APPENDIX C

SITE MANAGEMENT AND MONITORING PLAN FOR THE RHODE ISLAND SOUND DISPOSAL SITE

RHODE ISLAND REGION LONG-TERM DREDGED MATERIAL DISPOSAL SITE EVALUATION PROJECT

FINAL ENVIRONMENTAL IMPACT STATEMENT

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ATTACHMENTS

Attachment A: Hypotheses Flow Charts and Summary Table
Attachment B: Scow Log Sample

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ACRONYMS AND KEYWORDS

CAD	Confined Aquatic Disposal
CFR	Code of Federal Regulations
Corps	U.S. Army Corps of Engineers
Corps-NAE	U.S. Army Corps of Engineers, New England District
CPUE	Catch Per Unit Effort
CWA	Clean Water Act (Federal Water Pollution Control Act)
CY	cubic yards
CZM	Coastal Zone Management
DAMOS	Disposal Area Monitoring System
DDT	1,1,1-trichloro-2,2-bis(*p*-chlorophenyl)ethane
DEIS	Draft Environmental Impact Statement
DMSMART	Dredged Material Spatial Management Record Tool
DO	dissolved oxygen
EDC	Economic Development Corporation
EIS	Environmental Impact Statement
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ER-L	Effects Range-Low
ER-M	Effects Range-Median
ESA	Endangered Species Act
FDA	Food and Drug Administration
FEIS	Final Environmental Impact Statement
GPS	Global Positioning System
H’	Shannon-Wiener Diversity Index
J’	Evenness Index
LORAN-C	Low Frequency Hyperbolic Radionavigation and time reference system
MCY	million cubic yards
mg/L	milligrams per liter
mg/kg	milligrams per kilogram
MPRSA	Marine Protection, Research, and Sanctuaries Act of 1972
NAD83	North American Datum 1983
NAE	Corps New England District
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration

NRC	National Research Council
OSI	Organism Sediment Index
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
ppb	parts per billion
pptr	parts per trillion
psu	Practical Salinity Unit
QA	Quality Assurance
RHA	Rivers and Harbors Act
RICRMC	Rhode Island Coastal Resources Management Council
RIDEM	Rhode Island Department of Environmental Management
RIDOA	Rhode Island Department of Administration
RIDOT	Rhode Island Department of Transportation
RIM	Regional Implementation Manual
RIPA	Rhode Island Port Authority
RIR	Rhode Island Region
RIS	Rhode Island Sound
RISDS	Rhode Island Sound Disposal Site
ROD	Record of Decision
RPD	Redox Potential Discontinuity
SAIC	Science Applications International Corporation
SMMP	Site Management and Monitoring Plan
TOC	Total Organic Carbon
TSS	Total Suspended Solids
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service (Department of the Interior)
WRDA	Water Resources Development Act of 1992 (Public Law 102-580)
wt	weight

1.0 BACKGROUND

Maintenance of adequate navigation depth in the states' marine terminals, port facilities, and private marinas is vital to the economics of Rhode Island and southeast Massachusetts (referred to as the Rhode Island Region). Both commercial and recreational industries throughout the Rhode Island Region (RIR) rely on the utility of such areas. To ensure continued use, economic viability and safety of the region's navigational channels and navigation-dependant facilities, periodic dredging must be performed to remove accumulated sediment. Maintenance dredging in the RIR has become both difficult and costly due to the absence of a designated long-term ocean disposal site in the region. In an effort to ease the burden, the Governor of Rhode Island requested that the U.S. Environmental Protection Agency (EPA), in cooperation with the U.S. Army Corps of Engineers (Corps), consider the designation of a long-term dredged material disposal site in Rhode Island Sound (pursuant with the Marine Protection, Research, and Sanctuaries Act (MPRSA), 33 U.S.C. §§ 1401 *et seq.*). The EPA has selected Site W (Figure 1) in central Rhode Island Sound (RIS) as the preferred alternative to provide for the long-term needs of dredged material disposal in the Rhode Island Sound and southeastern Massachusetts regions. Site W is also the same location as Site 69B selected in the Providence River and Harbor Maintenance Dredging Project Final EIS (Corps, 2001a). Site W is hereinafter referred to as the Rhode Island Sound Disposal Site (RISDS). Dredged material from Federal and private projects of any size, that satisfy the requirements of the MPRSA and for which a permit for disposal is obtained, may be disposed of at the site (see Section 3.1). Prior to use of the site, each project must receive a permit issued by the U.S. Army Corps of Engineers (Corps) under Section 103 of the MPRSA, 33 U.S.C. §§ 1413 (hereafter cited as "MPRSA §103") with concurrence by the USEPA.

Management plans for designated ocean dredged material disposal sites are required pursuant to §102(c) of the MPRSA, as amended by §506(a) of the Water Resources Development Act (WRDA) of 1992. In accordance with MPRSA (section 103(a)) disposal activities at the site "will not unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities." The purpose of this Site Management and Monitoring Plan (SMMP) is to synthesize prior site monitoring results and outline a management plan and monitoring program for the proposed site that complies with the requirements of MPRSA.

The SMMP serves as a framework to guide the development of future project-specific sampling and survey plans created under the monitoring program. The data gathered from the monitoring program will be routinely evaluated by EPA New England Region, the Corps of Engineers New England District (NAE), and other agencies such as the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (FWS), and state regulatory agencies (see Section 9.0), to determine whether modifications in site usage, management, testing protocols, or additional monitoring are warranted. The SMMP will be reviewed on an annual basis and will be revised and updated as necessary.

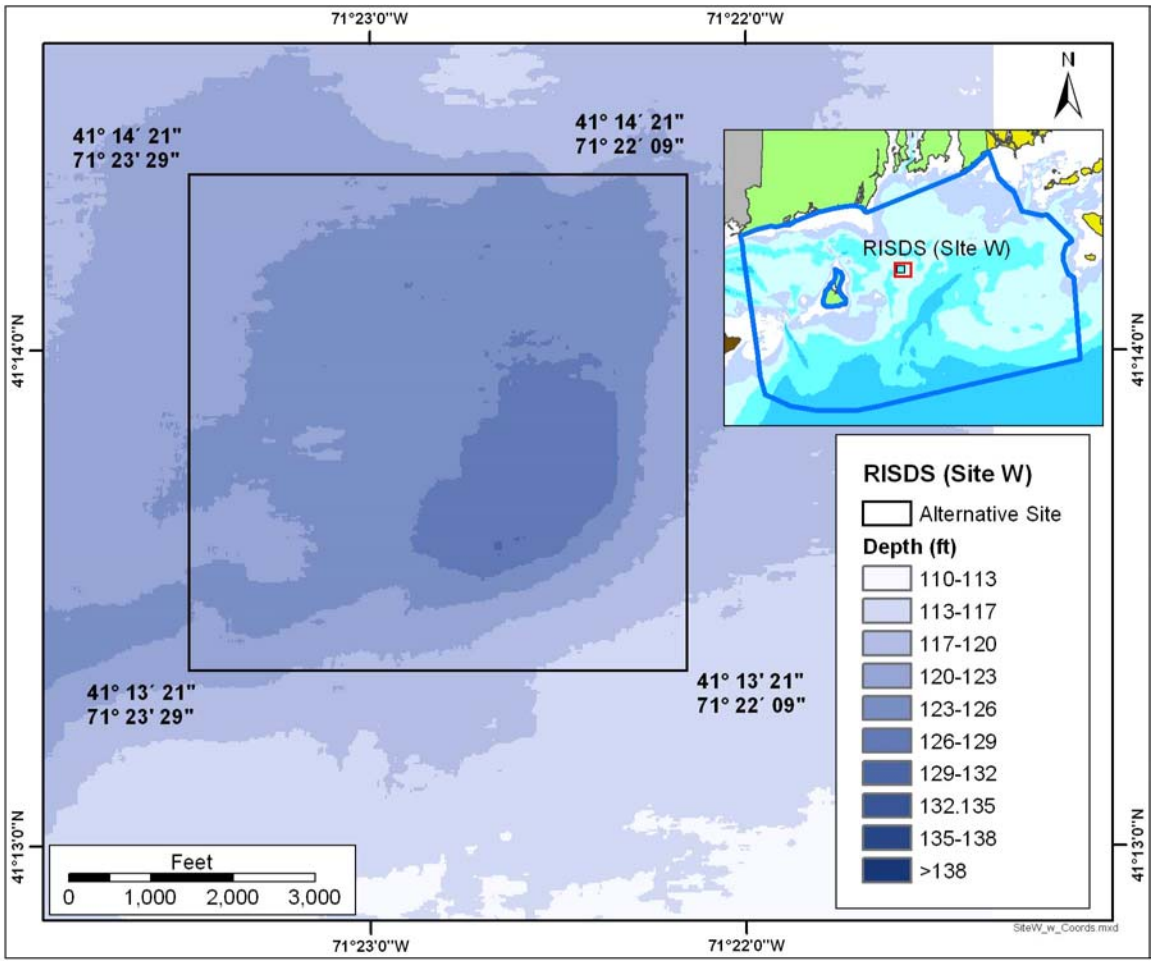

Figure 1. Location of the Rhode Island Sound Disposal Site (RISDS).

As discussed in the guidance for development of site management plans issued by EPA and the Corps ("Guidance Document for Development of Site Management Plans for Ocean Dredged Material Disposal Sites", February 1996), management of the disposal site involves: regulating the times, quantity, and physical/chemical characteristics of dredged material that is disposed at the site; establishing disposal controls, conditions, and requirements; and monitoring the site environment to verify that potential unacceptable conditions are not occurring from past or continued use of the disposal site and that permit terms are met. In addition, the plan also incorporates the six requirements for ocean disposal site management plans discussed in MPRSA § 102(c)(3), as amended. These are:

1. consideration of the quantity of the material to be disposed of at the site, and the presence, nature and bioavailability of the contaminants in the material [§102(c)(3) Section II C];
2. a baseline assessment of conditions at the site [§102(c)(3) Section III];
3. a program for monitoring the site [§102(c)(3) Section IV];

4. special management conditions or practices to be implemented at each site that are necessary for protection of the environment [§102(c)(3) Section V.A);
5. consideration of the anticipated use of the site over the long term, including the anticipated closure date for the site, if applicable, and any need for management of the site after closure [§102(c)(3) Section VI);
6. a schedule for review and revision of the plan (which shall not be reviewed and revised less frequently than 10 years after adoption of the plan, and every 10 years thereafter) [§102(c)(3) Section VII).

Dredging and disposal operations have been documented in the RIR since the 1920s. Dredging activities from the 1920s through the 1950s, were conducted as navigation projects or bridge construction work in the Mount Hope Bay and the Tiverton, Rhode Island areas, and the upper reaches of Narragansett Bay. Materials from these projects were placed at various locations in Narragansett Bay, Rhode Island. Prior to 1970, disposal activities occurred with less regulatory oversight and record keeping than today. In the late 1960s, the first disposal of dredged material in the waters of Rhode Island Sound took place at a location known commonly as the Brenton Reef Disposal Site (Saila *et al.,* 1969). The mound built by this early disposal was evaluated as Site 16 (Figure 2) in the Providence River and Harbor Maintenance Dredging Project Environmental Impact Statement (Corps, 2001a). Dredged material placed at the Brenton Reef Site originated from the Providence River and Harbor Navigation Project, several smaller projects from the Mount Hope Bay approach channels and berthing area of the New England Power Company's Brayton Point Plant (Corps, 1972), and Point Judith, Rhode Island (Pratt *et al.*, 1973). Disposal at the site was concluded by 1976.

Significant dredging in Rhode Island and southeastern Massachusetts did not occur over the next 25 years (see Section 1.1 of the DEIS, EPA, 2004). An attempt to designate a regional disposal site (Corps, 1982) and to dredge the Fall River navigation channel in Massachusetts was made in the early 1980s but failed due to the controversy over the perceived impacts of dredging and disposal (see Section 1.1 of the DEIS, EPA, 2004). More recently, the need to dredge the Providence River led to selection and approval of Site 69B (Separation Zone Site) (Figure 2) selected under the MPRSA Site Selection criteria as provided for in MPRSA Section 103.

The Record of Decision (ROD) for the Providence River and Harbor Maintenance Dredging Project was signed on March 18, 2002, and dredging was initiated in April 2003. Dredged material to be disposed of at Site 69B from this project consists primarily of material removed as a result of navigation channel maintenance (confined aquatic disposal [CAD] cell construction and maintenance material acceptable for ocean disposal) in the Providence River and determined to be acceptable for ocean disposal under the national and regional testing regulations (EPA and Corps, 1991; EPA and Corps, 2004). Site 69B is also Alternative W in the RIR Long-Term Dredged Material Disposal Site Evaluation Project EIS, now known as the Rhode Island Sound Disposal Site.

Table 1 summarizes the volumes and sources of dredged material disposed of or permitted for disposal seaward of the Territorial Sea baseline in Rhode Island Sound since 1967 and the disposal site location.

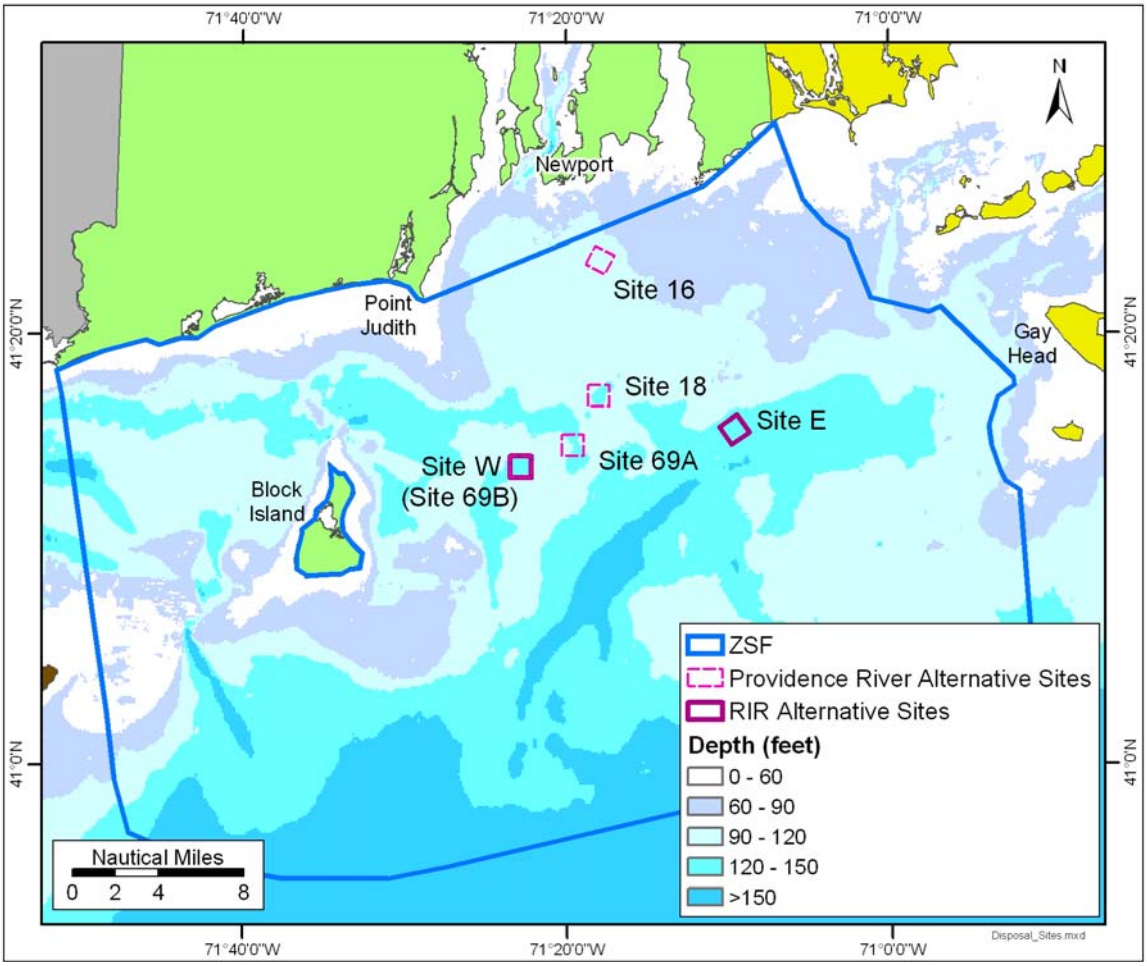

Figure 2. Open-Water Alternative Sites Evaluated Previously in the Providence River and Harbor Maintenance Dredging Project EIS and Currently in the RIR EIS.

2.0 SMMP OBJECTIVES

The intent of this SMMP is to provide a management framework and monitoring program (Section 6.0) that strives to minimize the potential for significant adverse impacts to the marine environment from dredged material disposal. To this end, the SMMP identifies actions, provisions, and practices necessary to manage the operational aspects of dredged material disposal at the RISDS. Section 40 CFR § 228.10(a) of the Ocean Dumping Regulations requires that the impact of disposal at a designated site be evaluated periodically. Section 40 CFR § 228.10(b) specifically requires consideration of the following types of potential effects when evaluating impact at a disposal site:

- Movement of materials into sanctuaries or onto beaches or shorelines [228.10(b)(1)];
- Movement of materials towards productive fishery or shellfishery areas [228.10(b)(2)];

Table 1. Disposal of Dredged Material in Rhode Island Region.

