FOCUSED FEASIBILITY STUDY
SITE 01 - McALLISTER POINT LANDFILL

U.S. DEPARTMENT OF THE NAVY
NAVAL EDUCATION AND TRAINING CENTER
NEWPORT, RHODE ISLAND

Prepared For:
Northern Division - Naval Facilities
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1.0 INTRODUCTION

At the request of the U.S. Navy, TRC Environmental Corporation (TRC) is conducting a Focused Feasibility Study (FFS) at Site 01, McAllister Point Landfill, at the Naval Education and Training Center (NETC), Newport, Rhode Island. The FFS is being conducted under the Navy's Installation Restoration Program and in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA). The study is being performed by TRC under contract N62472-86-C-1282.

Four sites at the NETC facility are being investigated under a Remedial Investigation/Feasibility Study (RI/FS) program. A Phase I Remedial Investigation (RI) has been conducted to investigate the physical characteristics of the sites, as well as to identify potential sources of contamination, determine the nature and extent of contamination, and characterize potential health risks and environmental impacts. Detailed site background information, results of the investigations, and a characterization of the potential risks to human health and the environment posed by the sites are presented in a report entitled Remedial Investigation Technical Report (TRC, 1991). Additional investigations of these sites (Phase II) are currently proposed.

Based on a review of the risks posed by the various contaminated media at the NETC sites (as identified by the Phase I investigations), source control at McAllister Point Landfill was determined to be of high priority in addressing relative risks to human health. Therefore, to expedite the decision making process and reduce the overall time frame required to clean up the site, it was determined that the preparation of a Focused Feasibility Study addressing source control at Site 01, McAllister Point Landfill, was appropriate. This evaluation process is discussed further in Section 3.1.

The purpose of the Focused Feasibility Study is to identify and evaluate alternatives which are applicable to providing source control at the site. By evaluating remedial solutions selected from the range of technologies available for cleanup, a response can be formulated which is technically feasible, protects public health and the environment, is cost-effective, and is consistent with applicable or relevant environmental standards. The remaining contaminated environmental media at McAllister Point Landfill will be addressed within a separate Feasibility Study.

The Feasibility Study process was formulated by the U.S. Environmental Protection Agency (EPA) to properly implement CERCLA. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 CFR Part 300) establishes a framework for performing Feasibility Studies. Further definition of the FS process is provided in the Guide for Conducting Remedial Investigations and Feasibility Studies under CERCLA (U.S. EPA, Interim Final, October 1988). Site-specific guidance for the FS process at landfills can be found in the following documents: Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites (U.S. EPA, February 1991) and Design and Construction of RCRA/CERCLA Final Covers (U.S. EPA, May 1991).

The first section of this FFS presents information including general background descriptions of the history, geology, and hydrogeology of the NETC facility. After the description of the NETC facility as a whole, a description of McAllister Point Landfill, its site history, and results of previous site investigations is presented. The site geology and hydrogeology of McAllister Point Landfill are described in detail. Finally, a summary of contaminant fate and transport and the human health risk assessment is presented.

Section 2.0 provides a discussion of the potentially applicable or relevant and appropriate requirements (ARARs) for the study. ARAR identification is an iterative process, with the potential ARARs re-examined throughout the RI/FS process until a Record of Decision is issued. Section 3.0 presents the identification and screening of interim remedial actions considered for the site. In this section interim remedial action objectives are developed along with interim general response actions. The technologies and process options associated with the interim remedial actions are described and screened. On the basis of this screening, remedial alternatives are developed. For a Focussed Feasibility Study, a limited number of alternatives are considered.

Section 4.0 defines the interim remedial alternatives and provides an evaluation of the alternatives according to the criteria specified by the National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan, NCP). This section also includes a comparative analysis of the different alternatives.

1.1 NETC Background

This section presents a general review of the history, geology, and hydrogeology of the NETC facility, also referred to as the Newport Naval Base. Extensive information regarding these areas has already been presented in previous site reports, including the Initial Assessment Study (IAS, Envirodyne Engineers, 1983), Confirmation Study (CS, Loureiro Engineering Associates, 1986), and Remedial Investigation/Technical Report (TRC, 1991).

1.1.1 History of the NETC

NETC is located north of Newport, Rhode Island, on the west shore of Aquidneck Island facing the east passage of Narragansett Bay (see Figure 1-1). The following paragraphs present a summary of the history of the facility; additional detail is provided in the IAS (pp. 5-6 to 5-14).

The Newport area was first used by the Navy during the Civil War when the Naval Academy was moved from Annapolis, Maryland to Newport in order to protect it from Confederate troops. After the war, the Naval Academy returned to Annapolis. The first permanent Navy use of the area was in the 1880s when the Naval War College was established on Coasters Harbor Island. The outbreak of World War I brought a significant increase in military activity to Newport, including an increase in the number of men stationed at Newport and the number of ships entering port. Activity slowed after WWI until the onset of WWII. Reactivation of the base occurred in the late 1930s as a result of a military build-up in Europe. Following WWII, naval activities at Newport converted to peacetime status. In 1946, the entire naval complex was consolidated into a single naval command.

The Naval Base adjusted to peacetime status by increasing its activities in the fields of research and development, specialized training, and preparedness for modern warfare. In 1952, the U.S. Naval Station and the U.S. Naval Schools Command were established. McAllister Point Landfill opened in 1955. Newport became the headquarters of the Commander Cruiser-Destroyer Force Atlantic in 1962. In July of 1971, the Naval Schools Command was restructured and named the Naval Officer Training Center (NOTC) which became the Naval Education and Training Center (NETC) in 1974. In April of 1973, the Shore Establishment Realignment program (SER) was announced and resulted in the largest reorganization of Naval forces in the Newport area. The fleet stationed at Newport was relocated and several naval activities were disestablished. The reorganization brought about by the SER resulted in the Navy excessing some 1,629 of its 2,420 acres.

In November 1989, the entire NETC was listed on the U.S. EPA's National Priorities List (NPL) of abandoned or uncontrolled hazardous waste sites.

1.1.2 **Regional Physiography**

Presented in this section is a discussion of climate, terrestrial features, and marine features as they relate to the NETC facility and surrounding area. The information from this section has been summarized from the IAS, as noted. Additional site-specific studies regarding site terrestrial and marine features will be performed under the Phase II Remedial Investigation.

Climate - The climate at the NETC facility is greatly influenced by its proximity to Narragansett Bay and the Atlantic Ocean, which tend to moderate the area's temperatures. Winter temperatures are somewhat higher and summer temperatures somewhat lower than inland areas. The average annual precipitation for the area is 42.75 inches, and measurable precipitation (0.01 inch or greater) occurs on about one day out of three. Severe weather in the form of tropical cyclones and hurricanes is a serious threat in the NETC area. The probability that a tropical cyclone will invade the area is one in five in any year, while the probability of hurricane force winds invading the area is less than one in fifteen in any year. (IAS pp. 5-14 to 5-15)

Terrestrial Features - The topography of the NETC area was shaped by the bedrock geology, glaciation, and recent erosion. The bedrock geology controlled the locations of the ancient river valleys, which were gouged out of the bedrock by glaciers. The hills are cored by bedrock highs. A mantlè of poorly sorted till, an average of 20 feet thick, was spread over the bedrock during the Wisconsin glaciation. As the glaciers melted, ocean levels rose and flooded the river valleys, forming the passages of Narragansett Bay.

There are five basic types of soils at the NETC: mucks, beaches, loams, sands, and urban complexes. The mucks are found in tidal flats and inland depressions which hold ponded water. Loams (mixtures of sand, silt, clay, and organic matter) and sands are found in upland areas on-site and generally drain rapidly. Urban complexes are mixtures of natural soils, imported soils, and urban materials.

The flora and fauna of the NETC are strongly influenced by human activity. The upland vegetation within the NETC is restricted primarily to perennial weeds and grasses. The habitats available for lowland vegetation are located on the waterfront along Narragansett Bay and surrounding the small impoundments and their drainage further inland. Those areas located on the waterfront are comprised of borrow pits along the railroad tracks and abandoned disposal areas where excavation has created depressions. Borrow pits can be found along the railroad tracks which parallel the shoreline extending from McAllister Point northward to Melville North Landfill. All lowlands at the NETC have been artificially created and are in a disturbed condition. The potential for maintaining diversified floral species within the lowlands is poor.

The fauna of the region have been affected by disturbances (clearing, excavation, construction) similar to those which led to the impoverishment of the flora. Field studies have indicated impoverished fauna, particularly of herptile and mammal types. Widespread habitat destruction over a period of several hundreds of years has caused emigration or elimination of many species. As a result, the present regional fauna consist primarily of species of wide distribution and ecological tolerances, high adaptability, and nonrestrictive habitat requirements. (IAS pp. 5-37 to 5-39)

<u>Marine Features</u> - Narragansett Bay occupies three former river valleys which were drowned by the advance of the Atlantic Ocean. Narragansett Bay is 20 miles long and 11 miles wide. The bay has a surface area of 102 square miles. The average depth of the bay is 30 feet. The eastern passage, which the NETC fronts, allows deep water access up to the south end of Prudence Island. Channel depth exceeds 80 feet in the eastern passage from Gould Island seaward, and depths in excess of 150 feet occur near the mouth of the bay.

The sediments in the bay are contaminated with heavy metals, hydrocarbons, and sewage sludge (Master Plan, Naval Facilities Engineering Command, Northern Division, 1980). A survey conducted by the EPA (EPA, 1975) identified the presence of heavy metal concentrations in the sediments in interstitial waters north of the Naval Complex. These contaminants are the result of industrial and municipal discharges into the bay. (IAS, pp. 5-28, 5-31)

obtain a copy of survey.

The marine ecosystem of Narragansett Bay forms the shoreline of the base for approximately 9 miles. The bay is of great economic and aesthetic importance to the entire southern portion of Rhode Island. It is an estuary, and the fishery resources of the bay are extremely important. The annual value of the combined commercial and sport fishing is estimated at several million dollars. Shellfishing areas open to the public do not include the NETC shoreline. (IAS, pp. 5-40 to 5-47) Is this accurate in today's climate?

1.1.3 Regional Geology

The NETC facility is located at the southeastern end of Narragansett Basin. The basin is a complex synclinal mass of Pennsylvanian-aged sedimentary rocks and is the most prominent geologic feature in eastern Rhode Island and adjacent Massachusetts. The Narragansett Basin is an ancient north to south trending structural basin originating near Hanover, Massachusetts. The basin has a length of approximately 55 miles and varies in width from 15 to 25 miles. The western margin of the basin lies in the western portion of Providence, Rhode Island, and the eastern margin runs through Fall River, Massachusetts. Exposures of older rocks on Conanicut Island and in the vicinity of Newport suggest that the southern extent of the basin is near the mouth of Narragansett Bay.

The bedrock of the Narragansett Basin has been divided into the following five units: the Rhode Island Formation, Dighton Conglomerate, Wansulta Formation, Pondville Conglomerate, and Felsite at Diamond Hill. At NETC and in most of the surrounding area, the bedrock is entirely of the Rhode Island Formation. Included within the Rhode Island Formation are fine to coarse conglomerate, sandstone, lithic graywacke, graywacke, arkose, shale, and a small amount of meta-anthracite and anthracite. Most of the rock is gray, dark gray, and greenish, but the shale and anthracite are often black.

Overlying the Pennsylvanian rocks of the Narragansett Basin are surficial deposits of Pleistocene sediments. These Pleistocene sediments owe their origin to the Wisconsin glaciation which covered the area with ice several thousand feet thick. As the glaciers receded some 10,000 to 12,000 years ago, they deposited unconsolidated glacial materials of variable thickness throughout the Narragansett Basin area. The unconsolidated glacial material ranges in thickness from 1 to 150 feet, being thicker in the valleys and thinner in the uplands. The glacial material consists of till, sand, gravel, and silt. The glacial materials serve as the parent for the soils in the area. (IAS, pp. 5-18, 5-21)

1.1.4 **Regional Hydrology**

Regional Surface Water Hydrology - NETC is located within the Narragansett Bay Drainage Basin. This drainage basin covers an area of 1,850 square miles, 1,030 square miles of which are in Massachusetts and 820 square miles of which are in Rhode Island. All surface water drainage from the basin is into Narragansett Bay. Three major rivers, the Taunton, Blackstone, and Pawtucket, as well as the Providence River and a number of smaller rivers and streams, drain into Narragansett Bay. Discharge from Narragansett Bay is into the Atlantic Ocean between Point Judith and Sakonnet Point in Rhode Island. (IAS, pp. 5-26, 5-28)

The potential for pollutant migration by surface drainage at NETC is greatly increased by its proximity to Narragansett Bay. Several historic waste disposal areas, such as the McAllister Point Landfill, are located along the shoreline of Narragansett Bay. Surface drainage from these areas is directly into the bay. The NETC area is frequently subjected to thunderstorms during which intense periods of rainfall are common. Surface drainage into the bay would be greatest following these thunderstorms. (IAS, pg. 5-34)

Regional Surface Water Classifications - The surface water quality classifications for Narragansett Bay, as determined by the Rhode Island Department of Environmental Management (RIDEM), are shown on Figure 1-2. Most of Narragansett Bay is classified as Class SA, which means it is suitable for bathing and contact recreation, shellfish harvesting for direct human consumption, and fish and wildlife habitat.

Areas classified as Class SB are suitable for public drinking water with appropriate treatment, agricultural uses, bathing, other primary contact recreational activities, and fish and wildlife habitat. Areas classified as Class SC are suitable for boating, other secondary contact recreational activities, fish and wildlife habitat, industrial cooling, and good aesthetic value.

Two freshwater streams located on NETC property have been classified as Class B surface waters. Class B surface waters are suitable for public water supply with appropriate treatment, agricultural uses, bathing, other primary contact recreational activities, and fish and wildlife habitat.

Area Water Use - Public water in the City of Newport and town of Middletown is supplied and managed by the Newport Water Department. The Town of Portsmouth purchases water from the Newport Water Department, but operates its own distribution system. Approximately two-thirds of Portsmouth is serviced by public water while the remaining one-third is supplied water from private water wells. While no specific records exist as to private well use in the information reviewed, in general, the majority of private wells are reportedly located on the eastern portion of Aquidneck Island (Personal Communication, Town of Portsmouth, 1992).

Need to strength the language own effort

The Newport Water Department receives its water supply from a series of seven surface water reservoirs located on Aquidneck Island and two surface water reservoirs on the mainland. Each of the reservoirs is supplied water via rainfall and runoff and is not augmented by ground water supply wells. Figure 1-3 indicates the location of surface water reservoirs and public ground water supply wells in the vicinity of Newport Naval Base. The locations of ground water supply wells were obtained from the February 1992 RIDEM Ground Water Section Facilities Inventory Map for the Prudence Island Quadrangle (USGS). The map shows the locations of known public ground water supply wells, in addition to the locations of known or suspected sources of ground water contamination. The location of the supply wells within the Prudence Island Quadrangle reportedly have been field verified by RIDEM personnel.

check figure

1.1.5 Regional Ground Water Hydrogeology

Ground water on Aquidneck Island is obtained from the unconsolidated glacial deposits of till and outwash and from the underlying Pennsylvanian bedrock. Throughout the area, depth to ground water ranges from less than one foot to about 30 feet, depending on the topographic location, time of year, and character of subsurface deposits. The average depth to ground water is about 14 feet on Aquidneck Island; the ground water moves from areas of high elevations to Narragansett Bay or the Sakonnet River.

→ Is this a small river?

→ 14FT @ what time of the year?

The unconsolidated glacial deposits range in thickness from less than one foot near the rock exposures to about 50 feet throughout Aquidneck Island. In the NETC area, the glacial deposits are till with a thickness of less than 20 feet. The yield of wells completed in the till varies considerably depending upon the type and thickness of the water-bearing deposits penetrated. Under normal conditions, till wells yield a few hundred gallons of water per day and are adequate for domestic supplies. Wells completed within the till are typically dug wells.

Bedrock wells in the area range from 14 to 1,300 feet in depth with an average depth of about 135 feet. Most bedrock wells yield less than 10 gallons per minute. The yields vary considerably in the bedrock over short distances because the joints and fractures which transmit water to the wells occur intermittently. Joints and fractures are most numerous and widest near the top of the bedrock and become fewer and narrower with depth. (IAS, pp. 5-31 to 5-34)

The ground water at the NETC is very shallow; the water table lies less than 10 feet below the ground surface in most areas. This shallow depth to water increases the potential for ground water contamination at the NETC. Those pollutants which do find their way into the ground water could migrate to the west and discharge into Narragansett Bay. As the NETC extends along the western shoreline of Aquidneck Island, the on-site ground water has to migrate only a short distance before discharging into Narragansett Bay.

The soils occurring at the NETC have permeabilities which are moderate to moderately rapid, and they do not restrict the vertical movement of water. The glacial till, from which these soils were derived, is generally less permeable than the overlying soils but does not represent a barrier to the vertical migration of water. Therefore, it is possible that any contaminant transported in infiltrating surface or near-surface water could contaminate the ground water. There are also isolated bedrock outcrops at the ground surface. Ground water contamination is possible in these areas via the cracks and fissures which commonly occur in the bedrock. (IAS pg. 5-34)

Information obtained from the Phase I Remedial Investigation indicated that, in general, ground water at the NETC flows from east to west towards Narragansett Bay. Measured depth to ground water ranged from approximately 4 to 28 feet below the ground surface at the four RI/FS sites. Slug tests conducted on monitoring wells at these sites indicated that the hydraulic conductivity of the till unit ranged from 0.22 to 0.44 feet per day and the upper bedrock hydraulic conductivity ranged from 0.029 to 0.21 feet per day. The RI report noted that bedrock test data produced hydraulic conductivities that were higher than those normally attributed to unweathered/unfractured shale (3.28 x 10^{-8} to 3.28 x 10^{-4} feet per day Driscoll, 1987).

Ground Water Classifications - RIDEM has classified ground water in Rhode Island to protect and restore the quality of the state's ground water resources for use as drinking water and other beneficial uses, and to assure protection of the public health and welfare, and the environment. The ground water under the RI/FS sites ranges in classification from GAA-NA to GB, as shown on Figure 1-3.

Ground water classified as GAA includes those ground water resources which have been designated to be suitable for public drinking water without treatment. Ground water classified GA is known or presumed to be suitable for drinking water without treatment. Ground water classified GB may not be suitable for drinking water without treatment due to known or presumed degradation. GB classified ground water is primarily located at highly urbanized areas or is located in the vicinity of disposal sites for solid waste, hazardous waste or sewerage sludge.

Non-attainment (NA) applies to those areas which are known or presumed to be out of compliance with standards of the assigned classification. The goal for non-attainment areas is restoration to a quality consistent with the classification.

1.2 Background Information

1.2.1 Site Description

McAllister Point Landfill is located in the central portion of the NETC facility (see Figure 1-4). The site covers approximately 11.5 acres and is situated between Defense Highway and Narragansett Bay. A set of Penn Central Railroad tracks run in a north-south direction along the eastern side of the site. Access to the site is off Defense Highway, across the railroad tracks, and through a gate in the south-central portion of the site. A site map is presented as Figure 1-5.

