as well

as the final iteration of problem identification. Furthermore, the socio-economic, environmental, land use, and other impacts of the alternatives will be assessed in detail through the EIS process. Stage 3 will culminate in the Draft and Final Survey Report and Environmental Impact Statement which recommend a plan of action for DM containment that best answers the public needs. Other DM disposal plans must also be sufficiently detailed to allow valid comparisons with the recommended plan. Public participation is continued throughout Stage 3. Specific activities required for Stage 3 planning are preliminarily identified as:

ACTIVITIES FOR TASK 1, STAGE 3

1. Review public input from Stage 2.
2. Refine planning objectives to reflect more definition and precision.
3. Identify and fill any remaining gaps in baseline information.

ACTIVITIES FOR TASK 2, STAGE 3

1. Review the final set of containment alternatives to ensure that each is fully implementable and could be selected.
2. Develop and add detail to the set of finalized alternatives.
3. Reduce and further define viable options.
4. Develop documentation of alternative plans considered and the fate of each.
5. Identify conflicts between measures.
6. Combine compatible measures and identify those objectives that have not been fully or partially addressed.
7. Formulate and identify at least one alternative plan supporting environmental quality (EQ).
8. Formulate and identify at least one alternative plan supporting national economic development (NED).
9. Evaluate NED/EQ trade-offs to determine if net benefits are worth the dollar cost to obtain them.

10. Determine economic and environmental impacts of non-structural alternative plans.
11. Document how non-structural alternative plans were considered throughout planning process.

ACTIVITIES FOR TASK 3, STAGE 3

1. Analyze alternatives for sources of impacts.
2. Identify inputs and outputs of each alternative.
3. Compare inputs and outputs against the no-action condition.
4. Trace each action aspect to determine its significant impacts. Measure impacts, and specify incidence.
5. Determine location, timing, and duration of each significant impact.
6. Prepare a Draft EIS documenting environmental considerations throughout the planning process.

ACTIVITIES FOR TASK 4, STAGE 3

1. Subject all alternative plans to evaluation criteria.
2. Rank impacts of alternatives and trade-offs based on professional judgment and perceptions of public needs.
3. Provide rationale for selected plan and reasons for rejecting other options.
4. Display rationale through a System of Accounts.
5. Evaluate alternatives and selected plans with respect to planning objectives.
6. Identify actual and potential impacts of alternatives.
7. Establish degree of impacts in relative terms.
8. Perform trade-off analysis on each option.
9. Designate and evaluate NED and EQ plans.
10. Determine if additional iterations are required.

11. Initiate additional iterations of each of the four planning tasks, as needed.
12. Prepare Draft Survey Report and Environmental Impact Statement.
13 Prepare Final Survey Report and Environmental Impact Statement.

PRELIMINARY SCHEDULE

A preliminary schedule for conducting Stage 2 and Stage 3 planning for dredged material containment in LIS was presented in the January 1979 Reconnaissance Report. A management strategy for sub-dividing the Stage 2 effort into specific work plans and for coordinating the performance of all work is being developed at this time. The management strategy will include a more detailed schedule for Stages 2 and 3, to be prepared by the Corps.

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APPENDIX A

FEDERAL DREDGING PROJECTS - 1927 - 1979

A.01 Table A-1 is an inventory of New York District improvement and maintenance dredging in New York State bordering Long Island Sound since 1927. To obtain data on existing Federal navigation projects, three sources were consulted:

1. New York Division, Corps of Engineers, contract activity summaries for Operations Division, 1927 to 1979;
2. Plans and specifications for each project as contracted out from 1940 to 1979;
3. New York District, Operations and Regulatory Divisions personnel.

A.02 The contract activity summaries contained the project name or waterway, contract date, whether the contract was new work or maintenance, the pay yardage, and the contract cost. In addition, the disposal sites, whether upland or open water, were specified. When the disposal method was open water dumping, the disposal location was given. These records covered all New York District projects since 1927.

A.03 The plans and specifications were used mainly to locate upland disposal sites and corresponding map diagrams. This information was incomplete and very sketchy during the period between 1940 and 1979. Information prior to 1940 was not available.

A.04 Personnel in the Operations Division were consulted for additional information on disposal sites and methods of disposal for recent projects. Specific information on type of dredge material or dredge plant was not generally available. According to Operations Division personnel, greater than ninety percent of New York District Federal dredging was performed by hydraulic dredge plants.

A.05 Cost figures shown in Table A-1 represent actual contract costs only. In-house Corps supervision and administrative costs are not included. The yardages specified are pay yardages, and any non-allowable overdepth that may have been dredged by the contractor is not included. Thus, the yardage figures underestimate the total amount actually dredged.

Table A-1

INVENTORY OF CORPS OF ENGINEER IMPROVEMENT AND MAINTENANCE DREDGING IN NEW YORK (1927-1979)

NEW YORK COASTAL AREA	PROJECT NAME (USGS QUAD)	IMPROVEMENT OR MAINTENANCE	YEAR	PAY YARDAGE (CY)	COST $	$/CY	METHOD OF DISPOSAL	DISPOSAL TRANSPORT DISTANCE
Westchester County	Portchester Harbor (Mamaroneck)	I	1927	55,700	-	-	LIS	-
			1928	27,400	-	-	LIS	-
			1932	143,500	13,731	0.10	Upland	-
			1932	19,500	9,857	0.51	Upland	-
			1938	2,700	18,038	6.68	LIS	7 miles
		M	1935	8,700	7,922	0.91	LIS	7 miles
			1938	11,300	10,600	0.94	LIS	7 miles
			1947	31,600	39,232	1.24	LIS	7 miles
			1959	80,000	128,171	1.60	LIS	7 miles
			1966	61,100	145,174	2.38	LIS	7 miles
	Milton Harbor (Mamaroneck)	I	1967	147,330	235,891	1.60	LIS	12 miles
		M	1976	72,600	485,452	6.69	Mud Dump	47 miles
	Mamaroneck Harbor (Mamaroneck)	I	1927	24,200	-	-	LIS	-
			1927	24,200	-	-	Upland	-
			1932	19,100[a]	29,003	1.52	LIS	11 miles
			1939	105,500	-	-	Upland	-
			1940	161,700	33,676	0.21	Upland	-
			1966	144,200	296,491	2.06	LIS	11 miles
		M	1935	10,600	5,353	0.51	LIS	11 miles
			1935	10,600	5,353	0.51	Upland	-
			1963	57,600	95,000	1.65	LIS	11 miles
			1964	29,100[a]	79,535	2.73	LIS	11 miles
			1966	28,300	62,780	2.22	LIS	11 miles
	Echo Bay Harbor (Mt. Vernon)	M	1931	7,000	4,572	0.65	Upland	-
	New Rochelle Harbor (Mt. Vernon)	M	1931	33,300	8,000	0.24	Upland	-
			1936	23,000	12,161	0.53	LIS	13 miles
			1971	43,100	113,784	2.64	LIS	13 miles

[a]Same project performed over more than one year.

Table A-1

(continued)

NEW YORK COASTAL AREA	PROJECT NAME (USGS QUAD)	IMPROVEMENT OR MAINTENANCE	YEAR	PAY YARDAGE (CY)	COST $	$/CY	METHOD OF DISPOSAL	DISPOSAL TRANSPORT DISTANCE
New York City	Eastchester Creek (Flushing)	I	1929	100	-	-	Upland	-
			1935	110,100	52,186	0.47	Upland	-
			1936	205,100	125,685	0.61	Upland	-
			1940	227,300[a]	202,428	0.89	Upland	-
		M	1930	42,600	39,685	0.93	Upland	-
			1935	18,800	10,568	0.56	Upland	-
			1947	3,900	11,707	3.00	LIS	-
			1952	92,900	121,891	1.31	Upland	-
			1965	17,500	42,064	2.40	LIS	20 miles
			1974	45,200	269,500	5.96	Mud Dump	35 miles
	Westchester Creek (Flushing)	I	1932	304,400	69,717	0.23	LIS	-
			1932	22,300	7,122	0.32	LIS	-
			1933	2,500	9,861	3.94	LIS	-
			1935	10,100	-	-	LIS	-
		M	1930	10,300	2,680	0.26	Upland	-
			1938	186,800	58,448	0.31	Upland	-
			1948	170,700[a]	119,307	0.70	Upland	1 mile
			1959	215,400	282,736	1.31	Upland	1 mile
			1962	9,800	25,266	2.58	LIS	25 miles
			1966	186,600	374,417	2.01	LIS	25 miles
			1970	55,600	156,264	2.81	LIS	25 miles
			1973	123,800	528,048	4.27	Mud Dump	30 miles
	Bronx River (Flushing)	I	1940	133,100[a]	265,351	1.99	LIS	28 miles
		M	1931	106,200	27,850	0.26	Upland	-
			1936	104,000[a]	53,491	0.51	Upland	-
			1946	130,000	152,500	1.17	LIS	28 miles
			1956	40,300	109,000	2.70	LIS	28 miles
			1960	87,900	126,260	1.44	LIS	28 miles
			1965	59,000	147,693	2.50	LIS	28 miles
			1972	75,900	346,327	4.56	Mud Dump	34 miles

Table A-1

(continued)

NEW YORK COASTAL AREA	PROJECT NAME (USGS QUAD)	IMPROVEMENT OR MAINTENANCE	YEAR	PAY YARDAGE (CY)	COST $	$/CY	METHOD OF DISPOSAL	DISPOSAL TRANSPORT DISTANCE
New York City (cont'd.)	Flushing Bay and Creek (Flushing)	I	1938	888,700	386,002	0.43	Mud Dump	34 miles
			1963	1,985,700[a]	2,433,875	1.23	LIS	-
		M	1927	68,900	21,207	0.31	LIS	28 miles
			1929	45,600	15,477	0.34	Upland	-
			1931	63,300	17,711	0.28	Upland	-
			1936	150,300	84,367	0.56	75,200 Mud Dump	34 miles
							75,100 Upland	-
			1973	237,861	499,199	2.10	Mud Dump	34 miles
	Harlem River (Central Park)	I	1928	158,900	-	-	Mud Dump	30 miles
			1928	12,300	-	-	Cellar Dirt	-
			1929	12,400	-	-	Cellar Dirt	-
			1929	264,300	151,594	0.57	Mud Dump	30 miles
			1930	88,000	-	-	Mud Dump	30 miles
			1932	12,100	7,675	0.63	Upland	-
			1936	97,200	119,820	1.23	Cellar Dirt	-
			1937	49,500	61,020	1.23	Mud Dump	30 miles
			1937	442,800	545,849	1.23	Upland	-
			1938	176,600	217,698	1.23	Upland	-
		M	1926	24,300	-	-	Mud Dump	30 miles
			1931	60,000	-	-	Upland	-
			1938	29,700	36,612	1.23	Mud Dump	30 miles
			1956	1,400	10,000	7.14	LIS	30 miles
			1965	41,300	130,370	3.16	LIS	30 miles
			1968	4,100	27,402	-	LIS	30 miles
			1973	141,100	379,557	-	Mud Dump	30 miles
	East River (Flushing and Central Park)	I	1929	51,700[a]	533,211	10.31	LIS	-
			1929	37,000	-	-	-	-
			1930	34,700	-	-	LIS	-
			1930	44,700	502,602	11.24	Upland	1/2 mile
			1930	42,800	18,286	0.43	LIS	27 miles
			1931	34,700	454,840	13.11	LIS	-
			1931	2,100	27,500	13.10	LIS	-
			1931	31,500	-	-	LIS	-

Table A-1

(continued)

NEW YORK COASTAL AREA	PROJECT NAME (USGS QUAD)	IMPROVEMENT OR MAINTENANCE	YEAR	PAY YARDAGE (CY)	COST $	$ CY	METHOD OF DISPOSAL	DISPOSAL TRANSPORT DISTANCE
New York City (cont'd.)	East River (cont'd.) (Flushing and Central Park)	I	1932	10,400	-	-	Upland	3/4 mile
			1932	31,500	-	-	LIS	-
			1932	40,000	-	-	LIS	-
			1933	10,400	-	-	LIS	-
			1933	25,500	-	-	LIS	-
			1933	75,000	193,693	2.58	LIS	-
			1934	60,000	167,557	2.79	LIS	-
			1944	604,200	192,462	0.25	-	-
			1974	924,772	2,392,484	2.59	Mud Dump	30 miles
		M	1944	87,900	15,958	.18	Mud Dump	30 miles
			1946	14,492	24,410	1.68	Mud Dump	30 miles
			1947	6,000	-	-	Mud Dump	30 miles
			1953	18,674	51,782	2.77	Mud Dump	30 miles
			1956	12,655	45,595	3.60	Mud Dump	30 miles
			1963	16,600	80,431	4.85	Mud Dump	30 miles
			1966	132,810	306,771	2.31	Mud Dump	30 miles
			1976	27,254	96,155	3.53	Mud Dump	30 miles
	Little Neck Bay (Flushing)	I	1966	601,500	728,541	1.21	LIS	24 miles
			1967	803,900	1,246,133	1.55	LIS	24 miles
			1968	779,300	1,357,475	1.74	LIS	24 miles
Nassau County	Hempstead Harbor (Sea Cliff)	M	1928	69,900	31,848	0.46	-	-
			1936	19,800	15,229	0.77	LIS	-
			1950	31,600	53,147	1.68	LIS	18 miles
	Glen Cove Creek (Sea Cliff)	I	1933	196,700[a]	53,872	0.27	Upland	1/2 mile
		M	1948	26,500	26,866	1.01	Upland	1/2 mile
			1960	27,100	33,218	1.23	Upland	1/2 mile
			1965	6,800	18,124	2.67	LIS	18 miles

Table A-1

(continued)

NEW YORK COASTAL AREA	PROJECT NAME (USGS QUAD)	IMPROVEMENT OR MAINTENANCE	YEAR	PAY YARDAGE (CY)	COST $	$/CY	METHOD OF DISPOSAL	DISPOSAL TRANSPORT DISTANCE
Suffolk County	Huntington Harbor (Lloyd Harbor)	I	1941	217,800	37,707	0.17	Upland	1 mile
		M	1935	21,400	10,909	0.51	LIS	-
			1941	3,100	503	0.16	Upland	1 mile
	Northport Harbor (Northport)	I	1956	79,800	93,623	1.17	Upland	1 mile
	Port Jefferson Harbor (Port Jefferson)	M	1945	37,500	-	-	Upland	1 mile
	Mattituck Harbor (Mattituck Hills)	I	1965	41,000	65,070	1.59	Upland	1 mile
		M	1927	49,200	23,721	0.48	Upland	1 mile
			1935	50,800[a]	22,247	0.44	Upland	1 mile
			1938	18,300	8,102	0.44	Upland	1 mile
			1946	53,900	42,099	0.78	Upland	1 mile
			1950	22,900	14,190	0.62	Upland	1 mile
			1955	31,600	30,292	0.96	Upland	1 mile
			1961	43,500	35,280	0.81	Upland	1 mile
			1965	6,300	7,288	1.16	Upland	1 mile
	Greenport Harbor (Greenport)	I	1939	106,900	26,304	0.25	Upland	1 mile

[a]Same project performed over more than one year.

APPENDIX B

OTHER DREDGING PROJECTS UNDER FEDERAL PERMIT

1959 - 1979

B.01 Table B-1 is a log of dredged material disposal in open water for projects in the New York vicinity of Long Island Sound under Federal permit for the 10 year period 1968-1977. Dredging projects (including Federal Projects) appear in Table B-1 only if a Federal dumping permit was granted and the material was actually dumped in open water. The dredged quantity represents the contract estimate, and does not allow for any over-dredging that the contractor may have performed to meet project specifications.

B.02 Table B-2 is a record of "non-Federal" dredging/disposal projects in the New York vicinity of Long Island Sound under Federal permit. Data in Table B-2, however, include all projects under Federal permit, independent of the disposal method. Again, the reported volumes are estimates, and filed permit applications and accompanying information did not specify whether the work was actually performed or not. Table B-2 cannot be directly correlated with Table B-1, since dumping permit log numbers in Table B-1 do not correlate with dredging permit numbers in Table B-2.

B.03 To obtain the permits data, the Corps of Engineers New York District was visited between October 16 and November 26, 1979. In the Operations Branch, two major sources of information were consulted. The first source was the log-books listing each open water dumping permit according to permit year/log number. Table B-1 was compiled from this source. The log-books contain the open water disposal information including the waterway/applicant and the open water dumping site. For the purposes of the present investigation, pertinent information (including volumes and sources of material) for the period 1968 through 1977 was collected and

tabulated in Table B-1. Data for the years 1970 through 1977 were taken from the report by Mitre, 1979 (originally taken from the same log-books). Data after 1977 were not available in the log-books.

B.04 The second major source of information consulted was the file folders containing Federal permits issued for each dredging project according to waterway, applicant, and permit year. Table B-2 was compiled from this source. The file folders contain somewhat detailed information including the reasons for dredging, dredging location (some indicated on map), quantity permitted as well as the disposal method authorized. For the purpose of the present investigation, data for the years 1959 through 1979 were collected from these separate files and tabulated in Table B-2.

B-05 It must be noted that the permit quantity data are not as reliable as it might seem. There is no simple way to determine how much of the permitted work was done and how much material was actually dredged (see Appendix A also). The permitted yardage has to be taken as the best surrogate for the actual amount dredged and disposed.

TABLE B-1

HISTORY OF "NON-FEDERAL" DREDGING/DISPOSAL RECORDS IN LONG ISLAND SOUND, NEW YORK AREA
WITH OPEN WATER DUMPING

(January 1968 - January 1977)

LONG ISLAND SOUND, NEW YORK AREA	USGS QUADRANGLE	PERMIT YEAR AND LOG NO. (CORPS OF ENGINEERS)	DREDGING LOCATION (WATERWAY)	VOLUME (CU.YD.)	DISPOSAL METHOD
New York City	*Can be either Flushing, Central Park or Brooklyn	*68-375	East River	2000	Open Water (L.I.S.)
		*69-65		900	Open Water (L.I.S.)
	Flushing	69-71		13200	Open Water (L.I.S., Eatons Neck Dumping Ground)
		*69-375		44000	Open Water (L.I.S.)
		*70-75		32000	Mud Dump
		*70-114		64000	Mud Dump
		*70-266		20000	Mud Dump
		*70-285		2200	Mud Dump
		*70-319		13000	Open Water (L.I.S.)
		*70-345		4000	Mud Dump
		*70-463		44200	Open Water (L.I.S.)
		*71-51		(Not reported)	
		*71-73		1600	Mud Dump
	Central Park	71-75		213000	Mud Dump
		*71-76		800	Mud Dump
		*71-80		35985	Mud Dump
	Central Park	71-99		38000	Mud Dump
	Central Park	71-100		10000	Mud Dump
		*71-120			
		*71-177		6800	Mud Dump
		*71-178		28050	Mud Dump
	Brooklyn	71-262		3000	Cellar
		*71-263		6000	Cellar
	Brooklyn	71-278		3000	Cellar
	Brooklyn	71-282		24000	Mud Dump
	Central Park	71-283		23000	Mud Dump
	Central Park	71-284		22000	Mud Dump
	Flushing	71-309		200000	Mud Dump
	Central Park	71-342		6000	Mud Dump
	Central Park	71-388		27000	Mud Dump
	Central Park	71-396		1500	Mud Dump
	Central Park	71-404		4500	Mud Dump
	Central Park	71-435		3200	Mud Dump
	Flushing	71-454			

TABLE B-1 (Continued)

LONG ISLAND SOUND, NEW YORK AREA	USGS QUADRANGLE	PERMIT YEAR AND LOG NO. (CORPS OF ENGINEERS)	DREDGING LOCATION (WATERWAY)	VOLUME (CU.YD.)	DISPOSAL METHOD
New York City		*71-485	East River		
		*72-13			
	Brooklyn	72-22			
	Brooklyn	72-23		84000	Cellar
	Brooklyn	72-24		12000	Cellar
		*72-100		(not reported)	
	Brooklyn	72-140		76500	Cellar
	Brooklyn	72-141		76500	Cellar
		*72-146			
		*72-172			
		*72-203			
		*72-222			
	Brooklyn	72-249		21000	Cellar
	Brooklyn	72-251		7500	Mud Dump
	Brooklyn	72-252		46500	Mud Dump
	Brooklyn	72-254		70500	Cellar
	Central Park	72-289		15150	Mud Dump
	Central Park	72-334		19600	Mud Dump
	Central Park	72-391			
		*72-395			
	Brooklyn	72-416			
	Brooklyn	72-417			
		*73-86			
		*73-159		61000	Mud Dump
		*73-169		39200	Mud Dump
		*74-29		21000	Mud Dump
		*74-45		76000	Mud Dump
		*74-54		159100	Mud Dump
		*74-65		185585	Mud Dump
		*74-71		8460	Mud Dump
		*75-4		42700	Mud Dump
		*75-8		7900	Mud Dump
		*75-17		156000	Mud Dump
		*75-18		12000	Mud Dump
		*75-39		24700	Mud Dump
		*75-46		6400	Mud Dump
		*75-49		12300	Mud Dump
		*75-54		5000	Mud Dump

TABLE B-1 (Continued)

LONG ISLAND SOUND, NEW YORK AREA	USGS QUADRANGLE	PERMIT YEAR AND LOG NO. (CORPS OF ENGINEERS)	DREDGING LOCATION (WATERWAY)	VOLUME (CU.YD.)	DISPOSAL METHOD
New York City	Flushing	70-88	College Pt.-East River	2000	Open Water (L.I.S.)
		71-373		97840	Mud Dump
		68-330	Westchester Creek	1200	Open Water (L.I.S. Eatons Neck Dumping Ground)
		68-376		1800	Open Water (L.I.S. Stamford Dumping Ground)
		69-3		4500	Open Water (L.I.S. Stamford Dumping Ground)
		69-205		1500	Open Water (L.I.S. Stamford Dumping Ground)
		70-93		1400	Open Water (L.I.S.)
		70-206		66000	Open Water (L.I.S.)
		70-221		11000	Mud Dump
		68-165	City Island	1540	Open Water (L.I.S. Stamford Dumping Ground)
		68-176		1500	Open Water (L.I.S. Stamford Dumping Ground)
		68-357		700	Open Water (L.I.S. Eatons Neck Dumping Ground)
		69-82		900	Open Water (L.I.S. Stamford Dumping Ground)
		69-160		1500	Open Water (L.I.S. Stamford Dumping Ground)
		70-163		250	Open Water (L.I.S.)
		68-208	Eastchester Bay	5000	Open Water (L.I.S. Stamford Dumping Ground)
		68-266		5000	Open Water (L.I.S. Stamford Dumping Ground)
		71-358		4000	Mud Dump
		73-114			
		74-15		3860	Mud Dump
		68-91	Eastchester Creek	1540	Open Water (L.I.S. Stamford Dumping Ground)
		68-362		900	Open Water (L.I.S. Stamford Dumping Ground)
		69-179		4000	Open Water (L.I.S. Stamford Dumping Ground)
		69-184		2000	Open Water (L.I.S. Stamford Dumping Ground)
		70-324		2000	Open Water (L.I.S.)
		68-209	Little Neck Bay	266400	Open Water (L.I.S. Eatons Neck Dumping Ground)
		68-238		302400	Open Water (L.I.S. Eatons Neck Dumping Ground)
		70-342		24260	Open Water (L.I.S.)
		71-64		17000	Mud Dump

TABLE B-1 (Continued)

LONG ISLAND SOUND, NEW YORK AREA	USGS QUADRANGLE	PERMIT YEAR AND LOG NO. (CORPS OF ENGINEERS)	DREDGING LOCATION (WATERWAY)	VOLUME (CU. YD.)	DISPOSAL METHOD
New York City	Flushing	71-59	Hunts Pt. - East River	288800	Mud Dump
		71-380		159550	Mud Dump
		72-450			
		73-83			
		71-91	Hutchinson Point	2840	Mud Dump
		72-189	Hutchinson River	1560	Mud Dump
		72-190		1560	Mud Dump
		71-375	Tallmana Island	46500	Mud Dump
		69-377	Bronx River	4000	Open Water (L.I.S. Eatons Neck Dumping Ground)
		72-218		77000	Mud Dump
		72-250			
		72-292		24775	Mud Dump
		73-102	Bowery Bay	114825	Mud Dump
		73-131		160000	Mud Dump
		73-137		48000	Mud Dump
		73-143		66000	Mud Dump
		73-152		132600	Mud Dump
		73-175		176800	Mud Dump
		73-181		68800	Mud Dump
		75-29		31504	Mud Dump
		75-33		71028	Mud Dump
		69-76	Flushing Bay	420	Open Water (L.I.S. Stamford Dumping Ground)
		69-294		2000	Open Water (L.I.S. Stamford Dumping Ground)
		76-26		5975	Mud Dump
		71-4	Long Island City	(not reported)	
		71-138		3000	Mud Dump
		72-14			
		72-147			

TABLE B-1 (Continued)

LONG ISLAND SOUND, NEW YORK AREA	USGS QUADRANGLE	PERMIT YEAR AND LOG NO. (CORPS OF ENGINEERS)	DREDGING LOCATION (WATERWAY)	VOLUME (CU.YD.)	DISPOSAL METHOD
New York City	Central Park	68-294	Harlem River	6000	Open Water (L.I.S. Eatons Neck Dumping Ground)
		70-94		1600	Open Water (L.I.S.)
		72-129		7500	Mud Dump
		72-247			
		72-462			
		73-172		17400	Mud Dump
		74-64		11800	Mud Dump
		70-14	Astoria	3000	Mud Dump
		70-97		2000	Open Water (L.I.S.)
		70-149		1500	Mud Dump
		71-272		3000	Mud Dump
		71-374	Wards Island	94900	Mud Dump
	Brooklyn	70-185	Newtown Creek	3000	Open Water (L.I.S.)
		70-409		4000	Mud Dump
		71-224		81000	Open Water (L.I.S.)
		71-341		28000	Open Water (L.I.S.)
		71-365		50000	Open Water (L.I.S.)
		71-372		205800	Open Water (L.I.S.)
		71-453		11000	Open Water (L.I.S.)
		72-329			
		72-420		2200	Mud Dump
		73-121			
		73-127		3600	Mud Dump
		74-16		16050	Mud Dump
		74-43		11256	Mud Dump

TABLE B-1 *(Continued)*

LONG ISLAND SOUND, NEW YORK AREA	USGS QUADRANGLE	PERMIT YEAR AND LOG NO. (CORPS OF ENGINEERS)	DREDGING LOCATION (WATERWAY)	VOLUME (CU.YD.)	DISPOSAL METHOD
Westchester County	Mamaroneck	68-95	Mamaroneck Harbor	1260	Open Water (L.I.S. Stamford Dumping Ground)
		68-96		1260	Open Water (L.I.S. Stamford Dumping Ground)
		68-108		840	Open Water (L.I.S. Stamford Dumping Ground)
		68-156		200	Open Water (L.I.S. Stamford Dumping Ground)
		68-157		400	Open Water (L.I.S. Stamford Dumping Ground)
		69-62		2100	Open Water (L.I.S. Stamford Dumping Ground)
		69-63		420	Open Water (L.I.S. Stamford Dumping Ground)
		69-77		2000	Open Water (L.I.S. Stamford Dumping Ground)
		69-78		1260	Open Water (L.I.S. Stamford Dumping Ground)
		69-84		3000	Open Water (L.I.S. Stamford Dumping Ground)
		69-146		4200	Open Water (L.I.S. Stamford Dumping Ground)
		70-72		7000	Open Water (L.I.S.)
		71-90		1420	Mud Dump
		72-58		780	Mud Dump
		72-201		420	Mud Dump
		69-83	Larchmont Harbor	3000	Open Water (L.I.S. Stamford Dumping Ground)
		69-134		2520	Open Water (L.I.S. Stamford Dumping Ground)
		70-171		20000	Open Water (L.I.S.)
		70-199		800	Open Water (L.I.S.)
		70-453		800	Open Water (L.I.S.)
		71-92		1000	Mud Dump
		68-172	Milton Harbor	840	Open Water (L.I.S. Stamford Dumping Ground)
		68-276		5880	Open Water (L.I.S. Stamford Dumping Ground)
		69-163		206	Open Water (L.I.S. Stamford Dumping Ground)
		69-189		400	Open Water (L.I.S. Stamford Dumping Ground)

TABLE B-1 (Continued)

LONG ISLAND SOUND, NEW YORK AREA	USGS QUADRANGLE	PERMIT YEAR AND LOG NO. (CORPS OF ENGINEERS)	DREDGING LOCATION (WATERWAY)	VOLUME (CU.YD.)	DISPOSAL METHOD
Westchester County	Mt. Vernon	68-56	New Rochelle Harbor	9450	Open Water (L.I.S. Stamford Dumping Ground)
		69-85		15000	Open Water (L.I.S. Stamford Dumping Ground)
		69-135		15000	Open Water (L.I.S. Stamford Dumping Ground)
		69-260		1500	Open Water (L.I.S. Stamford Dumping Ground)
		69-382		3000	Execution Rocks (Special)
		70-64		6000	Open Water (L.I.S.)
		70-170		2000	Open Water (L.I.S.)
		70-176		2000	Open Water (L.I.S.)
		71-95		27300	Open Water (L.I.S.)
		71-207		42000	Open Water (L.I.S.)
		71-222		2000	Open Water (L.I.S.)
		72-79		21600	Mud Dump
		72-188		4260	Mud Dump
		68-80	New Rochelle Creek	1800	Open Water (L.I.S. Stamford Dumping Ground)
		68-99		900	Open Water (L.I.S. Stamford Dumping Ground)
		70-95		400	Open Water (L.I.S.)
	Glenville	69-147	Byram River	9000	Open Water (L.I.S. Stamford Dumping Ground)

TABLE B-1 (Continued)

LONG ISLAND SOUND, NEW YORK AREA	USGS QUADRANGLE	PERMIT YEAR AND LOG NO. (CORPS OF ENGINEERS)	DREDGING LOCATION (WATERWAY)	VOLUME (CU.YD.)	DISPOSAL METHOD
Nassau County	Sea Cliff	68-65	Manhasset Bay	1680	Open Water (L.I.S. Eatons Neck Dumping Ground)
		69-278		1500	Open Water (L.I.S. Eatons Neck Dumping Ground)
		69-374		2000	Open Water (L.I.S. Stamford Dumping Ground)
		69-57		4000	Open Water (L.I.S. Stamford Dumping Ground)
		69-152		1000	Open Water (L.I.S. Stamford Dumping Ground)
		69-159		3000	Open Water (L.I.S. Stamford Dumping Ground)
		69-393		1600	Open Water (L.I.S. Eatons Neck Dumping Ground)
		70-155		3000	Open Water (L.I.S.)
		70-195		1600	Open Water (L.I.S.)
		68-78	Hempstead Harbor	2500	Open Water (L.I.S. Eatons Neck Dumping Ground)
		68-359		900	Open Water (L.I.S. Stamford Dumping Ground)
		69-75		15000	Open Water (L.I.S. Eatons Neck Dumping Ground)
		69-99		20000	Open Water (L.I.S. Eatons Neck Dumping Ground)
		69-151		3000	Open Water (L.I.S. Stamford Dumping Ground)
		69-282		2000	Open Water (L.I.S. Stamford Dumping Ground)
		69-396		2000	Open Water (L.I.S. Stamford Dumping Ground)
		70-86		2000	Open Water (L.I.S.)
		70-322		2000	Open Water (L.I.S.)
		70-462			
		71-355		4000	Mud Dump
		71-487		6750	Mud Dump
		72-326			
		76-23		3500	
		76-24		81500	
		68-204	Port Washington	1100	Open Water (L.I.S. Eatons Neck Dumping Ground)
		70-87		2000	Open Water (L.I.S.)
		70-101		3000	Open Water (L.I.S.)
		71-83		4800	Mud Dump
		68-262	Kings Point	420	Open Water (L.I.S. Eatons Neck Dumping Ground)
		70-96		300	Open Water (L.I.S.)
		71-237		3000	Mud Dump
		69-198	Glen Cove Creek	800	Open Water (L.I.S. Eatons Neck Dumping Ground)
		70-451		1000	Open Water (L.I.S.)
		71-51		4260	Mud Dump
		68-88	Roslyn Harbor	350	Open Water (L.I.S. Eatons Neck Dumping Ground)
		68-267		350	Open Water (L.I.S. Eatons Neck Dumping Ground)

TABLE B-1 (Continued)

LONG ISLAND SOUND, NEW YORK AREA	USGS QUADRANGLE	PERMIT YEAR AND LOG NO. (CORPS OF ENGINEERS)	DREDGING LOCATION (WATERWAY)	VOLUME (CU. YD.)	DISPOSAL METHOD
Nassau County	Lloyd Harbor	70-99	Cold Spring Harbor	1200	Open Water (L.I.S.)
	Bayville	70-446	Oyster Bay	1800	Open Water (L.I.S.)
	Bayville	73-115	L.I.S.		
Suffolk County	New London and Mystic	71-371	Fisher Island Sound	38000	Mud Dump
	Northport	68-92	Northport Harbor	2900	Open Water (L.I.S. Eatons Neck Dumping Ground)
		69-269		10000	Open Water (L.I.S. Eatons Neck Dumping Ground)
	Port Jefferson	69-191	Port Jefferson Harbor	1200	Open Water (L.I.S. Port Jefferson Dumping Ground)
		69-277		500	Open Water (L.I.S. Port Jefferson Dumping Ground)
Long Island Sound		69-61	Long Island Sound	1800	Open Water (L.I.S. Stamford Dumping Ground)
		70-193			

TABLE B-2

HISTORY OF "NON-FEDERAL" DREDGING/DISPOSAL RECORDS IN LONG ISLAND SOUND, NEW YORK AREA

(1959-1979)

LONG ISLAND SOUND NEW YORK AREA	USGS QUADRANGLE	PERMIT YEAR AND NO (CORPS OF ENGINEERS)	WATERWAY	DREDGING LOCATION	VOLUME (CU.YD.)	DISPOSAL METHOD
New York City	Flushing	M 59-5714	East River	North Brother Island	1500	Long Island Sound
		I 59-5847		College Pt. Yacht Club	1260000	Open Water
		M 60-5917		Rikers Island	15000	Open Water
		M 61-6304		Hallets Cove	20000	Upland
		I 61-6335		College Pt. (sewage plant)	20000	Eatons Neck Dumping Ground
		M 62-6511		Long Island City	15000	Open Water
		M 63-6632		Fort Schuyler	23000	Dumping Ground
		I 63-6670		LaGuardia	2000000	Open Water
		M 64-6810		Long Island City	14000	Open Water
		I 64-6909		Private Marina, Whitestone	33000	Open Water
		M 64-6914		Con Ed-Ravenswood	Not specified	Open Water
		M 64-6922		Con Ed-Rikers Is.	3500	Open Water
		M 66-7341		Hell Gate (Pt.Morris)	2400	Long Island Sound
		I 66-7352		College Pt., commercial basin	11300	Bulkhead fill
		I 67-7537		College Pt., commercial basin	9100	Bulkhead fill
		M 67-7809		Maritime College	2400	Adjacent fill
		M 70-8026		Hunts Pt.	167000	Open Water
		M 70-8030		Wards Is.	28000	Dumping Ground
		M 70-8123		Fort Schuyler	13300	Dumping Ground
		M 70-8159		Long Island City	10000	Open Water
		M 71-8203		E. channel, Welfare Is.	41000	Open Water
		M 71-8213		Hallets Cove	5000	Open Water
		M 71-8214		Hallets Cove	4000	Open Water
		I 74-8030		Wards Is. (sewage plant)	28000	Open Water
		M 74-8463A		Con Ed.-Lawrence Pt.	Not specified	Mud Dump
		I 74-8911		Hunts Pt. (commercial pier)	471000	Mud Dump
		M 74-8975		Hunts Pt.	430	Upland
		M 75-9185		Con Ed.-Luyster Creek	85000	Mud Dump
		M 75-9234		Tallmans Is. (sewage plant)	10000	Mud Dump

B-2 (CONTINUED)

LONG ISLAND SOUND NEW YORK AREA	USGS QUADRANGLE	PERMIT YEAR AND NO. (CORPS OF ENGINEERS)	WATERWAY	DREDGING LOCATION	VOLUME (CU.YD.)	DISPOSAL METHOD
New York City	Flushing I	59-5830	Hutchinson River	At Eachester Creek	Not specified 700000	Fill in Givans Creek Upland
	I	70-8084		Parkway Bridge	1500	Fill and dredge in Hutchinson River
	I	70-8150		At Pelham Manor	2600	Dumping Ground
	I	71-8194		Colonial Asphalt	2000	Stamford Dumping Ground
	M	73-8642		Vicinity of Boston Road	4000-5000	Dumping Ground
LIS	M	65-7124	Long Is. Sound	City Island	850	Open Water
	M	68-7759		Willets Pt., Ft. Totten	1300	Stamford Dumping Ground
	M	73-8651			3500	Stamford Dumping Ground
	M	74-8143		Maritime College	4' below MWL	Dumping Ground
	I	74-8978		Alley Cr.	5000	Grade adjacent low area
	I	76-9618			2100	Bulkhead fill
	I	69-7791	Westchester Creek	Culvert Construction	small	Bulkhead fill
	I	69-7815		Culvert Construction	small	Bulkhead fill
	I	69-7816		Culvert Construction	small	Bulkhead fill
	M	71-8241		Colonial Sand & Stone	5000	Long Island Sound
	I	79-9598		Outfall pipe	840	Upland
	I	61-6325	Bronx River	Hunts Pt., ship docking basin	92000	Upland fill
	I	69-7808		Hunts Pt., ship docking basin	22000	Open Water
	I	69-8017		Hunts Pt., ship docking basin	133000	Open Water
	I	61-6257	Flushing Bay & Creek	Commercial basin	20000	Open Water
	I	62-6423		Road construction	10000	Open Water
	I	62-6467		Commercial basin	3500	Long Island Sound
	I	63-6673		Commercial basin	15' below MLW	Long Island Sound
	I	63-6694		Cable burying	15' below MLW	Long Island Sound
	I	64-6757		Bridge channel	Not specified	Open Water
	M	73-8691		Commercial basin	1200	Mud Dump
LIS	I	78-10631	Little Neck Bay	Little Neck Bay	400	Bulkhead Fill

TABLE B-2 (Continued)

LONG ISLAND SOUND NEW YORK AREA	USGS QUADRANGLE	PERMIT YEAR AND NO. (CORPS OF ENGINEERS)	WATERWAY	DREDGING LOCATION	VOLUME (CU.YD.)	DISPOSAL METHOD
Westchester County	Mt. Vernon	I 60-5979	New Rochelle Harbor	Davenport Neck	Up to 4' below MLW	Deposit behind a sea wall
		I 61-6158		Davenport Neck	12000	Bulkhead fill
		I 61-6182		New Rochelle Harbor	Up to 20' below MLW	Land (Pelham Manor)
		M 62-6359		Lion's Boat Yard	6500	Dumping Ground (Neptune Is.)
		I 63-6579		New Rochelle Creek	4400	Land (behind a sea wall)
		I 65-7050		Davenport Neck	6000 500	Dumping Ground Land
		I 65-7004		N.Y. Athletic Yacht Club (New Rochelle Creek)	Up to 6' below MLW	Dumping Ground (Travers Is.)
		I 66-7235		C.B.S. Dock	Up to 6' below MLW	Dumping Ground (Neptune Is.)
		M 66-7159		Huguenot Yacht Club	Up to 6' below MLW	Dumping Ground (Neptune Is.)
		M 67-7582		New Rochelle Harbor	Up to 3' below MLW	Dumping Ground (Neptune Is.)
		I 71-8230		At foot of Meadow St.	4000	Dumping Ground
		M 74-9015		Sound Yacht Club New Rochelle Harbor	2400	Dumping Ground
		I 75-9137		N.Y. Athletic Yacht Club	1000	Dumping Ground (Travers Is.)
		M 76-9556		Polar Bar	4000	Dumping Ground
		I 77-10195		N.Y. Athletic Yacht Club	4000	Upland (non-wetland)
		M 59-5662	Echo Bay	Echo Bay	40	Harrison Is.
		I 60-6093		Clifford Is.	35000	Bulkhead fill
		M 64-6933		Ferris Creek	2500	Long Island Sound
		M 66-7371		Echo Bay	2000	Long Island Sound
		M 69-7946		North Branch	500	Upland
		M 71-8224		Ferris Creek	15000	Long Island Sound
		M 78-10770		Echo Bay	1000	Long Island Sound
		I 63-6662	Long Is. Sound	Between Hunter Is. and Pelham Bay Park	180000	Retained by rock dike within park property
	Mamaroneck	I 59-5668	Larchmont Harbor	Mr. Schramms Boat Basin	Very small	Long Island Sound
		M 64-6767		Inside Harbor	Very small	Long Island Sound
		M 67-7473		Mr. Schramms Boat Basin	Not specified	Long Island Sound
		M 68-7797		Main channel of Satan's Toe	9600	Long Island Sound
		I 70-8068		New canal	20000	Long Island Sound
		M 78-10438		West side of Satan's Toe	500	Upland
		M 78-10453		West side of Satan's Toe	500	Upland
		M 78-10804		Around Cedar Is.	30000	Upland (non-wetland)
		I 79-10912		Inside Harbor	150	Bulkhead fill

TABLE B-2 (Continued)

LONG ISLAND SOUND NEW YORK AREA	USGS QUADRANGLE	PERMIT YEAR AND NO. (CORPS OF ENGINEERS)	WATERWAY	DREDGING LOCATION	VOLUME (CU.YD.)	DISPOSAL METHOD
Westchester County	Mamaroneck	M 58-5459	(Mamaroneck Harbor)	Inside Harbor	600	Upland
		M 58-5600		Inside Harbor	2000-3000	Long Island Sound
		M 64-6917		Inside Harbor	2000	Long Island Sound
		M 64-6935		Inside Harbor	112	Long Island Sound
		M 64-6936		Inside Harbor	4000	Stamford Dumping Ground
		M 65-6950		Inside Harbor	Very small amount	Long Island Sound
		M 67-7444		Inside Harbor	200	Long Island Sound
		M 68-7627		Inside Harbor	2000	Long Island Sound
		M 68-7641		Inside Harbor	112	Long Island Sound
		M 68-7748		Inside Harbor		Upland
		M 69-8013		Inside Harbor	5500	Long Island Sound
		M 75-9513		Beach Point Yacht Club	1500	Upland
		I 76-9750		Inside Harbor	300	Bulkhead fill
		M 77-10392		Inside Harbor	200	Upland (non-wetland)
		M 79-10919		Inside Harbor	5000	Upland (non-wetland)
		M 77-5791	Long Island Sound	Mill Cove	8500	Dumping Ground
		M 77-10113		Outlet from Playland Lake	6000	Upland
		I 78-10460		Rye and Portchester (Sew. line installation)	10000	Upland
		I 79-11193		Rye (create a ±1 acre tidal pond)	11500	Adjacent fill
		M 63-6595	Milton Harbor	Inside Milton Harbor	600	Open, off Port Chester
		M 66-7207		Inside Milton Harbor	Not specified	Upland
		M 67-7517		Inside Milton Harbor	1200	Open water
		M 67-7518		Inside Milton Harbor	500	Stamford Dumping Ground
	Glenville	I 59-5820	Byram River	Byram River	12000	Bulkhead fill
		M 63-6718		Port Chester Harbor	2000	Upland
		M 63-6722		Port Chester Harbor	2500	Adjacent upland
		I 67-7413		Byram Point	400	Open water
		M 67-7538		Byram River	17000	Open water
		M 69-7848		Byram River	12388	Upland
		I 72-8415		Byram River	1000	Bulkhead fill
		M 73-8830		Port Chester Harbor	7000	Upland
		M 73-9814		Byram River	475	Upland

TABLE B-2 (Continued)

LONG ISLAND SOUND NEW YORK AREA	USGS QUADRANGLE	PERMIT YEAR AND NO. (CORPS OF ENGINEERS)	WATERWAY	DREDGING LOCATION	VOLUME (CU.YD.)	DISPOSAL METHOD
NASSAU COUNTY	Sea Cliff	I 59-5724	Manhasset Bay	Private boatslips	Est. 32700	Bulkhead fill
		M 60-6027		Private maintenance	1800	Adjacent upland
		I 64-6753		Boat slips	3000	Long Island Sound
		I 64-6769 -6774		Boat dock near Thoms Point	3000	Eatons Neck Dumping Ground
		M 65-7032		Boat dock channel	6800	Eatons Neck Dumping Ground
		I 65-7102		Commercial area	Not specified	Bulkhead fill
		I 67-7423		Boat slips	6000	Eatons Neck Dumping Ground
		I 67-7505		Town park and Marina	70000	Upland, Long Island Sound & Bulkhead fill
		I 67-7506		Boat slips	250	Eatons Neck Dumping Ground
		I 67-7597		Boat slips	3000	Eatons Neck Dumping Ground
		I 68-7718		Boat slips	2000	Adjacent bulkhead fill
		M 74-8874		Tanker docking at utility plant	1200	Mud dump
		M 77-10415		Town's dock	2000	Upland (non-wetland)
		I 78-10506		Boat docking	4500	Upland (non-wetland)
		I 79-11007		Local small boat marina	30	Bulkhead fill
		I 79-11062		Stormwater outfall	200	Adjacent upland
		I 61-6148	Glen Cove Creek	Glen Cove Marina	15000	Upland
		I 62-6398		Treatment Plant	10000	Upland
		I 64-6768		Sewage Treatment Plant	1500	Eatons Neck Dumping Ground
		M 65-6976		Sea Cove Marina	Not specified	Adjacent upland
		M 67-7422		Sea Cove Marina	2434	Adjacent upland
		I 68-6981A		Glen Cove Yacht Club	35000	Not specified
		M 60-5966	Hempstead Harbor	Roslyn Marine Corp.	6' below MLW	Upland
		M 60-5974		Sea Cliff Yacht Club	3000	Along shore of Sea Cliff
		I 60-6084		Roslyn Boat Club	5700	Upland
		M 61-6270		Tide Water Oil Co. Plant (Roslyn)	7880	Eatons Neck Dumping Ground
		I 64-6784		Tappen Beach	170000	Upland

TABLE B-2 (Continued)

LONG ISLAND SOUND NEW YORK AREA	USGS QUADRANGLE	PERMIT YEAR AND NO. (CORPS OF ENGINEERS)	WATERWAY	DREDGING LOCATION	VOLUME (CU.YD.)	DISPOSAL METHOD
NASSAU COUNTY	Sea Cliff	I 66-7329	Hempstead Harbor	Glenwood Landing	1000	Bulkhead fill
		I 66-7350		Roslyn	3000	Upland
		I 68-7613		Roslyn	400-600	Dumping Ground
		I 68-7708		Downstream of Roslyn viaduct	50000	Dumping Ground
		I 71-8283		Sands Point	1600	Bulkhead fill
		I 72-8573		Port Washington	4000	Upland
		I 73-8630		Port Washington	4000	Upland
		M 75-9489		Glen Cove Creek	300	Upland
		I 78-10751		Glenwood Landing	17500	Upland (non-wetland)
		M 78-10775		Glen Cove Creek	600	Stored upland temporarily and reused in asphalt operation
		I 67-7501	Long Is. Sound	Kings Point	36000	Bulkhead fill
		M 77-10234		East Creek, Sands Point	12000	Beach, west of the project
	Bayville	I 72-8570	Long Is. Sound	Peacock Pt. (Locust Valley)	1200	Dumping Ground
	Hicksville	I 66-7213	Long Is. Sound	Dosovis (Glen Cove)	3' below MLW	Bulkhead fill

TABLE B-2 (Continued)

LONG ISLAND SOUND NEW YORK AREA	USGS QUADRANGLE	PERMIT YEAR AND NO. (CORPS OF ENGINEERS)	WATERWAY	DREDGING LOCATION	VOLUME (CU.YD.)	DISPOSAL METHOD
SUFFOLK COUNTY	Lloyd Harbor	M 59-5707	Huntington Bay	West Neck, Lloyd Harbor	25' below MLW	Salable, backfill or beach nourishment
		I 60-6034		Eatons Point	25' below MLW	Salable and backfill
		I 61-6131		Wyncote Club, Huntington Harbor	10500	Upland
		I 61-6143		Huntington Harbor Boat Club	75	Bulkhead fill
		I 61-6155		Lloyd Harbor	20' below MLW	Salable and backfill
		I 61-6204		Knutson Marina, Huntington Harbor	25000	Backfill or other purposes
		I 61-6351		Huntington Harbor	500000	Upland
		I 65-6968		Halesite Marina, Huntington Harbor	4000	Backfill
		I 67-7435		Halesite Marina, Huntington Harbor	2000	Backfill
		I 68-7730		Centerport Harbor	175000	Long Island Sound
		I 69-7872		Huntington Harbor Yacht Club	5500	Backfill
		M 72-8568		Halesite, Huntington Harbor	650	Upland
		M 75-9155		Wyncote Club, Huntington Harbor	240	Backfill
		M 75-9389		Huntington Harbor Yacht Club	200	Upland
		M 76-9664		Huntington Harbor Boat Club	3000	Upland
		M 76-9709		Halesite Marine, Huntington Harbor	400	Upland
		M 76-9729		Upland and interfacial area	2000	Sand city, beach
		I 79-11047		Knutson Marina, Huntington Harbor	600	Upland for construction
		M 79-11048		Huntington Harbor	600	Upland
		M 68-7779	Long Is. Sound	Eatons Neck, Coast Guard Station	15000	Dumping ground, 3 mile N. of Huntington Bay
		M 73-8971		Eatons Neck, Coast Guard Station	10000	Dumping ground, 3 mile N. of Huntington Bay
		M 76-9730		Eatons Neck, Coast Guard Station	16000	Beach nourishment

TABLE B-2 (Continued)

LONG ISLAND SOUND NEW YORK AREA	USGS QUADRANGLE	PERMIT YEAR AND NO. (CORPS OF ENGINEERS)	WATERWAY	DREDGING LOCATION	VOLUME (CU.YD.)	DISPOSAL METHOD
SUFFOLK COUNTY	Northport	I 62-6462	Northport Harbor	Marina	3500	Long Island Sound
		M 63-6581		Marina	2000	Long Island Sound
		M 63-6730		Marina	7000	Long Island Sound
		I 64-6801		Docks and slips	1200	Long Island Sound
		M 68-7617		Marina	7500	Long Island Sound
		M 76-9711		Town Marina	1000	Upland (non-wetland)
		M 79-10643		Marina	2500	Adjacent upland (non-wetland)
		I 59-5872	Northport Bay	Steer Channel	700000	Adjacent upland
		M 60-597		Eaton's Neck	3000	Beach nourishment
		M 60-6004		Steer Channel	Not specified	Upland
		M 65-7040		Steer Channel	19250	Upland (non-wetland)
		I 66-7251		Docking area	30000	Long Island Sound
		M 77-10248		Middle of the bay	6000	Sand city, beach nourishment
		M 77-10285		Middle of the bay	1100	Sand city, beach nourishment
		M 62-6531	Long Island Sound	Asharoken Beach	600000	Adjacent beach nourishment
		M 66-7310		Northport	2000	Upland
		I 68-7732		Eaton's Neck, Asharoken	10' below MLW	Adjacent upland, bulkhead fill
		M 71-8313		Asharoken Beach (LILCO)	35000	Upland
		M 76-9695		Northport (LILCO)	10000	West of cooling channel
		M 76-9893		Asharoken Beach (LILCO)	54000	Nearby beach nourishment
	Mattituck Hills	I 60-6012	Mattituck Creek	Marina	500	Bulkhead fill
		I 62-6452		Boat dock	500	Adjacent upland
		I 65-6971		Boat basin	20000	Bulkhead fill
		M 66-7335		Boat channel	17500	Adjacent upland
		I 66-7366		Boat basin	5000	Bulkhead fill
		M 76-9900		Marina	50	Upland (non-wetland)
		I 78-10798		Boat basin	100	Bulkhead fill

TABLE B-2 (Continued)

LONG ISLAND SOUND NEW YORK AREA	USGS QUADRANGLE	PERMIT YEAR AND NO. (CORPS OF ENGINEERS)	WATERWAY	DREDGING LOCATION	VOLUME (CU.YD.)	DISPOSAL METHOD
SUFFOLK COUNTY	Mattituck Hills	M 79-11008	Mattituck Creek	Boat basin	2000	Upland
	Port Jefferson	I 59-5709	Port Jefferson Harbor	Boatyard	347000	Bulkhead fill
		I 60-5185 -5977		Town Marina	25000	Bulkhead's upland fill
		I 60-5973		Strong's Neck	5833	Upland
		I 60-6049		Webb and Knapp Marina	18000	Sandhole
		M 60-6107		Marina	5000	Local upland fill
		M 61-6181		Tanker basin (LILCO)	50000	Long Island Sound
		I 61-6335		Strong's Neck	300	Backfill
		M 63-6675		Tanker basin (LILCO)	57650	Long Island Sound
		I 63-6703		Mclain Dock	2000	Long Island Sound
		M 64-6803		Ferry boat dock	1000	Sandhole
		M 66-7246		Tanker basin (LILCO)	2500	Long Island Sound
		I 66-7327		Marina	7200	Bulkhead fill
		M 67-7462		Ferry boat slip	3000	Upland
		M 67-7528		West side of harbor (Swery Oil)	1500	Sandhole
		M 68-7614		Inside harbor	11000	Sandhole
		M 68-7615		West of harbor	6000	Sandhole
		M 68-7744		Tanker basin (LILCO)	Large (not specified)	Long Island Sound
		M 72-8467		Town marina	800	Upland
		I 75-7614		Town boat ramp	1300	Bulkhead fill
		I 76-9842		Town marina	3200	Bulkhead fill
		I 67-7516	Long Island Sound	No. of Cedar Beach	100000	Salable, backfill
		M 75-9504		Mt. Sinai Harbor	30000	Beach nourishment, east of the harbor entrance
		M 76-9633		Mt. Sinai Harbor	5000	Nearby beach nourishment

TABLE B-2 (Continued)

LONG ISLAND SOUND NEW YORK AREA	USGS QUADRANGLE	PERMIT YEAR AND NO. (CORPS OF ENGINEERS)	WATERWAY	DREDGING LOCATION	VOLUME (CU.YD.)	DISPOSAL METHOD
SUFFOLK COUNTY	Northport and Saint James	I 60-8110	Smithtown Bay	Long Beach Yacht Club	70000	Adjacent marshland
		M 61-5444A		Small boat channel	766000	Local fill and beach nourishment
		M 65-6960 -6964		Near Porpoise Channel	207100	Upland disposal in harbor
		M 70-8174		Nissequogue River	42000	Beach nourishment
		I 71-8294		Sunken Meadow	200000	Beach nourishment
	St. James	I 60-5936	Long Island Sound	6000' west of Old Field light house	12' below MLW	Salable, commercial use
		M 75-9512		West Meadow Creek	100	Upland
		M 79-10899		Nissequogue River	35000	North and adjacent to Short Beach
		M 79-11085		Stony Brook Harbor	375	East of dredge site, beach nourishment
	Wading River	I 68-7695	Long Island Sound	Inlet Channel (LILCO)	6500	Upland
		I 68-7738		Inlet Channel (LILCO)	35000	Upland
		I 68-7743		Wading River and Long Island Sound	400000	Wading River, beach nourishment
	Southhold	M 75-9353	Long Island Sound	Goldsmith Inlet	1500	N.E. of the inlet as beach nourishment
		M 79-10986		Little Creek	400	Upland
	Middle Island	I 75-9304	Long Island Sound	Shoreham Nuclear Power Station (LILCO construction)	Not specified	Adjacent beach nourishment

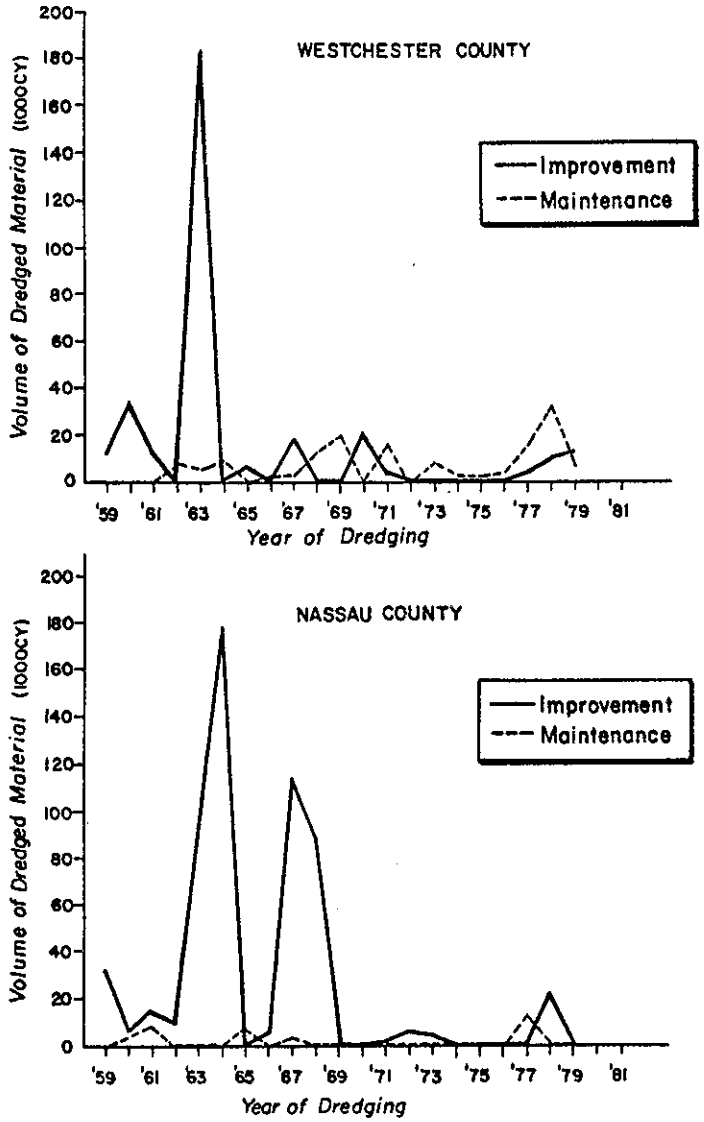

FIGURE B-1 NON-FEDERAL DREDGING IN WESTCHESTER AND NASSAU COUNTIES (1959-1979)

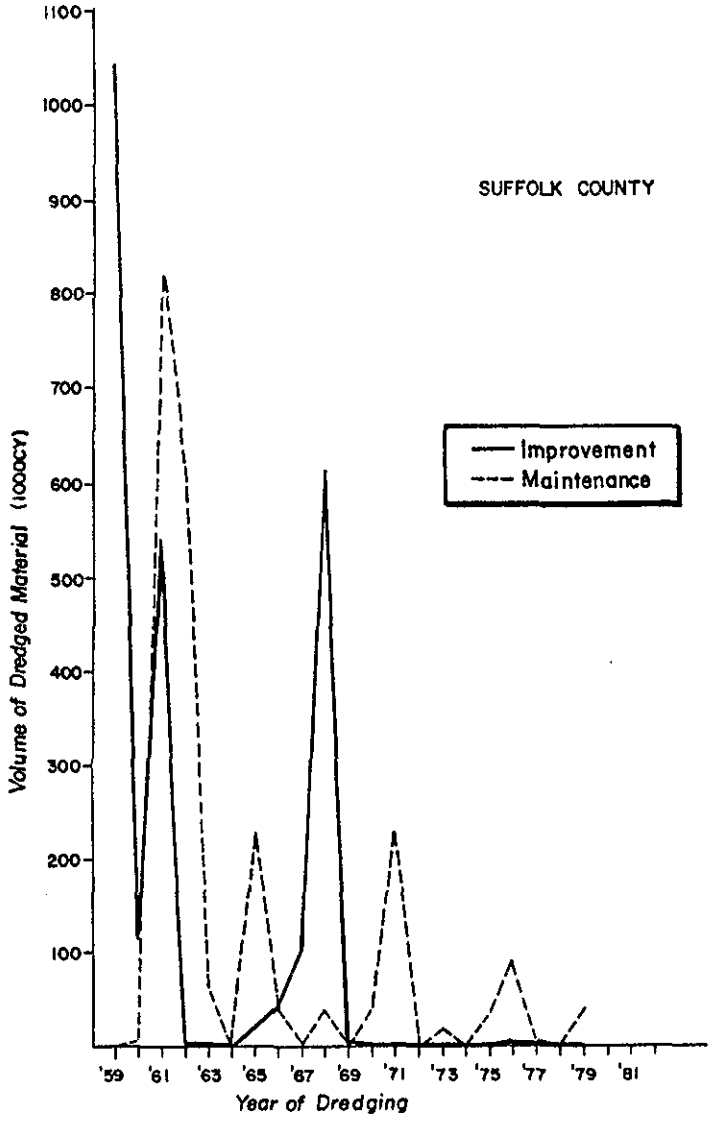

FIGURE B-2 NON-FEDERAL DREDGING IN SUFFOLK COUNTY (1959-1979)

APPENDIX C

CALCULATION OF SECONDARY CRITERIA POINTS

C.01 The planning process includes a detailed look at each of the preliminary sites to determine suitability based on specific locational data. Step 3 of the siting method attempts to rank selected alternatives in order of desirability. The following factors were incorporated in determining criteria points for each alternative site.

