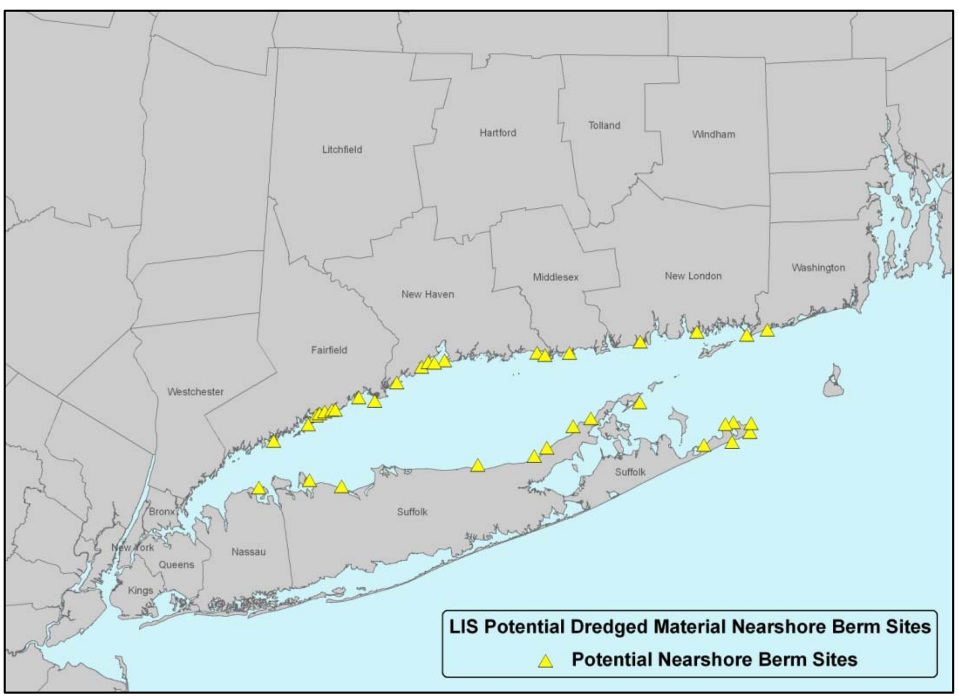
FINAL

Long Island Sound Dredged Material Management Plan (LIS DMMP)
Investigation of Potential Nearshore Berm Sites for Placement of Dredged Materials

Contract No. W912WJ-09-D-0001-0040



Prepared For:
United States Army Corps of Engineers
New England District
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Table of Contents

List of Figures

List of Tables

EXECUTIVE SUMMARY

This report provides an evaluation of potential nearshore berm sites in Long Island Sound (LIS) suitable for placement of dredged materials. The work was prepared within the larger context of the ongoing Dredged Material Management Plan for LIS, which includes reports that evaluate dredged material placement at aquatic containment facilities (Woods Hole Group, 2012), upland, beneficial use, and sediment dewatering sites (Battelle, 2009; Woods Hole Group, 2010), as well as small site alternatives for potential non-federal projects (Battelle, 2011).

This report includes a general description of nearshore berm placement methods, a site-by-site assessment of candidate sites in the LIS study area, and an estimate of the available capacity for dredged material at each site. Preliminary engineering designs are also discussed, as well as a summary of potential impacts. The summaries include site-specific evaluation matrices that provide qualitative descriptions of potential impacts from construction or maintenance of the berms. Potential impacts to local environmental, cultural, and physical resources and marine infrastructure are addressed.

Preliminary design criteria include placement of the nearshore berms in water depths of 15 feet. Berm lengths vary in relation to the size of the associated beach. A maximum berm height of 3 feet, a width of 200 feet at the crest, and side slopes between 25º and 40° provide the basic geometry needed to estimate berm capacity. Total capacity of the nearshore berms evaluated here is 3,600,000 cubic yards. The range of estimated volumes at the individual sites varies from 8,160 to 276,000 cubic yards. These estimates do not include consideration that some of the sites have potential to be used multiple times over the planning horizon of the DMMP.

The evaluation of potential impacts for candidate nearshore berm sites suggests the following:

- Potential impacts to Federal and State listed species habitat, shellfish, Federally managed species habitat, marine mammals, coastal structures, and recreational areas are frequently or always encountered at nearshore berm sites.
- Impacts to archaeological resources, terrestrial wildlife, mooring areas, navigation channels and shipping areas, ports, cable/power/utility crossings, commercial and industrial facilities, aquaculture sites, and existing dredged material disposal sites are rarely or never encountered at nearshore berm sites.

Comparison of impacts at the nearshore berm sites reveals areas with the least potential to adversely impact the surrounding resources. The impact matrices are also useful in identifying relative differences between the LIS sites evaluated. Site-specific assessments would be completed prior to construction of any nearshore berm, to further define the extent and magnitude of impacts to particular resources.

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1.0 INTRODUCTION

In June 2005, the Environmental Protection Agency (EPA) designated two open water dredged material disposal sites in LIS to provide long-term, environmentally acceptable disposal options for potential use by Federal, State, municipal, and private entities that dredge channels, harbors, marinas and other aquatic areas in LIS. The Designation Rule (40 CFR 228.15(b)(4)) anticipated the development of a regional Dredged Material Management Plan (DMMP) for LIS. Subsequent to the publication of the Designation Rule, EPA, the U.S. Army Corps of Engineers (Corps), and appropriate Federal and State resource agencies agreed to partner in the development of a LIS DMMP. The process was initiated in 2007, and when completed, the LIS DMMP will include an in-depth analysis of all potential dredged material management alternatives including open-water placement, beneficial use, upland placement, and innovative treatment technologies. Dredging proponents may use this plan in developing alternatives analyses for dredging in LIS.

The LIS DMMP will assess potential dredged material management options for Corps projects. Prior studies for the DMMP have documented options for dewatering, upland disposal, and various beneficial uses such as beach nourishment, wetlands restoration, etc. This study builds on prior work to assess potential nearshore placement options for dredged materials to act as feeder berms or wave dampening berms for adjacent beaches.

This study includes a general description of nearshore berm placement methods, a site-by-site assessment of candidate sites in the LIS study area, and an estimated capacity for dredged material at each site. Preliminary engineering designs are also discussed, as well as a summary of potential impacts associated with using the potential sites for dredged material placement. The summaries include site-specific evaluation matrices that provide qualitative descriptions of potential impacts from construction or maintenance of the berms. Potential impacts to local environmental, cultural, and physical resources and marine infrastructure are addressed.

The study area includes the waters and adjacent coastal zone from Throgs Neck in the west to Montauk Point and Watch Hill Point in the east including the waters of Long Island Sound, Fisher's Island Sound, Peconic Bay, Gardiners Bay and western Block Island Sound and tributaries to these waters (Figure 1).

Figure 1. Study area for LIS DMMP.

2.0 BACKGROUND INFORMATION AND CANDIDATE SITES

This section provides a review of documents previously developed in support of the LIS DMMP. Current methods for construction of nearshore berms are also discussed. A summary of Federal regulations governing the transport and disposal of dredged material in LIS, and the role of state agencies in regulatory oversight is provided. Finally, a list of candidate placement sites reviewed under this study is presented.

2.1 REVIEW OF BACKGROUND DOCUMENTS

The USACE has prepared several documents relevant to dredged material management options in LIS. The documents reviewed during the preparation of this report include:

- *LIS DMMP Phase I and Phase II Literature Review Updates.* The Phase I and Phase II literature review updates include a database and written report on data sources relevant to LIS dredging and dredged material disposal. The database and report provided several information sources that were used to evaluate potential impacts associated with nearshore placement sites (Woods Hole Group, 2009, 2010b).
- *Upland, Beneficial Use, and Sediment Dewatering Inventory* and *Phase 2 Upland, Beneficial Use, and Sediment De-Watering Inventory*. The Phase 1 and 2 inventory reports include descriptions of regional upland sites suitable for dewatering or placement of dredged material. These documents provided a list of potential beach nourishment sites that were included in the current assessment (Battelle, 2009; Woods Hole Group, 2010).
- *Follow-on Characterization of Small Site Management Alternatives for Potential Non-Federal Projects*. This report (Phase 1A of the Upland, Beneficial Use and Sediment Dewatering Inventory series) describes smaller upland placement, dewatering, and beach nourishment sites. It is the counterpart of the Phase 2 report noted above, and describes potential placement sites for dredged material generated by smaller scale projects (Battelle, 2011).
- *2010 Federal-State Regulatory Update*. This document summarizes regulations relevant to dredged material management in Long Island Sound. The document provided background for discussions with State and Federal Agency representatives regarding the acceptability and regulatory issues related to the construction of dredged material management sites in Long Island Sound (USACE, 2011).

2.2 NEARSHORE BERM METHODS

Nearshore berms are submerged, high-relief mounds, generally built parallel to the shoreline. They are commonly constructed of sediment removed from a nearby dredging project. There are typically two types, feeder berms and stable berms. Feeder berms contain predominantly clean sand placed in the nearshore zone directly adjacent to a beach, and are transient features. The physical benefits of feeder berms include the introduction of new sediment to the littoral system, beach nourishment through onshore sediment transport, and a reduction in nearshore wave energy along with reduced shoreline erosion. Stable berms are generally longer-lasting features constructed in deeper water or low energy environments, where sediment transport is limited. These berms can be constructed with finer-grained material since the environment is not conducive to wave or current-induced sediment transport. The physical benefits to stable berms include reduced wave energy along the shoreline, lower shoreline erosion, and enhanced habitat for fisheries.

Nearshore berm construction is commonly used for the placement of dredged material. The technology offers an alternative to conventional open water placement or direct beach nourishment. Costs associated with nearshore berm construction are generally lower that hauling the dredged sediment to an offshore disposal site, or in the case of clean beach compatible material, less than pumping directly to the beach. With the added benefits that the berms can be designed to maintain sediment within the nearshore littoral drift system, attenuate wave energy, reduce shoreline erosion, and/or enhance aquatic habitat, this technology offers a viable alternative to conventional dredged materials placement. Additionally, by linking the dredging activity with nearby beach needs through regional sediment management, a least-cost dredging and nearshore placement solution can often result in a beneficial reuse alternative.

2.2.1 Construction Method

Construction methods for nearshore berms include mechanical (clamshell or bucket dredge) and hydraulic (hopper or cutterhead dredge) options. Mechanical dredging involves placing dredged material in a bottom-release scow which is towed to the nearshore placement site. Once on location the dredged sediment is discharged into the water column to settle to the seafloor. Hydraulic dredging involves fluidizing sediments for pumping. Hopper dredges fluidize bottom sediments for pumping into their hoppers, and then discharge the sediment into the water column through doors or a split hull directly above the berm location. This technology works in much the same way as a bottom-release barge or scow used with mechanical dredging. Cutterhead dredges can also be used to hydraulically pump material to a nearshore berm site via pipeline, where the sediment is discharged into the water column directly above the desired berm location. However, the distances over which pipeline transport can be required are often a limitation for hydraulic method applications.

2.2.2 Engineering Considerations

Engineering considerations for nearshore berms depend on a wide range of factors including the placement objective, type and volume of material to be placed, dredging and placement methods, environmental restrictions, existing profile geometry, and restrictions on seafloor relief from boating and/or navigation interests. Where the dredged material is sandy and compatible with the adjacent native beach sediments, feeder berm construction should be considered. However, dredged sediments with higher percentages of fine-grained material should be considered for use in stable berms. Bathymetry of the proposed berm must be evaluated to determine the placement site location and boundaries. Knowledge of the hydrodynamic climate (wind, waves, and currents) must also be gained to assess the potential physical behavior of the dredged sediment, and to properly site the nearshore berm to optimize wave breaking or nearshore/beach feeding benefits. For feeder berms that have the potential to impact the incident wave climatology, engineering calculations must be made to evaluate and minimize wave focusing along the shoreline due to end effects at the nearshore berm terminal points.

2.3 REGULATORY OVERSIGHT OF DREDGED MATERIAL PLACEMENT IN LONG ISLAND SOUND

This section describes Federal and State laws and regulations including the Marine Protection, Research, and Sanctuaries Act (MPRSA), the Clean Water Act (CWA), the Ambro Amendment, and their relevance to potential dredged material management in LIS. The legislation described here governs the transportation and disposal of dredged material in Long Island Sound.

2.3.1 Federal Regulations

Proposed discharges of dredged or fill material are subject to regulations including the CWA, MPRSA, and Section 10 of the Rivers and Harbors Act. Projects conducted in inland waters are evaluated under the CWA and may be subject to Section 10 of the Rivers and Harbors Act if the project occurs in navigable waters. Dredged material disposal projects conducted beyond the baseline of the territorial sea are evaluated under the MPRSA, and also may be subject to section 10 of the Rivers and Harbors Act. Dredged material disposal projects that involve a beneficial use (e.g., beach nourishment, feeder berms) or fill (e.g., island creation) within the territorial sea are evaluated under the CWA and the Rivers and Harbors Act.

MPRSA was enacted by Congress in 1972 to address ocean disposal of material that could degrade or endanger human health or the environment. The act states that disposal of material in ocean waters must not "unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities. All dredged material being transported beyond the baseline of the territorial sea for disposal must be evaluated under MPRSA".