Grass, weeds, and some small trees cover most of the site. A small, lightly wooded area is present in the north-central portion of the site. A more mature wooded area is present just off the northeastern edge of the site between the railroad tracks and Defense Highway. In the central portion of the site, several depressions are present where standing water collects during heavy precipitation events. Ground elevations across the main portion of the site vary between approximately 15 and 35 feet above mean low water level (MLW). Along the western edge of the site, the grade drops off quickly to the shoreline, changing by as much as 20 feet. Metal debris and concrete rubble, which appear to serve as riprap, are present along the shoreline of the landfill. The presence of the riprap along the shoreline appears to have decreased the potential for erosion of the landfill slopes. A topographic map of the site is provided in Figure 1-5.

1.2.2 Site History

McAllister Point Landfill was the site of a sanitary landfill which operated over a 20-year period. From 1955 until the mid-1970s, the site accepted all wastes generated at the naval complex. The landfill received waste from all operational areas (machine shops, ship repair, Naval Underwater Systems Center (NUSC), etc.), Navy housing areas (domestic refuse), and from the 55 ships homeported at Newport prior to 1973 (approximately fourteen 40-cubic yard containers each day). The materials disposed of at the site included spent acids, paints, solvents, waste oils (diesel, lubrication, and fuel), and PCB-contaminated transformer oil.

A review of historic aerial photos identifies a railroad spur entering the site near the current entrance and running north into the center of the site in 1938, and large open depressions and what appear to be material storage areas and tanks in the 1940s and 1950s. From 1965 through 1975, the shoreline of the central portion of the site changes shape, indicating filling of Narragansett Bay in this area.

During the period 1955 through 1964, wastes were trucked to the site, spread with a bulldozer, and covered. In 1965, an incinerator was built at the landfill. From 1965 through 1970-71, some 98 percent of all the wastes were burned before being disposed of in the landfill. The incinerator was closed around 1970 as a result of the air pollution it caused. During the remaining years that the site was operational, all wastes were again disposed of directly into the landfill.

photos would be great.

Following the closure of the landfill at McAllister Point, a final three-foot-thick covering of clay/silt was placed over the site. However, the soil covering has not been maintained and is discontinuous across the site. Since the closure of the landfill, the site has remained inactive.

1.3 Site Geology

The soil boring activities performed at the site under the Phase I RI, as well under previous subsurface investigations (Envirodyne Engineers, 1983 and Loureiro Engineering Associates, 1986), provided information on the site geology. Previous subsurface investigation activities included the drilling and sampling of three soil borings completed for the installation of three monitoring wells (MW-21, MW-22 and MW-23). The locations of the Phase I RI wells and borings as well as the three previous site investigation well locations are shown in Figure 1-6. From the subsurface investigations, three geologic cross sections were developed for the site. The locations of the cross section lines are shown on Figure 1-6. The geologic cross sections are shown on Figures 1-7 through 1-9.

The overburden at this site consists of fill and glacial till deposits. All of the soil borings except for test boring B-13 (off-site and upgradient to the northeast) and all of the monitoring well borings, except for well MW-23 (previously installed off-site adjacent to the location of B-13), encountered fill material. The thickness of the fill material ranged from 3 feet (M-1) at the periphery of the site, to 24 feet (M-3) in the central portion of the landfill. The boring for well MW-21, previously installed at the western edge of the central portion of the landfill, reportedly encountered 38 feet of fill material. The fill material appears to have been deposited directly upon the bedrock surface across a majority of the site. The fill material encountered generally consisted of three broad categories of waste: domestic-type refuse, industrial/construction (demolition) waste, and incinerator ash. The central, mounded portion of the landfill was characterized by the presence of domestic-type refuse (e.g., plastic, paper, garbage). The remainder of the soil borings contained waste typical of building demolition debris (e.g., wood, metal, brick, concrete, etc.). Incinerator ash was encountered in borings in the northwestern portion of the site (B-1, B-2, B-4 and M-2) and in a single boring, B-9, in the southern part of the site. The ash was overlain by demolition-type debris at B-2, B-4, B-9 and M-2; at B-1 ash extended from 1.5 to 8 feet below grade and was the only type of waste encountered in the boring.

At several locations across the landfill, overlying the fill material is a clay-silt layer ranging in thickness from 0 to 4 feet. This layer is presumably the cover material or "cap" which was reportedly placed on-site when the landfill was closed in 1973. The cover material is discontinuous across the site, and was found primarily in the central portion of the landfill (soil borings B-3, B-4, B-5, and B-6), as indicated in Cross-Section B-B' (Figure 1-8) corresponding to the area in which domestic-type waste was identified. A clay-silt horizon was also encountered overlying the fill material in well boring M-5 and test boring B-10, both completed at the southern end of the landfill, and in B-1, completed in the northern portion of the landfill; however, this material did not appear to be the same "cap" material encountered in the central landfill area.

Glacial till deposits were observed directly beneath the fill and overlying the bedrock at the periphery of the site (at well borings M-1 and M-5, and test boring B-10), as indicated in Cross Section A-A' on Figure 1-7. Till was observed directly overlying the bedrock at the off-site location of soil boring B-13. Till was also encountered in boring B-4 in the central landfill area, and in B-8 in the southern portion of the site. These borings were completed within the till layer. The till encountered consisted primarily of fine to coarse sand and silt, with some horizons containing weathered shale fragments. The till varied in thickness from 4.5 feet (B-13) to 11.5 feet (M-5). One undisturbed Shelby tube soil sample was collected from the till, at the southern end of the site (M-5). The Shelby tube was collected from 14 to 15.5 feet below grade. The undisturbed soil sample was tested by Empire Soils Investigations, Inc. for triaxial permeability, particle size, and Atterberg limits. The till sample was determined to have a permeability of 2.69×10^{-7} cm/sec (7.3×10^{-4} ft/day). Grain size analysis indicated the till sample consisted of 23.5% gravel, 44.6% sand, 13.4% silt, and 18.5% clay. According to its Atterberg limits, the soil sample was classified as "non-plastic", which is typical of till.

The bedrock encountered at the McAllister Point Landfill consisted of a gray-green to black, highly weathered to competent, carboniferous shale. Cores of the shale exhibited a high degree of fracturing, with quartz and iron-oxide deposits common along the fractures. All but four of the soil borings were completed to the depth of the bedrock surface. The depth to bedrock at the site varied from 4 feet (at M-7) to 24 feet (at M-3). The bedrock surface exhibits a uniform, westward slope, towards Narragansett Bay. A bedrock contour map is presented on Figure 1-10.

1.4 Site Hydrogeology

1.4.1 Surface Water Hydrology

There are no surface water bodies present on the McAllister Point Landfill site. The general site topography slopes in an east to west direction (see Figure 1-5). Surface water on the site (precipitation or runoff from surrounding higher elevations) either evaporates, infiltrates into the site soils, or flows overland to surrounding lower elevation areas or the adjacent Narragansett Bay. During periods of heavy rainfall, water ponds in small depressions located in the north-central portion of the site. The western edge of the entire site, which borders Narragansett Bay, is at an elevation approximately 10 feet higher in elevation than the beach shoreline along the bay. Springs have been observed discharging from the bottom of the landfill bank along the western edge of the site, directly into the bay.

1.4.2 Ground Water Hydrogeology

1.4.2.1 Water Levels and Bedrock Hydraulic Conductivities

Ground water levels were measured in the nine monitoring wells installed at the site in April, July, and September of 1990, and in January of 1991. A representative ground water table contour map is presented as Figure 1-11. The contour map indicates that the site ground water is flowing from east to west, towards Narragansett Bay.

Single well hydraulic conductivity tests (slug tests) were performed in four of the monitoring wells at the site (MW-1, MW-3D, MW-5D, and MW-7). All of these wells are screened within the bedrock at the site. Monitoring wells MW-1 and MW-7 are screened in the weathered upper zone of the bedrock. The hydraulic conductivities determined from the slug tests range from 0.07 ft/day (wells MW-7 and MW-3D) to 0.20 ft/day (well MW-5D). These hydraulic conductivity values are higher than values normally attributed to shale (3.28×10^{-8} to 3.28×10^{-4} ft/day) (Driscoll, 1987) and probably reflect the highly weathered and fractured nature of the upper portion of the bedrock at the site. Slug tests were not conducted in monitoring wells screened in the fill material at the site, due to the ground water levels (i.e., insufficient water) in the shallow wells.

1.4.2.2 Vertical Hydraulic Gradients

Vertical hydraulic gradients were determined at the two sets of nested shallow/deep monitoring wells at the site (MW-3S/D and MW-5S/D). Vertical hydraulic gradients are used to evaluate whether contamination can migrate downward through an aquifer. A positive hydraulic gradient will result in an upward flow, and a negative gradient will result in a downward flow. A positive vertical gradient would tend to retard contaminant transport down through an aquifer, whereas a negative vertical gradient provides a means by which contamination can migrate toward the bottom of the aquifer. On all four of the dates that water levels were measured, a downward, or negative, hydraulic gradient was observed in both of the well pairs. The calculated vertical gradients ranged from -0.115 ft/ft (MW-3S/D on 4/3/90) to -0.242 ft/ft (MW-3S/D on 9/20/90). This indicates that ground water from above the bedrock surface (in the fill or overburden) could flow downward into the bedrock at these two locations.

1.4.2.3 Horizontal Hydraulic Gradients

Horizontal hydraulic gradients were also determined from the water level measurements at the site. Horizontal hydraulic gradients are used, along with the aquifer hydraulic conductivity and effective porosity, in determining horizontal ground water flow velocities, and hence the rate at which an aquifer may horizontally transport contaminant solutes. Horizontal hydraulic gradients were calculated for the shallow wells (screened in the fill and overburden materials), and the three deep wells (screened in bedrock) at the site on the basis of the average of the four sets of ground water level measurements taken at the site. The horizontal gradient represents the change in hydraulic head, measured in feet, per horizontal foot of travel through the medium.

Calculated shallow average horizontal hydraulic gradients ranged from 0.0056 ft/ft (MW-5S to MW-6), to 0.038 ft/ft (MW-4 to MW-3S). Deep average horizontal gradients were calculated as 0.0077 ft/ft (MW-5D to MW-3D) and 0.0049 ft/ft (MW-3D to MW-1).

1.4.2.4 Average Linear Velocities

The calculated average horizontal hydraulic gradients, along with the hydraulic conductivity and effective porosity values, were used to calculate average linear ground water velocity values at the site. Hydraulic conductivity and effective porosity values were assumed for the fill material on the basis of published values. Calculated average linear velocities for the shallow ground water ranged from 0.0061 ft/day (MW-6 to MW-5S) to 0.0417 ft/day (MW-3S to MW-4). The average linear velocities of the deep ground water were calculated as 0.0091 ft/day (MW-5D to MW-3D) and 0.0057 ft/day (MW-3D to MW-1). It is important to note that the calculated average linear ground water velocity values are lower than the "true microscopic velocities" because water particles must travel along irregular paths that are longer than the linearized paths represented by the calculated average linear velocities (Freeze and Cherry, 1979). In addition, the estimated effective porosity value for the fill at the site (52%) may be too high or low, causing the linear velocity estimates to be too low or high, respectively.

1.4.2.5 Tidal Influence

Continuous ground water level measurements were recorded in five of the monitoring wells at the site (MW-1, MW-3S, MW-3D, MW-5S, and MW-5D) for three days (August 21 to August 24, 1990). Ground water levels were recorded every 15 minutes during the three-day time period. At the same time, continuous surface water levels were recorded at a gauging station located in Narragansett Bay, adjacent to the site.

Tidal influences were observed in each of the monitoring wells except MW-3S. The influences upon monitoring wells MW-3D and MW-5S were small enough to be considered negligible. The strongest tidal influence was encountered in monitoring well MW-5D. The piezometric water level in MW-5D fluctuated by as much as 2.12 feet between high and low tide. In general, tidal influence was much stronger in the deep wells than the shallow wells. The water level fluctuations in the wells paralleled the six hour tidal period observed in the Narragansett Bay tidal station adjacent to the site. The amount of tidal fluctuation appears to be a function of proximity to Narragansett Bay and the transmissivity and storativity of the aquifer screened by the wells.

1.5 Nature and Extent of Contamination

The nature and extent of contamination at McAllister Point Landfill has been identified on the basis of site investigations, as described below.

1.5.1 Initial Assessment and Confirmation Studies

An Initial Assessment Study (IAS) was conducted at the site in 1983. The IAS (Envirodyne Engineers, 1983) identified sites at the NETC where contamination was suspected to exist and which may have posed a threat to human health or the environment. Based upon historic use of the site as a landfill and the potential contaminant migration pathways at the site, McAllister Point Landfill was identified within the IAS as an area of potential concern requiring a Confirmation Study (CS).

The CS (Loureiro Engineering Associates, 1986), conducted on the site from 1984 to 1985, consisted of two phases, the Verification and Characterization Steps. During the Verification Step of the CS, sediment and mussel samples from Narragansett Bay (including background samples), leachate samples, and one composite soil sample from the site were collected. Sample locations are shown on Figure 1-12. During the second phase of the CS, the Characterization Step, additional sediment and mussel samples were collected and a ground water investigation, consisting of the installation and sampling of two monitoring wells in the landfill area and one off-site upgradient well, was performed. See Figure 1-13 for sample locations.

Analysis of the composite surface soil sample indicated that low levels of inorganic contamination may be associated with the landfill cap material. Leachate spring samples from the western edge of the landfill exhibited cadmium, chromium, and cyanide, generally at concentrations less than 100 ppb. Ethylbenzene (30 ppb) and toluene (26 ppb) were also detected in one leachate sample. The sediment and mussel samples indicated the presence of inorganic contaminants in samples collected adjacent to the site, especially near the southern end of the landfill, with levels decreasing with distance from the site. Polychlorinated biphenyls (PCBs), which were detected in mussel samples but not in sediment samples, appeared to be attributable to bay-wide contamination, on the basis of similar levels also detected in background mussel samples. Site ground water samples exhibited elevated levels of metals. The analytical results from the sampling are provided in the Confirmation Study Final Report (Loureiro Engineering Associates, 1986).

1.5.2 U.S. Army Corps of Engineers Study

In early March 1988, the Water Quality Laboratory Engineering Division of the U.S. Army Corps of Engineers (ACOE) collected a series of six (6) sediment and mussel samples in Narragansett Bay near McAllister Point Landfill, as shown on Figure 1-14. The sediment samples were analyzed for total petroleum hydrocarbons (TPH), PCBs, and six metals (cadmium, chromium, copper, nickel, lead, and zinc). The mussel samples were also analyzed for the same six metals. The sediment sample results indicated the presence of TPH at concentrations from 30 ppm to 1,100 ppm, PCBs from 0.01 ppm to 20.3 ppm, and the presence of elevated levels of metals.

1.5.3 Phase I Remedial Investigation

The Phase I Remedial Investigation (TRC, 1991), conducted from 1989 to 1990, included site geophysical surveys and surface soil, subsurface soil, leachate and ground water sampling and analysis. Figure 1-15 provides the locations of the samples taken during the Phase I RI, while Table 1-1 gives a summary of samples taken and analyses performed. The findings of the Phase I RI are summarized below. For a detailed assessment of the Phase I RI refer to the RI Technical Report (TRC, 1991).

1.5.3.1 <u>Soil Assessment</u>

Volatile organic compounds (VOCs), base neutral/acid extractable organic compounds (BNAs) (including polynuclear aromatic hydrocarbons (PAHs)), pesticides, PCBs, and inorganics were all detected in on-site soils. Appendix M of the RI Technical Report (TRC, 1991) provides hits tables for all soil samples at the site.

The major areas of the site where contaminants were detected in the soil at elevated levels include the following:

- Northern area - Carcinogenic PAHs;
- North-central area - BNAs, carcinogenic PAHs, and inorganics;
- Central landfill area - VOCs, BNAs, PCBs and inorganics;
- South of access road - BNAs, carcinogenic PAHs, and inorganics; and
- Shoreline - BNAs, carcinogenic PAHs, and inorganics.

Volatile Organic Compounds (VOCs) - 1,1,1-Trichloroethane (1,1,1-TCA) was the only VOC detected in surface soil samples (in SS-01 at 12 ppb, SS-04 at 5 ppb, and SS-06 at 2 ppb). No other VOCs were observed at detectable concentrations at any surface sampling location. In subsurface soils, VOCs detected in several samples and/or at elevated levels included 1,2-dichloroethene, 1,1,1-TCA, trichloroethane, benzene, tetrachloroethene, toluene, chlorobenzene, ethylbenzene, and xylene. In general, significant VOC contamination (i.e., greater than 1 ppm total VOCs) was detected in soils and fill in the central portion of the landfill area, but VOC levels were not consistently high throughout the depth of the soil horizons sampled. Figure 1-16 provides an illustration of the general extent of volatile organic soil contamination.

Base Neutral/Acid Extractables (BNAs) - The highest concentrations of total BNAs (greater than 100 ppm) were detected in six soil samples in the central and southern portions of the site (in B05-2, B09-1, M03-2, M03-3, SS-06, and SS-11 at concentrations of 1,171 ppm, 1,010 ppm, 1,943 ppm, 506 ppm, 202 ppm, and 194 ppm, respectively). The general extent of BNA soil contamination is shown in Figure 1-17. The presence and distribution of polynuclear aromatic hydrocarbons (PAHs) and carcinogenic PAHs were also considered. The highest total PAH concentrations (greater than 50 ppm) and carcinogenic PAH concentrations (22 ppm to 256 ppm) were detected in samples collected at the following locations: B-5, M-3, SS-02, SS-06, SS-08 and SS-11. Locations where total carcinogenic PAHs were elevated (greater than 1 ppm) relative to total BNA concentrations (less than 10 ppm) are also indicated in Figure 1-17.

Pesticides/PCBs - The pesticides detected most frequently in the site soils were 4,4-DDE, 4,4-DDD, and 4,4-DDT. The other pesticides detected, beta-BHC, aldrin, dieldrin, and alpha-chlordane, were each detected in only one sample. The highest pesticide concentrations were detected in soil samples SS-11 (4,4-DDT at 1,800 ppb) and B05-2 (4,4-DDT at 2,300 ppb).

PCBs are primarily present in the subsurface soils across the site, with nearly half (50%) of the sample locations containing detectable levels of PCBs. Four PCB Aroclors (Aroclors 1242, 1248, 1254, and 1260) were detected in at least one sample, with a maximum detected total PCB concentration of 1.1 ppm at B12-2. PCBs were detected in only four of the surface soil samples (SS-12, SS-13, SS-14, and SS-15), and all of those samples were from the shoreline area.

Some of the highest levels (>200 ppb) of PCBs detected at the site were detected in soil samples collected from the 22- to 24-foot interval. Figure 1-18 shows the general extent of PCB soil contamination at the site.

Inorganics - Inorganics levels in the site soil samples were compared to background inorganics levels, as defined by the analyses of two background surface soil samples (SS-16 and SS-17). Based on this comparison, a general trend of elevated concentrations of antimony, arsenic, barium, cadmium, calcium, chromium, cobalt, copper, lead, manganese, magnesium, nickel, silver, vanadium, and zinc across the site is apparent, as shown on Figure 1-19. Lead was particularly elevated at one surface soil sample near the shore (SS-15), where the detected concentration was 1,980 ppm.