Disposal Site Location	Year(s) of Use	Volume/Type of Material	Source of Material
Site 16 (Brenton Reef)	1967 to 1970	~9 million cubic yards (MCY)[a] Dredged material[1]	Providence River and Harbor Navigation Project
Site 16 (Brenton Reef)	1970 to 1976	320,000 cubic yards (CY)[a] Dredged material[1]	New England Power Co. Brayton Point
Site 16 (Brenton Reef)	1970 to 1976	30,000 CY[a] Dredged material[1]	Point Judith, RI
Site 69B (Separation Zone Site)	2003 to 2008	5.05 MCY (authorized) Dredged material	2003 Providence River and Harbor Maintenance Dredging Project
Site 69B (Separation Zone Site)	2003 to 2008	0.55 MCY Dredged material	Private maintenance projects adjacent to Providence River and Harbor Maintenance Dredging Project

[a] Pratt, et al. 1973.
[1]Material was dredged prior to current testing requirements.

- Absence from the disposal site of pollutant-sensitive biota characteristic of the general area [228.10(b)(3)];
- Progressive, non-seasonal, changes in water quality or sediment composition at the disposal site when these changes are attributable to materials disposed of at the site [228.10(b)(4)];
- Progressive, non-seasonal, changes in composition or numbers of pelagic, demersal, or benthic biota at or near the disposal site when these changes can be attributed to the effects of materials disposed at the site [228.10(b)(5)];
- Accumulation of material constituents (including without limitation, human pathogens) in marine biota at or near the site (*i.e.,* bioaccumulation [228.10(b)(6)]).

The regulation 40 CFR Section 228.10(c) requires that a disposal site be periodically assessed based on the entire available body of pertinent data and that any identified impacts be categorized according to the overall condition of the environment of the disposal site and adjacent areas. Because knowledge and understanding of impacts resulting from dredged material disposal have advanced substantially over the past several decades, the monitoring approach defined in this SMMP focuses on those factors that provide an early indication of potential unacceptable effects and provides for further assessments should these early indicators suggest potential impact may be occurring. The plan also incorporates ongoing regional monitoring programs in the RIR that can provide additional information to inform the periodic assessment of impact, such as NMFS trawl surveys.

The specific objectives of this SMMP are:

- **Objective 1: To ensure site management practices and disposal options are sufficient to avoid significant degradation or endangerment to the environment.** Management of the disposal site involves 1) regulating the timing of disposal(s), quantity of material, and physical/chemical characteristics of dredged material placed at the site, 2) instituting disposal controls, conditions, and requirements that avoid or minimize potential impacts to the marine environment, 3) ensuring permit conditions are met, and 4) monitoring to verify that unanticipated or significant adverse effects are not occurring from use of the disposal site. The phrase "significant adverse impact" is inclusive of all significant or potentially substantial negative impacts on resources within site or its vicinity. Factors to be considered under this objective include:

    - Evaluation of compliance with MPRSA permit conditions and initiation of enforcement actions where warranted and as appropriate;
    - Provision of reasonable assurance that use of the site will not adversely affect beaches, shorelines, or productive fish and shellfish areas.

- **Objective 2: To ensure a monitoring program and data review process that evaluates whether disposal of dredged material at the site unreasonably degrades or endangers human health and welfare, the marine environment, or economic potentialities.** The factors to be evaluated under this objective include:

    - Biotic characteristics on dredged material mounds and nearby areas;
    - Progressive, non-seasonal, changes in water quality or sediment composition at the disposal site;
    - Progressive, non-seasonal, changes in composition or numbers of pelagic, demersal, or benthic biota at or near the site(s);
    - Accumulation of material constituents in marine biota near the site.

To achieve these objectives, the SMMP includes the following components:

- A baseline assessment of current conditions against which future monitoring results can be compared;
- A description of special management conditions to be applied;
- A plan for monitoring;
- A schedule for review and revision of the SMMP.

Recognizing and correcting any potential unacceptable condition before it causes any significant adverse impact to the marine environment or presents a navigational hazard to commercial and recreational water-borne vessel traffic is central to this SMMP. Therefore, the plan includes a monitoring program that uses a "leading indicator" approach to provide early evidence of unexpected responses as further described in Section 6.0. The identification of unacceptable impacts from dredged material disposal at the site will be accomplished in part through comparisons of the monitoring results to historical (*i.e.,* baseline) conditions, and in part through comparison to unimpacted nearby reference locations measured concurrently with site measurements. The timing of monitoring surveys and other activities will be governed by

funding resources, the frequency of disposal at the site, and the results of previous monitoring data.

If site monitoring data demonstrates that the disposal activities are causing unacceptable impacts to the marine environment as defined under 40 CFR § Section 228.10(b), the site managers may place appropriate limitations on site usage to reduce the impacts to acceptable levels. Such responses may range from withdrawal of the site's designation to limitations on the amounts and types of dredged material permitted to be disposed or limitations on the specific disposal methods, locations, or schedule.

3.0 SITE MANAGEMENT RESPONSIBILITIES AND AUTHORITIES

The RIS Disposal Site will be jointly managed by EPA and the Corps. An Interagency Regional Dredging Team, comprised of representatives from EPA, Corps, NMFS, USFWS, and Rhode Island and Massachusetts state representatives, meets approximately every six months in Sudbury, Massachusetts to discuss management and monitoring of New England dredged material disposal sites. This team could also provide recommendations on management of the RIS Disposal Site. Other meetings may be called in response to unusual physical events or unexpected monitoring observations. During these meetings, monitoring data will be evaluated and the SMMP will be revised as necessary depending on current conditions and available site-specific and scientific information.

3.1 FEDERAL REGULATORY/STATUTORY RESPONSIBILITIES

The primary authorities that apply to the disposal of dredged material in the U.S. are the Rivers and Harbors Act of 1899 (RHA), the Water Resources Development Act of 1992 (WRDA), the Clean Water Act (CWA) and MPRSA. The RHA regulates dredging and discharge of material in navigable waters and WRDA addresses research and funding in support of specific water resource projects for various needs (*i.e.,* transportation, recreation). It also modifies other Acts, as necessary (*e.g.,* MPRSA).

Section 404 of the Clean Water Act (33 U.S.C. Section 1344) governs the disposal of fill, including dredged materials, in waters of the United States within the three mile territorial sea. This applies to discharges landward of the baseline of the territorial sea and in instances seaward of the baseline when the intent is to fill or nourish beaches. The Section 404 permit program is implemented by the Corps and covers the discharge or placement of dredged or fill material into inland waters of the U.S. RISDS does not involve inland waters, as defined; therefore, the Section 404 permitting process does not apply to disposal at this site.

Under Section 103 of MPRSA, the Corps is assigned permitting responsibility for dredged material, subject to EPA review and concurrence that the material meets applicable ocean disposal criteria. The Corps is required to use EPA designated open-water disposal sites for dredged material disposal to the maximum extent feasible. If EPA designated sites are not feasible, the Corps may select an ocean disposal site and it may be used for two, 5-year periods. Section 33 of the Code of Federal Regulations (CFR) Part 336 describes the factors to be

considered in the evaluation of dredging projects that involve discharge of dredged material into waters of the United States and ocean waters (MPRSA waters).

Section 307 of the Coastal Zone Management (CZM) Act of 1972 requires that Federal agencies proposing activities within or outside the coastal zone, that affect any land or water use or natural resource of the coastal zone, ensure that those activities are conducted in a manner which is consistent to the maximum extent practicable, with the enforceable policies of approved State coastal management programs. As part of the National Environmental Policy Act (NEPA) process, EPA prepared a Federal determination of consistency with State approved Coastal Zone Management Programs.

Additionally, EPA obtained concurrence for the RIS Disposal Site from the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) regarding an Endangered Species Act Section 7. The NMFS and USFWS concurrence confirmed that the selection of RISDS will not adversely affect threatened or endangered species or adversely modify critical habitat. EPA also coordinated with NMFS to ensure that essential fish habitat (EFH) issues were considered and addressed.

3.2 SURVEILLANCE, ENFORCEMENT, AND MONITORING

All dredging, dredged material transport, and disposal must be conducted in compliance with the permits issued for these activities. To ensure compliance, the MPRSA provides for both surveillance and enforcement. The Corps and EPA share surveillance and enforcement responsibilities at the disposal site. The U.S. Coast Guard may also assist with such surveillance (See 33 U.S.C. Sec 1417[c]). The permittee is responsible for ensuring compliance with all project conditions including placement of material at the correct location and within applicable site use restrictions. Both the Corps and EPA have enforcement authority under MPRSA. The EPA and the Corps will cooperate to ensure effective enforcement of permit violations.

The Corps and EPA also share responsibility for monitoring of the site. Monitoring data may be generated by the agencies or through coordination or use of data gathered under other programs. Monitoring data from other agencies will be utilized as appropriate to maximize the availability of information at the site. The Corps Disposal Area Monitoring System (DAMOS) Manager will direct the disposal of dredged material at the site. EPA will lead the evaluation of these data for potential impacts from disposal. Under MPRSA, EPA has the responsibility for determining if an unacceptable impact has occurred as a result of dredged material disposal at the site. However, such determinations will be made in consultation with other agencies and be based on available monitoring data. The Corps and EPA share responsibility for developing any necessary mitigation plan. EPA is responsible for determining any modification to site use or de-designation.

As in the past, disposal will continue to be practiced using a grid system on a case-by-case basis, in addition to a taut-wire buoy or specified coordinates, to ensure that disposal locations are known and that post-disposal monitoring is effective. On-board inspectors will be used by the Corps for all disposal activities at RISDS to ensure compliance with this policy. These

inspectors will be trained and certified by the Corps specifically for the dredged material disposal program.

Prospective inspectors are required to submit their qualifications to the Corps prior to being approved for training. Every inspector must have basic knowledge of seamanship, which includes shipboard navigation equipment, buoy identification and the ability to chart location using whatever navigation equipment is available on board. Many of the existing disposal inspectors hold Master's licenses or are merchant marine academy graduates. All inspectors must have a basic understanding of the Corps Regulatory Program, especially permit and enforcement requirements. This information is provided in a Corps disposal inspector certification training session that all inspectors are required to attend and also included in an Inspector's Manual provided during the training.

Communication is an essential part of the inspector's duties. This includes coordination with the permittee, the dredging and towing contractors, and the New England District's headquarters office in all instances where problems arise. Disposal activities will not generally be performed during poor sea conditions. Inspectors have been issued specific guidance on disposal under these conditions ("Guidance for Inspectors on Open-Water Disposal of Dredged Material, Corps NAE, January 1996).

The inspector must carefully review and fully understand the specific details of the project to be inspected before embarking on a trip to the disposal site. Before leaving for the disposal site, the inspector must understand the exact location of the specified disposal point for the specific project. The inspector must also know the planned route that will be taken from the dredging area to the specified disposal point. The inspector must be alert at all times and ensure the route on charts is followed during the trip to make certain the disposal operation is accomplished as planned. Unusual events during the trip that affect the disposal of the dredged material must be reported on the scow logs. An example of this would be discharge of the material at a location other than that specified.

The inspector must complete an Inspector's Daily Report of Disposal by Scow (scow log; see Attachment A) for each and every disposal trip. The inspector must send the original of the scow log to the Corps' disposal inspection program manager within one week of the date of the disposal trip. The inspector, not the permittee, must also submit a monthly report to NAE, Regulatory Division, Policy Analysis and Technical Support Branch for each month the inspector performs disposal inspections. The monthly report includes permittee name, permit number, trip dates and estimated cubic yards discharged. At the completion of a dredging project, either final or seasonal period, the permittee must submit to the Corps' disposal inspection program manager the completion report form. The form is included with the letter authorizing the initiation or continuation of open-water disposal at the disposal site.

If any apparently illegal disposal-related activity is discovered or is about to occur, the inspector must advise the responsible party of the requirements for proper disposal, the apparent violation, and the possible legal ramifications that could ensue should the action occur. Any instances of non-compliance observed by the inspectors must be reported to the Corps within 24 hours and in

writing to both the Corps and EPA within five working days of the observed violation. Both agencies will cooperate to ensure effective enforcement of all disposal requirements. Section 105 of the MPRSA gives authority to EPA to enforce permit conditions. Egregious violations of permit conditions may be referred by the Corps or EPA to the Department of Justice for criminal prosecution. Illegal disposal can lead to penalties that include revocation or suspension of the permit as well as fines of up to $50,000 and imprisonment for one year. Penalties for violations of the Ocean Dumping Act can be even more severe. The inspector is required to inform the captain of the requirements concerning disposal and to report to the Corps what occurred. This report must be made immediately from the vessel itself or as soon as possible after the event is observed.

Monitoring surveys at and near the site will be conducted periodically as available funding permits. The monitoring objective for each survey will be based on prior monitoring results and recommendations of the Interagency Regional Dredging Team , in consultation with Rhode Island Departments of Environmental Management (RIDEM), Transportation (RIDOT), and Administration (RIDOA), the Rhode Island Coastal Resources Management Council (RICRMC), the Rhode Island Port Authority (RIPA), the Economic Development Corporation (EDC), the Port of Providence, the Governor's Policy Office, the Massachusetts Office of Coastal Zone Management (CZM), the Massachusetts Division of Marine Fisheries (DMF), and the Massachusetts Department of Environmental Management (DEM).

4.0 MANAGEMENT APPROACH

Dredged material disposal at the disposal site will be authorized under MPRSA Section 103 and the site will be managed in a manner that ensures the following site management goals are met:

- Ensure and enforce compliance with permit conditions;
- Minimize loss of sediment from the disposal site;
- Minimize conflicts with other uses of the area;
- Maximize site capacity;
- Minimize environmental impact from sediments placed at the site;
- Recognize and correct conditions before unacceptable impact occurs.

The practices that will be applied to address these management goals at the disposal site include coordination among Federal and state agencies, testing of material for acceptability for disposal at the site, review of general and specific permit conditions, review of allowable disposal technologies and methods, implementation of inspection, surveillance and enforcement procedures, periodic environmental monitoring at the site and at relevant reference sites for comparative evaluation, and information management and record keeping.

4.1 MANAGEMENT PRACTICES

EPA and the Corps will jointly manage the disposal site. The effectiveness of the management approach depends on having efficient planning processes, consistent compliance and enforcement, a robust yet flexible monitoring plan, and an effective communication structure that

includes timely receipt and review of information relevant to the site management goals. One component of this communication structure will be an Interagency Regional Dredging Team meeting, convened by EPA, to review the SMMP with respect to current information and conditions as well as scientific advancements.

Management of the site will include the following practices for the disposal site:

- Evaluation of the suitability of material for disposal, conducted in accordance with the applicable requirements for the specific type of project (i.e., MPRSA), is determined through the Regional Implementation Manual (RIM) (EPA and Corps, 2004);
- Specification of disposal conditions, location, and timing in permits as appropriate (e.g., to ensure that dredging windows for fisheries are met or disposal may be restricted during spring tides to ensure that water quality criteria are not exceeded outside the boundaries of the site);
- Enforcement of all permit conditions;
- Use of a grid system for the disposal of dredged material on a case by case basis
- Use and maintenance of disposal buoys at the site with disposal specified to occur at the buoy or designated coordinate;
- Positioning disposal buoys each year with the intent to create bowl-like features on the seafloor;
- Use of disposal inspectors or electronic vessel tracking or both to record all disposal events;
- Building disposal mounds to no shallower than 105 feet below mean low water;
- Conducting disposal site monitoring in a consistent, systematic manner;
- Holding technical advisory panel meetings for the monitoring program, as needed;
- Specification of de-designation (*i.e.,* closure) conditions and dates.

In addition, special management practices may exist at the site for individual projects to improve site management, anticipate future disposal requirements, or improve the conditions at the site. Examples include:

- Specification of the dredged material volume that can be placed at specific locations within the site or the total dredged material volume placed in the site;
- Modifications to the site designation or to disposal methods, locations, or time of disposal;
- Monitor mounds on a rotating basis as determined during annual planning meetings.

In addition to management practices for the disposal site and individual projects, the SMMP must also include a monitoring plan (as described in detail in Section 6.0) and a coordination/outreach component. Coordination and outreach will be continuous and include state and Federal agencies, scientific experts, and the public. To ensure communications are

appropriate and timely, site management activities and monitoring findings will be communicated through many mechanisms: scientific reports, peer reviewed publications, participation in symposia, the Corps and EPA websites, public meetings, and fact sheets.

4.2 TESTING REQUIREMENTS

National guidance for determining whether dredged material is acceptable for open-water disposal is provided in the Ocean Testing Manual (Green Book; EPA and Corps, 1991). The RIM (EPA and Corps, 2004), consistent with the Green Book, provides specific testing and evaluation methods for dredged material disposal projects in New England. Any updates and revisions will take precedence at the time of notification by the agencies.

These guidance documents are consistent in their application of test procedures used to determine acceptability for MPRSA 103 projects. The testing requirements are the same regardless of statute under which the material will be managed and each project is evaluated on a project-by-project basis. However, management of the material may differ depending on the regulations under which it is disposed. All projects that propose to use RISDS for disposal of dredged material must adhere to the guidance documents or superceding versions of these documents.

4.3 DISPOSAL CONDITIONS, LOCATION, AND TIMING

The following list represents special conditions that will be applied to projects using RISDS for disposal. These conditions may be modified on a project-by-project basis, based on factual changes (*e.g.,* administrative changes in phone numbers, points of contact) or when deemed necessary as part of the individual permit review process.