1. PROXIMITY OF SITE TO SIGNIFICANT ECOLOGICAL AREAS

C.02 Distances between potential shoreline extension containment sites and ecological areas are important from two standpoints: 1) potential adverse impacts from construction activities, and 2) impacts from potential leachate and dewatering effluent from the facility. While distances in this case indicate downdrift directions, points should be allotted regardless of dominant local currents, to approximate worst case conditions. Points are assigned based on the following categories:

A. Shellfish Beds (distance in miles)

0 to 1 mile (radius)	:	0 points
1 to 3 miles	:	1 "
Greater than 3 miles	:	2 "

B. Lobster Locations (distance in miles)

0 to 1 mile (radius)	:	0 points
1 to 3 miles	:	1 "
Greater than 3 miles	:	2 "

C. Finfish Concentrations (distance in miles)

0 to 2 miles	:	0 points
2 to 5 miles	:	1 "
Greater than 5 miles	:	2 "

D. Waterfowl Areas (distance in miles)

0 to 2 miles	:	0 points
2 to 5 miles	:	1 "
Greater than 5 miles	:	2 "

E. Wetland Areas (distance in miles)

0 to 1/2 mile	:	0 points
1/2 to 1 mile	:	1 "
Greater than 1 mile	:	2 "

Total points for categories A through E for each alternative site and record (maximum of 10 points available).

2. BATHYMETRY OF SITE/AVAILABLE VOLUME

C.03 Average water depth, bottom slope, and available surface area together determine the total estimated capacity of a containment facility, including room for future expansion. The limits of available surface area of a potential site are defined by: (1) navigation channels, (2) adjacent shoreline/harbor shapes, (3) shorefront width of the public site, and (4) other restrictions due to non-compatibility with adjacent land use or ecological habitats. For purposes of ranking alternative sites, the 20 ft. MLW depth contour is defined as the offshore limit of the containment area. Points are assigned based on the following categories:

A. Available Containment Volume Below MSL (cu. yards)

Less than 300,000	:	0 points
300,000 - 600,000	:	1 "
600,000 - 900,000	:	2 "
900,000 - 1,200,000	:	3 "
1,200,000 - 1,500,000	:	4 "
1,500,000 - 1,800,000	:	5 "
1,800,000 - 2,100,000	:	6 "
2,100,000 - 2,400,000	:	7 "
2,400,000 - 2,700,000	:	8 "
2,700,000 - 3,000,000	:	9 "
More than 3,000,000	:	10 "

Total points for category A and record (maximum of 10 points available).

3. EXPOSURE CONSIDERATIONS

C.04 Exposure considerations include wave energy, shoreline erosion potential, flooding potential, and existence of endangered structures. As previously discussed, high wave energy will significantly increase the cost of construction and maintenance of the containment facility. Construction of a shoreline extension facility in a region of critical shoreline erosion potential (mainly open beaches) is also undesirable because of the potential creation of severe downdrift erosion, and undermining of the dikes. The size and cost of containment structures in areas of severe flooding potential will increase substantially if the site is to be designed as safe for structures or other uses. The existence of endangered structures or historically high flood loss indicates the potential for a containment facility to serve as a buffer zone. Based on the following sub-criteria, the site is ranked on a scale of 0 to 10 according

to conditions within one mile on either side of the site:

A. Wave Energy

low	:	3 points
moderate	:	2 "
high	:	0 "

B. Critical Erosion Area (percent of shoreline)

0 to 10%	:	3 points
10% to 25%	:	2 "
Over 25%	:	0 "

C. Flooding Potential

Not in flood plain	:	2 points
In flood plain	:	0 "

D. Endangered Structures (combined present value)

$0 to $ 10,000	:	0 points
$10,000 to $100,000	:	1 "
Over $100,000	:	2 "

Total points for categories A through D and record (maximum of 10 points available).

4. SOIL/FOUNDATION CHARACTERISTICS OF SITE

C.05 As previously discussed in Section 3, the sediment characteristics at a given location may have a significant effect on: (1) design

and cost of containment dikes, (2) structural stability of containment areas for reuse as a foundation for buildings, and (3) leachate potential into groundwater. (Also of concern is the characteristics of dredged sediment to be contained, which is included under criteria #6). The following categories are included:

A. Soil/Sediment Physical Characteristics (USCS classification)

PT, OH, CH, MH, OL, CL, ML	:	0 points
SM, SC	:	3 "
SP, SW, GC	:	6 "
GM, GP, GW	:	9 "

B. Permeability (relative diffusivity)

High	:	0 points
Low	:	1 "

Total points for categories A and B and record (maximum of 10 points available).

5. EXISTING AND POTENTIAL LAND USE

C.06 Land use adjacent to the alternative site and within a one mile radius of the site is used to determine compatability and potential adverse impact. Points are assigned based on the following categories:

A. Residential Use (presence of)

No residential use in area	:	2 points
Residential use inland only	:	1 "
Residential use on shoreline within radius	:	0 "

B. Recreational Use (presence of)

No recreational use in area	:	2 points
Recreational use inland only	:	1 "
Recreational use on shoreline within radius	:	0 "

C. Commercial Use (presence of)

Water-related commercial use	:	2 points
Commercial use inland only	:	1 "
Non-water-related commercial use on shoreline within radius	:	0 "

D. Industrial Use (presence of)

Industrial use adjacent to site	:	2 points
Industrial use within area	:	1 "
No industrial use in area	:	0 "

E. Open Space (presence of)

Open space adjacent to site	:	2 points
Open space in area	:	1 "
No open space within radius	:	0 "

Total points for categories A through E and record for each alternative (maximum of 10 points available).

6. VOLUME AND TYPES OF DREDGED MATERIAL AVAILABLE FOR CONTAINMENT

C.07 Proximity of the containment site to areas where major dredging

is projected to occur, as well as consideration of the volumes of dredged material suitable for containment (or for other purposes), can significantly influence site desirability. Criteria Points are assigned to alternative sites based on: (1) barge distance from site to major dredging locations, and (2) volume of material at major dredge sites suitable or desirable for containment. For the preliminary siting analysis, an estimate of the percentage of projected dredged material expected to be used for beach nourishment was made based on historic information (Appendices A and B). The remaining projected volume of dredged material was assumed to be desirable for containment. This criterion could be modified to consider in more detail the reuse potential of dredged material in a rehandling facility. However, much more detailed data on material characteristics and a Market User's Survey would be required before such criteria could be established.

C.08 A modified gravity model is used to determine the relative attractiveness or importance of the dredge site/disposal combinations. The importance factor also relates to transport costs on the basis of cubic yards of material per mile. The gravity model states:

$$F = K \frac{I_d I_c}{D^2}$$

where:

F = force of attraction
K = a constant
I = importance value for dredging (d) and containment (c) sites
D = distance between the two

C.09 For this study, the gravity model is modified to reflect specific conditions. First, the importance value for containment sites (I_c) are

considered to be constant in all cases, assuming only one site will be used for all dredge spoil containment. The term I_c, therefore, assumes a role as a constant, K. The distance factor in this case is represented by miles travelled by a barge and is linear; the squared term is removed from the denominator and D is doubled to reflect barge travel in two directions. Because the exercise seeks only relative values and the constant K will remain the same in all cases, it is removed from the right-hand term. The result is an equation which represents the number of cubic yards of material per mile expected to travel between two given points:

$$F = \frac{V}{2D}$$

where:

V = average annual volume of material requiring containment disposal

F and D = as before

A matrix table is constructed which indicates, for each alternative site, the corresponding distances to major dredging locations and available volumes for containment. The table headings appear as below:

Dredging Locations	Volume(V) for Containment	Distances(D) to Sites	Attraction V/2D for Sites

To determine the point spread for the alternative sites, assign 10 points to the location recording the largest total attraction, and 0 points for the smallest total. Points for the remaining sites are interpolated between these two extremes. Record the allotted points (maximum of 10 points available).

7. COMPATIBILITY WITH ADJACENT LAND/REUSE POTENTIAL

C.10 Conversion of a newly-constructed shoreline extension site to a secondary use (industrial/commercial/recreational) would enhance the economic benefits of the plan. The potential for reuse of the containment facility, or parts thereof, is considered here in four categories:

A. Docking Facilities (presence of)

Existing industrial docking facilities	:	2 points
Existing small boat facilities	:	1 "
No access by water	:	0 "

B. Access by Land (presence of)

Existing major roadway	:	3 points
Existing secondary roadway	:	2 "
Easements only, no structure	:	1 "
No access by land	:	0 "

C. Types of Industrial/Commercial Uses (presence of)

Existing water-related use	:	3 points
Non-water related indust/comm. use	:	1 "
No indust/comm. use in area	:	0 "

D. Area-Wide Plan (provision for industrial/commercial/recreational use)

Adjacent to site	:	2 points
Within area of alternative site	:	1 "
Not provided	:	0 "

Total points for categories A through D for each alternative and record (maximum of 10 points available).

8. PROXIMITY OF SITE TO CULTURAL RESOURCES

C.11 Cultural resources should be avoided in siting the containment facility to minimize potential construction damage and noise or related operation impacts on a resource that is used by the public. An exception would be a cultural site currently threatened by erosion which might benefit from shoreline protection. Points are allotted as follows:

A. Cultural Resources (distance in miles)

Submerged within area	:	0 points
On adjacent shoreline	:	1 "
Within 2-mile radius	:	5 "
Greater than 2-mile radius	:	10 "

Total points for each alternative and record (maximum of 10 points available).

9. USE OF SITE FOR EXISTING OR HISTORIC DREDGED MATERIAL DISPOSAL

Locating a dredged material containment facility at a site that has already been used for spoil disposal may have certain advantages. There may already be structures in the vicinity which have disturbed the natural setting. Using such an area would avoid impacting an otherwise undisturbed shoreline. In addition, the precedence set by earlier disposal may ameliorate future containment structures and disposal. Points are allotted within two categories:

A. Use of Material Previously Disposed

Containment of contaminated material	:	7 points
Material Rehandling Facility	:	6 "
Construction fill	:	4 "
Primarily beach nourishment	:	0 "

B. Volume of Material Previously Disposed (maximum in cu. yards)

More than 500,000	:	3 points
200,000 to 500,000	:	2 "
50,000 to 200,000	:	1 "
Less than 50,000	:	0 "

Total points for categories A and B for each alternative and record (maximum of 10 points available).

C.12 The results of this exercise should be recorded in the columns of a summary matrix table. Calculations within that table may then proceed for determining the ranking of alternative sites.

A P P E N D I X D

SITE-SPECIFIC DATA FOR SCREENED ALTERNATIVE SITES

Table D-1

LIST OF QUAD MAP NUMBERS AND NAMES FOR LIS
(Refer to Figure 4-2)

Quad No.	Quad Name	Quad No.	Quad Name
1.	Flushing	19.	Sherwood Point
2.	Sea Cliff	20.	Mattituck Hills
3.	Hicksville	21.	Southold
4.	Huntington	22.	Greenport
5.	Mt. Vernon	23.	Westport
6.	Mamaroneck	24.	Bridgeport
7.	Bayville	25.	Milford
8.	Lloyd Harbor	26.	Woodmont
9.	Northport	27.	Orient
10.	Saint James	28.	Plum Island
11.	Port Jefferson	29.	New Haven
12.	Middle Island	30.	Branford
13.	Wading River	31.	Guilford
14.	Riverhead	32.	Clinton
15.	Mattituck	33.	Essex
16.	Glenville	34.	Old Lyme
17.	Stanford	35.	Niantic
18.	Norwalk South	36.	New London
		37.	Mystic

Siting Criteria

Name: U.S. Naval Reserve County: Nassau Map # A Location# 1-3

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 2 miles
   b. Lobster Locations: 3 miles
   c. Finfish Concentrations: 2 miles
   d. Waterfowl Areas: 4 miles
   e. Wetland Areas: 1 miles
   f. Water Quality Conditions: poor/fair/good

3. Bathymetry
   a. Nearshore Slope: 65 ft/mile
   b. Available Surface Area: 50 acres
   c. Available Volume Below MSL: 875,000 cu. yards

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) two pier located on site
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: coarse sand
      or USCS Classification:
   b. Permeability: > 6.0 in/hr

6. Existing and Projected Land Use (within 1 mile radius of site)
   a. Residential: 40 % 50 %
   b. Recreational: 40 % 40 %
   c. Commercial: % %
   d. Industrial: % %
   e. Wetlands: % %
   f. Public: % %
   g. Open Space: 10 % 0 %
   h. Agricultural: % %
   i. institutional: 10% 10 %

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: 76 % Land 24% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 13,200 - 34,500 cy/yr
      Within Surrounding Quads: 60,000 - 265,900 cy/yr
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) (military)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space) (institutional)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities) LIS
   e. Access by Land: (roads/bridges) local
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) increase residential
      (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: 2 miles 13 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: U.S. Merchant Marine Acad. County: Nassau Map # A Location# 1-4

1. **Shorefront Ownership and Shorefront Disposal Sites**
   a. Site Ownership: (Federal, State, County, Town, Private)

2. **Proximity of Site to Significant Ecological Areas**
   a. Shellfish Beds: 3 miles
   b. Lobster Locations: 5 miles
   c. Finfish Concentrations: 1 miles
   d. Waterfowl Areas: 2 miles
   e. Wetland Areas: 3 miles
   f. Water Quality Conditions: poor/fair/good

3. **Bathymetry**
   a. Nearshore Slope: 57 ft/mile
   b. Available Surface Area: 65 acres
   c. Available Volume Below MSL: 2,400,000 cu. yards

4. **Exposure Considerations** (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) series of long docking piers
   e. Cost of Flood Damages: (high/medium/low)

5. **Soil/Foundation Characteristics**
   a. Soil/Sediment Physical Characteristics: coarse to fine sand
      or USCS Classification:
   b. Permeability: 0.6 – 2.0 inches/hr

6. **Existing and Projected Land Use** (within 1 mile radius of site)
   a. Residential: 40 % 45 %
   b. Recreational: 40 % 40 %
   c. Commercial: 5 % 5 %
   d. Industrial: % %
   e. Wetlands: % %
   f. Public: % %
   g. Open Space: 5 % 0 %
   h. Agricultural: % %
   Institutional: 10 10

7. **Volume and Types of Dredged Material Available for Containment**
   a. Present Disposal Method: 8% land 92% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 48,700 - 231,300 cy/yr
      Within Surrounding Quads: 64,600 - 279.2 cy/yr.
   c. General Characteristics of Material (Phys-chem):

8. **Compatability with Adjacent Land/Re-use Potential**
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) institutional
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities) Manhasset Bay
   e. Access by Land: (roads/bridges) local
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) increase in residential
      (market for re-use of dredged material)

9. **Proximity to Cultural Resources**
   a. Cultural: 3 miles 10 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. **Existing and Historical Spoil Disposal Location**
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: Fort Totten Military Reser County: Queens Map # A Location# 1-5

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 5 miles
   b. Lobster Locations: 7 miles
   c. Finfish Concentrations: 3 miles
   d. Waterfowl Areas: 0 miles
   e. Wetland Areas: 2 miles
   f. Water Quality Conditions: poor/fair/good

3. Bathymetry
   a. Nearshore Slope: 10 ft/mile
   b. Available Surface Area: 200 acres
   c. Available Volume Below MSL: 2,345,000 cu. yards

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) none
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: coarse to fine sand
      or USCS Classification:
   b. Permeability: .6 - 2.0 in/hr

6. Existing and Projected Land Use (within 1 mile radius of site)
   a. Residential: 45 % %
   b. Recreational: 25 % %
   c. Commercial: % %
   d. Industrial: % %
   e. Wetlands: % %
   f. Public: % %
   g. Open Space: 10 % %
   h. Agricultural: % %
   Military 20

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: 8% land 92% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 48,700 - 231,300 cy/yr
      Within Surrounding Quads: 64,600 - 279,200 cy/yr
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) military
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities) Little Neck Bay
   e. Access by Land: (roads/bridges) major highway
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation)
      (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: 4 miles 5 10 mile radius
   b. Types: (historical, archaeological, etc.)

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: U.S. Naval Res County: Kings Map # A Location# 1-6

1. **Shorefront Ownership and Shorefront Disposal Sites**
   a. Site Ownership: (Federal, State, County, Town, Private)

2. **Proximity of Site to Significant Ecological Areas**
   a. Shellfish Beds: 5 miles
   b. Lobster Locations: 10 miles
   c. Finfish Concentrations: 2 miles
   d. Waterfowl Areas: 2 miles
   e. Wetland Areas: 3 miles
   f. Water Quality Conditions: poor/fair/good

3. **Bathymetry**
   a. Nearshore Slope: 35 ft/mile
   b. Available Surface Area: 120 acres
   c. Available Volume Below MSL: 450,370 cu. yards

4. **Exposure Considerations** (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) 2 piers
   e. Cost of Flood Damages: (high/medium/low)

5. **Soil/Foundation Characteristics**
   a. Soil/Sediment Physical Characteristics: fine sand
      or USCS Classification:
   b. Permeability: 2-6.0 in/hr

6. **Existing and Projected Land Use** (within 1 mile radius of site)
   a. Residential: 35 % %
   b. Recreational: 30 % %
   c. Commercial: 5 % %
   d. Industrial: % %
   e. Wetlands: % %
   f. Public: % %
   g. Open Space: 20 % %
   h. Agricultural: % %
   Institutional 10

7. **Volume and Types of Dredged Material Available for Containment**
   a. Present Disposal Method: 8% land 92% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 48.7K-231.3K cy/yr
      Within Surrounding Quads: 64,600-279,200 cy/yr
   c. General Characteristics of Material (Phys-chem):

8. **Compatability with Adjacent Land/Re-use Potential**
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) military
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities) East River
   e. Access by Land: (roads/bridges) local
   f. Area-wide Plan: (industrial/commercial expansion) (need for recreation) & residential (market for re-use of dredged material)

9. **Proximity to Cultural Resources**
   a. Cultural: 3 miles 9 10 mile radius
   b. Types: (historical, archaeological, etc.)

10. **Existing and Historical Spoil Disposal Location**
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: — CY

Siting Criteria

Name: U.S. Military reser. County: Bronx Map # A Location# 1-7

1. **Shorefront Ownership and Shorefront Disposal Sites**
   a. Site Ownership: (Federal, State, County, Town, Private)

2. **Proximity of Site to Significant Ecological Areas**
   a. Shellfish Beds: 4 miles
   b. Lobster Locations: 7 miles
   c. Finfish Concentrations: 2 miles
   d. Waterfowl Areas: 4 miles
   e. Wetland Areas: 2 miles
   f. Water Quality Conditions: poor/fair/good

3. **Bathymetry**
   a. Nearshore Slope: 88 ft/mile
   b. Available Surface Area: 86 acres
   c. Available Volume Below MSL: 2,185740 cu. yards

4. **Exposure Considerations** (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.)
   e. Cost of Flood Damages: (high/medium/low)

5. **Soil/Foundation Characteristics**
   a. Soil/Sediment Physical Characteristics: fine sand
      or USCS Classification:
   b. Permeability: 2-6 in/hr

6. **Existing and Projected Land Use** (within 1 mile radius of site)
   a. Residential: 35 % %
   b. Recreational: 5 % %
   c. Commercial: % %
   d. Industrial: 10 % %
   e. Wetlands: % %
   f. Public: % %
   g. Open Space: % %
   h. Agricultural: % %
   i. institution: 50

7. **Volume and Types of Dredged Material Available for Containment**
   a. Present Disposal Method: 8% land 92% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 48,700 - 231,300 cy/yr
      Within Surrounding Quads: 64,600 - 279,200 cy/yr
   c. General Characteristics of Material (Phys-chem):

8. **Compatability with Adjacent Land/Re-use Potential**
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) Military
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space) Island
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities) LIS
   e. Access by Land: (roads/bridges) none
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation)
      (market for re-use of dredged material)

9. **Proximity to Cultural Resources**
   a. Cultural: 1 miles 10 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. **Existing and Historical Spoil Disposal Location**
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

N.Y.S. Merchant Marine Academy

Siting Criteria

Name: N.Y.S. Merchant Marine Academy County: Queens Bronx Map # A Location# 2-6

1. **Shorefront Ownership and Shorefront Disposal Sites**
   a. Site Ownership: (Federal, State, County, Town, Private)

2. **Proximity of Site to Significant Ecological Areas**
   a. Shellfish Beds: 5 miles
   b. Lobster Locations: 10 miles
   c. Finfish Concentrations: 2 miles
   d. Waterfowl Areas: 5 miles
   e. Wetland Areas: 3 miles
   f. Water Quality Conditions: poor/fair/good

3. **Bathymetry**
   a. Nearshore Slope: 40 ft/mile
   b. Available Surface Area: 100 acres
   c. Available Volume Below MSL: 5,170,000 cu. yards

4. **Exposure Considerations** (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) Throgs Neck Bridge structure in area of site
   e. Cost of Flood Damages: (high/medium/low)

5. **Soil/Foundation Characteristics**
   a. Soil/Sediment Physical Characteristics: fine sand
      or USCS Classification:
   b. Permeability: 2-6 in/hr

6. **Existing and Projected Land Use** (within 1 mile radius of site)
   a. Residential: 70 % %
   b. Recreational: % %
   c. Commercial: % %
   d. Industrial: % %
   e. Wetlands: % %
   f. Public: % %
   g. Open Space: 20 % %
   h. Agricultural: % %
   i. institutional 10%

7. **Volume and Types of Dredged Material Available for Containment**
   a. Present Disposal Method: 8% land 92% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 48,700 - 231,300 cy/yr
      Within Surrounding Quads: 64,600 - 279,200 cy/yr
   c. General Characteristics of Material (Phys-chem):

8. **Compatability with Adjacent Land/Re-use Potential**
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) institutional
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space) open water area
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) none
   d. Access by Water: (channels, docking facilities) LIS & East River
   e. Access by Land: (roads/bridges) local
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation)
      (market for re-use of dredged material)

9. **Proximity to Cultural Resources**
   a. Cultural: 3 miles 9 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. **Existing and Historical Spoil Disposal Location**
    a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
    b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
    c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: Mill Dam View Park County: Suffolk Map # A Location# 3-18

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 3 miles
   b. Lobster Locations: 5 miles
   c. Finfish Concentrations: 6 miles
   d. Waterfowl Areas: 2 miles
   e. Wetland Areas: 1.5 miles
   f. Water Quality Conditions: poor/fair/good

3. Bathymetry
   a. Nearshore Slope: 70 ft/mile
   b. Available Surface Area: 6 acres
   c. Available Volume Below MSL: 50,000 cu. yards

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: inland of site %
   d. Endangered Structures: (buildings, homes, jetties, etc.) none
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: sand-gravel
      or USCS Classification:
   b. Permeability: 6.0 in/hr

6. Existing and Projected Land Use (within 1 mile radius of site)

a. Residential:	50 %	70 %	f. Public:	%	%
b. Recreational:	10 %	10 %	g. Open Space:	15 %	0 %
c. Commercial:	10 %	10 %	h. Agricultural:	%	%
d. Industrial:	5 %	0 %	i. INSTITUTIONAL:	10%	10%
e. Wetlands:	%	%			

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: 80% Land 20% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 19,300 - 44,700 cy/yr
      Within Surrounding Quads: 29,200 - 115,500 cy/yr
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) sewage disposal site
   d. Access by Water: (channels, docking facilities) Huntington Harbor
   e. Access by Land: (roads/bridges) local
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) need for residential
      (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: 5 miles 6 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: Morgan Memorial Park County: Nassau Map # A Location# 3-24

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 6 miles
   b. Lobster Locations: 3.5 miles
   c. Finfish Concentrations: 1.5 miles
   d. Waterfowl Areas: 2.0 miles
   e. Wetland Areas: 3.0 miles
   f. Water Quality Conditions: poor/fair/good

3. Bathymetry
   a. Nearshore Slope: 127 ft/mile
   b. Available Surface Area: 35 acres
   c. Available Volume Below MSL: 488,890 cu. yards

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low) 0
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 60 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) piers, Lighthouse
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: coarse sand
      or USCS Classification:
   b. Permeability: 6 in/hr

6. Existing and Projected Land Use (within 1 mile radius of site)

a. Residential:	98 %	95 %	f. Public:	%	%
b. Recreational:	5 %	5 %	g. Open Space:	2 %	0 %
c. Commercial:	%	%	h. Agricultural:	%	%
d. Industrial:	%	%			
e. Wetlands:	%	%			

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: 76% land 24% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 13,200 - 34,500 cy/yr
      Within Surrounding Quads: 62,000 - 265,900 cy/yr
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) institution
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities)
   e. Access by Land: (roads/bridges) local
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation)
      (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: 0 miles 14 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: Garvies Point Reserve County: Nassau Map # A Location# 3-25

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 6 miles
   b. Lobster Locations: 3.5 miles
   c. Finfish Concentrations: 1.5 miles
   d. Waterfowl Areas: 2.0 miles
   e. Wetland Areas: 3.0 miles
   f. Water Quality Conditions: poor/fair/good

3. Bathymetry
   a. Nearshore Slope: 106 ft/mile
   b. Available Surface Area: 32 acres
   c. Available Volume Below MSL: 2,058,300 cu. yards

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) piers
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: coarse sand
      or USCS Classification:
   b. Permeability: 6 in/hr

6. Existing and Projected Land Use (within 1 mile radius of site)

a. Residential:	97 %	98 %	f. Public:	%	%
b. Recreational:	%	%	g. Open Space:	1 %	0 %
c. Commercial:	%	%	h. Agricultural:	%	%
d. Industrial:	%	%	Institutional	2	2
e. Wetlands:	%	%			

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: 76% land, 24% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 13,200 - 34,500 cy/yr
      Within Surrounding Quads: 62,000 - 265,900 cy/hr
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities)
   e. Access by Land: (roads/bridges) Local
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation)
      (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: 0 miles 14 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: Garvies Point Park County: Nassau Map # A Location# 3-26

1. **Shorefront Ownership and Shorefront Disposal Sites**
   a. Site Ownership: (Federal, State, County, Town, Private)

2. **Proximity of Site to Significant Ecological Areas**
   a. Shellfish Beds: 6 miles
   b. Lobster Locations: 4 miles
   c. Finfish Concentrations: 2 miles
   d. Waterfowl Areas: 2.5 miles
   e. Wetland Areas: 2.0 miles
   f. Water Quality Conditions: poor/fair/good

3. **Bathymetry**
   a. Nearshore Slope: 53 ft/mile
   b. Available Surface Area: 58 acres
   c. Available Volume Below MSL: 1,140,000 cu. yards

4. **Exposure Considerations** (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) piers
   e. Cost of Flood Damages: (high/medium/low)

5. **Soil/Foundation Characteristics**
   a. Soil/Sediment Physical Characteristics: Major Coarse sand
      or USCS Classification:
   b. Permeability: 6in/hr.

6. **Existing and Projected Land Use** (within 1 mile radius of site)
   a. Residential: 25 % 25 %
   b. Recreational: 35 % 35 %
   c. Commercial: 0 % 5 %
   d. Industrial: 30 % 30 %
   e. Wetlands: % %
   f. Public: % %
   g. Open Space: 5 % 0 %
   h. Agricultural: % %
   Institutional: 5 % 5 %

7. **Volume and Types of Dredged Material Available for Containment**
   a. Present Disposal Method: 76% land 24% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 13,200 - 34,500 cy/yr
      Within Surrounding Quads: 62,000 - 265,900 cy/yr
   c. General Characteristics of Material (Phys-chem):

8. **Compatability with Adjacent Land/Re-use Potential**
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Uses: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities) creek
   e. Access by Land: (roads/bridges) local
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) - stable -
      (market for re-use of dredged material)

9. **Proximity to Cultural Resources**
   a. Cultural: <.5 miles 14 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. **Existing and Historical Spoil Disposal Location**
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: Little Bay Park County: Queens Map # A Location# 3-39

1. **Shorefront Ownership and Shorefront Disposal Sites**
   a. Site Ownership: (Federal, State, County, Town, Private) city

2. **Proximity of Site to Significant Ecological Areas**
   a. Shellfish Beds: 5 miles
   b. Lobster Locations: 8 miles
   c. Finfish Concentrations: 3 miles
   d. Waterfowl Areas: 1 miles
   e. Wetland Areas: 3 miles
   f. Water Quality Conditions: poor/fair/good

3. **Bathymetry**
   a. Nearshore Slope: 50 ft/mile
   b. Available Surface Area: 132 acres
   c. Available Volume Below MSL: 2,670,000 cu. yards

4. **Exposure Considerations** (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) bridge + piers in site area
   e. Cost of Flood Damages: (high/medium/low)

5. **Soil/Foundation Characteristics**
   a. Soil/Sediment Physical Characteristics: Coarse to fine sand
      or USCS Classification:
   b. Permeability: 0.6 - 6.0 in/hr

6. **Existing and Projected Land Use** (within 1 mile radius of site)
   a. Residential: 55 % %
   b. Recreational: 20 % %
   c. Commercial: 5 % %
   d. Industrial: 5 % %
   e. Wetlands: % %
   f. Public: % %
   g. Open Space: % %
   h. Agricultural: % %
   i. Military 15 %

7. **Volume and Types of Dredged Material Available for Containment**
   a. Present Disposal Method: 92% water 8% sand
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 48,700 - 231,300 cy/yr
      Within Surrounding Quads: 64,600 - 279,200 cy/yr
   c. General Characteristics of Material (Phys-chem):

8. **Compatability with Adjacent Land/Re-use Potential**
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space) military
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) warehouses
   d. Access by Water: (channels, docking facilities) East River
   e. Access by Land: (roads/bridges) major road
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation)
      (market for re-use of dredged material)

9. **Proximity to Cultural Resources**
   a. Cultural: 4 miles 5 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. **Existing and Historical Spoil Disposal Location**
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: Ferry Point Park County: Kings Map # A Location# 3-43

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private) (city)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 7 miles
   b. Lobster Locations: 3.5 miles
   c. Finfish Concentrations: 4.5 miles
   d. Waterfowl Areas: 4 miles
   e. Wetland Areas: 4.5 miles
   f. Water Quality Conditions: (poor/fair/good)

3. Bathymetry
   a. Nearshore Slope: 160 ft/mile
   b. Available Surface Area: 120 acres
   c. Available Volume Below MSL: 1,411,100 cu. yards

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, (low))
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) piers
   e. Cost of Flood Damages: (high/medium/(low))

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: fine sands & silt
      or USCS Classification:
   b. Permeability: 6.0 m/hr.

6. Existing and Projected Land Use (within 1 mile radius of site)

a. Residential:	30 %	%	f. Public:	%	%
b. Recreational:	50 %	%	g. Open Space:	10 %	%
c. Commercial:	>10 %	%	h. Agricultural:	%	%
d. Industrial:	%	%			
e. Wetlands:	%	%			

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: 8% land 92% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 48,700 - 231,300 cy/yr
      Within Surrounding Quads: 64,600 - 279,200 cy/yr
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/(Rec)/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/(Open Space))
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: ((channels), docking facilities) East River
   e. Access by Land: ((roads)/bridges) major
   f. Area-wide Plan: (industrial/commercial expansion) (need for recreation) * need for residential (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: 1 miles 7 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: Pelham Bay Park County: Bronx Map # A Location# 3-44 & 45

1. Shorefront Ownership and Shorefront Disposal Sites (city)
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 6 miles
   b. Lobster Locations: 7 miles
   c. Finfish Concentrations: 2 miles
   d. Waterfowl Areas: 4 miles
   e. Wetland Areas: 1 miles
   f. Water Quality Conditions: poor/(fair)/good

3. Bathymetry
   a. Nearshore Slope: 1 ft/mile
   b. Available Surface Area: 100 acres
   c. Available Volume Below MSL: 1,370,000 cu. yards

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, (low))
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) bulk head
   e. Cost of Flood Damages: (high/medium/(low))

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: sandy silt, sand
      or USCS Classification:
   b. Permeability: 0.6 - 2.0 in/hr

6. Existing and Projected Land Use (within 1 mile radius of site)
   a. Residential: 40 % %
   b. Recreational: 40 % %
   c. Commercial: % %
   d. Industrial: 20 % %
   e. Wetlands: % %
   f. Public: % %
   g. Open Space: % %
   h. Agricultural: % %

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: 100 % water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 2,700 - 13,400 cy/yr
      Within Surrounding Quads: 69,900 - 291,500 cy/yr
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/(Rec)/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: ((Res)/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) not known
   d. Access by Water: (channels, docking facilities) Hutchinson River
   e. Access by Land: ((roads)/bridges) major road
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) increase of residential
      (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: 2 miles 10 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) bulk head
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.)
   c. Volume of Material Previously Disposed: 697,000 CY

Siting Criteria

Name: Harbor Island Park County: Westchester Map # A Location# 3-47

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 6 miles
   b. Lobster Locations: 2.5 miles
   c. Finfish Concentrations: 2.5 miles
   d. Waterfowl Areas: 6 miles
   e. Wetland Areas: 0.5 miles
   f. Water Quality Conditions: poor/fair/good

3. Bathymetry
   a. Nearshore Slope: 1 ft/mile
   b. Available Surface Area: 7 acres
   c. Available Volume Below MSL: 50,000 cu. yards

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 6 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) piers + docks
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: 80% clay silt, 20% coarse sand
      or USCS Classification:
   b. Permeability: 2 - 6 in/hr

6. Existing and Projected Land Use (within 1 mile radius of site)
   a. Residential: 50 % %
   b. Recreational: 20 % %
   c. Commercial: 5 % %
   d. Industrial: % %
   e. Wetlands: 5 % %
   f. Public: - % %
   g. Open Space: 10 % %
   h. Agricultural: % %
   i. INSTITUTIONAL: 10 %

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: 35% land, 65% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 18,500 - 46,800 cy/yr
      Within Surrounding Quads: 22,900 - 62,800 cy/yr
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities)
   e. Access by Land: (roads/bridges) major
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) need for residential
      (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: 2 miles 11 10 mile radius
   b. Types: (historical, archaeological, etc.)

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: Federal dredge spoil site County: Nassau Map # A Location# 4-4

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 6.5 miles
   b. Lobster Locations: 3.5 miles
   c. Finfish Concentrations: 2.5 miles
   d. Waterfowl Areas: 3.0 miles
   e. Wetland Areas: 2.0 miles
   f. Water Quality Conditions: poor/fair/good

3. Bathymetry
   a. Nearshore Slope: ft/mile
   b. Available Surface Area: acres
   c. Available Volume Below MSL: cu. yards

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) piers + Treatment plant
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: Coarse sand
      or USCS Classification:
   b. Permeability: 6in/hr

6. Existing and Projected Land Use (within 1 mile radius of site)
   a. Residential: 25 % 25 %
   b. Recreational: 5 % 5 %
   c. Commercial: 0 % 3 %
   d. Industrial: 30 % 30 %
   e. Wetlands: % %
   f. Public: % %
   g. Open Space: 40 % 37 % (recreational)
   h. Agricultural: % %

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: 76% land 24% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 13200 - 34500 cy/hr
      Within Surrounding Quads: 62000 - 265,900 cy/yr
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) Treatment Plant
   d. Access by Water: (channels, docking facilities)
   e. Access by Land: (roads/bridges) local
   f. Area-wide Plan: (industrial/commercial expansion) (need for recreation) stable (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: .5 miles 14 10 mile radius
   b. Types: (historical, archaeological, etc.) museum

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.)
   c. Volume of Material Previously Disposed: 250,000 CY

Siting Criteria

Name: Non-Federal Dredge site County: Nassau Map # A Location# 5-8

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 8 miles
   b. Lobster Locations: 5 miles
   c. Finfish Concentrations: 3 miles
   d. Waterfowl Areas: 4.5 miles
   e. Wetland Areas: 3.5 miles
   f. Water Quality Conditions: poor/fair/good

3. Bathymetry
   a. Nearshore Slope: 79 ft/mile
   b. Available Surface Area: 15 acres
   c. Available Volume Below MSL: 250,000 cu. yards

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 100%
   d. Endangered Structures: (buildings, homes, jetties, etc.) bulkhead
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: coarse sand
      or USCS Classification:
   b. Permeability: 6 in/hr

6. Existing and Projected Land Use (within 1 mile radius of site)

a. Residential:	82 %	80 %	f. Public:	- %	%
b. Recreational:	%	%	g. Open Space:	10 %	12 %
c. Commercial:	3 %	3 %	h. Agricultural:	%	%
d. Industrial:	3 %	3 %	Institution	2	2
e. Wetlands:	%	%			

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: 76% Land 24% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 13200 - 34500 cy/yr
      Within Surrounding Quads: 62,000 - 265,900 cy/yr
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities) harbor
   e. Access by Land: (roads/bridges) local roads
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) stable areas
      (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: 2 miles 13 10 mile radius
   b. Types: (historical, archaeological, etc.) Museum

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) bulk head 800' long
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.)
   c. Volume of Material Previously Disposed: 170,000 CY

Siting Criteria

Name: Fort Trumbull U.S.N. Reserve County: _____ Map # D Location # 1-9

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: <1 miles
   b. Lobster Locations: 6 miles
   c. Finfish Concentrations: 5 miles
   d. Waterfowl Areas: 2 miles
   e. Wetland Areas: 2 miles
   f. Water Quality Conditions: poor/fair/good

3. Bathymetry
   a. Nearshore Slope: 88 ft/mile
   b. Available Surface Area: 40 acres
   c. Available Volume Below MSL: 2,646,000 cu. yards

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) two long piers
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: silt + clay (90%)
      or USCS Classification: _____
   b. Permeability: 2-6 in/hr

6. Existing and Projected Land Use (within 1 mile radius of site)
   a. Residential: 70 % ___ %
   b. Recreational: 5 % ___ %
   c. Commercial: >25 % ___ %
   d. Industrial: ___ % ___ %
   e. Wetlands: ___ % ___ %
   f. Public: ___ % ___ %
   g. Open Space: ___ % ___ %
   h. Agricultural: ___ % ___ %

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: 55% land 45% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 161.9 cy/yr
      Within Surrounding Quads: 214.7 cy/yr
   c. General Characteristics of Material (Phys-chem): _____

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) Military
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) chemical
   d. Access by Water: (channels, docking facilities) Thames River
   e. Access by Land: (roads/bridges) Conn. Turnpike
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation)
      (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: 11 miles ___ 0 ___ 10 mile radius
   b. Types: (historical, archaeological, etc.)

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions)
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: U.S. Coast Guard Acad. County: _____ Map # D Location# 1-10

1. **Shorefront Ownership and Shorefront Disposal Sites**
   a. Site Ownership: (Federal, State, County, Town, Private)

2. **Proximity of Site to Significant Ecological Areas**
   a. Shellfish Beds: 1 miles
   b. Lobster Locations: 8 miles
   c. Finfish Concentrations: 6 miles
   d. Waterfowl Areas: 4 miles
   e. Wetland Areas: 4 miles
   f. Water Quality Conditions: poor/fair/good

3. **Bathymetry**
   a. Nearshore Slope: 55 ft/mile
   b. Available Surface Area: 65 acres
   c. Available Volume Below MSL: 341,540 cu. yards

4. **Exposure Considerations** (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) several small piers
   e. Cost of Flood Damages: (high/medium/low)

5. **Soil/Foundation Characteristics**
   a. Soil/Sediment Physical Characteristics: 75% silt-clay 25% sand gravel
      or USCS Classification: _____
   b. Permeability: 2-6 in/hr

6. **Existing and Projected Land Use** (within 1 mile radius of site)
   a. Residential: 50 % ____ %
   b. Recreational: 10 % ____ %
   c. Commercial: 10 % ____ %
   d. Industrial: 5 % ____ %
   e. Wetlands: ____ % ____ %
   f. Public: ____ % ____ %
   g. Open Space: 15 % ____ %
   h. Agricultural: ____ % ____ %
   INSTITUTIONAL 10

7. **Volume and Types of Dredged Material Available for Containment**
   a. Present Disposal Method: 55% land 45% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 161.9 cy/yr
      Within Surrounding Quads: 214.7 cy/yr
   c. General Characteristics of Material (Phys-chem): _____

8. **Compatability with Adjacent Land/Re-use Potential**
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) institutional
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) oil tanks
   d. Access by Water: (channels, docking facilities) Thames River
   e. Access by Land: (roads/bridges) Rt 95 + local roads
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation)
      (market for re-use of dredged material)

9. **Proximity to Cultural Resources**
   a. Cultural: 13 miles ____ 0 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. **Existing and Historical Spoil Disposal Location**
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: Byram Park County: Fairfield Map # A Location# 3-50

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 1 miles
   b. Lobster Locations: 3.5 miles
   c. Finfish Concentrations: 3 miles
   d. Waterfowl Areas: 6.5 miles
   e. Wetland Areas: 1.0 miles
   f. Water Quality Conditions: poor/fair/good

3. Bathymetry
   a. Nearshore Slope: 1 ft/mile
   b. Available Surface Area: 20 acres
   c. Available Volume Below MSL: 40,000 cu. yards

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) piers
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics or USCS Classification: silt with fine sand
   b. Permeability: >6.0 in/hr

6. Existing and Projected Land Use (within 1 mile radius of site)
   a. Residential: 40 % %
   b. Recreational: 20 % %
   c. Commercial: 10 % %
   d. Industrial: 20 % %
   e. Wetlands: 5 % %
   f. Public: % %
   g. Open Space: 5 % %
   h. Agricultural: % %

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: 41% land 59% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 42,000 cy/yr
      Within Surrounding Quads: 72,300 cy/yr
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) water-type industry
   d. Access by Water: (channels, docking facilities)
   e. Access by Land: (roads/bridges) Turnpike, local streets
   f. Area-wide Plan: (industrial/commercial expansion) (need for recreation) need for residential (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: 0 miles 7 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: Seaview Park County: Fairfield Map # A Location# 3-58

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 2 miles
   b. Lobster Locations: 6 miles
   c. Finfish Concentrations: 4 miles
   d. Waterfowl Areas: 11 miles
   e. Wetland Areas: 0.5 miles
   f. Water Quality Conditions: (poor/fair/good)

3. Bathymetry
   a. Nearshore Slope: 1 ft/mile
   b. Available Surface Area: 20 acres
   c. Available Volume Below MSL: 145,200 cu. yards

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 20 %
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) none
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: silt & coarse sand
      or USCS Classification:
   b. Permeability: 6.0in/hr

6. Existing and Projected Land Use (within 1 mile radius of site)
   a. Residential: 50 % %
   b. Recreational: 20 % %
   c. Commercial: 10 % %
   d. Industrial: 10 % %
   e. Wetlands: 5 % %
   f. Public: % %
   g. Open Space: 5 % %
   h. Agricultural: % %

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: 41% land, 59% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 42,200
      Within Surrounding Quads: 95,300
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) ports
   d. Access by Water: (channels, docking facilities)
   e. Access by Land: (roads/bridges) railroads & local streets
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation)
      (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: 1.5 miles 3 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: Seaside Park County: _____ Map # B Location# 3-63

1. **Shorefront Ownership and Shorefront Disposal Sites**
   a. Site Ownership: (Federal, State, County, Town, Private)

2. **Proximity of Site to Significant Ecological Areas**
   a. Shellfish Beds: 1 miles
   b. Lobster Locations: 2 miles
   c. Finfish Concentrations: 3 miles
   d. Waterfowl Areas: 1.5 miles
   e. Wetland Areas: 2 miles
   f. Water Quality Conditions: poor/fair/good

3. **Bathymetry**
   a. Nearshore Slope: 21 ft/mile
   b. Available Surface Area: 90 acres
   c. Available Volume Below MSL: 2,023,100 cu. yards

4. **Exposure Considerations** (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 20 %
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) breakwater (bulkhead)
   e. Cost of Flood Damages: (high/medium/low)

5. **Soil/Foundation Characteristics**
   a. Soil/Sediment Physical Characteristics: Sand & Typic Udorthents cut & fill
      or USCS Classification: _____
   b. Permeability: >6.0 in/hr

6. **Existing and Projected Land Use** (within 1 mile radius of site)

a. Residential:	15 %	%	f. Public:	%	%
b. Recreational:	30 %	%	g. Open Space:	%	%
c. Commercial:	10 %	%	h. Agricultural:	%	%
d. Industrial:	15 %	%	INSTITUTIONAL 30		
e. Wetlands:	%	%			

7. **Volume and Types of Dredged Material Available for Containment**
   a. Present Disposal Method: 41% land, 59% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 88,100 CY/yr
      Within Surrounding Quads: 154,400 CY/yr
   c. General Characteristics of Material (Phys-chem): _____

8. **Compatability with Adjacent Land/Re-use Potential**
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space) institutional
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) power plant, general heavy manufacturing and process
   d. Access by Water: (channels, docking facilities) LIS
   e. Access by Land: (roads/bridges) Local
   f. Area-wide Plan: (industrial/commercial expansion) _____
      (need for recreation) need for residential
      (market for re-use of dredged material) _____

9. **Proximity to Cultural Resources**
   a. Cultural: 4 miles 2 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. **Existing and Historical Spoil Disposal Location**
    a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
    b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
    c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: BAYVIEW Park County: , CONN Map # B Location# 3-69

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: <1 miles
   b. Lobster Locations: 4 miles
   c. Finfish Concentrations: 2 miles
   d. Waterfowl Areas: 2 miles
   e. Wetland Areas: 1.5 miles
   f. Water Quality Conditions: poor/fair/good

3. Bathymetry
   a. Nearshore Slope: 6 ft/mile
   b. Available Surface Area: 225 acres
   c. Available Volume Below MSL: 1,738,000 cu. yards

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 0%
   d. Endangered Structures: (buildings, homes, jetties, etc.)
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: tidal flat area - Typic Udorthents, cut + fill
      or USCS Classification:
   b. Permeability: > 6.0 in/hr

6. Existing and Projected Land Use (within 1 mile radius of site)

a. Residential:	30 %	%	f. Public:	%	%
b. Recreational:	10 %	%	g. Open Space:	20 %	%
c. Commercial:	10 %	%	h. Agricultural:	%	%
d. Industrial:	20 %	%			
e. Wetlands:	10 %	%			

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: 65% Land 35% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 347.0 cy/yr
      Within Surrounding Quads: 382.7 cy/yr
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) Light Manufacturing
   d. Access by Water: (channels, docking facilities) Harbor
   e. Access by Land: (roads/bridges) Conn. Turnpike
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation)
      (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: 6 miles / 10 mile radius
   b. Types: Cultural

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: East Shore Park County: _____ Map # B Location# 3-71

1. **Shorefront Ownership and Shorefront Disposal Sites**
   a. Site Ownership: (Federal, State, County, Town, Private)

2. **Proximity of Site to Significant Ecological Areas**
   a. Shellfish Beds: 0.5 miles
   b. Lobster Locations: 6 miles
   c. Finfish Concentrations: 3 miles
   d. Waterfowl Areas: 2.5 miles
   e. Wetland Areas: 3 miles
   f. Water Quality Conditions: poor/fair/good

3. **Bathymetry**
   a. Nearshore Slope: 9 ft/mile
   b. Available Surface Area: 100 acres
   c. Available Volume Below MSL: 963,000 cu. yards

4. **Exposure Considerations** (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) none
   e. Cost of Flood Damages: (high/medium/low)

5. **Soil/Foundation Characteristics**
   a. Soil/Sediment Physical Characteristics or USCS Classification: silt-sand, cut/fill
   b. Permeability: high

6. **Existing and Projected Land Use** (within 1 mile radius of site)
   a. Residential: 35 % ___ %
   b. Recreational: 20 % ___ %
   c. Commercial: 10 % ___ %
   d. Industrial: 30 % ___ %
   e. Wetlands: ___ % ___ %
   f. Public: ___ % ___ %
   g. Open Space: 5 % ___ %
   h. Agricultural: ___ % ___ %

7. **Volume and Types of Dredged Material Available for Containment**
   a. Present Disposal Method: 65% land 35% water
   b. Volume of Dredged Material Projected:
      Within Quadrangal: 347,900 cy/yr
      Within Surrounding Quads: 382,700 cy/yr
   c. General Characteristics of Material (Phys-chem): _____

8. **Compatability with Adjacent Land/Re-use Potential**
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) power plant + treatment plant
   d. Access by Water: (channels, docking facilities) New Haven Harbor
   e. Access by Land: (roads/bridges) major highway
   f. Area-wide Plan: (industrial/commercial expansion) (need for recreation) (market for re-use of dredged material)

9. **Proximity to Cultural Resources**
   a. Cultural: 10 miles / 1 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. **Existing and Historical Spoil Disposal Location**
    a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
    b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
    c. Volume of Material Previously Disposed: none CY

APPENDIX E
POTENTIAL PUBLIC CONTACTS

Federal

- Advisory Council on Historic Preservation
- U.S. Environmental Protection Agency
- General Service Administration
- U.S. Department of Agriculture
- U.S. Department of Commerce
  - Deputy Assistant Secretary for Environmental Affairs
  - National Oceanic & Atmospheric Administration
  - National Marine Fisheries Service
  - Maritime Administration
- U.S. Department of Housing and Urban Development
- U.S. Department of the Interior
  - Fish and Wildlife and Parks
  - National Park Service
  - Bureau of Outdoor Recreation
  - U.S. Fish and Wildlife Service
  - U.S. Geological Survey
- U.S. Department of Health, Education and Welfare
- U.S. Department of the Navy
  - Commander Eastern Sea Frontier
  - Commandant Third Naval District
  - Oceanographer Third Naval District
- U.S. Department of Transportation
  - U.S. Coast Guard
  - Federal Highway Administration

States of New York and Connecticut

- Secretary of State
- Department of Environmental Conservation
- Department of Public Works
- Attorney General
- Seagrant Advisory Service
- Department of Transportation
- State Clearing House
- Office of Parks and Recreation
- Long Island State Park Commission
- Department of Commerce

Local Agencies and Groups

- Board of Equilization and Assessment
- Fisheries, Inc.
- Long Island Shellfish Farmers
- Long Island Fisherman's Assn.
- Nassau/Suffolk County Regional Planning Commission
- Nassau-Suffolk Bi-County Regional Marine Resources Council
- Suffolk County
    - Board of Supervisors
    - Commissioner of Public Works
    - Council on Environmental Quality
    - Water Authority
    - Planning Department
    - Health Department
- Action, North Shore of Long Island, Inc.
- American Littoral Society
- Baymen's Protection Assn.
- Eastern Long Island Wetlands Preservation Assn.
- Environmental Policy Center

Local Agencies and Groups (Cont'd)

- Federated Garden Clubs of New York State, Inc.
- Long Island Environmental Council
- League of Women Voters
- Scientist Committee for Public Information
- Save Our Bays Association
- Sierra Club
- National Wildlife Federation
- National Resources Defense Council
- Group for Americas
- Students for Environmental Quality
- Audubon Society
- Nature Conservancy
- Stripe Bass Fund, Inc.
- Environmental Defense Fund
- The Wilderness Society
- National Parks and Conservation Assn.
- National Parks Foundation
- The Conservation Foundation
- Center for Environmental Studies

APPENDIX F

APPLICABLE LEGISLATION, GUIDELINES, AND REGULATIONS

Legislation

- Clean Water Act
- Coastal Zone Management Act
- Deepwater Port Act
- Endangered Species Act
- Fish and Wildlife Coordination Act
- Marine Protection, Research, and Sanctuaries Act
- NEPA
- River and Harbor Act

Executive Guidelines

- Executive Order 11514 - Protection and Enhancement of Environmental Quality
- Executive Order 11988 - Floodplain Management
- Executive Order 11990 - Protection of Wetlands

Other Regulations

- Navigable Waters Discharge of Dredged or Fill Material (404)
- Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act of 1969
- Protection of Historic and Cultural Properties
- EPA Guidelines for Reviewing Dredged, Fill Disposal Sites
- Principles and Standards for Planning Water and Related Land Resources (WRC)

Corps of Engineers Regulations

- ER 200-2-2
- ER 1105-2-50
- ER 1105-2-71

Corps of Engineers Regulations (Cont'd)

- ER 1105-2-95
- ER 1105-2-200 (series)
- ER 1105-2-301
- ER 1105-2-403
- ER 1105-2-502
- ER 1105-2-507
- ER 1105-2-800
- ER 1105-2-811
- ER 1105-2-920
- ER 1105-2-921
- Public Involvement in the Corps of Engineers Planning Process

DRAFT REPORT

ADDENDUM TO INTERIM REPORT
DREDGED MATERIAL CONTAINMENT
IN LONG ISLAND SOUND

EXTENSION OF SITING ANALYSIS

Prepared for:

U.S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, Massachusetts 02154

January, 1981

TETRA TECH

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January 12, 1981

Mr. Dick Quinn
Planning Division/River Basins Branch
New England Division
U.S. Corps of Engineers
424 Trapelo Road
Waltham, MA 02154

Re: Dredged Material Containment Study for Long Island Sound
Contract # DACW33-80-C-0010

Dear Mr. Quinn:

We are pleased to enclose three (3) draft copies of the Addendum to the Interim Report, Dredged Material Containment in Long Island Sound for your review.

I am sure you will find the enclosed material covers all of the requirements outlined in the scope of work. However, if you have any questions or comments, we will be pleased to respond.

Sincerely,

James R. Pagenkopf

James R. Pagenkopf
Manager, New York Office

JRP/jt

Enclosures

cc: Contracts

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Preface and Acknowledgements

This is an addendum to the previously completed Interim Report of a Stage 2 study to prepare an overview assessment of the feasibility of containment of material dredged from Connecticut and New York Harbors along Long Island Sound. Specifically, an extension of the preliminary siting analysis has been made to include 121 more shoreline and near shore sites.

The study was performed under contract by Tetra Tech, Inc., Melville, New York. The contract was directed by James Pagenkopf, principal investigator, who was assisted by Gary Bigham, Henry Fong, Steve Giannino, Jack Olsen, James LaMorte, and John Segna.

The study was conducted under the supervision of Dick Quinn, Planning Division/River Basins Branch, New England Division of the Corps of Engineers.