1.5.3.2 Ground Water Assessment

Under the ground water investigation, a total of nine (9) wells were installed across the site as shown on Figure 1-15. Ground water samples were collected from all of the wells except MW-2, which was dry at the time of sampling. Three existing wells (MW-21, MW-22, and MW-23) and one leachate location (LS-1) were also sampled. Below is a summary of ground water contamination detected at the site. A detailed description can be found in the RI Technical Report (TRC, 1991). For the purpose of the RI, ground water contaminant levels were compared to federal and state action levels, including final, proposed, and tentative maximum contaminant levels (MCLs).

VOCs, BNAs, PCBs and inorganics were all detected in ground water samples. The major areas of the site where contaminants were detected at levels exceeding action levels include the following:

- Northern area - inorganics;
- North-central area - inorganics;
- Central landfill area - VOCs, and inorganics; and
- South of access road - VOCs, PCBs, and inorganics.

Ground water sample results indicated the presence of low level VOC contamination in the central and southern portions of the site, consisting mostly of aromatic VOCs (e.g., xylene and benzene). Low concentrations (1 to 160 ppb) of VOCs were detected in five of the ten on-site wells (MW-3S, MW-3D, MW-4, MW-5S, and MW-21). VOCs were also detected in soil boring samples collected at the depth of the water table from the north-central to southern portions of the site, indicating the potential for ground water contamination throughout this area. A thin oil layer was observed in one well (MW-5S) in the southern portion of the site five months after it was sampled. Figure 1-20 provides an illustration of the extent of VOC contamination in the shallow wells.

BNAs were detected in three of the eleven wells sampled (MW-3S, MW-4, and MW-5S). The BNAs detected consisted primarily of PAHs and phenols with the highest level of total PAHs being 407 ppb at well MW-3S.

No pesticides were detected in ground water samples. A PCB concentration of 0.73 ppb was detected in the well in the southern portion of the site (MW-5S) in which a thin oil layer was subsequently observed.

The inorganic ground water sample results indicate the presence of numerous inorganic analytes in the ground water samples collected at the site. Inorganics were detected in each of the twelve wells sampled and in the leachate sample. Figure 1-21 shows the general extent of inorganic ground water contamination as defined during the Phase I RI on the basis of federal action levels, as described previously.

1.6 Contaminant Fate and Transport

A contaminant fate and transport analysis was conducted as part of the Phase I RI to evaluate the fate and transport of contaminants associated with the site and to provide an indication of the potential future contaminant movement. That analysis is summarized below. For a more detailed discussion refer to the RI Technical Report (TRC, 1991).

Several of the environmental media studied, primarily surface soils and ground water, present a potential pathway for off-site contaminant migration. Subsurface soils are not likely to be at risk of transport off-site unless exposed by excavation. Contaminants in surface soils can migrate or be carried from the site by surface runoff (resulting from precipitation), in the form of fine particulates sorbed to windblown dust, and by users of the site via vehicle tires, shoes, etc. In addition, contaminants can migrate from the surface soils through leaching (by infiltration of precipitation) and subsequent transport by ground water, and by volatilization to the ambient air. Transport of contaminants to plants or animals which may subsequently be consumed by humans is also a possible route of migration. The sampling results have demonstrated that the site ground water has been impacted, thereby indicating that contaminants have leached downward through the site soils and fill materials. As discussed in Section 1.4.2, the ground water flow direction at the site is towards Narragansett Bay, with tidal influences observed in bedrock wells located adjacent to the bay. Leachate seeps draining form the western bank of the site have also been observed. Therefore, contaminated ground water migration to Narragansett Bay is a potential migration pathway.

The discussions below are presented with respect to individual contaminants or contaminant groups. Contaminants observed in the environmental samples collected from the site include volatile organic compounds (VOCs), base neutral/acid extractable compounds (BNAs), PCBs, pesticides, and inorganics.

1.6.1 **Volatile Organic Compounds**

The principal mechanism for the natural removal of VOCs is through volatilization (EPA, 1979). Compounds with higher vapor pressures have a greater tendency to volatilize from soil. The role of biodegradation in the natural attenuation of these compounds is compound-specific. Similarly, the role of adsorption is compound-specific; the amount adsorbed is highly related to both the amount of organic carbon in the soil and a compound's organic/water partition coefficient (K_{oc}). The compounds with higher K_{oc} values would be preferably partitioned to organic matter in soils and thus would be less likely to be leached from the soils and transported to the ground water.

Typically, VOCs were detected infrequently and at low concentrations in on-site soils. Subsurface soils showed the greatest pattern of occurrence of VOCs of the three media sampled. VOCs detected most frequently and at the greatest concentrations in subsurface soils included ethylbenzene, tetrachloroethene, toluene, trichloroethane, and xylenes. In general, these contaminants are only moderately mobile in soils, and their presence in subsurface soils may be a result of past disposal practices.

Aromatic and chlorinated hydrocarbons present above trace concentrations (>10 ppb) in ground water samples included chlorobenzene (11 ppb), ethylbenzene (12 ppb) , and xylene (160 ppb). The chemical/physical and environmental fate data indicate that these hydrocarbons are likely to migrate downward in soils to ground water.

The ground water flow direction at the site is primarily to the west (towards Narragansett Bay). Contamination present in monitoring wells MW-21 and MW-5 is considered to be indicative of potential off-site migration of ground water contaminants. Detectable levels of xylenes were noted in monitoring wells MW-5S, MW-5D, and MW-21, suggesting potential VOC migration in the ground water.

1.6.2 **Base Neutral/Acid Extractable Compounds (BNAs)**

BNAs were detected in all of the media sampled on-site. BNAs are generally characterized by high boiling points, low vapor pressures, and low solubilities (except phenols).

Polynuclear aromatic hydrocarbons (PAHs), a subset of BNAs, were frequently detected in surface and subsurface soils on site. PAHs generally have a very low solubility (<4.0 mg/l) and high K_{oc} values (>2,500 ml/g). This indicates that most PAHs readily adsorb to organic carbon in soils. While PAHs were detected in centrally located wells (e.g., MW-3S), PAHs were not detected in downgradient wells, such as MW-5 and MW-21. Thus, migration of PAHs from soil to ground water does not appear to be a primary route of concern.

Phenols and phenol compounds generally display a higher solubility than other BNA compounds, relatively low K_{oc}, and relatively low volatility, resulting in a tendency to leach from soil into ground water. Phenols and phenol compounds were not detected in surface soil, but were detected at a frequency of greater than 50% in subsurface soil. Phenols were detected in trace concentrations in ground water samples (2,4-dimethylphenol, 4-chloro-3-methylphenol, and 4-methylphenol). It is unclear if phenols are migrating with ground water off-site at this time since none of the contaminants detected on-site were detected in MW-21. Both 2,4-dimethylphenol and 4-chloro-3-methylphenol were detected in MW-5S but not in MW-5D.

Phthalate compounds were reported in samples from all environmental media collected at the site. They generally exhibit low solubility and high K_{oc} values, and thus would not be amenable to water transport. This statement is somewhat consistent with the site data which show that the phthalates occur at much greater concentrations in soil samples than in ground water. Phthalates detected in ground water include bis(2-ethylhexyl)phthalate, butylbenzylphthalate, dimethylphthalate, di-n-butylphthalate, di-n-octylphthalate, and diethylphthalate. Only diethylphthalate was detected in one downgradient well (MW-5D).

1.6.3 Pesticides and PCBs

Pesticide and PCB compounds were detected in both surface soil and subsurface soil samples. In general, pesticides and PCBs have an affinity for organics in soil (high K_{oc} value), which tends to render them immobile. In addition, most pesticides and PCBs tend to be persistent in the environment.

The occurrence of pesticides and PCBs at the site typically is confined to soils, with the exception of the detection of PCBs in the well (MW-5S) in which a thin oil layer was later observed. Therefore, for the most part, pesticides and PCBs do not appear to be migrating from the site. However, where these compounds are present in the surface soils, they have the potential to be transported with suspended sediments via surface water runoff.

1.6.4 Inorganics

Many metals have an affinity for soils which reduces their mobility. The analytes which were detected at levels elevated above U.S. background surface soil levels in one or more samples are antimony, arsenic, cadmium, cobalt, copper, lead, mercury, nickel, and zinc. The analytes which appeared elevated above background in subsurface soil samples include antimony, arsenic, cadmium, cobalt, copper, lead, magnesium, mercury, nickel, selenium, and zinc.

With the exception of cyanide, selenium, silver, thallium, and vanadium, all inorganic analytes were commonly detected in the ground water samples, suggesting potential migration from soils and waste fill materials. On-site inorganic levels in the ground water were compared to data from the downgradient wells (MW-5 and MW-21). Beryllium, nickel, and zinc appeared to be slightly elevated in MW-5S, indicating potential movement of these analytes in the ground water.

1.7 Human Health Assessment

The exposure scenarios considered in the human health evaluation of the McAllister Point Landfill site included:

- **Trespassing Scenario (Scenario 1)** - Exposure of trespassing children from 9 to 18 years of age to site surface soils through dermal contact and ingestion.

- **Recreational Use Scenario (Scenario 2)** - Exposure of children from 6 to 18 years of age (due to development of the site as a ballfield) to site surface soils through dermal contact and ingestion.

- **Construction Scenario (Scenario 3)** - Exposure of adult construction workers for a period of one year to subsurface soils through inhalation, dermal contact and ingestion.

- **Commercial/Industrial Use Scenario (Scenario 4)** - Exposure of adult employees through commercial/industrial use of the site to surface soils through ingestion and dermal contact and to ground water through ingestion.

- **Residential Use Scenario (Scenario 5)** - Exposure of children from 0 to 6 years of age and adults (30-year period) to surface soil through soil/house dust ingestion, inhalation and dermal contact and to ground water through dermal contact, inhalation and ingestion.

Human health risks potentially associated with the site, which may include risks of cancer or non-cancerous (systemic) effects, were evaluated. Both average-case (based on the geometric mean of the on-site data) and maximum (based on the highest detected on-site concentration) risks were calculated. Cancer risk levels, the lifetime incremental probabilities of excess cancer due to exposure to the site contaminants, were estimated, taking into account exposure concentrations and the carcinogenic potencies of the chemicals. The cancer risk estimates are presented in scientific notation, where a lifetime risk of 1×10^{-4} represents a lifetime risk of one in ten thousand.

Health effects associated with exposures to non-carcinogenic chemicals were evaluated using RfDs. The associated chemical-specific risk was quantitated by the Hazard Index Ratio (HI), which is the ratio of the exposure dose to the RfD.

The calculated cancer risks and non-cancer HIs were evaluated using available regulatory guidance. The calculated risk is compared to the acceptable lifetime cancer risk range (1×10^{-4} to 1×10^{-6}) for evaluating the need for remediation, as stated in 40 CFR Part 300 (EPA, 1990b).

EPA (1990b) considers a cancer risk of 1×10^{-6} as the point of departure for determining risk-based remediation goals. For non-carcinogenic risks, a target HI of unity is used. When the total HI for an exposed individual or group of individuals exceeds unity, there may be concern for potential non-cancer health effects. Thus, the cancer risk and HI ratios that constitute a potential concern are those which are greater than 1×10^{-4} and unity (1), respectively. Cancer risks which fall within the range of 1×10^{-4} to 1×10^{-6} (referred to as within the acceptable risk range) require further evaluation. The potential risks posed by the site in association with each scenario evaluated, and the exposure pathway(s) driving the calculated risks are summarized below:

- **Trespassing Scenario (Scenario 1)** - Total cancer risks fall within the acceptable range; total hazard index ratios are acceptable (less than unity).
- **Recreational Use Scenario (Scenario 2)** - The maximum cancer risk value (1.3×10^{-4}), slightly exceeds the acceptable risk range. The mean risk value and total hazard index ratio range are within acceptable values.
- **Construction Scenario (Scenario 3)** - The total cancer risk range and the mean hazard index ratio are within acceptable values. The maximum hazard index ratio (2.5) exceeded the acceptable value.
- **Commercial/Industrial Use Scenario (Scenario 4)** - The total cancer risks (1.8×10^{-3} and 3.9×10^{-3}) and the hazard index ratios (1.8 and 13) exceed acceptable values.
- **Residential Use Scenario (Scenario 5)** - The total cancer risks (ranging from 2.3×10^{-3} to 1.3×10^{-2}) and the hazard index ratios (ranging from 5 to 65) exceed acceptable values for both children and adult receptors.

For Scenarios 1, 2, and 3, the major contributing factor to the calculation of cancer risk is ingestion of carcinogenic PAHs in soil. The pathway of primary concern associated with Scenarios 4 and 5 with respect to cancer risk is ingestion of ground water containing inorganics (arsenic, beryllium) and carcinogenic PAHs. The primary contributor to the total hazard index ratio for Scenarios 1, 2, and 3 is ingestion of inorganics in soil. Ingestion of inorganics (antimony, arsenic, cadmium, chromium, copper, manganese, mercury and zinc) in ground water drives the total hazard index ratio for Scenarios 4 and 5.

While current risks posed by site surface soils to potential trespassers fall within the acceptable risk range of 1×10^{-4} to 1×10^{-6}, they exceed the point of departure risk level of

1×10^{-6}. Existing conditions at the site may pose a potential risk to the environment as well, due to the potential for contaminant migration via erosion and the continued generation of leachate as a result of the infiltration of precipitation.

2.0 IDENTIFICATION OF POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA, 1986), and the National Contingency Plan (NCP, 1990) require that all remedial response actions attain or exceed applicable or relevant and appropriate requirements (ARARs) of Federal and more stringent promulgated requirements of State environmental statute(s). The NCP defines applicable requirements as "those cleanup standards, standards of control, other substantive environmental protection requirements, criteria or limitations promulgated under federal environmental or state environmental facility siting law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site." Relevant and appropriate requirements are defined in the NCP as "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at the CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site."

To-be-considered criteria (TBCs) are non-promulgated advisories or guidance issued by federal or state government that are not legally binding and do not have the status of potential ARARs. The TBC material may provide useful information or procedures if no ARAR addresses a particular situation or if existing ARARs do not provide sufficient protection. Therefore, in many circumstances TBCs may be considered along with ARARs in determining the necessary level of cleanup for protection of health or the environment.

ARARs may be categorized as: 1) chemical-specific requirements, which may define acceptable exposure levels and be used in establishing preliminary cleanup goals; 2) location-specific requirements, which may set restrictions on activities within specific locations such as floodplains or wetlands; and 3) performance, design or other action specific requirements, which may set controls or restrictions for particular treatment activities related to the management of hazardous wastes. The documents CERCLA Compliance With Other Laws Manual (U.S. EPA, 1988b), and CERCLA Compliance With Other Laws Manual: Part II. Clean Air Act and Other

Environmental Statutes and State Requirements (U.S. EPA, 1989b), contain detailed information on identifying and complying with ARARs. Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites (U.S. EPA, 1991a) was also used in the identification of potential ARARs/TBCs.

The identification of potential ARARs is a site-specific process which is dependent on the specific hazardous substances, pollutants, and contaminants at a site, the physical characteristics of a site and the remedial actions under consideration at a site. Therefore, it is also an iterative process which requires re-examination throughout the RI/FS process, until a Record of Decision (ROD) is issued.

Preliminary lists of Federal and State of Rhode Island ARARs have been compiled for the McAllister Point Landfill Site, and are presented in Tables 2-1 through 2-6. Later in this document, within the detailed analysis of alternatives, individual remedial alternatives will be evaluated in detail to determine their compliance with ARARs/TBCs and the potential impacts of ARARs/TBCs on their implementation. A comprehensive approach has been taken in which the ARARs/TBCs applicable to all media at McAllister Point Landfill are presented, not just the media to be impacted by the operable unit addressed in this Focused Feasibility Study.

2.1 Potential Chemical-Specific ARARs/TBCs

2.1.1 Potential Federal Chemical-Specific ARARs/TBCs

Potential federal chemical-specific ARARs and TBC criteria are presented in Table 2-1. While ground water at McAllister Point Landfill is not a current source of drinking water, Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs), published under the Safe Drinking Water Act (40 CFR 141.11-.16, 141.50-.52, and 141.60-.63), as well as Ground Water Protection Standards Alternate Concentration Limits promulgated under the Resource Conservation and Recovery Act (RCRA) may be relevant and appropriate in assessing the need for ground water remediation. The U.S. EPA Risk Reference Doses (RfDs), Lifetime Health Advisories, and the U.S. EPA Human Health Assessment Group Cancer Slope Factors (CSFs) will represent TBC criteria.

The Ambient Water Quality Criteria (AWQC) promulgated under the Clean Water Act, represent potential TBC criteria for remedial alternatives which involve discharges to surface waters.

The Toxic Substance Control Act provides PCB cleanup levels for solid surfaces and soils where spills occurred after May 4, 1987. While not applicable, these levels may be relevant and appropriate for McAllister Point Landfill. The Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites (OSWER Directive 9355.4-02) will represent TBC criteria for the lead in soils at the site. Toxicity Characteristic requirements (40 CFR 261.24) are applicable to actions involving the excavation of soils, which could require handling as hazardous waste on the basis of Toxicity Characteristic Leachate Parameter (TCLP) analysis. Also, Land Disposal Restrictions (40 CFR 268.30-268.35) represent an ARAR applicable to alternatives which utilize land disposal of hazardous wastes.

Sections of the Clean Air Act which establish maximum concentrations for particulates and fugitive dust emissions, emissions limitations for new sources, and emissions limitations for hazardous air pollutants, are considered potential chemical-specific ARARs for remedial alternatives which impact ambient air.

2.1.2 Potential Rhode Island Chemical-Specific ARARs/TBCs

Potential Rhode Island chemical-specific ARARs and TBC criteria for McAllister Point Landfill are presented in Table 2-2. Potential chemical-specific ARARs for ground water remediation include the Rhode Island Public Drinking Water Regulations (RI Ground Water Protection Act, RIGL, Title 46, Chapter 13). The Rhode Island Water Quality Standards, under the RI Water Pollution Control Law (RIGL, Title 46, Chapter 12), will apply to remedial alternatives which involve discharges to surface waters. The Rhode Island Department of Environmental Management (RIDEM) has historically applied a non-promulgated cleanup standard of 1 part per million (ppm) for PCB contamination. Proposed Amendments to the Rules and Regulations for Hazardous Waste Management, under the RI Hazardous Waste Management Act of 1987, define Type 6 - extremely hazardous waste as including waste containing PCBs at a concentration of 50 ppm or greater. Proposed Amendments to the Rules and Regulations for Solid Waste Management Facilities define solid waste as including any soil, debris, or other material with a concentration of PCBs of 10 ppm or greater. These proposed regulations will be considered as TBCs until promulgated. RIDEM and the Rhode Island Department of Health-Risk Assessment consider a safe lead level in soil (total) as under 300 ppm. This guidance also is considered a TBC.

The RI Clean Air Act (RI Title 23, Chapter 23) establishes maximum ambient levels for criteria pollutants under the Air Pollution Control Regulation Standards. These levels constitute potential chemical-specific ARARs for remedial alternatives which emit pollutants into the air.