1. At least ten working days in advance of the start date, the First Coast Guard District, Aids to Navigation Office (617-223-8356) shall be notified of the location and estimated duration of the dredging and disposal operations.
2. At least ten working days in advance of the start date, the Coast Guard Marine Safety Office (617-223-3000) shall be notified of the location and estimated duration of the dredging and disposal operations.
3. Every discharge of dredged material at the disposal site must be witnessed by an onboard inspector who has been trained by, and who holds a current certification from, the Corps NAE. The disposal inspector shall be contracted and paid for by the permittee. A list of currently certified inspectors can be obtained from the New England District Regulatory Division at 978-318-8292. The inspector will require that all permit conditions and other special requirements are followed as applicable.
4. For the initiation of disposal activity and any time disposal operations resume after having ceased for one month or more, the permittee or the permittee's representative must notify the Corps NAE. Notification must be made at least ten working days before the date disposal operations are expected to begin or resume by contacting the Corps Policy Analysis and Technical Support Branch at 978-318-8292. The information to be provided in this notification is: permit number, permittee name,

name and address of dredging contractor, estimated dates dredging is expected to begin and end, name of disposal inspector, name of the disposal site and estimated volume of material to be dredged. Disposal operations shall not begin or resume until the Policy Analysis and Technical Support Branch issues a letter authorizing the initiation or continuation of open-water disposal. The letter will include disposal-point coordinates to use for this specific project at that time. These coordinates may differ from those specified for other projects using the same disposal site or even from those specified earlier for this project. It is not necessary to wait ten days before starting disposal operations. Disposal operations may start as soon as this letter is issued.

5. The permittee shall ensure that a separate Corps disposal inspection report (scow log; see Attachment B) is fully completed by the inspector for every trip to the disposal site and that this report is received by the Corps NAE within one week of the trip date. The Regulatory Division telefax number is 978-318-8303. The original of this report must be mailed to: U.S. Army Corps of Engineers, Regulatory Division, Policy Analysis and Technical Support Branch, 696 Virginia Road, Concord, MA 01742-2751. For each dredging season during which work is performed, the permittee must notify the Corps upon completion of dredging for the season by completing and submitting the form that the Corps will supply for this purpose when disposal-point coordinates are specified.
6. Except when directed otherwise by the Corps DAMOS Program Manager, all disposal of dredged material shall adhere to the following: The permittee shall release the dredged material at a specified buoy or set of coordinates within the disposal site. All disposal is to occur at the buoy or specified coordinates with the scow at a complete halt. The Corps will provide buoys and the coordinates. This requirement must be followed except when doing so will create unsafe conditions because of weather or sea state, in which case disposal within 150 feet of the buoy or specified coordinates with the scow moving only fast enough to maintain safe control (generally less than one knot) is permitted. Disposal is not permitted if these requirements cannot be met due to weather or sea conditions. In that regard, special attention needs to be given to predicted conditions prior to departing for the disposal site.
7. EPA and the Corps (and/or their designated representatives) reserve all rights under applicable law to free and unlimited access to and/or inspection of (through permit conditions): 1) the dredging project site including the dredge plant, the towing vessel and scow at any time during the course of the project; 2) any and all records, including logs, reports, memoranda, notes, etc., pertaining to a specific dredging project (Federal or non-Federal); 3) towing, survey monitoring, and navigation equipment.
8. If dredged material regulated by a specific permit issued by the Corps or Federal authorization is released (due to an emergency situation to safeguard life or property at sea) in locations or in a manner not in accordance with the terms or conditions of the permit or authorization, the master/operator of the towing vessel and/or the Corps Disposal Inspector shall immediately notify the Corps of the incident, as required by

permit. In addition, both the towing contractor and the Corps-certified disposal inspector shall make a full report of the incident to the Corps and EPA within ten (10) days. The report should contain factual statements detailing the events of the emergency and an explanation of the actions that were ultimately taken.

4.4 ALLOWABLE DISPOSAL TECHNOLOGIES AND METHODS

Dredging and dredged material disposal in Rhode Island Sound has historically been accomplished using a bucket dredge to fill split hull or pocket scows for transport to the disposal site. Typically, 1,000-6,000 CY vessels are used but allowable size is not specified by EPA or the Corps. The volume of material allowed in a barge may be restricted depending upon the results of the ADDAMS Model for any given dredging project.

4.5 MODIFICATIONS TO DISPOSAL PRACTICES AND THE SITE

Based on the findings of the monitoring program (Section 6), modifications to the site use may be required. Corrective measures such as those listed below, but not limited to, may be developed by EPA New England Region and the Corps NAE.

- Stricter definition and enforcement of disposal permit conditions;
- Implementation of more conservative judgments on whether sediments proposed for dredging are suitable for open-water disposal;
- Implementation of special management practices to prevent any additional loss of sediments to the surrounding area;
- Excavation and removal of any unacceptable sediments from the disposal site (an unlikely, worst case scenario given that the permitting program should exclude such material from the site to begin with, and since excavation could make matters worse by releasing contaminants during the process);
- Closure of the site as an available dredged material disposal site (*i.e.,* to prevent any additional disposal at the site).

4.6 OTHER MANAGEMENT CONSIDERATIONS

In addition to the management practices outlined in Section 4.1, other management considerations may be determined on a project by project basis through consultation with the NMFS and the USFWS, and coordination with other state and Federal agencies. These may include the following:

- Use of marine mammal observers during disposal operations;
- Establishment of dredging windows;
- Compliance with Essential Fish Habitat (EFH) recommendations;
- Endangered Species Act (ESA) concerns.

Any changes to special permit conditions may be discussed at the Interagency Regional Dredging Team meeting.

5.0 BASELINE ASSESSMENT

MPRSA 102(c)(3)(A) as amended by WRDA 92 requires that the SMMP include a summary of baseline conditions at the site. Much of the information provided in this section is based on surveys conducted in support of the site designation DEIS (EPA, 2004) and disposal site monitoring for the Providence River and Harbor Maintenance Dredging Project. Baseline conditions are defined as the conditions existing at the time data to support the Final EIS (FEIS) were developed[1]. This section includes a general characterization of the site followed by a description of current disposal at the site including information on the dredged material disposal mounds in the site.

5.1 SITE CHARACTERIZATION

Physical, chemical, and biological environment at the site are summarized in this section.

5.1.1 Site Location

The RISDS is located in central Rhode Island Sound. The site is a 1-nmi^2 square with its center at 41˚ 13' 51'"N and 71˚ 22' 49"W (NAD 83) (see Figure 1) is located approximately 9 nmi south of Point Judith and roughly 6.5 nmi due east of Block Island. RISDS is located over a historic topographic depression, where the maximum water depth is about 130 ft. Water depths of the surrounding area are between 110 and 118 ft to the north, east, and south of the site. The southeastern portion of the site shoals more rapidly than the northern area. RISDS (also referred to as Site 69B) is currently being used as the disposal location for the Providence River and Harbor Maintenance Dredging Project.

5.1.2 Reference Areas

The baseline assessment activities conducted at RISDS as part of the Final EIS study (Section 3.0 Affected Environment) also sampled areas adjacent to the site (Area W; EPA, 2004). Seven stations located around the periphery of the site were sampled in 2001, and 10 stations located west and north of the site, were sampled in 2003 for infauna and sediment characteristics. Sediment profile images were obtained from 9 and 20 stations within these areas during 2001 and 2003, respectively. Similarly collected samples have been gathered from other sites in Rhode Island Sound (Site 18, Site 69A, Site E; see Figure 2) in 2001 or 2003.

Site 69A, with center coordinates at 41º 14' 51"N 71º 19' 36"W, will serve as a potential reference area. The precise location of the reference area could shift depending upon whether siltier or sandier material is needed for comparison. Additional reference sites may also be selected including areas adjacent to the site.

[1] This information will be updated as necessary based on any new information presented in the FEIS.

5.1.3 Physical Characteristics

Bathymetric surveys of RISDS have shown that the original site encompassed a topographic depression with water depths around the boundary of the site generally about 120 ft and depths within the depression about 130 ft. The water depth in RISDS ranges from 115 ft in the southeast corner to 128 ft in the depression. This depth range places Sites W in the depth range determined by the sediment transport model to correspond to an area of occasional sediment transport and reworking.

Multi-beam imagery data indicate that the original sea floor at RISDS (prior to April 2003), consisted of various types of sediments ranging from glacially derived till to soft, silty sand (Table 2). Sediments along the northern and eastern boundaries and in the southeast corner tended to be a mixture of fine sands, whereas the northern area has some hard-bottom areas interspersed with fine sands, which correspond to shallower depths. Very fine rippled sand occurs at the southernmost stations within the site. The rippled sand corresponds to shallower depths and higher near-bottom energy regimes, which are near or outside the 120-ft depth contour. In the deeper central portion of the site, the sediments tend toward very fine sand mixed with silt-clay and an unconsolidated soft bottom, suggesting a depositional environment in the hollow. Outside of RISDS, the sediments consist of coarse-grained glacial sediment made up of gravel, till, and coarse sand to the north (shallower depths) and softer sediment (sand and silt) to the southwest (deeper depths). The TOC content of the natural sediments is very low (<1%) throughout the site (Table 2).

Since April 2003, dredged material from the Providence River and Harbor Maintenance Dredging Project has been placed along the western boundary of the site to build a low berm that is up to two meters above the natural seafloor bathymetry (Figure 3-5 of SAIC report; Corps, 2004a) with a width of 6-200 m. This low berm is composed primarily of glacial tills, cobbles, sands, clays to silt/clays from material excavated from the CAD cells (Corps, 2004a). As the project proceeds, maintenance dredging material that is primarily fine-grained estuarine sediment, will be deposited to the east of the excavated CAD cell material and within the shallow depression in the site.

Table 2. Average Grain Size and TOC Content for Sediment Samples from RISDS and the Nearby Area.

Parameter	RISDS[1]	Adjacent Area[2]	Area West and North[3]
Gravel (%)	12	7	8
Sand (%)	75	86	63
Fines (%)	13	7	30
TOC (%)	0.4	0.2	0.5

[1] Nine sediment stations sampled in 2001; average of values shown.
[2] Seven reference stations sampled in 2001; average of values shown.
[3] Ten reference stations sampled in 2003; average of values shown.

Currents: No long-term current measurements are available from within RISDS, or from its vicinity. Short-term measurements are available from a 1-month current meter deployment in the fall of 1999 (Corps, 2001b) and a 2-month deployment in April and May 2002 (Corps, 2003a).

The dominant tidal flow directions are northwest and southeast, with the narrow ellipses indicating little flow perpendicular to the dominant flow direction. The amplitude of the tidal velocity decreases with depth (Table 3). The surface tidal amplitude was 12.7 cm/s and the near-bottom amplitude was 7 cm/s. Based on these data, only 40 percent to 50 percent of the current variance during the 2-month late-spring deployment period is attributable to the tide. The remainder is caused primarily by wind stress and atmospheric pressure gradients associated with storms.

Table 3. Tidal Ellipse Parameters for Near-bottom, Middle and Surface Currents Measured in RISDS, April–May 2002.

Layer	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Inclination (deg)	Phase (deg)	Major Axis % Tidal Variance	Minor Axis % Tidal Variance
Surface	12.7	2.0	135	25	50.4	34.8
Middle	11.2	0.9	131	29	43.1	58.7
Near-Bottom	7.0	2.4	143	5	48.8	58.6

Source: Corps, 2004b

Near-surface currents recorded at RISDS reached as high as 60 cm/s flowing toward the south. Currents this strong, however, were infrequent, with current speeds greater than 30 cm/s occurring four percent of the time. Surface currents tend to be much stronger because of the effect of the wind stress on the surface layer. Throughout the rest of the water column, the maximum currents were only 30 cm/s and occurred very infrequently. Velocities of 30 cm/s occurred two percent of the time at mid-depth and 0.2 percent of the time near the bottom. Currents greater than 20 cm/s occurred approximately 10 percent of the time at mid-depth and 0.6 percent of the time near the bottom. The mean current velocity for the station was 2.5 cm/s directed toward the west at mid-depth and 1.6 cm/s toward the west near-bottom.

Waves: No wave measurements are available at or near RISDS, but the site can be expected to experience a wave climate similar to that of Rhode Island Sound in general. However, because of differences in fetch, wave climatology may vary somewhat from the general pattern. The exposure of RISDS to winds and waves from the southwest is partly blocked by the presence of Block Island, including the island itself and its surrounding bathymetry. The results from the 10-year wave model hindcast at RISDS for storms of different frequencies or occurrence indicate that RISDS will experience wave heights of about 9 feet during storms with a frequency of occurrence of about 5 percent (Table 4).

Table 4. Wave Height and Period at RISDS for Storms of Various Frequencies of Occurrence.

Storm Frequency of Occurrence	Estimated Wave Height [1] (ft)	Estimated Wave Period (seconds)
5%	8.9	6.6
1%	13.4	9.0
0.2%	15.1	14.2

[1] Wave heights are reported as significant wave height, which is the average of the one-third highest waves.

5.1.4 Sediment Quality

Concentrations of total organic carbon (TOC) were very low (0.4 percent) in the ambient (native) surface sediments from RISDS and were correlated with grain size (Table 2). Concentrations of total polycyclic aromatic hydrocarbons (PAHs) (Table 5) correlated well with grain size and TOC content, with lower concentrations found in sandier sediments which have low TOC content. Higher concentrations were found in finer sediments having higher TOC content. Metals concentrations (Table 5) were consistent with TOC content (more TOC correlated with greater metals concentrations), but not with grain size material. Sediments from RISDS contained slightly higher concentrations of metals than sediments with smaller amounts of fine material (<15 percent fines). The correlation between metals concentrations and sediment grain size was stronger in sediments located adjacent to RISDS. For example, concentrations of some chemicals (e.g., total PAH, copper, and mercury) were higher in sediments located to the west of RISDS, which typically had higher amounts of fines and TOC. Concentrations of chemicals found in the RISDS natural sediments were well below established sediment quality benchmarks (i.e., National Oceanic and Atmospheric Administration [NOAA] Effects Range-Low [ER-L] and Effects Range-Median [ER-M] values).

The material being placed in the site from the Providence River and Harbor Maintenance Dredging Project ranges in grain size and TOC content. Typically, the sandy gravel material is low in TOC while fine-grained maintenance material will have high TOC. Data collected through September 2003 found a range of sediment type within the deposited dredged material from silty-sand to cohesive white clay and black sulfidic mud.

No toxicity tests have been conducted on original sediments from RISDS due to the low levels of contaminants.

Table 5. Summary of Metals and Total PAH Concentrations in Sediment Samples from and Near the RISDS in Rhode Island Sound.

Parameter	Surface Sediment (top 1 inch)					
	RISDS (a)		Adjacent to RISDS (n=10)		Rhode Island Sound (b)	
	Range	Mean	Range	Mean	Range	Mean
Organic Chemicals (ppb dry wt)						
Total PAH	5.62 to 25.1	18.4	14.9 to 821	235	5.05 to 407	137
Metals (ppm dry wt)						
Aluminum	7550 to 39700	25800	22200 to 50100	38800	7550 to 45600	34300
Chromium	10.9 to 36.4	24.9	ND to 54	30.4	8.59 to 43.2	26.2
Copper	2.8 to 7.69	5.16	6.3 to 52.5	18.4	2.16 to 19	8.01
Lead	2.69 to 17.5	13	12.4 to 33.3	18.8	2.69 to 21.7	15.7
Mercury	ND to 0.009	0.006	0.009 to 0.082	0.033	0.003 to 0.051	0.019
Nickel	3.87 to 14.6	8.57	ND to 16.6	10	2.94 to 14.6	8.27
Zinc	4.37 to 50	28.7	25.6 to 75.9	46.1	4.37 to 50	31.4

ND = Not detected.

5.1.5 Water Column Characteristics/Circulation

Studies conducted within RISDS in 2001 and 2002 (Corps, 2002a; Corps, 2002b; Corps, 2003a) gathered physical and chemical information about the water column (i.e., temperature, salinity, turbidity, DO), including concentrations of organic and inorganic contaminants. When compared to similar data collected elsewhere within Rhode Island Sound, the water quality at RISDS was found to be consistent with and representative of the water quality of Rhode Island Sound in general.

Within Rhode Island Sound, salinity is generally constant, ranging from approximately 31 to 33 practical salinity units (psu) with the lower values occurring in the surface waters. Surface water temperatures in the summer may range from 20 to 23 °C and can be as low 3 °C or less in the winter. During the summer, temperatures near the bottom can be several degrees cooler than those at the surface as the thermocline intensifies and deepens. Most turbidity (water clarity) measurements for Rhode Island Sound have been based on total suspended solids (TSS), expressed as or the concentration of particulate matter in the water. Measurements from 2001 and 2002 (Corps, 2002a; Corps, 2002b) were within the range of historical values (Table 6). These values, which are spatially consistent across different areas in Rhode Island Sound, indicate that the water column within the region is generally clear. Recent measurements of dissolved oxygen (DO) concentrations in surface waters within Rhode Island Sound ranged from 7.2 mg/L in October 2001 to 10.8 mg/L in December 2002 (Corps, 2002a; Corps, 2002b), well above the Rhode Island DO water quality criterion for SA waters (6.0 mg/L) (RIDEM, 2000).

DO concentrations in water near the seafloor are often lower than those in surface waters because oxygen is consumed as organic matter decays.

Table 6. Water Column Turbidity in Rhode Island Sound.

Study	TSS
Pratt and Heavers, 1975	0.1 – 7.4 mg/L
Collins, 1976	0.23 – 1.61 mg/L
Pilson and Hunt, 1989	0.33 – 3.79 mg/L
Corps, 2002a	0.51 – 1.42 mg/L
Corps, 2002b	0.28 – 1.26 mg/L

Data on water-column contaminant levels in Rhode Island Sound are limited. Organic contaminants (polychlorinated biphenyls [PCBs] and pesticides) were measured in October 2001 and May 2002 in support of this Draft EIS and were generally below method detection limits (Corps, 2002a; Corps, 2002b). For example, total PCB concentrations were less than 46 parts per trillion (pptr), and total DDTs were less than 4 pptr. Recent measurements of water-column dissolved metals concentrations in Rhode Island Sound were also low (Table 7) (Corps, 2002a; Corps, 2002b). Dissolved metal concentrations appeared similar throughout the year and throughout Rhode Island Sound. The distribution of dissolved metals within the water column varies with depth (higher in surface waters) because of the presence of the vertical salinity gradient in Rhode Island Sound during the spring and summer. When this gradient is present, surface waters are less saline than bottom waters. Because concentrations of metals tend to be higher in freshwater than in marine water, surface waters tend to have slightly greater metal concentrations than found in higher-salinity bottom waters.