ADDENDUM TO INTERIM REPORT:
DREDGED MATERIAL CONTAINMENT IN LONG ISLAND SOUND
EXTENSION OF SITING ANALYSIS

INTRODUCTION

1.01 This is an addendum to the Interim Report previously completed in July, 1980 as part of the New England Division Corps of Engineers' Stage 2 planning efforts to develop a plan of study for dredged material (DM) containment in Long Island Sound (LIS). The Interim Report included the description and preliminary application of a siting methodology to assess the feasibility of publicly owned shorefront land for the creation of small-volume containment facilities.

1.02 A total of 133 public shorefront sites and existing DM disposal sites along the coast of LIS in New York and Connecticut were examined. These areas consisted mainly of parks, beaches, transportation corridors, and military and institutional sites. Of the 133 initial sites, only 26 survived the initial screening analysis, which included consideration of the proximity of the site to significant ecological areas, public bathing beaches, high wave energy, and land use incompatibility. The remaining 26 sites were examined on the basis of more site-specific criteria and data, and were ranked in relative order of desirability, independently for New York and Connecticut sites. Of these sites, 4 in New York and 3 in Connecticut were dropped due to lack of sufficient surface area for a containment facility. Most of the highest ranking New York sites are located in a tight cluster at the extreme western end of LIS. An additional cluster of three sites is located in Hempstead Harbor in Nassau County. In Connecticut, two of the four remaining sites are located in New Haven Harbor, a third near Bridgeport Harbor, and a fourth in New London. Figure 1 shows the locations of the public sites surviving the preliminary screening analysis.

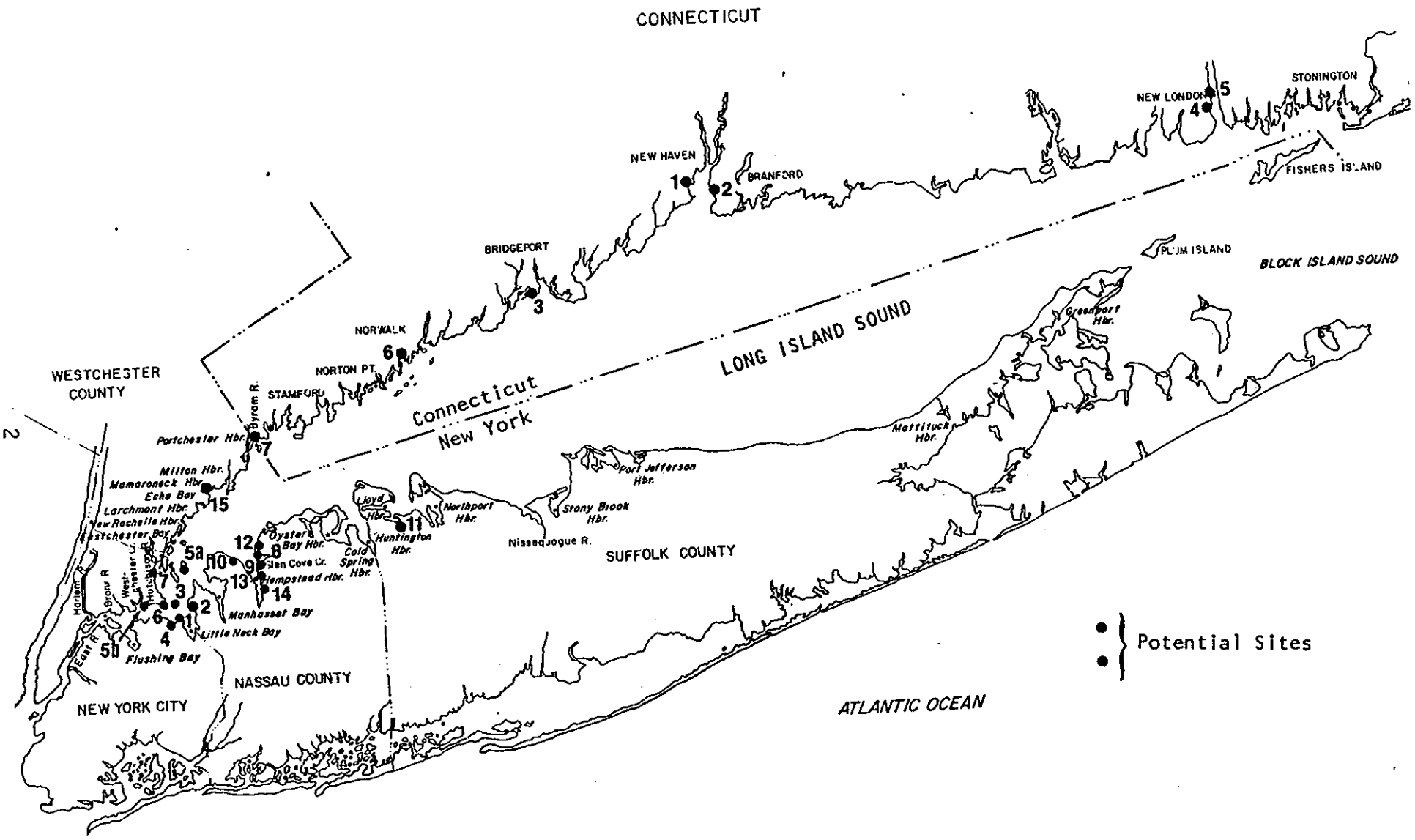

FIGURE 1 LOCATIONS OF PUBLIC SITES SURVIVING PRIMARY SCREENING (FROM INTERIM REPORT)

1.03 Overall, shorefront public and existing disposal sites appear to have relatively limited possibilities for shoreline extension containment sites. Most of these sites are simply not compatible due to land use, surface area availability, and proximity to important ecological areas. Because of these limitations, the Interim Report recommended expansion of the siting analysis to include consideration of privately owned shorefront, especially industrial or water-related commercial areas. This addendum to the Interim Report addresses the analysis of the above additional sites.

ANALYSIS OF ADDITIONAL SITES

1.04 Recapping from the Interim Report, the siting methodology for assessing shoreline sites consists of the following 4 steps:

1) Identify and rank primary screening criteria for selecting alternative sites (site screening maps).

2) Apply the criteria to LIS to obtain specific site alternatives.

3) Preliminarily rank the alternative sites in relative order of desirability (secondary screening).

4) Investigate the use of sites individually or in combinations to determine the potential of using more than one site.

1.05 The purpose of Steps 1 and 2 is to eliminate from further consideration coastal areas of LIS clearly not feasible for containment siting opportunities. Step 3 applies additional, more specific criteria to areas surviving Steps 1 and 2, and categorizes them in preliminary order of desirability. Step 4 takes the alternative sites, having been care-

fully screened and ranked, and formulates preliminary designs of projects considering site-specific issues, construction feasibility, operational logistics and other factors. This step constitutes the beginning of conventional project planning and design, and is recommended for inclusion in Stage 2 final planning.

1.06 The remainder of the Addendum Report focuses on the application of the first three siting steps to approximately 121 additional shoreline sites in LIS.

Step 1 - Identify and Rank Primary Screening Criteria

1.07 Several primary screening criteria pertaining to the selection of alternative containment sites were identified in the Interim Report, and are restated as follows:

(1) Bathymetry/Available Containment Volume
(2) Shoreline Ownership and Existing Disposal Sites
(3) Significant Ecological Areas
(4) Major Public Beaches
(5) Wave Energy
(6) Land Use Compatibility/Reuse Potential

The above criteria were used to screen the 133 public sites and historical DM disposal sites evaluated in the Interim Report. As stated in the Interim Report, sites that would have failed any of the above criteria can be preserved for further, more detailed analysis under Step 3 (Secondary Screening). This is so because the above criteria are considered again in ranking the sites in order of desirability. For purposes of this Addendum Report, only Criteria #1 (bathymetry) and Criteria #4 (major public beaches) are used to eliminate the additional sites from the secondary screening process. This is to allow an analysis of the sensitivity

of the secondary criteria point ranking system by including sites which have a wide range in acceptability value. This concept will be more fully discussed under the section on weighting factor sensitivity. Sites failing from the standpoint of insufficient surface area or excess depths (Criteria #1), or due to the existence of a major public bathing beach (Criteria #4) are judged to have the least potential for hosting a dredged material containment facility.

1.08 As in the Interim Report, base maps were prepared which locate the sites under consideration. Figure 2 acts as a guide for the orientation of subsequently more detailed maps. Figure 3 shows the locations of the 121 additional sites to be evaluated, consisting of the following categories:

1. Shallow Water Areas (18 sites)
2. Municipal Waste Water Treatment Facilities (31 sites)
3. Power Generating Stations (14 sites)
4. Corps Navigation Projects (23 sites)
5. Industrial Wastewater Discharges (11 sites)
6. Petroleum Facilities (20 sites)
7. Sand and Gravel Pits (4 sites)

Table 1 summarizes information on the above site categories.

Step 2 - Primary Screening Analysis

1.09 The purpose of this second step is to systematically eliminate from further consideration potential containment sites clearly not feasible based on the criteria outlined in Step 1. Since only bathymetry/surface area and public beach limitations are considered, the use of map overlays as in the Interim Report was not necessary. Rather, each site was examined specifically to determine the approximate available surface area and containment volume and proximity to public beaches.

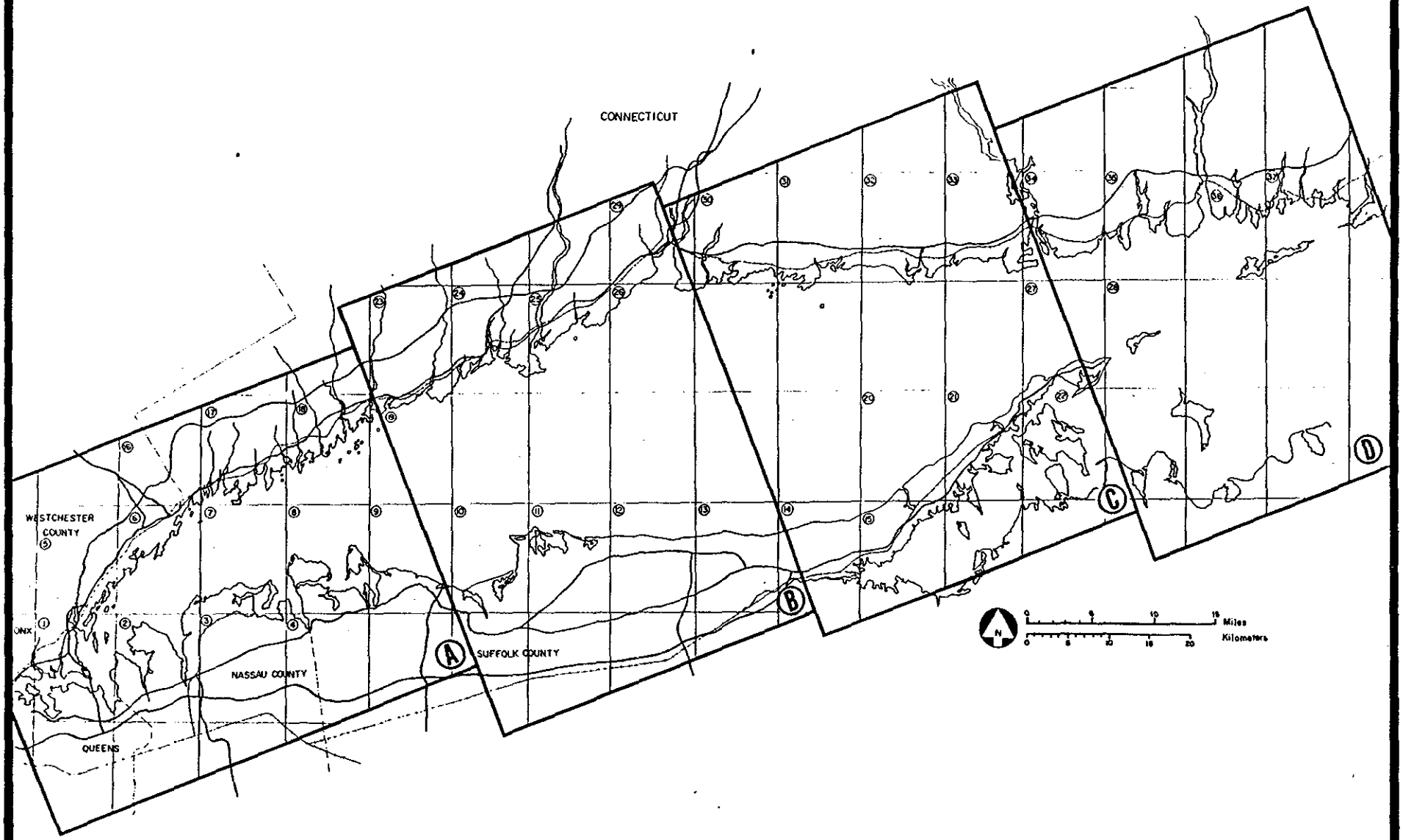

FIGURE 2 GUIDE FOR SITE SCREENING MAPS OF LIS

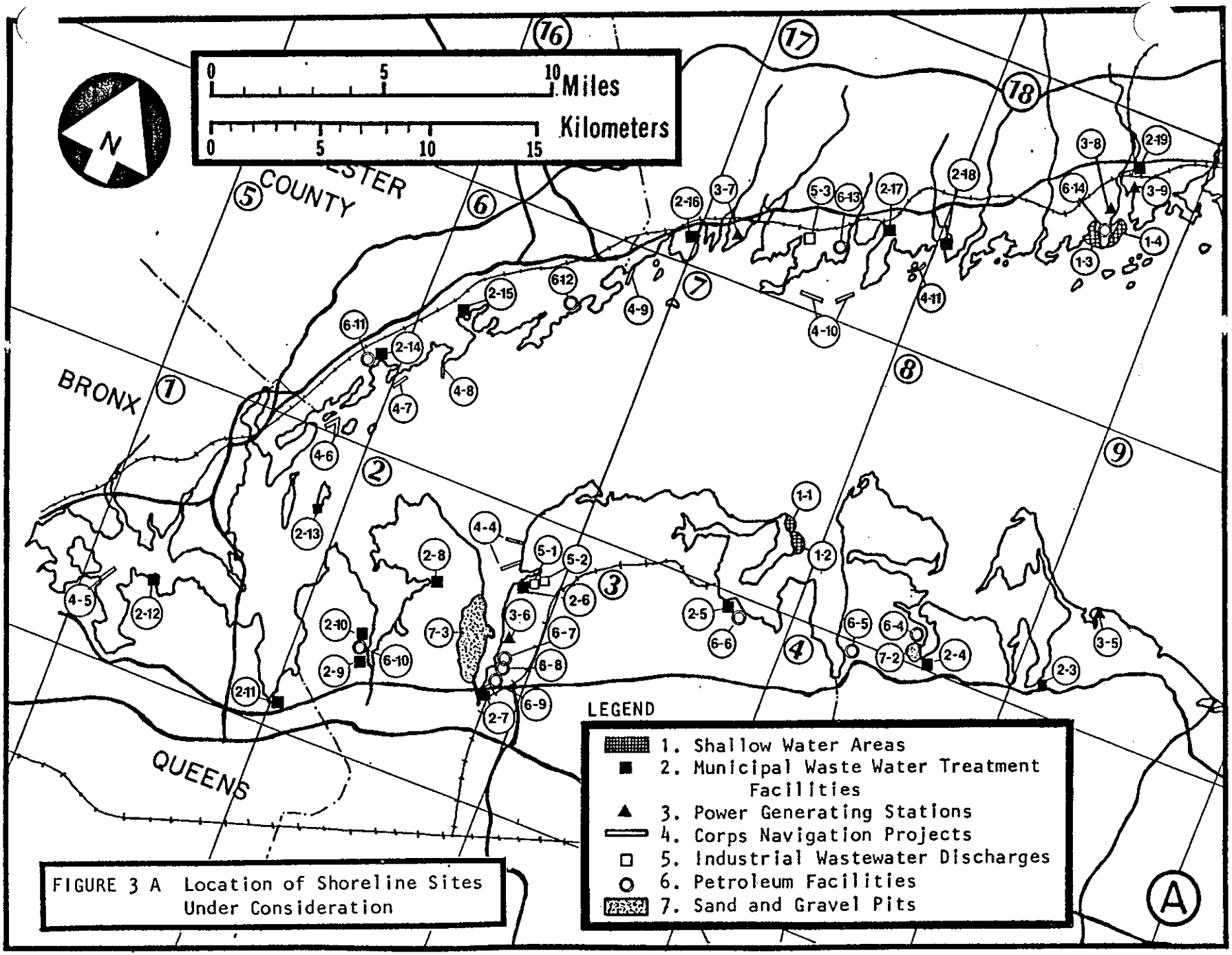

FIGURE 3 A Location of Shoreline Sites Under Consideration

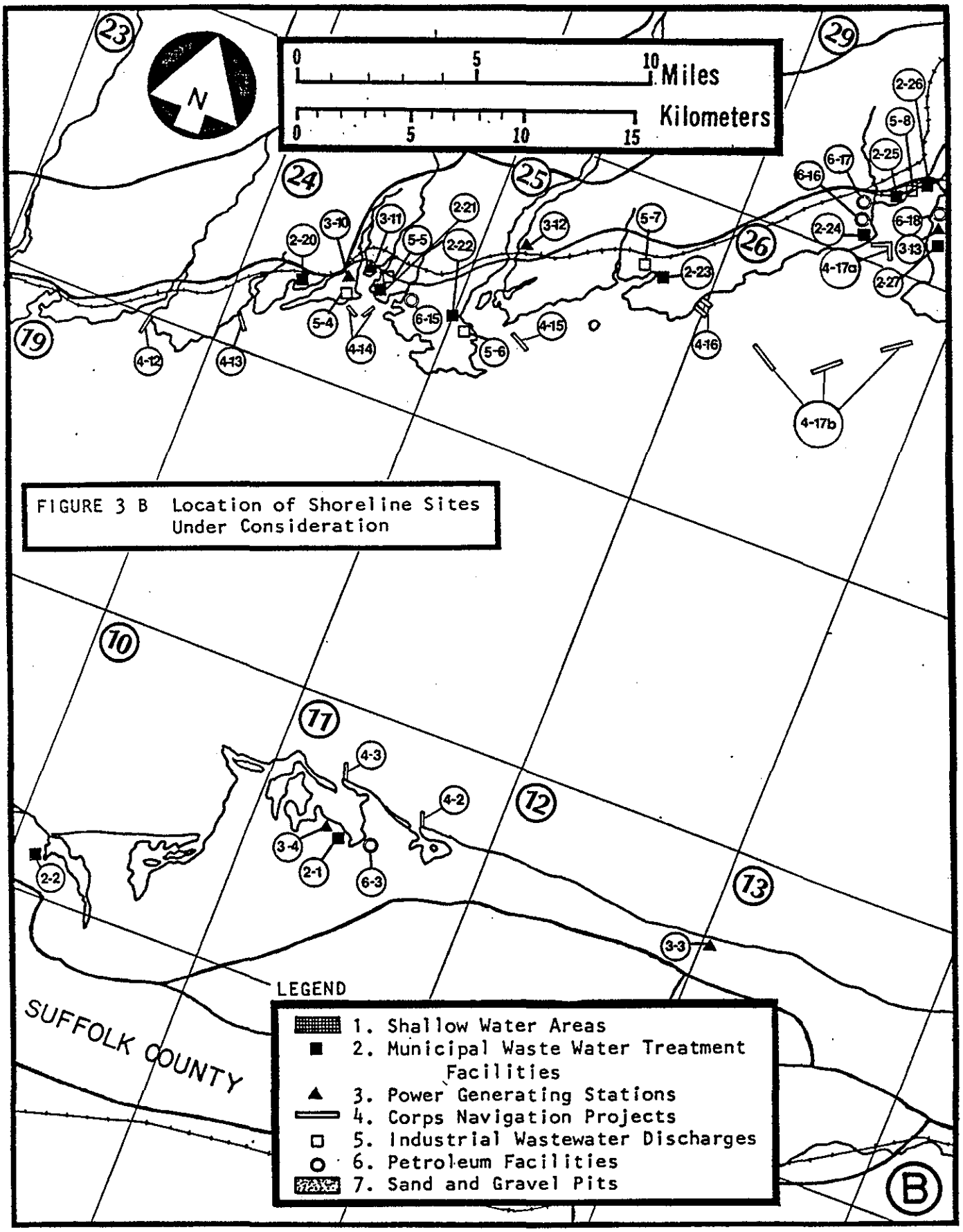

FIGURE 3 B Location of Shoreline Sites Under Consideration

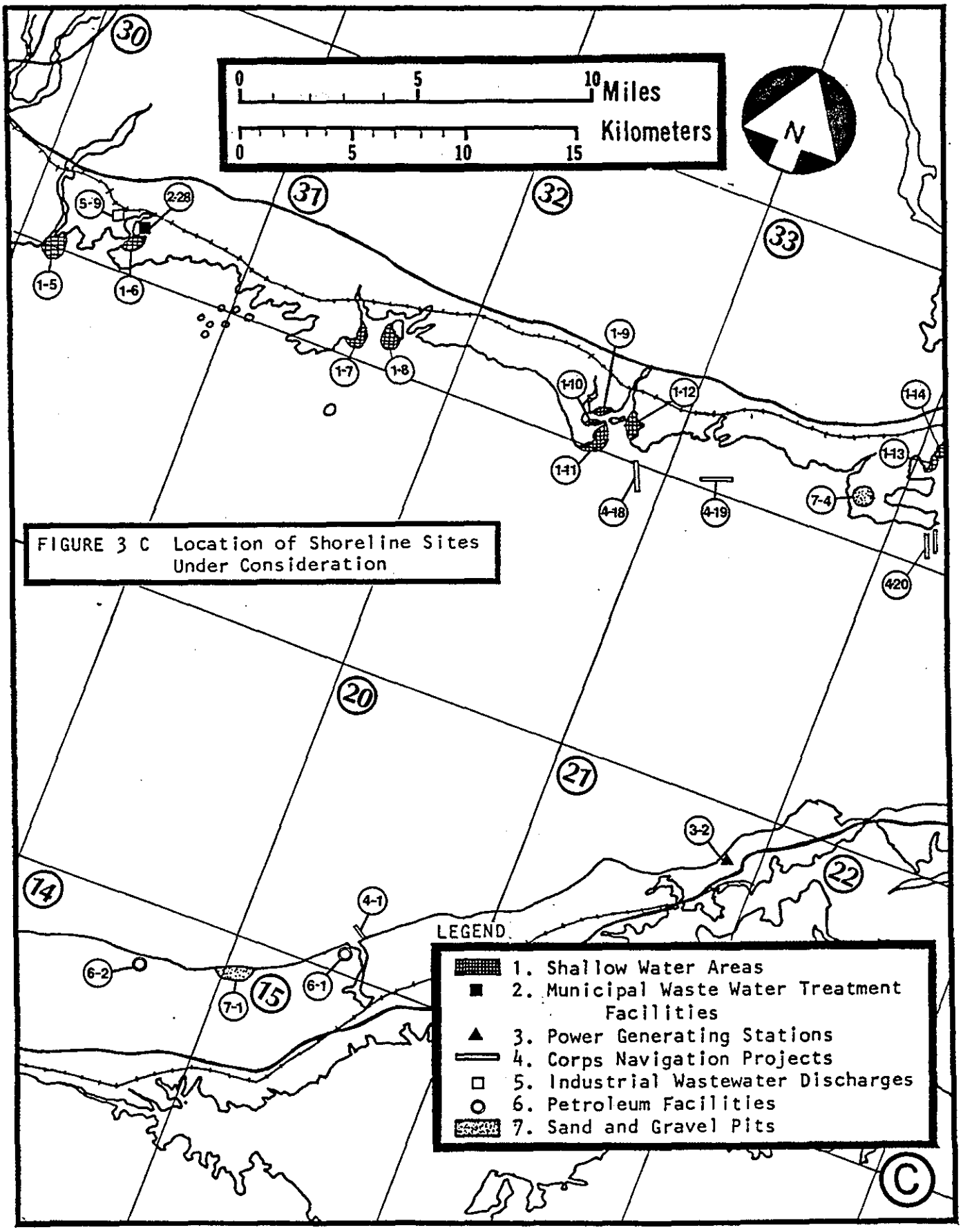

FIGURE 3 C Location of Shoreline Sites Under Consideration

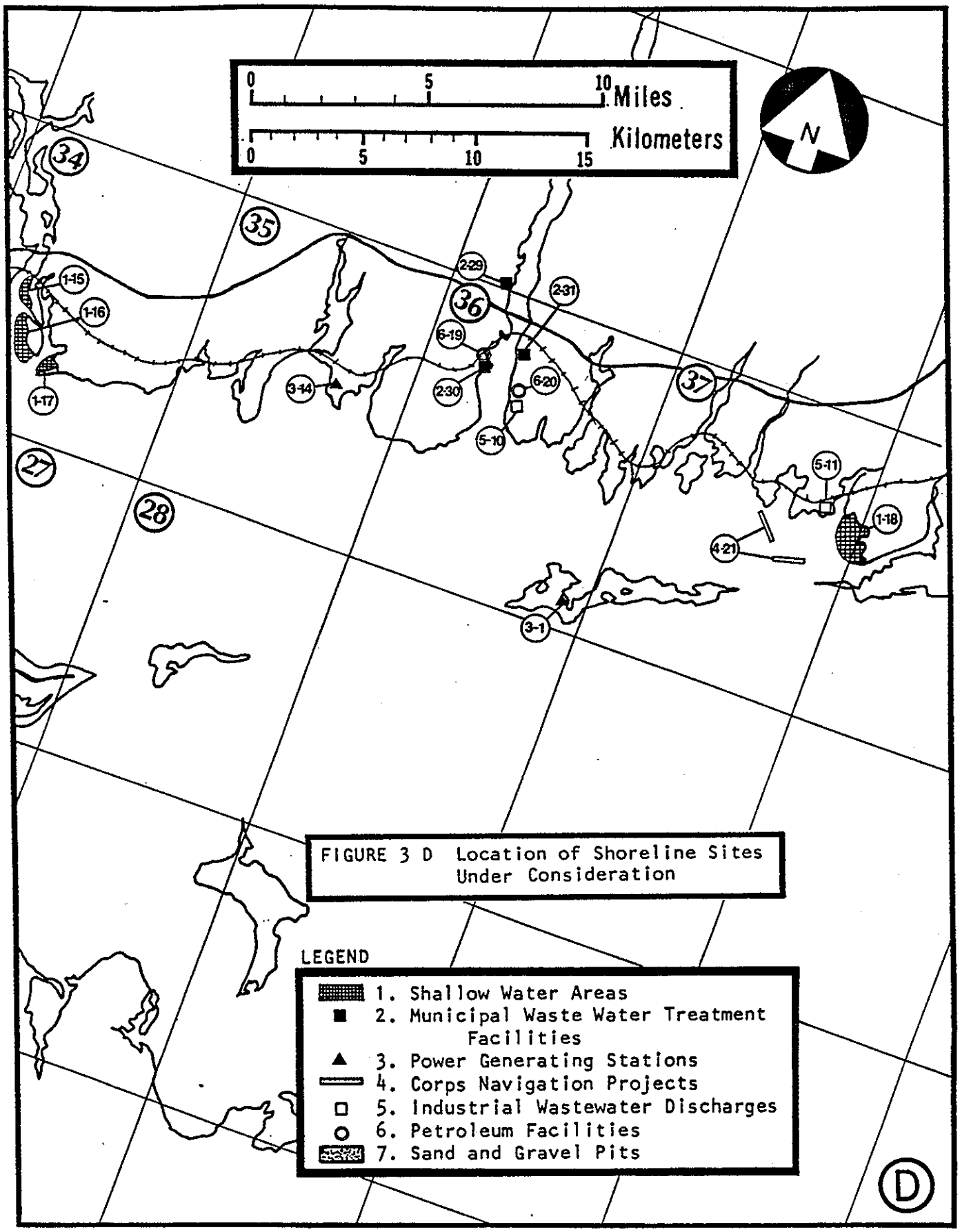

FIGURE 3 D Location of Shoreline Sites Under Consideration

TABLE 1

SITE INFORMATION BY CATEGORY

I. Shallow Water Areas

Name of Site	Site No.	Quadrangle Location	Quad. No.
Centre Island (North)	1-1	Bayville, NY-CT	7
Centre Island (East)	1-2	Bayville, NY-CT	7
Hoyt Island	1-3	Norwalk South, CT	18
Harborview	1-4	Norwalk South, CT	18
Kelsey Island	1-5	Bramford, CT	30
Indian Neck	1-6	Bramford, CT	30
Guilford Harbor, West	1-7	Guilford, CT	31
Guilford Harbor, East	1-8	Guilford, CT	31
Hammonasset River Tidal Flats	1-9	Clinton, CT	32
Cedar Island Flats	1-10	Clinton, CT	32
Clinton Harbor, West	1-11	Clinton, CT	32
Clinton Harbor, East	1-12	Clinton, CT	32
Rock Creek, South	1-13	Old Lyme, CT	34
Rock Creek, North	1-14	Old Lyme, CT	34
Lyme Station Tidal Flats	1-15	Old Lyme, CT	34
Great Island	1-16	Old Lyme, CT	34
Griswold Point	1-17	Old Lyme, CT	34
Barn Island Hunting Area	1-18	Mystic, CT & Watch Hill, RI-CT	38

II. Municipal Waste Water Treatment Facilities

Name of Facility	Site No.	Quadrangle Location	Quad. No.
Port Jefferson	2-1	Port Jefferson, NY	11
San Remo	2-2	Saint James, NY	10
Northport	2-3	Northport, NY	9
Huntington	2-4	Lloyd Harbor, NY	8
Oyster Bay	2-5	Bayville, NY	7
Glen Cove	2-6	Sea Cliff, NY	2
Roslyn	2-7	Sea Cliff, NY	2
Port Washington	2-8	Sea Cliff, NY	2
Great Neck	2-9	Sea Cliff, NY	2
Great Neck (V)	2-10	Sea Cliff, NY	2
Little Neck	2-11	Sea Cliff, NY	2
Tallman Island	2-12	Flushing, NY	1
City - Hart Island	2-13	Flushing, NY	1
New Rochelle	2-14	Mount Vernon, NY	5
Mamaroneck	2-15	Mamaroneck, NY	6
Greenwich	2-16	Glenville, CT-NY	16
Stamford	2-17	Stamford, CT	17
Darien	2-18	Norwalk South, CT	18
Norwalk	2-19	Norwalk South, CT	18
Bridgeport-West Side	2-20	Bridgeport, CT	24
Bridgeport-East Side	2-21	Bridgeport, CT	24
Stratford	2-22	Bridgeport, CT	24
Milford-Gulf Pond	2-23	Milford, CT	25
West Haven	2-24	New Haven, CT	29
New Haven-Blvd.	2-25	New Haven. CT	29
New Haven-East St.	2-26	New Haven, CT	29
New Haven-East Side	2-27	New Haven, CT	29
Branford	2-28	Branford, CT	30
New London-Riverside Plant	2-29	Uncasville, CT	above 36
New London-Trumbull St.	2-30	New London, CT	36
City of Groton	2-31	New London, CT	36

TABLE 1 (Cont.)

SITE INFORMATION BY CATEGORY

III. Power Generating Stations

Plant	Ownership	Site No.	Quad. Location	Quad. No.
Fisher Island	Fisher Island El.	3-1	New London, CT	36
Southold	Long Island Lt.	3-2	Southold, NY	21
Shoreham	Long Island Lt.	3-3	Wading River, NY	13
Port Jefferson	Long Island Lt.	3-4	Port Jefferson, NY	11
Northport	Long Island Lt.	3-5	Northport, NY	9
Glenwood	Long Island Lt.	3-6	Sea Cliff, NY	2
Cos Cob	Ct. L & P	3-7	Stamford, CT	17
South Norwalk	South Norwalk Mun.	3-8	Norwalk South, CT	18
Norwalk Harbor	Ct. L & P	3-9	Norwalk South, CT	18
Bridgeport Harbor	United Illum	3-10	Bridgeport, CT	24
Steel Point	United Illum	3-11	Bridgeport, CT	24
Devon	Ct. L & P	3-12	Milford, CT	25
English	United Illum	3-13	New Haven, CT	29
Millstone	Millstone Point Co.	3-14	Niantic, CT	35

IV. Corps Navigation Projects with Jetties or Breakwaters

Name of Harbor		Site No.	Quad. Location	Quad. No.
Mattituck Harbor	Jetties	4-1	Mattituck Hills, NY	20
Mt. Sinai Harbor	Jetties	4-2	Port Jefferson, NY	11
Port Jefferson Harbor	Jetties	4-3	Port Jefferson, NY	11
Hempstead Harbor	Breakwaters	4-4	Sea Cliff, NY	2
Flushing Bay & Creek	Dike	4-5	Flushing, NY	1
New Rochelle Harbor	Breakwaters	4-6	Mt. Vernon, NY	5
Echo Bay	Breakwaters	4-7	Mt. Vernon, NY	5
Larchmont Harbor	Breakwaters	4-8	Mamaroneck, NY	6
Port Chester Harbor	Breakwaters	4-9	Mamaroneck, NY	6
Stamford Harbor	Breakwaters	4-10	Stamford, CT	17
Cove Island, Stamford	Jetty	4-11	Stamford, CT	17
Southport Harbor	Breakwaters	4-12	Westport, CT	23
Black Rock Harbor, Bridgeport	Breakwaters	4-13	Bridgeport, CT	24
Bridgeport Harbor	Breakwaters	4-14	Bridgeport, CT	24
Housatonic River, Stratford	Breakwaters	4-15	Milford, CT	25
Woodmont Shore, Milford	Groins	4-16	Woodmont, CT	26
New Haven Harbor	Breakwaters	4-17 a,b	New Haven, CT	26
Clinton Harbor	Breakwaters	4-18	Clinton, CT	32
Duck Island Harbor	Breakwaters	4-19	Essex, CT	33
Conn. River, Saybrook	Jetty	4-20	Old Lyme, CT	34
Stonington Harbor	Breakwaters	4-21	Mystic, CT	37

V. Industrial Wastewater Discharges

Discharger/Industry	Site No.	Quadrangle Location	Quad. No.
Long Island Tungsten - Metal	5-1	Sea Cliff, NY	2
Powers Chemco Inc. - Organic Chemicals	5-2	Sea Cliff, NY	2
Electrolux - Metal Services	5-3	Stamford, CT	17
Remington Electric - Metal Plating	5-4	Bridgeport, CT	24
Carpenter Technology Co. - Steel Mill	5-5	Bridgeport, CT	24
Avco: Lycoming	5-6	Bridgeport/Milford, CT	24/25
Schick Safety Razor - Metal Plating	5-7	Milford, CT	25
Sargent & Co. - Metal Services	5-8	New Haven, CT	29
Atlantic Wire Co. - Steel & Wire	5-9	Branford, CT	30
Pfizer Co. - Chemical	5-10	New London, CT	36
American Velvet Co. - Textiles	5-11	Mystic, CT	37

Table 1 (Cont.)

SITE INFORMATION BY CATEGORY

VI. Petroleum Facilities

Name of Facility	Site No.	Quadrangle Location	Quad. No.
	6-1	Mattituck Hills, NY	20
Northville Industries	6-2	Riverhead, NY	14
Swezy Oil Co. Exxon Consolidated Petroleum Co. Mobil Oil Co. Northville Industries	6-3	Port Jefferson, NY	11
Huntington Utilities	6-4	Lloyd Harbor, NY	8
Mobil Oil Co.	6-5	Huntington, NY	4
Commander Oil Co.	6-6	Bayville, NY	7
Windsor Oil Co.	6-7	Sea Cliff, NY	2
Phillips Oil Co.	6-8	Sea Cliff, NY	2
Lewis Oil Co. Mobil Oil Co. Auto Heat	6-9	Sea Cliff, NY	2
Metropolitan Petroleum Co. Universal Utilities Wharf Sinclair Refining Co. Wells Fuel Wharf	6-10	Sea Cliff, NY	2
Sun Oil Co.	6-11	Mt. Vernon, NY	5
Mitchell Oil Co.	6-12	Mamaroneck, NY	6
Fleming Rutledge Oil Corp. Hoffman Fuel Co. Metropolitan Petroleum Corp.	6-13	Stamford, CT	17
Penn. Petroleum Co.	6-14	Norwalk South, CT	18
Sun Oil Co.	6-15	Bridgeport, CT	24
Connecticut Refining Co.	6-16	New Haven, CT	29
Elm City Plant No. 3	6-17	New Haven, CT	29
Atlantic Richfield Exxon Getty Oil Co. Gulf Oil Corp. New Haven Terminal T.A.D. Jones & Co., Inc.	6-18	New Haven, CT	29
City Coal Co. Central Vermont Railroad	6-19	New London, CT	36
Hess Oil Co.	6-20	New London, CT	36

VII. Sand and Gravel Pits

Name of Site	Site No.	Quadrangle Location	Quad. No.
Jamesport - LILCO	7-1	Mattituck, NY	15
Huntington Harbor	7-2	Lloyd Harbor, NY	8
Colonial Sand & Stone, Penn Ind.	7-3	Sea Cliff, NY	2
Old Saybrook	7-4	Essex, CT	33

1.10 Table 2 presents results of the primary screening analysis for each site. Although proximity to significant ecological areas is not used to eliminate sites as was done in the Interim Report for public sites, the results of testing for this criteria are shown nevertheless to demonstrate the sensitivity of primary screening to this criteria. Table 3 summarizes the primary screening analysis for each site category. It is observed that almost half of the original 121 sites drop out due to the lack of adequate room for the construction of a containment facility. Most of these sites, especially waste water treatment plants, power plants, industrial waste discharges, and petroleum facilities, are located up inside small, congested harbors where a containment facility would interfere with navigation channels. On the other hand, few sites dropped out due to the presence of major public bathing beaches, which is contrary to that which occurred with the public sites examined in the Interim Report. The number of sites remaining for secondary screening are 59, with 43 in Connecticut, 5 in Westchester County, 4 in New York City, 5 in Nassau County, and 5 in Suffolk County.

Step 3 - Secondary Screening Analysis

1.11 The purpose of Step 3 is to characterize the desirability of each site that survives Steps 1 and 2 of the screening process and to rank them accordingly. The ranking can include the criteria identified in Step 1 that were not applied because the criteria would have been too restrictive. An example is with ecological considerations, which was demonstrated in Table 3 to be a highly restrictive criteria in the primary screening process. It is of advantage to the planner to be able to evaluate as many potential sites as possible, especially where the complexity of the problem is great due to several opposing or conflicting criteria (e.g. ecological considerations vs. economic need for a disposal site).

TABLE 2

APPLICATION OF PRIMARY SCREENING ANALYSIS

CATEGORY:I Shallow Water Areas

SITE				PRIMARY SCREENING ANALYSIS							
Name of Site	Ste. No.	Quad/Map		Bathy-metry*		Ecological Areas+		Public Beaches		Pass/Fail	
Centre Island (North)	1-1	7	A	P			F	P		P	
Centre Island (East)	1-2	7	A	P			F	P		P	
Hoyt Island	1-3	18	A	P		P		P		P	
Harborview	1-4	18	A	P		P		P		P	
Kelsey Island	1-5	30	C	P			F	P		P	
Indian Neck	1-6	30	C		F		F	P			F
Guilford Harbor, West	1-7	31	C	P			F	P		P	
Guilford Harbor, East	1-8	31	C	P			F	P		P	
Hammonasset River Tidal Flats	1-9	32	C	P			F		F		F
Cedar Island Flats	1-10	32	C	P			F		F		F
Clinton Harbor, West	1-11	32	C	P			F	P		P	
Clinton Harbor, East	1-12	32	C	P			F	P		P	
Rock Creek, South	1-13	34	C/D	P		P		P		P	
Rock Creek, North	1-14	34	C/D	P		P		P		P	
Lyme Station Tidal Flats	1-15	34	C/D		F		F		F		F
Great Island	1-16	34	C/D	P			F	P		P	
Griswold Point	1-17	34	C/D	P			F	P		P	
Barn Island Hunting Area	1-18	38	D	P			F	P		P	

* Failures due to Lack of Adequate Available Surface Area

\+ All Sites Failing Ecological Primary Screening are Allowed to Pass to Secondary Screening Evaluation

TABLE 2 (Cont.)
APPLICATION OF PRIMARY SCREENING ANALYSIS

CATEGORY: II. Municipal Waste Water Treatment Facilities

SITE			PRIMARY SCREENING ANALYSIS			
Name of Site	Ste. No.	Quad/Map	Bathy-metry*	Ecological Areas+	Public Beaches	Pass/Fail
Port Jefferson	2-1	11 B	F	P	P	F
San Remo	2-2	10 B	F	F	P	F
Northport	2-3	9 A/B	F	P	P	F
Huntington	2-4	8 A	F	P	P	F
Oyster Bay	2-5	7 A	F	F	P	F
Glen Cove	2-6	2 A	F	P	P	F
Roslyn	2-7	2 A	F	P	P	F
Port Washington	2-8	2 A	F	F	F	F
Great Neck	2-9	2 A	F	F	P	F
Great Neck (V)	2-10	2 A	F	F	P	F
Little Neck	2-11	2 A	P	F	P	P
Tallman Island	2-12	1 A	P	P	P	P
City - Hart Island	2-13	1 A	P	P	P	P
New Rochelle	2-14	5 A	P	P	P	P
Mamaroneck	2-15	6 A	F	P	P	F
Greenwich	2-16	16 A	P	P	P	P
Stamford	2-17	17 A	F	P	P	F
Darien	2-18	18 A	P	P	P	P
Norwalk	2-19	18 A	F	P	P	F
Bridgeport-West Side	2-20	24 B	P	F	P	P
Bridgeport-East Side	2-21	24 B	F	P	P	F
Stratford	2-22	24 B	P	F	P	P
Milford-Gulf Pond	2-23	25 B	F	F	P	F
West Haven	2-24	29 B/C	P	F	P	P
New Haven-Blvd.	2-25	29 B/C	P	P	P	P
New Haven-East St.	2-26	29 B/C	P	P	P	P
New Haven-East Side	2-27	29 B/C	P	P	P	P
Branford	2-28	30 C	F	F	P	F
New London-Riverside Plant	2-29	above 36 D	P	P	P	P
New London-Trumbull St.	2-30	36 D	P	F	P	P
City of Groton	2-31	36 D	F	F	P	F

* Failures due to Lack of Adequate Available Surface Area

\+ All Sites Failing Ecological Primary Screening are Allowed to Pass to Secondary Screening Evaluation

TABLE 2 (Cont.)

APPLICATION OF PRIMARY SCREENING ANALYSIS

CATEGORY III: Power Generating Stations

SITE			PRIMARY SCREENING ANALYSIS			
Name of Site	Ste. No.	Quad/Map	Bathy-metry*	Ecological Areas +	Public Beaches	Pass/Fail
Fisher Island	3-1	36 D	F	F	P	F
Southold	3-2	21 C	F	P	P	F
Shoreham	3-3	13 B	F	F	P	F
Port Jefferson	3-4	11 B	F	P	P	F
Northport	3-5	9 A/B	F	P	P	F
Glenwood	3-6	2 A	F	P	F	F
Cos Cob	3-7	17 A	P	F	P	P
South Norwalk	3-8	18 A	F	P	P	F
Norwalk Harbor	3-9	18 A	P	P	P	P
Bridgeport Harbor	3-10	24 B	F	F	P	F
Steel Point	3-11	24 B	F	F	P	F
Devon	3-12	25 B	F	F	P	F
English	3-13	29 B/C	P	P	P	P
Millstone	3-14	35 D	P	F	P	P

* Failures due to Lack of Adequate Available Surface Area

\+ All Sites Failing Ecological Primary Screening are Allowed to Pass to Secondary Screening Evaluation

TABLE 2 (Cont.)

APPLICATION OF PRIMARY SCREENING ANALYSIS

CATEGORY IV: Corps Navigation Projects with Jetties or Breakwaters

SITE			PRIMARY SCREENING ANALYSIS			
Name of Site	Ste No.	Quad/Map	Bathy-metry*	Ecological Areas *	Public Beaches	Secondary Screening
Mattituck Harbor	4-1	20 C	P	P	F	F
Mt. Sinai Harbor	4-2	11 B	F	P	F	F
Port Jefferson Harbor	4-3	11 B	P	P	P	P
Hempstead Harbor	4-4 a	2 A	P	P	P	P
Hempstead Harbor	4-4 b	2 A	P	P	P	P
Flushing Bay & Creek	4-5	1 A	P	P	P	P
Glen Island	4-6	5 A	P	P	P	P
Echo Bay	4-7	5 A	P	P	P	P
Larchmont Harbor	4-8	6 A	P	P	P	P
Port Chester Harbor	4-9	6 A	P	P	P	P
Stamford Harbor	4-10	17 A	P	P	P	P
Cove Island, Stamford	4-11	17 A	P	F	F	F
Southport Harbor	4-12	23 B	P	F	F	F
Black Rock Harbor, Bridgeport	4-13	24 B	P	P	P	P
Bridgeport Harbor	4-14	24 B	P	P	P	P
Housatonic River, Stratford	4-15	25 B	P	P	P	P
Woodmont Shore, Milford	4-16	26 B	P	P	F	F
New Haven Harbor	4-17 a	29 B	P	F	P	P
New Haven Harbor	4-17 b	26 B	P	P	P	P
Clinton Harbor	4-18	32 C	P	P	P	P
Duck Island Harbor	4-19	33 C	P	P	P	P
Conn. River, Saybrook	4-20	34 D/C	P	P	P	P
Stonington Harbor	4-21	37 D	P	P	P	P

* Failures due to Lack of Adequate Available Surface Area

\+ All Sites Failing Ecological Primary Screening are Allowed to Pass to Secondary Screening Evaluation

TABLE 2 (Cont.)

APPLICATION OF PRIMARY SCREENING ANALYSIS

CATEGORY V: Industrial Wastewater Discharges

SITE			PRIMARY SCREENING ANALYSIS			
Name of Site	Ste. No.	Quad/Map	Bathy-metry*	Ecological Areas +	Public Beaches	Pass/Fail
Long Island Tungsten - Metal	5-1	2 A	F	P	P	F
Powers Chemco Inc. - Organic Chemicals	5-2	2 A	F	P	P	F
Electrolux - Metal Services	5-3	17 A	F	P	P	F
Remington Electric - Metal Plating	5-4	24 B	P	F	P	P
Carpenter Technology Co. Steel Mill	5-5	24 B	F	P	P	F
Avco: Lycoming	5-6	24/25 B	F	F	P	F
Schick Safety Razor Metal Plating	5-7	25 B	F	F	P	F
Sargent & Co. - Metal Services	5-8	29 B/C	P	P	P	P
Atlantic Wire Co. - Steel & Wire	5-9	30 C	F	P	P	F
Pfizer Co. - Chemical	5-10	36 D	F	F	P	F
American Velvet Co. - Textiles	5-11	37 D	P	F	F	F

* Failures due to Lack of Adequate Available Surface Area

\+ All Sites Failing Ecological Primary Screening are Allowed to Pass to Secondary Screening Evaluation

TABLE 2 (Cont.)

APPLICATION OF PRIMARY SCREENING ANALYSIS

CATEGORY VI: Petroleum Facilities

SITE			PRIMARY SCREENING ANALYSIS			
Name of Site	Ste No.	Quad/Map	Bathy-metry*	Ecological Areas+	Public Beaches	Pass/Fail
Unknown	6-1	20 C	F	P	P	F
Northville Industries	6-2	14 C/B	F	P	P	F
Swezy Oil Co. Exxon Consolidated Petroleum Co. Mobil Oil Co. Northville Industries	6-3	11 B	F	P	P	F
Huntington Utilities	6-4	8 A	F	P	P	F
Mobil Oil Co.	6-5	4 A	F	F	P	F
Commander Oil Co.	6-6	7 A	F	F	P	F
Windsor Oil Co.	6-7	2 A	F	P	P	F
Phillips Oil Co.	6-8	2 A	F	P	P	F
Lewis Oil Co. Mobil Oil Co. Auto Heat	6-9	2 A	F	P	P	F
Metropolitan Petroleum Co. Universal Utilities Wharf Sinclair Refining Co. Wells Fuel Wharf	6-10	2 A	F	P	P	F
Sun Oil Co.	6-11	5 A	F	P	P	F
Mitchell Oil Co.	6-12	6 A	P	P	F	F
Fleming Rutledge Oil Corp. Hoffman Fuel Co. Metropolitan Petroleum Corp.	6-13	17 A	F	F	P	F
Penn. Petroleum Co.	6-14	18 A	P	P	P	P
Sun Oil Co.	6-15	24 B	F	F	P	F
Connecticut Refining Co.	6-16	29 B/C	P	F	P	P
Elm City Plant No. 3	6-17	29 B/C	P	F	P	P
Atlantic Richfield Exxon Getty Oil Co. Gulf Oil Corp. New Haven Terminal T.A.D. Jones & Co., Ind.	6-18	29 B/C	P	P	P	P
City Coal Co. Central Vermont Railroad	6-19	36 D	F	F	P	F
Hess Oil Co.	6-20	36 D	P	F	P	P

* Failures due to Lack of Adequate Available Surface Area

\+ All Sites Failing Ecological Primary Screening are Allowed to Pass to Secondary Screening Evaluation

TABLE 2 (Cont.)

APPLICATION OF PRIMARY SCREENING ANALYSIS

CATEGORY VII: Sand and Gravel Pits

SITE			PRIMARY SCREENING ANALYSIS			
Name of Site	Ste. No.	Quad/Map	Bathy-metry*	Ecological Areas+	Public Beaches	Pass/Fail
Jamesport - LILCO	7-1	15 C	P	P	P	P
Huntington Harbor	7-2	8 A	F	P	P	F
Colonial Sand & Stone, Penn Ind.	7-3	2 A	P	P	P	P
Old Saybrook	7-4	33 C	F	P	P	F

* Failures due to Lack of Adequate Available Surface Area

+ All Sites Failing Ecological Primary Screening are Allowed to Pass to Secondary Screening Evaluation

TABLE 3

SUMMARY OF PRIMARY SCREENING ANALYSIS

Primary Criteria	Remaining Available Sites							Total
	1	2	3	4	5	6	7	
Total Sites	18	31	14	23	11	20	4	121
Bathymetry/Area	16	14	4	22	3	6	2	67
Ecological Areas	16 (4)	14 (9)	4 (2)	22 (19)	3 (1)	6 (3)	2 (2)	67 (40)
Public Beaches	14	14	4	18	2	5	2	59
Remaining	14	14	4	18	2	5	2	59

( ) Sites Remaining if Criteria for Ecological Areas Applies

1.12 As presented in the Interim Report, the siting criteria used for Step 3 evaluations include:

Site Specific Criterion	Weighting Factor
1. Proximity of Site to Significant Ecological Areas	10
2. Bathymetry of Site/Available Volume	9
3. Exposure Considerations	7
4. Soil/Foundation Characteristics of Site	7
5. Existing and Potential Land Use	6
6. Volume and Type of Dredged Material Available for Containment	4
7. Compatibility with Adjacent Land/Re-use Potential	2
8. Proximity of Site to Cultural Resources	2
9. Use of Site for Existing or Historic Dredged Material Disposal	1

The potential sites receive a thorough evaluation (see Table 4) for each of the factors listed above, and are assigned criteria points according to a sliding scale from 0-10, with 10 representing the most desirable characteristics. Appendix A presents the method for converting site-specific data to numerical values. Since the assumption was made that no dredged material would cross state boundaries, scoring for criteria #6 (Available Dredged Material) is different between Connecticut and New York (see pages A-6 through A-9), and thus New York and Connecticut sites will be ranked separately.

Secondary Screening of Connecticut Sites

1.13 According to the secondary siting criteria previously presented (see Appendix A), total points were determined for 43 Connecticut sites and were entered in summary matrix tables, which are subsequently presented.

TABLE 4 - SITE-SPECIFIC SECONDARY SCREENING CRITERIA

Siting Criteria

Name:_____ County:_____ Map #_____ Location#_____

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: ____ miles
   b. Lobster Locations: ____ miles
   c. Finfish Concentrations: ____ miles
   d. Waterfowl Areas: ____ miles
   e. Wetland Areas: ____ miles
   f. Water Quality Conditions: poor/fair/good

3. Bathymetry
   a. Nearshore Slope: ____ ft/mile
   b. Available Surface Area: ____ acres
   c. Available Volume Below MSL: ____ cu. yards

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: ____ %
   c. Flood Zone Area: ____ %
   d. Endangered Structures: (buildings, homes, jetties, etc.)
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: ____
   b. Permeability: ____

6. Existing and Projected Land Use (within 1 mile radius of site)
   a. Residential: ____ % ____ %
   b. Recreational: ____ % ____ %
   c. Commercial: ____ % ____ %
   d. Industrial: ____ % ____ %
   e. Wetlands: ____ % ____ %
   f. Public: ____ % ____ %
   g. Open Space: ____ % ____ %
   h. Agricultural: ____ % ____ %

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: ____ CY/year
      Within Surrounding Quads: ____ CY/year
   c. General Characteristics of Material (Phys-chem): ____

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities)
   e. Access by Land: (roads/bridges)
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation)
      (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: (closest) miles ____ (number) ____ 10 mile radius
   b. Types: (historical, archaeological, etc.)

10. Existing and Historical Spoil Disposal Location
    a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions)
    b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.)
    c. Volume of Material Previously Disposed: ____ CY

Tables 5a and 5b more specifically present the results of applying secondary criteria #6 (Volume and Types of Dredged Material Available for Containment) to the alternative sites. Using the modified gravity model concept, the force of attraction (V/2D) was calculated for each site based on: (1) the average annual projected dredged material volume (V) within each Connecticut quadrangle map, and (2) the approximate distance (D) between the shoreline area centroid of each quadrangle map and the site. Thus, for each site in question, points representing the projected annual dredged material volume (V in CY) divided by distance traveled by barge both to and from the site (2D in miles), i.e., annual CY per barge mile, are totaled. According to Table 5b, sites scoring the highest under this category tend to be located in or near areas of historically and projected significant dredging activity, such as New Haven Harbor and the Connecticut River. Sites scoring poorly under this criteria tend to be located near the western and eastern extremes of the Connecticut coastal shorefront on LIS.

1.14 Site-specific results of the ranking analysis are presented in matrix form in Table 6. Total points for each alternative site reflect the suitability of that site for locating a small-volume containment facility and provide the basis for site ranking, with the greatest number of points being most suitable, relatively speaking. For comparison purposes, Table 6 also includes the public sites previously screened in the Interim Report (the letter "P" appears before each site). Sites are ranked two ways: (1) within each of the eight categories, and (2) over all 50 Connecticut sites, public and private.

1.15 Table 7 summarizes the results of the secondary screening analysis showing the average points and range of points scored in each site category. Sites scoring highest tended to be in category #2 (municipal treatment plants), category #5 (industrial discharges), or category #8 (public sites from Interim Report). Sites scoring the lowest tended to be in category #1 (shallow water areas). In general, each category ex-

TABLE 5a

RANKING OF CONNECTICUT SITES BASED ON AVAILABLE DREDGED MATERIAL VOLUME VS. DISTANCE FROM SITE

Quad Map No.	Quad Map Name	Volume cy/year(10^3)	DISTANCE(D) IN MILES TO SITE 1-3	1-4	1-5	1-7	1-8	1-11	1-12	1-13	1-14	1-16	1-17	1-18	2-16	2-18	2-20	2-22	2-24	2-25	2-26
16	Glenville	4.2	12	13	45	53	54	59	60	68.5	68.5	69	69.5	94	1	8	24.5	28.5	41	42	43
17	Stanford	35.4	8.5	9.5	40	48.5	49.5	54	55	64	64	64.5	65	89.5	3.7	3.7	20	24	37	37.5	38.5
18	Norwalk South	42.2	1	1	32	41	42	47.5	48.5	57	57	57.5	58	82.5	11	1	13.5	17.2	27.7	30.5	31.5
23	Westport	17.7	6	5	26	34.5	35.5	41	42	51.5	51.5	52	52.5	75.5	17.5	10	7	10.5	23	23.5	24.5
24	Bridgeport	88.1	15	14	18	27	28	34.5	35.5	44	44	44.5	45	68	26	18	1	1	15	16	17
25	Milford	48.6	20	19	12	21	22	28	29	38	38	38.5	39	62	31.5	23.5	7.5	3	9	10	11
29	New Haven	347.9	30	29	5	13	14	20	21	29.5	29.5	30	31.5	55	41	33	18	13	1	1	1
30	Branford	28.8	33.5	32.5	1	7	8	14	15	23.5	23.5	24	24.5	48	46	38	23	17	7	6.7	5.7
31	Guilford	26.8	40	39	9	1	1	7.5	8.5	17	17	17.5	18	42	52	44	29	24	13	12.5	11.5
32	Clinton	47.2	46	45	16	7	6	1	1	10.5	10.5	11	11.5	35	57	49	35	30.5	20	20	19
33	Essex	51.1	53	52	22	13.5	12.5	6	5	4	4	4.5	5	28.5	64	56	42	37	26	25.7	24.7
34	Old Lyme	205.7	57	56	27	18	17	11	10	1.5	1	1	1	23.5	68.5	60.5	46	42	31.5	31	30
35	Niantic	18.0	65	64	34.5	26	25	18	17	8.5	8.5	8	7.5	14	76.5	68.5	53.5	49.5	38	38	37
36	New London	161.9	72	71	41	31.5	30.5	24	23	14.5	14.5	14	13	10.5	82.5	74.5	59.5	55.5	44	44	43
37	Mystic	16.4	77	76	47	39	38	31	30	22	22	21.5	20.5	1	89.5	81.5	66	62	52	52	51
	Watch Hill	7.0	85	84	53.5	44.5	43.5	37	36	27.5	27.5	27	26	3	95.5	88	73	69	57.5	57.5	56.5

TABLE 5a (Cont.)