2.2 Potential Location-Specific ARARs/TBCs

A site's location is a fundamental determinant of its impact on human health and the environment. Location-specific ARARs are restrictions placed on the concentrations of hazardous substances or the conduct of activities based on their specific location (U.S. EPA 1988b). McAllister Point Landfill is situated in an area with a diversity of land uses. The following sections indicate the various potential federal and state location-specific ARARs or TBCs which may be applicable to the site.

2.2.1 Potential Federal Location-Specific ARARs/TBCs

Federal location-specific ARARs and TBCs potentially applicable the McAllister Point Landfill are presented in Table 2-3. Wetland/water resource regulations, including Executive Order 11990, Wetlands Construction and Management Procedures, and the Prohibition of Wetland Filling under the Clean Water Act will apply to any remedial action which impacts on- or off-site wetlands. In addition, the Fish and Wildlife Coordination Act requires consideration of wildlife conservation when water bodies may be impacted by a decision-making process. A functional wetlands assessment will be conducted during Phase II remedial investigations. The Wild and Scenic Rivers Act will not be considered a potential ARAR since no designated rivers lie in the vicinity of the site.

Floodplain regulations are potentially applicable to remedial activities conducted at McAllister Point Landfill, since the shoreline of the site lies within 100-year coastal flood area. The regulations include Executive Order 11988 and the Flood Disaster Protection Act of 1973, both of which regulate activities conducted within floodplains, and the National Flood Insurance Act of 1968, which provides insurance for disaster relief and establishes flood control methods.

Based on McAllister Point Landfill's location adjacent to Narragansett Bay, the Coastal Zone Management Act is a potential ARAR because it regulates activities affecting the coastal zone and adjacent shoreline.

The Endangered Species Act of 1973, which restricts activities in areas inhabited by registered endangered species, is a potential ARAR because areas near the site may sustain endangered or threatened wildlife species. An ecological evaluation of the site, to be conducted as part of the Phase II RI, will further define the presence or absence of endangered species.

The National Historic Preservation Act of 1966 and the Archeological and Historic Preservation Act of 1974 are potential ARARs for remedial actions which may impact cultural resources or sites of archeological significance.

Based on site observations, the Farmland Protection Policy Act is not considered a potential ARAR for the site. Similarly, regulations regarding coastal barriers and wilderness areas are not applicable or relevant and appropriate to the site.

2.2.2 Potential State Location-Specific ARARs/TBCS

State location-specific ARARs/TBCs potentially applicable to McAllister Point Landfill are presented in Table 2-4. Rhode Island defines and establishes provisions for the protection of swamps, marshes, and other freshwater wetlands in the state under Rhode Island Wetland Laws. These regulations are potential ARARs for any remedial actions which would impact a wetland area. As mentioned previously, a functional wetlands assessment will be conducted during Phase II remedial investigations.

Ground water regulations under the Rhode Island Ground Water Protection Act may be potential ARARs for the site, since ground water in the vicinity of the site is classified by the State as GAA Non-attainment.

The RI Water Pollution Control Law represents a potential ARAR for any remedial action which impacts surface water.

2.3 Potential Action-Specific ARARs/TBCs

Based on the identification of contaminants in various on-site media at McAllister Point Landfill, remediation activities may be required and numerous state and federal requirements could apply to the implementation of these activities. Potential action-specific ARARs/TBCs pertaining to such general response actions as no action, institutional controls, containment, material removal, ground water collection, treatment, decontamination, and disposal are provided in the following sections.

2.3.1 Potential Federal Action-Specific ARARs/TBCs

Numerous federally promulgated action-specific ARARs and TBC criteria could potentially affect the implementation of remedial measures. The primary federal regulatory requirements potentially applicable to remediation at McAllister Point Landfill appear on Table 2-5.

The primary federal administrative requirements which may guide remediation are those established under the following:

- Resource Conservation and Recovery Act
  - (40 CFR 258) Criteria for Municipal Solid Waste Landfills,
  - (40 CFR 262) Generator Requirements for Manifesting Waste for Off-Site Disposal,
  - (40 CFR 263) Transporter Requirements for Off-Site Disposal,
  - (40 CFR 264 and 265) Standards and Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities,
  - (40 CFR 268) Land Disposal Restrictions;
- Toxic Substances Control Act (applicable to handling of PCB-contaminated materials);
- Safe Drinking Water Act (applicable to discharges to ground water);
- Clean Water Act (applicable to discharges to surface water and publicly owned treatment works);
- Fish and Wildlife Coordination Act (applicable to modifications of water bodies);
- Clean Air Act (applicable to discharges to the atmosphere);
- Hazardous Materials Transportation Act (applicable to off-site shipment of hazardous waste);

- Federal Water Pollution Control Act (applicable to discharges to Narragansett Bay); and

- Occupational Safety and Health Act (applicable to personnel involved in hazardous activities).

2.3.2 **Potential State Action-Specific ARARs/TBCs**

The State of Rhode Island has promulgated regulations similar to those of the federal government. The potential state action-specific ARARs which may be applicable to the remediation of McAllister Point Landfill are presented in Table 2-6.

The RI Water Pollution Control Act is a potential ARAR which establishes general requirements and effluent limits for discharge of treated waters to surface waters, ground waters (including discharge to a source of public drinking water supply), or a POTW. This act also establishes ground water classifications and maximum contaminant levels for each classification. Remedial alternatives which impact coastal areas require the review of the RI Coastal Resource Management Council (CRMC).

The RI Hazardous Waste Management Act of 1978 and the RI Hazardous Substance Community Right-to-Know Act are potential ARARs for alternatives which involve the on- or off-site management of hazardous wastes. Proposed Rules and Regulations for the Investigation and Remediation of Hazardous Materials Releases present requirements for the design and operation of remedial systems. The RI Refuse Disposal Law provides the basis for rules and regulations governing solid waste management.

The RI Clean Air Act sets emissions limitations for particulates and visible air contaminants. The Clean Air Act is a potential ARAR for alternatives involving remedial actions which impact ambient air.

Table 1-1
SITE 01 – MCALLISTER POINT LANDFILL
SAMPLE SUMMARY

MATRIX (SAMPLE TYPE)	NUMBER OF SAMPLES ENVIRONMENTAL	DUPLICATE	FIELD BLANK	TRIP BLANK(1)	EPA SPLIT	ANALYSES(2)
SURFACE SOIL	15	2	–	3	–	A,B,C,D,E
	–	–	3		–	A,B,C,D
	4	1	1	1	–	A
	2	–	–	–	–	D
TEST BORINGS	26	3	–	–	–	A,B,C,D,E
	4	–	6	8	–	A,B,C,D
	1	–	–	–	–	A,D,E
	2	–	–	–	–	F
WELL BORINGS	10	–	–	–	–	A,B,C,D,E
	8	1	5	5	–	A,B,C,D
GROUND WATER	11	1	1	4	2	A,B,C,D
TAP WATER (3)	2	–	–	–	–	A,B,C,D
LEACHATE SPRING WATER	1	–	–	1	–	A,B,C,D

(1) – Trip blanks analyzed for volatile organic compounds only.
(2) – Analyses performed as follows:
A) Target Compound List Volatile Organic Compounds
B) Target Compound List Base Neutral/Acid Extractable Compounds
C) Target Compound List Pesticide/PCB Compounds
D) Target Analyte List (Metals & Cyanide)
E) 2,3,7,8–TCDD (Dioxin) Archived
F) TCLP Analysis
(3) – Samples of Tap Water Used In Equipment Decontamination.

TABLE 2-1
FEDERAL CHEMICAL-SPECIFIC ARARs AND TBCs
FOCUSED FEASIBILITY STUDY
McALLISTER POINT LANDFILL
NETC - NEWPORT

MEDIA	REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Ground Water--				
	Safe Drinking Water Act (40 CFR 141.11-.16 and 141.60-.63) Maximum Contaminant Levels (MCL's)	Applicable	MCL's directly apply to "public water systems", defined as systems with at least 15 connections which service a minimum of 25 persons.	Ground water at McAllister Point Landfill is not a current source of drinking water, but is classified as GAA Non-attainment. MCLs therefore may be applicable to the assessment of ground water remediation at the site.
	Safe Drinking Water Act (40 CFR 141.50-.52) Maximum Contaminant Level Goals (MCLGs)	Applicable	Non-enforceable health goals for public water supply systems, set at levels which result in no known or anticipated adverse health effects.	Non-zero MCLGs are to be used as remedial goals for current or potential sources of drinking water, per the NCP (40 CFR 300). Ground water at McAllister Point Landfill is not a current source of drinking water, but is classified as GAA Non-attainment. MCLGs therefore may be applicable to the assessment of ground water remediation at the site.
	Resource Conservation and Recovery Act (RCRA), Subpart F (40 CFR 264.94) Ground Water Protection Standards, Alternate Concentration Limits	Relevant and Appropriate	Sets ground water protection standards for 14 pesticides and metals or allows for the development of alternate concentration limits for facilities which treat, store or dispose of hazardous waste.	While McAllister Point Landfill does not meet the definition of a RCRA solid waste management unit, RCRA ground water concentration limits may be relevant and appropriate to the assessment of ground water remediation at the site.
	USEPA Risk Reference Doses (RfDs)	To Be Considered	Toxicity values for evaluating noncarcinogenic effects resulting from exposures to contamination.	USEPA RfDs are used to characterize risks due to noncarcinogens in ground water; TBC criteria due to the presence of contaminants in ground water.
	Lifetime Health Advisories	To Be Considered	Guidelines developed based on toxicity for noncarcinogenic compounds	TBC criteria due to the presence of contaminants in ground water.
	USEPA Human Health Assessment Group Cancer Slope Factors (CSFs)	To Be Considered	A slope factor is used to estimate an upper-bound probability of an individual developing cancer as a result of a lifetime of exposure to a particular level of a potential carcinogen.	USEPA CSFs are used to compute the individual incremental cancer risk resulting from exposure to certain compounds; TBC criteria due to the presence of contaminants in ground water.

TABLE 2-1, continued
FEDERAL CHEMICAL-SPECIFIC ARARs AND TBCs
FOCUSED FEASIBILITY STUDY
McALLISTER POINT LANDFILL
NETC - NEWPORT

MEDIA	REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Surface Water --				
	Clean Water Act (Section 303 and 304) Ambient Water Quality Criteria (AWQC)	To be determined	Basis under which non-enforceable guidelines are established for the protection of human health and/or aquatic organisms.	AWQC are to be considered for remedial alternatives which involve discharges to surface water.
Soils/Surfaces--				
	Toxic Substances Control Act (40 CFR 761.125)	Relevant and Appropriate	Establishes PCB cleanup levels for soils and solid surfaces.	Applicable to spills of materials containing PCBs at concentrations of 50 ppm or greater that occurred after May 4, 1987. While not applicable to McAllister Point Landfill, these requirements may be relevant and appropriate.
	Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites (OSWER Directive 9355.4-02)	To Be Considered	Sets forth an interim soil cleanup level for lead at 500 to 1000 ppm.	To be considered, since lead has been detected in on-site soils.
	Toxicity Characteristic (40 CFR 261.24)	To be determined	Establishes maximum concentrations of contaminants for the toxicity characteristic using the test method described in 40 CFR 261 Appendix II.	Applicable to the identification of soils which, if excavated, may require handling as a hazardous waste on the basis of the Toxic Characteristc Leachate Parameter (TCLP) analysis.
	Land Disposal Restrictions (40 CFR 268.30 - 268.35)	To be determined	Establishes maximum concentrations of contaminants on the basis of which hazardous wastes are restricted from land disposal.	This regulation will be applicable to alternatives which utilize land disposal of hazardous waste.

TABLE 2-1, continued
FEDERAL CHEMICAL-SPECIFIC ARARs AND TBCs
FOCUSED FEASIBILITY STUDY
McALLISTER POINT LANDFILL
NETC - NEWPORT

MEDIA	REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Air--				
	Clean Air Act (40 CFR 50) National Ambient Air Quality Standards (NAAQS)	To be determined	Establishes maximum levels for pollutants and particulates within air quality control districts.	Potential ARARs for alternatives involving remedial actions which impact ambient air (e.g. incinerators)
	Clean Air Act (40 CFR 60) New Source Performance Standards (NSPS)	To be determined	Establishes emissions limitations for new sources (source-specific requirements).	Potential ARARs for alternatives involving treatment methods which are subject to NSPS (e.g. an incinerator) or if the pollutant emitted and the technology employed are sufficiently similar to that regulated by NSPS.
	Clean Air Act (40 CFR 61) National Emissions Standards for Hazardous Air Pollutants (NESHAPS)	To be determined	Establishes emissions standards for hazardous air pollutants.	Potential ARARs for alternatives involving treatment methods which emit hazardous air pollutants.

TABLE 2-2
STATE CHEMICAL-SPECIFIC ARARs AND TBCs
FOCUSED FEASIBILITY STUDY
McALLISTER POINT LANDFILL
NETC - NEWPORT

MEDIA	REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Ground Water--				
	RI Ground Water Protection Act (RIGL, 46-13 et seq.) Public Drinking Water Regulations	Applicable	Establishes provisions for the protection and management of potable drinking waters, including the development of ground water classifications and associated standards which specify maximum contaminant levels for each classification.	Ground water at McAllister Point Landfill is not a current source of drinking water, but is classified as GAA Non-attainment. These regulations are applicable to the assessment of ground water remediation at the site.
Surface Water --				
	RI Water Pollution Control Law (RIGL 46-12 et seq.) RI Water Quality Standards	To be determined	Establishes water use classification and water quality criteria for all waters of the state. Also establishes acute and chronic water quality criteria for the protection of aquatic life.	Regulation will be applicable for remedial alternatives which involve discharges to surface water.
Soils/Surfaces--				
	Soil Cleanup Standards (Guidance)	To Be Considered	A PCB cleanup standard of 1 ppm has historically been used by RIDEM, while RIDEM and the Rhode Island Department of Health-Risk Assessment consider a safe lead level in soil (total) to be under 300 ppm.	To be considered since PCB and lead have been detected in on-site soils.
	RI Hazardous Waste Management Act of 1987 (RIGL 23-19.1 et seq.) Proposed Amendments to the Rules and Regulations for Hazardous Waste Management	To Be Considered	Defines Type 6 - extremely hazardous waste as including wastes which contain PCBs at a concentration of 50 ppm or greater or showing 10 $\mu g/100\ cm^2$ or greater as measured by a standard wipe test.	To be considered since PCBs have been detected in on-site soils.
	Proposed Amendments to the Rules and Regulations for Solid Waste Management Facilities	To Be Considered	Defines solid waste as including any soil, debris, or other material with a concentration of PCBs of 10 ppm or greater or containing 2 $\mu g/100\ cm^2$ or greater as measured by a standard wipe test.	To be considered since PCBs have been detected in on-site soils.

TABLE 2–2, continued
STATE CHEMICAL–SPECIFIC ARARs AND TBCs
FOCUSED FEASIBILITY STUDY
McALLISTER POINT LANDFILL
NETC – NEWPORT

MEDIA	REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Air--				
	RI Clean Air Act (RIGL Title 23, Chapter 23) Air Pollution Control Regulation Standards	To be determined	Establishes maximum ambient levels for criteria pollutants.	Potential ARARs for remedial alternatives involving treatment methods which emit criteria pollutants.

TABLE 2-3
FEDERAL LOCATION-SPECIFIC ARARs AND TBCs
FOCUSED FEASIBILITY STUDY
McALLISTER POINT LANDFILL
NETC - NEWPORT

MEDIA	REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Wetlands/Water Resources--				
	Executive Order 11990	To be determined	Regulates activities conducted in a wetland area to minimize the destruction, loss, or degradation of the wetlands and to preserve and enhance the natural and beneficial values of wetlands.	Will be applicable if implementation of a remedial action impacts wetland areas.
	Wetlands Construction and Management Procedures (40 CFR 6, Appendix A)	To be determined	Sets forth EPA policy for carrying out the provisions of Executive Order 11990 (see above)	Will be applicable if implementation of a remedial action impacts wetland areas.
	Clean Water Act Section 404 (40 CFR 230.10) and Rivers and Harbors Act (Section 10) Prohibition of Wetland Filling	To be determined	Prohibits the discharge of dredged or fill material to a wetland if there is a practicable alternative which poses less of an adverse impact on the aquatic ecosystem or if it causes significant degradation of the water.	Will be applicable if implementation of a remedial action involves the discharge of dredged or fill material to a wetland area or to the water.
	Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 661) Protection of Wildlife Habitats	To be determined	Requires consideration of wildlife conservation during planning and decision making process which may impact water bodies, including wetlands.	Potential ARAR if existing site conditions or the implementation of a remedial action results in an impact to a water body.
Floodplains --				
	Executive Order 11988 Protection of Floodplains	To be determined	Regulates activities conducted in a floodplain to minimize adverse affects to the floodplain and ensure that flood hazards have been considered.	Potential ARAR as the shoreline of McAllister Point Landfill is located within an area of 100-year coastal flood with velocity (wave action).
	Flood Disaster Protection Act of 1973 Protection of Floodplain	To be determined	Regulates development in flood prone areas under FEMA.	Potential ARAR as the shoreline of McAllister Point Landfill is located within an area of 100-year coastal flood with velocity (wave action).

TABLE 2-3, continued
FEDERAL LOCATION-SPECIFIC ARARs AND TBCs
FOCUSED FEASIBILITY STUDY
McALLISTER POINT LANDFILL
NETC - NEWPORT

MEDIA	REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Floodplains (cont.)--				
	National Flood Insurance Act of 1968 (24 CFR 1909.1-.24)	To be determined	Provides flood insurance for disaster relief and establishes flood control methods.	Potential ARARs as the shoreline of McAllister Point Landfill is located within an area of 100-year coastal flood with velocity (wave action).
Coastal Zones--				
	Coastal Zone Management Act (16 USC Section 1451 et seq.)	To be determined	Regulates activities affecting the coastal zone including lands thereunder and adjacent shoreline.	Potential ARAR as McAllister Point Landfill is located in a coastal zone.
Endangered Species--				
	Endangered Species Act of 1973 (16 U.S.C. 1531) Protection of Endangered Species	To be determined	Restricts activities in areas inhabited by registered endangered species.	Potential ARAR for activities which could impact endangered or threatened wildlife species.
Cultural Resources--				
	National Historic Preservation Act of 1966 (16 USC 470, et seq.) Protection of Historic Lands and Structures	To be determined	Requires actions to take into account effects on properties included in or eligible for the National Register of Historic Places and minimizes harm to National Historic Landmarks.	Potential ARAR for activities which could impact historic places.
	Archeological and Historic Preservation Act of 1974 (132 CFR 229 & 229.4, 43 CFR 7 & 7.4) Protection of Archeological and Historic Lands	To be determined	Restricts the use of land of known archeological or historical significance.	Potential ARAR for activities which could impact archeological or historic places.