Table 7. Concentrations of Dissolved Metals (parts per billion [ppb]) in Water from Rhode Island Sound.

Metal	Fall 2001[a]	Spring 2002[b]
Arsenic	0.82 - 1.21	0.97 - 1.17
Cadmium	0.029 - 0.058	0.027 - 0.029
Copper	0.24 - 0.92	0.31 - 0.39
Chromium	0.17 - 0.49	0.17 - 0.24
Mercury	0.00030 - 0.0011	0.00062 - 0.00082
Nickel	0.25 - 1.38	0.37 - 1.15
Lead	0.045 - 0.25	0.045 - 0.28
Selenium	0.038 - 0.11	0.013 - 0.045
Silver	0.014 - 0.028	0.018 - 0.037
Zinc	0.58 - 5.88	0.74 - 2.36

[a]Corps, 2002a. Sites 18, 69A, and W (= 69B).
[b]Corps, 2002b. RISDS (= 69B) only.

5.1.6 Biological Characteristics

No recent studies have specifically examined the phytoplankton or zooplankton communities at RISDS. However, RISDS is located within the open waters of Rhode Island Sound, where the primary factors controlling fluctuations in plankton communities are water temperature, nutrient abundance, water column turbulence and stratification, and the presence of predators. The available information about plankton communities in this area suggests that the plankton community at RISDS is similar to that found in the open waters of Rhode Island Sound.

Plankton Community

The phytoplankton and zooplankton populations within Rhode Island Sound fluctuate annually and seasonally. Phytoplankton species and abundance are affected by environmental factors such as water temperature, nutrient abundance, and water column turbulence and stratification. Phytoplankton populations within Rhode Island Sound are influenced by the presence of certain zooplankters and the grazing of those zooplankton on the existing phytoplankton species. Zooplankton populations are also influenced by some of these factors. Additionally, the presence of various finfish that prey upon zooplankton influences the zooplankton species that are present within Rhode Island Sound and their abundances.

Benthic Community

The benthic infaunal communities found within regional RISDS sediment and in the nearby areas during the 2001 and 2003 sediment characterization surveys were very similar (Corps, 2002c; Corps, 2003b). The number of infaunal animals within each area was moderate to relatively high, with about 32,000 individuals/m^2 found within RISDS, about 25,000 individuals/m^2 occurring within the reference area located just outside of RISDS sampled in 2001, and about 29,000 individuals/m^2 found in the area north and west of the site sampled in 2003 (Table 8). The average numbers of species found in the RISDS (2001), reference site (2001), and nearby (2003) samples were 53, 46, and 57, respectively. These sets of moderately high values were reflected in the moderately high Shannon-Wiener diversity (*H'*) values calculated for the RISDS and nearby area samples (Table 8). Evenness values were moderate at the RISDS stations and at the nearby stations (0.6).

Two of the three most abundant species co-occurred at all three locations: the small clam *Nucula annulata* and the tube-dwelling amphipod *Ampelisca agassizi*. The relative contribution of these two taxa to the total abundance of the infauna identified to species was similar in 2001 (49 percent) to that in 2003 (48 percent). The density of *N. annulata* among all area samples was about 6,850 individuals/m^2 for samples collected in 2001 and about 8,450 individuals/m^2 for samples collected in 2003. Other numerically important species in 2001 were three polychaete worms (*Polygordius* sp. A, *Tharyx acutus*, and *Exogone hebes*) and small crustaceans such as *Byblis serrata* and *Eudorella pusilla.* In 2003, other common taxa included the crustaceans *Crassicorophium crassicorne, Eudorella pusilla*, and *Unciola irrorata*, and additional clam species (*Crenella decussata, Nucula delphinodonta*). In general, the infaunal community in RISDS was very similar to that found in the nearby area and was typical of the open-water silty-sand/sand communities found in Rhode Island Sound.

Table 8. Comparison of the Sedimentary and Biological Characteristics of RISDS (September 2001, July 2003).

Parameter	RISDS[1]	Adjacent Area[2]	Area West and North[3]
Sediment Features			
Gravel (%)	12	7	8
Sand (%)	75	86	63
Fines (%)	13	7	30
TOC (%)	0.4	0.2	0.5
SPI Features			
Grain Size (modal category)	Silty/fine sand-pebbles	Silty/fine sand	Silty/fine sand–cobble
Prism Penetration (cm)	1.4–14.3	1.1–9.9	0.2–7.6
Dominant Surface Processes	Physical/Biological	Physical	Physical
RPD Depth (cm)	0.9–2.6	1.2–3.3	1.1 – >7.1
Successional Stage	I, II-III	I, I-III	I-II, II-III
OSI	4.0–9.0	3.0–10.0	4.0–10.0
Infaunal Community Features			
Average Abundance (#/sample)	1,298 (~32,450/m^2)	989 (~24,725/m^2)	1,175 (~29,375/m^2)
Average Species (#/sample)	53	46	57
Average Diversity (*H'*)	3.4	3.4	3.7
Average Evenness (*J'*)	0.59	0.62	0.64
Ten Most Abundant Taxa[4]	*Nucula annulata* *Ampelisca agassizi* *Oligochaeta* *Tharyx acutus* *Eudorella pusilla* *Polygordius* sp. A *Byblis serrata* *Exogone hebes* *Levinsenia gracilis* *Nucula delphinodonta*	*Ampelisca agassizi* *Polygordius* sp. A *Nucula annulata* *Eudorella pusilla* *Exogone hebes* *Tharyx acutus* *Goniadella gracilis* Oligochaeta *Spiophanes bombyx* *Byblis serrata*	*Nucula annulata* *Ampelisca agassizi* *Crassicorophium crassicorne* *Eudorella pusilla* *Exogone hebes* *Unciola irrorata* *Crenella decussata* *Nucula delphinodonta* *Tharyx acutus* *Ericthonius fasciatus*

Source: Corps, 2003b
OSI = Organism-Sediment Index; RPD = Redox Potential Discontinuity
[1] Nine sediment stations sampled in 2001; average of values shown. Nine SPI stations sampled in 2001; range of values shown.
[2] Seven reference stations sampled in 2001; average of values shown. Nine SPI stations sampled in 2001; range of values shown.
[3] Ten reference stations sampled in 2003; average of values shown. Twenty SPI stations sampled in 2003; range of values shown.
[4] In order of decreasing abundance.

Cluster analyses performed combining the 2001 and 2003 data (Corps, 2003b) indicated that 8 of the 10 samples collected west and north of RISDS in 2003, were more similar to each other than to the other two samples collected in 2003 and all of the 2001 samples. This may indicate that the recent disposal of dredged material in RISDS has slightly changed the nearby infaunal community, although natural variation cannot be excluded.

SPI data were obtained from nine stations within RISDS in 2001 and from several nearby stations sampled in 2001 and 2003. Analyses of the SPI data generally indicated that habitat quality in RISDS and in the nearby area was moderately variable. Primary evidence for this conclusion was the variability in the average Organism-Sediment Index (OSI) values calculated for the site, ranging from 4.0 to 9.0 within the site, and ranging from 3.0 to 10.0 in the area near the site (Table 8). The successional stages evident in the profile images showed that the communities within RISDS and in the nearby area were similarly developed (primarily stages I and I-III or II-III). No anoxic sediments or gas voids were found in the area.

SPI data from the late fall of 2003 show similar results for areas not receiving dredged material. Within the site, evidence of disturbance on the deposited mounds and within the areas is clear. However, even these areas show recovery as *Ampelisca*, species indicative of recovering sediment, were observed on some of the recently deposited sediment.

Commercial/Recreational Fish and Shellfish Resources

The finfish resources within Rhode Island Sound are spatially and temporally variable. Fish are mobile, moving between various locations within Rhode Island Sound in search of prey or better habitat. Migrations of several species occur in relation to temperature changes. These fish may use topographic depressions preferentially during these migrations, but this possibility remains unclear.

Three trawls conducted by the National Marine Fisheries Service (NMFS) within about 4 nmi northeast of RISDS, yielded medium CPUE values (988–1,396 fish/tow). Several recent trawl surveys have yielded mixed results due to the timing of the surveys and seasonal variations in fish abundance. Several trawl surveys were conducted at RISDS during a recent evaluation of the site for the Providence River and Harbor Maintenance Dredging Project EIS. The trawls at RISDS were conducted at different times of the year (June, November, and December) than more recent tows conducted west and north of the RISDS (July 2003). The CPUE for three tows at RISDS in June 2002 ranged from 288 fish/tow to 1,322 fish/tow, with a mean CPUE of about 680 fish/tow. Fifteen species were caught at RISDS during this survey. Squid (unidentified species) comprised the largest portion of the catch (101 to >1,170/30-min tow). Little skate, spiny dogfish, Atlantic butterfish, and winter flounder were the next most abundant species. In July 2003, three trawls were conducted west or north of RISDS. CPUE values (standardized to equal 30-min tows) for the tows near RISDS ranged from 50.0 to 82.0 fish/tow, with a mean CPUE of 70.8 fish/tow. Thirteen species were caught in the trawls near RISDS. NMFS and Corps-sponsored surveys indicated that the RISDS is within a region of Rhode Island Sound that has relatively low finfish productivity. The most common species found at the site were similar to those found elsewhere in the central region of Rhode Island Sound.

Rhode Island Sound supports a valuable lobster population, which appeared to be in decline as of mid-2003. Data suggest that lobsters in the Rhode Island Sound area make seasonal movements between inshore locations within Narragansett Bay and the more northern and central reaches of Rhode Island Sound, to locations in the southern region of Rhode Island Sound and much further offshore. Six surveys conducted from 1999 to August 2003 to assess the lobster population in and around RISDS, yielded average CPUE values for the site (~7 lobster/trap) that were generally similar to or slightly less than those from other sites in Rhode Island Sound.

Four commercially harvestable shellfish species—ocean quahogs, Atlantic surf clams, sea scallops, and whelks—occur in Rhode Island Sound. Of these, the ocean quahog is the most commercially important. Ocean quahogs typically live in fine-sand sediments at depths of 30 to 480 ft and rarely occur where bottom water temperatures exceed 16 ºC. Three recent (1997, 2002, and 2003) surveys of ocean quahog populations in and near RISDS found adult (greater than 70 mm) ocean quahog densities within RISDS ranged from 0.1 individuals/m^2 in the southeastern part of the site to 1.76 individuals/m^2 just west of the site (Corps, 1998; Corps, 2003d). These are comparable to historical estimates for the general area (Fogarty, 1979). The area in and around RISDS supports an ocean quahog population that has remained fairly stable through the last two decades, but one that is not as productive as other areas of Rhode Island Sound. No surf clams, scallops, or whelks were collected during the recent dredge or infaunal surveys conducted in and near RISDS. Juvenile ocean quahogs captured during benthic grab sample surveys have been uncommon, occurring at densities of about 34 individuals/m^2 to 48 individuals/m^2 (Corps, 2002c; Corps, 2003b).

Endangered and Threatened Species

Known endangered, threatened, and "special concern" species within the Rhode Island Sound region are summarized in this section. An endangered species is one whose overall survival in a particular region or locality is in jeopardy as a result of loss or change in habitat, direct exploitation by man, predation, adverse interspecies competition, or disease. Unless an endangered species receives protective assistance, extinction may occur. Threatened or rare species are those with populations that have become notably decreased because of the development of any number of limiting factors leading to a deterioration of the environment. A species may also be considered as a species of "special concern." These may be any native species for which a welfare concern or risk of endangerment has been documented within a state. Endangered and threatened species are protected by the Federal Endangered Species Act, 16 U.S.C. §§ 1531 *et seq.* and state law, while species listed as "special concern" are protected only by state law. Sixteen federally protected species and five species of special concern may occur in or near the waters of Rhode Island Sound and are listed in Table 9.

Endangered and Threatened Marine Mammals: In general, the six Federally listed whales (Table 9) and other marine mammals are not frequently observed in Rhode Island Sound. They are also not expected to spend significant portions of time in or near RISDS. Fin whales have the greatest likelihood of occurrence in the Rhode Island Sound area. These whales feed in coastal waters along the 130- to 165-ft depth contour and therefore may occur occasionally in the southern areas of Rhode Island Sound, approximately 8-10 nautical miles south of RISDS. The other listed whales generally occur off the continental shelf or deeper waters and therefore are

not expected to occur in or near Rhode Island Sound except as an occasional visitor during possible migration or along feeding routes in the summer months.

Table 9. List of Federal and State Endangered or Threatened Species in the Rhode Island Sound Region.

Species	Federal Status – NMFS[1]	Federal Status – USFWS[2]	MA status[3]	RI status[3]
Blue Whale (*Balaenoptera musculus*)	NA	Endangered	Endangered	NA
Finback Whale (*Balaenoptera physalus*)	Endangered	Endangered	Endangered	Endangered
Humpback Whale (*Megaptera novaeangliae*)	Endangered	Endangered	Endangered	Endangered
Right Whale (*Eubalaena* spp. – all species)	Endangered	Endangered	Endangered	Endangered
Sei Whale (*Balaenoptera borealis*)	NA	Endangered	Endangered	NA
Sperm Whale (*Physeter catodon*)	NA	Endangered	NA	NA
Green Turtle (*Chelonia mydas*)	Endangered	Threatened	NA	NA
Hawksbill Turtle (*Eretmochelys imbricata*)	NA	Endangered	Endangered	Endangered
Leatherback Turtle (*Dermochelys coriacea*)	Endangered	Endangered	Endangered	Endangered
Loggerhead Turtle (*Caretta caretta*)	Threatened	Threatened	Threatened	Threatened
Atlantic Kemp's Ridley Turtle (*Lepidochelys kempii*)	Endangered	Endangered	Endangered	Endangered
Bald Eagle (*Haliaeetus leucocephalus*)	NA	Threatened	Threatened	Threatened
Piping Plover (*Charadrius melodus*)	NA	Threatened	Threatened	Threatened
Roseate Tern (*Sterna dougallii dougallii*)	NA	Endangered	Endangered	Endangered
American Burying Beetle (*Nicrophorus americanus*)	NA	Endangered	NA	Endangered
Northeastern Beach Tiger Beetle (*Cicindela dorsalis dorsalis*)	NA	Threatened	Threatened	NA
Common Loon (*Gavia immer*)	NA	NA	Species of special concern	NA
Common Tern (*Sterna hirundo*)	NA	NA	Species of special concern	NA
Arctic Tern (*Sterna paradisaea*)	NA	NA	Species of special concern	NA
Least Tern (*Sterna antillarum*)	NA	NA	Species of special concern	NA
Leach's Storm-Petrel (*Oceanodroma leucorhoa*)	NA	NA	Rare/seriously declining in MA	NA

Source: [1] NMFS, 2002; [2] USFWS, 2002; [3]http://ecos.fws.gov/ecos/reports.do

Endangered and Threatened Reptiles: Five species of turtles have migration and feeding patterns that occasionally may bring them into the area that includes RISDS (Table 9). Three of these turtle species (loggerhead, leatherback, and green turtles) are more common in the shallow, coastal areas in the summer time where they search for food. The frequency of observation decreases in the winter months when most turtles are cold-stunned by water temperatures.

Endangered and Threatened Fish: No Federally or State-listed fish species are documented as occurring in or near RISDS waters (Table 9).

Endangered and Threatened Birds: The bald eagle, roseate tern, arctic tern, and Leach's storm-petrel are the bird species most likely to feed in the open waters of Rhode Island Sound (Table 9) and therefore occasionally could occur at RISDS. The other threatened and endangered bird species (piping plovers, common loon, common tern, and least tern) are more likely to occur in the nearshore, coastal areas of Rhode Island Sound.

Endangered and Threatened Insects: The two Federally listed beetle species (Table 9) live strictly in the intertidal areas (northeastern beach tiger beetle) or in the shrubs or grasses on Block Island (American burying beetle) and are not expected in the open areas of Rhode Island Sound or RISDS.

5.1.7 Bioaccumulation and Potential Risks

The Food and Drug Administration (FDA) has set action/tolerance limits that define levels of selected contaminants in food that are safe for human consumption. Measured chemical concentrations in edible tissue from finfish, lobster, and quahogs from within Rhode Island Sound were all very low (Table 10) and were at least 10 to 100 times below FDA limits for all contaminants measured.

Table 10. Comparison of Finfish, Lobster, and Ocean Quahog Edible Tissue Contaminant Concentrations (wet weight) to Human Health Action Levels (i.e., FDA Action Levels)[1].

	Total PCB (ppb)	Total DDT (ppb)	Total Chlordane[a] (ppb)	Aldrin (ppb)	Dieldrin (ppb)	Heptachlor (ppb)	Heptachlor Epoxide (ppb)	Mercury (ppm)
FDA Limits	2000	5000	300	300	300	300	300	1
Mean Concentrations in RISDS								
Fish Fillet[1]	39.83	3.73	1.29	ND	0.39	ND	ND	0.033
Lobster Meat[2]	14.3	0.928	0.139	ND	0.338	ND	0.0302	0.159
Ocean Quahog[3]	3.33	0.524	0.226	ND	ND	ND	0.118	0.006
Mean Concentrations in Rhode Island Sound (s.d.)								
Fish Fillet[4]	42.5 (15.4)	3.3 (1.3)	1.3 (0.61)	ND	0.42(0.34)	ND	ND	0.09 (0.1)
Lobster Meat[5]	12.8 (2.6)	0.73 (0.16)	0.15 (0.02)	ND	0.29 (0.04)	ND	0.03 (0.004)	0.14 (0.02)
Ocean Quahog[6]	4.3 (0.74)	0.66 (0.15)	0.33 (0.12)	ND	ND	ND	0.13 (0.04)	0.007 (0.001)

ND = not detected at or above method detection limit.
s.d. = standard deviation
[1]Mean of winter flounder (n = 2); butterfish (n = 2); scup (n = 1); and silver hake (n = 1).
[2]N = 1 lobster meat composites values.
[3]N = 1 ocean quahog composite values.
[4]Mean of winter flounder (n = 7); butterfish (n = 7); scup (n = 3); and silver hake (n = 4).
[5]Mean calculated from n = 8 lobster meat composites values.
[6]Mean calculated from n = 6 ocean quahog composite values.
[a] Total chlordane is the sum of cis Chlordane and trans-Nonachlor, as described in FDA (1989).