The baseline of the territorial sea is generally the mean lower low water line along the coast (i.e. the tidal datum MLLW on NOAA charts), but may extend as a straight line across the mouth of rivers and bays if the coast is deeply indented (Articles 9 and 10, United Nations Convention on Law of the Sea, UNCLOS).

This designation, particularly the straight lines at river mouths and embayments, can leave significant areas of coastal waters landward of the baseline. This is the case for Long Island Sound, where the baseline cuts across Block Island Sound from the mainland near the CT/RI border to the eastern tip of Long Island at Montauk. Therefore, the entire area within LIS falls landward of the baseline, and disposal of dredged material would not be expected to fall under the MPRSA, but rather would fall under the CWA.

However, the transport and disposal of certain specified dredged material in LIS is subject to the provisions of MPRSA, because the Statute was amended in 1980 to include Section 106(f), termed the Ambro Amendment. The Ambro Amendment requires "the dumping of dredged material in Long Island Sound from any Federal project (or pursuant to Federal authorization), or from a dredging project by a non-Federal applicant exceeding 25,000 cubic yards" to be subject to the requirements of MPRSA.

MPRSA provides for a permitting process to control placement of dredged material in ocean waters. Section 103 authorizes the Secretary of the Army (through the Army Corps of Engineers) to issue permits for the transportation and placement of dredged material in the territorial sea and ocean waters. This transportation and dredged material placement activity must meet criteria established by the EPA (40 CFR 227 & 228) which ensure the material poses no unacceptable risk to human health or the environment. The regulations also prohibit disposal of certain materials from ocean disposal, including radioactive waste, metals and other hazardous compounds in concentrations other than trace amounts, as well as persistent materials that may float or remain in suspension.

The procedures for evaluating dredged material for placement in ocean waters are contained in the Evaluation of Dredged Material Proposed for Ocean Disposal – Testing Manual (EPA/COE-503/8-91/001). The manual contains technical guidance for determining the suitability of dredged material for ocean disposal through chemical, physical, and biological evaluations.

The Corps is the lead Federal agency for issuing permits under MPRSA for placement of dredged material. The permits are subject to EPA concurrence. MPRSA also authorizes EPA to designate long-term dredged material disposal sites, and requires that these sites have Site Monitoring and Management Plans to determine whether disposal projects have significant adverse effects.

In summary, the Ambro Amendment requires that all Federal projects and any non-Federal applicant project exceeding 25,000 cubic yards proposed for open water placement within Long Island Sound comply with the requirements of MPRSA. However, nearshore berms are a beneficial use and would be regulated under the CWA and not the MPRSA.

2.3.2 Regulatory Oversight at the State Level

This subsection relies on the recent report, "Federal, State, and Local Regulations and Programs Applicable to Dredged Material" (USACE, 2011) and subsequent contacts with regulatory agency leads in Connecticut, New York, and Rhode Island to discuss regulatory requirements associated with the construction and maintenance of nearshore berms. While the three states differ somewhat with respect to the regulatory review process, all three state agencies are concerned with potential impacts to coastal habitat and water quality, and are charged with reviewing project plans to ensure compliance with regulations related to dredging and dredged material management.

2.3.2.1 Connecticut

The Connecticut Department of Energy and Environmental Protection (DEEP) Office of Long Island Sound Programs manages and regulates dredging and dredged material placement projects. The agency also manages the Coastal Zone Management Program, Structures and Dredging Program, Tidal Wetlands Act permitting program. It also issues

Water Quality Certificates under the CWA. In general, when reviewing projects involving dredging and placement of dredged material, CT DEEP looks for compliance with the CWA and other regulations. To do this, they evaluate environmental conditions on and adjacent to the site, and evaluate likely impacts associated with construction and maintenance of the facility. When an applicant proposes a nearshore berm project to the State, the proponents must provide:

- Analysis of disposal alternatives that would avoid the use of the marine environment completely, or that would minimize impacts on the coastal/marine environment (this ensures compliance with the CWA, which indicates that if lower-impact alternatives are available these should be used).
- Sediment quality information including sediment type, bathymetry, and contaminant status. This information is used to evaluate sediment quality and compatibility of the nearshore berm with the surrounding areas.
- Documentation of physical, biological, and socioeconomic characteristics of the areas adjacent to the proposed nearshore berm site to evaluate potential impacts from transport of the dredged material. Socioeconomic characteristics include land use in the vicinity of the project, including parks and protected habitats, as well as open space and recreation areas.
- Hydrologic modeling to evaluate the potential for sediment transport away from the nearshore berm site, and to evaluate potential changes in hydrological characteristics of the site.

With this information the CT DEEP makes a determination of compliance with regulations and issues permits for the construction, maintenance, and stipulates if monitoring is required. In addition, under the Interstate Consistency agreement, CT DEEP provides coastal zone review for projects occurring within NY state waters if the project occurs seaward of the 20 ft contour line.

2.3.2.2 New York

The Department of Environmental Conservation (NYSDEC) and the Department of State (NYDOS) are responsible for ensuring regulatory compliance for dredging and fill projects in the coastal zone.

NYSDEC is the lead agency in charge of reviewing projects for compliance with the Federal Clean Water Act. The agency issues Section 401 Water Quality Certificates for proposed dredged material disposal and fill projects in the coastal zone.

NYDOS reviews dredged material and fill projects for Coastal Zone Management Program Consistency, ensuring that Federal actions within the coastal zone (including direct actions, site selection and designation, permitting, or rulemaking) are carried out in a manner consistent with the enforceable policies of approved State management programs. Enforceable coastal policies include those in the State Coastal Management Program, the LIS Coastal Management Program, and any Local Waterfront Revitalization

Program[1]. Additionally, under the Interstate Consistency agreement, NYDOS provides consistency review for projects occurring within Connecticut state waters if the project occurs seaward of the 20 ft contour line.

Coastal policies applicable to dredged material disposal projects include consideration of fish and wildlife, flooding and erosion, historic, cultural, and scenic resources, air and water resources, facilitating water dependent uses, revitalizing underutilized waterfronts, and wetlands. The 44 policies are provided in the New York State Coastal Management Program and Final Environmental Impact Statement, available online (NYS, 2010). Consultation with NYDOS indicates that the State favors beneficial reuse, particularly nearshore placement over many other placement options. It is a goal of the New York Coastal Management Program to preserve natural coastal processes and to keep material within the littoral system. Certain sites included in this evaluation receive dredged material when adjacent inlets are dredged (personel communication, Jennifer Street, NYCDOS). For example, Baile's Beach in Mattituck, NY and Orient Point State Park beach have received material from dredging of nearby navigation projects. Due to the location and configuration of jetties and groins, some of the beaches are sand-starved, and would benefit from the addition of material via nearshore or direct placement. Certain beaches are critically in need of sand, and are currently in the feasibility analysis phase or under contract with the New York District Corps for direct nourishment or nearshore berm projects (ex., Lake Montauk Harbor, Hashamomuck Cove – County Road 48 and Kenney's Beach).

2.3.2.3 Rhode Island

The Rhode Island Coastal Resources Management Council (RICRMC) is the lead agency for regulating dredging in tidal waters. RICRMC is the initial and primary point of contact for dredging activities in coastal waters. The agency integrates and coordinates the plans and policies of other state agencies as they pertain to dredging in order to develop comprehensive dredging programs. The State of Rhode Island Coastal Resources Management Program document (the "Red Book") describes these policies, along with the authority and duties of the RICMC in enforcing them.

The RICRMC must coordinate with the RI Department of Environmental Management (RIDEM) for reviewing and permitting projects in the coastal zone. The RIDEM issues Water Quality Certification for placement of dredged material, while RICRMC is authorized to issue, modify or deny permits for dredging, filling, or alteration of coastal wetlands and directly related areas. If dredged material disposal is involved, project applicants are required to obtain a Section 401Water Quality Certification from RIDEM before the RICRMC can consider granting approval for the project.

[1] A Local Waterfront Revitalization Program (LWRP) is both a plan and a program. The term refers to both a planning document prepared by a community, as well as the program established to implement the plan. The Program may be comprehensive and address all issues that affect a community's entire waterfront or it may address the most critical issues facing a significant portion of its waterfront. As a planning document, a LWRP is a land and water use plan and strategy for a community's natural, public, working, or developed waterfront through which critical issues are addressed. In partnership with the Division of Coastal Resources, a municipality develops community consensus regarding the future of its waterfront and refines State waterfront policies to reflect local conditions and circumstances. Once approved by the New York Secretary of State, the Local Program serves to coordinate State and federal actions needed to assist the community achieve its vision. LWRPs occur in the following towns and villages: Bayville, East Hampton, Greenport, Head of Harbor/Nissequog Village, Lloyd Harbor, Ocean Beach, Sag Harbor, Southold, Smithtown, Mamaronek, Port Chester, and Rye.

For placement of dredged material along shorelines or in State waters, a Council Assent or Federal Consistency Determination is required from RICRMC. RICRMC aims to ensure that placement projects are consistent with State interests and policies, and it works with other State agencies and Federal agencies to coordinate dredged material placement projects.

In 2010 RIDEM updated its "Rules and Regulations for Dredging and Management of Dredged Material" regulation (regulation DEM-OWR-DR-02-03). This set of regulations ensures that dredging and material management is conducted so as to protect groundwater, surface water quality, fish and wildlife, and habitat resources while streamlining the permitting process. The regulations provide guidance on in-water placement of dredged material. In-water placement is prohibited unless there is no practicable alternative to the proposed project that would have less adverse environmental impact. In addition, the placement activity must not cause violations of water quality standards or contribute to significant degradation of waters of the State. Lastly, appropriate steps must be taken to minimize any potential adverse impacts.

The RICRMC's priorities in dredged material placement are generally to promote beneficial uses of dredged material. Depending on the nature and characteristics of the material and on reasonable costs, the agency's priorities are:

- Beneficial use including beach nourishment, habitat restoration or creation in the coastal zone;
- Beneficial use in upland areas, including daily cover for landfills and general fill used by the RI Department of Transportation;
- Offshore in open water for large volumes, provided that environmental impacts are minimized;
- Innovative nearshore placement methods, including wetland or shellfish habitat creation and beach nourishment.

2.4 IDENTIFICATION OF POTENTIAL NEARSHORE BERM SITES

A method for locating, characterizing, and screening potential LIS nearshore berm sites was developed in consultation with the USACE project team (memorandum dated September 26, 2011; email revisions dated September 29, 2011). The initial list included 51 potential sites adjacent to beaches previously identified as candidate beach nourishment areas (Woods Hole Group, 2010). The beach sites included federal shore protection projects, state beaches, and municipal beaches within two (2) miles of federal navigation channels. The list of potential sites was subject to a four step review process to locate, characterize and screen the sites as follows.

- Step 1 – Nearshore Berm Location
  This step mapped the potential nearshore berms on NOAA nautical charts along the 15 ft depth (MLLW) contour immediately seaward of each beach site. This specific contour was selected as the closest nearshore location for placement given the operational requirements for a typical shallow-draft, split-hull hopper

dredge or scow. The length of the nearshore berm along the contour was assumed to be roughly equal to the length of the associated beach. Figures 2.4-1 and 2.4-2 illustrate the results of Step 1 for representative beach sites in New York and Rhode Island, respectively.

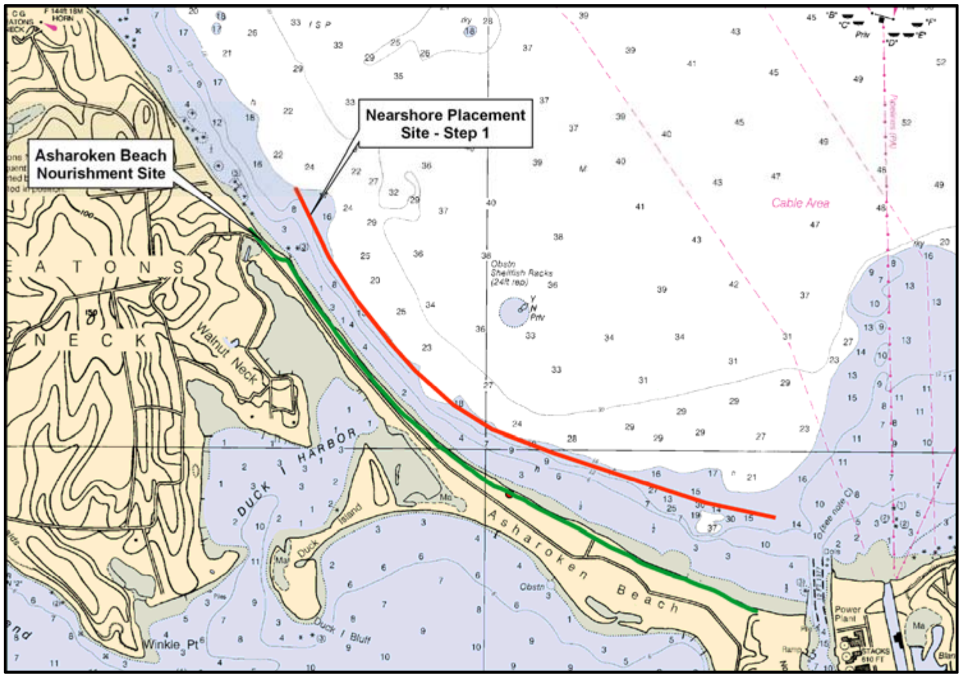

Figure 2.4-1. Potential nearshore placement site identified during Step 1 for Asharoken Beach, NY.