TABLE 2-4
STATE LOCATION-SPECIFIC ARARs AND TBCs
FOCUSED FEASIBILITY STUDY
McALLISTER POINT LANDFILL
NETC - NEWPORT

MEDIA	REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Wetlands--	Rhode Island Wetlands Laws (RIGL 2-1-18 et seq.)	To be determined	Defines and establishes provisions for the protection of swamps, marshes and other freshwater wetlands in the state.	Regulation will be applicable if implementation of a remedial action impacts a wetland area.
Ground Water--	RI Ground Water Protection Act (RIGL, Title 46, Chapter 13.1 et. seq.)	Applicable	Provides for protection of state ground waters, requiring the maintenance or upgrading of existing or potential drinking water sources and prohibits the degradation of state ground water.	Applicable since ground water at McAllister Point Landfill is designated GA-NAA.
Surface Water--	RI Water Pollution Control Law (RIGL 46-12 et seq.) Rhode Island Water Quality Standards	To be determined	Provides for the restoration and preservation of state surface waters.	Regulations will be applicable if existing contamination or implementation of a remedial action impacts surface water.

TABLE 2-5
FEDERAL ACTION-SPECIFIC ARARs AND TBCs
FOCUSED FEASIBILITY STUDY
McALLISTER POINT LANDFILL
NETC - NEWPORT

REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Resource Conservation and Recovery Act (RCRA) (40 CFR 258) Criteria for Municipal Solid Waste Landfills (Subtitle D)	Applicable	Outlines specifications and standards for the location, operation, design, monitoring, and closure of municipal solid waste landfills.	Since no wastes were disposed of on-site after November 19, 1990 (the effective data of RCRA), RCRA Subtitle D requirements are applicable.
40 CFR 258.60 - Closure Criteria for Municipal Solid Waste Waste Landfills	Applicable	Requires and establishes guidelines for design of a municipal landfill final cover system.	Applicable for alternatives which include closure of the landfill area.
40 CFR 258.61 - Post Closure Care Requirements for Municipal Solid Waste Landfills	Applicable	Establishes requirements for maintaining integrity and effectiveness of cover, and other monitoring systems.	Applicable for alternatives which include closure of the landfill area.
RCRA (40 CFR 262) Generator Requirements for Manifesting Waste for Off-Site Disposal	To be determined	Standards for manifesting, marking and recording off-site hazardous waste shipments for treatment/disposal.	This regulation will be applicable to alternatives which utilize an off-site disposal/treatment method for hazardous wastes.
RCRA (40 CFR 263) Transporter Requirements for Off-Site Disposal	To be determined	Standards for transporters of hazardous waste materials.	This regulation will be applicable to alternatives which utilize an off-site disposal/treatment method for hazardous wastes.
RCRA (40 CFR 264 and 265) Requirements for Hazardous Waste Treatment Facility Design and Operating Standards for Treatment and Disposal Systems	To be determined	Outlines specifications and standards for design, operation, closure and monitoring of performance for hazardous waste storage, treatment and disposal facilities.	Potential ARARs for alternatives which utilize a surface impoundment, waste pile, landfill, land treatment, incineration or miscellaneous treatment units for on-site storage/disposal/treatment of hazardous wastes.
40 CFR 264.10-264.18 Subpart B - General Facility Standards	To be determined	General requirements regarding waste analysis, security, training, inspections, and location applicable to a facility which stores, treats or disposes of hazardous wastes (a TSDF facility).	This regulation may be applicable to remedial actions which address a waste which is a listed or characteristic waste under RCRA and which constitute current treatment, storage, or disposal as certified by RCRA.

TABLE 2-5, continued
FEDERAL ACTION-SPECIFIC ARARs AND TBCs
FOCUSED FEASIBILITY STUDY
McALLISTER POINT LANDFILL
NETC - NEWPORT

REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
40 CFR 264.30-264.37 Subpart C - Preparedness and Prevention	To be determined	Requirements applicable to the design and operation, equipment, and communications associated with a TSDF facility, and to arrangements with local response departments.	This regulation may be applicable to remedial actions which address a waste which is a listed or characteristic waste under RCRA and which constitute current treatment, storage, or disposal as certified by RCRA.
40 CFR 264.50-264.56 Subpart D - Contingency Plan and Emergency Procedures	To be determined	Emergency planning procedures applicable to a TSDF facility.	This regulation may be applicable to remedial actions which address a waste which is a listed or characteristic waste under RCRA and which constitute current treatment, storage, or disposal as certified by RCRA.
40 CFR 264 Subpart F Ground Water Protection	To be determined	Ground water monitoring/corrective action requirements; dictates adherence to MCLs and establishes points of compliance.	Potential ARARs for alternatives which involve placement of hazardous wastes within solid waste management units, including surface impoundments, waste piles, and land treatment units.
40 CFR 264 Subpart G Closure/Post Closure Requirements	To be determined	Establishes requirements for the closure and long-term management of a hazardous disposal facility.	Applicable to the closure of a RCRA hazardous waste management facility.
40 CFR 264 Subpart I Use and Management of Containers	To be determined	Outlines use and management standards applicable to owners and operators of all hazardous waste facilities that store containers of hazardous waste.	Potential ARARs for remedial actions which require storage of hazardous waste in containers.
40 CFR 264 Subpart L Waste Piles	To be determined	Regulates owners and operators of facilities that store or treat hazardous waste in piles.	Potential ARARs for remedial alternatives which utilize a waste pile for on-site storage/treatment of hazardous waste.

TABLE 2-5, continued
FEDERAL ACTION-SPECIFIC ARARs AND TBCs
FOCUSED FEASIBILITY STUDY
McALLISTER POINT LANDFILL
NETC - NEWPORT

REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
40 CFR 264 Subpart O Incinerator Restrictions	To be determined	Outlines specifications and standards for incinerating hazardous waste.	Potential ARARs for alternatives which utilize incineration for on-site treatment of hazardous wastes.
40 CFR 264.600-264.999 Subpart X - Miscellaneous Units	To be determined	Environmental performance standards, monitoring requirements and post-closure care requirements applicable to miscellaneous units (not otherwise defined in the RCRA regulations) used to treat, store or dispose of hazardous waste.	This regulation may be applicable to remedial actions involving hazardous waste treatment, storage or disposal in units not otherwise covered under RCRA regulations.
RCRA (40 CFR 268) Land Disposal Restrictions	To be determined	Identifies hazardous wastes that are restricted from land disposal and sets treatment standards for restricted wastes.	This regulation will be applicable to alternatives which utilize land disposal of hazardous wastes.
Toxic Substances Control Act (15 USC. Sect. 2601)(40 CFR 761.60-761.79) Subpart D - Storage and Disposal Requirements for PCBs	To be determined	Establishes requirements for the storage, landfilling, and incineration of PCBs.	This regulation may be relevant and appropriate to alternatives which involve handling of PCBs or PCB-contaminated materials.
Safe Drinking Water Act (40 CFR 144 and 146) Underground Injection Control Requirements	To be determined	Establishes the general requirements, technical criteria and standards for underground injection wells.	This regulation will be applicable to alternatives in which treated water is discharged back to the ground water.
Clean Water Act (40 CFR 122-125) National Pollutant Discharge Elimination System (NPDES) Permit Requirements	To be determined	Permits contain applicable effluent standards (i.e., technology-based and/or water quality-based), monitoring requirements, and standards and special conditions for discharge.	This regulation will be applicable to alternatives in which treated water is discharged to surface waters or back to the ground water.

TABLE 2-5, continued
FEDERAL ACTION-SPECIFIC ARARs AND TBCs
FOCUSED FEASIBILITY STUDY
McALLISTER POINT LANDFILL
NETC - NEWPORT

REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Clean Water Act (40 CFR 403) Discharge to Publicly- Owned Treatment Works (POTW)	To be determined	A national pretreatment program designed to protect municipal wastewater treatment plants and the environment from damage that may occur when hazardous, toxic or other non-domestic wastes are discharged into a sewer system.	This regulation is applicable to alternatives in which waters are discharged to a POTW.
Clean Water Act (40 CFR 404) Requirements for Discharge of Dredged or Fill Material	To be determined	Prohibits activities that impact a wetland unless no other practical alternatives are available.	Potential ARARs for alternatives conducted in or around adjacent wetlands.
Fish & Wildlife Coordination Act (16 U.S.C. 661) Protection of Wildlife Habitats	To be determined	Regulates actions which cause the impoundment, diversion or modification of a body of water, or affect fish and wildlife.	Potential ARARs for alternatives conducted in or around adjacent wetlands.
Clean Air Act (40 CFR 50) National Ambient Air Quality Standards (NAAQS)-Particulates	To be determined	Establishes maximum concentrations for particulates and fugitive dust emissions.	Potential ARARs for alternatives involving treatment methods which impact ambient air. (e.g. incinerators)
Clean Air Act (40 CFR 50) New Source Performance Standards (NSPS)	To be determined	Requires Best Available Control Technology (BACT) for new sources, and sets emissions limitations.	Potential ARARs for alternatives involving treatment methods which impact ambient air. (e.g. incinerators)
Clean Air Act (40 CFR 61) Emissions Standards for Hazardous Pollutants (NESHAPS)	To be determined	Establishes emissions limitations for hazardous air pollutants.	Potential ARARs for alternatives using treatments (e.g., incinerators) which result in emissions to the air.

TABLE 2-5, continued
FEDERAL ACTION-SPECIFIC ARARs AND TBCs
FOCUSED FEASIBILITY STUDY
McALLISTER POINT LANDFILL
NETC - NEWPORT

REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Hazardous Materials Transportation Act (49 CFR 171, 172) Rules for Transportation of Hazardous Materials	To be determined	Procedures for packaging, labelling, manifesting, and off-site transport of hazardous materials.	This regulation will be applicable to alternatives which include off-site transport of hazardous materials.
Federal Water Pollution Control Act (40 CFR 220-233) Ocean Discharge Criteria	To be determined	Establishes general requirements for discharge into United States oceans.	This regulation will be applicable if waters or dredged materials are discharged to Narragansett Bay.
Occupational Safety and Health Act (29 CFR 1904) Recordkeeping, Reporting and Related Regulations	To be determined	Outlines recordkeeping and reporting requirements.	These requirements will apply to all contractors/ subcontractors involved in hazardous activities.
Occupational Safety and Health Act (29 CFR 1910) General Industry Standards	To be determined	Establishes requirement for 40-hour training and medical surveillance of hazardous waste workers. Establishes Permissible Exposure Limits (PELs) for workers at hazardous waste operations and during emergency response.	These requirements will apply to all contractors/ subcontractors involved in hazardous activities.
Occupational Safety and Health Act (29 CFR 1926) Safety and Health Standards	To be determined	Regulations specify the type of safety equipment and procedures for site remediation/excavation.	These requirements will apply to all contractors/ subcontractors involved in hazardous activities.

TABLE 2-6
STATE ACTION-SPECIFIC ARARs AND TBCs
FOCUSED FEASIBILITY STUDY
McALLISTER POINT LANDFILL
NETC - NEWPORT

REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
RI Water Pollution Control Act			
RI Water Quality Regulations (RIGL 46-12 et seq.)	To be determined	Establishes general requirements and effluent limits for discharge to area waters.	This regulation will be applicable to alternatives in which treated water is discharged to area surface water or ground water.
RI Pollutant Discharge Elimination Systems (RIGL 46-12 et seq.)	To be determined	Permits contain applicable effluent standards (i.e., technology-based and/or water quality-based), monitoring requirements, and standards and special conditions for discharge.	This regulation will be applicable to alternatives in which treated water is discharged to area surface water or ground water.
RI Pretreatment Regulations (RIGL 46-12 et seq.)	To be determined	Establishes rules concerning pretreatment of water prior to discharge to a Rhode Island POTW.	This regulation will be applicable to alternatives which include discharge of waters to a POTW.
RI Underground Injection Control Regulations (RIGL 46-12 et seq.)	To be determined	Establishes the general requirements, technical criteria and standards for underground injection wells.	This regulation will be applicable to alternatives in which treated water is discharged back to the ground water via injection.
Public Drinking Water Laws (RIGL, Title 46, Chapter 14) Protection of Public Drinking Water	To be determined	Establishes rules concerning discharge to any source of water supply for drinking purposes.	Potential ARARs for alternatives which affect public drinking water supplies.
RI Ground Water Protection Act (RIGL, Title 46, Chapter 13.1) Protection of Ground Water	To be determined	Establishes ground water classifications and maximum contaminant levels for each classification.	Potential ARARs for alternatives involving the treatment of contaminated ground water. Will establish cleanup levels.
RI Hazardous Waste Management Act of 1978 (RIGL 23-19.1 et seq.) Hazardous Waste Management Rules and Regulations and Proposed Amendments	To be determined	Rules and regulations for hazardous waste generation, transportation, treatment, storage, and disposal.	These rules will be applicable for alternatives which involve the on- or off-site management of hazardous wastes. Establish closure and post closure rules for land disposal facilities.

TABLE 2–6, continued
STATE ACTION–SPECIFIC ARARs AND TBCs
FOCUSED FEASIBILITY STUDY
McALLISTER POINT LANDFILL
NETC – NEWPORT

REQUIREMENT	STATUS	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Proposed Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases	To be determined	Proposed rules and regulations for the investigation and remediation of releases of hazardous materials.	These rules, when promulgated, will be applicable to the design and operation of remedial systems.
RI Refuse Disposal Law Rules and Regulations and Proposed Amendments for Solid Waste Management Facilities	Applicable	Rules and regulations intended to minimize environmental hazards associated with the operation of solid waste transfer, resource recovery, and disposal facilities.	Applicable to design and implementation of closure and post closure plans for McAllister Point Landfill.
RI Hazardous Substance Community Right to Know Act (RIGL, Title 23, Chapter 24.4) Public Right–to–Know Requirements	To be determined	Establishes rules for the public's right–to–know concerning hazardous waste storage and transportation.	These rules will be applicable for alternatives which involve the on– or off–site management of hazardous wastes.
RI Clean Air Act (RIGL, Title 23, Chapter 23) General Air Quality and Air Emissions Requirements	To be determined	Sets emissions limitations for particulates and visible air contaminants.	ARARs for alternatives involving remedial actions which impact ambient air.
RI Coastal Resource Management Council (CRMC)	To be determined	Review actions which impact coastal areas.	Alternatives which impact coastal areas will require CRMC approval.

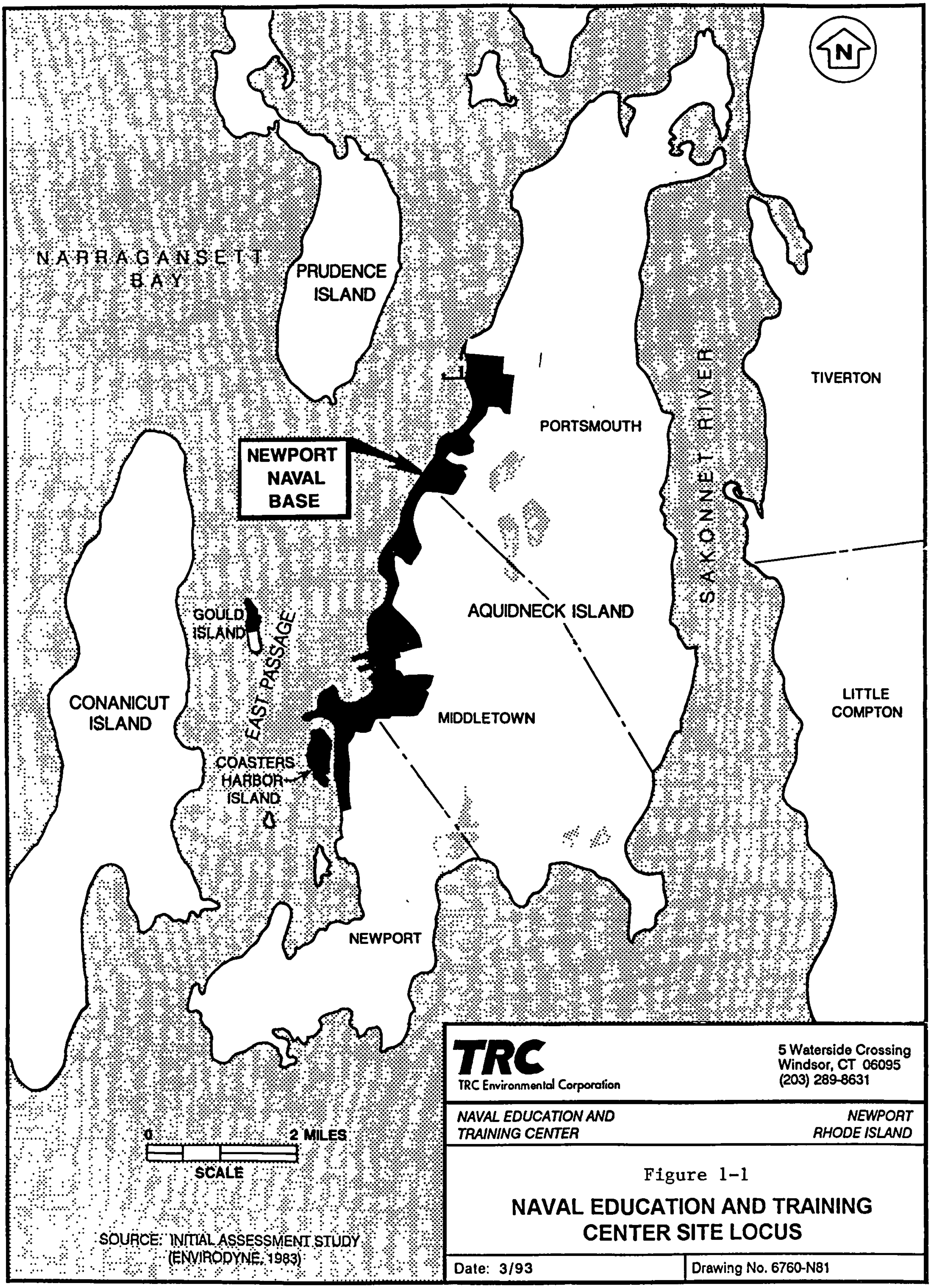

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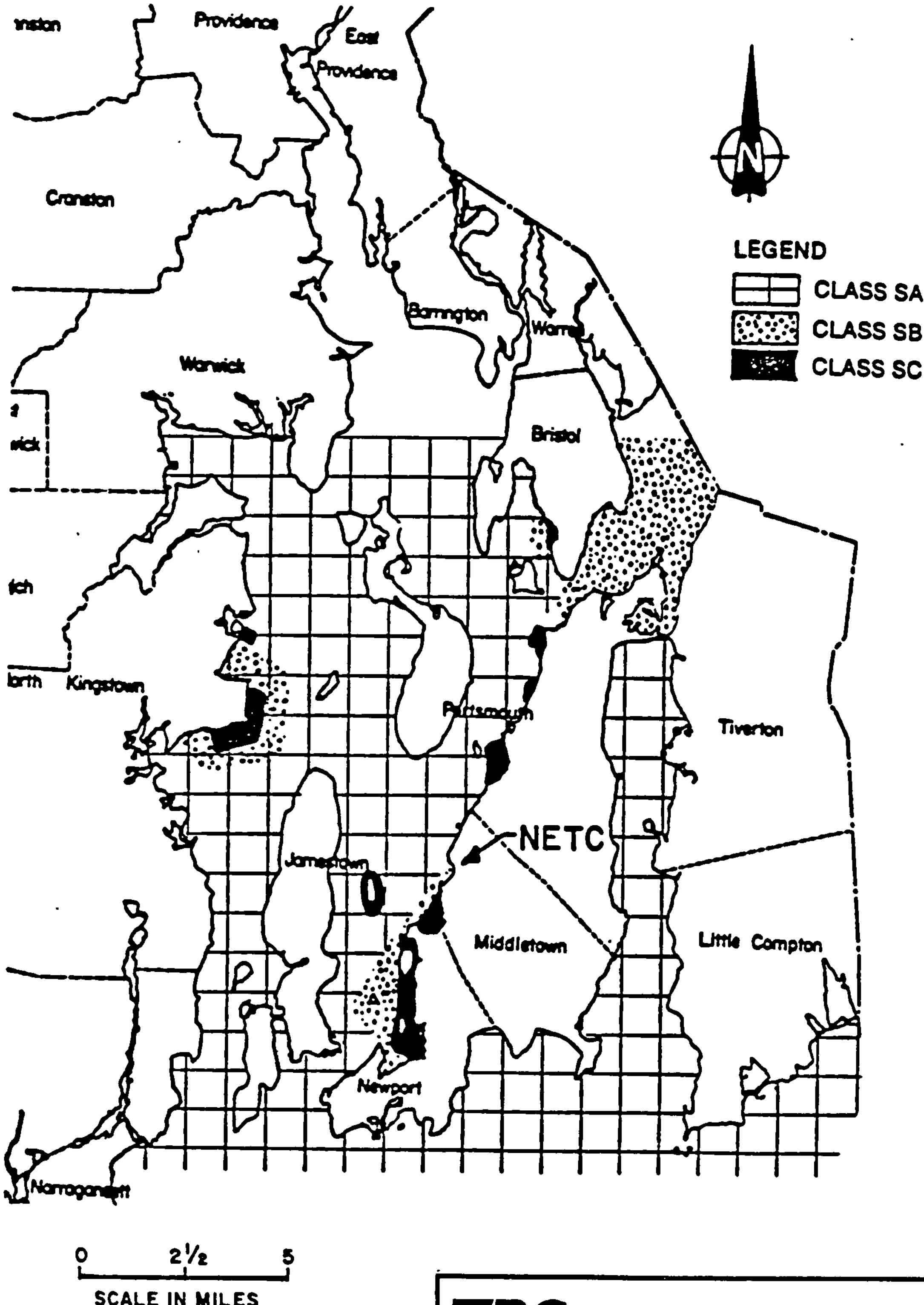
Figure 1-1