RANKING OF CONNECTICUT SITES BASED ON AVAILABLE DREDGED MATERIAL VOLUME VS. DISTANCE FROM SITE

Quad Map No.	Quad Map Name	Volume cy/year(10^3)	DISTANCE(D) IN MILES TO SITE 2-27	2-29	2-30	3-7	3-9	3-13	3-14	4-10	4-13	4-14	4-15	4-17a	4-17b	4-18	4-19	4-20	4-21	5-4	5-8	6-14	6-16	6-17	6-18	6-20
16	Glenville	4.2	42.5	81.5	81.5	2	13.5	42	78	5	23	26.5	30.5	41	40	60	62	68.5	91.5	26	42	12.5	40	40.2	42	83.2
17	Stanford	35.4	38.5	71.5	71.5	1	9.5	38	73.5	1	18.5	22	27	37	35	36.5	58	64	87	21.5	38	8.5	35	35	38	79.2
18	Norwalk South	42.2	31.5	71	71	9.5	1	31	66	7	11.5	14.5	19	29.5	28	49	51.5	57	80	14	30.5	1	29	29	32	72
23	Westport	17.7	24.5	64	64	6.25	4.5	24	60	14	4.5	8	12	23	21	42.5	45	51	73	7.5	13.5	6	22	22	25	65
24	Bridgeport	88.1	17	57	57	24	12.2	17	53.2	21.5	1	1	5	15	13	35	38	44	65	1	16.5	13	14.5	14.5	17	58
25	Milford	48.6	11	51.5	51.5	29.5	17	11	47	27	9	6	1	9	8	29.5	32	38.5	60	4	10	19	9	9	16	52.5
29	New Haven	347.9	1	43	43	39	18.2	1	39	37	19	15	11	1	5	22	24	31	52	15	1	8	1	1	1	44
30	Branford	28.8	4.7	37	37	44	28	5	33	42	23	20	16	6	7	15.5	17.5	24	45	21	6	33.5	7	7	5	38
31	Guilford	26.8	11	37	30.5	49.5	32.5	11	27	40.5	30	27	21.5	12.5	13	8.5	11.5	26	40	27	12	40	13.5	13.5	11.5	31.5
32	Clinton	47.2	18	25	24	56	38.5	18	20	53	37	34	28.5	19.5	20	1	4.5	11	33.5	33.5	19	46	20	20	18	25
33	Essex	51.1	24	17.5	17.5	62.5	45	26	17	59.7	43.5	40.5	35.0	26.0	26.5	5	1	4.5	27	40	25	51.5	27	26.5	24	18.5
34	Old Lyme	205.7	29	13.5	13	67.5	51.5	29	8.5	65	48.5	45.5	40	31	31.5	10	7.5	1	21.5	44	30.5	57	31.5	31.5	29	14
35	Niantic	18.0	36	6.5	5	75	56	36	1	72	56	53	47.5	37.5	38	17	15	8.5	14.5	51.5	37	64	38	38	36	6
36	New London	161.9	42	1	1	81	69.5	42	5	78	60	57	51.5	42	44	23	21	14.5	7.5	57	43.5	70	44	44	42	1
37	Mystic	16.4	49	9	8.5	86	77	49.5	11.5	85.5	68	64.5	60	50	51	30	27	21.5	1	65	50.5	77.5	51.5	51.5	49.5	7
	Watch Hill	7.0	55	15	14	94	82	55	18	91.5	73.5	70	65	56	56	36	33.5	27	5	71	57	83	57	57	55	13.2

TABLE 5b

MATRIX FOR V/2D ATTRACTION CONNECTICUT

Quad Map No.	Quad Map Name	V/2D CONNECTICUT SITES 1-3	1-4	1-5	1-7	1-8	1-11	1-12	1-13	1-14	1-16	1-17	1-18	2-16	2-18
16	Glenville	175	161	46	39	38	36	35	31	31	30	30	22	2,100	262
17	Stanford	2,082	1,863	442	365	357	328	322	276	276	274	272	198	4,783	4,783
18	Norwalk South	21,100	21,100	659	515	502	444	435	370	370	366	363	255	1,918	21,108
23	Westport	1,475	1,770	340	256	249	215	210	171	171	170	168	117	506	885
24	Bridgeport	2,937	3,146	2,447	1,631	1,573	1,277	1,240	1,001	1,001	990	979	648	1,694	2,447
25	Milford	1,215	1,278	2,025	1,157	1,105	868	838	639	639	631	623	391	771	1,034
29	New Haven	5,798	5,998	34,790	13,381	12,425	8,697	8,283	5,897	5,897	5,798	5,522	3,163	4,243	5,271
30	Branford	430	443	14,400	2,057	1,800	1,029	960	613	613	600	588	300	313	379
31	Guilford	335	345	1,489	13,400	13,400	1,787	1,576	788	788	766	744	319	258	305
32	Clinton	513	524	1,475	3,371	3,933	23,600	23,600	2,248	2,248	2,145	2,052	674	414	482
33	Essex	482	491	1,161	1,893	2,044	4,258	5,110	6,388	6,388	5,678	5,110	896	399	456
34	Old Lyme	1,804	1,837	3,809	5,714	6,050	9,350	10,285	102,850	102,850	102,850	102,850	4,377	1,501	1,700
35	Niantic	138	141	261	346	360	500	529	1,059	1,059	1,125	1,200	643	118	131
36	New London	1,124	1,140	1,974	2,570	2,654	3,373	3,520	5,583	5,583	5,782	6,227	7,710	981	1,087
37	Mystic	106	108	174	210	216	265	273	373	373	381	400	8,200	92	101
	Watch Hill	41	42	65	79	80	95	97	127	127	130	135	1,167	37	40
	TOTAL	39,755	40,387	65,558	46,984	46,786	56,122	57,333	128,414	128,414	127,716	127,263	29,080	20,078	40,463
	POINTS	2	2	4	3	3	3	3	8	8	8	8	1	1	2

TABLE 5b (Cont.)

MATRIX FOR V/2D ATTRACTION CONNECTICUT

Quad Map No.	Quad Map Name	V/2D CONNECTICUT SITES 2-20	2-22	2-24	2-25	2-26	2-27	2-29	2-30	3-7	3-9	3-13	3-14	4-10	4-13
16	Glenville	86	73	51	50	48	49	26	26	2,100	156	50	27	420	91
17	Stanford	885	737	478	472	459	459	247	247	8,045	1,863	466	241	17,700	956
18	Norwalk South	1,562	1,226	761	691	669	669	297	297	2,221	21,100	681	320	3,014	1,834
23	Westport	1,264	843	385	377	361	361	138	138	1,416	1,967	369	148	632	1,966
24	Bridgeport	44,050	44,050	2,937	2,753	2,591	2,591	773	773	1,835	3,611	2,591	828	2,049	44,050
25	Milford	3,240	8,100	2,700	2,430	2,209	2,209	472	472	824	1,429	2,209	517	900	2,700
29	New Haven	9,664	13,381	173,950	173,950	173,950	173,950	4,045	4,045	4,460	9,558	173,950	4,460	4,701	9,155
30	Branford	626	847	2,057	2,149	2,526	3,064	389	389	327	514	2,880	436	343	626
31	Guilford	462	558	1,030	1,072	1,165	1,218	362	439	271	412	1,218	496	331	480
32	Clinton	674	773	1,180	1,180	1,242	1,311	944	983	421	613	1,311	1,180	445	638
33	Essex	608	691	983	994	1,034	1,065	1,460	1,460	409	568	983	1,503	428	587
34	Old Lyme	2,235	2,449	3,265	3,318	3,428	3,547	7,619	7,912	1,524	1,997	3,547	12,100	1,582	2,121
35	Niantic	168	182	237	237	243	250	1,385	1,800	12	16	25	9,000	125	161
36	New London	1,361	1,459	1,840	1,840	1,883	1,927	80,950	80,950	999	1,165	1,927	16,190	1,038	1,349
37	Mystic	124	132	158	158	161	167	911	965	95	106	165	713	96	121
	Watch Hill	48	51	61	61	62	64	233	250	37	43	64	194	38	48
	TOTAL	67,057	75,552	192,073	191,732	192,031	192,901	100,251	101,146	24,996	45,118	192,437	48,353	33,842	66,889
	POINTS	4	5	10	10	10	10	6	6	1	3	10	3	2	4

TABLE 5b (Cont.)

MATRIX FOR V/2D ATTRACTION CONNECTICUT

Quad Map No.	Quad Map Name	V/2D CONNECTICUT SITES 4-14	4-15	4-17[a]	4-17[b]	4-18	4-19	4-20	4-21	5-4	5-8	6-14	6-16	6-17	6-18	6-20
16	Glenville	79	69	51	52	35	34	31	22	81	50	168	53	52	50	25
17	Stanford	804	655	478	505	484	305	276	203	823	465	2,082	505	505	465	223
18	Norwalk South	1,455	1,110	715	753	430	409	370	264	1,507	692	21,100	727	727	659	293
23	Westport	1,106	738	385	421	208	197	174	121	1,180	655	1,475	402	402	354	136
24	Bridgeport	44,050	8,810	2,937	3,388	1,259	1,159	1,001	678	44,050	2,670	3,388	3,038	3,038	2,591	759
25	Milford	4,050	24,300	2,700	3,038	824	759	631	405	6,075	2,430	1,278	2,700	2,700	2,209	463
29	New Haven	11,597	15,814	86,975	57,983	7,907	7,248	5,611	3,345	11,597	173,950	21,743	173,950	173,950	173,950	3,953
30	Branford	720	900	2,400	2,057	929	823	600	320	686	2,400	430	2,057	2,057	2,880	379
31	Guilford	533	623	1,072	1,031	1,576	1,165	515	335	496	1,116	335	993	993	1,165	425
32	Clinton	694	828	1,210	1,180	23,600	5,244	2,145	704	704	1,242	513	1,180	1,180	1,311	944
33	Essex	631	730	983	964	5,110	25,550	5,677	946	639	1,022	496	946	964	1,065	1,381
34	Old Lyme	2,260	2,571	3,318	3,265	10,285	13,713	102,850	4,784	2,338	3,372	1,804	3,265	3,265	3,547	7,346
35	Niantic	170	189	240	237	529	600	1,059	621	175	243	141	237	237	250	1,500
36	New London	1,420	1,572	1,927	1,840	3,520	3,855	5,583	10,793	1,420	1,861	1,156	1,840	1,840	1,927	80,950
37	Mystic	127	137	164	161	273	304	381	8,200	126	162	106	159	159	166	1,171
	Watch Hill	50	54	63	63	97	104	130	700	49	61	42	61	61	64	265
	TOTAL	69,746	59,100	192,593	77,538	57,066	61,469	127,034	32,441	71,946	192,391	56,257	192,113	192,130	192,653	100,213
	POINTS	4	3	10	5	3	4	8	2	4	10	3	10	10	10	6

TABLE 6

SUMMARY MATRIX FOR SITE-SPECIFIC EVALUATION OF POTENTIAL SITES IN CONNECTICUT

CRITERIA	(Weight Factor)	Sub-Criteria	Total Pts. Possible	Connecticut Sites																
				1-3	1-4	1-5	1-7	1-8	1-11	1-12	1-13	1-14	1-16	1-17	1-18	2-16	2-18	2-20	2-22	2-24
Proximity to Sensitive Ecological Areas (SEA's)	(10)	A	(2)	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0
		B	(2)	20	20	20	0	0	0	0	10	10	0	0	0	10	10	20	10	20
		C	(2)	10	10	10	0	0	0	0	0	10	0	0	0	10	0	10	10	0
		D	(2)	20	10	10	20	20	0	0	0	0	0	0	0	20	20	10	0	10
		E	(2)	0	0	20	0	0	0	0	0	0	0	0	0	20	20	20	0	20
		Subtotal	(10)	50	40	60	20	20	0	0	10	20	0	0	0	70	50	60	20	50
Bathymetry of Site	(9)	A	(10)	27	27	63	72	36	90	45	36	36	90	36	90	9	27	9	36	27
Exposure Considerations	(7)	A	(3)	14	14	14	0	0	14	14	14	14	14	21	21	21	14	21	21	14
		B	(3)	21	21	0	0	0	0	0	21	21	21	21	21	21	21	21	21	0
		C	(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		D	(2)	7	7	7	0	0	0	7	0	0	0	0	0	7	7	7	14	7
		Subtotal	(10)	42	42	21	0	0	14	21	35	35	35	42	42	49	42	49	56	21
Soil/Foundation Characteristics	(7)	A	(9)	0	0	63	0	0	0	0	0	0	0	0	0	0	42	0	0	21
		B	(1)	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		Subtotal	(10)	7	7	70	7	7	7	7	7	7	7	7	7	7	49	7	7	28
Existing and Potential Land Use	(6)	A	(2)	6	0	0	0	0	0	0	0	6	0	0	12	0	0	0	0	0
		B	(2)	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		C	(2)	6	12	6	6	6	6	6	6	6	12	6	0	12	0	12	12	12
		D	(2)	12	12	0	6	6	0	0	6	0	0	0	0	6	0	12	12	6
		E	(2)	6	6	12	12	12	12	12	6	12	12	12	12	6	6	12	12	12
		Subtotal	(10)	36	30	18	24	24	18	18	18	24	24	18	24	24	6	36	36	30
Volume and Types of Dredged Material Available (see Table 4-7)	(4)	A	(10)	8	8	16	12	12	12	12	32	32	32	32	4	4	8	16	20	40
Proximity to Cultural Resources	(2)	A	(10)	10	10	20	10	10	10	2	2	2	2	10	10	10	20	20	10	10
Land Reuse Potential	(2)	A	(2)	2	4	2	2	2	2	2	2	2	2	0	0	4	2	4	4	0
		B	(3)	4	4	0	4	2	0	4	0	0	0	2	4	6	6	2	4	4
		C	(3)	2	6	0	2	2	2	2	0	0	6	2	0	6	0	6	6	6
		D	(2)	0	0	0	0	0	4	2	0	0	0	0	0	2	0	0	0	2
		Subtotal	(10)	8	14	2	8	6	8	10	2	2	8	4	4	18	8	12	14	12
Use of Site for Final Disposal	(1)	A	(7)	4	4	0	0	0	0	4	4	0	0	0	0	4	0	4	4	0
		B	(3)	2	2	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0
		Subtotal	(10)	6	6	0	0	0	0	4	4	0	0	0	0	5	0	5	6	0
Total Points	(480)			194	184	270	153	106	159	119	146	178	198	149	181	196	210	160	187	218
Ranking (Within Site Group)				3	4	1	8	12	7	11	10	6	2	9	5	8	7	10	9	6
Ranking (Overall, 50 Sites)				27	29	6(b)	38	42	35	41	40	31	24	39	30	25	21	33	28	17(b)

TABLE 6 (Cont.)

SUMMARY MATRIX FOR SITE-SPECIFIC EVALUATION
OF POTENTIAL SITES IN CONNECTICUT

Connecticut Sites

CRITERIA	(Weight Factor)	Sub-Criteria	Total Pts. Possible	(P3-69) 2-25	2-26	2-27	2-29	2-30	3-7	3-9	3-13	3-14	4-10	4-13	4-14	4-15	4-17a	4-17b	4-18	4-19
Proximity to Sensitive Ecological Areas (SEA's)	(10)	A	(2)	0	10	0	0	0	0	10	0	0	0	0	0	0	0	0	10	10
		B	(2)	20	20	20	20	20	10	20	20	0	0	20	20	0	20	20	10	10
		C	(2)	10	10	10	20	10	10	10	10	0	0	10	10	0	0	0	0	0
		D	(2)	10	10	10	10	0	10	20	0	0	10	10	0	0	0	0	0	10
		E	(2)	20	20	20	20	20	0	20	20	20	20	10	0	10	20	10	10	20
		Subtotal	(10)	60	70	60	70	50	30	80	50	20	30	50	30	10	40	30	30	50
Bathymetry of Site	(9)	A	(10)	90	36	72	27	9	54	9	18	18	81	63	81	36	90	90	45	90
Exposure Considerations	(7)	A	(3)	21	21	21	21	21	21	21	21	0	14	14	14	0	14	0	14	0
		B	(3)	21	21	21	21	21	21	21	21	14	14	0	14	0	0	14	14	0
		C	(2)	14	0	14	14	14	0	0	0	14	14	0	0	14	0	14	14	14
		D	(2)	7	7	0	0	0	0	7	0	0	0	0	14	7	7	14	0	7
		Subtotal	(10)	63	49	56	56	56	42	49	42	28	42	14	42	21	21	42	42	21
Soil/Foundation Characteristics	(7)	A	(9)	21	21	21	21	0	21	0	21	63	42	21	21	0	21	42	0	21
		B	(1)	0	0	0	7	7	7	7	0	7	0	0	0	7	7	0	7	7
		Subtotal	(10)	21	21	21	28	7	28	7	21	70	42	21	21	7	28	42	7	28
Existing and Potential Land Use	(6)	A	(2)	6	6	6	0	0	0	0	6	0	0	0	6	0	0	0	0	12
		B	(2)	0	12	0	6	6	0	0	0	12	12	0	0	0	0	0	0	12
		C	(2)	6	12	6	12	12	6	6	12	12	0	6	12	0	12	0	0	0
		D	(2)	6	12	12	12	12	6	6	12	0	0	0	12	0	6	0	0	0
		E	(2)	6	12	6	6	6	12	6	12	12	12	12	12	6	12	12	6	12
		Subtotal	(10)	24	54	30	36	36	24	18	42	36	24	18	42	6	30	12	6	36
Volume and Types of Dredged Material Available (see Table 4-7)	(4)	A	(10)	40	40	40	24	24	4	12	40	12	8	16	16	12	40	20	12	16
Proximity to Cultural Resources	(2)	A	(10)	20	20	20	20	20	20	10	20	20	10	20	2	2	2	2	10	10
Land Reuse Potential	(2)	A	(2)	0	4	4	4	2	2	2	4	4	2	2	4	2	2	2	2	2
		B	(3)	6	6	6	4	4	2	4	4	2	0	4	6	0	2	0	0	0
		C	(3)	6	6	6	6	6	2	2	6	6	0	0	6	0	6	0	0	0
		D	(2)	4	2	6	0	2	0	4	2	0	2	0	4	0	4	4	2	0
		Subtotal	(10)	16	18	18	14	14	6	12	16	12	4	6	20	2	14	6	4	2
Use of Site for Existing or Historical Spoil Disposal	(1)	A	(7)	0	4	0	4	4	4	4	4	0	0	4	2	0	0	0	0	0
		B	(3)	0	1	0	1	1	1	2	2	0	0	2	1	0	0	0	0	0
		Subtotal	(10)	0	5	0	5	5	5	6	6	0	0	6	3	0	0	0	0	0
Total Points	(480)			334	313	317	280	221	213	203	255	216	241	214	257	96	265	244	156	253
Ranking (Within Site Group)				1	3	2	4	5	3	4	1	2	5	6	2	10	1	4	9	3
Ranking (Overall, 50 Sites)				1(c)	3	2(b)	5	16	20	22	11(b)	18	15	19	10	43	7	13	37	12

TABLE 6 (Cont.)

SUMMARY MATRIX FOR SITE-SPECITIC EVALUATION
OF POTENTIAL SITES IN CONNECTICUT

CRITERIA	(Weight Factor)	Sub-Criteria	Total Pts. Possible	Connecticut Sites														
				4-20	4-21	5-4	P3-69 5-8	6-14	6-17 6-16	6-18	6-20	P1-9	P1-10	P3-50	P3-58	P3-63	P3-69	P3-72 P3-71
Proximity to Sensitive Ecological Areas (SEA's)	(10)	A	(2)	0	0	0	0	0	0	10	0	0	0	0	10	0	0	0
		B	(2)	0	0	20	20	20	20	20	20	20	20	20	20	10	20	20
		C	(2)	0	10	10	10	10	10	10	10	10	20	10	10	10	10	10
		D	(2)	0	0	0	10	10	10	10	0	10	10	20	20	10	10	10
		E	(2)	10	10	20	20	0	0	20	20	20	20	10	10	20	20	20
		Subtotal	(10)	10	20	50	60	40	40	70	50	60	70	60	70	50	60	60
Bathymetry of Site	(9)	A	(10)	36	45	36	90	18	27	9	27	9	36	9	9	90	90	72
Exposure Considerations	(7)	A	(3)	0	14	21	21	14	21	21	21	21	21	14	14	14	21	21
		B	(3)	14	21	21	21	21	21	21	21	21	21	21	14	14	21	21
		C	(2)	14	14	0	14	0	0	0	14	14	14	0	7	14	14	14
		D	(2)	0	0	14	7	0	7	7	0	14	7	7	0	7	7	0
		Subtotal	(10)	28	49	56	63	35	49	49	56	63	63	42	35	49	63	56
Soil/Foundation Characteristics	(7)	A	(9)	21	42	21	21	21	21	21	0	0	0	0	0	42	21	21
		B	(1)	7	0	7	0	7	7	0	7	0	0	0	0	0	0	0
		Subtotal	(10)	28	42	28	21	28	28	21	7	0	0	0	0	42	21	21
Existing and Potential Land Use	(6)	A	(2)	0	0	6	6	6	0	6	0	6	6	6	12	6	6	6
		B	(2)	0	0	0	0	0	0	0	6	6	6	0	0	0	0	0
		C	(2)	0	0	12	6	0	12	12	12	6	6	6	12	6	6	6
		D	(2)	0	6	12	6	12	12	12	12	6	6	12	0	6	6	12
		E	(2)	12	12	12	6	12	6	12	12	0	6	6	12	0	6	6
		Subtotal	(10)	12	18	42	24	30	30	42	42	24	30	30	36	18	24	30
Volume and Types of Dredged Material Available (see Table 4-7)	(4)	A	(10)	32	8	16	40	12	40	40	24	24	24	4	8	28	40	40
Proximity to Cultural Resources	(2)	A	(10)	10	10	10	20	10	20	20	20	20	20	2	10	20	20	20
Land Reuse Potential	(2)	A	(2)	2	2	4	0	4	4	4	4	4	2	2	2	0	0	4
		B	(3)	0	0	4	6	4	6	6	4	6	6	6	6	4	6	6
		C	(3)	0	6	6	6	6	6	6	6	6	2	6	0	2	6	6
		D	(2)	0	0	4	4	2	2	2	2	2	2	2	0	4	4	6
		Subtotal	(10)	2	8	18	16	16	18	14	16	18	12	16	8	10	16	18
Use of Site for Existing or Historical Spoil Disposal	(1)	A	(7)	0	0	4	0	4	4	4	0	0	0	0	0	0	0	0
		B	(3)	0	0	2	0	2	2	1	0	0	0	0	0	0	0	0
		Subtotal	(10)	0	0	6	0	6	6	5	0	0	0	0	0	0	0	0
Total Points	(480)			158	200	262	334	195	258	270	242	218	255	163	176	307	334	317
Ranking (Within Site Group)				8	7	2	1	4	2	1	3	5	4	7	6	3	1	2
Ranking (Overall, 50 Sites)				36	23	8	1(b)	26	9	6(a)	14	17(a)	11(a)	34	32	4	1(a)	2(a)

TABLE 7

SUMMARY OF SECONDARY SITING ANALYSIS IN CONNECTICUT

Site Group	No. Sites	Average Pts. Scored		Range of Pts. Scored	Total Pts. Possible
1. Shallow Water Areas	12	170 (215)	35% (36%)	106-270 (148-267)	480 (590)
2. Treatment Plants	10	243 (326)	51% (55%)	160-334 (209-426)	480 (590)
3. Power Plants	4	222 (274)	46% (46%)	203-255 (219-363)	480 (590)
4. Corps Nav. Projects	10	208 (243)	43% (41%)	96-265 (116-345)	480 (590)
5. Industrial Discharges	2	298 (383)	62% (65%)	262-334 (342-423)	480 (590)
6. Petroleum Facilities	4	241 (328)	50% (56%)	195-270 (261-368)	480 (590)
7. Sand & Gravel	0	- (-)		- (-)	- (-)
8. Public Sites*	7	264 (332)	55% (56%)	163-334 (213-423)	480 (590)
Total	49 (49)	221 (281)	46% (48%)	106-334 (116-426)	480 (590)

( ) Criteria Points Scored Under Second Set of Weighting Factors
* Public Sites Previously Analyzed in Interim Report

hibited a wide range in site scores, so it is difficult to derive generalities about the advantages or disadvantages of sites based on the site category alone. Table 8 shows the distribution of site scores indicating the highest score as 70 percent with most sites scoring within the range 30 to 60 percent.

1.16 Table 9 presents the sites, or site groups, that scored within the top ten of all 50 Connecticut sites. As in the Interim Report, the two highest ranking sites, or site groups, are located in New Haven Harbor. In addition, sites ranked #3, 6(a), 7 and 9 are also in New Haven Harbor. Three sites (ranked #4, 8, and 10) are located near Bridgeport Harbor, one site (ranked #5) in New London on the Thames River, and one site (ranked #6b) near Branford Harbor. Figure 4 shows the approximate locations of these sites or site groups. Further discussion concerning these sites, as well as more detailed maps, are presented in a later section of this report.

Secondary Screening of New York Sites

1.17 The 21 New York sites surviving primary screening were similarly evaluated according to the secondary criteria point system in Appendix A. Tables 10a and 10b present the results of applying secondary criteria #6 (Volume and Types of Dredged Material Available for Containment), which corresponds to Tables 5a and 5b for the Connecticut sites. According to Table 10b, sites scoring the highest under this category tend to be located in or near areas of historically and projected major dredging activity, such as in the extreme western end of Long Island Sound and the Upper East River. Sites scoring poorly under this criteria tend to be located in eastern Nassau or Suffolk Counties on Long Island. Again, it is emphasized that no dredged material was assumed to cross from Connecticut to New York, or vice versa. If that were not the case, sites on Long Island would have scored higher under this criterion.

TABLE 8

DISTRIBUTION OF SITE SCORES FOR CONNECTICUT SITES

Scoring Range (%)	No. of Sites (based on 480 pts.)	No. of Sites (based on 590 pts.)
0 - 10	0	0
10 - 20	1	1
20 - 30	2	1
30 - 40	13	14
40 - 50	13	15
50 - 60	14	8
60 - 70	7	7
70 - 80	0	4
80 - 90	0	0
90 - 100	0	0
TOTAL	50	50

TABLE 9

TOP TEN RANKING SITES IN CONNECTICUT

Rank	Score %	Site No.	Name of Site	Waterway	Quad Map No.	Map
1(a)		P3-69	Bayview Park	New Haven H.	29	B
(b)	70	5-8	Sargent & Co.	New Haven H.	29	B
(c)		2-25	New Haven Blvd.*	New Haven H.	29	B
2(a)	66	P3-71, P3-72	East Shore & Nathan Hale Parks	New Haven H.	29	B
(b)		2-27	New Haven-East Side*	New Haven H.	29	B
3	65	2-26	New Haven- East St.*	New Haven H.	29	B
4	64	P3-63	Seaside Park	Bridgeport H.	24	B
5	58	2-29	Riverside Plant*	New London	36	D
6(a)	56	6-18	Oil Terminals	New Haven H.	29	B
(b)		1- 5	Kelsey Island	Branford	30	C
7	55	4-17a	Breakwater	New Haven H.	29	B
8	55	5-4	Remington Electric	Bridgeport H.	24	B
9(a)	54	6-16	Connecticut Refining Co. & Elm City Plant No. 3	New Haven H.	29	B
(b)		6-17				
10	54	4-14	Breakwaters	Bridgeport H.	24	B

* Municipal Wastewater Treatment Plant

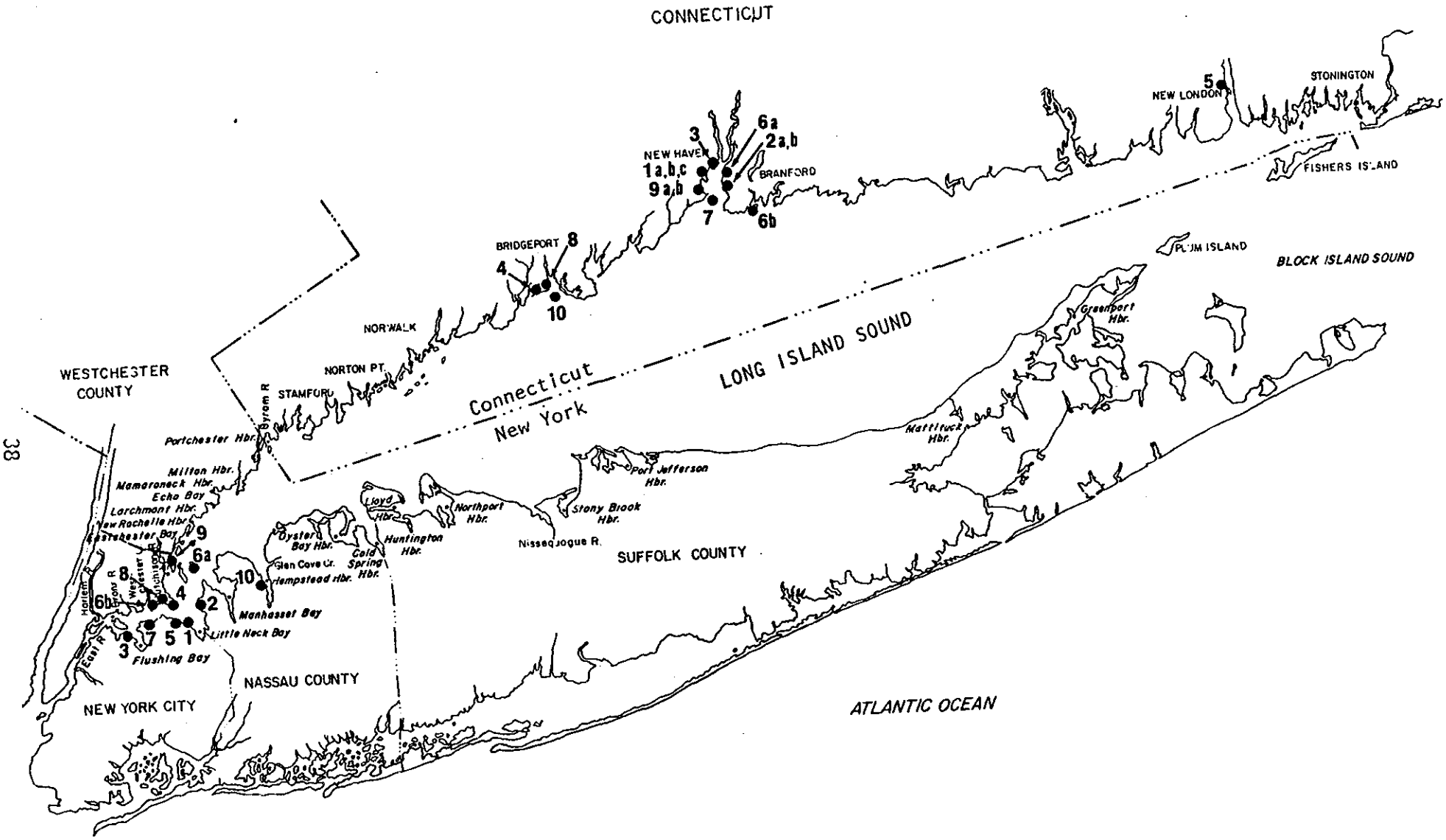

FIGURE 4 LOCATION OF TOP TEN RANKED SITES OR SITE GROUPS IN CONNECTICUT AND NEW YORK

TABLE 10a

RANKING OF NEW YORK SITES BASED ON AVAILABLE DREDGED MATERIAL VOLUME VS. DISTANCE FROM SITE

Quad Map No.	Name	Volume cy/year(10^3)	NEW YORK SITES DISTANCE(D) IN MILES 1-1	1-2	2-11	2-12	2-13	2-14	4-3	4-4	4-5	4-6	4-7	4-8	4-9	6-3	6-4	6-5	7-1	7-3
21	Southhold	0	57.5	59	71.7	75.5	71	69.5	35.2	65	77	70.5	69	61	65	34.2	54	55	12	66
20	Mattituck Hills	0	50	49.2	64.2	68	63.5	62	27.7	57.5	69.5	63	62.5	61.2	57.5	26.7	46.5	47.5	4.5	58.5
13	Wading River	2.9	36	37.5	50.5	54.2	49.7	49	14.5	45	55.5	49	49	47	45	13.2	32.7	34.5	10	45.2
11	Port Jefferson	12.4	23	23	37	41	36	35	1	31.5	43	36.5	35	34	34	1	19	21	24	32
10	Saint James	10.8	17	17	31.5	35	31	31	6.5	25	37	31	30	26.5	27.5	6.5	13	15	30	26
9	Northport	20.1	10	10	25	27.5	24	23	12	17	30	24	22.5	21.5	21	13	6.5	8	37	19
8	Lloyd Harbor	30.7	5	4.5	20	23	18	18	18	13	25	18	17	15	6	19	1	4	39	14
7	Bayville	0.1	1	1	14	16	11	10.5	25	7	8	11.5	10	8.5	6.5	26	7	6	50	8.5
2	Sea Cliff	22.7	10	10.2	6.5	8.5	4	6.5	33	1	10	5	5.5	6	9	33.5	14	12	57	1
1	Flushing	140.0	16.5	16.7	1	1	1	8	39	8	1	5	7	8.5	13	40	20	18.5	63	7.5
5	Mt. Vernon	8.0	13	13	9	8	3.5	1	35.5	6	9	1	1	3	6.5	37	17	16	60	7.5
6	Mamaroneck	32.7	9.5	10	13	13.2	8.5	5	31	6.5	15	6.5	5.5	1	1	33	14	13	55	9

TABLE 10b

MATRIX FOR V/2D ATTRACTION NEW YORK

Quad Map No.	Quad Map Name	Volume cy/year(10^3)	V/2D NEW YORK SITES 1-1	1-2	2-11	2-12	2-13	2-14	4-3	4-4 a&b	4-5	4-6	4-7	4-8	4-9
21	Southold	0	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Mattituck Hills	0	-	-	-	-	-	-	-	-	-	-	-	-	-
13	Wading River	2.9	40	38	28	26	29	29	99	32	26	29	29	30	32
11	Port Jefferson	12.4	269	269	167	151	171	176	6192	196	143	169	176	183	182
10	Saint James	10.8	316	316	170	153	173	173	827	215	145	173	179	203	195
9	Northport	20.1	1006	1006	402	365	419	437	838	591	335	419	447	468	479
8	Lloyd Harbor	30.7	3072	3413	768	667	853	853	853	1181	614	353	903	1024	2560
7	Bayville	0.1	50	50	3	3	4	4	2	7	6	4	5	5	7
2	Sea Cliff	22.7	1132	1110	1742	1332	2832	1742	343	11329	1132	2265	2059	1888	1258
1	Flushing	140.0	4242	4242	70000	70000	70000	8750	1794	8750	70000	14000	10000	8235	5384
5	Mt. Vernon	8.0	309	309	447	503	1150	4025	113	670	447	4025	4025	1341	619
6	Mamaroneck	32.7	1718	1632	1255	1236	1920	3265	526	2511	1088	2511	2968	16325	16325
	TOTAL		12,154	12,385	74,982	74,436	77,551	19,454	11,587	25,482	89,686	24,448	20,791	29,701	27,041
	Points		1	1	9	9	10	2	1	3	10	3	2	3	3

TABLE 10b (Cont.)

MATRIX FOR V/2D ATTRACTION NEW YORK

Quad Map No.	Quad Map Name	Volume cy/year(10^3)	V/2D NEW YORK SITES 6-3	6-4	6-5	7-1	7-3
21	Southold	0	-	-	-	-	-
20	Mattituck Hills	0	-	-	-	-	-
13	Wading River	2.9	109	44	41	144	31
11	Port Jefferson	12.4	6192	325	294	257	193
10	Saint James	10.8	827	413	358	179	206
9	Northport	20.1	774	1548	1257	271	529
8	Lloyd Harbor	30.7	808	15360	3840	393	1097
7	Bayville	0.1	1	7	8	1	5
2	Sea Cliff	22.7	338	809	944	198	11329
1	Flushing	140.0	1750	3500	3783	1111	9333
5	Mt. Vernon	8.0	108	236	251	67	536
6	Mamaroneck	32.7	494	1166	1255	296	1813
	TOTAL		11,401	23,408	12,031	2,917	25,071
	POINTS		1	3	1	0	3

1.18 Site-specific results of the ranking analysis for New York sites are presented in matrix form in Table 11. Total points for each alternative site reflect the suitability of that site for locating a small-volume containment facility and provide the basis for site ranking, with the greatest number of points being most suitable, relatively speaking. For comparison purposes, Table 11 also includes the public sites previously screened in the Interim Report (the letter "P" appears before each site). As with Connecticut sites, New York sites are ranked two ways: (1) within each site category, and (2) over all 35 New York sites, public and private.

1.19 Table 12 summarizes the results of the secondary screening analysis showing the average points and range of points scored in each site category. Sites scoring highest tended to be in category #8 (public sites from Interim Report). Sites scoring the lowest tended to be in category #1 (shallow water area). Table 13 shows the distribution of site scores indicating the highest scores in the range 80 to 90% with most sites scoring within the range 40 to 70%.

1.20 Table 14 presents the sites, or site groups, that scored within the top ten of all 35 New York sites. As in the Interim Report, the two highest ranking sites are located near the Throgs Neck Bridge. In addition, all other sites within these top ten, except for site 7-3 (Colonial Sand & Stone) in Hempstead Harbor, are clustered around the Throgs Neck Bridge vicinity. Figure 4 shows the approximate locations of these sites, or site groups. Further discussion concerning these sites, as well as more detailed maps, are presented in a later section of this report.

TABLE 15
WEIGHTING FACTOR SENSITIVITY ANALYSIS FOR CONNECTICUT SITES

CRITERIA	Weighting Factors (1)	(2)	1-3	1-4	1-5	1-7	1-8	1-11	1-12	1-13	1-14	1-16	1-17	1-18	2-16	2-18	2-20	2-22	2-24	P3-69 2-25
Ecological	10	10	50	40	60	20	20	0	0	10	20	0	0	0	70	50	60	20	50	60
Bathymetry	9	10	30	30	70	80	40	100	50	40	40	100	40	100	10	30	10	40	30	100
Exposure	7	7	42	42	21	0	0	14	21	35	35	35	42	42	49	42	49	56	21	63
Soils	7	2	2	2	20	2	2	2	2	2	2	2	2	2	2	14	2	2	8	6
Land Use	6	7	42	35	21	28	28	21	21	21	28	28	21	28	28	7	42	42	35	28
Vol. of DM	4	9	18	18	36	27	27	27	27	72	72	72	72	9	9	18	36	45	90	90
Cultural	2	2	10	10	20	10	10	10	2	2	2	2	10	10	10	20	20	10	10	20
Reuse	2	7	28	49	7	28	21	28	35	7	7	28	14	14	63	28	42	49	42	56
Hist. Disp.	1	5	30	30	0	0	0	0	20	20	0	0	0	0	25	0	25	30	0	0
Total (1)	480		194	184	270	153	106	159	119	146	178	198	149	181	196	210	160	187	218	334
Total (2)		590	252	256	255	195	148	202	178	209	206	267	201	205	266	209	286	294	286	423
Percent (1)			40	38	56	32	22	33	25	30	37	41	31	38	41	44	33	39	45	69
of Total (2)			43	43	43	33	25	34	30	35	35	45	34	35	45	35	48	49	48	72
Ranking (1)			27	29	6(b)	38	42	35	41	40	31	24	39	30	25	21	33	28	17(b)	1(c)
Ranking (2)			26	24	25	36	40	34	39	30(a)	32	21	35	33	22(a)	30(b)	17(a)	16	17(b)	2(c)

TABLE 11 (Cont.)

SUMMARY MATRIX FOR SITE-SPECIFIC EVALUATION OF POTENTIAL SITES IN NEW YORK

CRITERIA	(Weight Factor)	Sub-Criteria	Total Pts. Possible	6-3	6-4	6-5	7-1	7-3	NEW YORK SITES P1-3	P1-4	P1-5	P1-6	P1-7	P2-6	P3-18	P3-24	P3-25	P3-26
Proximity to Sensitive Ecological Areas (SEA's)	(10)	A	(2)	20	10	0	20	20	10	10	20	20	20	20	10	20	20	20
		B	(2)	20	20	20	10	20	10	20	20	20	20	20	20	20	20	20
		C	(2)	10	20	10	0	10	10	0	10	10	10	20	20	10	10	10
		D	(2)	0	0	0	20	0	10	10	0	10	10	20	10	10	10	10
		E	(2)	20	20	20	20	20	10	20	20	20	20	20	20	20	20	20
		Subtotal	(10)	70	70	50	70	70	50	60	70	80	80	80	80	80	80	80
Bathymetry of Site	(9)	A	(10)	63	18	9	9	90	45	90	90	63	90	90	0	27	72	54
Exposure Considerations	(7)	A	(3)	21	21	21	0	21	21	21	21	21	21	21	21	21	21	21
		B	(3)	21	21	21	0	21	21	21	21	21	21	21	21	21	21	21
		C	(2)	14	14	14	14	14	14	14	14	14	14	14	14	0	14	14
		D	(2)	0	0	0	0	0	0	14	0	7	0	7	0	7	7	7
		Subtotal	(10)	56	56	56	14	56	56	70	56	62	56	63	56	49	63	63
Soil/Foundation Characteristics	(7)	A	(9)	0	21	0	42	42	63	63	63	21	42	42	63	42	42	42
		B	(1)	7	7	7	0	0	0	7	7	0	0	0	0	0	0	0
		Subtotal	(10)	7	28	7	42	42	63	70	70	21	42	42	63	42	42	42
Existing and Potential Land Use	(6)	A	(2)	0	0	0	12	0	6	6	6	6	6	0	6	6	0	6
		B	(2)	12	0	0	0	0	6	6	6	6	6	12	6	12	12	0
		C	(2)	12	12	6	12	6	12	6	12	6	12	12	6	12	12	12
		D	(2)	12	12	12	0	12	0	0	0	0	6	0	6	0	0	6
		E	(2)	12	12	6	12	12	6	6	12	6	0	6	6	12	0	12
		Subtotal	(10)	48	36	24	36	30	30	24	36	24	30	30	30	42	24	36
Volume and Types of Dredged Material Available (see Table 4-7)	(4)	A	(10)	4	12	4	0	12	12	40	36	36	40	36	8	12	12	12
Proximity to Cultural Resources	(2)	A	(10)	20	20	2	20	2	20	20	20	20	2	20	20	0	0	2
Land Reuse Potential	(2)	A	(2)	4	4	4	2	4	2	2	0	2	2	2	0	2	2	2
		B	(3)	4	4	4	4	4	4	4	6	4	0	4	4	4	4	4
		C	(3)	6	6	6	6	6	0	2	0	2	2	0	2	0	0	2
		D	(2)	2	4	4	0	4	2	2	4	2	2	2	4	0	0	0
		Subtotal	(10)	16	10	18	12	18	8	10	10	10	6	8	10	6	6	8
Use of Site for Existing or Historical Spoil Disposal	(1)	A	(7)	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4
		B	(3)	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
		Subtotal	(10)	0	0	0	0	0	0	0	0	0	0	0	0	0	6	6
Total Points	(480)			284	250	170	203	320	284	384	388	329	346	369	267	258	305	303
Ranking (Within Site Group)				1	2	3	2	1	10	2	1	6	5(a)	3	11	12	8	9
Ranking (Overall, 35 Sites)				14(a)	19	28	25	10	14(b)	2	1	8	6(a)	4	15	16	11	12

TABLE 11 (Cont.)

SUMMARY MATRIX FOR SITE-SPECIFIC EVALUATION OF POTENTIAL SITES IN NEW YORK

CRITERIA	(Weight Factor)	Sub-Criteria	Total Pts. Possible	NEW YORK SITES P3-39	P3-43	P3-44 P4-5	P3-47	P4-4	P3-27 P5-8
Proximity to Sensitive Ecological Areas (SEA's)	(10)	A	(2)	20	20	20	20	20	20
		B	(2)	20	20	20	10	20	20
		C	(2)	10	10	10	10	10	10
		D	(2)	10	10	10	20	10	10
		E	(2)	20	20	10	10	20	20
		Subtotal	(10)	80	80	70	70	80	80
Bathymetry of Site	(9)	A	(10)	90	90	81	0	0	90
Exposure Considerations	(7)	A	(3)	21	21	21	21	21	21
		B	(3)	21	21	21	21	21	21
		C	(2)	14	14	14	14	14	21
		D	(2)	7	7	0	7	7	0
		Subtotal	(10)	63	63	56	63	63	56
Soil/Foundation Characteristics	(7)	A	(9)	21	21	21	0	42	42
		B	(1)	7	0	0	7	0	0
		Subtotal	(10)	28	21	21	7	42	42
Existing and Potential Land Use	(6)	A	(2)	0	12	6	6	6	6
		B	(2)	0	0	6	6	0	0
		C	(2)	6	12	12	12	6	6
		D	(2)	6	12	6	0	6	6
		E	(2)	12	12	0	12	6	6
		Subtotal	(10)	24	36	30	36	24	24
Volume and Types of Dredged Material Available (see Table 4-7)	(4)	A	(10)	36	36	36	12	12	8
Proximity to Cultural Resources	(2)	A	(10)	20	10	10	10	20	20
Land Reuse Potential	(2)	A	(2)	2	4	0	2	0	2
		B	(3)	6	6	6	6	4	4
		C	(3)	2	0	2	0	2	2
		D	(2)	4	0	2	0	4	4
		Subtotal	(10)	14	10	10	8	10	12
Use of Site for Existing or Historical Spoil Disposal	(1)	A	(7)	0	0	4	0	4	4
		B	(3)	0	0	3	0	2	1
		Subtotal	(10)	0	0	7	0	6	5
Total Points	(480)			355	346	321	206	257	256
Ranking (Within Site Group)				4	5(b)	7	15	13	14
Ranking (Overall, 35 Sites)				5	6(b)	9	24	17	18

TABLE 12

SUMMARY OF SECONDARY SITING ANALYSIS
IN NEW YORK

Site Group	No. Sites	Average Pts. Scored	% Score	Range of Pts. Scored	Total Pts. Possible
1. Shallow Water Sites	2	106 (120)	22% (20%)	101-110 (117-123)	480 (590)
2. Treatment Plants	4	245 (292)	51% (49%)	201-335 (235-409)	480 (590)
3. Power Plants	0	- (-)	- (-)	- (-)	- (-)
4. Corps. Nav. Proj.	8	230 (268)	48% (45%)	155-370 (159-470)	480 (590)
5. Ind. Discharges	0	- (-)	- (-)	- (-)	- (-)
6. Pet. Facilities	3	235 (279)	49% (47%)	170-284 (220-339)	480 (590)
7. Sand & Gravel	2	262 (288)	55% (49%)	203-320 (210-365)	480 (590)
8. Public Sites*	16	311 (356)	65% (60%)	206-388 (242-429)	480 (590)
Total	35 (35)				480 (590)

( ) Criteria Points Scored Under Second Set of Weighting Factors
* Public Sites Previously Analyzed in Interim Report

TABLE 13

DISTRIBUTION OF SITE SCORES FOR NEW YORK SITES

Scoring Range (%)	No. of Sites (based on 480 pts.)	No. of Sites (based on 590 pts.)
0 - 10	0	0
10 - 10	0	1
20 - 30	2	2
30 - 40	3	5
40 - 50	9	10
50 - 60	7	5
60 - 70	7	5
70 - 80	5	7
80 - 90	2	0
90 - 100	0	0
TOTAL	35	35

TABLE 14

TOP TEN RANKING SITES IN NEW YORK

Rank	Score %	Site No.	Name of Site	Waterway	Quad Map No.	Map
1	81	P1-5	Fort Totten	Little Neck Bay	1	A
2	80	P1-4	U.S. Merchant Marine Ac.	Little Neck Bay	1	A
3	77	4-5	Dike	Flushing Bay	1	A
4	77	P2-6	New York State Merchant Marine Ac.	East River	1	A
5	74	P3-39	Little Bay Park	East River	1	A
6(a)	72	P1-7	U.S. Military Reservation	Long Is. Sound	1	A
(b)	72	P3-43	Ferry Point Park	East River	1	A
7	70	2-12	Tallman Island*	East River	1	A
8	69	P1-6	U.S. Naval Reservation	East River	1	A
9	67	P4-5 P3-44	Pelham Bay Park Pelham Bay Park	East Chester Bay	1	A
10	67	7-3	Colonial Sand & Stone	Hempstead H.	1	A

* Municipal Wastewater Treatment Plant

SENSITIVITY ANALYSIS FOR CRITERIA WEIGHTING FACTORS

1.21 Shown below again are the secondary siting criteria used for Step 3 evaluations:

Site Specific Criterion	Weighting Factors (1)	(2)	Change
1. Proximity of Site to Significant Ecological Areas	10	10	0
2. Bathymetry of Site/Available Volume	9	10	+1
3. Exposure Considerations	7	7	0
4. Soil/Foundation Characteristics of Site	7	2	-5
5. Existing and Potential Land Use	6	7	+1
6. Volume and Type of Dredged Material Available for Containment	4	9	+5
7. Compatibility with Adjacent Land/Re-use Potential	2	7	+5
8. Proximity of Site to Cultural Resources	2	2	0
9. Use of Site for Existing or Historic Dredged Material Disposal	1	5	+4

1.22 Step 3 of the siting methodology uses two distinct sets of numerical values and care should be taken not to confuse them. Weighting Factors are assigned to the criteria listed above according to the estimated relative importance of each factor. Criteria Points represent the physical and geographic characteristics of the alternative sites, in relation to optimal conditions. In the summary matrix tables, these two numbers are multiplied for each entry for the respective alternative sites. (Details for the criteria point calculation system are presented in Appendix A.)

1.23 In the application of the siting methodology to public sites in the Interim Report, it became clear that the prioritizing of screening criteria, i.e., the weighting of criteria importance, is a subjective process and should be based on a coordinated effort between the Corps and the various concerned agencies, institutions, environmental groups and individuals. Towards the goal of better understanding the importance of the weighting factors in determining site acceptability, a sensitivity analysis of the criteria weighting factors is presented in this report for all sites examined under the secondary screening process.

1.24 The weighting factors shown above include two sets. The first set is that used in the Interim Report and in evaluating the additional sites in this report. The second set is the result of a re-evaluation of the siting criteria by the planning team based on the results of the secondary siting exercise. In specifying the first set of weighting factors, the heaviest weight was given to ecological impact considerations relative to all other factors. Weights for the remaining eight criteria were spread over the range from 9 to 1, as shown above. For the new set of weighting factors, criteria addressing the engineering/economic (#2, 6) and compatibility (#5, 7, 9) factors were given additional weight relative to the ecological impact criterion. Less weight was given to soil/foundation characteristics (#4) due to lack of adequate and consistent data on submarine soils. Finally, the weighting factors for criteria #1, 3 and 8 were judged to be appropriate relative to the remaining criteria.

1.25 Using the second set of weighting factors (which lend greater emphasis to engineering, economic, and land use compatibility factors relative to environmental impact considerations) new summary matrix tables were prepared for Connecticut and New York sites. Tables 15 and 16 compare the total points scored, the percent of total possible points

TABLE 15
WEIGHTING FACTOR SENSITIVITY ANALYSIS FOR CONNECTICUT SITES

CRITERIA	Weighting Factors (1)	(2)	1-3	1-4	1-5	1-7	1-8	1-11	1-12	1-13	1-14	1-16	1-17	1-18	2-16	2-18	2-20	2-22	2-24	P3-69 2-25
Ecological	10	10	50	40	60	20	20	0	0	10	20	0	0	0	70	50	60	20	50	60
Bathymetry	9	10	30	30	70	80	40	100	50	40	40	100	40	100	10	30	10	40	30	100
Exposure	7	7	42	42	21	0	0	14	21	35	35	35	42	42	49	42	49	56	21	63
Soils	7	2	2	2	20	2	2	2	2	2	2	2	2	2	2	14	2	2	8	6
Land Use	6	7	42	35	21	28	28	21	21	21	28	28	21	28	28	7	42	42	35	28
Vol. of DM	4	9	18	18	36	27	27	27	27	72	72	72	72	9	9	18	36	45	90	90
Cultural	2	2	10	10	20	10	10	10	2	2	2	2	10	10	10	20	20	10	10	20
Reuse	2	7	28	49	7	28	21	28	35	7	7	28	14	14	63	28	42	49	42	56
Hist. Disp.	1	5	30	30	0	0	0	0	20	20	0	0	0	0	25	0	25	30	0	0
Total (1)	480		194	184	270	153	106	159	119	146	178	198	149	181	196	210	160	187	218	334
Total (2)		590	252	256	255	195	148	202	178	209	206	267	201	205	266	209	286	294	286	423
Percent (1)			40	38	56	32	22	33	25	30	37	41	31	38	41	44	33	39	45	69
of Total (2)			43	43	43	33	25	34	30	35	35	45	34	35	45	35	48	49	48	72
Ranking (1)			27	29	6(b)	38	42	35	41	40	31	24	39	30	25	21	33	28	17(b)	1(c)
Ranking (2)			26	24	25	36	40	34	39	30(a)	32	21	35	33	22(a)	30(b)	17(a)	16	17(b)	2(c)

TABLE 15 (Cont.)

WEIGHTING FACTOR SENSITIVITY ANALYSIS

FOR CONNECTICUT SITES

CRITERIA	Weighting Factors (1)	(2)	P3-71 2-26	2-27	2-29	2-30	3-7	3-9	3-13	3-14	4-10	4-13	4-14	4-15	4-17[a]	4-17[b]	4-18	4-19	4-20	4-21
Ecological	10	10	70	60	70	50	30	80	50	20	30	50	30	10	40	30	30	50	10	20
Bathymetry	9	10	40	80	30	10	60	10	20	20	90	70	90	40	100	100	50	100	40	50
Exposure	7	7	49	56	56	56	42	49	42	28	42	14	42	21	21	42	42	21	28	49
Soils	7	2	6	6	8	2	8	2	6	20	12	6	6	2	8	12	2	8	8	12
Land Use	6	7	63	35	42	42	28	21	49	42	28	21	49	7	35	14	7	42	14	21
Vol. of DM	4	9	90	90	54	54	9	27	90	27	18	36	36	27	90	45	27	36	72	18
Cultural	2	2	20	20	20	20	20	10	20	20	10	20	2	2	2	2	10	10	10	10
Reuse	2	7	63	63	49	49	21	42	56	42	14	21	70	7	49	21	14	7	7	28
Hist. Disp.	1	5	25	0	25	25	25	30	30	0	0	30	15	0	0	0	0	0	0	0
Total (1)	480		313	317	280	221	213	203	255	216	241	214	257	96	265	244	156	253	158	200
Total (2)		590	426	410	355	309	243	271	363	219	244	268	340	116	345	266	182	274	189	208
Percent (1)			65	66	58	46	44	42	53	45	50	45	54	20	55	51	33	53	33	42
Percent (2)			72	69	60	52	41	46	62	37	41	45	58	19	58	45	31	46	32	35
Ranking (1)			3	2(b)	5	16	20	22	11(b)	18	15	19	10	43	7	13	37	12	36	23
Ranking (2)			1	3(b)	7	14	28	19	6	27	27	20	11	41	9	22(b)	38	18	37	31

TABLE 15 (Cont.)

WEIGHTING FACTOR SENSITIVITY ANALYSIS

FOR CONNECTICUT SITES

CRITERIA	Weighting Factors (1)	(2)	5-4	P3-69 5-8	6-14	6-17 6-16	6-18	6-20	P1-9	P1-10	P3-50	P3-58	P3-63	P3-69	P3-72 P3-71
Ecological	10	10	50	60	40	40	70	50	60	70	60	70	50	60	60
Bathymetry	9	10	40	100	20	30	10	30	10	40	10	10	100	100	80
Exposure	7	7	56	63	35	49	49	56	63	63	42	35	49	63	56
Soils	7	2	8	6	8	8	6	2	0	0	0	0	12	6	6
Land Use	6	7	49	28	35	35	49	49	28	35	35	42	21	28	35
Vol. of DM	4	9	36	90	27	90	90	54	54	54	9	18	63	90	90
Cultural	2	2	10	20	10	20	20	20	20	20	2	10	20	20	20
Reuse	2	7	63	56	56	63	49	56	63	42	56	28	35	56	63
Hist. Disp.	1	5	30	0	30	30	25	0	0	0	0	0	0	0	0
Total (1)	480		262	334	195	258	270	242	218	255	163	176	307	334	317
Total (2)		590	342	423	261	365	368	317	298	324	214	213	350	423	410
Percent of Total (1)			55	69	41	54	56	50	45	53	34	37	64	69	66
Percent of Total (2)			58	72	44	62	62	54	51	55	36	36	59	72	69
Ranking (1)			8	1(b)	26	9	6(a)	14	17(a)	11(a)	34	32	4	1(a)	2(a)
Ranking (2)			10	2(b)	23	5	4	13	15	12	28	29	8	2(a)	3(a)

TABLE 16

WEIGHTING FACTOR SENSITIVITY ANALYSIS FOR NEW YORK SITES

CRITERIA	Weighting Factors (1)	(2)	1-1	1-2	2-11	2-12	2-13	2-14	PS-2 4-3	4-4(a)	4-4(b)	4-5	4-6	4-7	4-8	4-9	6-3	6-4	6-5
Ecological	10	10	10	10	50	80	60	50	50	40	50	100	40	40	50	70	70	70	50
Bathymetry	9	10	10	30	20	90	30	50	40	40	90	100	60	20	30	20	70	20	10
Exposure	7	7	42	21	56	56	28	49	42	56	56	56	49	35	49	42	56	56	56
Soils	7	2	2	2	12	8	8	2	8	12	12	8	8	8	8	2	2	8	2
Land Use	6	7	28	21	21	35	21	28	14	35	42	42	21	14	7	35	56	42	28
Vol. of DM	4	9	9	9	81	81	90	18	9	27	27	90	27	18	27	27	9	27	9
Cultural	2	2	10	10	10	10	2	10	20	2	2	2	2	10	10	10	20	20	2
Reuse	2	7	14	14	7	49	28	28	35	49	56	42	35	14	14	21	56	35	63
Hist. Disp.	1	5	0	0	0	0	0	0	40	0	30	30	0	0	0	0	0	0	0
Total (1)	480		110	101	232	335	211	201	210	232	301	370	213	155	161	195	284	250	170
Total (2)		590	123	117	257	409	267	235	258	261	335	470	242	159	195	227	339	278	220
Percent of Total (1)			23	21	48	69	44	42	44	48	63	77	44	32	34	41	59	52	35
Percent of Total (2)			21	20	44	69	45	40	44	44	57	79	41	27	33	38	57	47	37
Ranking (1)			31	32	20(a)	7	22	26	23	20(b)	13	3	21	30	29	27	14(a)	19	28
Ranking (2)			33	34	25	8	21	27	24	23	15	1	26(b)	32	31	28	14	19	29

TABLE 16 (Cont.)