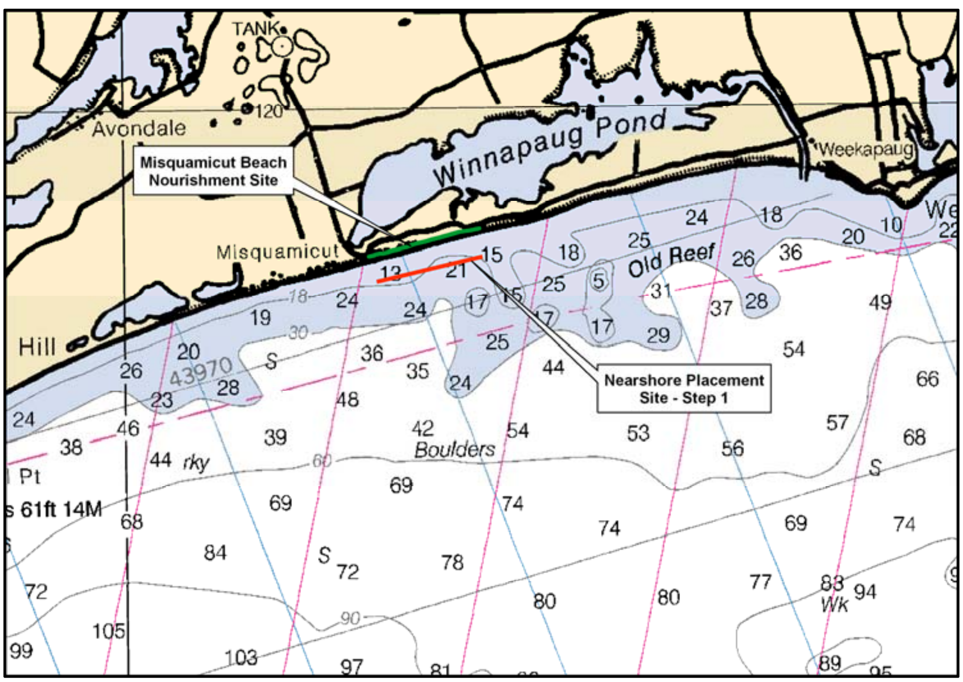

Figure 2.4-2. Potential nearshore placement site identified during Step 1 for Misquamicut Beach, RI.

- Step 2 – Characterize Type of Nearshore Berm
  This step characterized the potential nearshore berm sites identified in Step 1 as feeder or stable berms. Feeder berm sites were identified where sustained shoreward migration of the nearshore berm would result in landward dispersion of the placed sand and beach accretion. Stable berm sites showed a low potential for shoreward transport; however, wave attenuation over the nearshore berm could have a positive impact on the beach by reducing incoming wave energy. Long-term near-bed velocity (u_{dmax}) distributions following the method of Hands and Allison (1991) were used to classify the potential sites as feeder or stable using the equation:

$$u_{dmax} = \pi \frac{H}{T} + \sinh \frac{2\pi d}{L}$$

  Wave hindcast and buoy data at various locations throughout Long Island Sound were transformed to each of the potential nearshore berm sites. The wave transformations were performed using standard equations that describe changes in height and length as the wave form travels from deep water to shallower water at the potential nearshore berm sites. The waves were transformed to a water depth of 12 ft, calculated by adding a berm height of 3 ft to the original placement depth of 15 ft MLLW.

  The long-term near-bed velocities (u_{dmax}) were then calculated and ranked from highest to lowest. Following the method of Hands and Allison (1991), near-bed velocities at the 75th percentile in excess of 40 cm/sec, or velocities at the 95th percentile in excess of 70 cm/sec were used to classify the sites as feeder berms. Velocities below these thresholds were indicative of stable berm sites. Of the 51 potential nearshore berm sites, only 4 met the criteria for active feeder berms, while the remaining 47 sites were considered stable (Table 2.4-1). Three (3) of the sites were assumed to be stable due to protection provided by breakwaters, and near bed velocities (u_{dmax}) were not calculated.

- Step 3 – Screen Potential Sites Based on Impacts to Navigation
  Step 3 evaluated the potential nearshore berm locations with respect to navigation concerns. The potential for adverse impacts to navigation through increased shoaling in navigation channels, or obstructions to vessel traffic were the primary screening criteria. Nearshore berm sites close to navigation channels were assumed to have an adverse impact on shoaling, regardless of whether the site was characterized under Step 2 as stable or active. Although sediment transport at the stable sites was not considered significant enough to supply sand to the adjacent beaches, dispersion during high energy wave conditions could potentially move sediment along the seafloor, thus impacting nearby navigation channels. Nearshore berm sites resulting in bathymetric obstructions to primary navigation routes servicing harbors and marinas were also considered to have an adverse impact on vessel traffic, and were thus screened out. Of the initial 51 nearshore berm sites, a total of 13 were screened out for potential impacts to navigation

(Table 2.4-1). Figures 2.4-3 and 2.4-4 illustrate the results of Step 3 for potential nearshore berm sites in New York and Rhode Island, respectively.

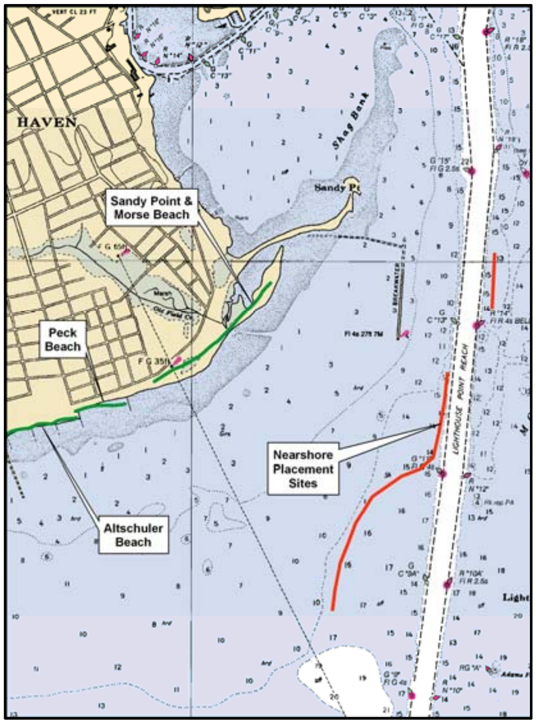

Figure 2.4-3. Potential nearshore berm site identified for beaches in West Haven showing proximity to New Haven Harbor entrance channel.

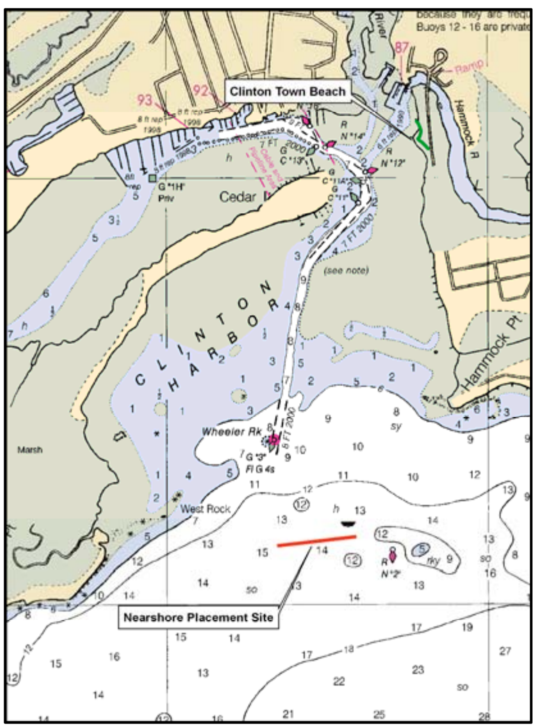

Figure 2.4-4. Potential nearshore berm site identified for Clinton Town Beach showing potential interference with navigation to Clinton Harbor.

- Step 4 – Screen Potential Sites Based on Impacts to Cultural Resources and Select Marine Infrastructure
  This step evaluated the potential berm sites with respect to sensitive cultural resources and a sub-set of marine infrastructure. Sites identified with direct placement on cultural resources and/or in areas with utilities or mooring areas were assumed to have an adverse impact. The locations of important cultural resources were identified using the "Cultural Resources Inventory Long Island Sound – Dredged Material Management Plan" (PAL, 2010). State GIS files for submerged pipelines, cable routes, and mooring fields were used to evaluate potential impacts on marine infrastructure. The Step 4 screening did not result in the elimination of any sites. All 38 sites passing the Step 3 screening also passed the Step 4 screening process. Potential nearshore berm sites located near cultural resources and/or marine infrastructure were documented with reason codes for subsequent use in the impact analysis (Table 2.2-1).

The 4 step review process classified and screened 51 potential nearshore berm sites (Table 2.4-1). Forty-seven (47) of the sites were characterized as stable berms, and the remaining 4 sites were characterized as feeder berms (Table 2.4-1). Thirteen (13) berm sites were screened out due to the potential for adverse impacts to navigation, cultural resources, and/or certain marine infrastructure. A total of 38 nearshore berms passed the screening process and were retained for further evaluation; 21 sites in Connecticut, 15 sites in New York, and 2 sites in Rhode Island. The distribution of potential nearshore berm sites that passed the screening is illustrated in Figure 2.4-5.

Table 2.4-1. Characterization and Screening of Potential Nearshore Berm Sites.

Site ID	Location	Site Name	Step 2	Step 3	Step 4
177	East Hampton, NY	Shadmoor State Park	Feeder	Pass	Pass
178	East Hampton, NY	Camp Hero State Park	Feeder	Pass	Pass
179	East Hampton, NY	Montauk Point State Park	Stable	Pass	Pass[1,2]
121	East Hampton, NY	Gin Beach	Stable	Pass	Pass
446	East Hampton, NY	Theodore Roosevelt County Park	Stable	Pass	Pass
453	East Hampton, NY	Lake Montauk Harbor	Stable	Pass	Pass[1]
173	East Hampton, NY	Hither Hills State Park	Stable	Pass	Pass
180	Orient, NY	Orient Beach State Park	Stable	Pass	Pass
454	Southold, NY	Hashamomuck Cove - County Road 48/ Kenney's Beach	Stable	Pass	Pass
455 / 82	Mattituck, NY	Mattituck Harbor 111 / Bailie's Beach	Stable	Pass	Pass
445	Riverhead, NY	Jamesport State Park	Stable	Pass	Pass[1]
171	Wading River, NY	Wildwood State Park	Stable	Pass	Pass
170	Kings Park, NY	Sunken Meadow State Park	Stable	Pass	Pass
63	Huntington, NY	Asharoken Beach	Stable	Pass	Pass
456	Oyster Bay, NY	Bayville	Stable	Pass	Pass[1]

Site ID	Location	Site Name	Step 2	Step 3	Step 4
181	Bronx, NY	Orchard Beach	Stable	Eliminate	
442	Stamford, CT	Cummings Park Beach	Stable	Eliminate	
441	Stamford, CT	Cove Island Beach	Stable	Pass	Pass
320	Norwalk, CT	Calf Pasture Beach	Stable	Pass	Pass
440	Westport, CT	Compo Beach	Stable	Pass	Pass[1]
449	Westport, CT	Sherwood Island State Park	Stable	Pass	Pass
438	Westport, CT	Burial Hill Beach	Stable	Pass	Pass[1]
433	Fairfield, CT	Southport Beach	Stable	Pass	Pass
434	Fairfield, CT	Sasco Hill Beach	Stable	Pass	Pass
436	Fairfield, CT	Jennings Beach	Stable	Eliminate	
323	Bridgeport, CT	Seaside Beach	Stable	Pass	Pass[1]
467	Stratford, CT	Long Beach	Stable	Pass	Pass[1]
450	Stratford, CT	Short Beach	Stable	Eliminate	
364	Milford, CT	Silver Sands State Park (west side only)	Stable	Pass	Pass
451	Milford, CT	Woodmont Shore Beach	Stable	Pass	Pass
444	Milford, CT	Gulf Beach	Stable	Eliminate	
447	West Haven, CT	Prospect Beach	Stable[3]	Pass	Pass
327	West Haven, CT	Bradley Point Park	Stable	Pass	Pass
333	West Haven, CT	Savin Rock	Stable	Pass	Pass
330	West Haven, CT	Oak Street Beach	Stable	Pass	Pass
325	West Haven, CT	Altschuler Beach	Stable	Eliminate	
331	West Haven, CT	Peck Beach	Stable	Eliminate	
329	West Haven, CT	Morse Beach	Stable	Eliminate	
332	West Haven, CT	Sandy Point	Stable	Eliminate	
459	New Haven, CT	Fort Nathan Hale Park	Stable	Eliminate	
337	New Haven, CT	Lighthouse Point Park Beach	Stable[3]	Pass	Pass
339	Guilford, CT	Jacobs Beach	Stable	Eliminate	
457	Madison, CT	East Wharf Beach	Stable	Pass	Pass
365	Madison, CT	Hammonasset State Park	Stable	Pass	Pass
343	Clinton, CT	Clinton Town Beach	Stable	Eliminate	
NA	Westbrook, CT	Grove Point Beach	Stable[3]	Pass	Pass
367	East Lyme, CT	Rocky Neck State Park	Stable	Pass	Pass
368	Groton, CT	Bluff Point State Park	Stable	Pass	Pass
480	Stonington, CT	duBois Beach	Stable	Eliminate	
381/ 382	Westerly, RI	Watch Hill Beach /Napatree Point Beach	Feeder	Pass	Pass[2]
384	Westerly, RI	Misquamicut State Beach	Feeder	Pass	Pass

[1] Nearshore berm zone is near cultural resource(s).
[2] Nearshore berm zone is near submerged cable(s).
[3] Site assumed to be stable due to protection by breakwaters; near bed velocity not calculated.