NAVAL EDUCATION AND TRAINING CENTER SITE LOCUS

Date: 3/93 | Drawing No. 6760-N81



SOURCE: FIGURE 5.3-8 OF 1983 IAS REPORT (ENVIRODYNE)

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Figure 1-2

SURFACE WATER QUALITY MAP OF NARRAGANSETT BAY

Date: 3/93 | Drawing No. ~~6760-N81~~

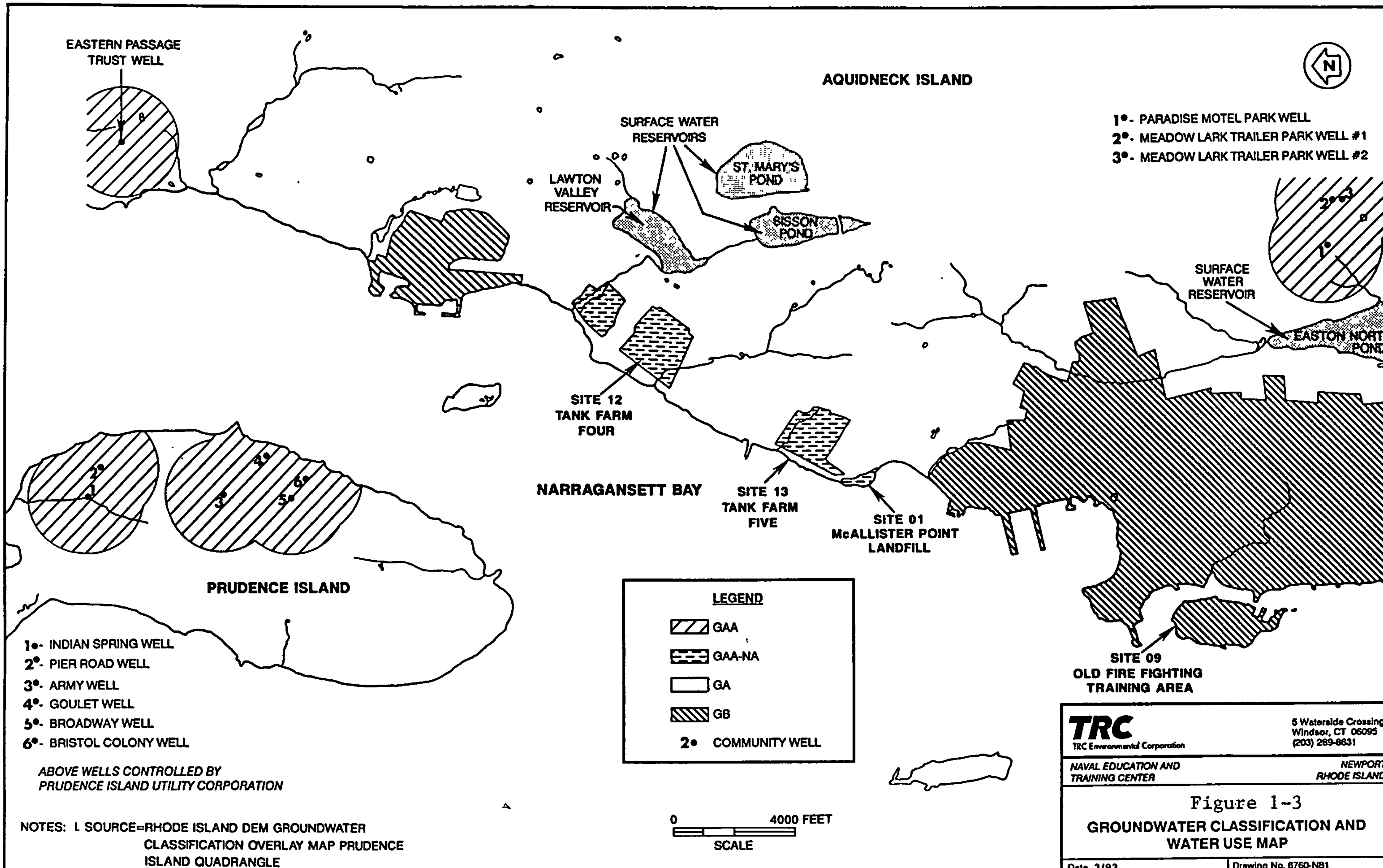


Figure 1-3
GROUNDWATER CLASSIFICATION AND WATER USE MAP

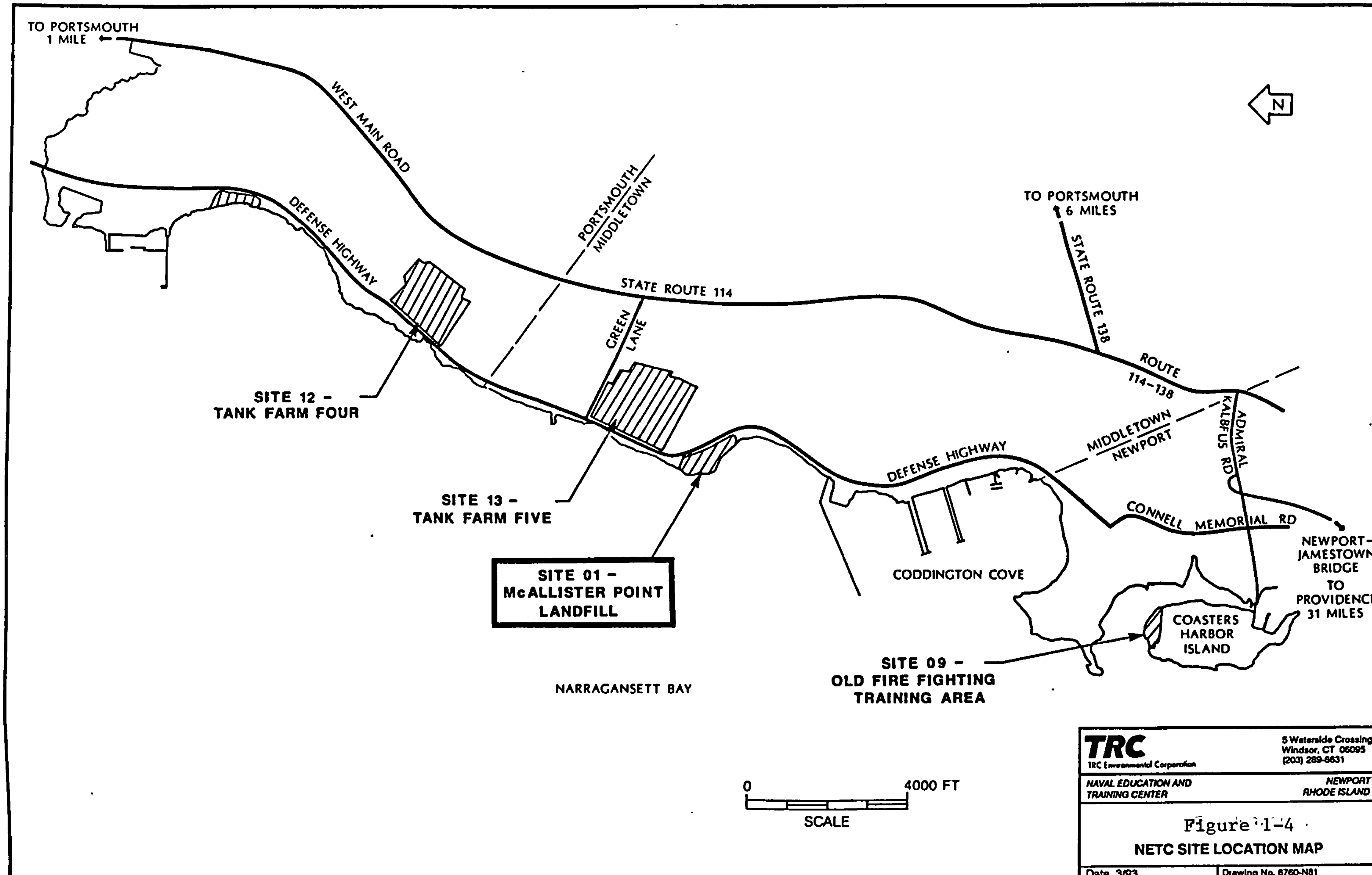
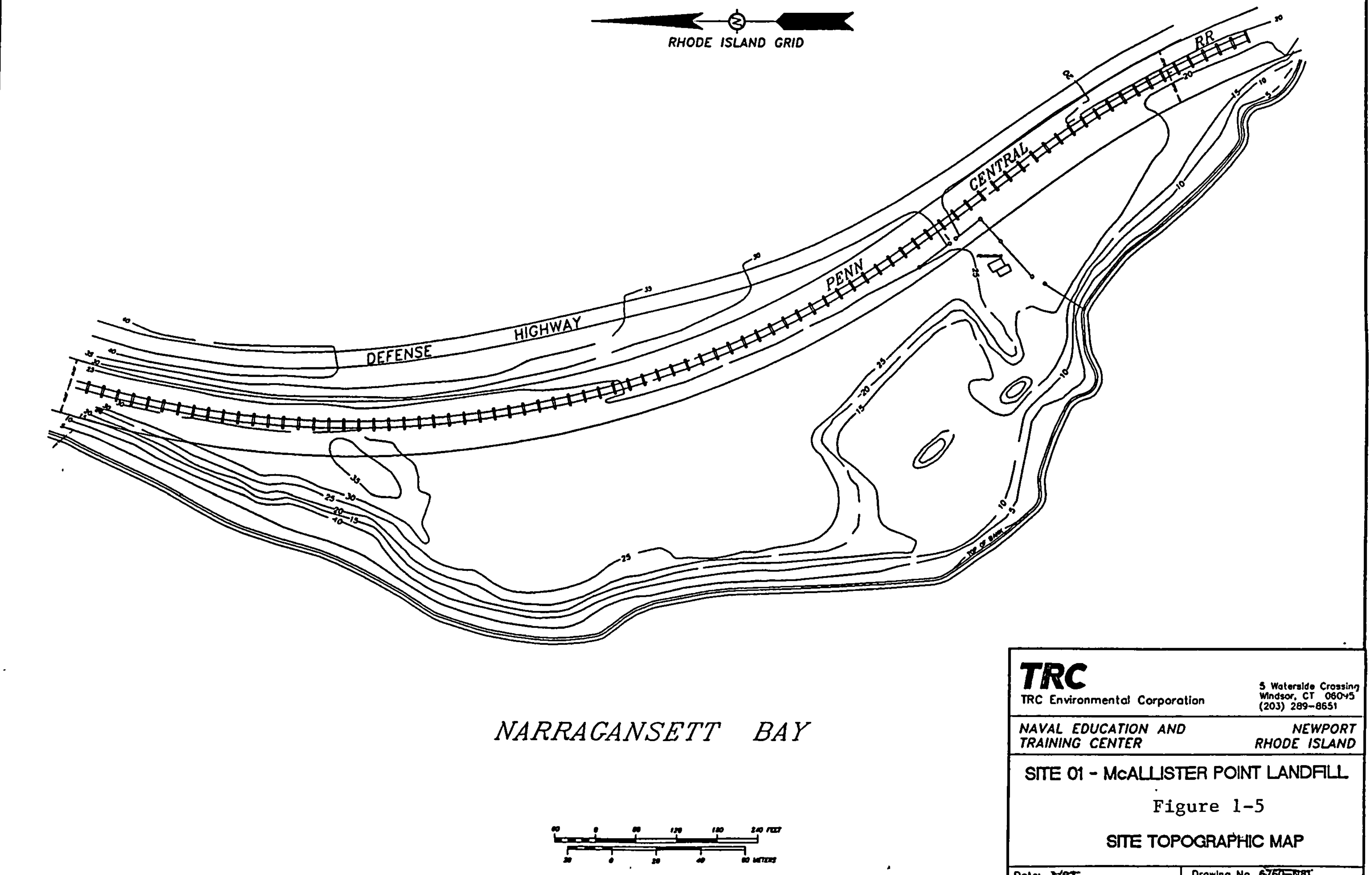


Figure 1-4
NETC SITE LOCATION MAP



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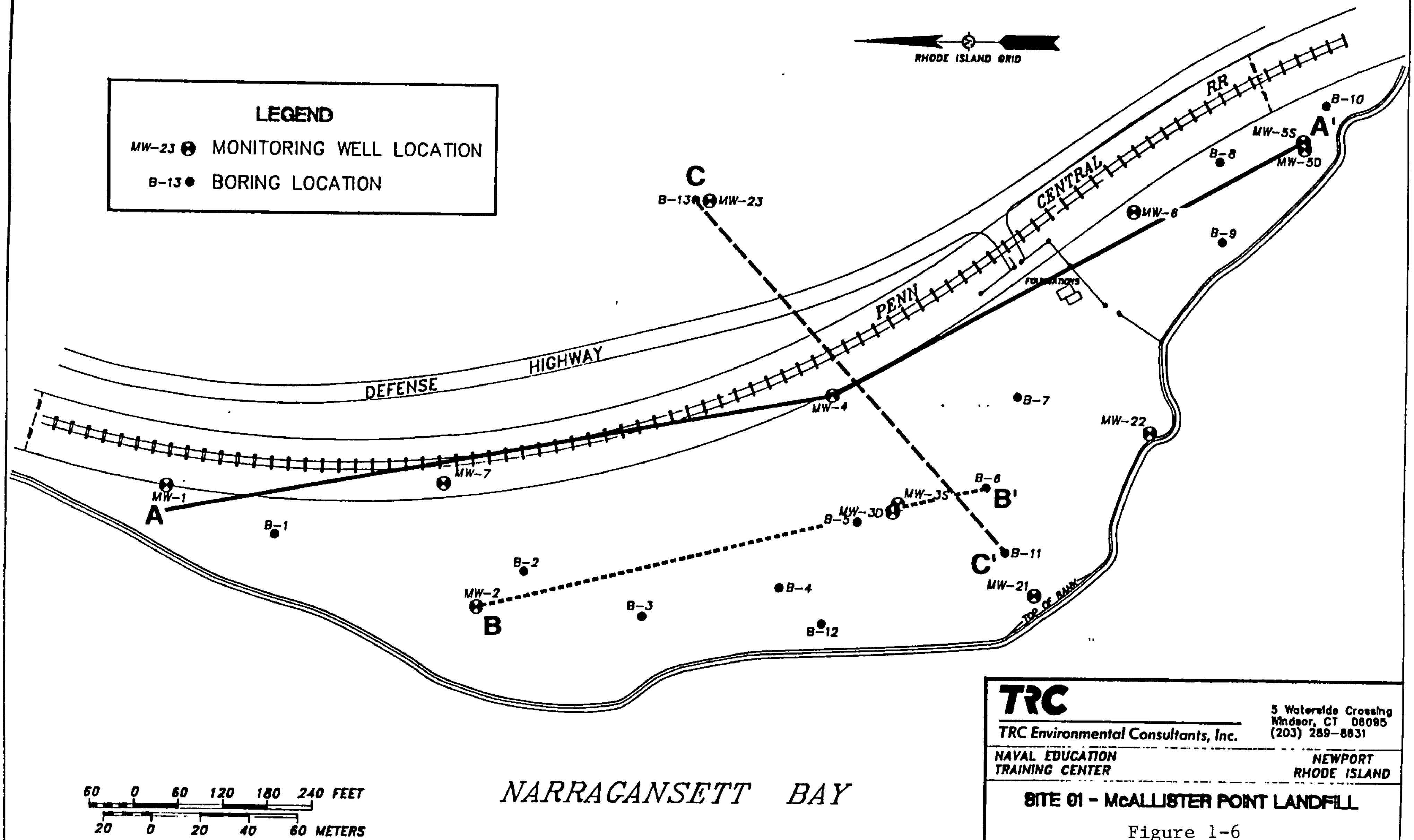
SITE 01 - McALLISTER POINT LANDFILL