WEIGHTING FACTOR SENSITIVITY ANALYSIS FOR NEW YORK SITES

CRITERIA	Weighting Factors (1)	(2)	7-1	7-3	P1-3	P1-4	P1-5	P1-6	P1-7	P2-6	P3-18	P3-24	P3-25	P3-26	P-3-39	P3-43	P3-44 P4-5	P3-47	P4-4	P3-27 P5-8
Ecological	10	10	70	70	50	60	70	80	80	80	80	80	80	80	80	80	70	70	80	80
Bathymetry	9	10	10	100	50	100	100	70	100	100	0	30	80	60	100	100	90	0	0	100
Exposure	7	7	14	56	56	70	56	63	56	63	56	49	63	63	63	63	56	63	63	56
Soils	7	2	12	12	18	20	20	6	12	12	18	12	12	12	8	6	6	2	12	12
Land Use	6	7	42	35	35	28	42	28	35	35	35	49	28	42	28	42	35	42	28	28
Vol. of DM	4	9	0	27	27	90	81	81	90	81	18	27	27	27	81	81	81	27	27	18
Cultural	2	2	20	2	20	20	20	20	2	20	20	0	0	2	20	10	10	10	20	20
Reuse	2	7	42	63	28	35	35	35	21	28	35	21	21	28	49	35	35	28	35	42
Hist. Disp.	1	5	0	0	0	0	0	0	0	0	0	0	6	30	0	0	35	0	30	25
Total (1)	480		203	320	284	384	388	329	346	369	267	258	305	303	355	346	321	206	257	256
Total (2)		590	210	365	284	423	424	383	396	419	262	268	317	344	429	417	418	242	295	381
Percent of Total (1)			42	67	59	80	01	69	72	77	56	54	64	63	74	72	67	43	54	53
Percent of Total (2)			36	62	48	72	72	65	67	71	44	45	54	58	73	71	71	41	50	65
Ranking (1)			25	10	14(b)	2	1	8	6(a)	4	15	16	11	12	5	6(b)	9	24	17	18
Ranking (2)			30	12	18	4	3	10	9	5	22	20	16	13	2	7	6	26(a)	17	11

scored (480 for method (1) and 590 for method (2)), and the overall ranking of each site for the two sets of weighting factors for Connecticut and New York, respectively. In addition to the comparisons shown in Tables 15 and 16, Tables 7, 8, 12 and 13 previously presented allow further observations to be made on the sensitivity of site scoring to changes in the weighting factors.

1.26 On an overall basis, the average percent scores of each site category did not change appreciably, nor did the distribution of site scores based on percent of total. In short, the sensitivity of the secondary screening and ranking process does not appear to be significant, at least based on the two sets of weighting factors tested. Table 17 presents a cross reference of site ranking for the sites originally ranked in the top ten for Connecticut and New York (see Tables 9 and 14). It is observed that, except for sites 1-5, 3-13 and 4-14 in Connecticut and site 7-3 in New York, the group of sites ranked in the top ten in each state remain the same, although the order of ranking within each group changes.

1.27 Sites that scored lower under the second set of weighting factors, such as P3-63 and 1-5 in Connecticut, and P1-5 and P1-7 in New York, did so primarily due to one or all of the following reasons: (1) these sites originally scored high under the soils/foundation criterion, but the weighting factor for this criterion was substantially reduced; or (2), these sites originally scored low under the criteria for available DM volume needing containment, land reuse potential, or historical DM disposal, and the weighting factors for these criteria were substantially increased. Sites that scored higher under the second set of weighting factors, such as 3-13 in Connecticut and P3-39, P4-5 and P3-44 in New York did so for the opposite of the reasons given above.

1.28 As previously stated, the specification of weighting factors has involved a certain amount of subjective reasoning on the part of the

TABLE 17

SUMMARY OF WEIGHTING FACTOR
SENSITIVITY ANALYSIS

CONNECTICUT

SITE NO.	Ranking (1)	Ranking (2)
P3-69	1(a)	2(a)
5-8	1(b)	2(b)
2-25	1(c)	2(c)
P3-71, P3-72	2(a)	3(a)
2-27	2(b)	3(b)
2-26	3	1
P3-63	4	8
2-29	5	7
6-18	6(a)	4
1-5	6(b)	25
4-17(a)	7	9
5-4	8	10
6-16, 6-17	9	5
4-14	10	11
P1-10	11(a)	12
3-13	11(b)	6

NEW YORK

SITE NO.	Ranking (1)	Ranking (2)
P1-5	1	3
P1-4	2	4
4-5	3	1
P2-6	4	5
P3-39	5	2
P1-7	6(a)	9
P3-43	6(b)	7
2-12	7	8
P1-6	8	10
P4-5, P3-44	9	6
7-3	10	12

planning team. Although the sensitivity of the site criteria scores based on the two sets of weighting factors used above was not significant, the order of ranking did change somewhat. The identification of sites worth serious examination for building a containment structure may best be approached by selecting sites that score well under two or more sets of weighting factors, as those sites given in Table 17. Further tests of weighting factor sensitivity should be made based on input from concerned agencies, municipalities, environmental groups, etc.

ANALYSIS OF THE TOP TEN RANKED SITE GROUPS IN CONNECTICUT

1.29 The use of the primary screening analysis (Step 2) reduced the number of public (133) and additional (121) sites from a total of 254 to 85 for secondary analysis (59 in Connecticut). The secondary analysis (Step 3) ranked the selected alternatives in the relative order of desirability independently for Connecticut and New York sites. This section presents maps and summarizes the site-specific information for each site or site group which ranked within the top ten for both weighting factor methods previously presented.

1.30 Table 18 presents the top ten site groups in Connecticut. A site group includes at least one site which scored within the top ten under both sets of weighting factors. For each site group, there is an accompanying location map and a brief summary description of the site group. Appendix B presents tables for each site which summarize the site-specific information used to develop the secondary screening analysis.

Site Group No. 1 - New Haven Harbor

1.31 Site Group No. 1 consists of a public site (Bayview Park) previously analyzed in the Interim Report, two municipal wastewater

TABLE 18

TOP TEN SITE GROUPS IN CONNECTICUT

Group No.	Ranking (1)	Ranking (2)	Site No.	Name of Site	Figure No.
1	1(a)	2(a)	P3-69	Bayview Park	5
	(b)	(b)	5-8	Sargent & Co.	
	(c)	(c)	2-25	New Haven Blvd.*	
	3	1	2-26	New Haven - East St.*	
2	2(a)	3(a)	P3-71,72	East Shore & Nathan Hale Parks	5
	(b)	(b)	2-27	New Haven - East Side*	
	11(b)	6	3-13	English - United Illuminating	
3	4	8	P3-63	Seaside Park	6
	19	20	4-13	Breakwaters - Black Rock H.	
	10	11	4-14	Breakwaters - Bridgeport H.	
	8	10	5-4	Remington Electric	
4	11(a)	12	P1-10	U.S. Coast Guard Academy	7
	5	7	2-29	Riverside Plant*	
5	6(a)	4	6-18	Oil Terminals - Atlantic Richfield Exxon Getty Oil Co. Gulf Oil Corp. New Haven Terminal	5
6	6(b)	25	1-5	Kelsey Island	8
7	7	9	4-17a	Breakwater, New Haven H.	5
	17(b)	17(b)	2-24	West Haven*	
8	9	5	6-16	Connecticut Refining Co.	5
			6-17	Elm City Plant No. 3	

* Municipal Wastewater Treatment Plant

treatment plants, and an industrial discharge (Sargent & Co.). This area is located away from residential areas, is surrounded by major roadways, and the containment area (shown by the shaded areas in Figure 5) would be near but would not interfere with the major navigational channel and anchorage areas. This area is near waterfowl nesting areas and shellfish beds (closed), but is located away from wetlands. The combined total volume of the site available for containment of dredged material is estimated at almost 7 million cubic yards distributed over a surface area of about 275 acres. (An average maximum height of confined dredged material of 10 feet above Mean Sea Level was assumed.) The site is located in the New Haven Quad #29 which contains the highest projected volume of dredged material for all Connecticut Quads (348,000 cy/year or 3,480,000 cy in ten years). This area is located in a low wave energy and a non-critical erosion zone, and the containment dikes would serve to protect the adjacent roadways and low lying structures. The sediment characteristics of the site consist of a fine sand and silt mixture, and thus the foundation bearing capacity is likely to be poor. The land use within a 1-mile radius of the site consists of 30% residential, 10% recreational, 20% industrial, 10% wetland, and 20% open space. The site is isolated from the residential areas by a major interstate highway, institutional (treatment plants), and open lands. The areawide plan indicates the need for a recreation facility near the proposed containment site. This creates the possibility of intergrating a small boat marina and associated recreational facilities with the containment facility.

Site Group No. 2 - New Haven Harbor

1.32 Site Group No. 2 consists of two local public parks (East Shore and Nathan Hale Parks), the New Haven East Side Wastewater treatment plant, and United Illuminating's English power station. These

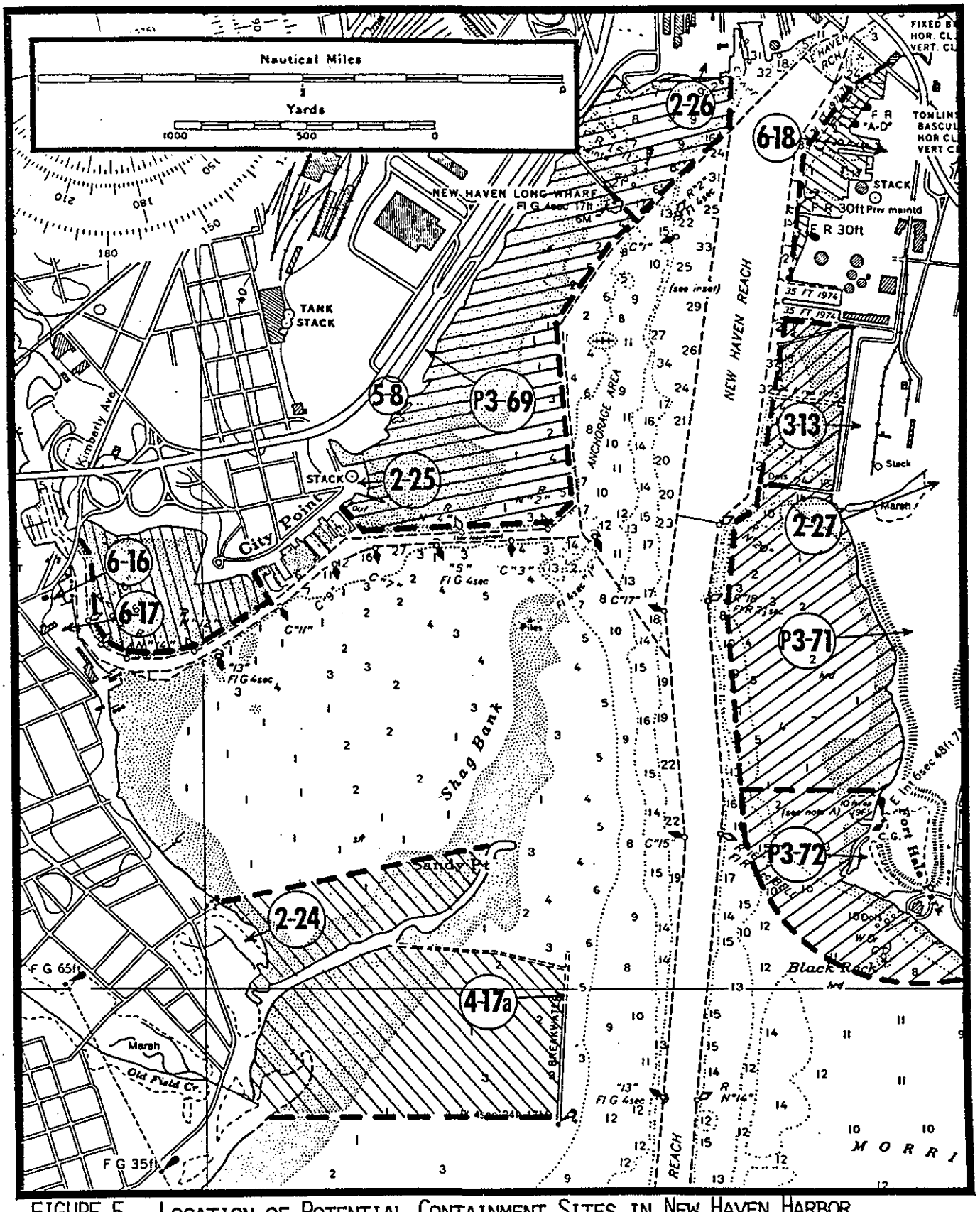

FIGURE 5 LOCATION OF POTENTIAL CONTAINMENT SITES IN NEW HAVEN HARBOR

sites are contiguously located on the east shore of New Haven Harbor as shown in Figure 5. Like Site Group No. 1, Site Group No. 2 is cut off from residential areas by open space, bluffs, and industrial areas, and the containment area would not interfere with marine navigation (if properly designed). Except for shellfish beds, there are no major ecological areas in proximity to the site. The combined total volume of the site available for containment is estimated at about 7 million cubic yards distributed over a surface area of about 264 acres. This area is located in a low wave and a non-critical erosion zone. The containment structure would serve to protect industrial and institutional structures from flood damage. Sediment characteristics consist of a fine sand and silt mixture, similar to that of Site Group No. 1. The land use within a 1-mile radius of site 3-13 (English power station) consists of 31% residential, 14% recreational, 4% commercial, 24% industrial, 20% public, and 7% open space. Access to the shoreline from land is available through secondary roads leading to the petroleum terminals, power plant, and sewage treatment facilities. In addition, there is deep water access via the main ship channel in New Haven Harbor. As the area-wide plan calls for additional recreational facilities, land created offshore from East Shore Park or Nathan Hale Park could be used to expand recreational facilities in this area, such as a new public marina.

Site Group No. 3 - Bridgeport Harbor

1.33 Site Group No. 3 consists of a public site (Seaside Park) previously analyzed in the Interim Report, two breakwaters at the entrance to Bridgeport Harbor, an industrial discharger (Remington Electric), and a Corps navigation project at the entrance to Black Rock Harbor. It is observed from Table 18 that site number 4-13 at Black Rock Harbor scored relatively poor compared to the other sites within this group. This is primarily due to unfavorable land use conditions

surrounding this site, greater exposure to waves, and the limited volume available for containment. The public site number P3-63, on the other hand, scored relatively high due to greater available containment volume and more favorable land use conditions. This site would essentially extend the present park seawall out possibly as far as the position shown in Figure 6 which would allow a maximum volume of about 8 million cubic yards over 344 acres. This land might be used to expand the park area or to develop open space for waterfowl nesting. The land use adjacent to the site consists of 15% residential, 30% recreational, 10% commerical, 15% industrial, and 30% public institutional.

1.34 Sites 4-14 and 5-4, at the entrance to Bridgeport Harbor, are protected from wave energy by the existing breakwaters, however both areas also host shellfish beds. The total available volume behind both breakwaters is approximately 3 million cubic yards distributed over about 76 acres. The projected annual volume of dredged material for the Bridgeport quadrangle is about 90,000 cy/year or 900,000 cy in ten years. Land use surrounding the harbor entrance consists of 16% residential, 16% recreational, 4.5% commercial, 22% industrial, 6.5% wetlands, 15% public, and 20% open space. Access to sites on either side of the harbor entrance is good by both water and land. The area-wide plan calls for expansion of oil storage facilities and development of the Pleasure Beach recreational facilities (marina). Properly designed containment facilities could be made compatible with such uses.

Site Group No. 4 - New London

1.35 Site Group No. 4 consists of a public site (U.S. Coast Guard Academy) and the Riverside wastewater treatment plant on the west bank of the Thames River about 5 miles upstream from the entrance to LIS. This area is a mixture of land uses, including about 50% residential, 10%

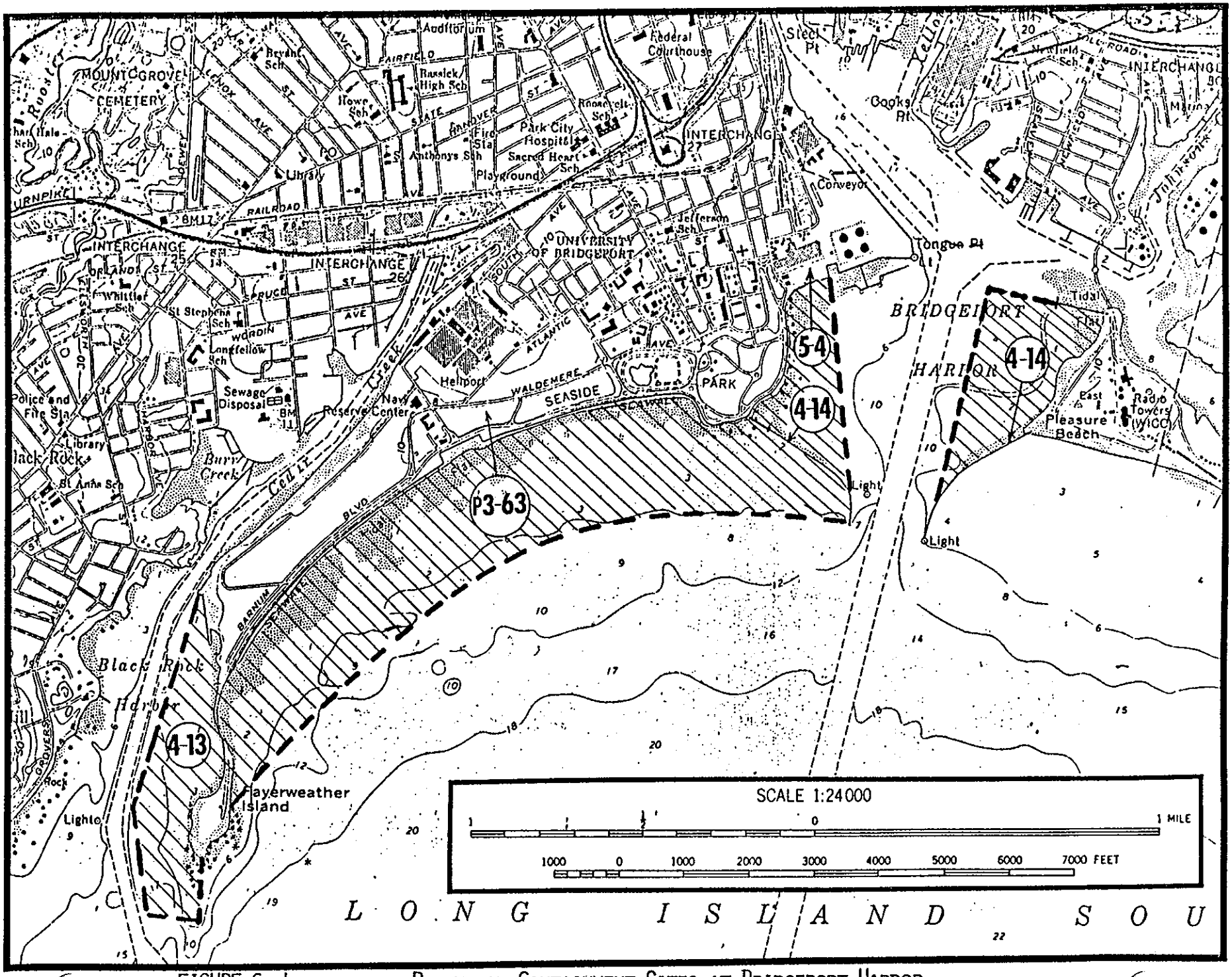

FIGURE 6 LOCATION OF POTENTIAL CONTAINMENT SITES AT BRIDGEPORT HARBOR

recreational, 10% commercial, 5% industrial, 10% institutional, and 15% open space. Railroad tracks run along the entire length of river shorefront on both banks. Shellfish beds (closed?) exist along the riverbank. The combined total volume of areas shown in Figure 7 is about 2.4 million cubic yards over a surface area of about 100 acres. The projected annual dredging within the New London quadrangle is about 160,000 cy/year or 1,600,000 cy in ten years. Sediments are composed primarily of fine sands and silts, and thus offer relatively poor foundation support, as is true of most sites examined in Connecticut. Land created by a containment structure could be used to create riverfront parkland, wildlife areas, or light industrial use.

Site Group No. 5 - New Haven Harbor

1.36 Site Group No. 5 is a conglomerate of oil handling and storage facilities on the upper east side of New Haven Harbor. Although this site scored high under most criteria, the existence of deepwater docking facilities along most of the shorefront, as well as the lack of adequate available containment area, makes this site unacceptable for a containment site.

Site Group No. 6 - Branford Harbor

1.37 Site Group No. 6 is actually a single shallow water site (Kelsey Island) near Branford Harbor as shown on Figure 8. According to Table 18 and the previous analysis on weighting factor sensitivity, this site dropped from sixth place under the first set of weighting factors to twenty-fifth place under the second set, which places greater emphasis on economic and re-use factors. In addition, this site scored the highest of all eighteen shallow water areas primarily because of the favorable sediment characteristics (rock) for foundation support,

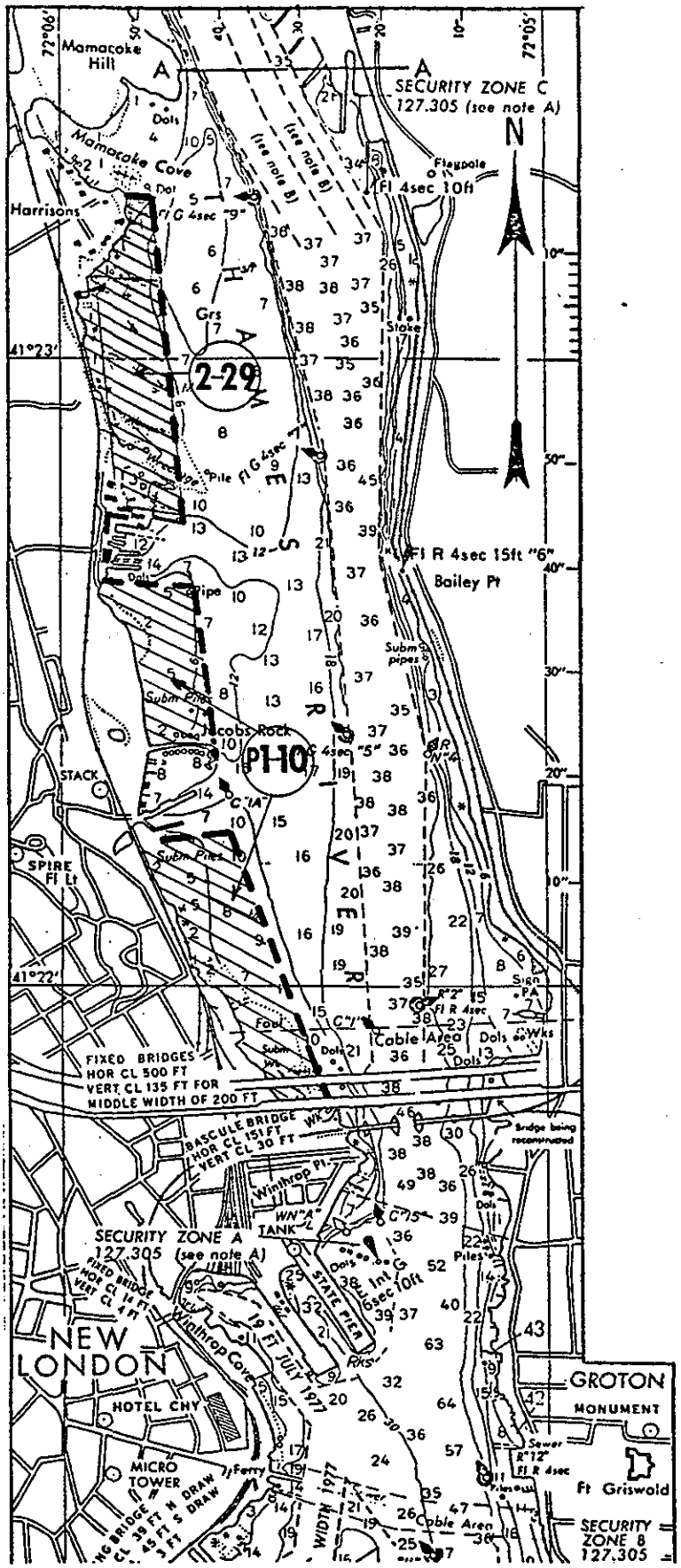

FIGURE 7 LOCATION OF POTENTIAL CONTAINMENT SITES IN NEW LONDON

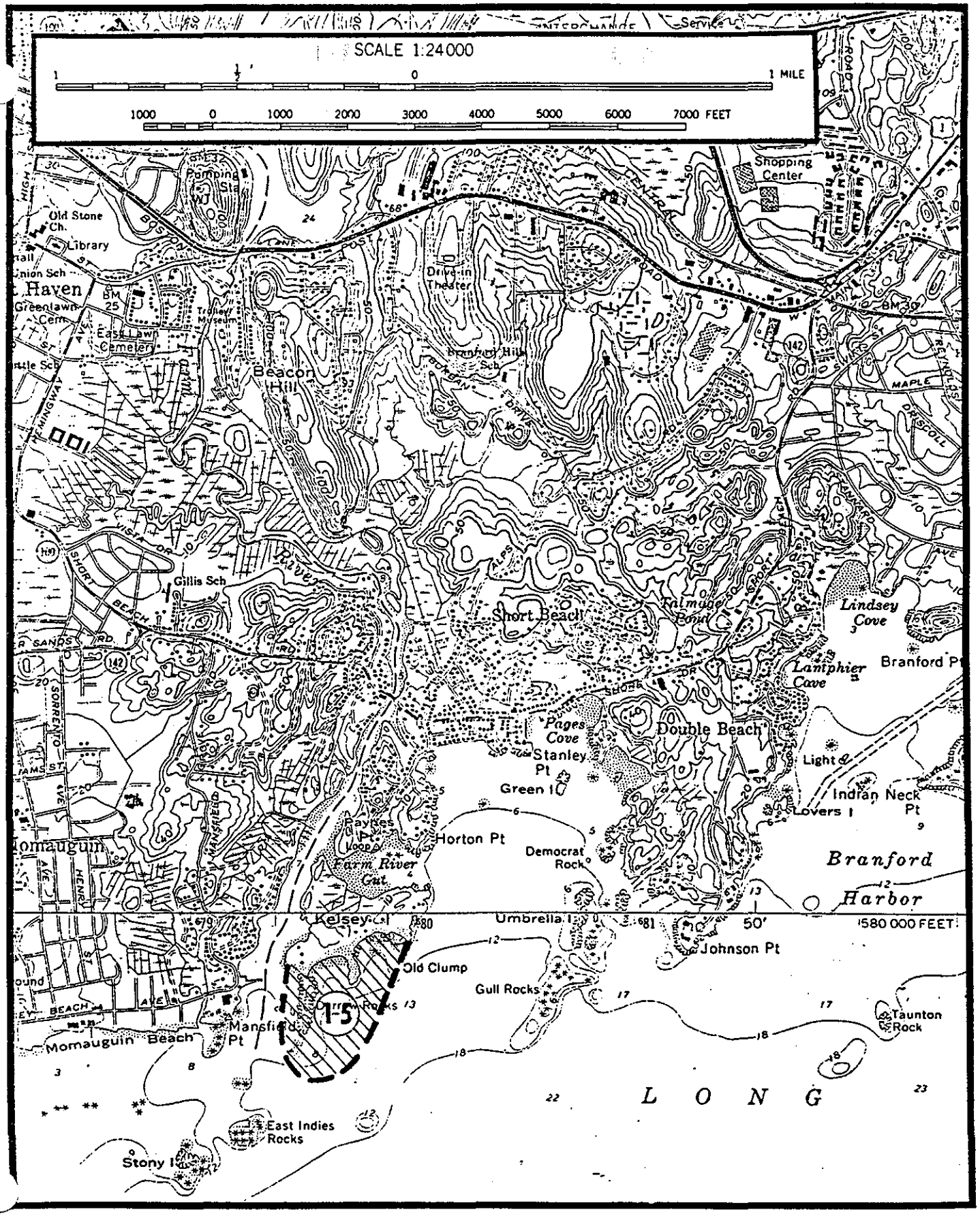

FIGURE 3 LOCATION OF POTENTIAL CONTAINMENT SITE NEAR BRANFORD HARBOR

however, the weighting factor for soil characteristics was substantially reduced. The Kelsey Island site is surrounded by residential, recreational, and open space. Shellfish beds are located at the site. The approximate volume of the containment site is 2 million cubic yards over an area of about 62 acres. The projected annual dredging in the Branford quadrangle is about 29,000 cy/year or 290,000 cy in ten years. Potential use of this site would be most probable as open land for wildlife refuge.

Site Group No. 7 - New Haven Harbor

1.38 Site Group No. 7 consists of the West Haven wastewater treatment plant and a nearby breakwater on the west side of New Haven Harbor (see Figure 5). It is observed from Table 18 that the treatment plant site (2-24) scored relatively low on the ranking scale (17th) compared to the adjacent breakwater site (4-17a) which ranked 7th and 9th under the two sets of weighting factors. The difference in scoring is primarily due to the greater available volume and surface area of site 4-17a. Together, the volume of these sites is about 4 million cubic yards, over a surface area of about 186 acres. The shoreline along this site is characterized primarily by residential use, recreational land, water related commercial, open space, and the municipal wastewater treatment facility. The shallow area enclosed within the shaded zone shown in Figure 5 is coincident with shellfish beds. The site is exposed to moderate wave energy and is in a known critical erosion area. Sediments consists of fine sands and silts. Access to this site by land is limited to secondary, residential roads. There is presently no access channel by water. The areawide plan calls for creation of new public recreational facilities (marina, fishing pier, etc.), which could be integrated with a properly planned containment facility.

Site Group No. 8 - New Haven Harbor

1.39 The last site group containing sites which scored within the top ten of all Connecticut sites consists of two oil processing facilities (6-16 and 6-17) located in the northwest corner of New Haven Harbor off City Point. The volume of this site is about one million cubic yards over an area of about 44 acres. The surrounding land use is a mixture of residential, commercial, industrial (oil facilities), and open space adjacent to a highway interchange. There is good access to this site both by land and water. Exposure considerations are minimal. Shellfish beds exist at the site and a wetlands area is located just to the north, but not immediately adjacent to, the site. The re-use potential of this site is very high as either recreational, commercial or industrial space.

ANALYSIS OF THE TOP TEN RANKED SITE GROUPS IN NEW YORK

1.40 Table 19 presents the top ten site groups in New York. For each site group, there is an accompanying location map and a brief summary description of the site group. Appendix B presents tables for each site which summarize the site-specific information used to develop the secondary screening analysis.

Site Group No. 1 - Upper East River/Little Neck Bay

1.41 Site Group No. 1 consists of the Fort Totten military base at Willets Point and the adjacent Little Bay Park under the southern approach to the Throgs Neck Bridge (see Figure 9). The surrounding land use is made up of about 50% residential, 20% recreational, 5% industrial, 10% open space, and 15% military. The residential areas are isolated from the shoreline for the most part by the Cross Island Parkway and bridge access ramps. There are no significant ecological areas associated with

TABLE 19

TOP TEN SITE GROUPS IN NEW YORK

Group No.	Ranking (1)	Ranking (2)	Site No.	Name of Site	Figure
1	1 5	3 2	P1-5 P3-39	Fort Totten Little Bay Park	9
2	2	4	P1-4	U.S. Merchant Marine Ac.	9
3	3	1	4-5	Dike, Flushing Bay	10
4	4 8	5 10	P2-6 P1-6	New York State Merchant Marine Ac. U.S. Naval Reservation	9
5	6(a)	9	P1-7	U.S. Military Reservation	11
6	6(b)	7	P3-43	Ferry Point Park	12
7	7	8	2-12	Tallman Island*	12
8	9	6	P4-5 P3-44	Pelham Bay Park Pelham Bay Park	11
9	10	12	7-3	Colonial Sand & Stone	13

* Municipal Wastewater Treatment Plant

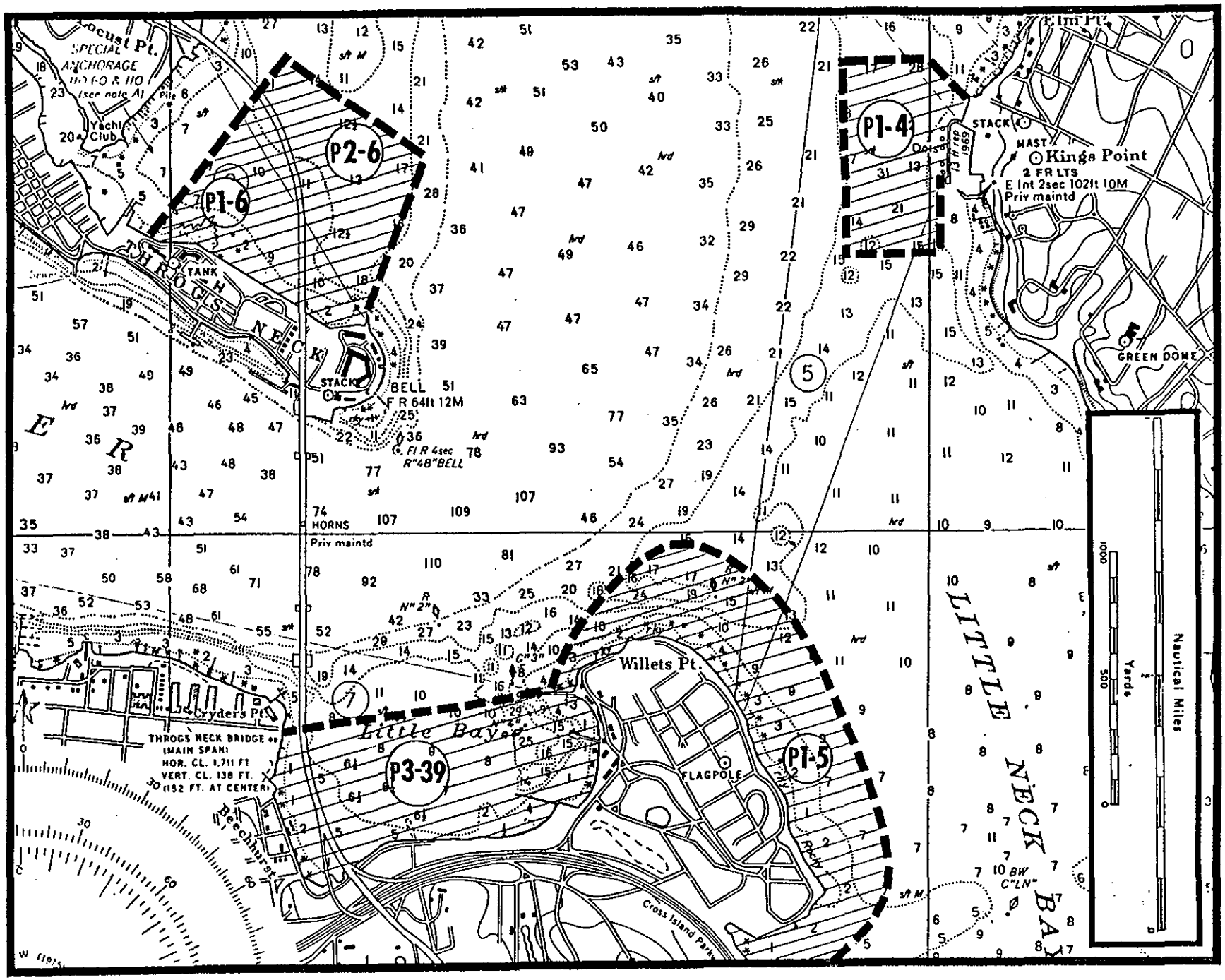

FIGURE 9 LOCATION OF POTENTIAL SITES AT THROGS NECK

these sites. The total volume estimated to be available for containment is about 10 million cubic yards over a combined surface area of 330 acres. This site group is located in the Flushing quadrangle, which has an estimated projected annual dredging volume of 140,000 cy/year or 1,400,000 cy in ten years. Exposure considerations at this site are minimal. Sediment characteristics consist of fine to coarse sands. Access by both water and land is considered excellent. The reuse potential of these sites is also considered excellent for new recreational, light industrial, or institutional expansion.

Site Group No. 2 - Kings Point

1.42 Site Group No. 2 is actually a single site P1-4, the U.S. Merchant Marine Academy at Kings Point near the mouth of Little Neck Bay (see Figure 9). Although this site scored high, the existence of docks along the entire shorefront of the site, as well as surrounding residential lands and the absence of major highways or industrial/commercial uses makes this site appear less suitable for a containment facility after a closer examination.

Site Group No. 3 - Flushing Bay

1.43 Site Group No. 3 consists of a single site 4-5 located at LaGuardia Airport in Flushing Bay, as shown in Figure 10. There are no known significant ecological areas in proximity to this site (water quality in this area is poor). The volume estimated for this site is about 10 million cubic yards, over an area of about 360 acres. Exposure considerations at this site are minimal. Land use in the surrounding area consists primarily of commercial (airport), residential (College Point) with some industrial and open space. Access by both water and land is very good. The reuse potential for this site appears to be relatively

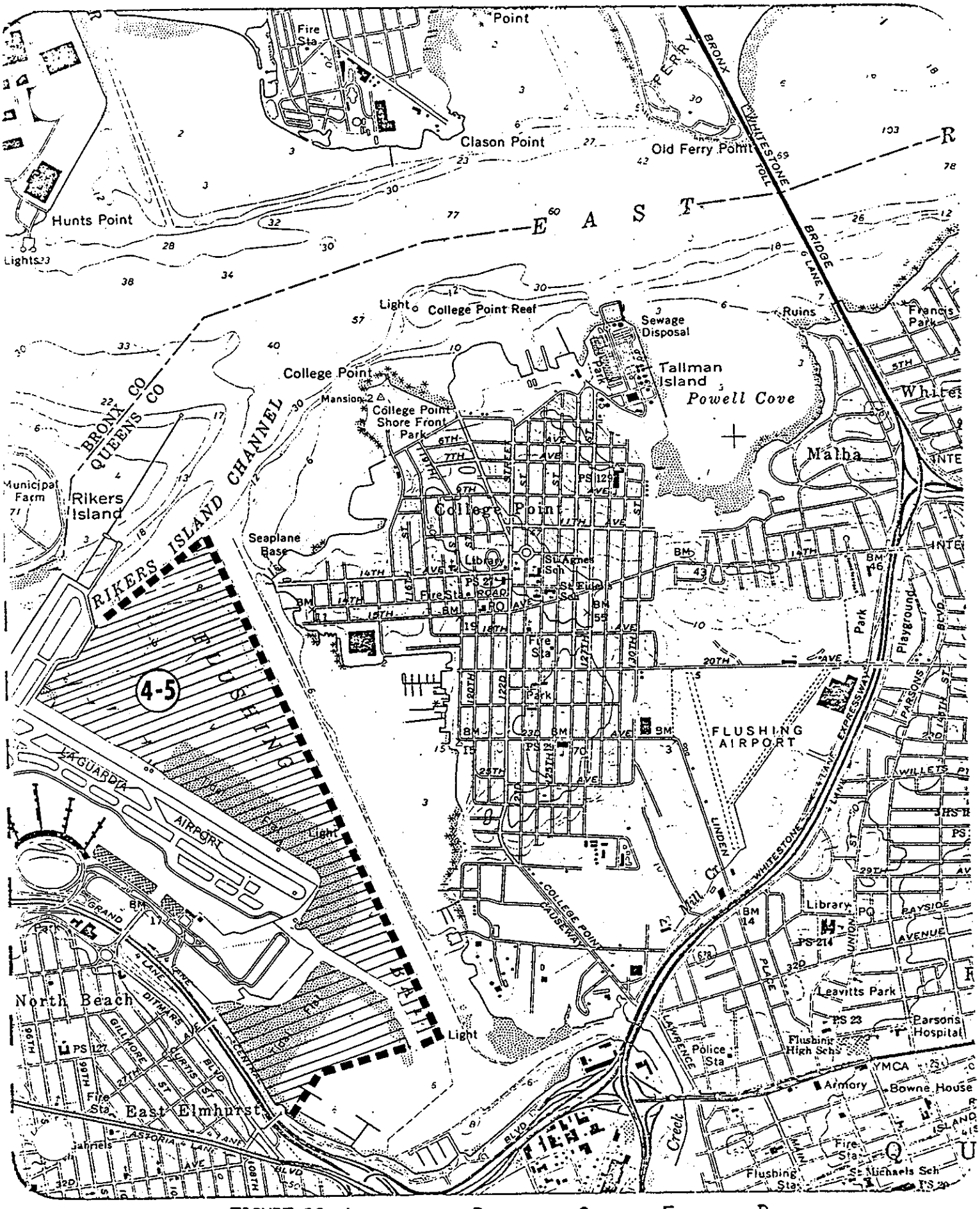

FIGURE 10 LOCATION OF POTENTIAL SITE AT FLUSHING BAY

high depending on the possible limitations or restrictions due to the adjacent LaGuardia Airport.

Site Group No. 4 - Throgs Neck

1.44 Site Group No. 4 consists of the New York State Maritime College (P2-6) and the adjacent U.S. Naval Reservation (P1-6) on Throgs Neck (see Figure 9). The site shown is located away from high residential areas, does not obstruct navigation channels, and is located directly under the Throgs Neck Bridge. There are no significant ecological areas associated with this site. The estimated volume available for containment is about 7 million cubic yards over a surface area of about 100 acres. Exposure conditions are judged to be minimal at this location. Soil characteristics consist of a fine and coarse sand mixture. The land use mixture for the adjacent shore area consists of 70% residential, 20% open space, and 10% institutional. The residential area located at Locust Point may play an important opposing role in planning a containment structure at this site. Much of the shoreline area at Locust Point is used for small boat piers and may interfere with the construction of containment in the area. However, compatibility with the Locust Point residents may be realized by constructing additional facilities and piers for boats along the containment dike which would enhance the future value of the surrounding lands. The land reuse potential for New York State Maritime College (2-6) has pro and con aspects. The New York location is characterized by: (1) a lack of adjacent industrial or commercial use in the immediate area, (2) although Route 296 is nearby, immediate site access is by secondary roads through residential areas, and (3) small boat docking facilities are located nearby. The areawide plan for this section of the Bronx (District 10) has identified the need for additional industrial area. The scarcity of industrial lands makes the development of light industry conceivable

for containment area reuse. The potential use of the site for industrial purposes would also help improve employment opportunities in this highly urbanized area.

Site Group No. 5 - Hart Island

1.45 Site Group No. 5 is a single public site (P1-7), a U.S. Military Reservation on Hart Island as shown in Figure 11. This site is in close proximity to City Island and Orchard Beach at Pelham Bay Park. Thus, the area is surrounded by residential and recreational shoreline uses. Shellfishing in this area is closed due to consistently poor water quality. Wave exposure is moderate and much of the shoreline is subject to critical erosion. The estimated volume of this site is about 1 million cubic yards over a surface area of about 34 acres. The New York City Coastal Zone Management Plan has identified the need for an artificial island for recreational purposes as well as a barrier for flood protection for City Island and Pelham Bay Park. A containment facility located approximately as shown in Figure 11 could serve these purposes.

Site Group No. 6 - Ferry Point Park

1.46 Site Group No. 6 consists of the public site P3-43, Ferry Point Park, located adjacent to the Whitestone Bridge on the north shore of the Upper East River (see Figure 12). As observed, this site is primarily surrounded by open parkland, the land use breakdown being 30% residential, 50% recreational, 10% commercial/industrial, and 10% open space. There are no significant ecological areas at or near this site. Exposure conditions are minimal. The total volume of the site is about 3.3 million cubic yards over an area of about 120 acres. Sediments in this area consist of fine sands and silt. Access by both

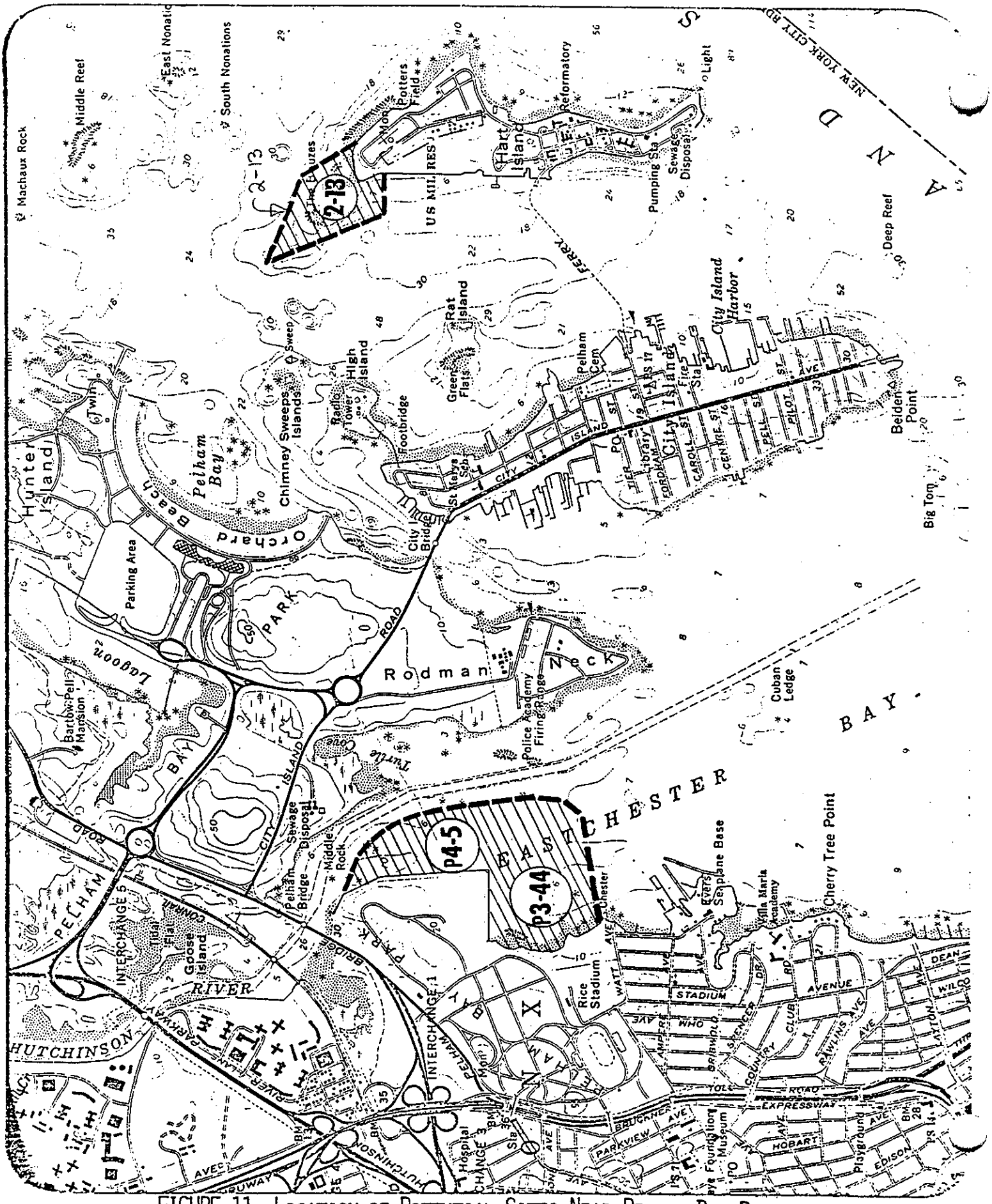

FIGURE 11 LOCATION OF POTENTIAL SITES NEAR PELHAM BAY PARK

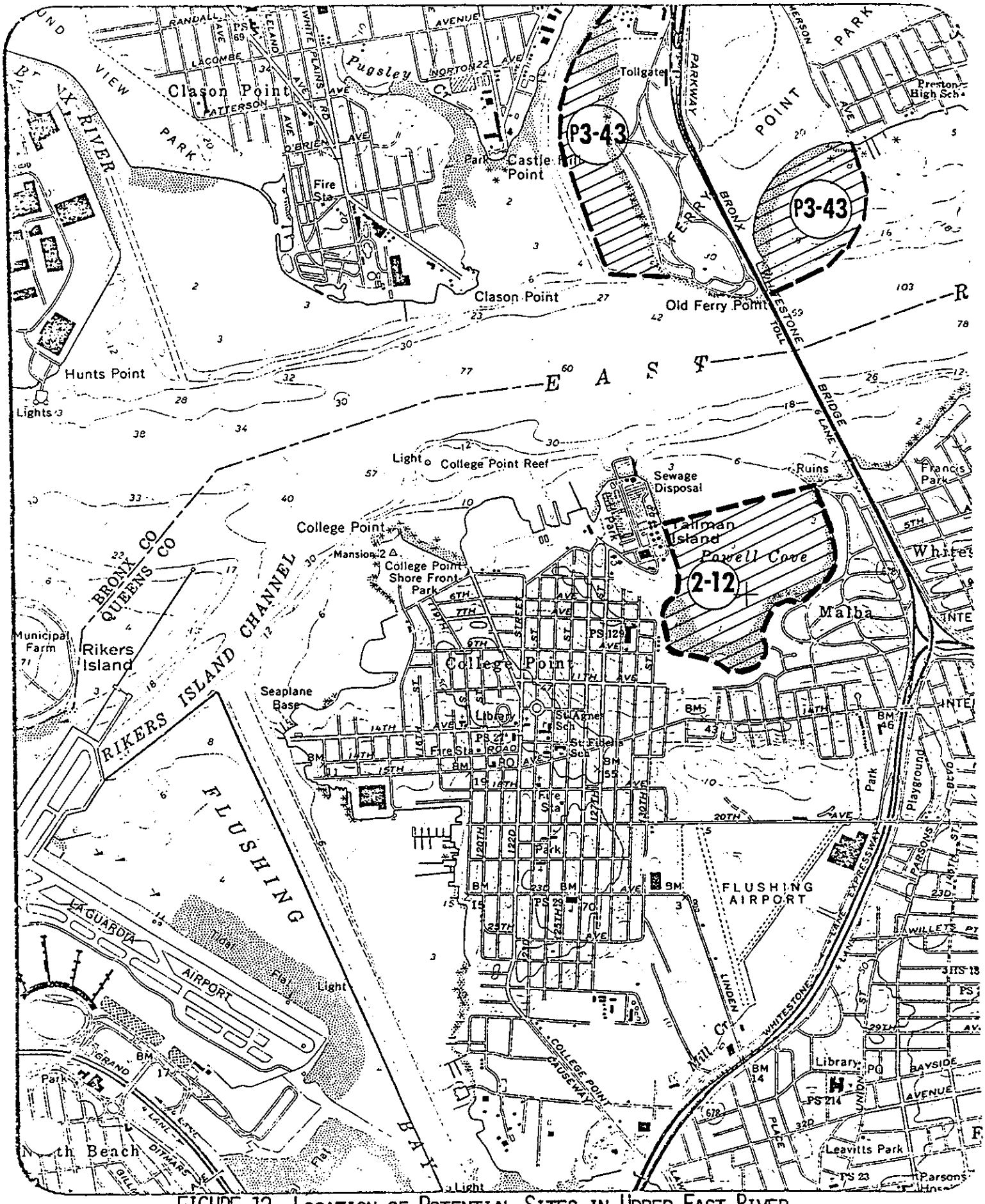

FIGURE 12 LOCATION OF POTENTIAL SITES IN UPPER EAST RIVER

water and land is considered good. In view of the present adjacent public park area, the only reasonable reuse of this site would be expansion of the park areas for recreation or wildlife refuge. Contrary to this, however, the areawide plan calls for additional residential building space in this part of the Bronx.

Site Group No. 7 - Tallman Island

1.47 Also shown in Figure 12 is Site Group No. 7 which is the Tallman Island Wastewater Treatment Plant (site 2-12) which is located directly across the East River from Ferry Point Park. Despite the presence of the treatment plant, most of the shoreline around Powell Cove is high density residential with some open space along the shoreline, which is considered to be an incompatibility for a containment facility. This site, therefore, is not recommended for further detailed evaluation.

Site Group No. 8 - Pelham Bay Park

1.48 Site Group No. 8 is the Pelham Bay Park in the Bronx along the shoreline of Eastchester Bay. Much of the shoreline of this site was filled in with construction fill and previously disposed dredged material by the Corps of Engineers. The area outlined in Figure 11 has an estimated containment volume of about 3 million cubic yards over an area of about 100 acres. Besides wetlands located across the Hutchinson River channel, there are no significant ecological areas associated with this site. Portions of the shoreline are presently bulkheaded, and there are no severe exposure conditions. Sediments are composed of mud, silt, and fine sands. The land use surrounding this site consists of about 40% residential, 40% recreational, and 20% industrial. Access by land and water appears good. As with the Ferry Point Park site, the reuse of this site would primarily be expansion of recreational land, however, again the area-wide plan calls for increased residential space.

Site Group No. 9 - Hempstead Harbor

1.49 Site Group No. 9 is site 7-3, which is the large Colonial Sand and Stone mining operation on the west shore of Hempstead Harbor (see Figure 13). The surrounding area is a wide mixture of uses, including 30% residential, 18% recreational, 2% commercial, 28% industrial, 5% public, and 17% open space. There are no significant ecological areas associated with this site. Exposure conditions are negligible. There is some concern for the economic and engineering feasibility of transporting dredged material to this site from areas outside of Hempstead Harbor due to the location and shallow, confined nature of lower Hempstead Harbor. However, the shipping channels do allow the transport of petroleum barges to oil facilities in Roslyn at the southern tip of Hempstead Harbor. The area-wide plan calls for the reclamation of the sand pits for recreation space and facilities. This would require upland disposal of dredged material which was not addressed under this study. However, a shorefront containment site could add additional open space for recreational use. The total volume of the site shown in Figure 13 is about 3.5 million cubic yards over a surface area of about 116 acres.

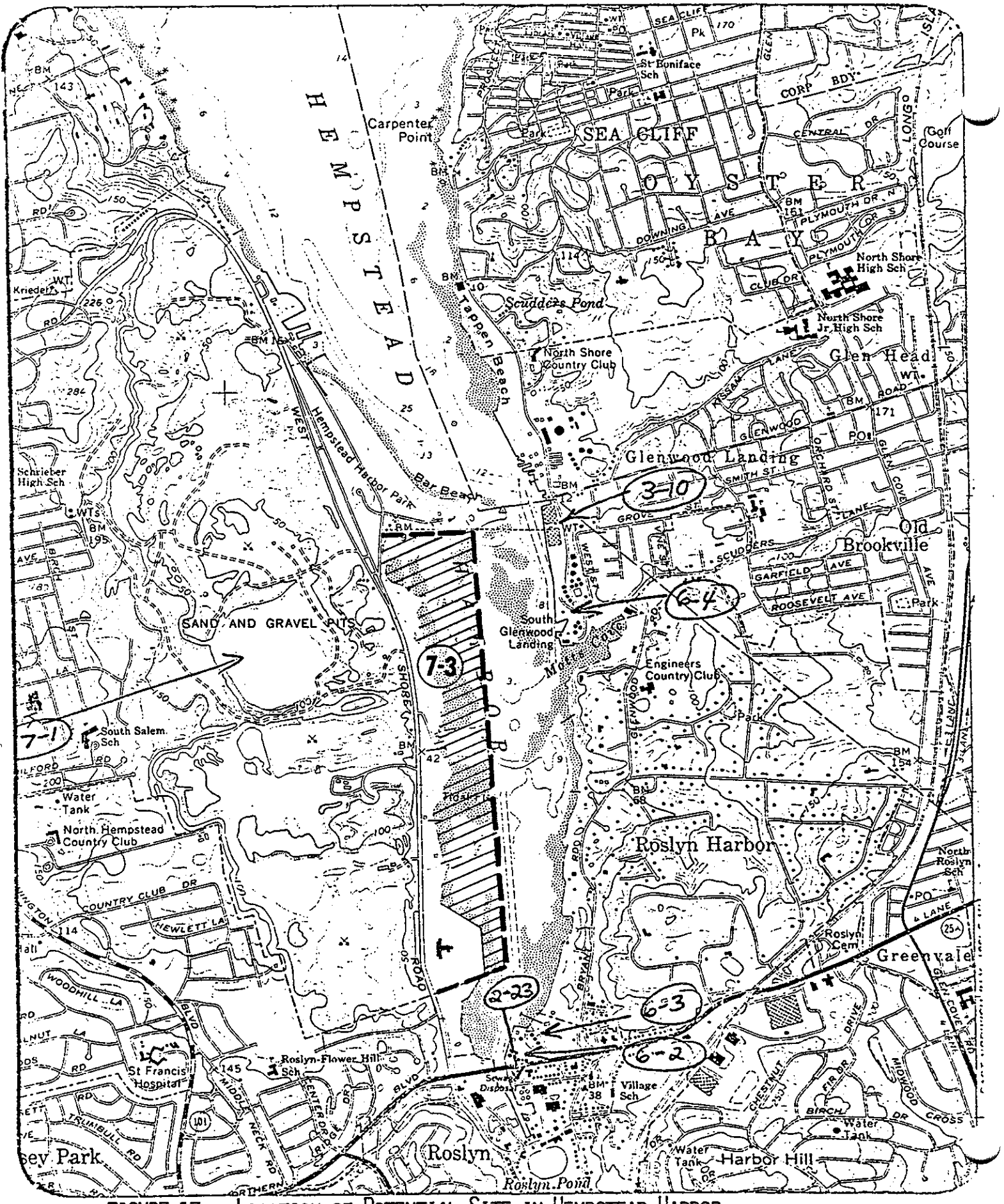

FIGURE 13 LOCATION OF POTENTIAL SITE IN HEMPSTEAD HARBOR

REFERENCES

U.S. Corps of Engineers, "Interim Report Dredged Material Containment in Long Island Sound (with Special Emphasis on Eastern New York Waters) dated July, 1980.