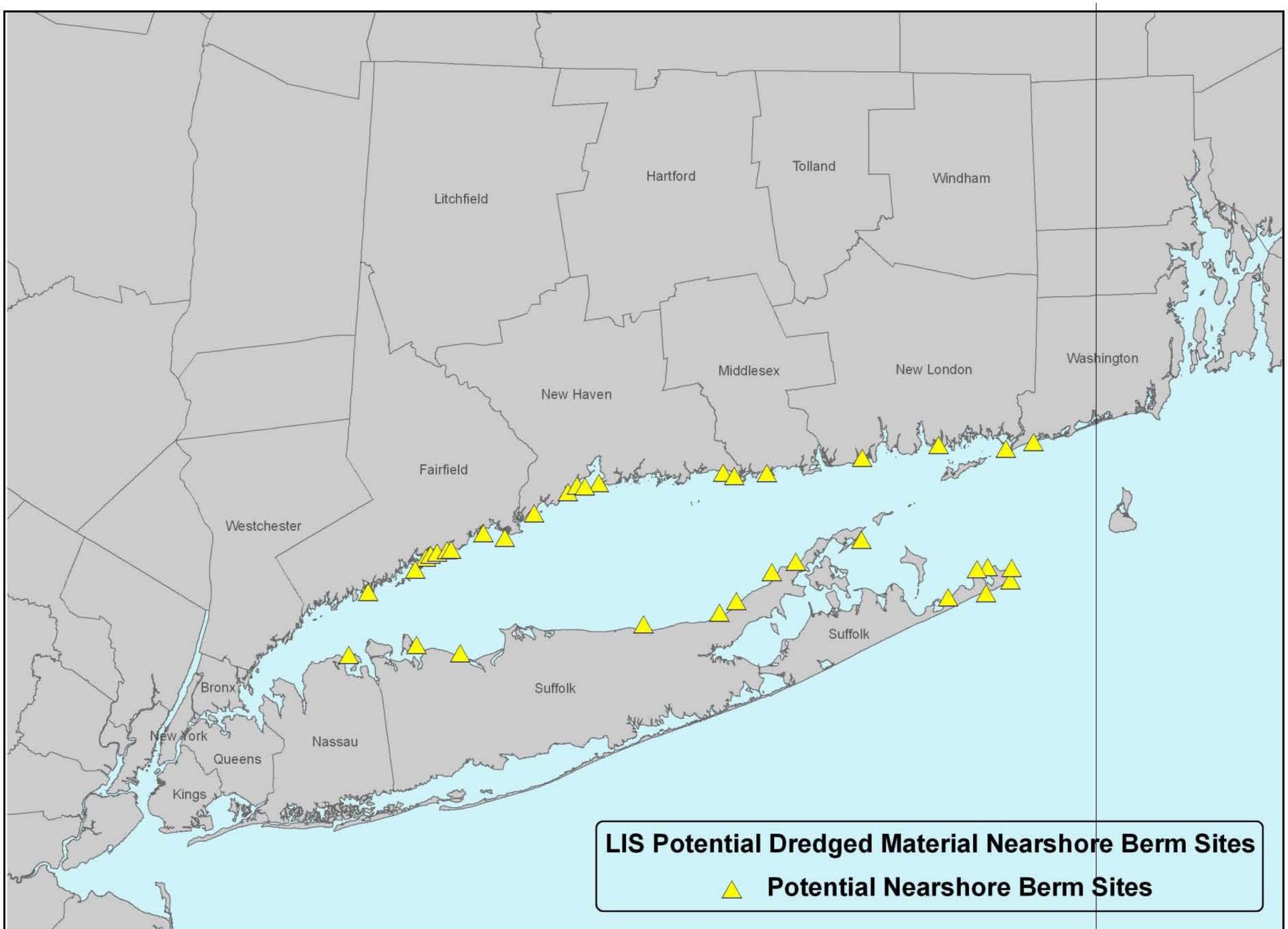

Figure 2.4-5. Distribution of potential nearshore berm sites throughout the LIS DMMP study area.

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3.0 SITE EVALUATION

3.1 INTRODUCTION

The objectives of this section are to evaluate each of the 38 nearshore berm sites based on: (1) a narrative description, including appropriate exhibits of each site, and (2) an estimate of site capacity.

This evaluation included three general tasks to meet these objectives:

1) Evaluate preliminary engineering design;
2) Obtain basemaps, physical, environmental, and cultural data for each site;
3) Prepare nearshore berm site summaries.

Tasks 2 and 3 constituted an evaluation of each potential nearshore berm site in terms of the location and the resources that may be affected during either site construction or operation. This evaluation took the form of site-specific evaluation matrices that compared the resources that come under the influence of a site against the potential impacts that might accrue to each resource from site construction or operation. The matrices were populated by qualitative characterizations of the impacts and a descriptive assessment of their probability of occurrence in each resource area. Figure 3.1-1 shows how these matrices were developed and applied.

3.2 PRELIMINARY ENGINEERING DESIGN

Engineering designs for nearshore berms typically consider a variety of factors such as the type and volume of material used for construction, water depth of placement, berm height and orientation, incident wave climatology, and construction methodology (USACE, 1990a). The intended purpose of the berm is also an important design consideration (ie., feeder vs. stable). For the LIS region most of the potential berm sites were determined to be stable, with only four (4) sites showing the potential to be feeder berms. Due to the planning nature of this study, many of the other important design parameters are still undefined. As such, a number of assumptions were required to complete first-order designs for the nearshore berms. The primary assumptions and design criteria are described below.

- Water Depth – The nearshore berms were located along the 15 ft depth (MLLW) contour immediately seaward of the target beaches. The 15 ft contour was assumed to be the shallowest location accessible for a typical shallow-draft, split-hull hopper dredge or scow likely to perform the dredging work. During operations it may be possible for the vessels to work with the tides, so that berm placement could be shallower than 15 ft MLLW, thereby increasing the potential for berms to nourish the adjacent beach. This type of evaluation would need to be performed on a site by site basis as various alternatives for dredged material placement sites are considered.

- Berm Height – The nearshore berms were assumed to have a height of 3 ft, thus placing the crest elevation at 12 ft below MLLW. This maximum crest elevation provided an opportunity for wave induced dispersion of the berm material, and also minimized potential adverse impacts to navigation.

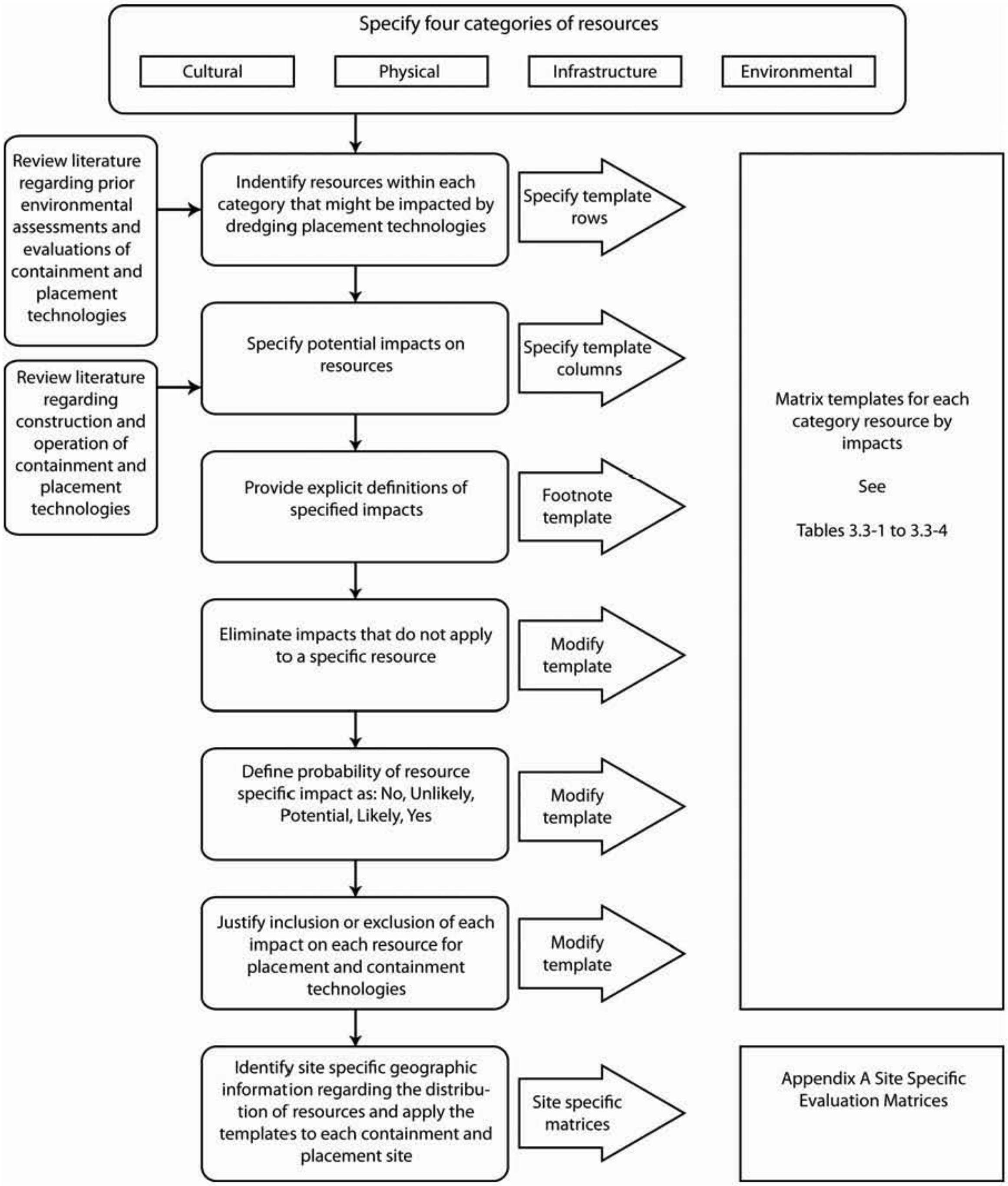

Figure 3.1-1. Development and application of evaluation matrices.

- Berm Length and Width – Berm length along the 15 ft contour was assumed to be roughly equal to the length of the target beach, and ranged from 354 ft to 12,123 ft. A crest width of 200 ft was chosen based on field data from existing berm sites that indicate negligible additional reductions of nearshore wave energy for widths greater than 200 ft (USACE, 1990b; USACE 1993).

- Berm Side Slopes – Berm side slopes were assumed to be equal to the angle of repose for subaqueous sand, which is between 25 and 40 degrees, or 1V to 2.5-1.25H (Voisey and Robinson, 2006).

- Sediment Characteristics – The characteristics of the dredged material available for nearshore berm construction should be used to guide the design of the berm. Clean, beach compatible sand should be utilized where possible to construct feeder berms that gradually nourish the target beach. Dredged sediments that contain a mixture of sand and finer-grained material can also be used in nearshore berms. In this case, the wave climatology, currents, and sediment characteristics should be used to identify the optimum placement depth that would allow winnowing of the fines with onshore transport of the sand. Dredged sediments with higher percentages of fine-grained material should be used in stable berm sites to minimize the potential for secondary transport.

  The analyses described in this report assumed that the nearshore berms would be composed primarily of sand sized dredged material, and of reasonable similarity to the target beach. Site specific sediment information for the target beaches from the "Upland, Beneficial Use, and Sediment Dewatering Site Investigations Phase 2" report (WHG, 2010) was used to characterize the ideal average grain size of the nearshore berm. The Hands and Allison (1991) method that was used to characterize the berms as feeder or stable does not explicitly consider sediment grain size. Rather, the method assumes sand since it is based on empirical data from berms constructed with sandy sediments. As such, the methodology does not specifically address the stability of berms with mixed or fine-grained sediments. The assumption used for this analysis, that the nearshore berms would be primarily sand, weights the results towards a greater number of stable berms. If the sediment size in the potential berms is finer, the material will tend to disperse, and site specific analyses should be performed to evaluate the suitability the nearshore placement site given the characteristics of the dredged material.

Volumetric calculations for each nearshore berm site were completed using the aforementioned assumptions. A summary of the berm dimensions, volume, and sediment characteristics is provided in Table 3.2-2.

Table 3.2-2. Summary of Potential Nearshore Berm Designs.