In 2001, selected organisms were collected at four locations within Rhode Island Sound (Site 16, Site 18, Site 69A, and RISDS [formerly called 69B]; see Figure 2) for chemical contaminant analyses to characterize body burdens of biota within Rhode Island Sound. Chemical analyses

for organic contaminants and trace metals were performed on finfish, lobster, and ocean quahog tissue collected from each site.

Contaminant concentrations measured in fish collected from Rhode Island Sound are low when compared to concentrations measured in fish from coastal waters such as Boston Harbor, Cape Cod Bay, and Long Island Sound. Tissues from scup, Atlantic butterfish, silver hake, and winter flounder were collected from four locations in Rhode Island Sound in 2001 and 2002 for contaminant analyses (Corps, 2002d; Corps, 2003c). Differences in the concentrations of organic and metals contaminants among species or between collection locations were small when observed.

Organic contaminant and mercury concentrations measured in lobster meat from Rhode Island Sound are low compared to concentrations measured in lobsters from coastal waters such as Boston Harbor, Cape Cod Bay, and the New York Bight, and similar to those in lobster meat from Long Island Sound. Concentrations of the organic contaminants in lobster tissues collected from RISDS in 2002 were similar to those at two other sites in Rhode Island Sound (Sites 18 and 69A). Mercury concentrations in lobster tissues were similar among all sites sampled.

Concentrations of organic contaminants and mercury in ocean quahog tissues collected from RISDS were generally similar to or lower than those in clams from other sites in Rhode Island Sound (Corps, 2003c).

5.2 DISPOSAL SITE HISTORY

RISDS is a 1-nmi^2 square with its center located at 41˚ 13’51”N and 71˚ 22’49”W (NAD 83) (Figure 3). The site is located approximately 9 nmi south of Point Judith and roughly 6.5 nmi due east of Block Island. RISDS is located over a historic topographic depression, where the maximum water depth is about 130 ft. Water depths of the surrounding area are between 113 and 118 ft to the north, east, and south of the site. The southeastern portion of the site shoals more rapidly than the northern area. Disposal of dredged material for the Providence River and Harbor Maintenance Dredging Project began in April 2003. Recent disposal of dredged material has decreased the bathymetry in a narrow bend along the western portion of the site to approximately 112 ft as of May 2004 (Figure 3). Mound building since 2003 has been in the western and northern thirds of the site. Some disposal occurred in other locations in the site through September 2003.

6.0 MONITORING PROGRAM

Dredged materials managed under MPRSA may be disposed at RISDS. Effective environmental monitoring programs draw on available knowledge and understanding to establish approaches and clearly define monitoring objectives that focus on the primary issues of concern. Historically, monitoring of disposal sites in New England has relied on the Corps DAMOS Program as the tool for data collection. The DAMOS program uses a tiered monitoring framework (Germano *et al.,* 1994). The monitoring program presented in this section

incorporates many of the features of the DAMOS framework. The goal of the monitoring program for the disposal at RISDS is to generate information that will:

- indicate whether disposal activities are occurring in compliance with permit and site restrictions;
- support evaluation of the short-term and long-term fate of materials based on MPRSA site impact evaluation criteria;
- support assessment of potential significant adverse environmental impact from dredged material disposal at the site.

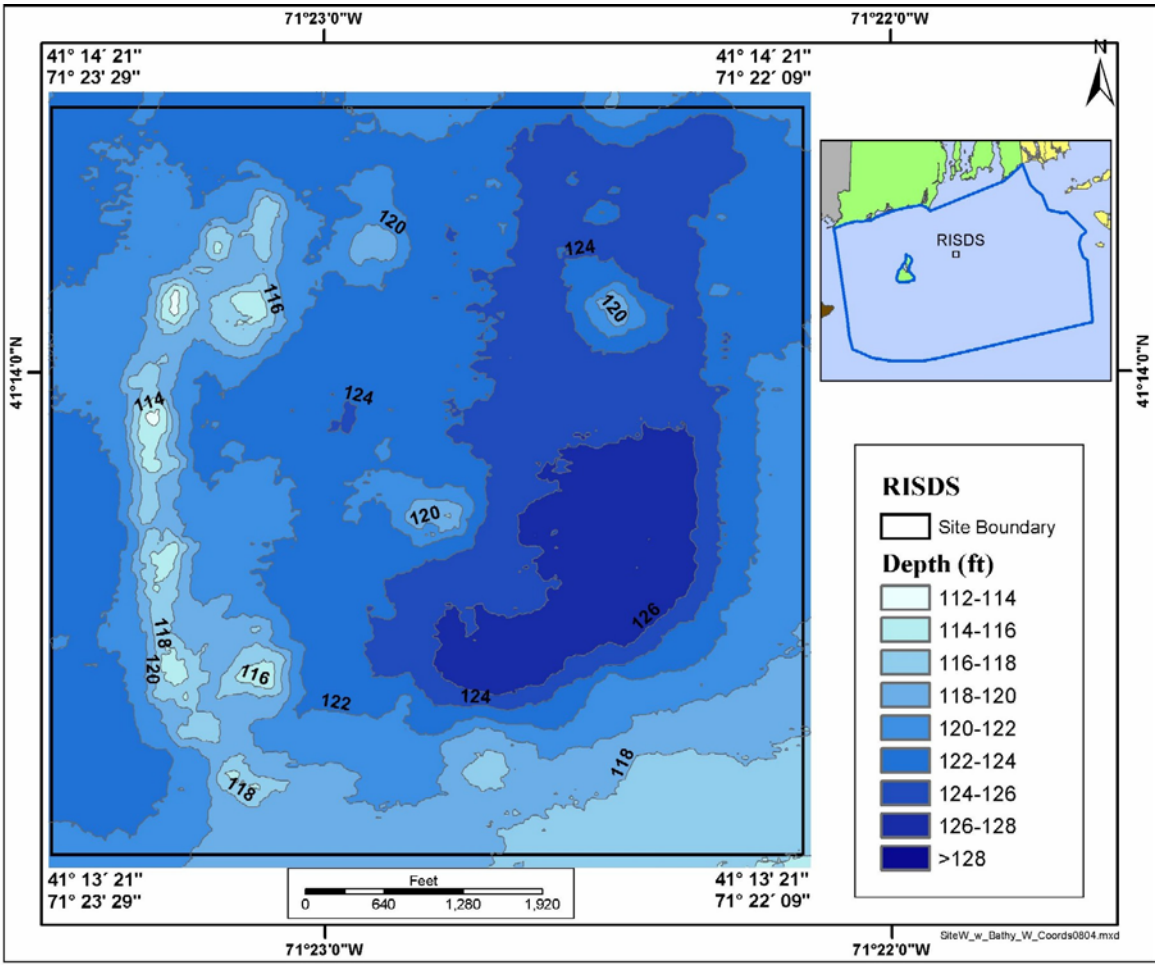

Figure 3. Location and Bathymetry of RISDS as of May 2004.

To achieve this goal, data will be developed in two areas: 1) compliance with conditions in disposal permits and authorizations and 2) environmental monitoring of the disposal site and nearby regions (as defined in Section 6.3). The latter information will be evaluated together with historic and ongoing dredged material testing data and other accessible and relevant databases (*e.g.,* Dredged Material Spatial Management and Resolution Tool [DMSMART]). These data may be provided to the EPA, Corps, and states of Rhode Island and Massachusetts at least one month prior to the Interagency Regional Dredging Team meeting. The evaluation of impacts from disposal at the site will be accomplished through a comparison of the conditions at the disposal mound(s) to historical conditions (*e.g.,* changes in historic mound height and footprint) or to unimpacted nearby reference stations. The meeting participants may use this information and the monitoring data gathered in the previous year to assess the potential impact and assist in plan monitoring surveys. EPA and the Corps will coordinate to implement the appropriate action (e.g., field surveys, additional investigations, or management actions [or subset of actions]) within the tiered Monitoring Program and to define appropriate actions to mitigate unacceptable situations.

This monitoring plan provides a general framework for the monitoring program and guides future sampling efforts at the disposal site. Specific details about those efforts (*e.g.,* sampling design, statistical comparisons) will be developed in project-specific survey plans considered during the annual agency meeting. Similarly, the schedule for the monitoring surveys will be governed by the frequency of disposal at the site, results of previous monitoring surveys, and funding resources. The data gathered under this monitoring plan will be evaluated on an ongoing basis to determine whether modifications to the site usage or designation are warranted.

Section 6.1 describes the organization of the monitoring program and summarizes the measurement program, schedule, and results that would lead to implementing additional studies. Sections 6.2 and 6.3 respectively, provide general information quality assurance requirements and a summary of the primary data collection tools.

6.1 ORGANIZATION OF MONITORING PROGRAM

The monitoring program is organized into two parts: compliance monitoring and environmental monitoring. Compliance information includes data relevant to the conditions in permits and authorizations and will be gathered separately from the environmental data.

The environmental monitoring program for the disposal site is developed around four fundamental premises that establish the overall monitoring approach from a data acquisition perspective as well as the temporal and spatial scales of the measurement program:

- Testing information from projects previously authorized to use the site for dredged material disposal can provide key information about the expected quality of material that has been placed in the site;
- Lack of benthic infaunal community recovery on recently created mounds provides an early indication of potential significant adverse impact;

- Some aspects of the impact evaluation required under MPRSA Section 102(c)(3) can be accomplished using data from regional monitoring programs (*e.g.,* fisheries impact);
- Measurement of certain conditions in the site can be performed at a lower frequency (*e.g.,* long-term mound stability) or only in response to major environmental disturbances such as the passage of major storms.

The first premise requires that historic and ongoing dredged material testing results be available. The remaining premises require various types and scales of monitoring to ensure dredged material disposal at the site is not unduly impacting the marine environment. Thus, the monitoring program is further organized around five management focus areas that are derived from the six types of potential effects required for evaluation under MPRSA [40 CFR § 228.10(b)] as described in Section 2:

- **Management Focus 1: Movement of dredged material.** This focus combines the requirements under 40 CFR 228.10(b)(1) (Movement of materials into sanctuaries, or onto beaches or shorelines) and 40 CFR 228.10(b)(2) (Movement of materials towards productive fishery or shellfishery areas) into one focus;
- **Management Focus 2: Absence of pollutant-sensitive biota.** Addresses 40 CFR 228.10(b)(3) (Absence from the disposal site of pollutant-sensitive biota characteristic of the general area);
- **Management Focus 3: Changes in water quality.** Addresses 40 CFR 228.10(b)(4) (progressive, non-seasonal, changes in water quality or sediment composition at the disposal site when these changes are attributable to materials disposed of at the site);
- **Management Focus 4: Changes in composition or numbers of biota.** Addresses 40 CFR 228.10(b)(5) (Progressive, non-seasonal, changes in composition or numbers of pelagic, demersal, or benthic biota at or near the disposal site when these changes can be attributed to the effects of materials disposed at the site);
- **Management Focus 5: Accumulation of material constituents in biota.** Addresses 40 CFR 228.10(b)(6) (Accumulation of material constituents [including without limitation, human pathogens] in marine biota at or near the site [*i.e.,* bioaccumulation]).

A tiered approach, based on a series of null hypotheses[2], is used to monitor compliance and address concerns under each Management Focus. Tier 1 evaluates a series of hypotheses addressing "leading indicators" that provide early evidence of unacceptable environmental responses or conditions. Examples include documentation of whether recolonization is proceeding as expected or whether mounds are deposited as planned and that no post-deposition movement is occurring. Should the hypotheses under Tier 1 be falsified, the findings would be

[2] A null hypothesis, H_0, represents a theory that has been put forward, either because it is believed to be true or because it is to be used as a basis for argument, but has not been proved. The null hypothesis is often the reverse of what the experimenter actually believes.

evaluated and decisions to conduct Tier 2 activities made. The specific condition that will initiate Tier 2 or Tier 3 monitoring will be decided between EPA and the Corps. Based on the type of event/action that has occurred, EPA and the Corps, with advice from other state and federal agencies, will work to implement the appropriate management practice with the Monitoring Program.

The measurement program under Tier 1 focuses on both individual dredged material mounds and the overall site conditions. New mound construction will be evaluated within one to two years of completion and the entire site will be evaluated as needed. While specific monitoring activities are defined under each Tier, the actual monitoring conducted in a given year must be consistent with budgetary constraints. Thus, prioritization of monitoring by organizational focus and findings of the monitoring program must be done annually during the Agency planning meeting.

Tiers 2 and 3 provide for progressively more detailed and focused studies to confirm or explain unexpected or potentially significant adverse conditions identified under Tier 1. For example, if Tier 1 monitoring under Management Focus 2, indicates that the benthic community was not recovering on recently deposited sediments, successive Tiers would enable examination of potential causes by incorporating additional investigation of sediment characteristics and quality. However, if the results from the Tier 1 data do not suggest impact, Tier 2 activities would not be invoked.

The following sections describe the monitoring approach that will be applied to each management focus. Each subsection provides the following:

- Intent of the data gathered under the focus area;
- Statement of relevant questions and hypotheses to be addressed within each tier;
- Summary of the measurement approach and tools to be used under each successive Tier.

Attachment A provides flow charts that summarize the tiered approach for each management focus (as questions) and a table that summarizes each of the hypotheses and the leading indicators that would require action.

6.1.1 Compliance Monitoring

Compliance monitoring includes evaluation of information and data relevant to the conditions in permits and authorizations and will be gathered separately from the environmental data. The hypothesis that will be addressed is:

H_0 0-1: Disposal operations are not consistent with requirements of issued permits/authorizations.

This hypothesis will be evaluated by review of the disposal inspectors report and any variances identified will be discussed by the EPA and the Corps on a project-specific basis to determine the potential magnitude of effect and the appropriate action.

6.1.2 Management Focus 1: Movement of the Dredged Material

This management focus addresses two concerns relative to the disposal of dredged material at RISDS. The first is site management and compliance. The second is movement of the material after disposal. The questions that will be addressed include:

- Is the material deposited at the correct location?
- Are mounds constructed consistent with the site designation?
- Are mounds stable and dredged material retained within the disposal site?

The latter question directly addresses management concerns about material moving into sanctuaries, or onto beaches or shorelines and towards productive fishery or shellfishery areas.

Tier 1

The site designation specifies that RISDS is a non-dispersive site; therefore significant movement of materials out of the site is not expected. Loss of mound material could mean that the material is being lost inappropriately and may potentially impact areas outside of the site, if transported beyond the site's boundary. For the purpose of Tier 1, this question is addressed through two hypotheses.

H_0 1-1: Changes in elevation for any mound are not greater than 1.0 feet (0.3 meter) over an area greater than 50 by 50 meters:

This hypothesis will be tested by determining the dimensions of disposal mounds created in a given dredging season and performing periodic monitoring of the mound using precision bathymetry techniques (see Section 6.3). The bathymetric baseline data for new or modified mounds will be collected after one year of consolidation. Bathymetric surveys of mounds (historic and recently completed) and the entire site will also be performed periodically. Information on mound size and height will be compared with previous data to determine if loss of material has occurred. Further study of the characteristic of the mound and surrounding area will be conducted under Tier 2, if large scale (50 by 50 meter) mound changes of more than 1.0 feet (0.3 meters) within any five year interval.

H_0 1-2: Major storms (greater than 10 year return frequency) do not result in erosion and loss of material from disposal mounds at RISDS.

This hypothesis tests whether storms that produce waves greater than 16 feet height with a period of 9.5 seconds have eroded mounds. Previous studies and sediment erosion modeling conducted during the site designation process suggest that a storm having a ten year return probability may cause a small amount of erosion on the mounds that approach the mound height restrictions (32 meters [105 feet] below mean low water) and potentially transport material from deposited mounds. However, storms of greater magnitude may interact with recently deposited sediments or sediments that are below the limiting erosion depth and result in movement of material from the mounds.

This hypothesis will be tested by determining the dimensions of disposal mounds within two months following the passage of storms with a ten-year return frequency. Dimensions will be determined using precision bathymetry techniques (Section 6.3.1). The decision to conduct post-storm surveys will be made jointly by the site managers. If a mound changes in height by more than 1.0 feet (0.3 meters) from the previous survey, the site and surrounding area will be examined as defined under Tier 2.

Tier 2

Significant loss of material from the deposited mound may result in changes to sediment quality (See Section 6.3.4) either within or beyond the site boundaries. Change in bathymetry and sediment quality immediately outside of the site would be indicative of potential unacceptable transport. Tier 2 investigates whether significant erosion of mound height determined under Tier 1 results in the relocation of material outside of the site boundaries.

H_0 1-3: Material lost from disposal mounds at RISDS does not increase the (a) bathymetry more than 0.5 feet (15 cm) over an area larger than 50 by 50 meters and (b) the organism sediment index is not significantly lower than the reference site in bathymetrically changed areas.

This hypothesis will be tested by determining changes in bathymetry and sediment characteristics within 1 kilometer (0.6 miles) beyond the site boundary. The survey design will take into account the expected direction of transport based on the predominant current direction and velocity (*e.g.,* it may not be necessary to survey the entire area within 1 kilometer [0.6 miles] of the site).