APPENDIX A

CALCULATION OF SECONDARY CRITERIA POINTS

A.01 The planning process includes a detailed look at each of the preliminary sites to determine suitability based on specific locational data. Step 3 of the siting method attempts to rank selected alternatives in order of desirability. The following factors were incorporated in determining criteria points for each alternative site.

1. PROXIMITY OF SITE TO SIGNIFICANT ECOLOGICAL AREAS

A.02 Distances between potential shoreline extension containment sites and ecological areas are important from two standpoints: (1) potential adverse impacts from construction activities, and 2) impacts from potential leachate and dewatering effluent from the facility. While distances in this case indicate downdrift directions, points should be allotted regardless of dominant local currents, to approximate worst case conditions. Points are assigned based on the following categories:

A. Shellfish Beds (distance in miles)

0 to 1 mile (radius)	:	0 points
1 to 3 miles	:	1 "
Greater than 3 miles	:	2 "

B. Lobster Locations (distance in miles)

0 to 1 mile (radius)	:	0 points
1 to 3 miles	:	1 "
Greater than 3 miles	:	2 "

C. Finfish Concentrations (distance in miles)

0 to 2 miles	:	0 points
2 to 5 miles	:	1 "
Greater than 5 miles	:	2 "

D. Waterfowl Areas (distance in miles)

0 to 2 miles	:	0 points
2 to 5 miles	:	1 "
Greater than 5 miles	:	2 "

E. Wetland Areas (distance in miles)

0 to 1/2 mile	:	0 points
1/2 to 1 mile	:	1 "
Greater than 1 mile	:	2 "

Total points for categories A through E for each alternative site and record (maximum of 10 points available).

2. BATHYMETRY OF SITE/AVAILABLE VOLUME

A.03 Average water depth, bottom slope, and available surface area together determine the total estimated capacity of a containment facility, including room for future expansion. The limits of available surface area of a potential site are defined by: (1) navigation channels, (2) adjacent shoreline/harbor shapes, (3) shorefront width of the public site, and (4) other restrictions due to non-compatibility with adjacent land use or ecological habitats. For purposes of ranking alternative sites, the 20 ft. MLW depth contour is defined as the offshore limit of the containment area. Points are assigned based on the following categories:

A. Available Containment Volume (cu. yards)
(assuming an average height of dewatered material at 10 feet above MSL)

Less than 500,000	:	0 points
500,001 - 1,000,000	:	1 "
1,000,001 - 1,500,000	:	2 "
1,500,001 - 2,000,000	:	3 "
2,000,001 - 2,500,000	:	4 "
2,500,001 - 3,000,000	:	5 "
3,000,001 - 3,500,000	:	6 "
3,500,001 - 4,000,000	:	7 "
4,000,001 - 4,500,000	:	8 "
4,500,001 - 5,000,000	:	9 "
More than 5,000,000	:	10 "

Total points for Category A and record (maximum of 10 points available).

A.04 Exposure considerations include wave energy, shoreline erosion potential, flooding potential, and existence of endangered structures. As previously discussed, high wave energy will significantly increase the cost of construction and maintenance of the containment facility. Construction of a shoreline extension facility in a region of critical shoreline erosion potential (mainly open beaches) is also undesirable because of the potential creation of severe downdrift erosion, and undermining of the dikes. The size and cost of containment structures in areas of severe flooding potential will increase substantially if the site is to be designed as safe for structures or other uses. The existence of endangered structures of historically high flood loss indicates the potential for a containment facility to serve as a buffer zone. Based on the following sub-criteria, the site is ranked on a scale of 0 to 10 accord-

ing to conditions within one mile on either side of the site:

A. Wave Energy

low	:	3	points
moderate	:	2	"
high	:	0	"

B. Critical Erosion Area (percent of shoreline)

0 to 10%	:	3	points
10% to 25%	:	2	"
Over 25%	:	0	"

C. Flooding Potential

Not in flood plain	:	2	points
In flood plain	:	0	"

D. Endangered Structures (combined present value)

$0 to $ 10,000	:	0	points
$10,000 to $100,000	:	1	"
Over $100,000	:	2	"

Total points for categories A through D and record (maximum of 10 points available).

4. SOIL/FOUNDATION CHARACTERISTICS OF SITE

A.05 As previously discussed in Section 3, the sediment characteristics at a given location may have a significant effect on: (1) design

and cost of containment dikes, (2) structural stability of containment areas for reuse as a foundation for buildings, and (3) leachate potential into groundwater. (Also of concern is the characteristics of dredged sediment to be contained, which is included under criteria #6). The following categories are included:

A. Soil/Sediment Physical Characteristics (USCS classification)

PT, OH, CH, MH, OL, CL, ML	:	0 points
SM, SC	:	3 "
SP, SW , GC	:	6 "
GM, GP, GW	:	9 "

B. Permeability (relative diffusivity)

High	:	0 points
Low	:	1 "

Total points for categories A and B and record (maximum of 10 points available).

5. EXISTING AND POTENTIAL LAND USE

A.06 Land use adjacent to the alternative site and within a one mile radius of the site is used to determine compatability and potential adverse impact. Points are assigned based on the following categories:

A. Residential Use (presence of)

No residential use in area	:	2 points
Residential use inland only	:	1 "
Residential use on shoreline within radius	:	0 "

B. Recreational Use (presence of)

No recreational use in area	:	2 points
Recreational use inland only	:	1 "
Recreational use on shoreline within radius	:	0 "

C. Commercial Use (presence of)

Water-related commercial use	:	2 points
Commercial use inland only	:	1 "
Non-water-related commercial use on shoreline within radius	:	0 "

D. Industrial Use (presence of)

Industrial use adjacent to site	:	2 points
Industrial use within area	:	1 "
No industrial use in area	:	0 "

E. Open Space (presence of)

Open space adjacent to site	:	2 points
Open space in area	:	1 "
No open space within radius	:	0 "

Total points for categories A through E and record for each alternative (maximum of 10 points available).

6. VOLUME AND TYPES OF DREDGED MATERIAL AVAILABLE FOR CONTAINMENT

A.07 Proximity of the containment site to areas where major dredging

is projected to occur, as well as consideration of the volumes of dredged material suitable for containment (or for other purposes), can significantly influence site desirability. Criteria Points are assigned to alternative sites based on: (1) barge distance from site to major dredging locations, and (2) volume of material at major dredge sites suitable or desirable for containment. For the preliminary siting analysis, an estimate of the percentage of projected dredged material expected to be used for beach nourishment was made based on historic information (Appendices A and B). The remaining projected volume of dredged material was assumed to be desirable for containment. This criterion could be modified to consider in more detail the reuse potential of dredged material in a rehandling facility. However, much more detailed data on material characteristics and a Market User's Survey would be required before such criteria could be established.

A.08 A modified gravity model is used to determine the relative attractiveness or importance of the dredge site/disposal combinations. The importance factor also relates to transport costs on the basis of cubic yards of material per mile. The gravity model states:

$$F = \frac{K\ I_d I_c}{D^2}$$

where:

F = force of attraction
K = a constant
I = importance value for dredging (d) and containment (c) sites
D = distance between the two

A.09 For this study, the gravity model is modified to reflect specific conditions. First, the importance value for containment sites (I_c)

are considered to be constant in all cases, assuming only one site will be used for all dredge spoil containment. The term I_c, therefore, assumes a role as a constant, K. The distance factor in this case is represented by miles travelled by a barge and is linear; the squared term is removed from the denominator and D is doubled to reflect barge travel in two directions. Because the exercise seeks only relative values and the constant K will remain the same in all cases, it is removed from the right-hand term. The result is an equation which represents the number of cubic yards of material per mile expected to travel between two given points:

$$F = \frac{V}{2D}$$

where:

V = average annual volume of material requiring containment disposal
F and D = as before

A matrix table is constructed which indicates, for each alternative site, the corresponding distances to major dredging locations and available volumes for containment. The table headings appear as below:

Dredging Locations	Volume (V) for Containment	Distances(D) to Sites	Attraction V/2D for Sites

To determine the criteria point spread for the alternative sites, an examination of the range of points scored for attraction (V/2D) is made (see Tables 4-7 and 4-8) and a table is constructed which reflects the observed ranges, as shown below. Since the assumption was made that no dredged material would cross state boundaries, separate scoring ranges are required for New York and Connecticut sites.

NEW YORK V/2D	Criteria Points	CONNECTICUT V/2D	Criteria Points
Less than 7,500	0	Less than 15,000	0
7,501 - 15,000	1	15,001 - 30,000	1
15,001 - 22,500	2	30,001 - 45,000	2
22,501 - 30,000	3	45,001 - 60,000	3
30,001 - 37,500	4	60,001 - 75,000	4
37,501 - 45,000	5	75,001 - 90,000	5
45,001 - 52,500	6	90,001 - 105,000	6
52,501 - 60,000	7	105,001 - 120,000	7
60,001 - 67,500	8	120,001 - 135,000	8
67,501 - 75,000	9	135,000 - 150,000	9
More than 75,000	10	More than 150,000	10

Record the allotted points (maximum of 10 points available).

7. COMPATIBILITY WITH ADJACENT LAND/REUSE POTENTIAL

A.10 Conversion of a newly-constructed shoreline extension site to a secondary use (industrial/commercial/recreational) would enhance the economic benefits of the plan. The potential for reuse of the containment facility, or parts thereof, is considered here in four categories.

A. Docking Facilities (presence of)

Existing industrial docking facilities	:	2 points
Existing small boat facilities	:	1 "
No access by water	:	0 "

B. Access by Land (presence of)

Existing major roadway	:	3 points
Existing secondary roadway	:	2 "
Easements only, no structure	:	1 "
No access by land	:	0 "

C. Types of Industrial/Commercial Uses (presence of)

Existing water-related use	:	3 points
Non-water related indust/comm. use	:	1 "
No indust/comm. use in area	:	0 "

D. Area-Wide Plan (provision for industrial/commercial/recreational use)

Adjacent to site	:	2 points
Within area of alternative site	:	1 "
Not provided	:	0 "

Total points for categories A through D for each alternative and record (maximum of 10 points available).

8. PROXIMITY OF SITE TO CULTURAL RESOURCES

A.11 Cultural resources should be avoided in siting the containment facility to minimize potential construction damage and noise or related operation impacts on a resource that is used by the public. An exception would be a cultural site currently threatened by erosion which might benefit from shoreline protection. Points are allotted as follows:

A. Cultural Resources (distance in miles)

Submerged within area	:	0 points
On adjacent shoreline	:	1 "
Within 2-mile radius	:	5 "
Greater than 2-mile radius	:	10 "

Total points for each alternative and record (maximum of 10 points available).

9. USE OF SITE FOR EXISTING OR HISTORIC DREDGED MATERIAL DISPOSAL

Locating a dredged material containment facility at a site that has already been used for spoil disposal may have certain advantages. There may already be structures in the vicinity which have disturbed the natural setting. Using such an area would avoid impacting an otherwise undisturbed shoreline. In addition, the precedence set by earlier disposal may ameliorate future containment structures and disposal. Points are allotted within two categories:

A. Use of Material Previously Disposed

Containment of contaminated material	:	7 points
Material Rehandling Facility	:	6 "
Construction fill	:	4 "
Primarily beach nourishment	:	0 "

B. Volume of Material Previously Disposed (maximum in cu. yards)

More than 500,000	:	3 points
200,000 to 500,000	:	2 "
50,000 to 200,000	:	1 "
Less than 50,000	:	0 "

Total points for categories A and B for each alternative and record (maximum of 10 points available).

A.12 The results of this exercise should be recorded in the columns of a summary matrix table (see Tables 4-9 and 4-10). Calculations within that table may then proceed for determining the ranking of alternative sites.

APPENDIX B

SITE SPECIFIC DATA FOR SCREENING ALTERNATIVE SITES

SC fair
SD poor

Siting Criteria

Name: HOYT ISLAND County: _____ Map # 18 A Location# 1-3

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 0.7 miles
   b. Lobster Locations: >3 miles
   c. Finfish Concentrations: 2 miles
   d. Waterfowl Areas: >5 miles
   e. Wetland Areas: 0 miles regulated tidal wetland
   f. Water Quality Conditions: poor/fair/(good) SB

3. Bathymetry
   a. Nearshore Slope: tidal flats ft/mile
   b. Available Surface Area: 39.7 acres
   c. Available Volume Below MSL: 3.5×10^5 cu. yards
   d. Total Volume to +10 9.9×10^5 yd3

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, (moderate), low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 100 % in flood hazard area
   d. Endangered Structures: (buildings, (homes), jetties, etc.) 7 in small developed area
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: QSM saltmarsh deposits, peat
   b. Permeability: 2-6 in/hr low

6. Existing and Projected Land Use (within 1 mile radius of site)
   a. Residential: 47 % %
   b. Recreational: 2 % %
   c. Commercial: .5 % %
   d. Industrial: 11 % %
   e. Wetlands: 23 % %
   f. Public: 9.5 % %
   g. Open Space: 7 % %
   h. Agricultural: 0 % %

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/(Wetlands)/Open Space) critical natural resource
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/(Wetlands)/Open Space)
   c. Types of Industrial/Commercial Uses: (Port), sand/gravel, (petroleum), etc.)
   d. Access by Water: ((channels), docking facilities)
   e. Access by Land: (roads/bridges)
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) marina, historical, natural area
      (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: (closest) miles (number) 3 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural/recreation

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) bulkheads & dikes
   b. Use of Material Previously Disposed (construction fill, beach nourishment, etc.)
   c. Volume of Material Previously Disposed: ? <500,000 CY not dredge spoil artificial fill?

Smallow Mate. Area

Siting Criteria

Name: Harborview County: _____ Map # 10/A Location# 1-4

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 1 miles
   b. Lobster Locations: 3 miles
   c. Finfish Concentrations: 2½ miles
   d. Waterfowl Areas: 4½ miles
   e. Wetland Areas: ½ miles
   f. Water Quality Conditions: poor/fair/good SC

3. Bathymetry
   a. Nearshore Slope: 2 ft/1000 ft ~~mile~~
   b. Available Surface Area: 51.9 acres
   c. Available Volume Below MSL: 3.8×10^5 cu. yards
   d. Total Vol 1.21×10^6 yd³

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high/moderate/low)
   b. Critical Erosion Areas: 0% %
   c. Flood Zone Area: 100% %
   d. Endangered Structures: (buildings/homes/jetties, etc.)
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: organic silt & muck
   b. Permeability: low

6. Existing and Projected Land Use (within 1 mile radius of site)
   a. Residential: 26 % %
   b. Recreational: 13 % %
   c. Commercial: 2 % %
   d. Industrial: 13 % %
   e. Wetlands: 32 % %
   f. Public: 11 % %
   g. Open Space: 4 % %
   h. Agricultural: 0 % %

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem): _____

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities)
   e. Access by Land: (roads/bridges)
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) marina
      (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: (closest) 1 miles (number) 3 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural/recreation

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs:
      (condition, dimensions) bulkheads, dikes
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.)
   c. Volume of Material Previously Disposed: ? < 500,000 CY

major ecological area
possible flooding hazard if built

Siting Criteria

Name: ROCK CREEK SOUTH County: _____ Map 34/C Location# 1-13

1. Shorefront Ownership and Shorefront Disposal Sites

   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas

   a. Shellfish Beds: <½ miles
   b. Lobster Locations: 2-3 miles
   c. Finfish Concentrations: 2 miles
   d. Waterfowl Areas: 0 miles — major water fowl area
   e. Wetland Areas: 0 miles — Regulated Tidal Wetland
   f. Water Quality Conditions: poor/fair/good SBc

3. Bathymetry

   a. Nearshore Slope: 6 ft/1400 ft/~~mile~~
   b. Available Surface Area: 55.3 acres
   c. Available Volume Below MSL: 4.24×10^3 cu. yards
   d. total volume 1.32×10^6 yd3

4. Exposure Considerations (within 1 mile either side of site)

   a. Wave Energy: (high/moderate/low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 100 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) none
   e. Cost of Flood Damages: (high/medium/low) flooded wetlands protect against flooding

5. Soil/Foundation Characteristics

   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: WESTBROOK MUCKY PEAT
   b. Permeability: low

6. Existing and Projected Land Use (within 1 mile radius of site)

   a. Residential: 18.5 % %
   b. Recreational: 1 % %
   c. Commercial: 1.5 % %
   d. Industrial: 2 % %
   e. Wetlands: 58.5 % %
   f. Public: 5.5 % %
   g. Open Space: 13 % %
   h. Agricultural: 0 % %

7. Volume and Types of Dredged Material Available for Containment

   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential

   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) hardly any. ST = Small shops
   d. Access by Water: (channel, docking facilities) Ship channel
   e. Access by Land: (roads/bridges) none
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) ferry, marina
      (market for re-use of dredged material)

9. Proximity to Cultural Resources — old saybrook, old lyme

   a. Cultural: (closest) <1 miles (number) 2 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. Existing and Historical Spoil Disposal Location

   a. Existence of Containment Structures, Dikes and Weirs:
      (condition, dimensions) harbor entrance structure
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.)
   c. Volume of Material Previously Disposed: small CY

1-14

major ecological area
possible flooding hazard if built

Siting Criteria

Name: ROCK CREEK NORTH County: _____ Map # 34/C Location # 1-14

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 0 miles on the site
   b. Lobster Locations: <3 miles
   c. Finfish Concentrations: <3 miles
   d. Waterfowl Areas: 0 miles
   e. Wetland Areas: 0 miles Regulated Tidal wetland
   f. Water Quality Conditions: poor/fair/good SBc

3. Bathymetry
   a. Nearshore Slope: 1ft/100 ft/~~mile~~
   b. Available Surface Area: 56.5 acres
   c. Available Volume Below MSL: 5.2X10^5 cu. yards & total volume 1.43X10^6 yd^3

4. Exposure Considerations (within 1 mile either side of site)
   a. Have Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 100 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) none
   e. Cost of Flood Damages: (high/medium/low) wetlands protect against flooding

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: WESTBROOK MUCKY PEAT
   b. Permeability: low

6. Existing and Projected Land Use (within 1 mile radius of site)
   a. Residential: 9.5 % %
   b. Recreational: 2 % %
   c. Commercial: 5 % %
   d. Industrial: 0 % %
   e. Wetlands: 52.5 % %
   f. Public: 6.5 % %
   g. Open Space: 24.5 % %
   h. Agricultural: 0 % %

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) hardly any ST = small shops
   d. Access by Water: (channels, docking facilities) ship channel
   e. Access by Land: (roads/bridges) none (rail ok)
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) ferry, public marina
      (market for re-use of dredged material)
      critical water related land

9. Proximity to Cultural Resources scenic townscape Saybrook Point Old Lyme
   a. Cultural: 1 (closest) miles (number) 2 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: 0 CY

C-16

Siting Criteria

Name: GREENWICH MWWTP County: _____ Map # 16/A Location# 2-16

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 1 miles
   b. Lobster Locations: 1½ miles
   c. Finfish Concentrations: 2 miles
   d. Waterfowl Areas: >5 miles
   e. Wetland Areas: >1 miles on site small patches none major
   f. Water Quality Conditions: poor/fair/good SB

3. Bathymetry
   a. Nearshore Slope: 0 ft/ft ft/mile
   b. Available Surface Area: 13.8 acres
   c. Available Volume Below MSL: 3.0X10^5 cu. yards & total vol 5.3X10^5 yd3.

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 100 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) sewage treatment facility
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: Typic Undorthents cut & fill (adjacent to site)
   b. Permeability: low

6. Existing and Projected Land Use (within 1 mile radius of site)
   a. Residential: 62 % %
   b. Recreational: 4.5 % %
   c. Commercial: 13.5 % %
   d. Industrial: 1 % %
   e. Wetlands: 3 % %
   f. Public: 9 % %
   g. Open Space: 7 % %
   h. Agricultural: 0 % %

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) Public Sewage Treatment Park, Highway
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities) existing
   e. Access by Land: (roads/bridges)
   f. Area-wide Plan: (industrial/commercial expansion) Primarily developed
      (need for recreation) private marinas
      (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: (closest) 1½ miles (number) 4 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs:
      (condition, dimensions) bulkheads
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.)
   c. Volume of Material Previously Disposed: low CY

C 1C

Siting Criteria

Name: DARIEN MWWTP County: _____ Map # 18/A Location# 2-18

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 500 ~~miles~~ ft
   b. Lobster Locations: 1½ miles
   c. Finfish Concentrations: 1½ miles
   d. Waterfowl Areas: >5 miles
   e. Wetland Areas: 1½ miles
   f. Water Quality Conditions: poor/fair/good SB

3. Bathymetry
   a. Nearshore Slope: 3 ft/100 ft ~~/mile~~
   b. Available Surface Area: 32.7 acres
   c. Available Volume Below MSL: 6.9×10^5 cu. yards
   d total vol 1.22×10^6 yd3

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 100 %
   d. Endangered Structures: (buildings, homes, jetties, etc.)
   e. Cost of Flood Damages: (high, medium, low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: Beaches & Typic Udorthents
   b. Permeability: low

6. Existing and Projected Land Use (within 1 mile radius of site)
   a. Residential: 68 % %
   b. Recreational: 14 % %
   c. Commercial: 0.5 % %
   d. Industrial: 0 % %
   e. Wetlands: 7 % %
   f. Public: 3 % %
   g. Open Space: 7 % %
   h. Agricultural: 0.5 % %

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) NONE
   d. Access by Water: (channels/docking facilities) deep channel
   e. Access by Land: (roads/bridges) medium duty
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) stable
      (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: (closest) 2 miles (number) 4 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: 0 CY

Siting Criteria

Name: NEW HAVEN EAST STREET County: _____ Map # 29B Location# 2-26

1. Shorefront Ownership and Shorefront Disposal Sites

   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas

   a. Shellfish Beds: 1 miles
   b. Lobster Locations: >10 miles
   c. Finfish Concentrations: 3½ miles
   d. Waterfowl Areas: 2½ miles
   e. Wetland Areas: 1½ miles
   f. Water Quality Conditions: poor/fair/good SD

3. Bathymetry

   a. Nearshore Slope: 38ft/200 ft/~~mile~~
   b. Available Surface Area: 468 acres
   c. Available Volume Below MSL: 7.6×10^5 cu. yards
   & total volume = 1.51×10^6 yd3

4. Exposure Considerations (within 1 mile either side of site)

   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 100 %
   d. Endangered Structures: (buildings, homes, jetties, etc.)
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics

   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: artificial fill/alluvium SM or SP
   b. Permeability: high >6 in/hr

6. Existing and Projected Land Use (within 1 mile radius of site)

   a. Residential: 13 % %
   b. Recreational: 15 % %
   c. Commercial: 7 % %
   d. Industrial: 33.5 % %
   e. Wetlands: 0 % %
   f. Public: 38 % %
   g. Open Space: 7 % %
   h. Agricultural: 0 % %

7. Volume and Types of Dredged Material Available for Containment

   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential

   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) sewage treatment rail yards, major highway
   d. Access by Water: (channels, docking facilities)
   e. Access by Land: (roads/bridges) & rail
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) fishing pier & artificial tee park at Lighthouse Point
      (market for re-use of dredged material) marina all proposed
      for artificial fill

9. Proximity to Cultural Resources

   a. Cultural: (closest) 3 miles (number) 2 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. Existing and Historical Spoil Disposal Location

   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) bulkheads, upland fills
   b. Use of Material Previously Disposed: (~~construction~~ fill, beach nourishment, etc.)
   c. Volume of Material Previously Disposed: 88000 CY (1977)
      among others from land sources

Siting Criteria

Name: NORWALK HARBOR SEAVIEW PARK County: _____ Map # 18/A Location # 3-9

1. Shorefront Ownership and Shorefront Disposal Sites

   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas

   a. Shellfish Beds: 2 miles
   b. Lobster Locations: 4½ miles
   c. Finfish Concentrations: 4 miles
   d. Waterfowl Areas: <5 miles
   e. Wetland Areas: 2 miles
   f. Water Quality Conditions: poor/fair/good SC

3. Bathymetry

   a. Nearshore Slope: 0 ft/mile
   b. Available Surface Area: 27.5 acres
   c. Available Volume Below MSL: 1.58x10^5 cu. yards
      total = 6.0 x 10^5

4. Exposure Considerations (within 1 mile either side of site)

   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 100 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) industrial
   e. Cost of Flood Damages: (high/medium/low) assumed.

5. Soil/Foundation Characteristics

   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: Estuarine Deposits (mud) adjacent to artificial fill
   b. Permeability: low

6. Existing and Projected Land Use (within 1 mile radius of site)

   a. Residential: 47 % %
   b. Recreational: 19 % %
   c. Commercial: 8 % %
   d. Industrial: 11 % %
   e. Wetlands: 5.5 % %
   f. Public: 6 % %
   g. Open Space: 3.5 % %
   h. Agricultural: 0 % %

7. Volume and Types of Dredged Material Available for Containment

   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential

   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) inland mostly
   d. Access by Water: (channels, docking facilities) no
   e. Access by Land: (roads/bridges) secondary
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) Marina
      (market for re-use of dredged material)
      adjacent park could be expanded.

9. Proximity to Cultural Resources

   a. Cultural: 1 (closest) miles (number) 3 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural

10. Existing and Historical Spoil Disposal Location

   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) bulkheads
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.)
   c. Volume of Material Previously Disposed: ? < 200,000 CY

Siting Criteria

Name: ENGLISH POWER STATION County: _____ Map # 29B Location# 3-13

1. Shorefront Ownership and Shorefront Disposal Sites

   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas

   a. Shellfish Beds: <1 miles
   b. Lobster Locations: 9 miles
   c. Finfish Concentrations: 3 miles
   d. Waterfowl Areas: 1 1/2 miles
   e. Wetland Areas: 2 miles
   f. Water Quality Conditions: (poor/fair/good) SD

3. Bathymetry

   a. Nearshore Slope: 28/800 ft/~~mile~~
   b. Available Surface Area: 38.6 acres
   c. Available Volume Below MSL: 2.6X10^5 cu. yards
   d. total volume 8.8X10^5 yd3

4. Exposure Considerations (within 1 mile either side of site)

   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 75% %
   d. Endangered Structures: (buildings, homes, jetties, etc.) oil storage tanks bluffs
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics

   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: TIDE FLATS SM or SC ?
   b. Permeability: high >6.0 in/hr.

6. Existing and Projected Land Use (within 1 mile radius of site)

   a. Residential: 31.5 % %
   b. Recreational: 14 % %
   c. Commercial: 4 % %
   d. Industrial: 23.5 % %
   e. Wetlands: 0 % %
   f. Public: 20 % %
   g. Open Space: 7 % %
   h. Agricultural: 0 % %

7. Volume and Types of Dredged Material Available for Containment

   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential

   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) PUBLIC POWER PLANT & DOCKS
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space) PET TERMINAL
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities) deep water
   e. Access by Land: (roads/bridges) rail
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) marina, fishing pier, artificial reef
      (market for re-use of dredged material) artificial fill

9. Proximity to Cultural Resources

   a. Cultural: 2 (closest) miles (number) 2 10 mile radius
   b. Types: (historical, archaeological, etc.)

10. Existing and Historical Spoil Disposal Location

   a. Existence of Containment Structures, Dikes and Weirs:
      (condition, dimensions) bulkheads upland fills
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.)
   c. Volume of Material Previously Disposed: medium CY
      land or other sources.

Siting Criteria

Name: STAMFORD HARBOR NAVIGATION WORKS County: _____ Map # 17/A Location# 4-10

1. Shorefront Ownership and Shorefront Disposal Sites

   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas

   a. Shellfish Beds: <1/2 miles
   b. Lobster Locations: 1/2 miles
   c. Finfish Concentrations: 1 miles
   d. Waterfowl Areas: 3 miles
   e. Wetland Areas: 2 miles
   f. Water Quality Conditions: poor/fair/good SB/SA

3. Bathymetry

   a. Nearshore Slope: 3'/500 ft/~~mile~~
   b. Available Surface Area: 70.7 acres
   c. Available Volume Below MSL: 1.8X10^6 cu. yards
   d. total Vol 2.9X10^6 yd3

4. Exposure Considerations (within 1 mile either side of site)

   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: ≈25 % protected by navigation works
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) breakwater depending on design
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics

   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: coarse sand
   b. Permeability: high

6. Existing and Projected Land Use (within 1 mile radius of site)

   a. Residential: 79 % %
   b. Recreational: 2 % %
   c. Commercial: 0 % %
   d. Industrial: 0 % %
   e. Wetlands: 2 % %
   f. Public: 0 % %
   g. Open Space: 17 % %
   h. Agricultural: 0 % %

7. Volume and Types of Dredged Material Available for Containment

   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential

   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) Navigation Works
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) none
   d. Access by Water: (channels, docking facilities) none
   e. Access by Land: (roads/bridges) none
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) proposed marina
      (market for re-use of dredged material)

9. Proximity to Cultural Resources

   a. Cultural: (closest) 1 1/2 miles (number) 5 10 mile radius
   b. Types: (historical, archaeological, etc.)

10. Existing and Historical Spoil Disposal Location

   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) breakwater forms one side
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) NONE
   c. Volume of Material Previously Disposed: NONE CY

Siting Criteria

Name: BLACK ROCK HARBOR BRIDGEPORT County: _____ Map # 24/B Location # 4-13

1. Shorefront Ownership and Shorefront Disposal Sites

   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas

   a. Shellfish Beds: 0 miles on site
   b. Lobster Locations: 3 miles
   c. Finfish Concentrations: 3 miles
   d. Waterfowl Areas: 2½ miles
   e. Wetland Areas: 1/2 miles
   f. Water Quality Conditions: poor/fair/good SC

3. Bathymetry

   a. Nearshore Slope: 1/100 ft/~~mile~~
   b. Available Surface Area: 73.9 acres
   c. Available Volume Below MSL: 1.01×10^6 cu. yards
   d. total volume 2.12×10^6 yd3

4. Exposure Considerations (within 1 mile either side of site)

   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 50% %
   c. Flood Zone Area: 100 % %
   d. Endangered Structures: (buildings, homes, jetties, etc.) sewage disposal plant
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics

   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: Gravelly sandy loam. SM
   b. Permeability: high

6. Existing and Projected Land Use (within 1 mile radius of site)

   a. Residential: 58 % %
   b. Recreational: 20 % %
   c. Commercial: 3 % %
   d. Industrial: 0 % %
   e. Wetlands: 7 % %
   f. Public: 7 % %
   g. Open Space: 5 % %
   h. Agricultural: 0 % %

7. Volume and Types of Dredged Material Available for Containment

   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential

   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) none
   d. Access by Water: (channels, docking facilities) no
   e. Access by Land: (roads/bridges) secondary
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) all in Bridgeport Harbor
      (market for re-use of dredged material)

9. Proximity to Cultural Resources

   a. Cultural: (closest) 3 miles (number) 3 10 mile radius
   b. Types: (historical, archaeological, etc.) recreational

10. Existing and Historical Spoil Disposal Location

   a. Existence of Containment Structures, Dikes and Weirs:
      (condition, dimensions) bulkheads, seawalls
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) land fill
   c. Volume of Material Previously Disposed: large CY

Siting Criteria

Name: BRIDGEPORT HARBOR County: _____ Map # 24/B Location# 4-14

1. Shorefront Ownership and Shorefront Disposal Sites

   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas

   a. Shellfish Beds: 0 miles on site
   b. Lobster Locations: 4 miles
   c. Finfish Concentrations: 2 1/2 miles
   d. Waterfowl Areas: < 1/2 miles
   e. Wetland Areas: 1/2 miles major
   f. Water Quality Conditions: poor/fair/good SC

3. Bathymetry

   a. Nearshore Slope: 1/100/2/100 ft/~~mile~~
   b. Available Surface Area: 76.4 acres
   c. Available Volume Below MSL: 1.5 X 10^6 cu. yards
   d. total vol 2.8X10^6 yd^3

4. Exposure Considerations (within 1 mile either side of site)

   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 10-25% %
   c. Flood Zone Area: 100% %
   d. Endangered Structures: (buildings, homes, jetties, etc.) factories, petroleum storage
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics

   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: silty sands/beach deposits
   b. Permeability: high

6. Existing and Projected Land Use (within 1 mile radius of site)

   a. Residential: 16 % %
   b. Recreational: 16 % %
   c. Commercial: 4.5 % %
   d. Industrial: 22 % %
   e. Wetlands: 6.5 % %
   f. Public: 15 % %
   g. Open Space: 20 % %
   h. Agricultural: 0 % %

7. Volume and Types of Dredged Material Available for Containment

   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: _____ CY/year
      Within Surrounding Quads: _____ CY/year
   c. General Characteristics of Material (Phys-chem): _____

8. Compatability with Adjacent Land/Re-use Potential

   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) power plants, waste disposal plants
   d. Access by Water: (channels, docking facilities)
   e. Access by Land: (roads/bridges)
   f. Area-wide Plan: (industrial/commercial expansion) expand oil storage facilities
      (need for recreation) development of pleasure beach, recreational ferry
      (market for re-use of dredged material) fishing reef, marina
      beach nourishment

9. Proximity to Cultural Resources

   a. Cultural: (closest) 1/2 miles (number) 3 10 mile radius
   b. Types: (historical, archaeological, etc.) recreational

10. Existing and Historical Spoil Disposal Location

   a. Existence of Containment Structures, Dikes and Weirs:
      (condition, dimensions) jetties
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) around jetty
   c. Volume of Material Previously Disposed: moderate

7-10

would fail on ecological points

Siting Criteria

Name: HOUSATONIC R. STRATFORD County: _____ Map # 25/B Location# 4-15

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 1000 ft ~~miles~~
   b. Lobster Locations: ½-1 miles
   c. Finfish Concentrations: 1 miles
   d. Waterfowl Areas: <½ miles major area
   e. Wetland Areas: ½-1 miles major area
   f. Water Quality Conditions: poor/fair/good SC/SB

3. Bathymetry
   a. Nearshore Slope: 1/200 ft/mile
   b. Available Surface Area: 51.9 acres
   c. Available Volume Below MSL: 6.0×10^5 cu. yards
   d. total volume 1.45×10^6 yd³

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 80% %
   c. Flood Zone Area: 0% (offshore) %
   d. Endangered Structures: (buildings, homes, jetties, etc.) sewage treatment plant
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: fine sandy loam ML
   b. Permeability: low

6. Existing and Projected Land Use (within 1 mile radius of site)
   a. Residential: 11 % %
   b. Recreational: 60 % %
   c. Commercial: 0 % %
   d. Industrial: 0 % %
   e. Wetlands: 10 % %
   f. Public: 2 % %
   g. Open Space: 17 % %
   h. Agricultural: 0 % %

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) Navigation work.
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space) Recreational
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) none
   d. Access by Water: (channels, docking facilities) none
   e. Access by Land: (roads/bridges) none
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) none
      (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: (closest) <½ miles (number) 3 10 mile radius
   b. Types: (historical, archaeological, etc.) ?

10. Existing and Historical Spoil Disposal Location
    a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) breakwater to form one side of dike
    b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
    c. Volume of Material Previously Disposed: 0 CY

spoil has been disposed on adjacent shoreline but not at site

Siting Criteria

Name: NEW HAVEN HARBOR EAST BREAKWATER County: _____ Map # 26B Location# 4-17b

1. Shorefront Ownership and Shorefront Disposal Sites

   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas

   a. Shellfish Beds: 0 miles on site
   b. Lobster Locations: 5 miles
   c. Finfish Concentrations: <1 miles
   d. Waterfowl Areas: 1/2-1 miles
   e. Wetland Areas: 1/2-1 miles
   f. Water Quality Conditions: poor/fair/good SB

3. Bathymetry

   a. Nearshore Slope: 1'/400' ft/~~mile~~
   b. Available Surface Area: 104 acres
   c. Available Volume Below MSL: 3.5×10^6 cu. yards
   d. total vol 5.2×10^6 yd3

4. Exposure Considerations (within 1 mile either side of site)

   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: ≈20 %
   c. Flood Zone Area: 0% % offshore
   d. Endangered Structures: (buildings, homes, jetties, etc.)
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics

   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: Coarse sand
   b. Permeability: high

6. Existing and Projected Land Use (within 1 mile radius of site)

   a. Residential: 37 % %
   b. Recreational: 37 % %
   c. Commercial: 0 % %
   d. Industrial: 0 % %
   e. Wetlands: 21 % %
   f. Public: 0 % %
   g. Open Space: 5 % %
   h. Agricultural: 0 % %

7. Volume and Types of Dredged Material Available for Containment

   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential

   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) navigation works
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) none
   d. Access by Water: (channels, docking facilities) no
   e. Access by Land: (roads/bridges) none
   f. Area-wide Plan: (industrial/commercial expansion) offshore oil tanker berth
      (need for recreation) artifrial reef
      (market for re-use of dredged material)

9. Proximity to Cultural Resources

   a. Cultural: <1/2 (closest) miles (number) 3 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural, recreational lighthouse Point Park

10. Existing and Historical Spoil Disposal Location

   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) breakwater foreneside of dike
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: CLINTON HBR County: _____ Map # 32C Location# 4-18

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 1½ miles
   b. Lobster Locations: 1 miles
   c. Finfish Concentrations: <1 miles
   d. Waterfowl Areas: 1-1½ miles major waterfowl area
   e. Wetland Areas: ½-1 miles
   f. Water Quality Conditions: poor/fair/good SA

3. Bathymetry
   a. Nearshore Slope: 1/100 ft/~~mile~~
   b. Available Surface Area: 45.6 acres
   c. Available Volume Below MSL: 1.06×10^6 cu. yards
   d. total Vol 1.8×10^6 yd3

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: >10% %
   c. Flood Zone Area: 0 % offshore
   d. Endangered Structures: (buildings, homes, jetties, etc.) few
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: Silt
   b. Permeability: low

6. Existing and Projected Land Use (within 1 mile radius of site)
   a. Residential: 57% %
   b. Recreational: 4.5% %
   c. Commercial: 0 % %
   d. Industrial: 0 % %
   e. Wetlands: 34 % %
   f. Public: 0 % %
   g. Open Space: 4.5 % %
   h. Agricultural: 0% %

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatsbility with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) navigation works
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) none
   d. Access by Water: (channels, docking facilities) deep water access
   e. Access by Land: (roads/bridges) none
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) increase access to Hammonasset State Park, private marina
      (market for re-use of dredged material)

9. Proximity to Cultural Resources
   a. Cultural: (closest) 1½ miles (number) 3 10 mile radius
   b. Types: (historical, archaeological, etc.)
      cultural scenic townscapes Clinton Center

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs:
      (condition, dimensions) breakwater makes 1 side of dike
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none (upland in Clinton Harbor & deep water site.)
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: DUCK ISLAND HARBOR County: _____ Map # 33/C Location# 4-19

1. Shorefront Ownership and Shorefront Disposal Sites

   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas

   a. Shellfish Beds: 1 miles
   b. Lobster Locations: 1 miles
   c. Finfish Concentrations: <1 miles
   d. Waterfowl Areas: 4 1/2 miles
   e. Wetland Areas: >1 miles
   f. Water Quality Conditions: poor/fair/good SA

3. Bathymetry

   a. Nearshore Slope: flat ft/mile
   b. Available Surface Area: 81.1 acres
   c. Available Volume Below MSL: 2.5X10^6 cu. yards
   & total vol. 3.8X10^6 yd^3

4. Exposure Considerations (within 1 mile either side of site)

   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 75% %
   c. Flood Zone Area: offshore %
   d. Endangered Structures: (buildings, homes, jetties, etc.)
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics

   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: FINE SAND
   b. Permeability: LOW

6. Existing and Projected Land Use (within 1 mile radius of site)

   a. Residential: % %
   b. Recreational: % %
   c. Commercial: % %
   d. Industrial: % %
   e. Wetlands: % %
   f. Public: % %
   g. Open Space: % %
   h. Agricultural: % %

   does not intersect with land

7. Volume and Types of Dredged Material Available for Containment

   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential

   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) navigation works
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) none
   d. Access by Water: (channels, docking facilities) deep water
   e. Access by Land: (roads/bridges) none
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) at Westbrook Harbor otherwise none
      (market for re-use of dredged material)

9. Proximity to Cultural Resources

   a. Cultural: (closest) miles <1 (number) 3 10 mile radius
   b. Types: (historical, archaeological, etc.)
      Long Island Sound Heritage - Menunketesuck Island

10. Existing and Historical Spoil Disposal Location

   a. Existence of Containment Structures, Dikes and Weirs:
      (condition, dimensions) breakwater forms one side of containm
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none at site but
   c. Volume of Material Previously Disposed: 79,000 CY on adjacent Patchogue River for wetland fill

Siting Criteria

Name: CONN. RIVER SAYBROOK JETTY County: _____ Map # 34/D Location # 4-20

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: 0 miles on site
   b. Lobster Locations: 1 miles
   c. Finfish Concentrations: 1 miles
   d. Waterfowl Areas: 1 miles major
   e. Wetland Areas: ½-1 miles major
   f. Water Quality Conditions: poor/fair/good SA

3. Bathymetry
   a. Nearshore Slope: 1/100 ft/~~mile~~
   b. Available Surface Area: 53.7 acres
   c. Available Volume Below MSL: 6.0×10^5 cu. yards
   d. Total Vol. 1.46×10^6 yd³

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 20% %
   c. Flood Zone Area: 50% %
   d. Endangered Structures: (buildings, homes, jetties, etc.)
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: fine sand/silt
   b. Permeability: low

6. Existing and Projected Land Use (within 1 mile radius of site)
   a. Residential: 31 % %
   b. Recreational: 22 % %
   c. Commercial: 0 % %
   d. Industrial: 0 % %
   e. Wetlands: 22 % %
   f. Public: 0 % %
   g. Open Space: 25 % %
   h. Agricultural: 0 % %

   hardly touches

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) navigation works
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) none
   d. Access by Water: (channel, docking facilities) no
   e. Access by Land: (roads/bridges) none
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) but not near site
      (market for re-use of dredged material) marina @ Old Saybrook

9. Proximity to Cultural Resources
   a. Cultural: (closest) ½ miles (number) 4 10 mile radius
   b. Types: (historical, archaeological, etc.) cultural
      Sceanic townscape at Old Saybrook Pt

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs:
      (condition, dimensions) breakwater forms part of containment
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none at site
   c. Volume of Material Previously Disposed: >400,000 cy on Conn. River for bank fill

Siting Criteria

Name: STONINGTON HARBOR County: _____ Map # 37/12 Location # 4-21

1. Shorefront Ownership and Shorefront Disposal Sites

   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas

   a. Shellfish Beds: 1/2 miles
   b. Lobster Locations: 1/2 miles
   c. Crab concentration / Finfish Concentrations: 3 1/2 miles
   d. Waterfowl Areas: 1 1/2 miles
   e. Wetland Areas: 1 1/2 miles
   f. Water Quality Conditions: poor/fair/(good) SA

3. Bathymetry

   a. Nearshore Slope: 1/300 ft/~~mile~~
   b. Available Surface Area: 47.7 acres
   c. Available Volume Below MSL: 8.0×10^5 cu. yards
   d. Total Volume (+10 ft) 1.6×10^6 yd^3

4. Exposure Considerations (within 1 mile either side of site)

   a. Wave Energy: (high, (moderate), low)
   b. Critical Erosion Areas: 10 % %
   c. Flood Zone Area: 0% offshore site
   d. Endangered Structures: (buildings, (homes), jetties, etc.)
   e. Cost of Flood Damages: (high/medium/(low))

5. Soil/Foundation Characteristics

   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: Coarse sand
   b. Permeability: high

6. Existing and Projected Land Use (within 1 mile radius of site)

   a. Residential: 60 % %
   b. Recreational: 20 % %
   c. Commercial: 0 % %
   d. Industrial: 20 % %
   e. Wetlands: 0 % % barely touches land
   f. Public: 0 % %
   g. Open Space: 0 % %
   h. Agricultural: 0 % %

7. Volume and Types of Dredged Material Available for Containment

   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem): _____

8. Compatability with Adjacent Land/Re-use Potential

   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) navigation works
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities) 12 ft draft @ MLW
   e. Access by Land: (roads/bridges) none
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) preserve special shore scenic zones.
      (market for re-use of dredged material)

9. Proximity to Cultural Resources

   a. Cultural: (closest) 1 1/2 miles (number) 3 10 mile radius
   b. Types: (historical), archaeological, etc.)
      special scenic zones Stonington Borough & north Stonington

10. Existing and Historical Spoil Disposal Location

   a. Existence of Containment Structures, Dikes and Weirs:
      (condition, dimensions) breakwater to form part of containment.
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

this site is 1 mile from previous COE Stonington disposal site.

Siting Criteria

Name: PENN PETROLEUM CO. County: _____ Map # 18A Location# 6-14

1. Shorefront Ownership and Shorefront Disposal Sites

   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas

   a. Shellfish Beds: 1/2 miles
   d. Waterfowl Areas: 3-5 miles
   b. Lobster Locations: 3 miles
   e. Wetland Areas: < 1/2 miles
   c. Finfish Concentrations: 2 miles
   f. Water Quality Conditions: poor/fair/good SB

3. Bathymetry

   a. Nearshore Slope: flat ft/mile
   c. Available Volume Below MSL: 2.9x10^5 cu. yards
   b. Available Surface Area: 24 acres
   d. Total Volume (+10ft) 6.8x10^5 yd^3

4. Exposure Considerations (within 1 mile either side of site)

   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 % %
   c. Flood Zone Area: 100 % %
   d. Endangered Structures: (buildings, homes, jetties, etc.) oil terminal
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics

   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: fin sand.
   b. Permeability: low

6. Existing and Projected Land Use (within 1 mile radius of site)

   a. Residential: 39 % %
   b. Recreational: 3 % %
   c. Commercial: 0 % %
   d. Industrial: 4 % %
   e. Wetlands: 35 % %
   f. Public: 9.5 % %
   g. Open Space: 9.5 % %
   h. Agricultural: 0 % %

7. Volume and Types of Dredged Material Available for Containment

   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential

   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) petroleum terminal power plant
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) power plant
   d. Access by Water: (channels, docking facilities)
   e. Access by Land: (roads/bridges) needs extension
   f. Area-wide Plan: (industrial/commercial expansion) Chimon & Sheffield Is. L.I.S. Heritage
      (need for recreation) Maurera Is. Boat Ramp.
      (market for re-use of dredged material)
      Shea Is. Classroom by Sound.

9. Proximity to Cultural Resources

   a. Cultural: (closest) 1/2 miles (number) 5 10 mile radius
   b. Types: (historical, archaeological, etc.) Cultural recreational

10. Existing and Historical Spoil Disposal Location

   a. Existence of Containment Structures, Dikes and Weirs:
      (condition, dimensions) bulkheads
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.)
   c. Volume of Material Previously Disposed: ? moderately

Siting Criteria

Name: TALLMAN ISLAND County: _____ Map # 1/A Location # 2-12

1. Shorefront Ownership and Shorefront Disposal Sites

   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas

   a. Shellfish Beds: >5 miles
   b. Lobster Locations: >5 miles
   c. Finfish Concentrations: 3½ miles
   d. Waterfowl Areas: 3½ miles
   e. Wetland Areas: >3 miles
   f. Water Quality Conditions: (poor/fair/good) ?

3. Bathymetry

   a. Nearshore Slope: flat ft/mile
   b. Available Surface Area: 106 acres
   c. Available Volume Below MSL: 1.1X10⁶ cu. yards
   d. Total Volume (+10ft) 2.8X10⁶ yd³

4. Exposure Considerations (within 1 mile either side of site)

   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0% %
   c. Flood Zone Area: 0% %
   d. Endangered Structures: (buildings, homes, jetties, etc.)
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics

   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: fine sand ??
   b. Permeability: low

6. Existing and Projected Land Use (within 1 mile radius of site)

   a. Residential: % %
   b. Recreational: % %
   c. Commercial: % %
   d. Industrial: % %
   e. Wetlands: % %
   f. Public: % %
   g. Open Space: % %
   h. Agricultural: % %

7. Volume and Types of Dredged Material Available for Containment

   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential

   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) Sewage Treatment Plant
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities) at adjacent plant
   e. Access by Land: (roads/bridges)
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation)
      (market for re-use of dredged material)

9. Proximity to Cultural Resources

   a. Cultural: (closest) ½ miles (number) 5 10 mile radius
   b. Types: (historical, archaeological, etc.) ?

10. Existing and Historical Spoil Disposal Location

   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.)
   c. Volume of Material Previously Disposed: CY

Siting Criteria

Name: CITY/HART ISLAND County: _____ Map # 1/A Location# 2-13

1. Shorefront Ownership and Shorefront Disposal Sites

   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas

   a. Shellfish Beds: 3½ miles
   b. Lobster Locations: 2½ miles
   c. Finfish Concentrations: <½ miles
   d. Waterfowl Areas: 2 miles
   e. Wetland Areas: 1 miles
   f. Water Quality Conditions: poor/fair/good closed to shellfishing

3. Bathymetry

   a. Nearshore Slope: _____ ft/mile
   b. Available Surface Area: 34 acres
   c. Available Volume Below MSL: 6.4×10^5 cu. yards
   d. Total Volume (+10ft) 1.2×10^6 yd³

4. Exposure Considerations (within 1 mile either side of site)

   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 50 %
   c. Flood Zone Area: 150 %
   d. Endangered Structures: (buildings, homes, jetties, etc.) boatyards
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics

   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: fine sand ??
   b. Permeability: low

6. Existing and Projected Land Use (within 1 mile radius of site)

   a. Residential: % %
   b. Recreational: % %
   c. Commercial: % %
   d. Industrial: % %
   e. Wetlands: % %
   f. Public: % %
   g. Open Space: % %
   h. Agricultural: % %

7. Volume and Types of Dredged Material Available for Containment

   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential

   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) Public! Potters Field
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space) in radius Reformatory
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) Sewage Disposal
   d. Access by Water: (channels, docking facilities)
   e. Access by Land: (roads/bridges) none
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation)
      (market for re-use of dredged material)

9. Proximity to Cultural Resources

   a. Cultural: (closest) 0.8 miles (number) 11 10 mile radius POTTERS FIELD &
   b. Types: (historical, archaeological, etc.) Pelham Bay Park

10. Existing and Historical Spoil Disposal Location

   a. Existence of Containment Structures, Dikes and Weirs:
      (condition, dimensions) bulkheads, offshore rocks
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: NEW ROCHELLE County: _____ Map # 5/A Location# 2-14

1. Shorefront Ownership and Shorefront Disposal Sites

   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas

   a. Shellfish Beds: >5 miles
   b. Lobster Locations: 2 miles
   c. Finfish Concentrations: 1½ miles
   d. Waterfowl Areas: 5 miles
   e. Wetland Areas: ½ miles
   f. Water Quality Conditions: poor/fair/good SB

3. Bathymetry

   a. Nearshore Slope: tide flats ft/mile
   b. Available Surface Area: 60 acres
   c. Available Volume Below MSL: 5.4×10^5 cu. yards
   d. Total Volume (+10ft) 1.5×10^6 yd³

4. Exposure Considerations (within 1 mile either side of site)

   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: no % ?
   c. Flood Zone Area: yes % ?
   d. Endangered Structures: (buildings, homes, jetties, etc.)
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics

   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: mud
   b. Permeability: low

6. Existing and Projected Land Use (within 1 mile radius of site)

   a. Residential: % %
   b. Recreational: % %
   c. Commercial: % %
   d. Industrial: % %
   e. Wetlands: % %
   f. Public: % %
   g. Open Space: % %
   h. Agricultural: % %

7. Volume and Types of Dredged Material Available for Containment

   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential

   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) Public Utility
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) inland
   d. Access by Water: (channels, docking facilities)
   e. Access by Land: (roads/bridges)
   f. Area-wide Plan: (industrial/commercial expansion)
      (need for recreation) none at site
      (market for re-use of dredged material)

9. Proximity to Cultural Resources

   a. Cultural: (closest) 1½ miles (number) 10 10 mile radius
   b. Types: (historical, archaeological, etc.) DAVIDS ISLAND

10. Existing and Historical Spoil Disposal Location

   a. Existence of Containment Structures, Dikes and Weirs:
      (condition, dimensions) bulkheads
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) for sewage treatment plant none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: PORT JEFFERSON County: _____ Map # 11/B Location # 4-3

1. Shorefront Ownership and Shorefront Disposal Sites

   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas

   a. Shellfish Beds: >3 miles
   b. Lobster Locations: 3 miles
   c. Finfish Concentrations: 2 miles
   d. Waterfowl Areas: 1/2 miles
   e. Wetland Areas: on site miles
   f. Water Quality Conditions: poor/(fair)/good
      pollution survey-tability 150
      not closed to shellfishing

3. Bathymetry

   a. Nearshore Slope: flat ft/mile
   b. Available Surface Area: 65 acres
   c. Available Volume Below MSL: 3.4X10^5 cu. yards
   d. Total Volume (+10ft) 1.4X10^6 yd^3

4. Exposure Considerations (within 1 mile either side of site)

   a. Wave Energy: (high, moderate/(low))
   b. Critical Erosion Areas: 0% %
   c. Flood Zone Area: 50 % %
   d. Endangered Structures: (buildings, homes, jetties, etc.) beaches & wetlands
   e. Cost of Flood Damages: (high/medium/(low))

5. Soil/Foundation Characteristics

   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: principally fine sand some mud & coarse sand
   b. Permeability: low

6. Existing and Projected Land Use (within 1 mile radius of site)

   a. Residential: 53 % %
   b. Recreational: 5 % %
   c. Commercial: 0 % %
   d. Industrial: 0 % %
   e. Wetlands: 5 % %
   f. Public: 2 % %
   g. Open Space: 35 % %
   h. Agricultural: 0 % %

7. Volume and Types of Dredged Material Available for Containment

   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential

   a. Site Land use: (Res/Rec/Comm/Ind/(Wetlands)/(Open Space))
   b. Adjacent Land Use: ((Res)/Rec/Comm/Ind/(Wetlands)/(Open Space))
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.) none
   d. Access by Water: ((channel)s, docking facilities) deep access no dock
   e. Access by Land: (roads/(bridges)) medium duty
   f. Area-wide Plan: (industrial/commercial expansion) recreational ferry
      (need for (recreation)) fish reef
      (market for re-use of dredged material) marmas offshore terminal

9. Proximity to Cultural Resources

   a. Cultural: (closest) ? miles (number) 1 10 mile radius
   b. Types: (historical, archaeological, etc.)