Site ID	Site Name	Berm Length (ft)	Berm Volume (cy)	Avg. Grain Size
177	Shadmoor State Park	1,477	33,700	medium sand
178	Camp Hero State Park	3,703	84,332	cobble to coarse sand
179	Montauk Point State Park	5,760	131,119	cobble to coarse sand
121/446	Gin Beach & Theodore Roosevelt Cty Park	8,892	202,358	medium to fine sand
453	Lake Montauk Harbor	4,618	105,144	medium to fine sand
173	Hither Hills State Park	12,132	276,053	coarse sand
180	Orient Beach State Park	8,968	204,086	medium sand
454A	Hashamomuck Cove - County Road 48/	6,815	155,115	coarse sand
454B	Hashamomuck Cove –Kenney’s Beach	3,196	72,800	coarse sand
455 / 82	Mattituck Harbor 111 / Bailie's Beach	1,540	35,133	medium sand
445	Jamesport State Park	5,695	129,641	medium to coarse sand
171	Wildwood State Park	8,693	197,831	coarse to medium sand
170	Sunken Meadow State Park	10,670	242,799	medium to coarse sand
63	Asharoken Beach	10,912	248,304	medium to fine sand
456	Bayville	4,224	96,182	medium sand
441	Cove Island Beach	1,235	28,196	coarse sand
320	Calf Pasture Beach	1,325	30,243	medium to coarse sand
440	Compo Beach	2,561	58,356	coarse sand
449	Sherwood Island State Park	4,648	105,931	coarse sand
438	Burial Hill Beach	554	12,706	coarse sand
433	Southport Beach	1,192	27,218	coarse sand
434	Sasco Hill Beach	878	20,076	coarse sand
323	Seaside Beach	6,285	143,060	medium sand
467	Long Beach	1,989	45,346	medium sand
364	Silver Sands State Park	1,111	25,375	fine sand
451	Woodmont Shore Beach	354	8,157	medium to coarse sand
447	Prospect Beach	2,413	54,990	medium sand
327	Bradley Point Park	9,435	214,709	medium sand
333	Savin Rock	See Berm 327	See Berm 327	N/A (no beach present)
330	Oak Street Beach	See Berm 327	See Berm 327	medium sand
337	Lighthouse Point Park Beach	2,439	55,581	medium sand
457	East Wharf Beach	379	8,726	coarse to medium sand
365	Hammonasset State Park	6,151	140,012	medium sand
NA	Grove Point Beach	2,757	62,814	medium sand
367	Rocky Neck State Park	2,131	48,576	medium sand
368	Bluff Point State Park	3,173	72,277	coarse sand
381/382	Watch Hill Beach /Napatree Point Beach	6,806	154,911	medium to fine sand
384	Misquamicut State Beach	3,093	70,457	medium to fine sand

3.3 GEOSPATIAL DATA

Potential impacts from development of the nearshore placement sites were evaluated using geospatial data rendered in a series of thematic working maps. The working maps were organized into the following four resource categories: cultural, environmental, infrastructure and physical.

3.3.1 Cultural

Cultural resources refer to anthropogenic remains or constructs that have historical or archaeological significance.

A report by Public Archaeological Laboratory (PAL, 2010) provided a cultural resources inventory for historic properties including archaeological sites and sensitivity of 57 coastal communities in the study area along the shoreline of Long Island Sound. The inventory included areas underwater within one-half mile of the shoreline and inland for a distance of no greater than 10 miles. Volume II Appendix A of the report provided a GIS database of these resources.

3.3.1.1 Shipwrecks

The "Underwater Cultural Resources Inventory" shapefile included in Volume II Appendix A of the Cultural Resources Inventory (PAL, 2010) documented 847 known maritime resources and submerged sites (i.e. shipwrecks) within the study area. Available information included the name and date of the shipwreck, the information source, and the National Register status (listed or not listed).

3.3.1.2 Historic Districts

The "Historic Aboveground Cultural Resources" geodatabase included in Volume II Appendix A of the Cultural Resources Inventory (PAL, 2010) documented the locations of all 321 recorded aboveground and belowground terrestrial historic properties within the project study area. According to the Advisory Council on Historic Preservation (ACHP), historic properties are defined as those "districts, sites, buildings, structures, and objects" listed or eligible for listing in the National Register of Historic Places. Available information included the state inventory number, resource name, location, property type, and National Register status (listed or eligible).

3.3.1.3 Archaeological Sites

The "Terrestrial Archaeology Cultural Resources" geodatabase included in Volume II Appendix A of the Cultural Resources Inventory (PAL, 2010) documented the locations (generalized for confidentiality purposes) of all 202 known terrestrial archaeological sites within the project study area. Available information included the state inventory number, name, location, site type, contents/function, temporal affiliation, National Register status (where known), and source of information.

3.3.2 Environmental

Environmental resources refer to flora and fauna that inhabit the coastal and marine environment, as well as any management areas established to protect these natural resources.

3.3.2.1 Wetlands

Each state in the study area has developed information on wetlands using different methods and varying definitions. These data were aggregated to make the representation of wetlands more consistent among the states.

The New York State Department of Environmental Conservation (NYSDEC) developed "Tidal Wetlands - NYC and Long Island – 1974" in 2005 and distributes it through the New York State Geographic Information Systems (NYGIS) Clearinghouse (NYSDEC, 2005). These data include New York State tidal wetlands south of the Tappan Zee Bridge, as of 1974. Six wetland types from the New York data layer were used to identify potential impacts from the nearshore berm sites. These wetland types and their respective codes were:

- Coastal Shoals, Bars and Mudflats (SM);
- Formerly Connected (FC);
- Intertidal Marsh (IM);
- Fresh Marsh (FM);
- High Marsh (HM); and
- Dredged Material (DC).

The Connecticut Department of Energy and Environmental Protection (CTDEEP) developed "Tidal Wetlands 1990s" in 1999 (CTDEEP, 1999) and distributes it through the CTDEEP GIS Data website. Wetland mapping for all tidal, coastal and navigable waters, and tidal wetlands were used to identify potential impacts from the nearshore berm sites.

The Rhode Island Department of Environmental Management (RIDEM), Narragansett Bay Estuary Program, and Rhode Island Coastal Resources Management Council (RICRMC) developed "South Coast Estuarine Habitat; cstlwet" in 2003 (RIDEM, 2003) and distributes it through the Rhode Island Geographic Information System (RIGIS). Four of the original wetland types were used to identify potential impacts from the nearshore berm sites. These wetland types were:

- Brackish Marsh
- Phragmites Marsh
- Salt Marsh
- Scrub Shrub Wetland

3.3.2.2 Federal and State Listed Species

Each state in the study area has developed natural heritage information on threatened and endangered species. The spatial coverage of this information is usually broad to protect the subject resources from anthropogenic intrusion. Therefore, any intersections with the project area may or may not overlap with actual species use.

The New York Natural Heritage Program (NYNHP) maintains "Biodiversity Databases" which must be requested from the agency. The agency provides the following data layers (NYNHP, 2010):

- records of occurrences of significant natural communities ("nynhp_LongIsland_comms_10" and "nynhp_WestOfSuffolk_comms_10")
- records of element occurrences either last documented before 1980 (historical records), and/or records for which precise or relatively precise locations are not known ("nynhp_LongIsland_potential_10" and "nynhp_WestOfSuffolk_potential_10")
- records of occurrences of rare animals and rare plants last documented since 1980, and for which the locations are precisely or relatively precisely known ("nynhp_LongIsland_species_10" and "nynhp_WestOfSuffolk_species_10")

The CTDEEP maintains the "Natural Diversity Data Base Areas" dataset (CTDEEP, 2011) and distributes it through the CTDEEP GIS Data website. The data layer represents general locations of endangered, threatened and special concern species and significant natural communities. The July 2011 update was utilized to evaluate potential impacts from the nearshore berm sites.

The RIDEM and The Nature Conservancy Natural Heritage Program developed the "Natural Heritage Areas; natHeritage90" in 1990 (RIDEM, 1990) and distribute it through the RIGIS. The data layer represents the estimated habitat and range of rare species and noteworthy natural communities in Rhode Island as of August 1990.

3.3.2.3 Shellfish

The NOAA National Ocean Service Office of Response and Restoration, along with other federal and state partners, developed the Environmental Sensitivity Index (ESI) for Long Island (NOAA, 2009) and for Rhode Island/Connecticut/New York/New Jersey (NOAA, 2002), and distribute the data through their ESI website. The ESI toolkit was developed as a reference of resources that are at-risk if an oil spill occurs nearby. It is used by responders to minimize environmental consequences of spills/cleanups, and by planners to identify and protect vulnerable areas. The "Invertebrates" data set contains

> "…sensitive biological resource data for coastal, estuarine, and marine invertebrate species. Vector polygons in this data set represent invertebrate distribution and concentration areas. Species specific abundance, seasonality, status, life history, and source information are stored in relational data tables designed to be used in conjunction with this spatial data layer."

Invertebrate data within the influence of a given nearshore berm site were used to determine potential impacts to sensitive coastal/estuarine/marine invertebrate species.

Shellfish are also included in the NOAA Essential Fish Habitat designations (discussed below). Therefore, shellfish may also appear in the evaluations of impacts on Federally Managed Species.

3.3.2.4 Federally Managed Species (Magnuson-Stevens)

The NOAA Fisheries Service Habitat Conservation Division manages the Essential Fish Habitat program and developed the Guide to Essential Fish Habitat Designations in the Northeastern United States (NOAA, 1999). The website provides a

> "…geographic species list of Essential Fish Habitat (EFH) designations…pursuant to the Magnuson-Stevens Fishery Conservation and Management Act [and specifies] species and life stages of fish, shellfish, and mollusks for which EFH has been designated in a particular area."

Recorded fish species from each 10' x 10' square that contained a nearshore berm were used to identify potential impacts to EFH.

3.3.2.5 Submerged Aquatic Vegetation

Information on the locations of submerged aquatic vegetation (i.e. eelgrass and other vegetation) was derived from three resources.

The "Habitats" dataset within the ESI for Long Island (NOAA, 2009) and Rhode Island/Connecticut/New York/New Jersey (NOAA, 2002) contains

> "…sensitive biological resource data for sensitive/rare coastal plants and submerged aquatic vegetation (SAV). Vector polygons in this data set represent sensitive/rare coastal plants recognized by the Natural Heritage Program (NHP) and eelgrass distribution. Species-specific abundance, seasonality, status, life history, and source information are stored in relational data tables…designed to be used in conjunction with this spatial data layer."

Data within the influence of a given nearshore berm site were used to determine potential impacts to sensitive SAV resources.

The U.S. Fish & Wildlife Service, Northeast Region National Wetlands Inventory developed "Connecticut Eelgrass Beds 2006 Poly" in 2006 (USFWS, 2006) and distributes it through the CTDEEP GIS Data website. This data layer is an inventory of delineations of eelgrass beds on the eastern Connecticut shoreline to the Rhode Island border (plus Fisher Island, Plum Island, and the northern shore of Long Island) based on interpretation of 1:20,000 scale Spring 2006 True Color aerial photography. This information was used to identify eelgrass beds in eastern Connecticut (east of Westbrook) and northeastern Long Island, and to evaluate potential impacts from nearshore berm sites. The geographic scope of this dataset is limited and therefore comparable evaluations were not possible at all LIS nearshore berm sites.

The RIDEM and RICRMC developed "South Coast Estuarine Habitat; cstlwet" in 2003 (RIDEM, 2003), and distribute it through the RIGIS. The original dataset presents a variety of coastal wetland habitats. Following the definitions provided in Section 300.18 of the Rhode Island Coastal Resources Management Program (RICRMC, 2010), only the following categories were displayed for the analysis of submerged aquatic vegetation:

- Aquatic Beds (eelgrass)
- Aquatic Beds (not eelgrass)

3.3.2.6 Marine Protected Areas

The NOAA Ocean and Coastal Resource Management (OCRM) National Marine Protected Areas Center (MPAC) developed the "MPA Inventory Database (3/2011)" dataset in 2011 (NOAA, 2011a) and distributes it through the MPAC website. The data layer inventories existing federal, state and territorial marine protected areas in the United States. The dataset describes six different levels of protection (Uniform Multiple Use, Zoned Multiple Use, Zoned with No Take Areas, No Take, No Impact, and No Access). The marine protected areas within LIS are all either Uniform Multiple Use or Zoned Multiple Use. Also, the data indicate that the Southern Nearshore Trap/Pot (Lobster) Waters MPA is a Uniform Multiple Use protected area occurring throughout LIS managed by the National Marine Fisheries Service through a Programmatic Species Management Plan. Since this management area is theoretically within the zone of influence of all sites in the evaluation, specific mention of the management area was not made in the site evaluation tables.

3.3.2.7 Birds

The "Birds" dataset within the ESI for Long Island (NOAA, 2009) and Rhode Island/Connecticut/New York/New Jersey (NOAA, 2002) contains

> "…sensitive biological resource data for wading birds, shorebirds, waterfowl, raptors, diving birds, pelagic birds, passerine birds, gulls and terns. Vector polygons in this data set represent locations of bird nesting, foraging, and rafting sites. Species specific abundance, seasonality, status, life history, and source information are stored in relational data tables designed to be used in conjunction with this spatial data layer."

Data within the influence of a given nearshore berm site were used to determine potential impacts to sensitive bird resources.

3.3.2.8 Marine Mammals

The "Marine Mammals" dataset within the ESI for Long Island (NOAA, 2009) and Rhode Island/Connecticut/New York/New Jersey (NOAA, 2002) contains

> "…sensitive biological resource data for seals, whales, and dolphins. Vector polygons in this data set represent marine mammal distribution and seal haul-out sites. Species-specific abundance, seasonality, status, life history, and source

> information are stored in relational data tables…designed to be used in conjunction with this spatial data layer."