Figure 1-5

SITE TOPOGRAPHIC MAP

Date: 3/93 | Drawing No. 6760-N81



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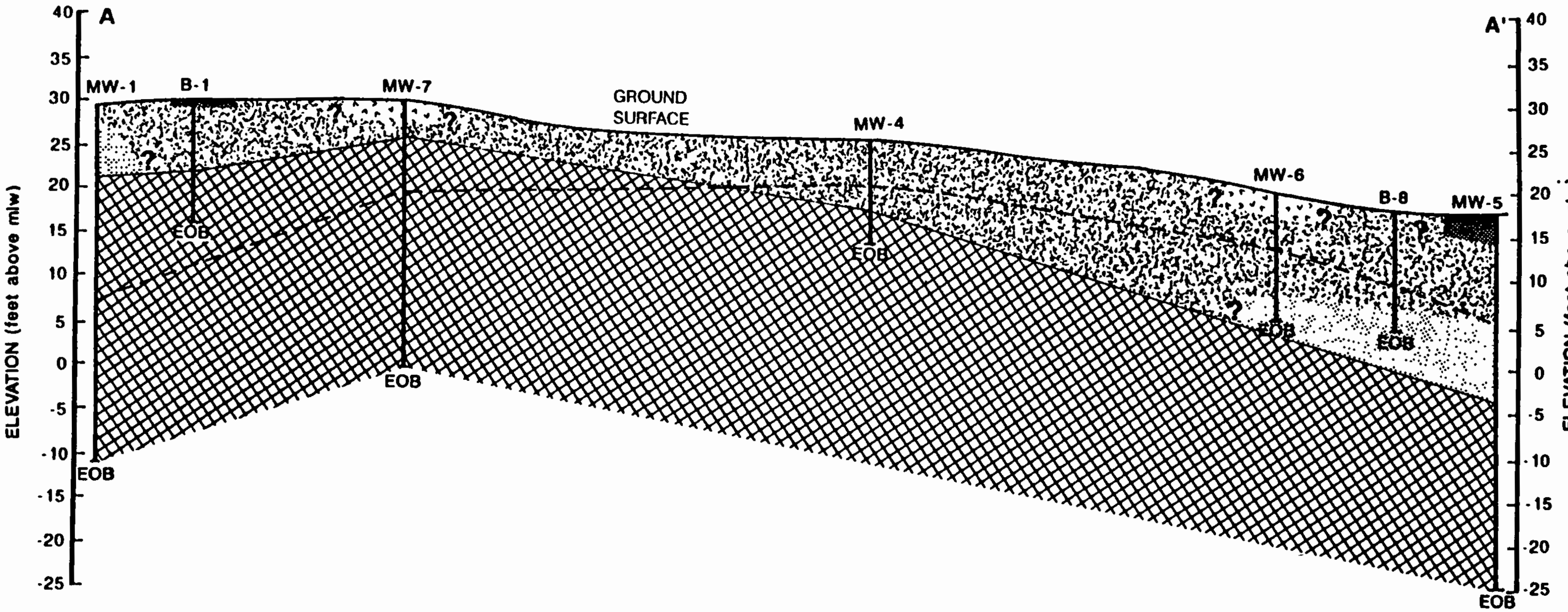
SITE 01 - McALLISTER POINT LANDFILL

Figure 1-6

GEOLOGIC CROSS SECTION LINE LOCATION MAP



LEGEND

— — GROUND WATER TABLE (01/31/91)

SAND & SILT FILL

CLAY/SILT FILL

FILL (DEBRIS, ASH)

TILL (FINE SAND & SILT, SOME SHALE PIECES)

SHALE (HIGHLY WEATHERED TO COMPETENT)

EOB- END OF BORING

0 200 FT
HORIZONTAL SCALE

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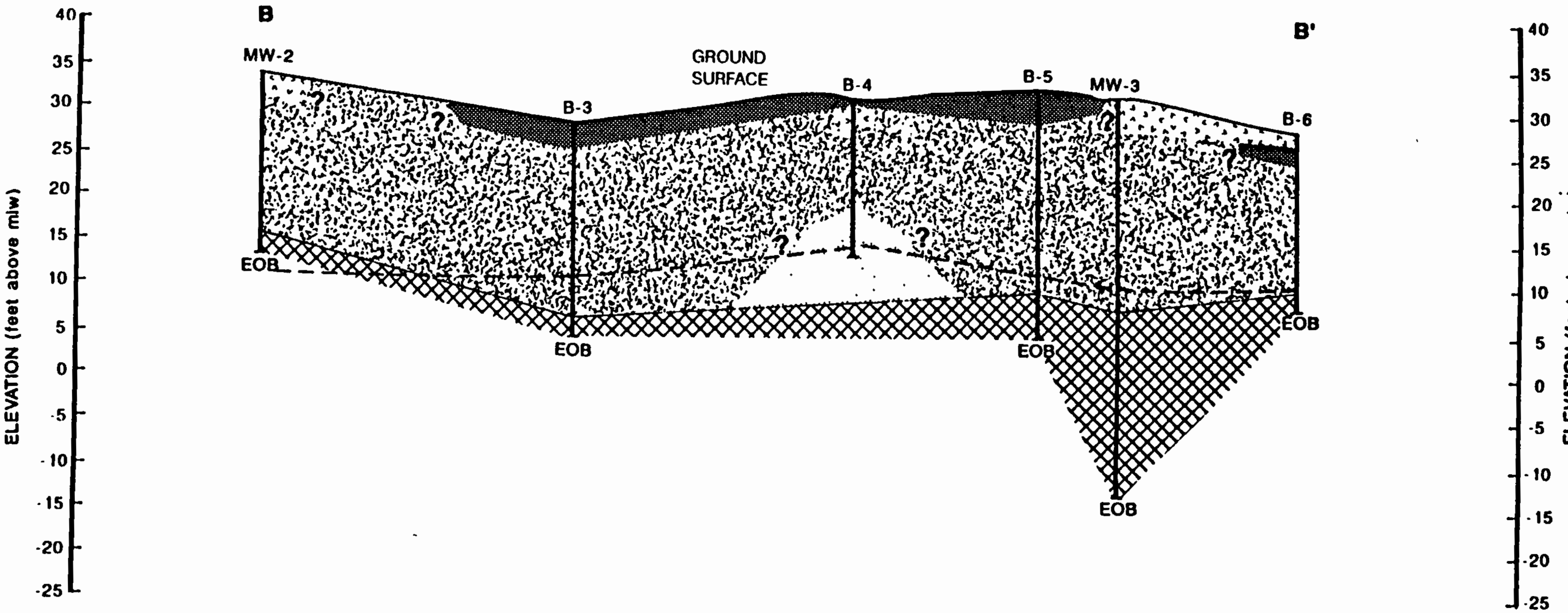
Figure 1-7

GEOLOGIC CROSS SECTION LINE A-A'



NOTE: WATER TABLE DEPTH AT BORINGS EXTRAPOLATED FROM GROUND WATER CONTOUR MAP

LEGEND

- — — GROUND WATER TABLE (01/31/91)
- SAND & SILT FILL
- CLAY/SILT FILL
- FILL (DEBRIS, ASH)
- TILL (FINE SAND & SILT, SOME SHALE PIECES)
- SHALE (HIGHLY WEATHERED TO COMPETENT)

EOB- END OF BORING

0 120 FT

HORIZONTAL SCALE

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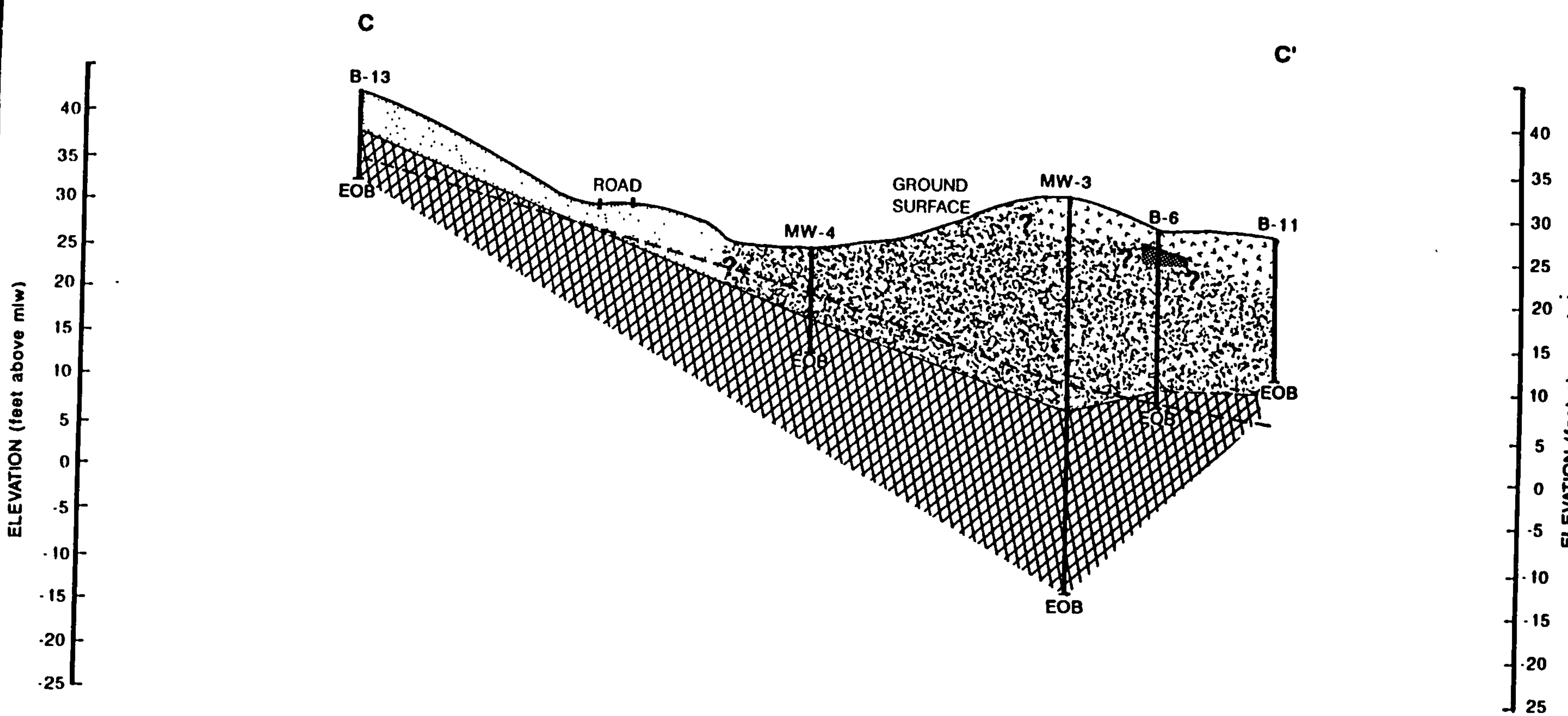
Figure 1-8

GEOLOGIC CROSS SECTION LINE B-B'



LEGEND

— — GROUND WATER TABLE (01/31/91)

SAND & SILT FILL

CLAY/SILT FILL

FILL (DEBRIS, ASH)

TILL (FINE SAND & SILT, SOME SHALE PIECES)

SHALE (HIGHLY WEATHERED TO COMPETENT)

EOB- END OF BORING

0 120 FT

HORIZONTAL SCALE

NOTE: WATER TABLE DEPTH AT BORINGS EXTRAPOLATED FROM GROUND WATER CONTOUR MAP

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SITE 01 - McALLISTER POINT LANDFILL

Figure 1-9

GEOLOGIC CROSS SECTION LINE C-C'

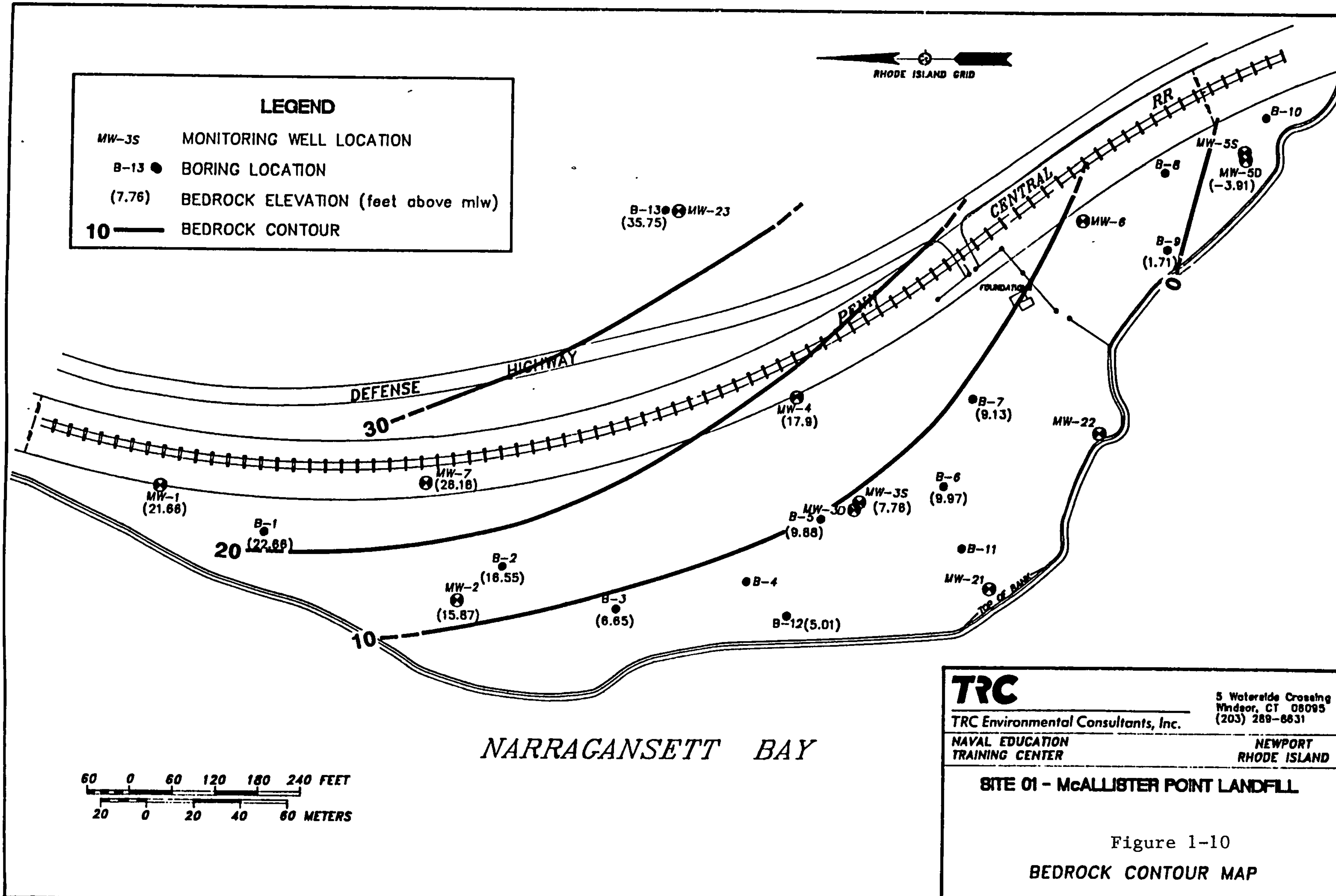
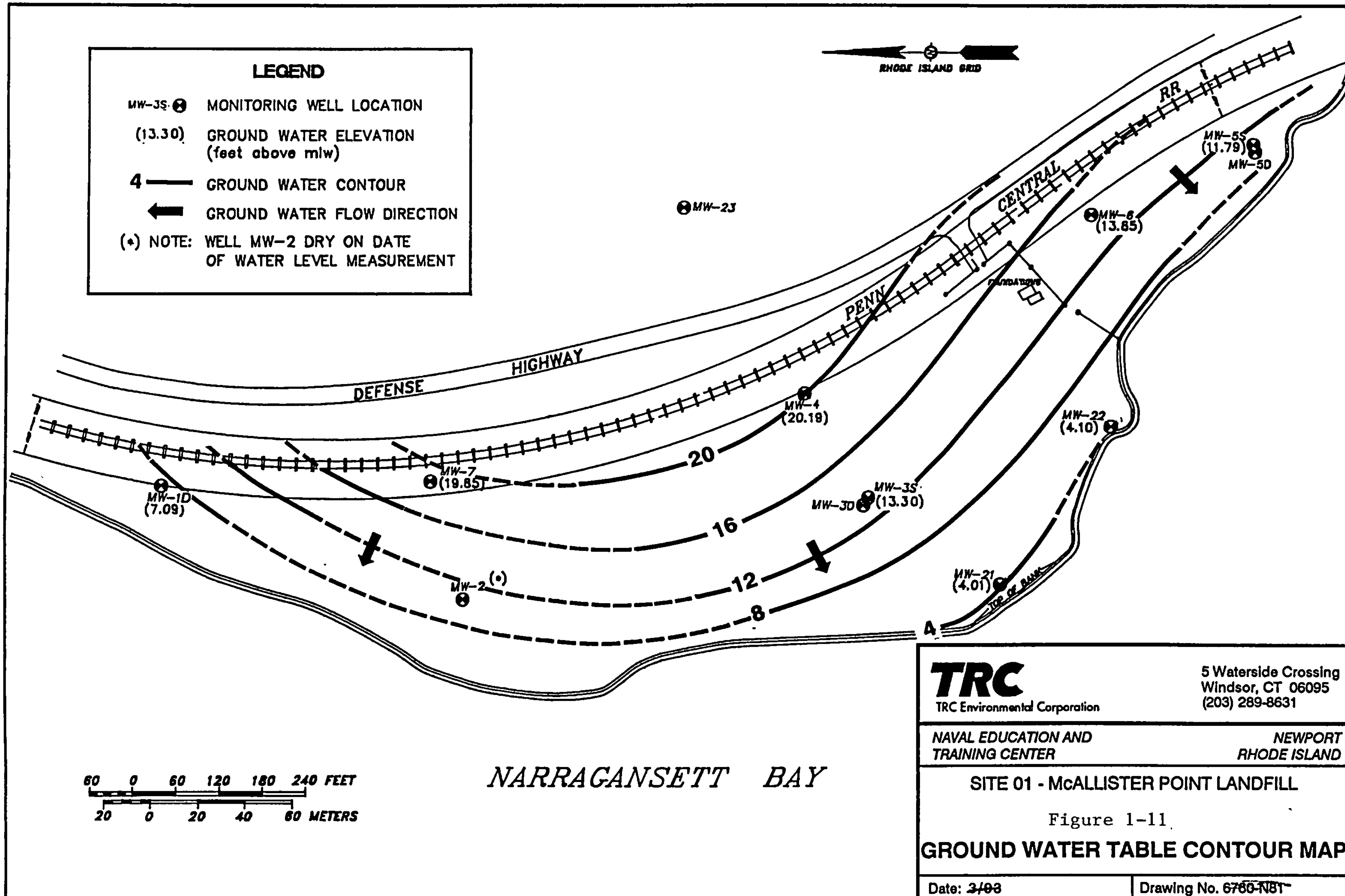