10. Existing and Historical Spoil Disposal Location

   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) spoil disposal
   c. Volume of Material Previously Disposed: ?? CY

SOUTH

Siting Criteria

Name: HEMPSTEAD HARBOR County: _____ Map # 2/A Location# 4-4

1. Shorefront Ownership and Shorefront Disposal Sites
   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas
   a. Shellfish Beds: >5 miles
   b. Lobster Locations: 1½ miles
   c. Finfish Concentrations: 1½ miles
   d. Waterfowl Areas: 0 miles on site
   e. Wetland Areas: 3 miles
   f. Water Quality Conditions: poor/fair/good
   closed to shellfishing susceptibility 40-120

3. Bathymetry
   a. Nearshore Slope: 2 ft/100 ft/~~mile~~
   b. Available Surface Area: 84.8 acres
   c. Available Volume Below MSL: 1.6X10^6 cu. yards
   d. Total Volume (+10ft) 3.0X10^6 yd^3

4. Exposure Considerations (within 1 mile either side of site)
   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 %
   c. Flood Zone Area: 10% %
   d. Endangered Structures: (buildings, homes, jetties, etc.) little
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics
   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: coarse sand bottom habitat
   b. Permeability: high

6. Existing and Projected Land Use (within 1 mile radius of site)
   a. Residential: 60 % %
   b. Recreational: 15 % %
   c. Commercial: 3 % %
   d. Industrial: 8 % %
   e. Wetlands: 0 % %
   f. Public: 3 % %
   g. Open Space: 11 % %
   h. Agricultural: 0 % %

7. Volume and Types of Dredged Material Available for Containment
   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential
   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities)
   e. Access by Land: (roads/bridges)
   f. Area-wide Plan: (industrial/commercial ~~expansion~~ lessening) harbor debris cleanup
      (~~need for recreation~~) marina develop
      (market for re-use of dredged material) phase out petroleum distribution facilities

9. Proximity to Cultural Resources
   a. Cultural: (closest) miles 0 (number) 9 10 mile radius
   b. Types: (historical, archaeological, etc.) MUSEUM ON SITE

10. Existing and Historical Spoil Disposal Location
   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) private wetland & construction fill
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.)
   c. Volume of Material Previously Disposed: 250,000 CY

Siting Criteria

Name: SWEZY OIL ETAL. County: _____ Map # 11/B Location# 6-3

1. Shorefront Ownership and Shorefront Disposal Sites

   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas

   a. Shellfish Beds: >3 miles
   b. Lobster Locations: 3½ miles
   c. Finfish Concentrations: 3½ miles
   d. Waterfowl Areas: 1 miles
   e. Wetland Areas: 1½ miles
   f. Water Quality Conditions: (poor/fair/good)
   pollution susceptibility 1000
   closed to shellfishing

3. Bathymetry

   a. Nearshore Slope: 1/100 ft/mile
   b. Available Surface Area: 63 acres
   c. Available Volume Below MSL: 1.4x10^6 cu. yards
   d. Total Volume (+10ft) 2.4x10^6 yd^3

4. Exposure Considerations (within 1 mile either side of site)

   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: ≈ 0 %
   c. Flood Zone Area: 0 %
   d. Endangered Structures: (buildings, homes, jetties, etc.)
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics

   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
   or USCS Classification: 25-31 M MUD
   b. Permeability: low

6. Existing and Projected Land Use (within 1 mile radius of site)

   a. Residential: 59 % %
   b. Recreational: % %
   c. Commercial: 3 % %
   d. Industrial: 2 % %
   e. Wetlands: 0 % %
   f. Public: 15 % %
   g. Open Space: 21 % %
   h. Agricultural: 0 % %

7. Volume and Types of Dredged Material Available for Containment

   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential

   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities)
   e. Access by Land: (roads, bridges)
   f. Area-wide Plan: (industrial/commercial expansion) offshore island
   (need for recreation) proposed public marina
   (market for re-use of dredged material) artificial reef berry

9. Proximity to Cultural Resources

   a. Cultural: (closest) miles 9 (number) 1 10 mile radius
   b. Types: (historical, archaeological, etc.)
   none in immediate vicinity

10. Existing and Historical Spoil Disposal Location

   a. Existence of Containment Structures, Dikes and Weirs:
   (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: HUNTINGTON UTILITIES County: _____ Map # 8/A Location# 6-4

1. Shorefront Ownership and Shorefront Disposal Sites

   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas

   a. Shellfish Beds: 2 miles
   b. Lobster Locations: 4½ miles
   c. Finfish Concentrations: >5 miles
   d. Waterfowl Areas: 1½-2 miles
   e. Wetland Areas: 2 miles
   f. Water Quality Conditions: poor/fair/good
      closed to shellfishing
      pollution susceptibility >1000

3. Bathymetry

   a. Nearshore Slope: variable ft/mile
   b. Available Surface Area: 2.13 acres
   c. Available Volume Below MSL: 4.7×10^5 cu. yards
   d. Total Volume (+10ft) 8.3×10^5 yd³

4. Exposure Considerations (within 1 mile either side of site)

   a. Have Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0 % %
   c. Flood Zone Area: 0 % %
   d. Endangered Structures: (buildings, homes, jetties, etc.)
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics

   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
      or USCS Classification: SB W Fine Sand
   b. Permeability: low

6. Existing and Projected Land Use (within 1 mile radius of site)

   a. Residential: % %
   b. Recreational: % %
   c. Commercial: % %
   d. Industrial: % %
   e. Wetlands: % %
   f. Public: % %
   g. Open Space: % %
   h. Agricultural: % %

   not compiled due to low containment value

7. Volume and Types of Dredged Material Available for Containment

   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential

   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities)
   e. Access by Land: (roads/bridges)
   f. Area-wide Plan: (industrial/commercial expansion) phase out pet. transfer facilities
      (need for recreation)
      (market for re-use of dredged material)

9. Proximity to Cultural Resources

   a. Cultural: (closest) 3 miles (number) 6 10 mile radius
   b. Types: (historical, archaeological, etc.) Cold Spring Harbor

10. Existing and Historical Spoil Disposal Location

   a. Existence of Containment Structures, Dikes and Weirs:
      (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) none
   c. Volume of Material Previously Disposed: none CY

Siting Criteria

Name: Colonial Sand & Stone County: _____ Map # 2/A Location # 7-3

1. Shorefront Ownership and Shorefront Disposal Sites

   a. Site Ownership: (Federal, State, County, Town, Private)

2. Proximity of Site to Significant Ecological Areas

   a. Shellfish Beds: >5 miles
   d. Waterfowl Areas: < 1/2 miles
   b. Lobster Locations: 4 miles
   e. Wetland Areas: >4 miles
   c. Finfish Concentrations: 4 miles
   f. Water Quality Conditions: poor/fair/good ?
   closed to shellfishing
   pollution susceptability 500 - 1000

3. Bathymetry

   a. Nearshore Slope: variable ft/mile
   c. Available Volume Below MSL: 1.6X10^6 cu. yards
   b. Available Surface Area: 116 acres
   d. Total Volume (+10ft) 3.5X10^6 yd^3

4. Exposure Considerations (within 1 mile either side of site)

   a. Wave Energy: (high, moderate, low)
   b. Critical Erosion Areas: 0% %
   c. Flood Zone Area: 10% %
   d. Endangered Structures: (buildings, homes, jetties, etc.)
   e. Cost of Flood Damages: (high/medium/low)

5. Soil/Foundation Characteristics

   a. Soil/Sediment Physical Characteristics: % sand, % clay, % silt
   or USCS Classification: coarse sand
   b. Permeability: high

6. Existing and Projected Land Use (within 1 mile radius of site)

   a. Residential: 30 % %
   b. Recreational: 18 % %
   c. Commercial: 2 % %
   d. Industrial: 28 % %
   e. Wetlands: 0 % %
   f. Public: 5 % %
   g. Open Space: 17 % %
   h. Agricultural: 0% %

7. Volume and Types of Dredged Material Available for Containment

   a. Present Disposal Method: % Water (site), % Land (site)
   b. Volume of Dredged Material Projected:
      Within Quadrangal: CY/year
      Within Surrounding Quads: CY/year
   c. General Characteristics of Material (Phys-chem):

8. Compatability with Adjacent Land/Re-use Potential

   a. Site Land use: (Res/Rec/Comm/Ind/Wetlands/Open Space) Sand Pit
   b. Adjacent Land Use: (Res/Rec/Comm/Ind/Wetlands/Open Space)
   c. Types of Industrial/Commercial Uses: (Port, sand/gravel, petroleum, etc.)
   d. Access by Water: (channels, docking facilities)
   e. Access by Land: (roads/bridges)
   f. Area-wide Plan: (industrial/commercial ~~expansion~~ contraction)
   (need for recreation)
   (market for re-use of dredged material)
   reclamation of sand pits for recreation activity

9. Proximity to Cultural Resources

   a. Cultural: (closest) 1/2 miles (number) 11 10 mile radius
   b. Types: (historical), archaeological, etc.) LIS heritage
   Town of Roslyn

10. Existing and Historical Spoil Disposal Location

   a. Existence of Containment Structures, Dikes and Weirs: (condition, dimensions) none
   b. Use of Material Previously Disposed: (construction fill, beach nourishment, etc.) adjacent beaches
   c. Volume of Material Previously Disposed: none CY

Long Island Sound
Dredged Material Containment
Feasibility Study

Island / Shoal Screening Report

US Army Corps
of Engineers
New England Division

PRELIMINARY SCREENING REPORT
ON
FEASIBILITY OF UTILIZING CONTAINMENT FACILITIES
ALONG THE CONNECTICUT COAST

by

The Oceanic Society
Stamford Marine Center
Magee Avenue
Stamford, CT 06902

to

U.S. Army Corps of Engineers
New England Division
Under
Purchase Order DACW33-81-Q-0054

February, 1983

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1.0 Introduction

Disposal of dredged materials continues to be a major marine environmental concern in the Long Island Sound region. Containment facilities offer an option for disposing of dredged materials by extending existing land seaward or creating artificial islands in shallow waters. Completed containment facilities can be used for recreation, development or wildlife habitat, including creation of marshlands. In other areas of the country, containment facilities have been successfully used for disposal of dredged materials.

This report reflects a preliminary screening effort assessing the feasibility of utilizing specific locations along the Connecticut coast for use as containment facility sites. Both the locations and factors used in evaluating these areas were specified by the U.S. Army Corps of Engineers, New England Division, in proposing the study. The principal purpose of this effort is to determine, based on available data and citizen comment, whether any of these potential containment facility sites merit further consideration and study.

Essentially, this study is an initial review designed to identify factors which would clearly eliminate or justify further consideration of a site for construction of an environmentally acceptable containment facility along the Connecticut coast. Areas reviewed in this report were suggested to the Corps of Engineers by citizens, fishermen, coastal land owners and government officials. Inclusion of an area in this study does not imply that consideration of that site has moved beyond a preliminary or conceptual stage.

In designing this study, the Corps of Engineers proposed review of the potential for containment facilities in broad geographical areas, i.e.: the Norwalk Islands. In order to bring this discussion into focus the study staff outlined a containment facility in a site

representative of conditions in the area. Site specific assessments in this report are completely hypothetical and are undertaken to reflect conditions found throughout the broader geographical area identified by the Corps of Engineers.

Nothing in this report should be taken to reflect support or endorsement of a specific containment facility site by either the Corps of Engineers, New England Division or the Oceanic Society. Instead, the findings of this report are designed as a basis for further study and consideration of specific containment facility sites. This is but the first step in a process which may lead to further study, public involvement, and consultation with state as well as local officials on a site specific basis. Design, detailed assessment of environmental effects and consideration of an actual construction project are several steps removed from the present, preliminary screening study.

1.1 Background Review

Since the inception of the National Environmental Policy Act in 1969, disposal of materials dredged from the harbors and channels has been seen as a potential pollution problem in coastal and estuarine environments. While much of the sediment dredged around the Sound is considered to be relatively innocuous, materials removed from older urban harbors are often contaminated with hazardous substances ranging from toxic chemicals to heavy metals and petroleum hydrocarbons. Some scientists believe open water disposal of contaminated sediments poses a real threat to marine environmental quality and potentially to public health.

Sediments to be dredged from Long Island Sound harbors are classified by the U.S. Army Corps of Engineers under the New England River Basin Commission's 1980 Interim Plan for Disposal of Dredged Materials from Long Island Sound, (see Dredging and Dredged Materials Management in the Long Island Sound Region, report to the New England Governors' Conference, August 13, 1982, pages 63-70). This system classifies sediments as:

* Class I, low level of pollutants, suitable for open water disposal, habitat creation, and land fill cover;

* Class II, moderate level of pollutants, requires assessment to determine if "potentially degrading." If judged not "potentially degrading," may be disposed of in open waters and used for landfill cover, etc. If considered "potentially degrading," sediments must be treated as Class III material; and

* Class III, high level of contaminants, considered to be potentially degrading and requires special treatment such as capping sediments dumped on the bottom of the Sound with a layer of cleaner dredged material.

To the public, containment is seen as serving one of two functions:

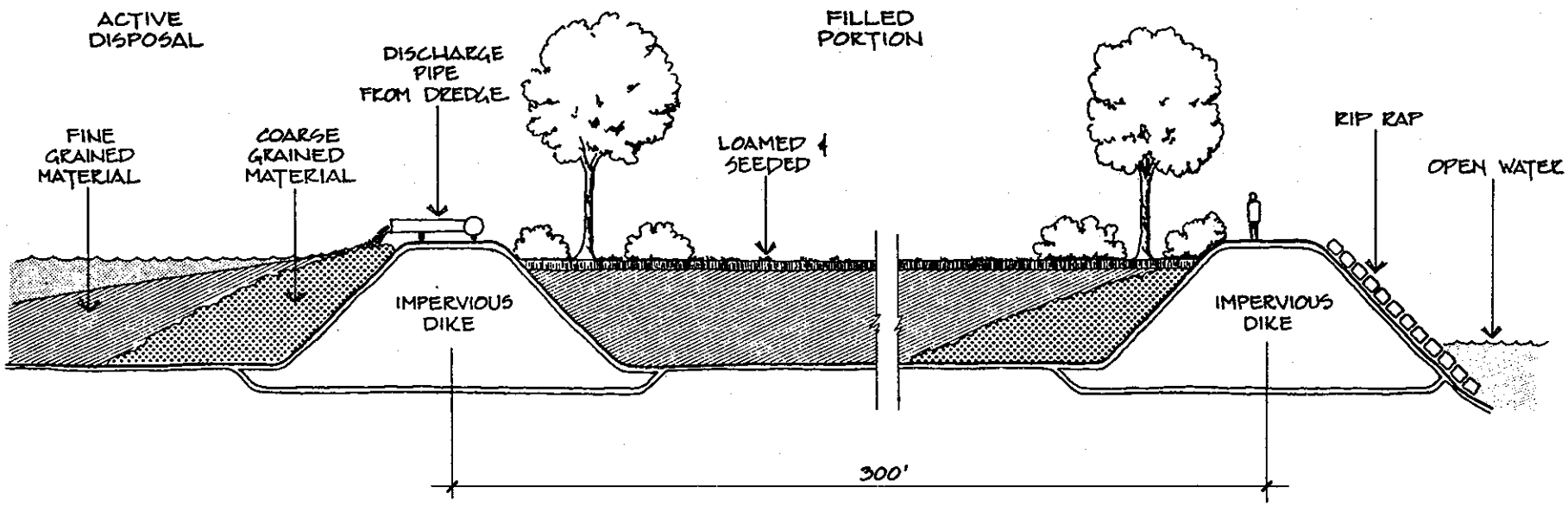
(1) isolating objectionable materials with post-disposal use of secondary importance; or

2) creating valuable shorefront property with the character of material to be used of secondary importance although clean material is obviously preferred. Containment can serve as a disposal mechanism for some Class III materials although these facilities can also be used solely for disposal of clean sediments. A marsh creation project, for example, might contain some Class III materials at the lowest levels of the project while cleaner sediments would be placed near the surface. The character of sediments to be contained in a facility is an issue addressed during design and assessment of environmental effect. As such, it is beyond the scope of this study.

Containment facilities are created by placing dredged materials behind dikes to extend existing land seaward or create artificial islands (see figure 1.1). Island construction is most feasible in shallow waters (i.e.: depths less than 30 feet). At least 70 containment facilities have been built by the Corps of Engineers around the country but none have been completed in the Sound. A quasi-containment facility does exist in the Connecticut River and has been used as a habitat creation project. The Corps' New England Division is currently undertaking a Congressionally mandated study of the potential for containment in this region.

Corps of Engineers studies show containment facilities built in the past can be designed and constructed with the creation of minimum turbidity and odor problems. Corps research indicated containment facilities utilizing contaminated sediments successfully isolated these materials from the adjacent environment.

FIGURE 1.1



CONCEPTUAL DIAGRAM OF A DREDGED MATERIAL CONTAINMENT AREA

Completed containment facilities can be used for development opportunities, recreational activities, or wildlife habitat. In Clinton, CT, a possible containment facility will extend a saltmarsh abutting a state park. An island creation project has been proposed for Black Ledge off Groton and New London. Both of these projects have progressed to site specific study and assessment by the Corps and are not considered in this report.

1.2 Potential Containment Sites

Broad geographical areas designed for review in this report include:

* Captain Harbor, Greenwich, an area of open water and islands off Byram, Greenwich, and Cos Cob harbors. A number of sizable islands and numerous small islands and rock outcroppings are located in the study area. The area considered is bounded on the west by Manursing Island, Rye, New York; on the east by Greenwich Point; and extends south into Long Island Sound approximately 1.25 NM offshore to the 30-foot contour.

* Norwalk Islands, Norwalk and Westport, an area of open water and islands at the entrance to Norwalk harbor. The majority of islands lie within the boundaries of Norwalk with Cockenoe Island to the east being located within the Town of Westport. There are approximately nine large islands with numerous smaller islands and rock outcroppings flanking the larger islands. Study area is located south and east of Bell Island; extending east to a point due south of Cedar Point and the entrance to the Saugatuck River. The 30-foot contour marks the study area's south border.

* Milford Point, Milford, a barrier beach and adjacent mudflat area located at the mouth of the Housatonic River on the eastern shore. The study area considered is located in a triangle between Milford Point on the northwest; outer breakwater flasher to the south; and Laurel Beach to the east.

* Thimble Islands, Branford, an open water and rocky island archipelago located to the east of Branford Harbor and west of Sachem Head. More than a dozen sizable islands make up "The Thimbles." Study area extends south from Brown Point to Browns Reef marker (#26) and from there northeast to Hoadley Point.

* Falkner Island, off Guilford, an area located approximately 3 nautical miles south of the entrance to Guilford Harbor. There are two major islands, Falkner Island and Goose Island and several rock outcroppings. The study area includes both islands and the shoal area in between.

* Sixmile Reef, off Clinton, a shoal area located approximately 3.0 nautical miles (NM) south of Hammonasset Point; extending eastward for 3.0 NM south of Menunketesuck Island. No portion of the reef is exposed at low tide and its depth ranges from 19-30 feet at low tide.

* Duck Island Roads, Westbrook, a harbor of refuge constructed by the Corps of Engineers completed in 1917. The harbor consists of two stone rip rap breakwaters extending at right angles north and west of Duck Island. The north breakwater extends 1,100 feet from Duck Island while the western breakwater extends 2,697 feet to the west. A third breakwater is located to the west of Duck Island extending 3,750 feet south from Stone Island.

* Menunketesuck Island, Westbrook, a slender island and associated sand flats extending southwest from the entrance to the Patchogue River. It lies due east of Duck Island Roads. The study area includes Menunketesuck Island and the sand shoal areas extending west to the Patchogue River entrance and northwest to West Branch.

* Bartlett Reef, off Waterford, an area of shoals that lies south of Seaside Point to the east of Niantic Bay and to the west of New London Harbor. The reef's northern edge lies ½ NM southwest of Seaside Point and is marked by Black Can "1." Bartlett Reef extends south for approximately 1.3 NM and its southern tip is marked by the Barlett Reef horn. A few rock outcroppings of the reef are visible at low tide though the majority of the reef lies 2-12 feet below low tide.

1.3 Study Screening Factors

In considering specific sites for the feasibility of use for containment facilities, the following factors were considered:

* Biological productivity, importance of the area as habitat for feeding, breeding, nursery, and/or other use by marine and marine dependent species. For marine species, factors reviewed include use of the area by commercially important finfish and shellfish as feeding, breeding, or nursery areas. For terrestrial species, the use of intertidal and upland areas by shorebirds, seabirds, and other species was considered. Important wildlife, erosion, flood hazards, and major habitat type were also screened.

* Shellfish concentrations, areas of important shellfish concentrations were considered in relationship to their proximity to recommended sites. Efforts were made to separate shellfish beds of significant economic importance from peripheral beds of secondary importance. It should be noted that commercially important shellfish species are common residents from the intertidal zone to depths of 30 feet so this study attempts to reflect the importance of the shellfish resource in relationship to the potential impact of the containment site.

* Finfish concentrations, potential impact on finfish were evaluated in terms of habitat losses and potential population decline. In many cases lost habitat would be mitigated by the creation of new habitat. For example, the rock rip-rap of a containment bulkhead provides a new habitat. In many cases, definitive information on location of significant habitat areas for economically significant species of finfish is lacking.

* Size of potential containment facilities, discussions with the Corps of Engineers, New England Division, show the economic feasibility of containment generally requires a facility be larger than 6 acres and located in coastal waters less than 30 feet deep. Given these guidelines, potential sites were evaluated in terms of their abilities to meet size and water depth requirement.

* Existing land use, each site is evaluated in terms of existing land use, adjacent land use and future land use potential. These land uses are considered in relationship to the proposed containment facility: some uses may be potentially benefited while others are in direct conflict with development of a containment structure.

* Distance to dredging activities, the distance between the proposed containment site and existing federal maintenance projects are determined with the size and nature of the maintenance project given. The location of smaller recreational projects are also included where appropriate.

* Navigation hazards, proximity to and affect upon navigation is appraised. The nature of the traffic and impact is also given: i.e., recreational sportfishing, tug traffic, etc. Conditions to mitigate potential navigational hazards are also considered where appropriate.

* Public comment, correspondence and reaction from the public in response to press releases, mailing, and personal contact are listed.

2.0 Study Methodology

As proposed by the Corps of Engineers, New England Division, this preliminary screening study reflects existing data and does not report any new field work or reflect additional scientific research. Information contained in the study report was developed during discussions with local, state and federal officials; telephone conversations and written correspondence with citizens and municipal officials; and interviews with marine scientists, fishermen, oystermen, and conservationists.

The original scope of work developed by the Corps was expanded at the request of the Oceanic Society to include:

* a mass mailing to individuals, organizations and local elected officials who had expressed an interest in containment and were on a mailing list developed for the Corps by the Long Island Sound Taskforce (Long Island Sound Dredged Material Containment Study Workshop Project, 1981) (sample letter section 2.1); and

* a press release soliciting public comment on the study sites based on the screening factors identified by the Corps (sample letter, section 2.2). Comments received during this process are reflected in Secion 3 of this report.

During the study period, Oceanic Society staff met with representatives of the New England Division to discuss definition of sites and selection factors.

Section 2.1 Sample letter

THE OCEANIC SOCIETY

EDUCATION • RESEARCH • CONSERVATION

EXECUTIVE OFFICES
Magee Avenue
Stamford, Ct. 06902
(203) 327-9786

Dear Coastal Citizen:

You are invited to assist in a feasibility study examining the potential of utilizing islands and shoal areas along the Connecticut coast for use as dredged material containment facilities. The Oceanic Society is conducting this research under contract to the U.S. Army Corps of Engineers, New England Division.

Our goal is to determine whether ten specific sites should be studied further in the search for locations suitable for dredged material containment through creation of islands. Inclusion of an area in this effort clearly does not signal any firm plans for construction of a containment facility. Rather, we are working to identify sites which merit detailed scientific examination and environmental review.

Locations identified by the Corps of Engineers for the study include:

* the Captain's Harbor area off Greenwich;
* the Norwalk Islands off Norwalk Harbor;
* the Thimble Islands off Stony Creek;
* the Falkner Island area off Guilford;
* the Six Mile Reef area off Clinton;
* the Duck Island Roads area off Clinton and Westbrook;
* the Bartlet Reef area off Waterford;
* the Stratford Shaol area off Stratford;
* the Menunketesuck Island area off Clinton; and
* the Charles Island area off Milford.

Western Regional Office / OCEANS Editorial Office / Expeditions Office: Fort Mason, San Francisco, Ca. 94123. (415) 441-1104
Mid-Atlantic Regional Office: Center for Ocean Studies, Gardner's Basin, Atlantic City, N.J. (609) 348-5252

One of the most difficult parts of this study is considering the competing interests for the shallow waters most suitable for islands extension or construction. We would appreciate your assistance in acquiring information on the different values of these areas.

Specifically, during the study we will by analyzing each location in terms of:

* biological productivity, or whether the area plays an important part in the Sound's marine ecosystem;

* shellfish concentrations, to reflect location of oyster, clam and scallop beds;

* finfish concentrations, to identify areas important for sport and commercial fishermen; and

* navigational hazards at or near the site. We will also consider existing land use at the site, distance to exsiting dredging activities, other potential impacts and size of potential containment facilities suitable for each area.

We hope you will assist us by submitting your comments to our staff within the next four weeks. Please contact me at the Oceanic Society, (203) 327-9786, if you have any questions on this study.

Thank you for your consideration and assistance in this project. We look forward to hearing from you on this important topic.

Sincerely,

Thomas C. Jackson
Vice President

TCJ:bas

Section 2.2 Sample press release

THE OCEANIC SOCIETY

EDUCATION • RESEARCH • CONSERVATION

EXECUTIVE OFFICES
Magee Avenue
Stamford, Ct. 06902
(203) 327-9786

FOR IMMEDIATE RELEASE

FOR MORE INFORMATION
(203) 327-9786

STAMFORD - - - Can sediments dredged from urban harbors be used to build islands along the Connecticut coast?

That question is examined in a feasibility study undertaken by a national marine conservation group -- the Oceanic Society -- under contract with the U.S. Army Corps of Engineers, New England Division.

The study is another step in the Corps' ongoing effort to determine if materials dredged from harbor bottoms around the Sound can be used to create islands or extend coastal marshes. While never used in this region, Corps officials say this practice is common in other areas of the country.

During the short-term study, Oceanic Society researchers will focus on ten sites along the state's shoreline. Factors to be considered in evaluating each location include:

* biological productivity, or whether the area plays an important part in the Sound's marine ecosystem;

* shellfish concentration, to reflect location of oyster, clam and scallop beds;

* finfish concentrations, to identify areas important for sport and commercial fishermen; and

* navigational hazards at or near the site.

Individuals and organizations concerned with these or other aspects of the study should contact Oceanic Society Vice President Thomas C. Jackson at the Oceanic Society's offices in the Stamford Marine Center on Magee Avenue here. Citizen comments and concerns received during

Western Regional Office / OCEANS Editorial Office / Expeditions Office: Fort Mason, San Francisco, Ca. 94123. (415) 441-1104
Mid-Atlantic Regional Office: Center for Ocean Studies, Gardner's Basin, Atlantic City, N.J. (609) 348-5252

the next four weeks will be reflected in the Oceanic Society study, Jackson said.

"Inclusion of an area in our study certainly does not signal firm plans on anyone's part to press ahead with a containment project," he added. "At most, we will be identifying sites which merit detailed scientific examination and environmental review."

Locations earmarked for the Oceanic Society study include areas off the coast of Greenwich, Norwalk, Stony Creek, Guilford, Clinton, Westbrook, Waterford, Milford, and Stratford.

"The purpose of this study is to determine the feasibility of utilizing islands and shoal area for potential use as dredged material containment facilities through the extension of existing land or creation of new islands," Jackson said. "Any information people can pass on to us about these areas will help in our study."

3.0 Site Specific Screening

This study applies a series of preliminary screening criteria established by the Corps of Engineers to locations identified as potential containment facility sites by the Corps. Since the Corps described study area in broad terms -- i.e.: The Thimble Islands -- the study staff has identified hypothetical containment facility locations for the purposes of this report. These areas were selected to reflect representative environmental conditions and marine resources found in the larger geographical area designated for preliminary screening by the Corps of Engineers.

It is essential to remember that designation of a hypothetical containment facility site for assessment in this preliminary screening report neither reflects any interest by the Corps in, nor support by, the Oceanic Society for construction of an artificial island or land extension project at that location. The location and design of containment facilities examined in this study are intended solely to focus the assessment into an understandable frame of reference.

3.1 Captain Harbor, Greenwich

An area some 0.9 NM east of Byram Point and due south from Byram Harbor was considered in this study (see map 3.1). For this assessment, a containment facility connecting the Calf Island or one extending eastward from the larger of these islands to include Bowers Island was examined. In either case, an area some 600 yds. by 400 yds. would be constructed in depths ranging up to nine feet (MLW).

Biological productivity is judged to be high by municipal conservation officials. Although this area has not been the subject of detailed scientific study, it does appear to be an important habitat for both flounders and oysters. This assessment is based on informal discussions with fishermen familiar with the area and inferences drawn from research in nearby locations. The Calf Islands have undergone significant erosion according to some sources. This suggests the presence of strong tidal currents.

Shellfish concentrations are high throughout much of the Captain Harbor area. Historically, numerous shellfish beds have been leased in this part of the Sound. Many of these beds are said to be highy productive although the shellfish industry is somewhat reluctant to discuss details of this question. A 1978 Oceanic Society Shellfish Survey conducted for the Greenwich Conservation Commission documented significant shellfish resources in town waters. The survey included extensive field work in the Greenwich Cove area and has been supplemented by more recent Oceanic Society sampling in this area.

Finfish concentrations vary with the season. Greenwich Conservation Coordinator Thomas Baptist believes this area is an important area for sport and commercial fishermen. Representatives of Connecticut's Department of Environmental Protection, Marine Fisheries Division also

expressed concerns that nearshore areas such as Captain Harbor often serve as important spawning and nursery areas for species such as winter flounder.

Size of the potential containment facility would be significantly limited by a series of factors. Depths in the area studied are not great enough to contain a high volume of sediments without extending the facility significantly above sea level. In addition, the maximum height of a facility would be limited in consideration of coastal resident's concerns. Further, a large containment facility would, by its very nature, operate for an extended period of time. It seems unlikely Greenwich residents or municipal officials would find this acceptable.

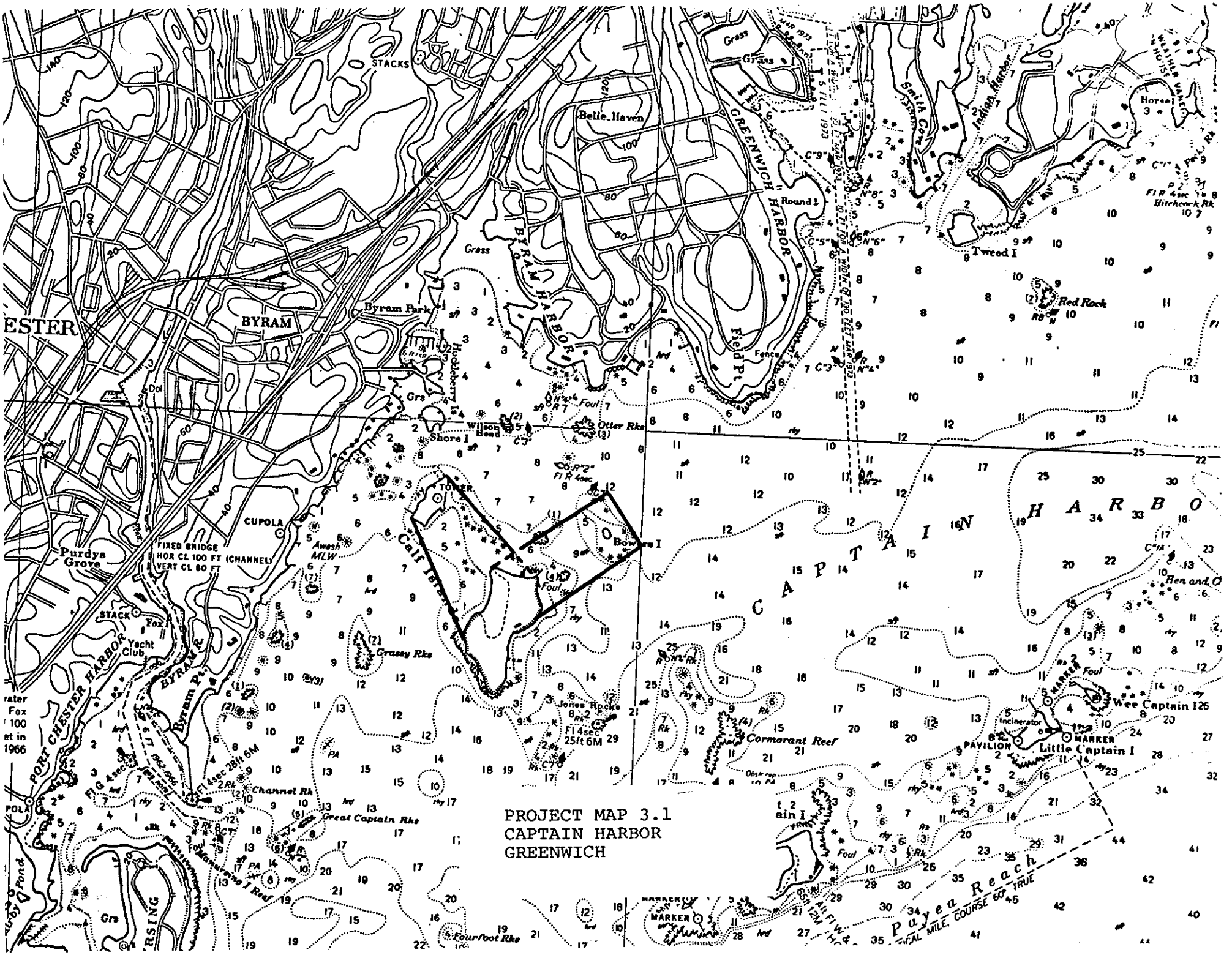
Existing land use at the site involves public recreation. The Captain Islands, particularly Little Captain, are heavily used for recreational purposes. Little Captain Island has regular ferry service linking Greenwich and municipal beaches on the island. The Calf Islands are utilized for recreation by individuals and local organizations such as the Boys Club. In addition, the adjacent mainland is a well developed residential shoreline overlooking the containment site. It is unlikely that a containment facility off this section of coast would be viewed as congruent with local land use by Greenwich residents or officials.

Distance to existing dredging activity would depend on the location of ports utilizing the facility. Port Chester, Greenwich, and Cos Cob (Mianus River) harbors are all within a few nautical miles of the Captain Harbor area. The Mianus River contains pockets where sediments are classified as Class III while materials to be dredged from both Greenwich and Port Chester have been classified as Class II. In the case of Port Chester, however, the upper river may well also contain Class III sediments, (see Section 1.1 for discussion of sediment classifications). In addition to Port Chester, remaining Westchester ports

could be considered potential donors to this site since New York State has not expressed interest in exploring sites within its own waters. Use of this site by Westchester County would elicit strong reaction from Fairfield County residents.

Navigational hazards at or near this site would largely depend on the location and design of the facility. Concerns to be considered in assessing potential navigational dangers include the large number of recreation craft using this area; the large number of reefs and islands in the area which limit maneuvering; and potentially strong currents and tidal flow around island in this area.

Public comment on the Captain Harbor site has been minimal despite publicaton of a news release describing this study in the local press. Correspondence has been exchanged with Greenwich Conservation Coordinator Thomas Baptist. Informal discussions with Greenwich residents suggested, however, substantial public opposition would develop should this site be considered further. The Town of Greenwich has recently recognized a need to control small private operations which have utilized upland disposal of dredged material. The continued use of open water disposal site WLIS III is also a factor.



PROJECT MAP 3.1
CAPTAIN HARBOR
GREENWICH

3.2 Norwalk Islands, Norwalk

The study's screening factors combined with the unique character of these islands makes it difficult to identify, for the purpose of this report, a hypothetical containment facility location in the archipelago. The study site selected is representative of the area as a whole and encompasses Goose Island and the shoals directly to the northeast and southeast to create a diamond shaped design measuring roughly 800 yards on a side. An existing navigational beacon marks the artifical island's northern tip while the terminus of Goose Island reef would be its southern tip (see map 3.2).

Biological productivity is considered among the highest in western Long Island Sound according to state and local officials. Connecticut conservationists support this conclusion and have expressed concern that any containment facility in the island chain would lower biological productivity. Data developed in the Oceanic Society's Coastal Energy Impact Program benthic research survey support this concern. Even minor modifications of tidal currents and flushing could have significant effects on the marine environment here.

Shellfish concentrations are said to be exceptionally high in beds around the Norwalk Islands. Historically, this area supported highly productive beds which helped make Norwalk a major American oyster port. The oyster beds surrounding these islands are used for both commercial and recreational purposes. Lobsters and clams are also taken in significant numbers.

Finfish concentrations vary according to the season but attract both recreational and commercial fishermen. Striped bass, flounder, blackfish, and bluefish are taken in this area of the Sound. Marshes and shallows around these islands are believed to play an important role as habitat for many marine species.

Size of the potential containment facility is limited by shallow depths (less than seven feet) and potential restrictions on the height an artificial island would be permitted to attain by citizens and officials in Norwalk and Westport. Construction of a facility in deeper water (greater than 17 feet) to the east of the site under discussion would afford a larger capacity. However, a deeper structure might face erosion forces similar to those currently affecting nearby Cockenoe Island. Westport officials suggested that Cockenoe be considered as a potential site of the containment facility in order to help control coastal erosion. The difficulty in devising a structural solution for an island undergoing erosion blocked consideration of the Cockenoe Island in this study. A containment facility in the Norwalk Islands could also be affected by recent federal legislation protecting portions of the archipelago as designated barrier islands.

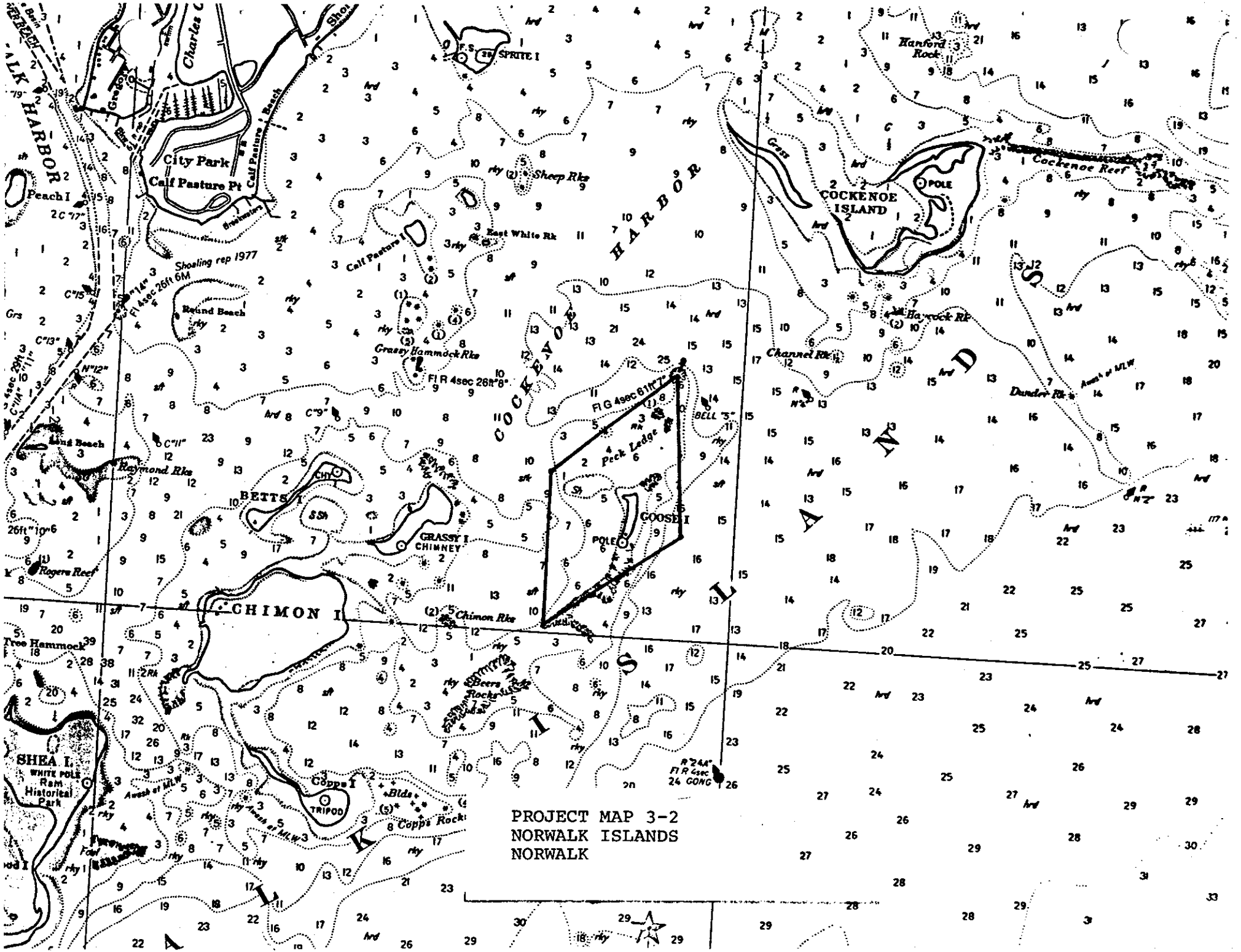
Existing land use on the islands ranges from public recreational space to developed residential shoreline and undeveloped natural areas. Chimon, Goose, Betts and Sheffield Islands have been designated as barrier islands limiting the level of development on these islands. Shea Island, owned by the City of Norwalk, is utilized as a public beach and for nature study. Cockenoe Island is owned by the Town of Westport and utilized for a similar purpose. Chimon Island is privately owned but contains significant wildlife habitat. Protecting this habitat from disturbance associated with the construction and operation of a containment facility would have to be part of any design plan for this area. Shoreline development along this portion of the Connecticut coast is mixed recreational and residential uses. A power plant is also operated on Manresa Island directly to the north of Shea Island.

Distance to dredging activities is conducive to economical operation of a containment facility near Norwalk, a central location in western Long Island Sound. Greenwich and Stamford are located to the west; Norwalk Harbor lies due north; while Bridgeport and Saugatuck are set to the east of this site. Past maintenance dredging projects

have identified Class III sediments in Stamford, Norwalk and Bridgeport while Class II materials have been found in Greenwich and Saugatuck. It is important to note that not all the sediments in the larger urban ports are highly contaminated Class III materials.

Navigational hazards at or near the site would stem from the heavy level of recreational boating, fishing, shellfishing and commercial users of Norwalk Harbor. This factor merits special attention in any further consideration of the Norwalk Islands area.

Public comment received included concern voiced by Assistant Planning and Zoning Director Bennett Boeschenstein and Connecticut Audubon Society President Roland Clement that highly productive shallows near the islands not be disrupted for, or filled by, a containment facility. Both individuals, however, expressed support for the concept of marsh creation through dredged spoil containment along the Connecticut coast.



PROJECT MAP 3-2
NORWALK ISLANDS
NORWALK

3.3 Thimble Islands, Branford

Topography, land use patterns and environmental concerns make it difficult to propose, even for just the purpose of evaluation in this study, a containment facility in the Thimble Islands. The location selected for assessment here involves an octogon, equal in area to Horse Island, extending eastward from Marine Island into waters ranging in depth from 17 to 24 feet, MLW (see map 3.3).

Biological productivity is said to be high in the area although detailed scientific studies are not readily available. Productivity may be affected by the combination of deep water, strong currents and sewage discharges from inhabited islands in the archipelago. Shallows around individual islands are limited, but would be expected to be areas of increased productivity.

Shellfish concentrations are found throughout the islands according to local oystermen. The Thimbles are used for recreational clamming on a seasonal basis and the islands are regarded as a good lobstering ground by state officials. A small oyster business operated in and around the island for many years, but became unprofitable, perhaps due to economies of scale and limitation on boat size imposed by physical characteristics of the area.

Finfish concentrations vary according to the season. State wildlife officials say the Thimbles provide a good bass fishing ground. The area is frequented by recreational fishermen during warmer weather.

Size of the potential containment facility would be limited by proximity of neighboring islands, depths in excess of 30 feet, and height limitations which Thimble Islands' residents would probably seek. A containment facility could be built to protect existing islands and incorporate outcroppings of rock. Such a facility would have depths averaging between 17 and 18 feet (MLW).

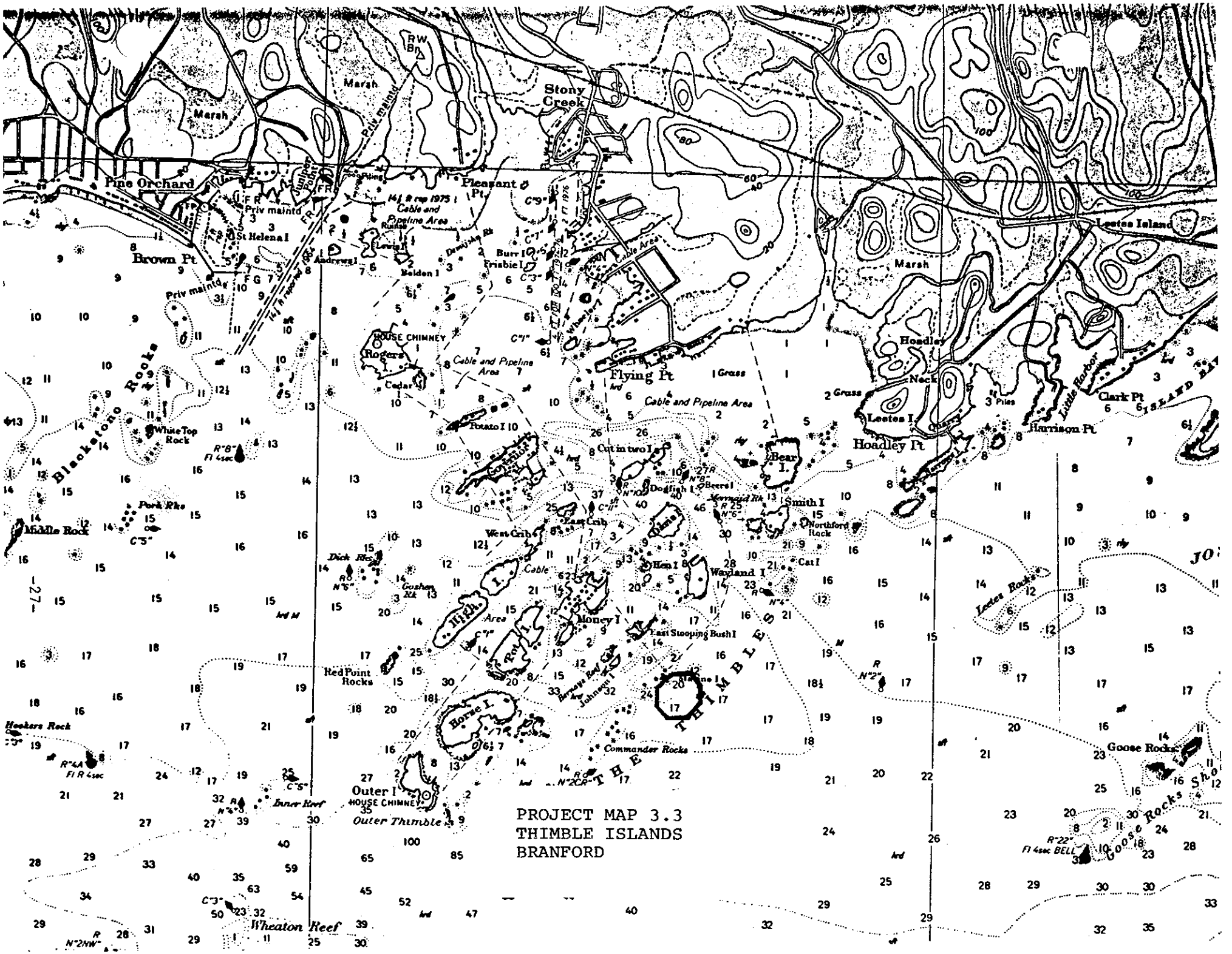
Existing land use at the site would provide a major obstacle to construction of any containment facilities among the Thimble Islands. These islands are privately owned and several are developed for low density residential use. From the air, the islands look like part of the Maine coastline transported to Connecticut. Further, the islands are located off a mainland also developed for residential use. Neither Thimble Island owners nor mainland Branford residents can be expected to support consideration of this area as a containment facility location. These forces would, in all probability, be joined by recreational boaters, shellfishermen, sportsfishermen and conservationists opposed to modification of the island chain.

Distance to dredging activities is not a major factor in evaluating this site. Although the Thimbles are close to New Haven harbor (8.0 NM), the major users of the site would be Branford harbor (4.0 NM), Stony Creek (0.75 NM) and Guilford (4.0 NM). The Thimble Islands are far removed from other major ports in the western Sound and New London, the major eastern Long Island Sound port, is a significant distance from the islands. Thus it appears a containment facility in the Thimbles would serve only New Haven and smaller harbors between the Quinnipiac River estuary and the Connecticut River, an area which may be served by other containment facilities.

Navigational hazards in this area are related to the heavy use of the Thimbles for recreational boating as well as strong tidal currents which run through the area. The archipelago is dotted with outcroppings of rock and navigational aids designed to prevent boating accidents. The Thimbles, then, appear to be an area of higher than average navigational hazard without adding additional hazards.

Public comment has been swift and sure in opposition to consideration of the Thimbles as a containment facility location. Comments

against this location came from such diverse sources as the chairman of the Port Development Committee of New Haven's Chamber of Commerce to a local school girl whose letter was published in a local newspaper, the Branford Review. Informal discussions with area residents reflect vehement opposition to this concept which would probably lead to widespread public criticism and legal action.



PROJECT MAP 3.3
THIMBLE ISLANDS
BRANFORD

3.4 Falkner and Goose Islands, Guilford

This island system is located 2.5 NM southeast of Sachem Head. The Falkner Island lighthouse is a familiar landmark in central Long Island Sound. Directly to the west of Falkner is a smaller group of islands known collectively as Goose Island. Goose Island was chosen as the screening site for a diamond shaped design that would roughly measure 700 yards on a side.

Biological productivity of this area is predominately focused on the presence of several shorebird nesting colonies including the common and roseate tern. The subtidal areas are productive reef habitats, but loss of this bottom habitat could be mitigated by the creation of additional rock/reef habitats by the construction of containment bulkheads. The open exposure of the site would require engineering design able to withstand wind generated waves and strong tidal currents.

Shellfish concentrations are not a major concern in this area because of the exposed nature of the site. Though oysters and hard clams are not found in abundance at the site, populations of blue mussels are found. This shellfish species is not considered a major commercial species in the Sound, but this status is undergoing change. However, initial loss of mussel habitat would be replaced in part by the rip-rap of the containment facility.

Finfish concentrations would be affected in small part by the loss of habitat, but that loss should be mitigated by the creation of new reef (rock) habitat. Goose Island site was not identified as a major commercial or recreational fishing site.

Size of the potential facility would be sufficient for consideration. Though the average bottom depth of the area averages some 6-8 feet MLW, the bulkhead design should reflect the need to protect

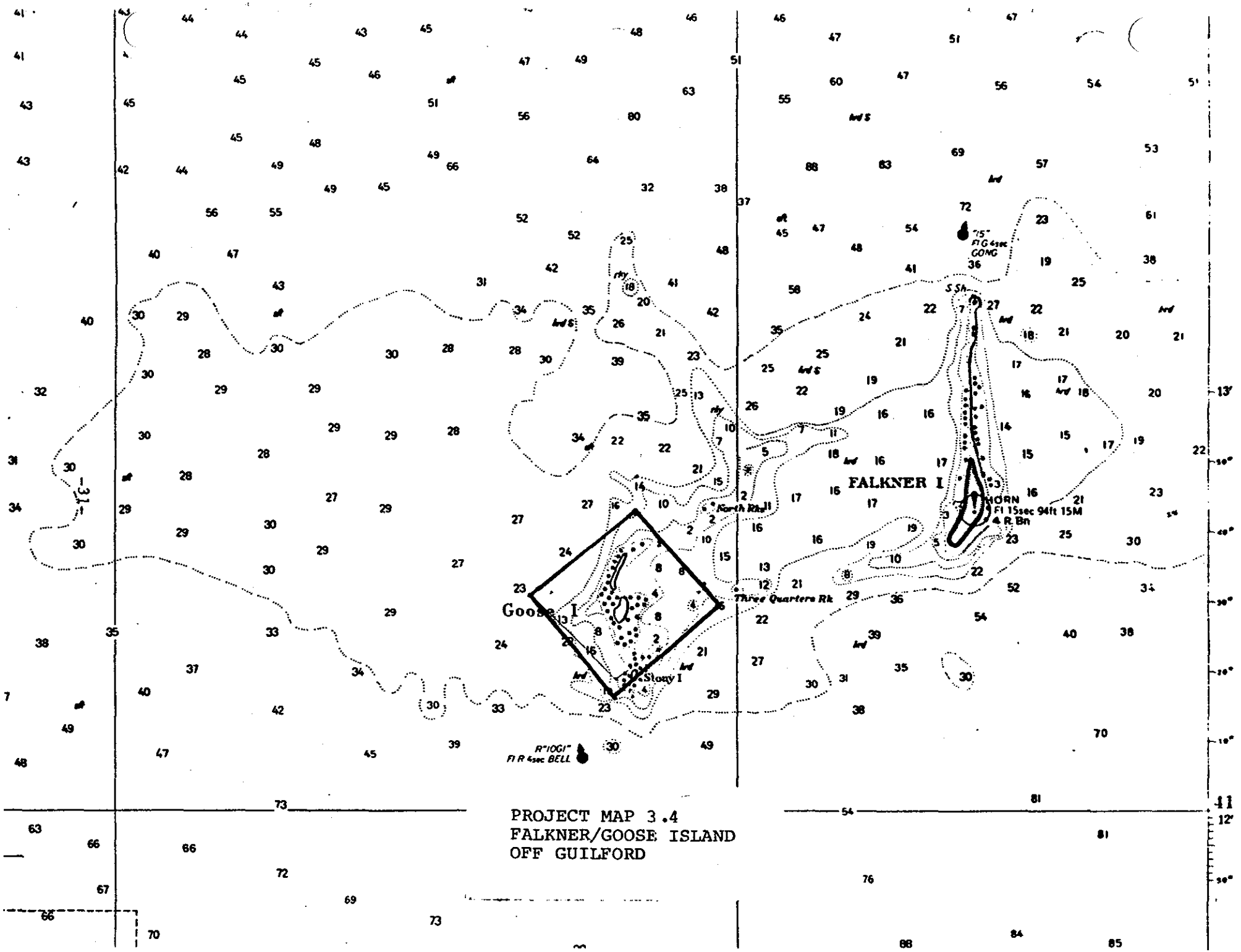
against storm surge and wind generated waves. Because the site is away from the coastal area and the facility should be as visible as possible to navigation, the design would be of higher profile than facilities located in the near shore area.

Existing land use at the site is largely limited to nesting shorebirds on the upland portions of the islands and use of the offshore rocks and outcroppings for roosting and feeding sites. The islands are an important breeding habitat for both common and roseate terns. The remote location of the islands facilitates the terns' successful use of the islands. Any containment site considered for this area should be designed to create additional nesting habitat for terns and other shorebird species.

Distance to existing dredging activity is suitable for consideration of several harbor projects. The largest is New Haven harbor, some 12 NM to the west with Branford and Stony Creek harbors 7-9 NM distant. Guilford harbor is directly north of the site and to the east, Clinton is approximately 6.5 NM away. New Haven is an industrial port and one of the largest navigation projects in Long Island Sound. An improvement project currently under consideration for the harbor would generate some 7.8 million cubic yards of material. The other harbors which might utilize the Goose Island site largely contain Class I and II material. The nature of material from New Haven harbor runs the gamut from sandy Class I material in the outer harbor to Class III enriched pockets within the inner harbor and adjacent tributaries.

Navigational hazards inherent at the site are largely related to its open water nature and visability to commercial and recreational craft. Currently, both the islands and adjacent shoals represent similar or greater danger to navigation than the additional use of the site for containment. Properly marked and charted, such a site would pose little or no additional danger to navigation.

Public comment was largely based on protection and enhancement of nesting habitat for shorebirds, in particular, tern species. Fisheries personnel also stated that the use of offshore sites such as Falkner and Goose Island, while posing greater engineering concerns, had less potential impact to the marine enviornment than the location of a similar facility in the nearshore environment. In addition, the loss of bottom habitat would be mitigated by the habitat created by the containment structure.



PROJECT MAP 3.4
FALKNER/GOOSE ISLAND
OFF GUILFORD

3.5 Sixmile Reef, off Clinton

Sixmile Reef is a group of shoals lying approximately 3 NM south of Hammonasset Point and running some 3 NM to the east southeast. The reef is not visible above low tide and at its shallowest, Sixmile reef remains some 19 feet below MLW. The largest segment of the reef was selected for the potential containment site. A trapazoid measuring 1,100 yards on its southern border and some 700 yards on a side would cover a surface area of approximately 120 acres (see map 3.5).

Biological productivity of the area is significant with the reef providing good ground for recreational fishing and lobstering.

Shellfish concentrations known for the area are predominantly lobsters. According to fishermen and marine fisheries officials alike, Sixmile Reef is known to be good habitat.

Finfish concentrations are located on and near the reef and the Sixmile Reef is a popular recreational fishing spot. As with all reef and shoal habitat in the region, the species and concentration, along with fishing effort vary on a seasonal basis.