Data within the influence of a given nearshore berm site were used to determine potential impacts to sensitive marine mammal resources.

3.3.2.9 Terrestrial Wildlife

The "Terrestrial Mammals" dataset within the ESI for Long Island (NOAA, 2009) and Rhode Island/Connecticut/New York/New Jersey (NOAA, 2002) contains

> "…sensitive biological resource data for small mammal species. Vector polygons in this data set represent terrestrial mammals. Species-specific abundance, seasonality, status, life history, and source information are stored in relational data tables designed to be used in conjunction with this spatial data layer."

Data within the influence of a given nearshore berm site were used to determine potential impacts to sensitive terrestrial wildlife resources.

3.3.3 Infrastructure

Infrastructure resources refer to built resources that support human activities such as transportation, recreation, and habitation. For this evaluation, only those elements that have direct relevance to the coastal and marine zone (i.e. developed along or in Long Island Sound) were investigated.

3.3.3.1 Mooring Areas

The United States Coast Guard Districts Operations Systems Center developed "Anchorage Areas" data in 2004 (USCG, 2004) and distributes it through the Marine Cadastre and the Northeast Ocean Data Viewer. The data layer inventories areas designated as special anchorage areas for purposes of 33 U.S.C. §§2030(g) and 2035(j). These data were downloaded from Database 2 (Ocean Uses) of the Northeast Ocean Data Portal's Northeast Ocean Data Files and used to evaluate potential impacts to designated anchorage areas from the nearshore berm sites.

NOAA nautical charts and current digital orthophotography (via Google Earth) were used to identify other anchorage areas and small recreational mooring fields.

3.3.3.2 Navigation Channels and Shipping

NOAA nautical charts were used to identify existing navigational channels and to evaluate impacts to navigation from the nearshore berm sites.

The NOAA-NOS Coastal Services Center and The Nature Conservancy developed "AIS Density" data in 2011 (NOAA, 2011b) and distribute it through the Northeast Ocean Data Viewer. The data layer maps patterns of large vessel traffic in the Northeast with a "…density grid based on the vessel point locations derived from the Automatic Identification System database from 2009." These data were downloaded from Database

2 (Ocean Uses) of the Northeast Ocean Data Portal's Northeast Ocean Data Files and used to evaluate potential impacts to shipping from the nearshore berm sites.

A number of state-generated road and ferry shapefiles were used to identify ferry traffic patterns throughout LIS. The New York State Office of Cyber Security annually releases updated versions of the "NYS Streets" shapefile (NYSOCS, 2011) and distributes it through the NYGIS Clearinghouse. "NYS Streets" is a vector file of public/private streets and ferry crossings compiled from orthoimagery and other sources and attributed with street names and route numbers. The Rhode Island Department of Administration Statewide Planning Program developed "Ferry Routes; Ferry_04" in 2004 (RIDASPP, 2004) and distributes it through the RIGIS. This data set contains established commercial passenger and vehicle water ferry routes for Rhode Island ports and ferry docks. A complimentary shapefile was digitized for Connecticut using the routes and destinations depicted in the New York and Rhode Island datasets as a guide.

3.3.3.3 Ports

The USACE Navigation Data Center (NDC) periodically develops an inventory of the principal ports of the United States. The shapefile "pports09" is the 2009 data (USACE NDC, 2009) available in the file "ndcgis11shp.zip" through the NDC website. The data includes port names, codes, and tonnage statistics.

3.3.3.4 Coastal Structures

Current digital orthophotography (via Google Earth) was utilized to identify coastal structures such as groins, breakwaters, jetties, bulkheads, and other shoreline armoring.

3.3.3.5 Cable/Power/Utility Crossings

Information on submerged cable areas and pipelines was obtained from the following two sources:

The NOAA-NOS Coastal Services Center developed "Submarine_Cable" data in 2011 (NOAA, 2011c) and distributes it through the Marine Cadastre and the Northeast Ocean Data Viewer. The data layer depicts the location of submarine cables as defined by the NOAA Electronic Navigation Charts and the NOAA Raster Nautical Charts. The data were downloaded from Database 2 (Ocean Uses) of the Northeast Ocean Data Portal's Northeast Ocean Data Files and used to evaluate potential impacts to submarine cables from the nearshore berm sites.

The CTDEEP developed "LIS_CABLES_PIPELINES" in 2002 (updated in 2005) (CTDEEP, 2005) and distributes it through the CT DEEP GIS Data website. The data layer documents the location of submerged cable and/or pipeline areas in LIS, including electric transmission lines, telephone and/or fiber optic cables, natural gas and/or petroleum pipelines.

3.3.3.6 Recreational Areas

Recreational areas including public beaches, municipal/state parks, and boat launches were identified using the Google Earth Primary Database and current digital orthophotography (also via Google Earth).

Information on recreational boat ramps was obtained from the following three sources:

1) The NYSDEC Bureau of Marine Resources Marine Fishing Access Unit prepared a report in 2009 “BOAT RAMPS LONG ISLAND REGION - A listing of facilities for the launching of trailered boats into the marine waters of Nassau and Suffolk Counties” (NYSDEC, 2009). The boat ramp locations for Long Island towns with shorelines fronting LIS (East Hampton, Southold, Riverhead, Brookhaven, Smithtown, Huntington, Oyster Bay, and North Hempstead) were digitized and used in the evaluation of impacts.
2) The CTDEEP developed “DEP_BOAT_LAUNCH” in 2008 (CTDEEP, 2008) and distributes it through the CT DEEP GIS Data website. The data layer includes all DEP boat launch locations in the State of Connecticut including trailered, car-top and carry-in.
3) The RIDEM developed “Boat Ramps in Rhode Island; s44obr96” in 1996 (RIDEM, 1996) and distributes it through the RIGIS. The data layer inventories “recreational boat launching ramp and marine pump out facilities for fresh and salt water bodies accessible to the public within Rhode Island.”

3.3.3.7 Commercial and Industrial Facilities

The NOAA-NOS Coastal Services Center developed “Regulated_Facilities” data in 2010 (NOAA, 2010a) and distributes it through the Marine Cadastre and the Northeast Ocean Data Viewer. The data layer inventories facilities, sites, or places subject to environmental regulation or of environmental interest to the United States Environmental Protection Agency (USEPA). The data were downloaded from Database 2 (Ocean Uses) of the Northeast Ocean Data Portal’s Northeast Ocean Data Files and used to evaluate potential impacts to regulated facilities from the nearshore berm sites.

3.3.3.8 Aquaculture

The NOAA-NOS Office of Coast Survey revised “Marine_Farms” data in 2011 (NOAA, 2011d) and distributes it through the NOAA ENC Direct to GIS viewer and the Northeast Ocean Data Viewer. The data layer inventories “aquaculture activities – defined as an assemblage of cages, nets, rafts and floats or posts where fish, including shellfish, are artificially cultivated.” The data were downloaded from Database 2 (Ocean Uses) of the Northeast Ocean Data Portal’s Northeast Ocean Data Files and used to evaluate potential impacts to aquaculture sites from the nearshore berm sites.

Additional information on aquaculture and commercial fishing activities were obtained through interpretation of NOAA nautical charts and current digital orthophotography (via Google Earth).

3.3.3.9 Dredged Material Disposal Sites

The NOAA-NOS Coastal Services Center developed "Disposal_Sites" data in 2010 (NOAA, 2010b) and distributes it through the Marine Cadastre and the Northeast Ocean Data Viewer. The data layer inventories disposal sites for dredged material, defined as finally approved and precise geographical areas within which ocean dumping of wastes is permitted. These data were downloaded from Database 2 (Ocean Uses) of the Northeast Ocean Data Portal's Northeast Ocean Data Files and used to evaluate potential impact to dredged material disposal sites from the nearshore berm sites.

3.3.4 Physical

Physical resources refer to the geological deposits and coastal processes that are characteristic of LIS.

3.3.4.1 Sediments

The U.S. Geological Survey (USGS) developed "listex" data in 2000 and distributes it through the USGS website. The data layer "Distribution of Surficial Sediments in Long Island Sound" is available within the USGS report OFR 00-304 (Paskevich and Poppe, 2000) on Long Island Sound seafloor mapping. The data layer contains "a computer generated model of the distribution of surficial sediments in Long Island Sound."

3.3.4.2 Littoral Drift

Information on the patterns of littoral drift was derived through interpretation of current digital orthophotography (via Google Earth). Sand impoundments against coastal structures such as groins and jetties, and accumulation of sand at the end of spits along undeveloped shorelines, were used as indicators of the direction of alongshore sediment transport.

3.3.4.3 Currents

Information on tidal currents was determined through evaluation of local bathymetric contours, proximity to tidal inlet and harbor entrances, shoreline orientation, and observed directions of littoral drift. Bathymetric data sources included: (1) the National Geophysical Data Center (NGDC) NOS hydrographic surveys, multibeam bathymetry, and trackline bathymetry, (2) the USGS, and (3) other federal governmental agencies and academic institutions. Proximity to inlet and harbor entrances was evaluated through examination of aerial photography available through Google Earth. Tidal currents were assumed to flood and ebb through the narrowest cross section of the tidal inlets and harbor entrances. Tidal currents were also assumed to flow along the general shoreline morphology as seen on the aerial photography.

3.3.4.4 Waves

Wave information and approach directions were derived through evaluation of the local bathymetric contours, shoreline orientation, and estimated littoral drift direction. Local bathymetric data were acquired in order to determine nearshore contours throughout the Sound. Bathymetric data sources included: (1) the NGDC NOS hydrographic surveys, multibeam bathymetry, and trackline bathymetry, (2) the USGS, and (3) other federal governmental agencies and academic institutions. Isobaths from the bathymetric data were then utilized, in concert with the shoreline orientation, to estimate the wave approach, potential wave transformations, and determine the dominant direction of wave approach. Average wave approach directions were assumed to align perpendicular to the offshore isobaths, while the more frequently occurring wave direction was estimated based on the shoreline orientation, fetch approaches, and littoral drift direction.

In addition, wave energy at each location was estimated by qualitatively evaluating the overall shoreline exposure, the fetch distances available for wind–generated waves, and the water depths in the vicinity of each site. The wave energy and approach directions were used to estimate impacts on wave transformations caused by the potential nearshore berms and disposal locations.

3.4 PROCESS OF IMPACT EVALUATIONS

The geospatial data were organized into four thematic working maps (Cultural, Environmental, Infrastructure, and Physical) as ArcGIS map projects. The footprints for the 38 potential nearshore berms were then added to each working map to facilitate the impact analyses. Figures 3.3-1 and 3.3-2 provide examples of these thematic working maps for Infrastructure and Physical resources, respectively.

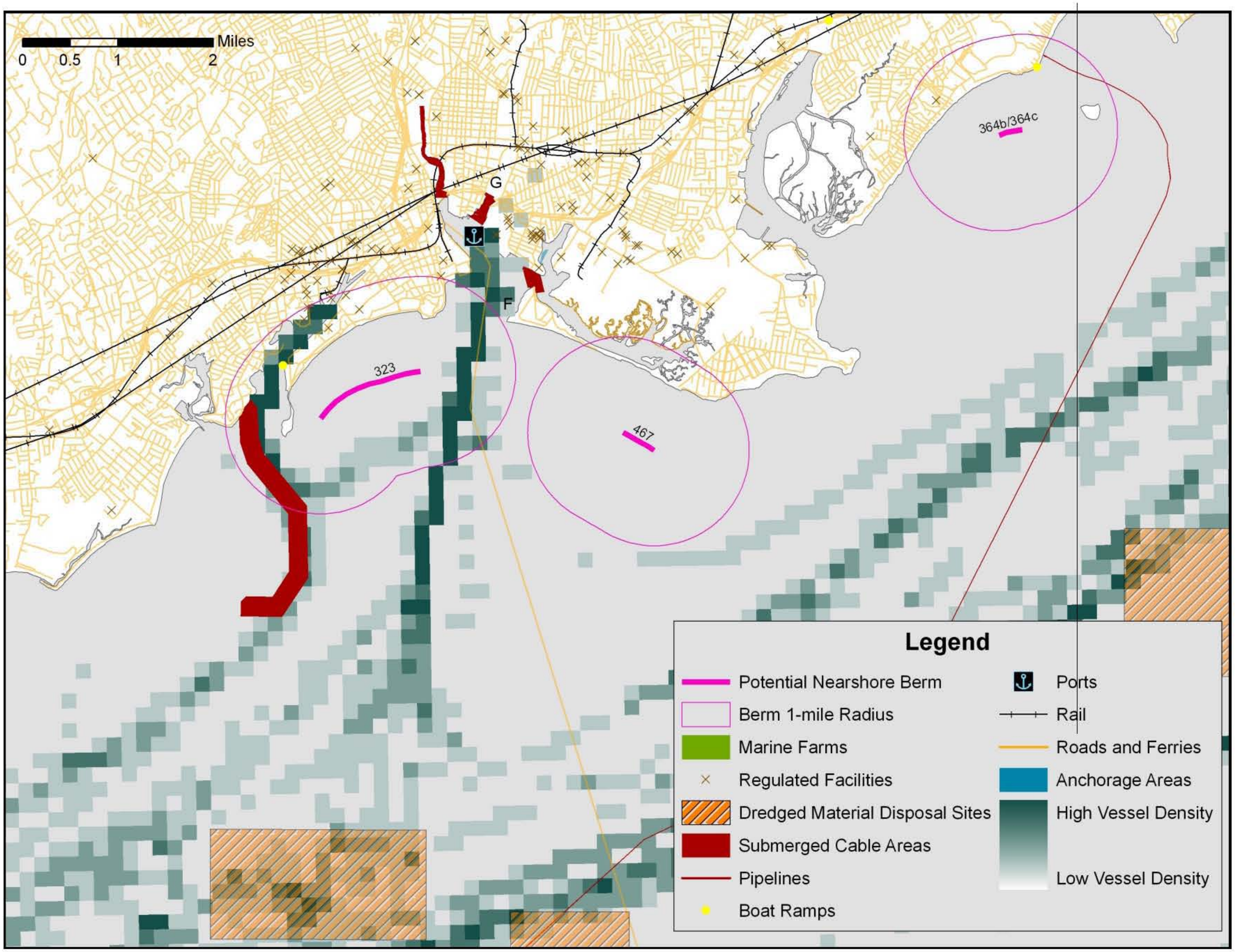

Figure 3.3-1. Example of infrastructure resources map (Bridgeport vicinity).