Precision bathymetry (Section 6.3.1) will be used to define substantive changes in bathymetry and topography (greater than 0.5 foot [15 centimeters]). Sediment profile imagery may also be used to evaluate changes in sediment characteristics (see Section 6.3.2). The sediment profile imagery can be used to observe layers of material too thin to detect by precision bathymetric methods and can also be used to evaluate if the benthic community in the sediments has been disturbed or is under stress (as defined in Management Focus 2, Tier 2) relative to the reference sites. Comparison of sediment profile imagery data from areas of concern to reference areas will be used to determine whether the transported material has a potential significant adverse biological effect.

Changes in bathymetry across the mound apex or apron of more than 1.0 feet (0.3 meters) or development of large areas of predominately muddy sediments not previously documented may be an indication of substantial transport of material from the site. If such changes are documented, Tier 3 characterization of sediment quality or further characterization of benthic communities may be required.

Tier 3

The premise of this Tier is that significant transport of material beyond the site boundary could affect the benthic productivity of the area. Therefore, characterization of sediment quality may be required.

H_0 1-4: Material transported beyond the RISDS boundaries does not result in significant decreases in sediment quality.

Sediment chemistry, toxicity, and benthic community structure will be measured at representative locations (determined through interagency coordination) from the area where the benthic community is depressed and at the RISDS reference sites to test this hypothesis (see Section 6.3.5).

Chemical and toxicity testing and analysis will be conducted using methods required by the RIM (EPA and Corps, 2004) or subsequent approved documents. Benthic community sampling and analysis methods will be the same as those conducted during site designation studies. Statistical comparisons and numbers of samples will be determined during project-specific survey planning.

Data from the area of concern will be compared statistically to data collected concurrently from the RISDS reference sites to determine if the quality of transported material is unacceptable. The decision of unacceptable conditions will be based on all three measures (*i.e.,* sediment quality, benthic community analysis, and toxicity).

6.1.3 Management Focus 2: Absence from the Disposal Site of Pollutant-Sensitive Biota Characteristic of the General Area

The premise underlying this management focus is that the infaunal community on disposal mounds recovers rapidly[3] after disposal ceases. Therefore, the absence of or slower-than-expected recovery of the benthic infaunal community indicates a potential biological impact at the mound and by implication the ability of the site to support higher trophic levels. The long history of disposal site monitoring in New England has resulted in an excellent understanding of the rate at which benthic infauna recover from disturbances such as those caused by dredged material disposal as well as the types of communities that are expected to recolonize the mounds (SAIC 2002; Murray and Saffert, 1999; Morris, 1998; Charles and Tufts, 1997; Wiley *et al.,* 1996; Williams, 1995; Wiley, 1995; Wiley and Charles, 1995; SAIC, 1995; Wiley, 1994; Germano *et al.,* 1994; Germano *et al.,* 1993; SAIC, 1990; SAIC, 1988; SAIC, 1987; SAIC, 1985; Morton *et al.,* 1984; Scott *et al.,* 1984; Scott *et al.,* 1983; Morton and Paquett, 1983; Arimoto and Feng, 1984; Morton *et al.,* 1982; Morton and Stewart, 1982; SAIC, 1982; Morton, 1980; SAIC 1980). Thus, the questions that the monitoring program addresses are directed at determining if benthic recovery is proceeding as expected and if pollutant sensitive organisms are growing on the mounds. For Tier 1, these questions include:

- Do opportunistic species return to the mound within a growing season?
- Are the infaunal assemblages consistent with similar nearby sediments or expected recovery stage?
- Are benthic communities and populations similar to surrounding sediments?

[3] Rapidly in this context means up to three (or more) years depending on a variety of factors that influence recolonization in coastal waters.

If these questions are answered in the affirmative, the biological community on the mounds is recovering as expected and significant adverse impact from the disposal operations is not demonstrated. If the questions are answered in the negative, investigation into potential causes is conducted under Tier 2.

Tier 1

This tier focuses on the biological recovery of the mound surface by sampling for specific, opportunistic, benthic infaunal species and the recolonization stage relative to nearby sediments.

H_0 2-1: Stage 2 or 3 assemblages (deposit-feeding taxa) are not present on the disposal mound one year after cessation of disposal operations.

This hypothesis will be tested with sediment profile imaging on the disposal mounds created in a given dredging season and by periodic imaging of older mounds (see Section 6.3.2). This evaluation includes estimates of grain size classes, which is a key variable affecting the types of organisms observed in the images. The initial sediment profile imaging survey should be conducted within 12 to 16 months after mound completion. Evaluation of selected historic (inactive) mounds and imaging of the RISDS reference stations will be incorporated into each survey of active mounds. Sampling of historic mounds can be sequenced across years depending on budgets and the conclusions of the previous data review at the annual agency coordination meeting.

Significant adverse impact will be determined from comparison of the sediment profile imagery data on the active and historic mounds to that of the reference stations. If the comparison of the mound data to the reference areas is consistent with the expected successional sequence, the biological community on the mounds would be considered to be recovering as expected and significant adverse impact from the disposal operations not demonstrated. If there is significant departure from the successional expectation in the sediment profile imagery data between the mounds and reference site, and the grain size information from the images or reference condition cannot explain the difference, further investigation into the potential causes of the difference is conducted under Tier 2.

Tier 2

This Tier is executed if differences in the benthic recolonization data on a dredged material mound cannot be explained by differences or changes in grain size. The hypotheses are designed to determine if the observations made under Tier 1 are localized (mound specific) or regional and to determine the affect of different sediment grain size distributions on the biological observations.

H_0 2-2: The absence of opportunistic species and Stage 2 or 3 assemblages is not confined to the disposal mounds.

H_0 2-3: The range in sediment grain-sizes on the disposal mound is not different from the ambient seafloor.

These hypotheses examine whether or not the differences observed in Tier 1 extend beyond the disposal mounds and whether the grain size distribution within and outside the site can explain the biological observations. If diminished recolonization (successional) stage data is widespread and substantial movement of material is not observed under Tier 1 or 2 of Management Focus 1 or if poor water quality conditions (*e.g.,* sustained low dissolved oxygen levels) are known to have occurred in the region (Management Focus 3), assignment of the dredged material disposal as the cause is questionable. However, if the differences are widespread and cannot be attributed to other factors, an investigation of cause would be initiated under Tier 3 of this Management focus.

These hypotheses will be tested with sediment profile imaging (see Section 6.3.2). The sediment profile image survey will be designed to sample representative conditions in the site and extend systematically to areas at least 1 kilometer (0.6 miles) beyond the site boundaries.

The full suite of information developed from the sediment profile images will be used to evaluate the similarity or differences of the areas sampled. This evaluation includes estimates of grain size classes, which is a key variable affecting the types of organisms observed in the images. The data will be used to address the above hypotheses. If the results find the effect is widespread and that grain size distributions can not explain the biological observations, additional cause effect studies defined under Tier 3 may be conducted.

Tier 3

Tier 3 is conducted if the benthic recolonization data developed under Tier 2 indicate that potential impacts are widespread (*i.e.,* encompass areas within and beyond the site boundaries). This Tier attempts to determine if the Tier 2 findings are the result of contaminants in the sediments or sediment toxicity. Tier 3 studies will only be conducted after a review and concurrence by the agencies managing the site.

H_0 2-4: The toxicity of sediment from the disposal site is not significantly greater than the reference sites.

H_0 2-5: The benthic community composition and abundance is not equal to that at reference sites.

Sampling and analysis of the sediments for benthic infaunal enumerations and community analysis will be conducted to evaluate the status of the infaunal community and compare the community to measures of sediment quality (see Section 6.3.2 and Section 6.3.5). Sediment chemistry and toxicity will be measured at representative locations from within the deposited material and at the RISDS references sites (see Section 6.3.4).

Chemical and toxicity measures will be conducted as defined in the RIM (EPA and Corps, 2004) or subsequent approved documents. Data from the area of concern will be compared statistically to data collected concurrently from the RISDS reference sites to determine if the quality of transported material is unacceptable. The number of stations to include in the testing may be

determined at the annual meeting. The decision of unacceptable conditions will be based on all three measures.

6.1.4 Management Focus 3: Changes in Water Quality

The premise underlying this management focus is that water quality in central Rhode Island Sound is affected by many different sources and that dredged material placed at the site exerts minimal oxygen demand on the water column. Moreover, dredged material plume studies indicate the cloud of particles resulting from dredged material disposal has a very short duration in the water column and turbidity levels reach ambient levels within minutes to hours. This fact, coupled with required testing that ensures residual material meets water quality criteria within an initial mixing period (within four hours within the site and always outside the site) before the material can be accepted at the site, minimizes any long-term, cumulative impact to the water column. Therefore, it is expected that significant short-term adverse effects are unlikely to result from the disposal operations. Relevant questions for water quality include:

- Is short-term water quality in RISDS different during disposal operations than in areas outside the site?
- Does dredged material disposal have a substantive impact on long-term water quality measures such as dissolved oxygen?

As discussed under Management Focus 1 and 2, dredged material placed at RISDS must pass the requirements of the RIM (EPA and Corps, 2004) or subsequent approved manuals, for disposal at RISDS. Potential water impacts are examined through the permitting process. Thus, short-term water quality impacts are not expected. Ample evidence exists, as documented in the DEIS (EPA, 2004), that dredged material disposal poses minimal potential to impact water quality in the short time scales that residual material remains in the water column. Although not a concern for most projects, some projects may be required to prove that they are not exceeding Limiting Permissible Concentration (LPC) criteria at the site boundary during dredged material disposal. Thus, a measurement program to document whether short-term changes in water quality during disposal operations (H_o3-0) occurs is not proposed under Tier 1 but may be required as part of a disposal permit.

H_0 3-0: The LPC is not exceeded at the site boundary for four hours after a dredged material disposal event.

Tier 1

Under this tier, it is assumed that water quality at RISDS and the surrounding region is not degraded by the disposal of dredged material. Measurements under this Tier will be triggered if information developed under Management Focus Area 2, suggests that RISDS is the cause of poor water quality and is causing wide-spread benthic impacts in central Rhode Island Sound.

H_0 3-1: Water quality at RISDS is not significantly less than nearby reference areas.

This hypothesis will be tested through water quality surveys designed to evaluate short-term gradients in water quality during disposal operations. If significant sustained short-term changes are found, further evaluation of the relationship to dredged material disposal will be undertaken (Tier 2) after discussion by the managing agencies.

Tier 2

Specific hypotheses cannot be defined for this Tier at this time and will be developed through interagency coordination at such time the Tier is deemed necessary. However, they may include special studies that determine the sediment oxygen demand to evaluate the contribution of the site to spatial and temporal dissolved oxygen trends in the water column. Such studies would compare the sediment oxygen demand levels in sediments within and outside the site including the RISDS reference locations. Special plume tracking studies may also be mounted to examine the specific effects of individual dredged material plumes on water quality during the disposal season.

Tier 3

No specific hypothesis can be determined at this time. Specific hypotheses will be developed as needed through interagency coordination.

6.1.5 Management Focus 4: Changes in Composition or Numbers of Pelagic, Demersal, or Benthic Biota at or Near the Disposal Site

This management focus addresses regional changes in species composition and abundance. Two areas of study are considered: finfish and macrobenthic organisms such as lobster. As discussed in the DEIS (EPA, 2004), significant short-term adverse effects to these communities are unlikely to result from the disposal operations. Long-term impacts to fish and shellfish populations in Rhode Island Sound are also unlikely, but are more difficult to predict. However, these populations are regularly monitored by NMFS and the State of Rhode Island through their fish trawl surveys. These surveys are anticipated to provide sufficient data to develop information necessary to determine if the dredged material disposal at RISDS is affecting the fish and lobster populations in Rhode Island Sound. Relevant questions include:

- Is the composition of the pelagic and demersal fish community unacceptably affected by disposal operations at the site?
- Is the composition of macro benthic biota unacceptably affected by disposal operations at the site?

Tier 1

H_0 4-1: Disposal of dredged material has no significant long-term impact on fish/shellfish populations or abundance.

This hypothesis will be addressed with data developed under the National Marine Fisheries Service (NMFS), Massachusetts Division of Marine Fisheries (MADMF), University of Rhode Island- Graduate School of Oceanography (URI-GSO) and Rhode Island Division of Fish and Wildlife (RIDFW) fish trawl surveys. These data are collected on a yearly basis under a stratified random sampling design. Data from the vicinity of the site will be compared with data obtained from other similar areas (depth, sediment type, etc.) in the central Rhode Island Sound to determine if there are significant spatial differences that could be related to dredged material disposal at RISDS.

H_0 4-2: Dredged material disposal operations have no significant direct impact on threatened and endangered species.

The need to test this hypothesis during Tier 1 monitoring will be determined annually or based on site use activity. Methodologies may include the placement of marine mammal observers on tugs or hopper dredges.

Tier 2

If the data reviewed under Tier 1 suggest that dredged material disposal at RISDS is potentially having an unacceptable adverse affect on the fish or shellfish populations, special studies to evaluate the distribution of these species in and near the site will be developed. These studies would address the distribution and composition of the fish and macrobenthic organism species within the site and in areas contiguous to the site boundaries. Control areas with similar habitat and depths to those found at RISDS would be identified and sampled to provide a control on the sample design. Specific study questions and sampling design will be developed and approved by the agencies managing RISDS before any study is conducted.

If studies under Tier 2 demonstrate a link between reduced fish or shellfish abundance and dredged material disposal at RISDS, additional studies to determine cause will be implemented under Tier 3.

Tier 3

Studies conducted under this tier may include evaluation of the availability of prey species in the site and surrounding areas and evaluation of bioaccumulation of chemicals in the fish and macro benthic species. Studies of prey species may include evaluation of the successional stage, infaunal community analysis (as described in Section 6.3) or bioaccumulation studies similar to those defined under Section 6.1.5 below. Specific study questions and sampling design will be developed and approved by the agencies managing RISDS before any study is conducted.

6.1.6 Management Focus 5: Accumulation of Material Constituents in Marine Biota at or Near the Site

The intent of this management focus is to evaluate whether significant potential for bioaccumulation results from disposal of dredged material at RISDS. The basic premise of this management focus is that testing of sediments for open water disposal eliminates material that poses an unacceptable risk to the marine environment from disposal at RISDS. Moreover,

because bioaccumulation of contaminants is a phenomena, it may not result in the impairment or death of organisms in and of itself. However, because bioaccumulation may result in transfer and possible biomagnification of certain chemicals throughout the food chain, which may pose potential unacceptable risks to marine organisms and humans that are not addressed through the evaluation of benthic community recovery, measurements for potential bioaccumulation are precautionary and prudent.

Such bioaccumulation data can serve two purposes. The first is to help understand whether transfer of chemicals from sediments to organisms could be contributing to a significant adverse biological response (*e.g.,* failure of a benthic infaunal community to thrive). The second is to estimate potential risks posed from bioaccumulation of contaminants at the site. The challenge in the monitoring program is how to best develop the information. Two questions are relevant under this Management Focus:

- Are risk levels from sediments placed at RISDS low?
- Does the bioaccumulation potential from the deposited sediments remain low after deposition?

There are several ways to address these questions. The first question is best addressed by continuing to test potential projects for potential risk (as currently practiced in the region) and by compiling test results into a readily available database. Addressing the second question involves periodically evaluating bioaccumulation potential for sediments at and near the disposal site. Methods for developing this information can range from estimating bioaccumulation potential using bioaccumulation models, to measuring the levels of contaminants in organisms collected from a site, to conducting controlled laboratory bioaccumulation studies with test organisms. These approaches are used in a tiered manner to address bioaccumulation concerns at RISDS.

If either of these questions is answered in the negative, significant adverse impact from the disposal operations may be present. Question 1 will be addressed through evaluation of the testing data submitted as part of the permit application and approval process. Question 2 is addressed under the Tiered approach below.

Tier 1

The premise of this Tier is that bioaccumulation potential at RISDS, and thus risk, does not increase after the sediments are deposited.

H_0 5-1: Bioaccumulation potential of sediments collected from RISDS is not significantly greater than the range of bulk chemical values measured in permitted projects.

This hypothesis will be tested by periodically collecting sediments from within RISDS and its reference areas and measuring the level of contaminants in the sediments. If statistically significant increases in sediment chemistry above permitted dredged material project data are found, theoretical bioaccumulation calculations will be performed. These may be performed in association with any sampling for sediment chemical analysis (*i.e.,* Tier 3 of Management

Focus 4). Such surveys should be designed to address other relevant management evaluations. If such sample collections are not performed within any five-year interval, a survey may be planned and conducted as a precautionary evaluation.

If the bioaccumulation modeling indicates a significant increase in potential bioaccumulation relative to baseline conditions or reference areas more specific studies that directly measure bioaccumulation may be conducted under Tier 2.

Tier 2

Direct evidence of bioaccumulation from sediments placed at RISDS may be obtained by comparing bioaccumulation in organisms collected from within and near (reference stations) the disposal site. The study may include collection of representative infaunal organisms from these locations and comparing the level of chemicals in their tissues or testing sediments under controlled laboratory conditions (*i.e.,* bioaccumulation bioassays) or both.

The specific study questions and sampling design will be developed and approved by the agencies managing RISDS before any study is conducted.

If significant increases in bioaccumulation are determined to exist in the sediments from the site, ecological and human health risk models may be run to examine the significance of the increase. If risks increase significantly, studies described under Tier 3 would be implemented.

Tier 3

This Tier tests for transfer of bioaccumulated compounds at the site into higher trophic levels.

H_0 5-2: Bioaccumulation of material constituents in higher tropic levels that reside at or near the site does not result from disposal of dredged material at RISDS.

Proving the source of contaminants measured in higher trophic level species is a difficult and complex task. Therefore, careful experimental design is required to make a cause effect link to the sediments deposited at RISDS. The specific study design will be developed and approved by the agencies managing RISDS before any study is conducted.