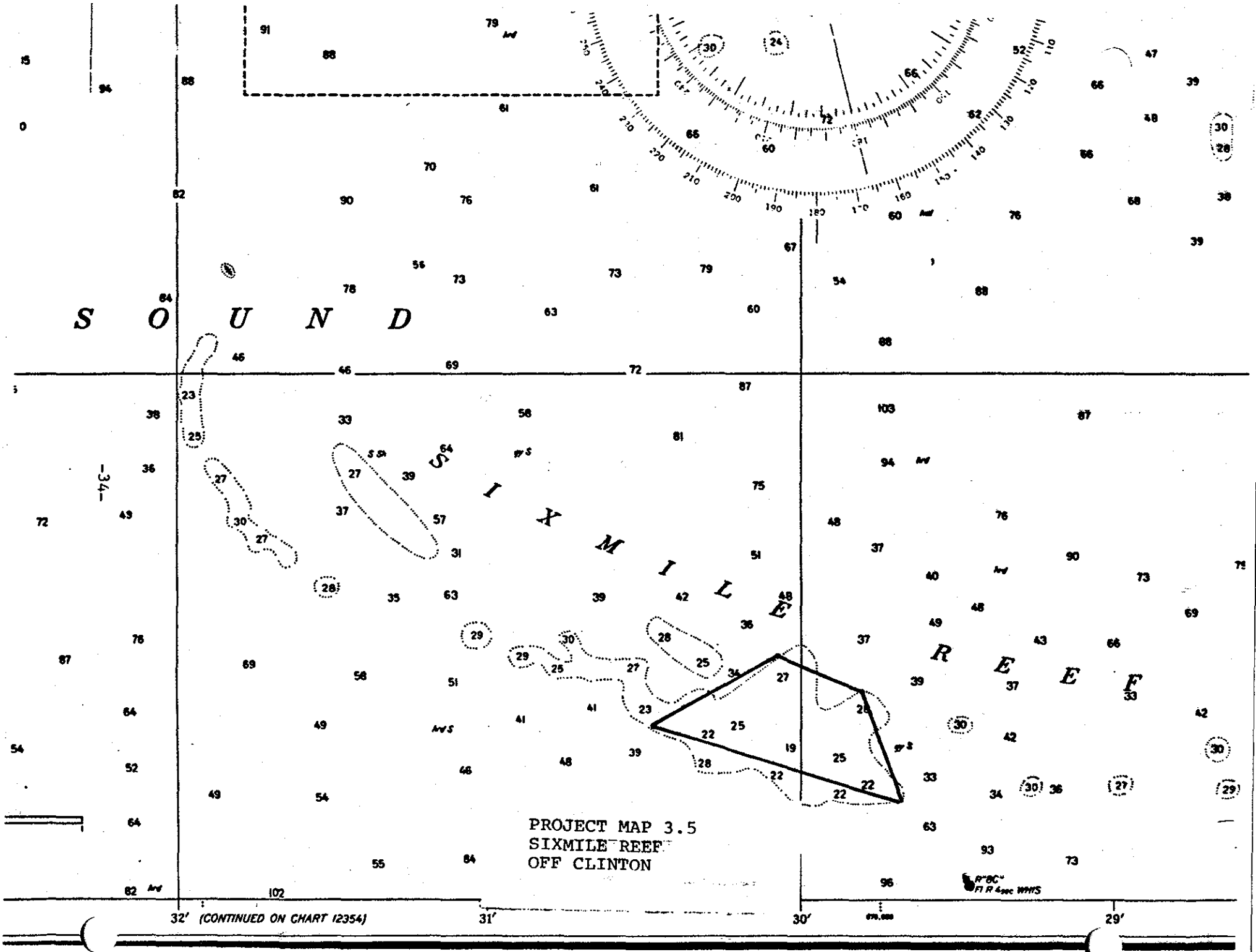
Size of potential containment facility would not be a factor in determining the site feasibility. However the reef lies in relatively deep waters (averaging 25-28 feet MLW) and the area is known for strong tidal currents. Sixmile Reef is further exposed to full wave and wind impact during storm action. Containment structure costs would be significant.

Existing land use at Sixmile Reef is confined to recreational sportfishing and commercial take of lobsters. Because the reef is located in deep waters, the vast majority of vessels can safely navigate the surface waters over the reef.

Distance to existing dredging activity makes the site a potential disposal site for Clinton (4.4 NM); Old Saybrook (7.2 NM); and the Patchogue River, Westbrook, (5.2 NM). These harbors are relatively small recreational harbors with Class I and Class II material. Large industrial ports lie further to the west and east. Other potential containment sites are in closer proximity to these harbors: Duck Island Roads, Falkner Island, and the Clinton Harbor site.

Navigational hazards at the site would be significant as a result of creating land where historically there has been relatively deep water. Because of the depth of the site, Sixmile Reef does not currently present a navigational hazard to the vast majority of vessels. Therefore, high visibility, good charting, and a great deal of boater education would be required to ensure that the containment island did not pose a significant hazard, especially during periods of reduced visibility during fog and storm conditions.

Public comment has been split. The Town of Clinton's Harbor Commission endorses study of the site, while other sources have expressed concern that the site is deep, washed by strong currents, and utilized by an active lobster and sportfishing industry.



PROJECT MAP 3.5
SIXMILE REEF
OFF CLINTON

3.6 Duck Island Roads, Clinton

The hypothetical containment facility considered here stands at the western end of the study area and does not affect the harbor of refuge created by attaching two breakwaters to Duck Island. The facility considered in this study would be an equilateral triangle some 700 yards on a side extending eastward from the southern tip of Stone Island over to East Ledge, running southwest back to the Kelsey Point Breakwater, and then running northward along the existing breakwater to the terminus of Stone Island (see map 3.6).

Biological productivity may be affected on a seasonal basis by winter storms and accompanying winds from the northeast. Kelsey Point Breakwater is believed to have increased habitat for blackfish and lobster. Biological productivity could be increased by construction of additional rip rap bulkheads surrounding the containment facility. Further, the finished facility could be designed to serve as a new habitat for least terns, a species considered by ornithologists as threatened in the Long Island Sound region. The species has been known to nest on nearby Menunketesuck Island.

Shellfish concentrations are believed to include oyster beds and lobster grounds in the area. Additional study would be required to document populations of these species and determine the net impact of a facility at this site.

Finfish concentrations include blackfish attracted to the Kelsey Point Breakwater along with other species which move through the site on a seasonal basis. Additional study is merited to determine if construction of a containment facility would improve or diminish finfishing in the leeward area between Kelsey and Hammock Points.

Size of the potential containment facility should be limited to preserve the scenic vista of Kelsey and Hammock Point residents.

This concern could limit elevation above sea level and lead to use of construction materials similar to those utilized in building the existing breakwater. Depths in the area range from 10 to 19 feet, providing sufficient capacity without requiring a high above-water profile. Concerns of coastal residents and a desire to create additional sheltered anchorage for boaters led the study staff to limit the facility's northern boundary to the southern tip of Stone Island. The southern terminus of the facility was determined by the 30 feet contour along the breakwater. If this limitation can be overcome, the facility could be enlarged to run from East Ledge to the southern end of the breakwater.

Existing land use at the site involves use of water east of the breakwater for mooring of recreational boats and fishing during the warmer months. The shoreline facing this area is developed for residential use. Additional study is required to determine the degree of protection from winter storms the facility would provide to coastal land owners from Kelsey to Hammock Point. Further, the final use of the containment facility would be a clear concern of residents and officials of both Clinton and Westbrook. Development of wildlife habitat similar to Menunketsuck Island could prove an important consideration in evaluation of a containment facility proposal.

Distance to dredging activities would be attractive to several small recreational ports in the region: to the west Clinton (1.0 NM) and Guilford (7.25 NM), and to the east Westbrook Harbor (1.25 NM) and Old Saybrook (5.25 NM). The dredged material from these harbors, as a result of their largely recreational nature, is largely comprised of Class I material with some Class II sediments. The industrial ports of New Haven and New London are both outside convenient range of this facility.

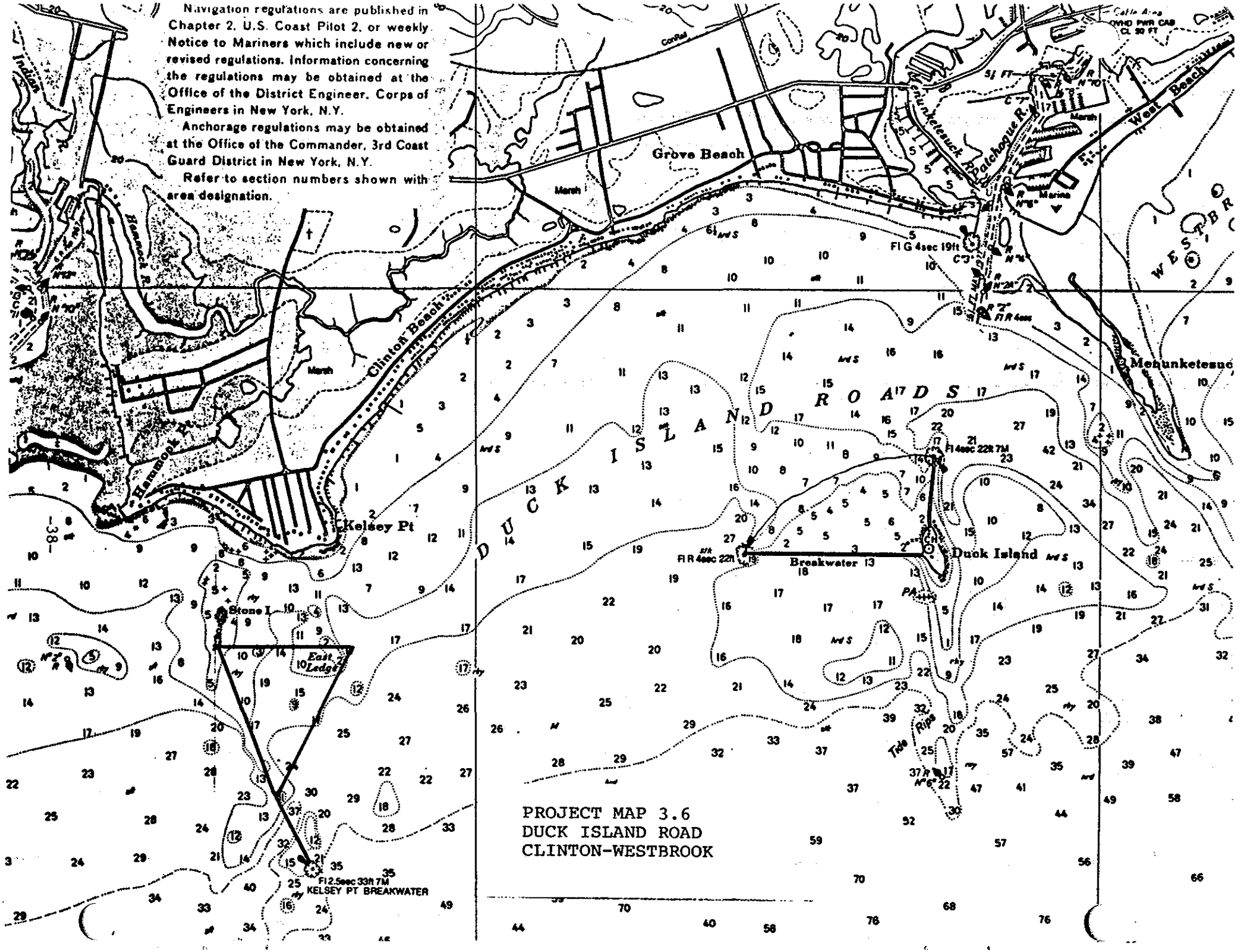
Navigational hazards in the area appear to be minimal as the study site is surrounded by deep waters on all three sides and the pre-existing breakwaters of the Duck Island Roads project.

Public comment has centered on expressions of opposition to any modification of the harbor of refuge between the breakwaters attached to Duck Island.

Navigation regulations are published in Chapter 2, U.S. Coast Pilot 2, or weekly Notice to Mariners which include new or revised regulations. Information concerning the regulations may be obtained at the Office of the District Engineer, Corps of Engineers in New York, N.Y.

Anchorage regulations may be obtained at the Office of the Commander, 3rd Coast Guard District in New York, N.Y.

Refer to section numbers shown with area designation.



PROJECT MAP 3.6
DUCK ISLAND ROAD
CLINTON-WESTBROOK

3.7 Bartlett Reef, Waterford

Bartlett Reef is located off Waterford and New London. A long slender reef, the northern tip lies approximately 850 yards off Seaside Point and runs 1.25 NM to its southern terminus. With the exception of a few rock outcroppings and the Bartlett Reef Light at its southern tip, the reef lies unexposed at low tide. The main body of Barlett lies in 6-16 feet of water MLW. For the purposes of this study, a site including the southern third of the reef was selected, measuring between 800 and 1,300 yards on a side (see map 3.7).

Biological productivity of Barlett Reef is considered high and is reflected in a major recreational finfishery and lobster fishery in the area. This productivity would be significantly altered by construction of any containment facility.

Shellfish concentrations are comprised primarily of lobster with the blue mussel the second most important shellfish resource. According to marine fishery officials, Bartlett Reef is a productive lobster area, and while some mitigation would occur for the loss of bottom ground with the construction of rock breakwaters for the containment island, fisheries personnel were concerned for overall impact to the shellfish and finfish populations.

Finfish concentrations are also found in the reef. A productive recreational fishery for species including striped bass, bluefish, fluke and occasionally cod occurs in the area.

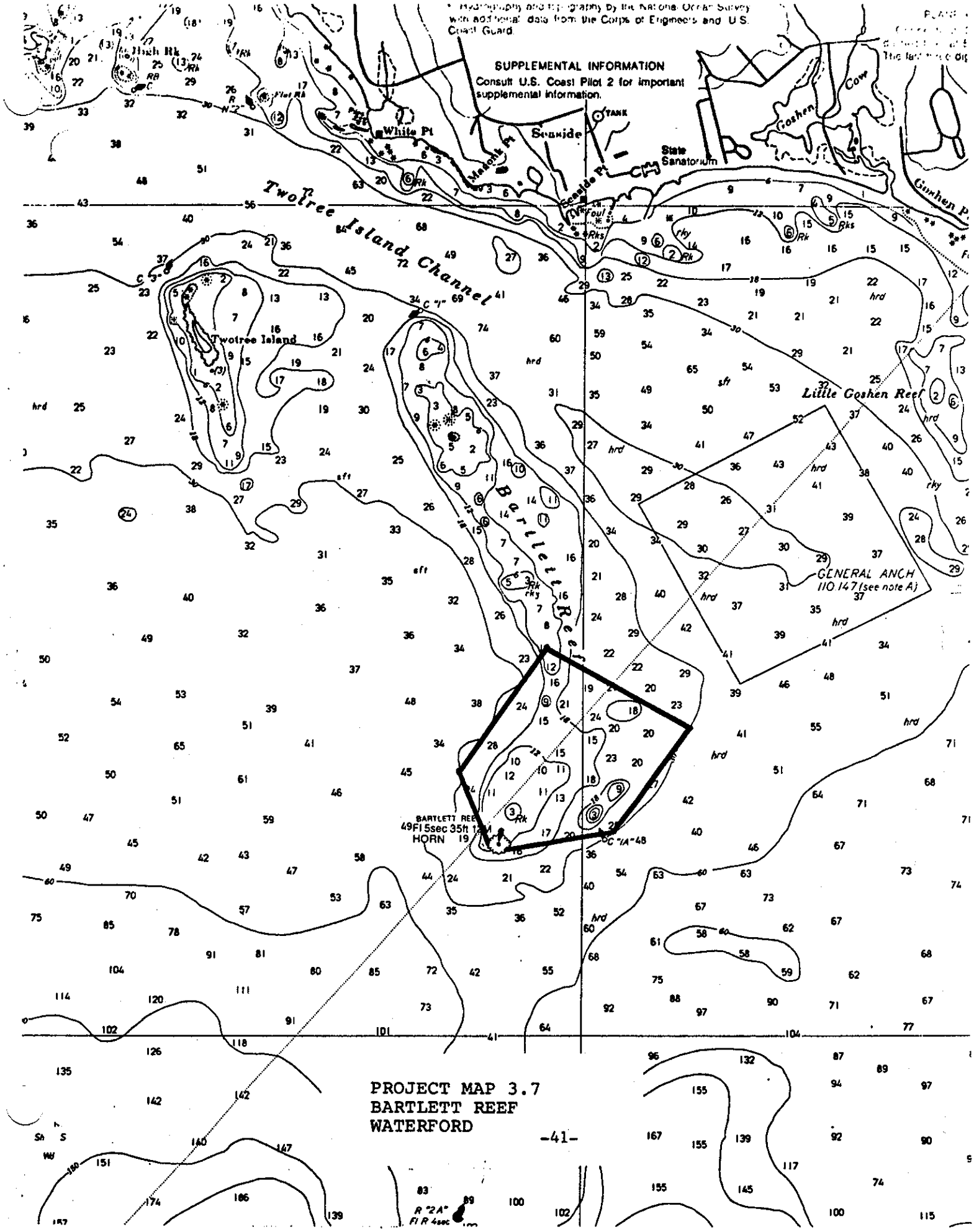
Size of containment facility would be sufficient to meet spatial and depth guidelines. A containment facility of some 120 acres could be constructed in 10 to 24 feet of water MLW. The site would be keyed off the existing Bartlett Reef Light.

Existing land use is limited to the reef's use as popular recreational fishing and lobstering area. The rock outcroppings and navigational aids are also used by variety of coastal birds for feeding and roosting.

Distance to existing dredging activity makes the Bartlett Reef site a potential disposal site for New London (approximately 3.0 NM northeast); Fishers Island (5.0 NM to the east); and Niantic Bay (3.25 NM to the west northwest). Fisher's Island and Niantic harbor are relatively small projects with clean materials, while New London is one of the largest projects in Long Island Sound. The Thames is also the major strategic harbor in the region for the Navy and Electric Boat. Dredged material from the industrial portions of the Thames are contaminated with a wide range of pollutants and fall under Class III.

Navigational hazards at or near the site would not be increased significantly by the presence of a containment site. Currently, Bartlett Reef poses a hazard that would not be increased if the new structure were properly marked by aids to navigation and charted. In fact, such a structure properly designed might offer a harbor of refuge in its lee. Placement of the facility in proximity to the mainland could produce stronger tidal currents and shoreline erosion.

Public comment has largely centered on concern that a containment facility site on Bartlett Reef would impact existing finfish and lobster habitat and the recreational and commercial fisheries that utilize these resources. Unlike offshore areas, it was felt that the potential benefits of the containment would not be worth the loss of bottom habitat on Bartlett Reef. Engineering concerns would be similar to offshore islands and shoals as a result of the exposed nature of the reef and strong tidal currents.



PROJECT MAP 3.7
BARTLETT REEF
WATERFORD

3.8 Stratford Shoals Middle Ground, off Stratford

The "Middle Ground" is a shoal located midway between Stratford Point to the north (5.5 NM) and Old Field Point on Crane Neck, Long Island to the south (5.0 NM). The 60 foot high beacon that marks the site is a familiar landmark to Long Island Sound boaters. The beacon structure and rip rap base are the only portion of the shoals that rise above mean low water. Consideration of the site for containment would likely encompass the beacon with the containment walls. The site chosen is triangular measuring between 700 and 1,200 yards on a side.

Biological productivity is high with the Middle Ground representing good reef/shoal habitat for a range of finfish and shellfish species. The site is a popular fishing area, particularly for recreational fishermen from Connecticut and Long Island.

Shellfish concentrations noted for the area apparently consist largely of a sizable lobster population. As a result of the exposure and depth, no significant populations of commercially significant bivalves were identified.

Finfish concentrations were representative of shoal areas in Long Island Sound. As already indicated, the Stratford Shoals are a popular fishing site for recreational fishermen. The uneven nature of the bottom topography would limit commercial dragging for finfish.

Size of a potential containment facility would be governed by the site's distance from dredged material sources and the need to engineer the bulkheads for exposure to waves and tidal currents. The water depth around the Middle Ground beacon ranges from 3 to 29 feet. As with any containment site placed in the open waters of the Sound, the design of the containment facility would likely necessitate high bulkhead walls to protect dredged materials against wind and wave action while

also affording the site greater holding capacity and increased visibility to vessel traffic.

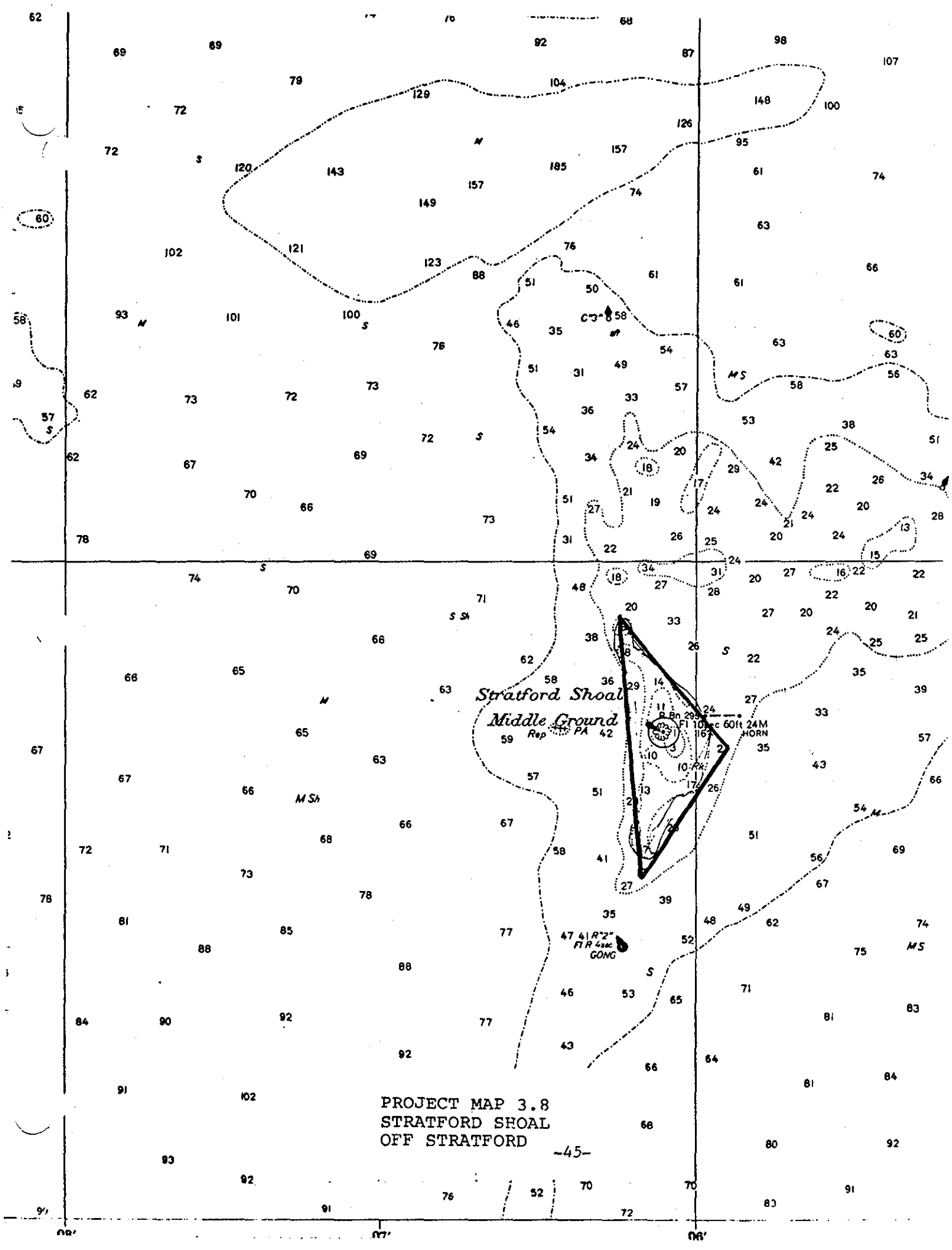
Existing land use is limited to the site's use for navigation aids and the adjacent water's use as a fishing site.

Distance to existing dredging activity makes this site perhaps the most "regional" site, in that it could be considered for use by both the north and south shores of Long Island Sound. Port Jefferson harbor lies 5.25 NM to the south while Bridgeport and Black Rock harbors are located approximately 7.0 NM to the north. All three harbors are active commercial ports. Port Jefferson, as result of its sandy sediments, is largely considered a Class I harbor while Bridgeport and, in particular, Black Rock, have highly contaminated sediments within their harbors that would be prime candidates for containment.

Navigational hazards at or near the Middle Ground would not be increased by the siting of a containment facility since the area already represents a navigational hazard to larger vessels. Proper marking and charting of a containment site would not increase existing navigational hazards. Obviously the mass of the above-water hazard would be increased. A regularly scheduled ferry service between Port Jefferson and Bridgeport as well as trans-Sound traffic do pass close to the Middle Ground.

Public comment largely focused on the use of the area as a popular fishing area, particularly for recreational fishermen. As with other open water sites, marine resources officials expressed an opinion that while the engineering costs and requirements were greater as a result of the exposed nature of the site, offshore areas such as Stratford Shoals could be utilized as containment areas with less impact to known shellfish and finfish resources than similar inshore areas. In

addition, the creation of upland sandy/rocky habitat at the Middle Ground would represent new nesting habitat for a variety of shorebirds, most importantly terns.



PROJECT MAP 3.8
STRATFORD SHOAL
OFF STRATFORD

3.9 Menunketesuck Island, Westbrook

Although not included in the original study proposal, this site was reviewed at the request of the Corps of Engineers. The facility considered in this study extends from the mainland southeast to the tip of Menunketesuck Island to create a penninsula (see map 3.9).

Biological productivity of mudflats between the existing island and Connecticut shore are believed to be high. Menunketesuck Island is described as a nesting site for numerous shorebirds by the Westbrook Conservation Commission. A threatened species, though not federally listed, the least tern, is known to nest in the area. It is likely this habitat would be disrupted and the terns forced to move elsewhere if a containment facility was built at this site.

Shellfish concentrations are reported to be high by local officials. The hard clam, soft shell, and scallop are among important species.

Finfish concentrations are reported significant along the Westbrook Harbor side of the island and along the mudflats during high tides. The area is a popular area for recreational fishing.

Size of a potential containment facility would be severely limited by the shallow depth of the area to be filled (less than 3 feet). Construction of an elevated structure to increase containment area would likely generate opposition from local land owners and town officials.

Existing land use at this site is largely confined to use of the island as shorebird nesting habitat. This habitat would be severely disturbed by construction of a containment facility. Connecting the

island to the mainland would open the area to numerous predators and increase human activity. Even temporary disruption of this island during construction of the facility would also affect nesting species currently using the area.

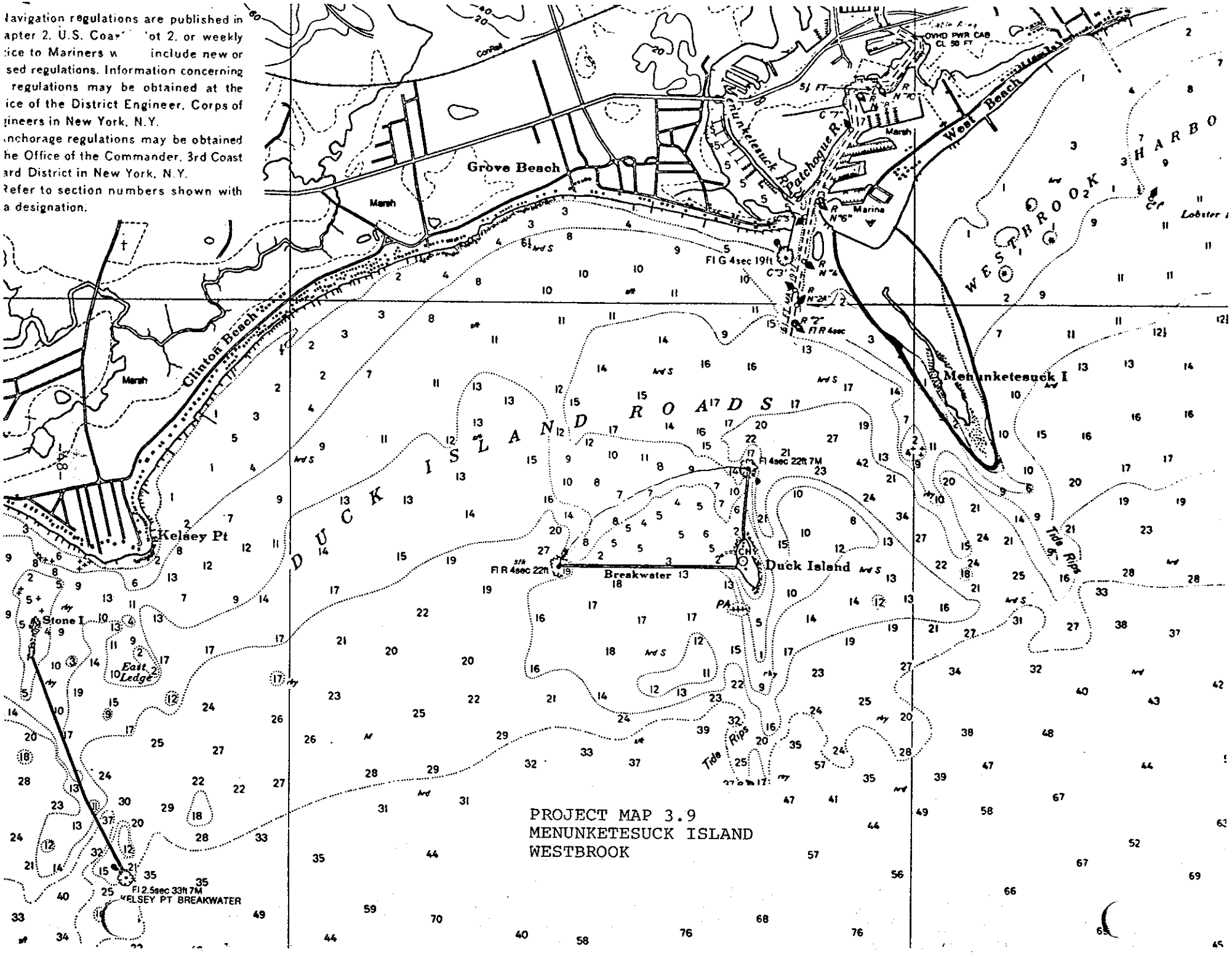
Distance to dredging activity is virtually identical to that described for the Duck Island Roads site.

Public comment included concern for the potential loss of habitat voiced by the Westbrook Conservation Commission. The presence of endangered species on the island combined with the site's proximity to two town beaches could be expected to generate significant public discussion should this site be considered further.

Navigation regulations are published in apter 2, U.S. Coa' 'ot 2, or weekly ice to Mariners w include new or sed regulations. Information concerning regulations may be obtained at the ice of the District Engineer, Corps of gineers in New York, N.Y.

Anchorage regulations may be obtained he Office of the Commander, 3rd Coast ard District in New York, N.Y.

Refer to section numbers shown with a designation.



PROJECT MAP 3.9
MENUNKETESUCK ISLAND
WESTBROOK

3.10 Other locations

Three other areas were advanced for consideration by the Corps during this study. A brief description of each project follows:

* Milford Point, Milford, proposed by Stratford officials, appears to be eliminated from consideration as a potential containment facility as a result of: 1) the area's high wildlife habitat value; 2) the esthetics of the existing barrier beach/salt marsh environment; and 3) recently enacted legislation designating Milford Point as a Connecticut barrier beach. The beach, marsh and mudflats of this area are heavily utilized by a variety of shorebird species including least terns. Because of the high quality of the existing system, habitat alteration through marsh creation would not be viewed as beneficial. In addition, the exposed nature of the site would pose erosion and stress problems for a marsh creation project.

* New London Harbor, New London, proposed by municipal officials, a five acre site abutting relocated Amtrak tracks just upriver from Shaw Cove. Depths in this area appear to range from five to eight feet. The limited depth and surface area available at this site appears to be insufficient to justify construction of a containment facility.

* Penfield Peninsula, Fairfield, proposed by Fairfield officials as a storm protection measure for adjacent coastal areas. Construction, as proposed by municipal officials, would involve creating a narrow peninsula extending from Shoal Point out to include exposed rocks known as the "Cows." This project would replace oyster grounds with a different habitat. It is unclear weather the design advanced by Fairfield, which is focused on storm protection, is economically feasible for consideration in construction of a containment facility. However, the proposal ("Proposal to Rebuild Penfield Reef as a Dredge Spoil/Peninsula Island for the purpose of Stabilizing the Fairfield, Connecticut,

Shoreline," Fairfield Conservation Commission, 1982), may merit consideration as a dual purpose (i.e.: containment and storm barrier) project.

4.0 Site Specific Findings

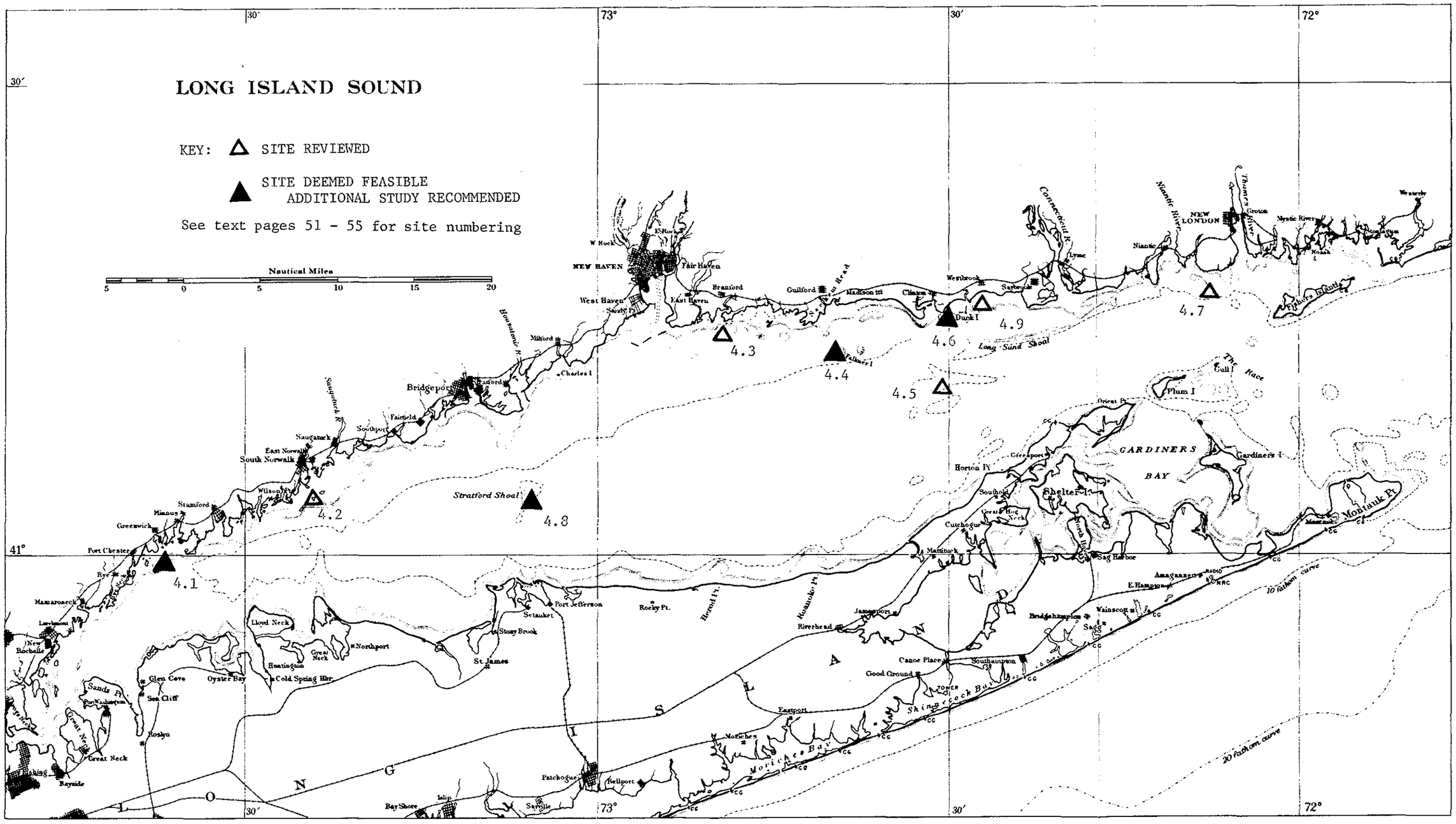
This preliminary screening study is designed to determine the feasibility of constructing containment facilities at specific locations along the Connecticut coastline. Findings in this report indicate whether a containment structure is practical for a site and identifies areas warranting additional detailed study. Measures which might mitigate negative environmental impacts along with factors which merit rejection of a site from further consideration are discussed in this section of the report (see figure 4.0 for regional location of study sites).

4.1 Captain Harbor, Greenwich

This site is technically feasible, although opposition from coastal residents reduces the practicality of this location. Captain Harbor is the best site in western Long Island Sound of those proposed for review in this study. As such, it merits some additional study to determine local concerns and gauge environmental impact. However, the Corps should consider whether a site in Westchester County, or elsewhere in New York State, could serve the western Sound with less potential disruption and greater benefits to the region.

4.2 The Norwalk Islands, Norwalk

Biological productivity, high concentrations of shellfish and finfish, along with the recreational land use patterns prompt rejection of this site from further consideration. Navigational hazards could be increased in this busy boating area by a containment facility. Further, recently enacted barrier island protection legislation may bar construction of a containment facility in much of this archipelago.



MAP 4.0 - LOCATION MAP FOR CONTAINMENT SCREENING SITES

4.3 Thimble Islands, Branford

Although technically feasible, public comment received during this study reflects strong community opposition which renders utilization of this area impractical as a containment facility site. Biological productivity, shellfish concentration, finfish concentrations, surrounding land use patterns and navigational hazards are among the factors supporting rejection of this location from further consideration.

4.4 Falkner/Goose Island, off Guilford

This site is feasible and merits further study by the Corps of Engineers. Additional study is needed to determine the net impact to the marine environment as a whole from construction of the facility. This evaluation should balance the loss of bottom and rock habitat covered by the facility against new rock habitat and wildlife areas created through construction of the facility. Use of the completed artificial island for wildlife habitat, nature study and passive recreational activities by boaters should be considered in studying this site. However, the need for suitable undisturbed shorebird nesting habitat, especially terns, should be given top priority at this site. Special attention should be paid to the engineering design proposed for this facility to determine the cost-effectiveness and economic feasibility of this location as result of its remote siting and exposed location.

4.5 Six Mile Reef, off Clinton

This site should be rejected from consideration due to high biological productivity; the potential for creating navigational hazard; and cost concerns related to construction expense in deep water.

4.6 Duck Island Roads, Clinton

This site merits a high priority in further study by the Corps. Potential benefits from the containment facility include: increased marine biological productivity; creation of additional nesting habitat for important shorebird species; potential protection of shoreline property; and creation of additional sheltered mooring areas for recreational boaters. Impact of the facility on the scenic vista of shoreline property owners should be mitigated by limiting elevation of the completed containment facility; reserving the completed facility for use as wildlife habitat with minimal human use; and restricting the northern boundary of the site to that considered in this report. This restriction on the northern limit of the facility may also be an important consideration for recreational boaters and fishermen. In evaluating this site, special attention should be paid to assessing net environmental impact; effect on shoreline erosion; and design considerations. A special effort should be made to inform and involve Clinton residents and officials in this process.

4.7 Bartlett Reef, Waterford

High biological productivity, potential for creating navigational hazards, strong currents and a significant potential for erosion combine to make this location unsuitable for further consideration.

4.8 Stratford Shoals, off Stratford

This site is feasible and merits further study by the Corps to assess the net environmental effect of containment facility construction. As in the case of Falkner's Island, special attention should be paid to engineering design, cost-effectiveness, and plans for final use.

4.9 Menunketesuck Island, Westbrook

Limitation on size and capacity combined with disruption of habitat utilized by shorebirds rule out further consideration of this site. High biological productivity, significant shellfish concentrations, and proximity to municipal beaches support this recommendation.

4.10 Other sites

* Milford Point, Milford is ruled out from further consideration by biological productivity, importance of wildlife habitat, and barrier island legislation recently enacted by Congress.

* New London Harbor, New London may merit further consideration as a port improvement project. However, limited capacity makes the economic of this site as a containment facility questionable.

* Penfield Reef, Fairfield merits further study as a storm protection structure. It is not clear that a structural solution to highly developed coastlines subject to storm related flooding will offer any more than temporary relief. There is also concern as to the project's impact on area oyster beds. The economics of construction appear to rule out consideration of this site as purely a containment project.

5.0 Study Summary

Construction of any containment facility along the coast inherently involves replacement of one habitat with another. Whether this exchange is beneficial can only be assessed by scientific study, and must ultimately involve public participation in the decision making process. Additional study of sites as outlined in this report (Section 4.0) will provide coastal citizens and managers with information needed to rationally analyze the benefits and liabilities of containment facility construction in specific communities and in the Long Island Sound region.

Generally, nearshore shallow waters are considered to be more biologically productive than deeper offshore waters. This factor played an important role in rejecting use of the Norwalk Islands and Thimble Islands as containment facility sites. In effect, this dichotomy can be seen as the difference between altering existing productive habitat of shallow waters and creating new habitat through artificial island construction in deeper waters.

The question of utilizing clean or contaminated sediments in filling containment facilities was not included in the Corps' screening factors and is not discussed in this report. This issue will be a major concern for coastal residents and officials considering a specific containment facility proposal. Among the points to be addressed in discussing this matter are: potential for pollution of the marine environment from facilities containing contaminated sediments; potential for catastrophic release of these sediments due to storm action or faulty design; and potential human health and environmental impacts. Likewise, the benefit and/or necessity of isolating contaminated sediments from the marine environment needs to be assessed and included in further consideration of this issue.

Economic feasibility and the responsibilty and potential expense of maintaining a completed containment facility through long periods of time are questions which also merit additional study on a site specific basis.

This study's site specific screening recommendations can be summarized as follows:

* Duck Island Roads (site 4.6) appears to be the most promising location studied, both in terms of environmental impact and human concerns.

* Falkner/Goose Island (site 4.4) and the Stratford Shoal (site 4.8) both appear to merit additional study as potential offshore artificial island sites.

* Captain Harbor (site 4.1) should be studied if a more acceptable site cannot be found in western Long Island Sound, and if it is considered important to have a containment site in this part of the Sound.

* The Norwalk Islands, (site 4.2); the Thimble Islands, (site 4.3); Sixmile Reef, (site 4.5); Bartlett Reef, (site 4.7); and Menunketesuck Island (site 4.9) are not believed to merit additional study for possible use as containment facilities.

6.0 Appendices

6.1 Contact List

Thomas R. Baptist, Conservation Coordinator, Town of Greenwich, 101 Field Point Road, Greenwich, CT, 06830.

Clinton S. Brown II, Town Planner, Town Hall, 200 Boston Post Road, Waterford, CT, 06385.

M. Bull, Connecticut Audubon, 2325 Burr Street, Fairfield, CT, 06430.

Tony Calabreci, Milford Labs, NMFS, 212 Rodgers Avenue, Milford, CT, 06460.

C. Francis Driscoll, City Manager, City of New London, Municipal Building, 181 Captain's Walk, New London, CT, 06320.

Henry Graver, Yacht Broker Associates of Guilford, 124 Tuttle Point Road, Guilford, CT, 06437.

Ward Hadley, Chairman, Clinton Harbor Commission, Town of Clinton, 54 E. Main Street, Clinton, CT, 06413.

Dr. James Hanks, Director, Milford Labs, NMFS, 212 Rodgers Aveue, Milford, CT, 06460.

Tom Hoehn, Conn. DEP, Wildlife Unit, State Office Building, Hartford, CT, 06115.

J. Milton Jeffrey, Chairman, Madison Shellfish Commission, Town Hall, 8 Meeting House Lane, Madison, CT, 06443.

Ens. Carl Lautenberger, U.S. Coast Guard, Port of New Haven, 120 Woodward Avenue, New Haven, CT, 06512.

Long Island Oyster Farms, Quinnipiac Avenue, New Haven, CT, 06513.

Richard Maconi, 41 Chimney Corner Circle, Guilford, CT, 06437.

William McCann, Conservation Administrator, Conservation Dept., Town of Stratford, Town Hall, 2725 Main Street, Stratford, CT, 06497.

Peter Minta, Marine Fisheries, Connecticut DEP, PO Box 248, Waterford, CT, 06385.

New Haven Port Development Council, New Haven Chamber of Commerce, 157 Church Street, New Haven, CT, 06510.

Thomas O'Dell, President, Connecticut Association of Conservation and Inland Wetlands Commissions, PO Box 5214, Hamden, CT, 06518.

Richard Quinn, Water Resource Engineers, Corps of Engineers, New England Division, 424 Trapelo Road, Waltham, MA, 02154.

Robert Sampson, Marine Fisheries, Connecticut DEP, PO Box 248, Waterford, CT, 06385.

Schooner, Inc., South Water Street, New Haven, CT, 06519.

Elizabeth H. Smith, 93 Linden Avenue, Branford, CT, 06405.

Eric Smith, Asst. Director, Marine Fisheries, Connecticut DEP, PO Box 248, Waterford, CT, 06385.

Michael Turiano, Chairman, Stratford Waterfront Authority, Town Hall, 2725 Main Street, Stratford, CT, 06497.

John H. Volk, Division Chief, Aquaculture Division, Department of Agriculture, Rogers Avenue, Milford, CT, 06460.

6.2 References

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New England River Basins Commission (NERBC). 1980. Interim Plan for the Disposal of Dredged Material from Long Island Sound. NERBC, Boston, MA. 55 pp.

New England River Basins Commission (NERBC). 1981a. Dredging Management: Data and Analysis for the New England/Long Island Sound Region. Technical assistance Report, Long Range Dredging Study. NERBC, Boston, MA. 139 pp.

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Seavey, G.L. and S.D. Pratt. 1979. The Disposal of Dredged Material in Rhode Island: An Evaluation of Past and Future Options. Coastal Resources Center. University of Rhode Island. Marine Technical Report 72. 96 pp.

6.3 Selected Press Coverage

Branford Review

Bridgeport Post

Greenwich Time

New Haven Register

Soundings

BRANFORD REVIEW- JANUARY 28, 1982

Briefs

More islands for Creek?

Several shoreline locations, including Stony Creek, are being studied to determine the feasibility of creating containment "islands" during dredging procedures.

The Oceanic Society, under contract with the New England Division of the U.S. Army Crops of Engineers, is taking an in-depth look at using islands or shoal areas of Connecticut for potential use as a dredged material containment facility.

Whitney Tilt of the Oceanic Society said there are nine test areas earmarked for the study including Greenwich, Norwalk, Stony Creek, Guilford, Clinton, Westbrook, Waterford, Milford, and Stratford.

The disposal of sand and material dredged is an expensive and controversial problem, Tilt said. Containment offers two advantages: the draining of possibly toxic materials accumulated from the bottom of the water, and the establishment of habitats for environmentally sensitive animals.

The containment of sand can also then be utilized by light industry using the substance in its production.

The study will use four factors in evaluating each location: whether biological productivity of the area plays an important part in the Sound's marine ecosystem; whether there are concentrations of shellfish, oysters, clams, or scallops in the area; the identification of important sport or commercial fishing spots; and if there are navigational hazards at or near the site.

Tilt said each of the areas will be studied and the society's recommendations will be given to the Corps. The Corps will then study the recommended locations for the establishment of a pilot program.

Before the program is set up, however, the Corps must get U.S. congressional approval since this type of program has never been tried in the Sound.

Tilt estimated that the whole process, if approved, should take five years to complete.

Individuals and organizations concerned with any aspects of the study should contact Oceanic Society Vice President Thomas C. Jackson in the society's office in the Stamford Marine Center on Magee Avenue in Stamford.

Citizen comments and concerns received during the next four weeks will be reflected in the Oceanic study.

The Oceanic Society is a national environmental organization, Tilt said, whose research expertise and capacities are being utilized by the Army for this project.

BRANFORD REVIEW- MARCH 4, 1982

Don't stir up pollution

To the editor:

There was an article in the Branford Review of January 28, concerning the possible plan of building material containment facilities on some shoreline islands. Stony Creek was one of the nine areas mentioned. The facilities would be used to contain the materials dredged from the Sound.

I am strongly opposed to this idea. I have a young niece, sister, and brother-in-law in the Creek. I am also a frequent visitor to the Creek, and am a member of the local Congregational Church.

I am very aware of many of the pollution problems of today. This project would, in my opinion, be causing a new one. It would be very disastrous to future generations to stir up human-poisoned silts of the deeps, and to place them in close contact with human, animal, and plant life. Today's chemicals may be tomorrow's cancer. Of course, I don't mean to say that illness and other problems would show up tomorrow or even in a few years. That's one reason why we so often make these horrendous mistakes; because the results are so often unobvious and prolonged.

Please, I beg of you all! Don't allow the geographic area of Stony Creek and all of Branford to have its ecology and character endangered so severly.

This is a problem for us all, for chemical pollution sees no boundaries, and can seep into our drinking water and later the solid foods.

Continued

Cows, for example, drink water. Our gardens and crops grow depending on water.

I, as a youngster of Branford request of you: don't poison our generation or our future children.

Elizabeth H. Smith
Linden Avenue

BRIDGEPORT POST- JANUARY 28, 1982

Society begins survey on adding to shoreline

By TED SCALA
Post staff writer

Taking "a quick look" at the feasibility of disposing of dredged sediment from urban harbors by using them to build new land along the Connecticut coast, the Oceanic Society has undertaken a $1,900 study for the U.S. Army Corps of Engineers.

The study will look at nine possible sites for land creation including the Stratford Shoals off the mouth of the Housatonic River, the Charles Island area of Milford and the Norwalk Islands.

Thomas C. Jackson, vice president of the Stamford-based Oceanic Society, said during an interview that the "quick look" study was one of the first steps in a long series of moves that would be taken before dredge containment, the disposal of dredge waste by using it to build islands and coastal extensions, was employed in Long Island Sound.

Jackson said that as part of its study, the society is seeking comment about the sites from local and federal officials, fishermen and the public. The sutdy is slated to evaluate each of the nine sites for biological productivity, shellfish concentration, finfish concentration, navigational characteristics, adjacent land use and distance from dredging sites.

The Corps maintains that particularly for dredging operations in western Long Island Sound there are no economical sites for the disposal of wastes.

Dredge containment by using sediment to build islands was the subject of a series of workships conducted last spring along the Sound.

The U.S. Army Corps of Engineers had been examining various ways of disposing dredged waste in the Long Island Sound area and last spring sponsored a series of workshops along the Sound on dredge containment.

Currently the corps is working on an environmental impact statement detailing the effects of using an open water site about five miles southwest of Norwalk for a dumping ground for dredge waste. That report is due in a month or two.

Long Island fisherman have objected to use of the site.

Jackson said public comment on the society study should be submitted by Feb. 22. The study should be completed by the end of February, he said.

GREENWICH TIME- SUNDAY, JANUARY 24, 1982

— Connecticut Newspapers Inc., Sunday, January 24, 1982

U.S. Army plans to create new islands off Fairfield County's coast

By Gretchen Webster
Staff Writer

The U.S. Army Corps of Engineers is weighing plans to create new islands in Captain's Harbor off Greenwich, among the Norwalk Islands off Norwalk Harbor, and at eight other places in Connecticut's coastal waters.

The islands could provide the area with new parks or wildlife sanctuaries while giving the Army engineeers a dumping site for material-some of it toxic-dredged from Connecticut's harbors to keep them deep enough for boating.

The island study, conducted by The Oceanic Society in Stamford under contract to the Army Engineers, was begun partly because there were few places to put the muck collected in the process of dredging the state's waterways, according to Karen Kirk, civil engineer for the Army Corps.

All but three of the state's dumping sites in Long Island Sound were closed after environemntal legislation set rigid standards for the dumping of toxic material in open waters, Kirk said.

Although the federal government has been searching for sites to put the dredge spoils along the coast, "nobody wants it in their back yard," she said.

Meanwhile, Greenwich Harbor, the mouth of the Mianus River and other waterways are filling in and becoming too shallow for safe navigation, threatening commercial and recreational boating, according to Robert Chard, Superintendent of Mmarine Facilities for Greenwich.

"There is a serious need for dredging, particularly in the Mianus River," he added.

Some of Greenwich's waterways have not been dredged for a decade, and are not naviagable at low tide, Chard said.

The lack of dumping sites threatens the livelihood of fishermen and private marine operators, and draws complaints from both commercial and recreational boaters in the area, he added.

"The stuff has to be dredged, nobody argues that point. Without dredging the harbors are useless," Kirk said. "We're looking for a better way."

The solution may lie in stockpiling the wastes in offshore "containment facilities" or islands, where toxic spoils are covered with clean material, producing new land, she said.

Islands made from dredge spoils in other parts of the country have been turned into parks, and one island has become the site of a hotel complex, Kirk said.

Long term tests of the manmade islands have shown that the material can be contained, and that drainoff water from the islands is not necessarily toxic, she added.

The effect of waste-created islands on marine life, on harbor traffic, and on fishing grounds is also due to be studied by the Oceanic Society, a private non-profit group dedicated to preserving the marine environment.

The $1,900 study, which is slated for completion by the end of February, will determine only which sites should be studied further as suitable spots for new islands, according to Thomas Jackson, vice-president of The Oceanic Society.

The size of the islands, created by building impervious dikes, filling them with the dredged materials, and adding clean fill on top, will depend on the space available at the chosen sites- and on economics, he said.

To make an island dumping site economically feasible, the island must hold at least 200,000 cubic yards of fill, and would be as big as 100 acres, Kirk said.

Part of the difficulty in finding sites for new islands off Greenwich and nearby coastal towns is attributable to heavy harbor traffic and competing uses, she said.

"In urban areas, it is more difficult to find a suitable site."

NEW HAVEN REGISTER- FEBRUARY 2, 1982

Dredge plan could create new islands

By KIM CALDWELL
Staff Reporter

A Stamford conservation organization is studying 10 coastal sites — including six in the Greater New Haven area — as possible disposal sites for materials dredged from Long Island Sound and nearby waterways.

One plan under discussion would be to extend existing islands in the Sound or create new ones with the dredged materials.

The Oceanic Society is ranking the sites to determine which ones "merit detailed scientific examination and environmental review," according to Thomas Jackson, vice president. The study is being funded by the U.S. Army Corps of Engineers.

The New Haven area sites are: the Thimble Islands off Stony Creek, Branford; Six Mile Reef, Menunketesuck Island and Duck Island Roads areas in Clinton; Faulkner's Island off Guilford; and Charles Island off Milford.

Other sites included in the study are: the Stratford Shoal area, the Norwalk Islands, Captain's Harbor off Greenwich and Bartlett Reef off Waterford.

The Oceanic Society will rank the

(Please turn to page 2)

Dredge plan

(Continued from page 1)

sites according to biological productivity, fish concentrations and navigational hazards, Jackson said.

The society also will consider current use of land adjacent to the sites, the distance to existing dredging activities and other potential impacts, he said.

Only the locations considered most suitable for containment facilities will be further examined. Some sites may be judged unsuitable, Jackson said.

If a place such as Faulkner's Island is selected, Jackson said, the Corps of Engineers would create a disposal site by filling in shallow areas — or building a new island — adjacent to Faulkner's.

To extend or build an island, a dike made of impervious material such as clay or large stones would be constructed. The dike, which would extend 20 feet below the mean water level, would form a lagoon, he said.

Silt and dredged materials dumped there would settle, creating a land mass. "The dike would be carefully monitored in a manner to minimize siltation," Jackson explained.

Currently, material dredged from harbors and channels is either dumped in one of two designated areas in Long Island Sound or trucked to an inland dumping site. Hazardous materials sometimes are buried underwater in containment facilities, he said.

The Oceanic Society realizes that there would be "a clear trade-off" where islands are built or extended. "We would be trading off water that potentially could produce shellfish and finfish," he said. "We would be putting in areas that would support marsh life."

*Soundings

Study explores islands made of dredge spoils

By NANCY TRIMBLE

Creating islands or extending coastal marshes with dredged sediment may be a common practice in many areas of the country, but it would be new to Connecticut.

The feasibility of such a program in the state is the subject of a short-term study by the Oceanic Society, a national marine conservation group.

A lack of dumping sites for dredged material in Long Island Sound has delayed numerous projects to improve harbors and maintain channels and docking sites.

Under a $1,900 contract from the U.S. Army Corps of Engineers, researchers from the Oceanic Society are looking at eight Connecticut sites where sediment from urban harbors in Long Island Sound could be dumped.

"It's not a field study. We've been interviewing municipal officials, fishermen, concerned citizens and others to obtain information in a preliminary screening effort," said Thomas C. Jackson, Oceanic Society vice president.

"We're looking for red lights that would tell us: It doesn't make sense to look here," he said. "The Corps of Engineers will use that information in selecting sites for additional environmental studies.

"It makes sense to spend a few hundred dollars (on this study) before the Corps of Engineers spends a lot more money on the in-depth studies."

The Oceanic Society has been studying the following areas: Captain Harbor off Greenwich, Norwalk Islands off Norwalk, The Thimbles off Stony Creek, Falkner Island off Guilford, Sixmile Reef off Clinton, Duck Island Roads between Clinton and Westbrook, Bartlett Reef off Waterford and Stratford Shoals off Stratford.

The three-month study, which was to have been done by the end of March, has turned up a couple of so-called red lights, Jackson said.

Comments from those surveyed show some opposition to building islands or marshes near Falkner Island, a much-used recreational area, and near the Norwalk Islands, a shellfishing site, Jackson said.

"Anywhere you go it's going to be a trade-off between competing uses," he said. "If you cover up a shellfish bed, you'll lose a fishing area but you stand to gain a recreation area or a wildlife refuge."

In studying each site, the Oceanic Society has considered the area's role in the sound's marine ecosystem, its proximity to shellfish beds, its finfish population and nearby navigational hazards.

The Army Corps of Engineers has been working on detailed environmental studies at two Connecticut locations: a marsh area off Hammonassett Beach in Clinton and Black Ledge in the New London Harbor.

Preliminary results of those studies will be released in late May, according to Dick Quinn, a water resources engineer with the Engineers.

Jackson said the Oceanic Society would report its findings to Quinn this month, but the conservation group will continue to receive comments on the proposed dumping sites. Comments may be addressed to the Oceanic Society, Stamford Marine Center, Magee Avenue, Stamford, Conn. 06902.