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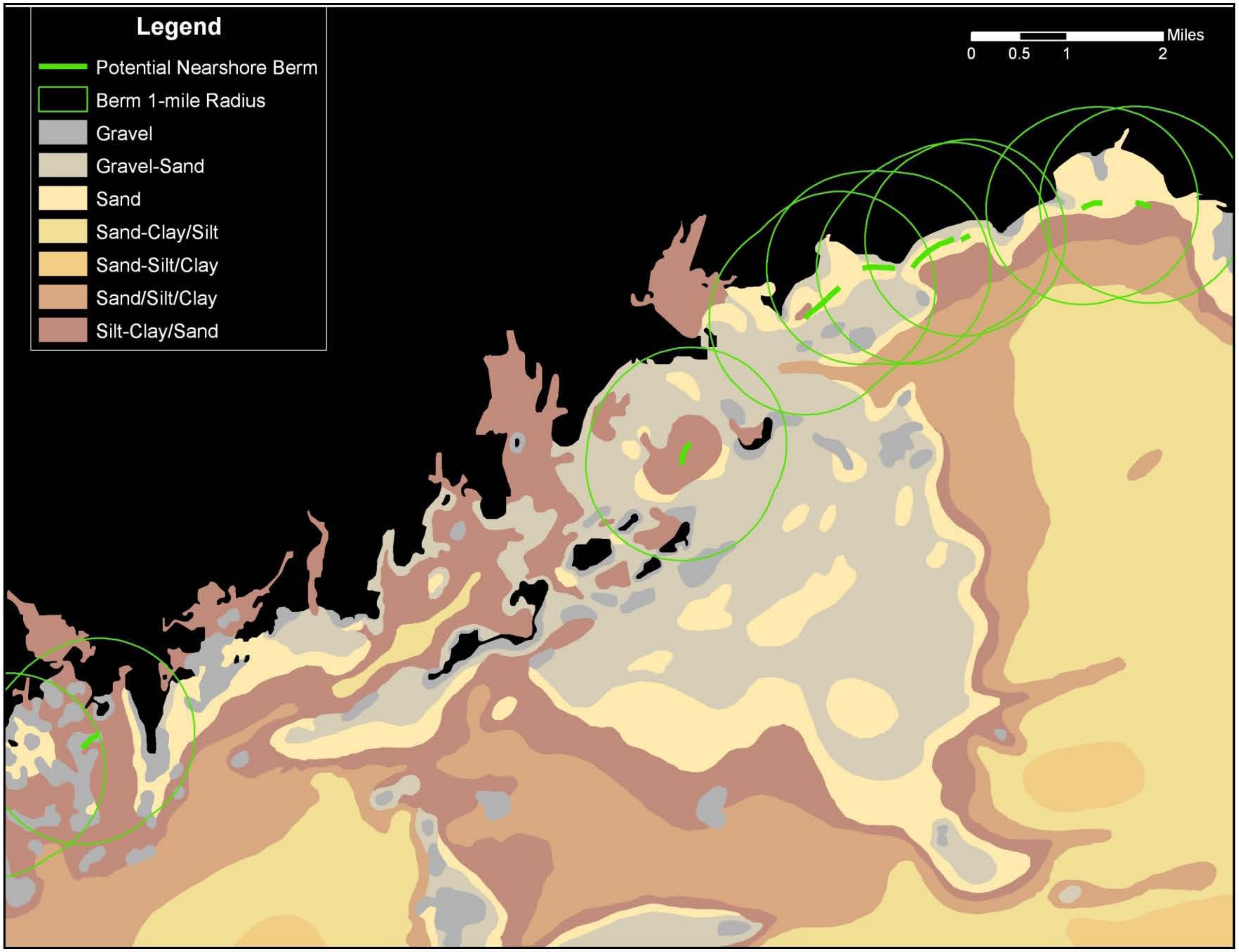

Figure 3.3-2. Example of physical resources map (Norwalk vicinity).

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Using the working maps, the resources within a potential zone of influence around each site were identified. A conservative area of interest within a 1-mile radius around each site was assumed. Unless best professional judgment indicated (i.e. on the opposite side of a harbor boundary, barrier beach, or island), it was assumed that the resources within this 1-mile radius were within the zone of influence of the site. Figures 3.3.1 and 3.3.2 show the potential zones of influence for nearshore berms in the Bridgeport and Norwalk areas, respectively.

Potential impacts to resources within the zone of influence were evaluated using site-specific impact matrices. Prior to reviewing impacts to individual sites, templates were prepared for each of the four resource categories (cultural, environmental, infrastructure, and physical). The templates and the operational definitions of the impacts are presented below. In each template, "X" indicates that a specific resource could conceivably be impacted in a specific way (i.e. Direct Destruction, Burial, etc.) during or after site development. Given the coarse nature of this screening, potential conflicts will need case-by-case evaluation if a proposal to use a specific site arises. However, the matrices will be useful in evaluating where potential conflicts might exist.

3.4.1 Potential Cultural Impacts

The potential impacts of site development to cultural resources are indicated in Table 3.3-1. For each site evaluation, "X's" were replaced with either a description of the probability and nature of the impact or a "NA" (if the resource was not within the zone of influence of the site).

Table 3.3-1. Template of Potential Cultural Impacts.

Cultural Resources	Direct Destruction	Changes in Local Sedimentation/ Erosion	Burial
Shipwrecks	x	x	x
Historic Districts	x	x	----
Archaeological Sites	x	x	----

The operational definitions of the possible impacts to cultural resources are:

- Direct Destruction – Removal or disturbance during construction
- Changes in Local Sedimentation / Erosion – Changes in the rate or pattern of sedimentation or erosion due to facility-related activities (particle settling during dumping, littoral drift following placement, scour due to changes in bathymetry, shoreline erosion due to wave-focusing, run-off during dewatering)
- Burial – Burial of resource by direct placement of material during placement operations

3.4.2 Potential Environmental Impacts

The potential impacts of site development to environmental resources are indicated in Table 3.3-2. For each site evaluation, "X's" were replaced with either a description of the probability and nature of the impact or a "NA" (if the resource was not within the zone of influence of the site).

Table 3.3-2. Template of Potential Environmental Impacts.

Environmental Resources	Direct Destruction	Burial	Changes in Local Sedimentation / Erosion	Habitat Impairment	Harassment	Water Quality Impairment	Habitat Enhancement
Wetlands	x	x	x	x	----	x	x
Federal & State Listed Species	x	x	----	x	x	x	x
Shellfish	x	x	----	x	----	x	x
Federally Managed Species (Magnuson-Stevens)	x	x	----	x	----	x	x
SAV	x	x	x	x	----	x	x
Marine Protected Areas	x	x	x	x	----	x	x
Birds	----	----	----	x	x	x	x
Marine Mammals	x	----	----	x	x	x	x
Terrestrial Wildlife	x	x	----	x	x	----	x

The operational definitions of the possible impacts to environmental resources are:

- Direct Destruction – Removal or mortality during construction
- Burial – Burial of resource by direct placement of material during placement operations
- Changes in Local Sedimentation / Erosion – Changes in the rate or pattern of sedimentation or erosion due to facility-related activities (littoral drift following placement, scour due to changes in bathymetry, shoreline erosion due to wave-focusing)
- Habitat Impairment – Loss or change in the extent or quality of habitat due to direct destruction, burial, sedimentation or erosion of critical habitat
- Harassment – Physical disturbance of individual organisms that significantly impairs breeding, feeding, or sheltering (direct strikes, noise and light pollution)
- Water Quality Impairment – Degradation of any parameter outside of its water quality criterion
- Habitat Enhancement – Increase in areal extent of wetland, unvegetated intertidal habitat, or open space

3.4.3 Potential Infrastructure Impacts

The potential impacts of site development to infrastructure resources are indicated in Table 3.3-3. For each site evaluation, "X's" were replaced with either a description of the probability and nature of the impact or a "NA" (if the resource was not within the zone of influence of the site).

Table 3.3-3. Template of Potential Infrastructure Impacts.

Infrastructure	Direct Interference	Changes in Sedimentation Patterns	Changes in Vessel Traffic Patterns	Burial	Undermining/ Erosion
Mooring Areas	----	x	x	x	----
Navigation Channels & Shipping	----	x	x	x	----
Ports	x	x	x	----	----
Coastal Structures	x	x	----	x	x
Cable/power/utility crossings	x	x	----	x	x
Recreational Areas	x	x	x	x	x
Commercial & Industrial Facilities	x	----	----	----	----
Aquaculture	x	x	----	x	x
Dredged Material Disposal Sites	----	x	----	----	x

The operational definitions of the possible impacts to infrastructure resources are:

- Direct Interference – Removal or disturbance during construction
- Changes in Sedimentation Patterns – Changes in the rate or pattern of sedimentation due to facility-related activities (particle settling during dumping, littoral drift following placement)
- Changes in Vessel Traffic Patterns – Changes in typical navigational paths due to facility-related activities (shoreline extension impinging on navigational area, creation of a navigational hazard by berm placement
- Burial – Burial of resource by direct placement of material during construction
- Undermining / Erosion – Changes in the rate or pattern of erosion due to facility-related activities (scour due to changes in bathymetry, shoreline erosion due to wave-focusing)

3.4.4 Potential Physical Impacts

The potential impacts of site development to physical resources are indicated in Table 3.3-4. For each site evaluation, "X's" were replaced with either a description of the probability and nature of the impact or a "NA" (if the resource was not within the zone of influence of the site).

Table 3.3-4. Template of Potential Physical Impacts.

Physical Resources	Change in Grain Size	Change in TOC	Change in Direction, Rate, Amplitude, or Period
Sediments	x	x	----
Littoral Drift	----	----	x
Currents	----	----	x
Waves	----	----	x

The operational definitions of the possible impacts to physical resources are:

- Change in Grain Size – Changes in ambient sediment texture characteristics caused by placement of material.
- Change in TOC – Potential changes in total organic carbon content of ambient sediment caused by placement of material.
- Change in Direction, Rate, Amplitude, or Period – Changes in the nature or intensity of ambient coastal processes caused by the physical presence of a nearshore placement facility.

3.5 NEARSHORE BERM SITE SUMMARIES

Study results suggest that the nearshore berm sites may have a number of potential impacts on cultural, environmental, infrastructure, and physical resources.

Site summaries showing potential impacts to cultural, environmental, infrastructure, and physical resources from the nearshore placement sites are shown in Appendix A. Tables 3.4-1 through 3.4-3 summarize potential impacts at each of the sites, and suggest:

- Certain types of impacts are rarely or never expected. These include impacts to archaeological resources, terrestrial wildlife, mooring areas, navigation channels and shipping, ports, cable/power/utility crossings, commercial and industrial facilities, aquaculture sites, and existing dredged material disposal sites.