6.2 QUALITY ASSURANCE

An important part of any monitoring program is a quality assurance (QA) regime to ensure that the monitoring data are reliable. Quality assurance has been described consisting of two elements:

- Quality Control - activities taken to ensure that the data collected are of adequate quality given the study objectives and the specific hypothesis to be tested, and include standardized sample collection and processing protocols and technician training (National Research Council [NRC], 1990).

- Quality Assessment - activities implemented to quantify the effectiveness of the quality control procedures, and include repetitive measurements, interchange of technicians and equipment, use of independent methods to verify findings, exchange of samples among laboratories and use of standard reference materials, among others (NRC, 1990).

Relevant laboratories are required to submit Quality Assurance (QA) sheets with all analyses on a project-specific basis (see the Ocean Testing Manual [Green Book; EPA and Corps, 1991] and the RIM [EPA and Corps, 2004] for further details).

6.3 MONITORING TECHNOLOGIES AND TECHNIQUES

This section describes equipment and approaches typically used to evaluate dredged material disposal sites in the northeast United States. Use of consistent techniques increases comparability with future and historic data; however, monitoring methods used at RISDS are not limited to these technologies. New technology and approaches may be used as appropriate to the issues and questions that must be addressed. The applications of equipment and survey approach must be tailored to each individual monitoring situation, as warranted.

6.3.1 Mound Erosion

Loss of deposited dredged material (erosion) at the site will be investigated using bathymetry (SAIC, 1985). Typically, this methodology applies a minimum area bounded by rectangular dimensions of approximately 800 meters to 1,200 meters centered around a disposal buoy and aligned with the major axis of the tidal ellipse at the site will be surveyed. Today's survey techniques and equipment have matured to the place that comparative surveys can detect changes in the bathymetry of mounds of approximately 6 inches (15 cm) over areas of 50 by 50m. Side scan sonar and sediment profile imaging systems (Rhoads and Germano, 1982; Germano *et al.*, 1994) may also be used and are useful for defining broad areas where grain size may have changed or identify thin layers of dredged material, respectively (Rhoads, 1994). Specific survey requirements and application of these measurement tools will be defined for each tier and situation investigated. Evidence of mound erosion will need to be evaluated carefully to distinguish between actual erosion and mound consolidation.

6.3.2 Biological Monitoring

Benthic recovery at disposal mounds will be measured by sediment profile imagery (Germano and Rhoads, 1982; 1994). Stations will center on the disposal buoy and sampled in a star pattern at 100 meter intervals (if more than one area is used in the year then these additional areas will be surveyed in a similar manner). In addition, stations at each of the reference sites will be obtained. At each station three photos will be taken with the sediment profile imaging camera. Image analyses will provide the following information:

- Sediment grain size;
- Relative sediment water content;

- Sediment surface boundary roughness;
- Sea floor disturbance;
- Apparent Redox Potential Discontinuity (RPD);
- Depth of camera penetration;
- Sediment methane;
- Infaunal successional stage;
- Organism-Sediment Index (OSI).

6.3.3 Water Quality

Should site specific monitoring be required for water quality monitoring, methodologies will be developed.

6.3.4 Sediment Quality

Grab samples of the sediments will be collected and analyzed for grain size, total organic carbon, and selected contaminants such as trace metals (*e.g.,* mercury, lead, zinc, arsenic, iron, cadmium, copper), total PCBs, total PAH, and pesticides (EPA/Corps, 2004). The number of stations and locations will be defined during survey planning and will be sufficient to enable characterization of within and among station variability. A minimum of two replicate samples should be obtained from each station sampled including each of the reference stations.

Toxicity tests will be selected from those used to evaluate dredge material proposed for disposal at RISDS (EPA/Corps, 2004). The number of stations and locations will be defined during survey planning and will be sufficient to enable characterization of within and among station variability. A minimum of two replicate samples should be subjected to testing and include each of the reference stations.

6.3.5 Living Resources

Data from the NMFS Trawl Survey will be obtained and analyzed to determine whether the diversity and abundance of recreational and commercial fish in the vicinity of RISDS differs from other similar areas (depth, sediment type, *etc*.) of Rhode Island Sound.

6.3.6 Bioaccumulation Measurements

Measurement of bioaccumulation will include collection of representative benthic infaunal species within the site and at reference locations. At least two types of organisms (filter feeders and sediment feeders) will be obtained and genus level species aggregated into field replicates. Sufficient biomass to enable quantifications of bioaccumulatable compounds will be obtained from grab samples (or other appropriate sample collections device). Tissue will be prepared and analyzed using methods consistent with EPA/Corps (2004). The number of stations and locations will be defined during survey planning and will be sufficient to enable characterization of within and among station variability. Between three and five replicate samples should be obtained from each station sampled including each of the reference stations.

Laboratory based bioaccumulation testing will follow the requirements outlined in EPA/Corps (2004).

7.0 ANTICIPATED SITE USE AND QUANTITY AND QUALITY OF MATERIAL TO BE DISPOSED

MPRSA 102(c)(3)(D) and (E) requires that the SMMP include consideration of the quantity of the material to be placed in the site, and the presence, nature, and bioavailability of the contaminants in the material as well as the anticipated use of the site over the long term. RISDS is designated to receive dredged material only. No other material may be placed in the site.

The 2002 dredging needs survey of Rhode Island Sound (Corps, 2002e) identified anticipated dredging volumes for each harbor in the Sound over the next 20 years. Based on the dredging needs study, the projected dredged material volume for Rhode Island and southeastern Massachusetts is approximately 9 million cubic yards (Table 1-1; EPA, 2004). These projected dredging volumes include a mix of large and small Federal navigation projects and many small private dredging projects (marinas, boatyards, and harbors, and a few large private projects), which is consistent with the pattern of dredging in Rhode Island Sound over the past 20 years. Sediments projected for disposal are expected to come primarily from maintenance dredging projects. This estimate does not include the 2003 Providence River and Harbor Maintenance Project disposal at Site 69B (Separation Zone Site) that began in early 2003 which consists of approximately 5.6 MCY of clean CAD material and suitable maintenance material. Of the 9 MCY estimated to be dredged over the next 20 years, approximately 3.7 MCY is expected from maintenance of Federal projects and approximately 5.1 MCY from non-Federal facilities. Of the Federal maintenance material, approximately 1 MCY is expected from further maintenance of the Providence River. The sediment properties are expected to be variable although the predominant sediment type is likely to be silty material (silts, organic silts, sandy silts, etc.).

All dredged material projects using RISDS for disposal must be either permitted or authorized under MPRSA (see Section 3.0). The quality of the material will be determined on a project specific basis under the testing requirements necessary to meet open-water disposal requirements of MPRSA 103. The quality of MPRSA material will be consistent with EPA's Ocean Dumping Regulations (40 CFR Part 227), as implemented under the EPA and Corps RIM (EPA and Corps, 2004). Any updates to the RIM will be in force when approved by the EPA and Corps.

A specific closure date for RISDS has not been assigned as of the date of this SMMP. The potential capacity of RISDS (approximately 20 MCY) is far in excess of the potential site use over the next 20 years (approximately 9 MCY); thus, developing a closure plan at this time is not critical. However, the 20 MCY site capacity for RISDS is only an estimate and was calculated as the volume between the seafloor and 105-ft depth, assuming a rectangular mound occupying 1 nmi^2 and having a shoulder slope of 1:20. The capacity of the site will be evaluated at least every three years, and no legal limit exists on the amount of material that can be placed at the site. At the time that site closure appears likely in the next decade, plans should be made to (1) manage sediment placement to achieve any preferred bathymetric profile, and (2) survey the

overall sediment chemical distributions to cover any site areas exhibiting relatively greater contaminant concentrations during the final years of site use.

8.0 REVIEW AND REVISION OF THIS PLAN

MPRSA 102 (c)(3)(F) requires that the SMMP include a schedule for review and revision of the SMMP, which shall not be reviewed and revised less frequently than 10 years after adoption of the plan, and every 10 years thereafter. The EPA, the Corps, and other federal and state agencies have agreed to review this plan yearly as part of the annual agency planning meeting agenda (Section 3.2). A formal review and revision of this SMMP will take place every 5 years beginning from the date of designation unless the frequency is modified during the annual agency planning meeting. Reassessment of the EFH and endangered species issues will also be conducted on a 5 year basis with NMFS.

9.0 COORDINATION/OUTREACH

To ensure a disposal program that minimizes impacts to the marine environment, the following management practices will continue to be implemented at RISDS as a matter of policy. First and foremost, all proposed dredging projects will be reviewed for suitability for ocean disposal by both the Corps and EPA.

The Interagency Regional Dredging Team, composed of representatives from EPA, Corps, NMFS, USFWS, and Rhode Island and Massachusetts state representatives, meets approximately every six months in Sudbury, Massachusetts to discuss management and monitoring of New England dredged material disposal sites.

To assess compliance with applicable permit conditions and to track overall site usage, permittees will be required to provide written documentation of disposal activities to the Corps during disposal operations and after dredging is complete. Disposal permits and authorizations will include standardized requirements for this reporting to include the source of the dredged material, the amount of the material disposed, the rate of disposal, the date, time and coordinates of disposal.

The Corps will provide EPA with summary information on each project at two stages of the dredging and disposal process. A Summary Information Sheet will be provided when dredging operations begin, and a Summary Report will be submitted when dredging operations have been completed.

The EPA and the Corps will continue to inform and involve the public regarding the monitoring program and results. For example, the DAMOS Program holds periodic symposia (typically every three years) to report results and seek comments on the program. In addition, DAMOS monitoring results are published in an ongoing series of technical reports that are mailed to interested people and organizations and also distributed at various public meetings and via the internet. The Corps also has prepared and distributed several Information Bulletins and

brochures. To better meet this need, a series of presentations on different aspects of the dredging and disposal process has been prepared. In addition, site related reports can be reviewed at both the Corps Technical Library and the EPA regional library:

U.S. EPA (New England)
Regional Library
One Congress St., 11th Floor
Boston, MA 02144
Hours: Monday-Friday 8:00-5:00

U.S.ACE
NAE Technical Library
696 Virginia Road
Concord, MA 01742
Hours: Monday-Friday 7:30-4:00

Any party interested in being added to the DAMOS mailing list should mail the appropriate information to the Corps at:

U.S. Army Corps of Engineers, New England District
Regulatory Division
Marine Analysis Section
696 Virginia Road
Concord, MA 01742

10.0 FUNDING

The costs involved in site management and monitoring will be shared between EPA Region I and the Corps NAE and are subject to the availability of funds. This SMMP will be in place until modified or the site is de-designated and closed.

These recommendations do not necessarily reflect program and budgeting priorities of the Federal government in the formulation of EPA's national Water Quality program or the Corps national Civil Works water resources program. Consequently, any recommendations for specific activities or annual programs in support of efforts in Rhode Island Sound may be modified at higher levels within the Executive Branch before they are used to support funding level recommendations. Requests for funding are also subject to review and modification by Congress in its deliberations on the Federal budget and appropriations for individual programs. Similarly, state agency programs will depend solely on funds allocated to the programs by those agencies or other supporting agencies.