- Certain types of impacts are frequently or always expected. These include:

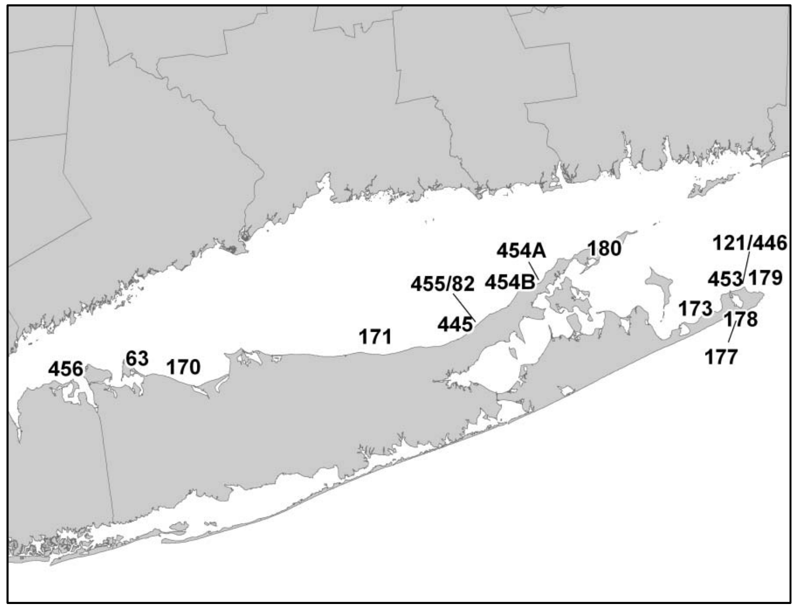
  - *Federal and State listed species habitat.* The frequency of potential impact is in part a function of the broad definition of these habitat areas, along with the project locations in the nearshore coastal zone where a number of listed species occur. As noted, the extent of impact for any particular site would be evaluated prior to construction with more detailed site-specific information on the occurrence and timing of these species in the area.
  - *Shellfish.* Shellfish are common in the nearshore coastal zone so many of the project footprints overlap with shellfish habitat. Site-specific information would be required to determine the occurrence of particular shellfish species at the proposed sites.
  - *Federally managed species habitat.* EFH is mapped for every section of LIS and habitat is mapped regionally rather than specifically for any species that could occur in the area. Therefore the projects evaluated always coincide with EFH. For any proposed project, the extent of impact would be evaluated using site specific information on the timing and occurrence of the species in the local EFH block.
  - *Marine Mammals.* Marine mammal impacts were almost always indicated because of the regional representation of marine mammal occurrence throughout LIS, coupled with the potential for harassment (noise, strikes etc) during construction on any project. The extent of impact expected from any proposed project would be evaluated on a site-specific basis.
  - *Coastal Structures.* Potential impacts to coastal structures are common in part because jetties, groins, and other hard structures are so common on beaches in LIS. Changes in sediment transport was considered to have a potential impact on structures (burial or scour), so most of the nearshore berm areas showed potential impact to coastal structures. The extent and effect of any such impact would be evaluated on a site-specific basis.
  - *Recreational Areas.* Potential changes in the size and configuration of beaches was considered a potential impact on a recreational area. This would be a positive change if the beach area was increased.

- Other types of impacts are sometimes expected some of the time. Examples include:
  - *Shipwrecks.* Approximately half the sites appear to have a potential impact on shipwrecks. There are many shipwrecks in the study area, and changes in sedimentation/erosion regime associated with construction or migration of nearshore berms was considered a potential impact to shipwrecks. The extent to which this represents a regulatory or physical problem at a given site would be evaluated using site-specific information.
  - *Historic Districts.* Six berm sites were located in the vicinity of historic districts. The extent to which the potential impacts would be likely for any given project would be evaluated on a site-specific basis.
  - *Wetlands.* About half of the berm sites are located in the vicinity of wetlands. Potential impacts from nearshore berms were noted if changes in the wave focusing and erosion/sedimentation patterns were expected.

Again, site-specific information would be necessary to evaluate the effect of any given project on wetlands.

- *Birds.* Impacts on birds were expected at about half of the nearshore berm sites simply because many shorebirds and other waterfowl co-occur with the project areas. Impacts associated with any given project would be evaluated on a site-specific basis.
- *Sediments*. Impacts to sediments were expected in about half the berm sites. Potential impacts were noted when the mapped sediment type was expected to be gravel or rocky, and placement of dredged material was expected to change the existing sediment type. The extent to which this would occur for any given project would be evaluated with site-specific information.
- *Submerged Aquatic Vegetation (SAV)*. Potential impacts to SAV were expected in just 5 of the berm sites. This is in part a result of the lack of SAV in the region, which in turn is related to the widespread loss of eelgrass in LIS over the past several decades. However, no SAV data were available for the Connecticut shoreline west of Westbrook. The effect of this data gap on expected SAV impacts is unknown and will need evaluation on a case-by-case basis.

Table 3.4-1. Summary of Potential Impacts for Candidate Nearshore Berm Sites in New York.



	Cultural Resources			Environmental Resources									Infrastructure Resources									Physical Resources			
	Shipwrecks	Historic Districts	Archaeological Sites	Wetlands	Federal & State Listed Species	Shellfish	Federally Managed Species (Magnuson-Stevens)	SAV	Marine Protected Areas	Birds	Marine Mammals	Terrestrial Wildlife	Mooring Areas	Navigation Channels & Shipping	Ports	Coastal Structures	Cable/power/utility crossings	Recreational Areas	Commercial & Industrial Facilities	Aquaculture	Dredged Material Disposal Sites	Sediments	Littoral Drift	Currents	Waves
New York																									
Berm 177 - Shadmoor State Park					X	X	X		X	X	X							X					X		X
Berm 178 - Camp Hero State Park					X	X	X		X	X	X							X					X		X
Berm 179 - Montauk Point State Park	X			X	X	X	X			X	X					X	X	X				X			X
Berm 121/446 - Gin Beach & Theodore Roosevelt County Park				X	X	X	X				X												X		X
Berm 453 - Lake Montauk Harbor	X		X	X	X	X	X	X			X							X							X
Berm 173 - Hither Hills State Park				X	X	X	X		X		X							X		X		X	X		X
Berm 180 - Orient Beach State Park				X	X	X	X	X	X	X	X					X		X		X		X	X		X
Berm 454A - Hashamomuck Cove County Road 48	X				X	X	X			X	X					X		X					X		X
Berm 454B - Hashamomuck Cove Kenney's Beach				X	X	X	X			X	X					X		X					X		X
Berm 455 / 82 - Mattituck Harbor 111 / Bailie's Beach				X	X	X	X			X	X														X
Berm 445 - Jamesport State Park	X		X	X	X	X	X			X	X					X		X					X		X
Berm 171 - Wildwood State Park				X	X	X	X		X	X	X					X		X					X		X
Berm 170 - Sunken Meadow State Park				X	X	X	X		X	X	X					X		X				X	X		X
Berm 63 - Asharoken Beach	X			X	X	X	X			X	X					X		X				X	X		X
Berm 456 - Bayville	X			X	X	X	X			X	X					X		X				X	X		X

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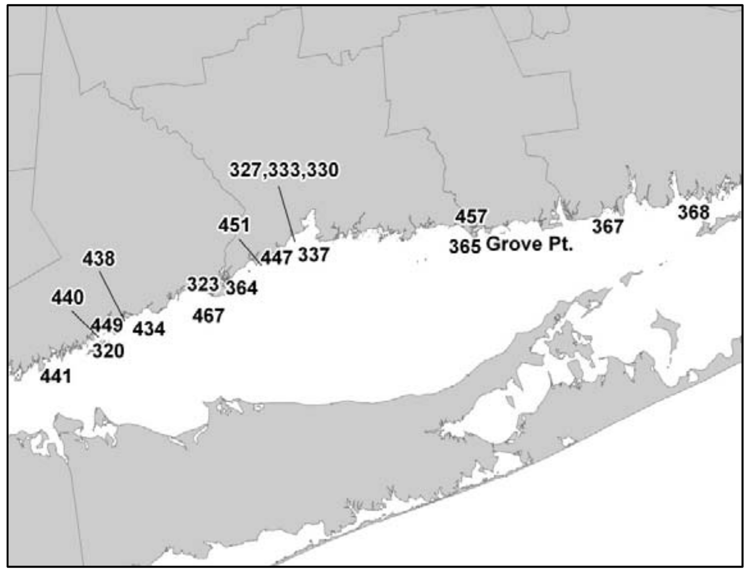
Table 3.4-2. Summary of Potential Impacts for Candidate Nearshore Berm Sites in Connecticut.



	Cultural Resources			Environmental Resources									Infrastructure Resources									Physical Resources			
	Shipwrecks	Historic Districts	Archaeological Sites	Wetlands	Federal & State Listed Species	Shellfish	Federally Managed Species (Magnuson-Stevens)	SAV	Marine Protected Areas	Birds	Marine Mammals	Terrestrial Wildlife	Mooring Areas	Navigation Channels & Shipping	Ports	Coastal Structures	Cable/power/utility crossings	Recreational Areas	Commercial & Industrial Facilities	Aquaculture	Dredged Material Disposal Sites	Sediments	Littoral Drift	Currents	Waves
Connecticut																									
Berm 441 - Cove Island Beach	X					X	X				X											X			
Berm 320 - Calf Pasture Beach	X					X	X				X											X			
Berm 440 - Compo Beach	X	X		X	X	X	X	X		X	X					X		X				X		X	X
Berm 449 - Sherwood Island State Park		X			X	X	X			X	X					X		X					X	X	X
Berm 438 - Burial Hill Beach					X	X	X			X	X					X		X					X	X	X
Berm 433 - Southport Beach	X	X			X	X	X			X	X					X		X					X		X
Berm 434 - Sasco Hill Beach	X	X			X	X	X			X	X					X		X				X	X		X
Berm 323 - Seaside Beach	X	X			X	X	X				X					X		X				X	X	X	X
Berm 467 - Long Beach	X				X	X	X		X	X	X					X		X					X		X
Berm 364 - Silver Sands State Park (west side only)					X	X	X		X	X	X					X		X					X		X
Berm 451 - Woodmont Shore Beach					X	X	X			X	X					X		X				X		X	X
Berm 447 - Prospect Beach					X	X	X			X	X					X		X				X	X	X	X
Berm 327 - Bradley Point Park						X	X			X	X					X		X						X	X
Berm 333 - Savin Rock						X	X				X					X		X						X	X
Berm 330 - Oak Street Beach						X	X			X	X												X	X	X
Berm 337 - Lighthouse Point Park Beach	X					X	X				X					X		X				X		X	X
Berm 457 - East Wharf Beach					X	X	X				X					X									X
Berm 365 - Hammonasset State Park					X	X	X		X	X	X					X		X			X	X	X		X
Berm - Grove Point Beach	X				X	X	X				X											X		X	
Berm 367 - Rocky Neck State Park					X	X	X	X		X	X					X		X				X			X
Berm 368 - Bluff Point State Park	X				X	X	X	X	X		X							X					X		X

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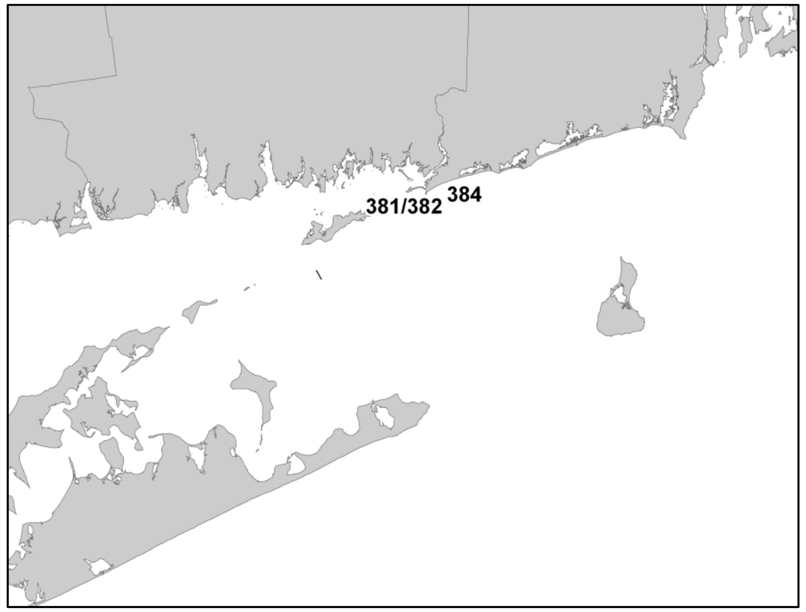
Table 3.4-3. Summary of Potential Impacts for Candidate Nearshore Berm Sites in Rhode Island.



	Cultural Resources			Environmental Resources									Infrastructure Resources									Physical Resources			
	Shipwrecks	Historic Districts	Archaeological Sites	Wetlands	Federal & State Listed Species	Shellfish	Federally Managed Species (Magnuson-Stevens)	SAV	Marine Protected Areas	Birds	Marine Mammals	Terrestrial Wildlife	Mooring Areas	Navigation Channels & Shipping	Ports	Coastal Structures	Cable/power/utility crossings	Recreational Areas	Commercial & Industrial Facilities	Aquaculture	Dredged Material Disposal Sites	Sediments	Littoral Drift	Currents	Waves
Rhode Island																									
Berm 381/382 - Watch Hill Beach /Napatree Point Beach	X	X			X	X	X				X					X	X	X					X		X
Berm 384 - Misquamicut State Beach	X				X	X	X				X					X		X					X		X

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4.0 SUMMARY AND CONCLUSIONS

The assessment of potential impacts demonstrates that for candidate nearshore berm sites:

- The total capacity of the nearshore berms evaluated in this report is 3,600,000 cubic yards, not including the possibility of multiple use cycles at active berms. The range of estimated volumes in the individual sites varies from 8,160 to 276,000 cubic yards.
- Among the nearshore berm sites evaluated, potential impacts to archaeological resources, terrestrial wildlife, mooring areas, navigation channels and shipping, ports, cable/power/utility crossings, commercial and industrial facilities, aquaculture sites, and existing dredged material disposal sites are rarely or never encountered;
- Among the nearshore berm sites evaluated, potential impacts to Federal and State listed species habitat, shellfish, Federally managed species habitat, marine mammals, coastal structures, and recreational areas are frequently or always encountered.

Comparison of impacts at the nearshore berm sites reveals areas with the least potential to adversely impact the surrounding resources. The impact matrices are also useful in identifying relative differences between the LIS sites evaluated. Site-specific assessments would be completed prior to construction of any nearshore berm, to further define the extent and magnitude of impacts to particular resources.

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APPENDIX A POTENTIAL NEARSHORE PLACEMENT SITES (ON CD)

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