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Attachment A

Hypotheses Flowcharts and Summary Table

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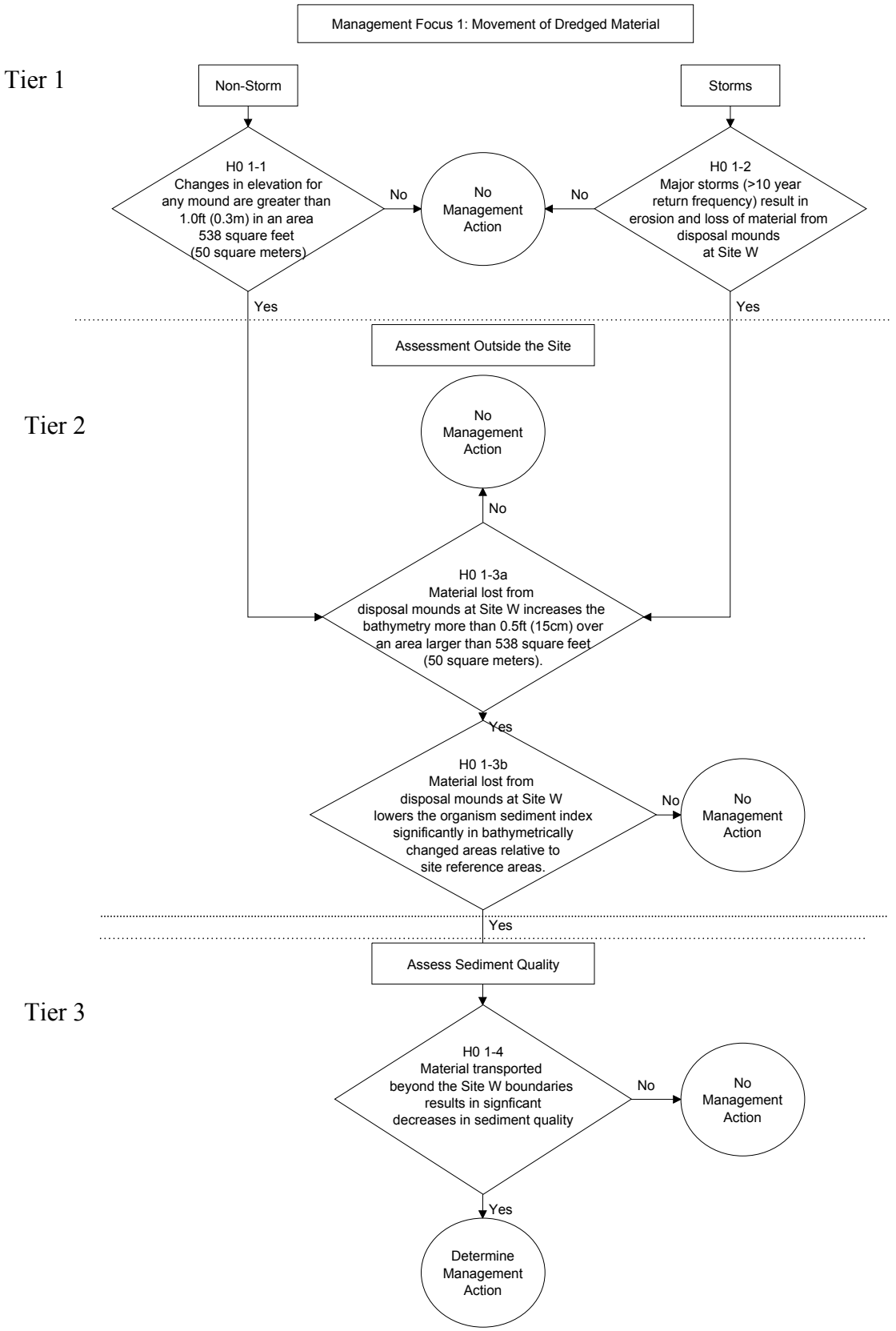
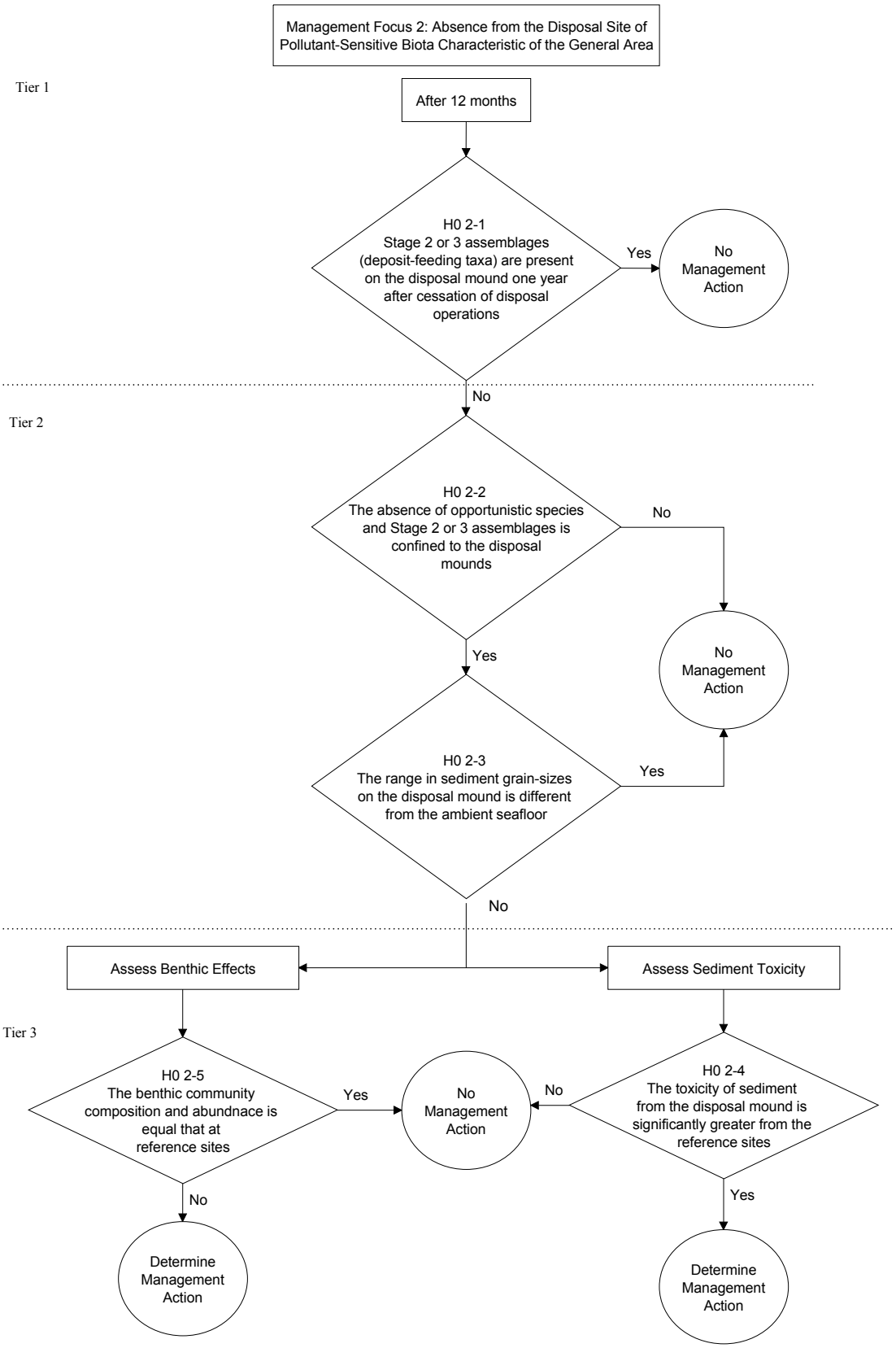
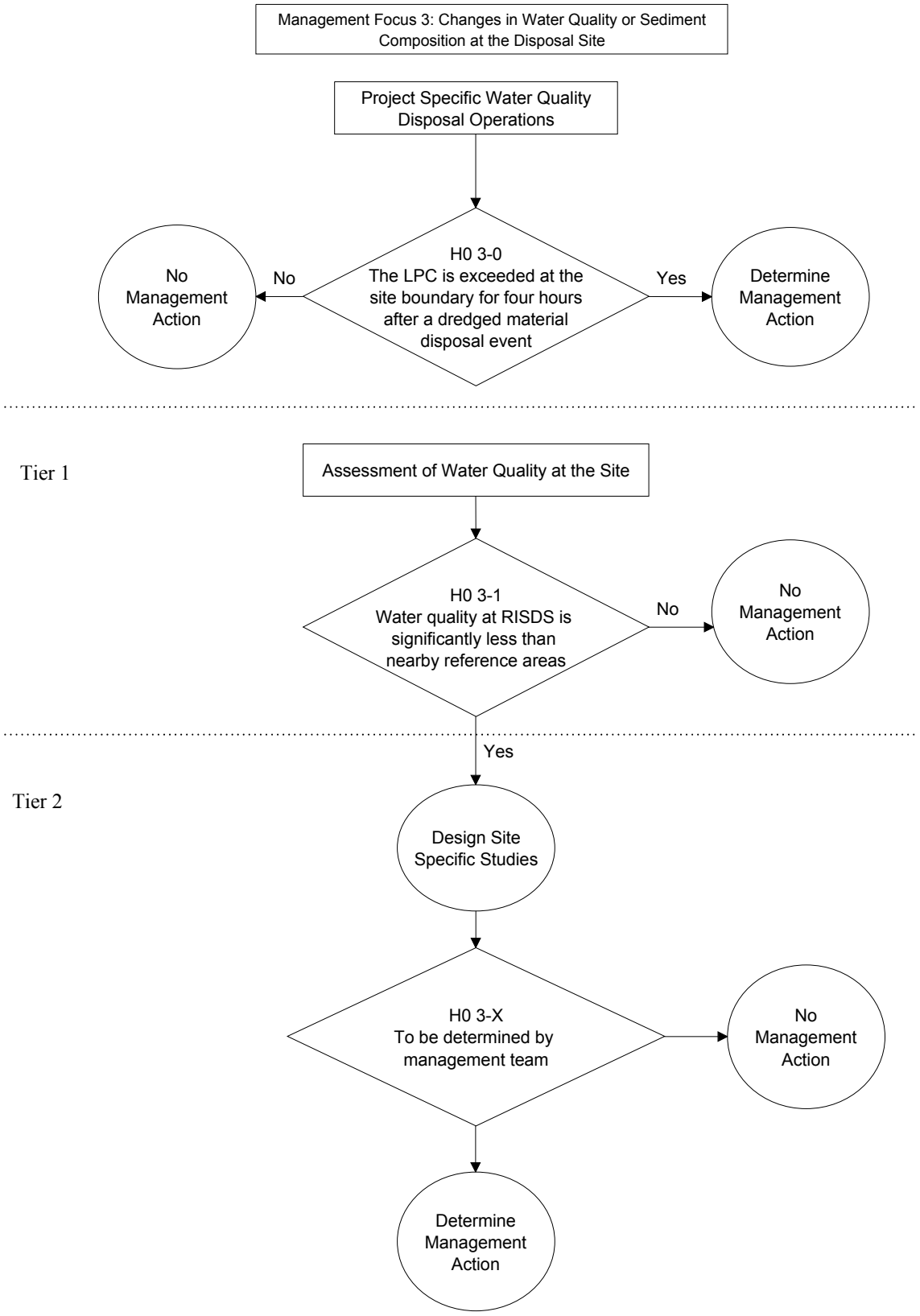
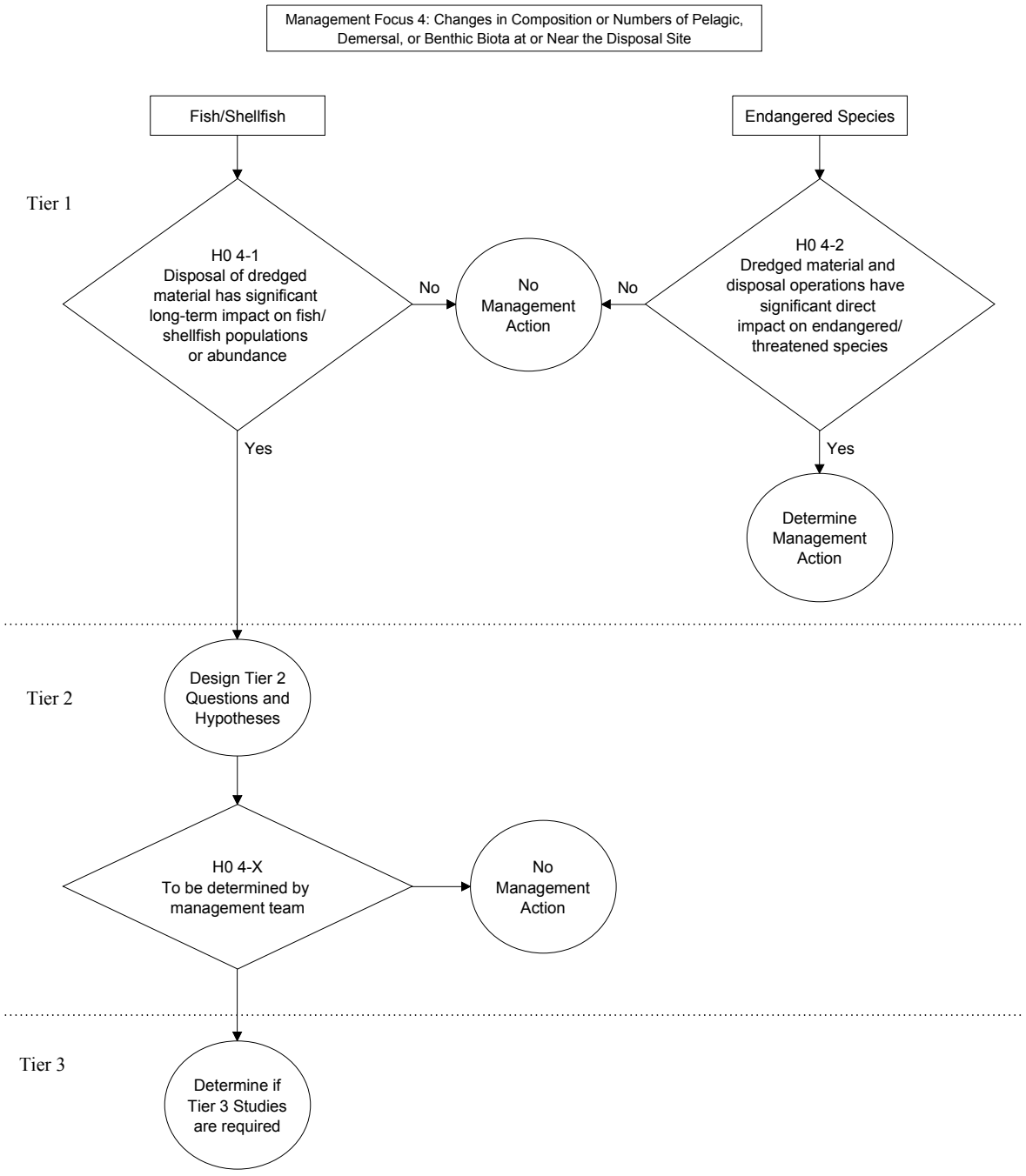
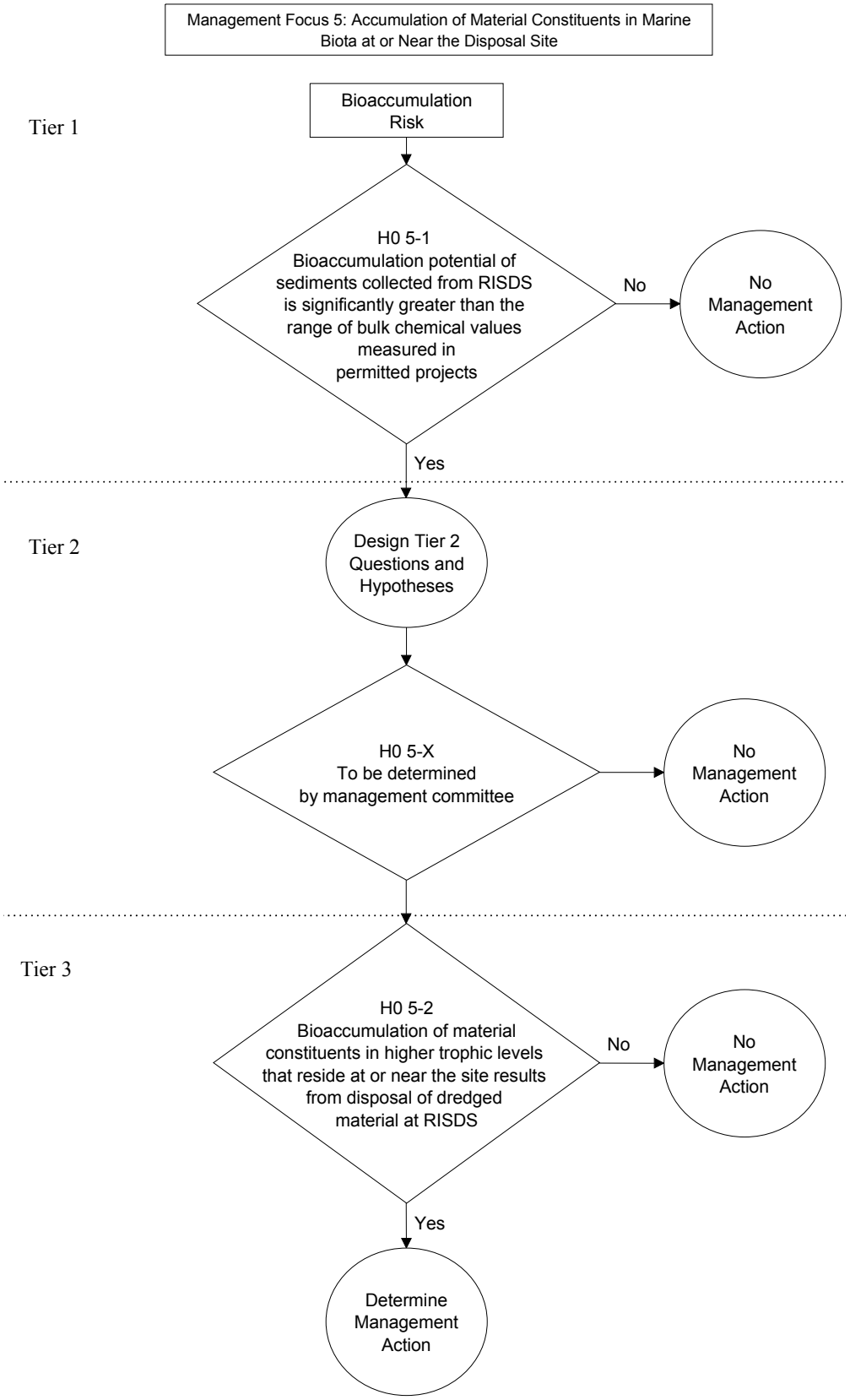

Management Focus 1: Movement of Dredged Material
Tier 1
Non-Storm
Storms
H0 1-1
Changes in elevation for any mound are greater than 1.0ft (0.3m) in an area 538 square feet (50 square meters)
No
No Management Action
No
H0 1-2
Major storms (>10 year return frequency) result in erosion and loss of material from disposal mounds at Site W
Yes
Yes
Assessment Outside the Site
Tier 2
No Management Action
No
H0 1-3a
Material lost from disposal mounds at Site W increases the bathymetry more than 0.5ft (15cm) over an area larger than 538 square feet (50 square meters).
Yes
H0 1-3b
Material lost from disposal mounds at Site W lowers the organism sediment index significantly in bathymetrically changed areas relative to site reference areas.
No
No Management Action
Yes
Assess Sediment Quality
Tier 3
H0 1-4
Material transported beyond the Site W boundaries results in signficant decreases in sediment quality
No
No Management Action
Yes
Determine Management Action


Management Focus 2: Absence from the Disposal Site of Pollutant-Sensitive Biota Characteristic of the General Area
Tier 1
After 12 months
H0 2-1
Stage 2 or 3 assemblages (deposit-feeding taxa) are present on the disposal mound one year after cessation of disposal operations
Yes
No Management Action
No
Tier 2
H0 2-2
The absence of opportunistic species and Stage 2 or 3 assemblages is confined to the disposal mounds
No
Yes
No Management Action
H0 2-3
The range in sediment grain-sizes on the disposal mound is different from the ambient seafloor
Yes
No
Assess Benthic Effects
Assess Sediment Toxicity
Tier 3
H0 2-5
The benthic community composition and abundnace is equal that at reference sites
Yes
No Management Action
No
H0 2-4
The toxicity of sediment from the disposal mound is significantly greater from the reference sites
No
Yes
Determine Management Action
Determine Management Action


Management Focus 3: Changes in Water Quality or Sediment Composition at the Disposal Site
Project Specific Water Quality Disposal Operations
H0 3-0
The LPC is exceeded at the site boundary for four hours after a dredged material disposal event
No
No Management Action
Yes
Determine Management Action
Tier 1
Assessment of Water Quality at the Site
H0 3-1
Water quality at RISDS is significantly less than nearby reference areas
No
No Management Action
Yes
Tier 2
Design Site Specific Studies
H0 3-X
To be determined by management team
No Management Action
Determine Management Action


Management Focus 4: Changes in Composition or Numbers of Pelagic, Demersal, or Benthic Biota at or Near the Disposal Site
Fish/Shellfish
Endangered Species
Tier 1
H0 4-1
Disposal of dredged material has significant long-term impact on fish/ shellfish populations or abundance
No
No Management Action
No
H0 4-2
Dredged material and disposal operations have significant direct impact on endangered/ threatened species
Yes
Yes
Determine Management Action
Tier 2
Design Tier 2 Questions and Hypotheses
H0 4-X
To be determined by management team
No Management Action
Tier 3
Determine if Tier 3 Studies are required


Management Focus 5: Accumulation of Material Constituents in Marine Biota at or Near the Disposal Site
Tier 1
Bioaccumulation Risk
H0 5-1
Bioaccumulation potential of sediments collected from RISDS is significantly greater than the range of bulk chemical values measured in permitted projects
No
No Management Action
Yes
Tier 2
Design Tier 2 Questions and Hypotheses
H0 5-X
To be determined by management committee
No Management Action
Tier 3
H0 5-2
Bioaccumulation of material constituents in higher trophic levels that reside at or near the site results from disposal of dredged material at RISDS
No
No Management Action
Yes
Determine Management Action

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Attachment B

Scow Log Sample

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INSPECTOR'S DAILY REPORT OF DISPOSAL BY SCOW

NOTE: Dredged material volume stated below is approximate and shall not be used for measurement and/or payment.

Permittee _____ Disposal Area _____
Permit/Contract No. _____ Date _____
Project _____ Towboat _____
Dredging Contractor _____ Owner _____

Trip No.	Scow No.	Started From Place	Started From Time	Disposal Time	Returned To Place	Returned To Time	Round Trip Time	Round Trip Dist.	Lat/Long Coordinates* Specified	Lat/Long Coordinates* Actual	Dist./Dir. From Buoy

Trip No.	No. of Pockets Loaded	No. of Pockets Dumped	Reason Pocket Not Dumped	Disposal Depth	Disposal Speed	Weather	Sea Conditions/ Visibility	Approx. Volume (CY)	Scow Draft

Comments:

*Check the datum used ___NAD27 ___NAD83. Also note any factors that may affect reliability of navigation instrument and readouts.

Time On	Time Off	Hours On Duty
	Total Hours On Duty	

Reviewed By: Permittee's Representative or, for Corps Projects, Corps' Resident Engineer or Field Inspector

To the District Engineer, U.S. Army Engineer District, New England, Concord, Massachusetts:

I certify that I informed the tug captain of the conditions of the U..S. Army Corps of Engineers permit or contract regarding the distance from the buoy and the speed of the scow during the release of the dredged material. I also informed the captain that failure to comply with these conditions would constitute a violation of the permit and would be reported to the Corps. I certify that this report is correct and that I am not an employee of the dredging or towing firm, or the permittee, nor have I been employed by any of them at any time during the past six months. The approximate volume of dredged material stated on this report is only an estimate. It was made either by me, the dredging or towing contractor, or the Corps of Engineers Resident Engineer of Field Inspector. I do not certify that it correctly states the volume of material dredged.

_____ _____

Signature of Disposal Inspector (Certification No.)

Print Name Here _____

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