Figure 1-10

BEDROCK CONTOUR MAP



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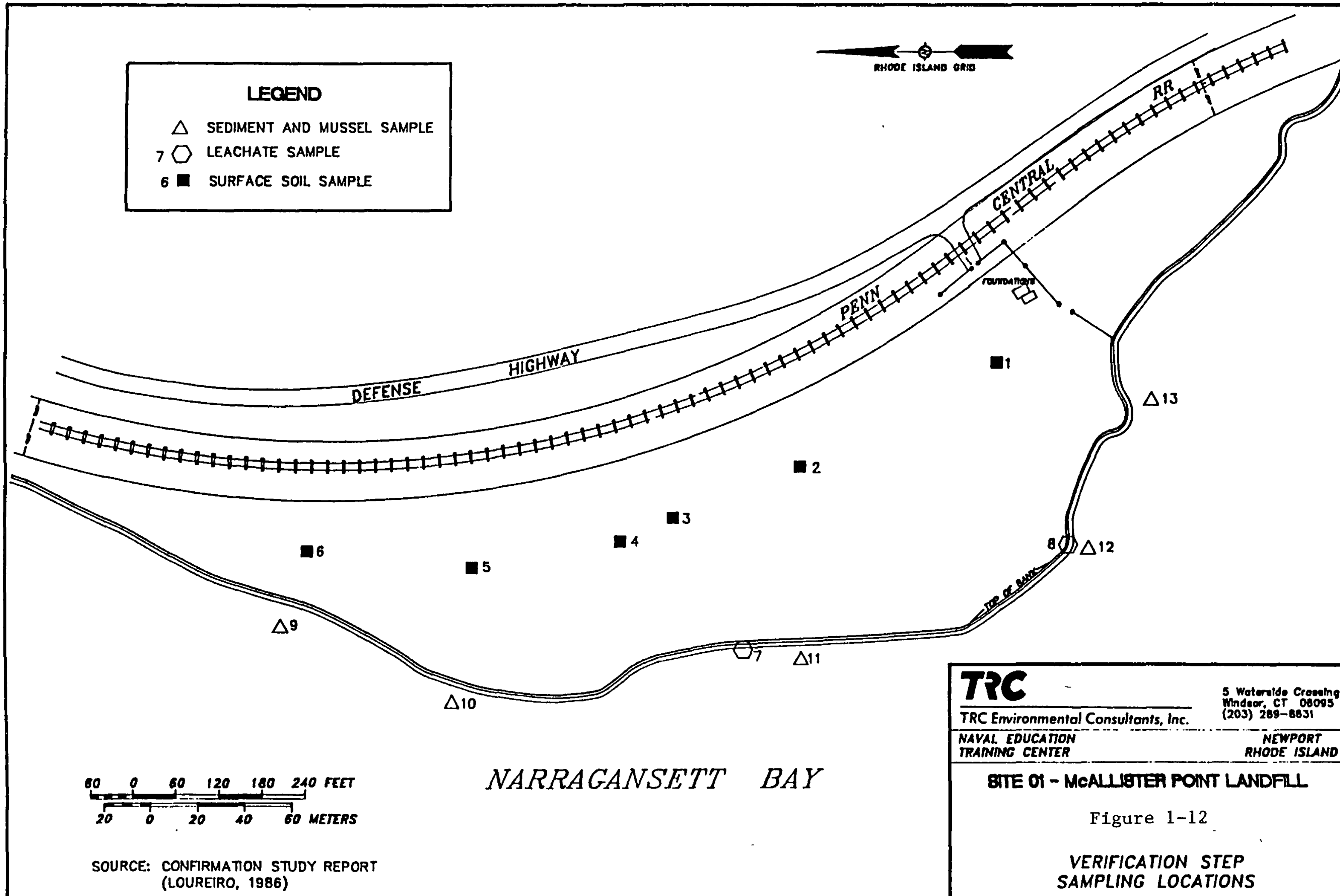
SITE 01 - McALLISTER POINT LANDFILL

Figure 1-11

GROUND WATER TABLE CONTOUR MAP

Date: 3/93 | Drawing No. 6760-N81



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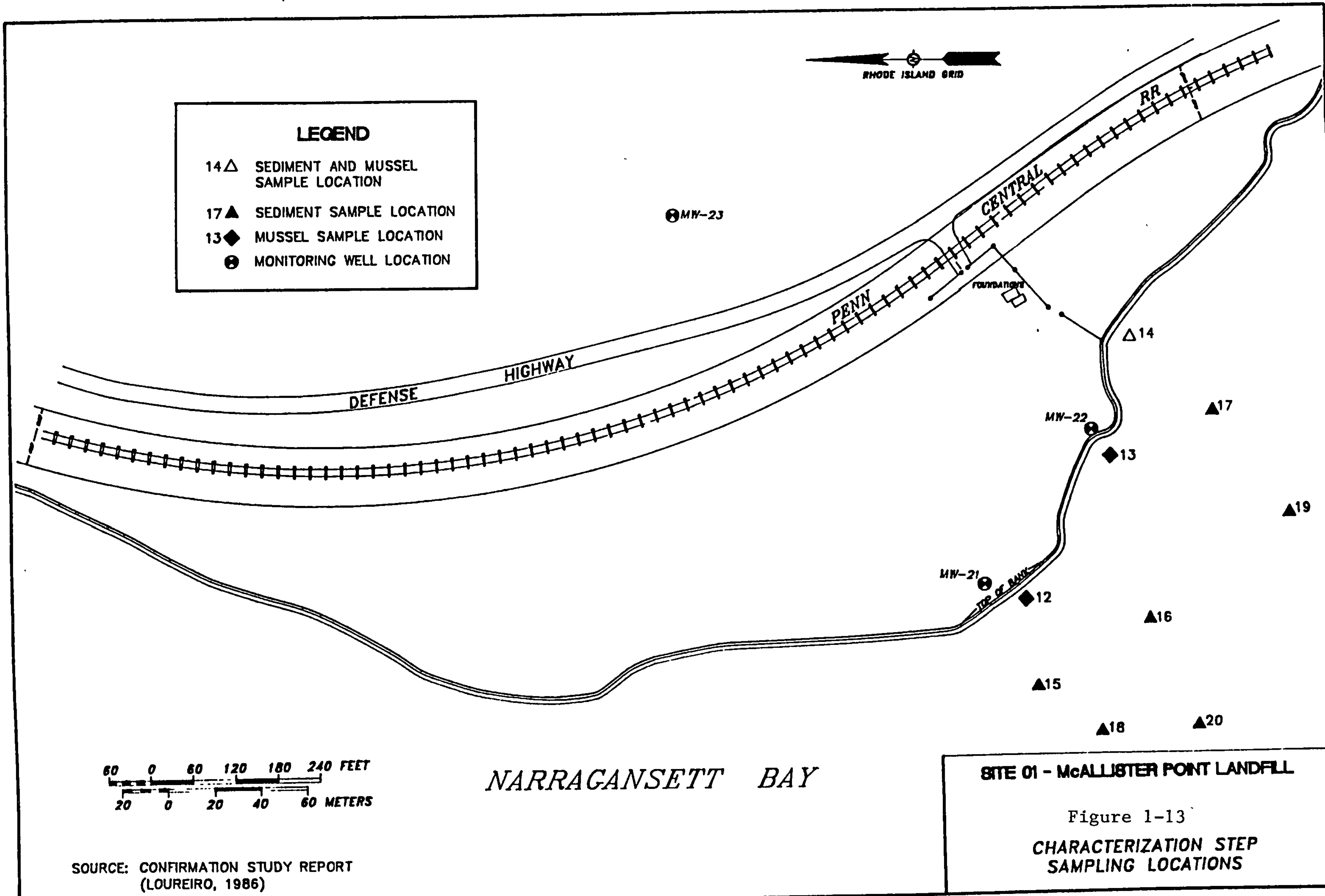
SITE 01 - McALLISTER POINT LANDFILL

Figure 1-12

VERIFICATION STEP SAMPLING LOCATIONS

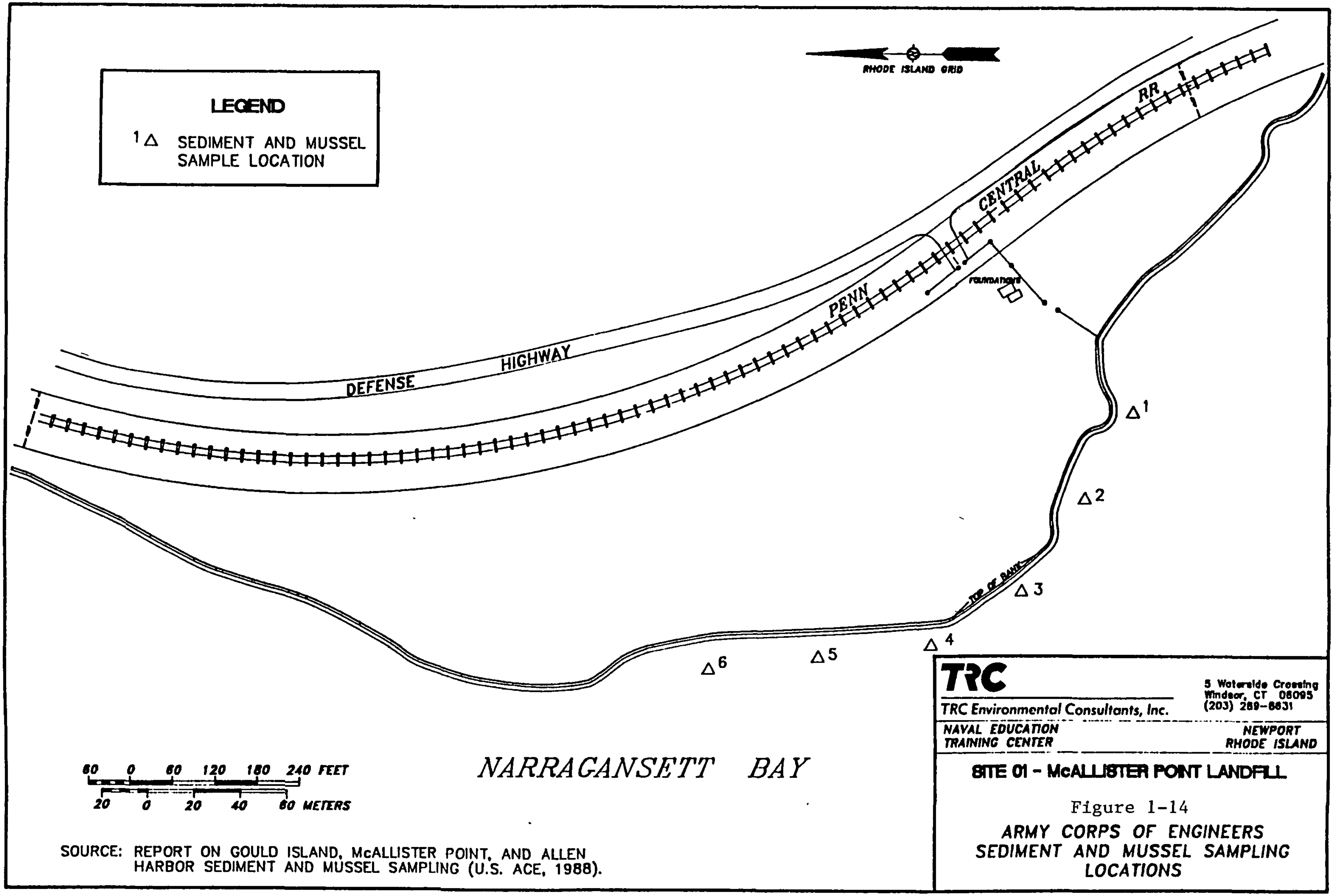


SOURCE: CONFIRMATION STUDY REPORT (LOUREIRO, 1986)

SITE 01 - McALLISTER POINT LANDFILL

Figure 1-13

CHARACTERIZATION STEP SAMPLING LOCATIONS



SOURCE: REPORT ON GOULD ISLAND, McALLISTER POINT, AND ALLEN HARBOR SEDIMENT AND MUSSEL SAMPLING (U.S. ACE, 1988).

Figure 1-14

ARMY CORPS OF ENGINEERS SEDIMENT AND MUSSEL SAMPLING LOCATIONS

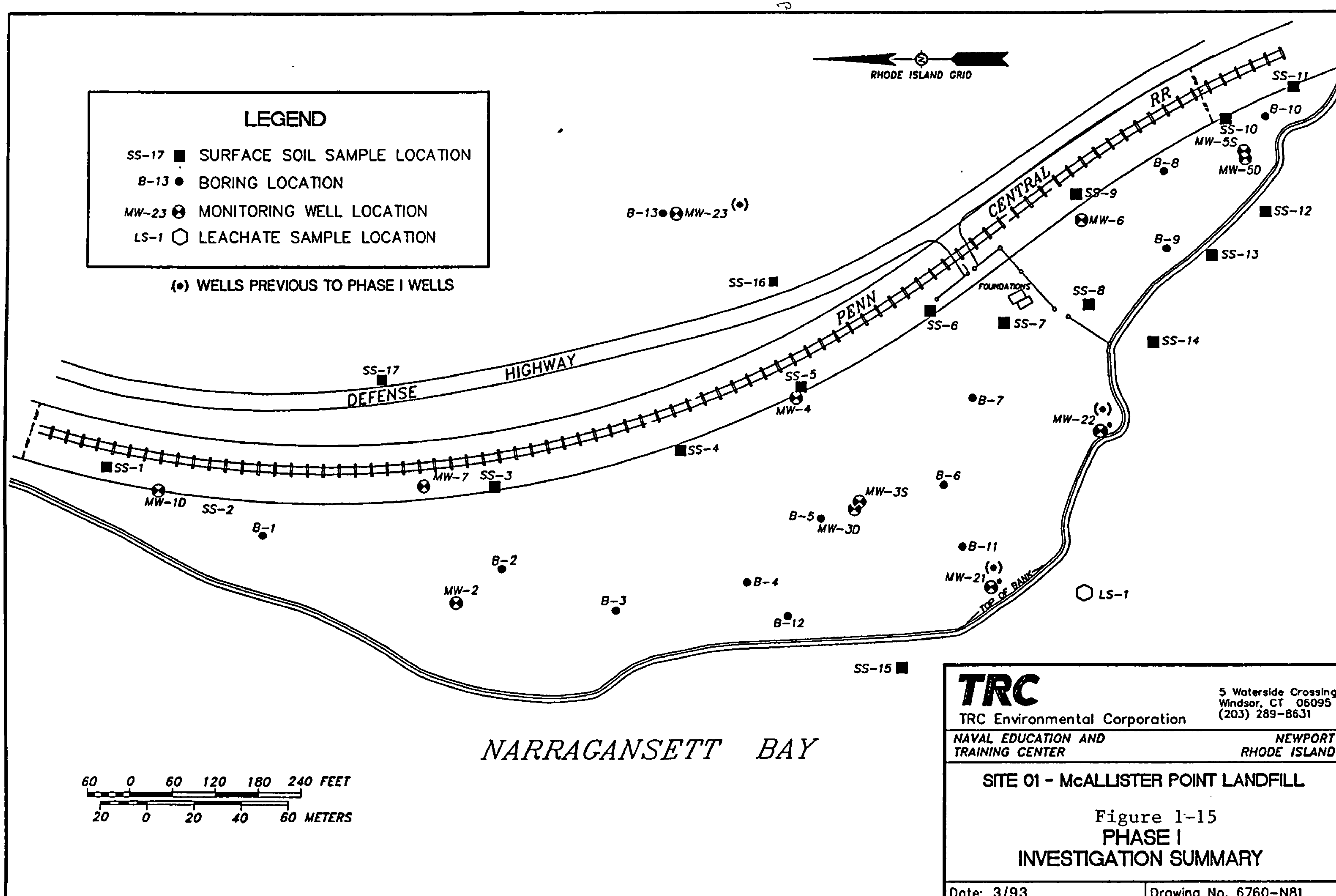


Figure 1-15
PHASE I
INVESTIGATION SUMMARY

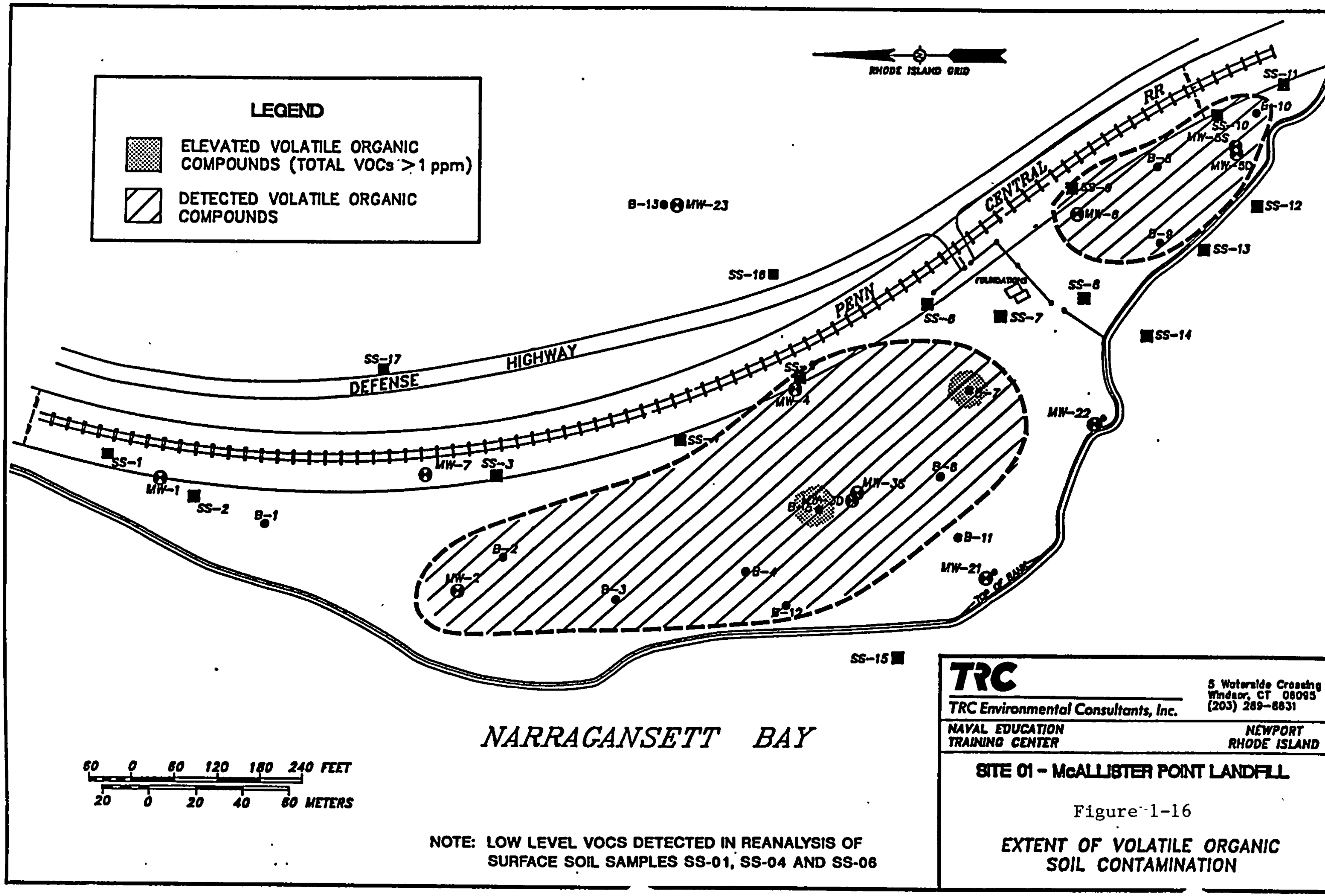


Figure 1-16

EXTENT OF VOLATILE ORGANIC SOIL CONTAMINATION

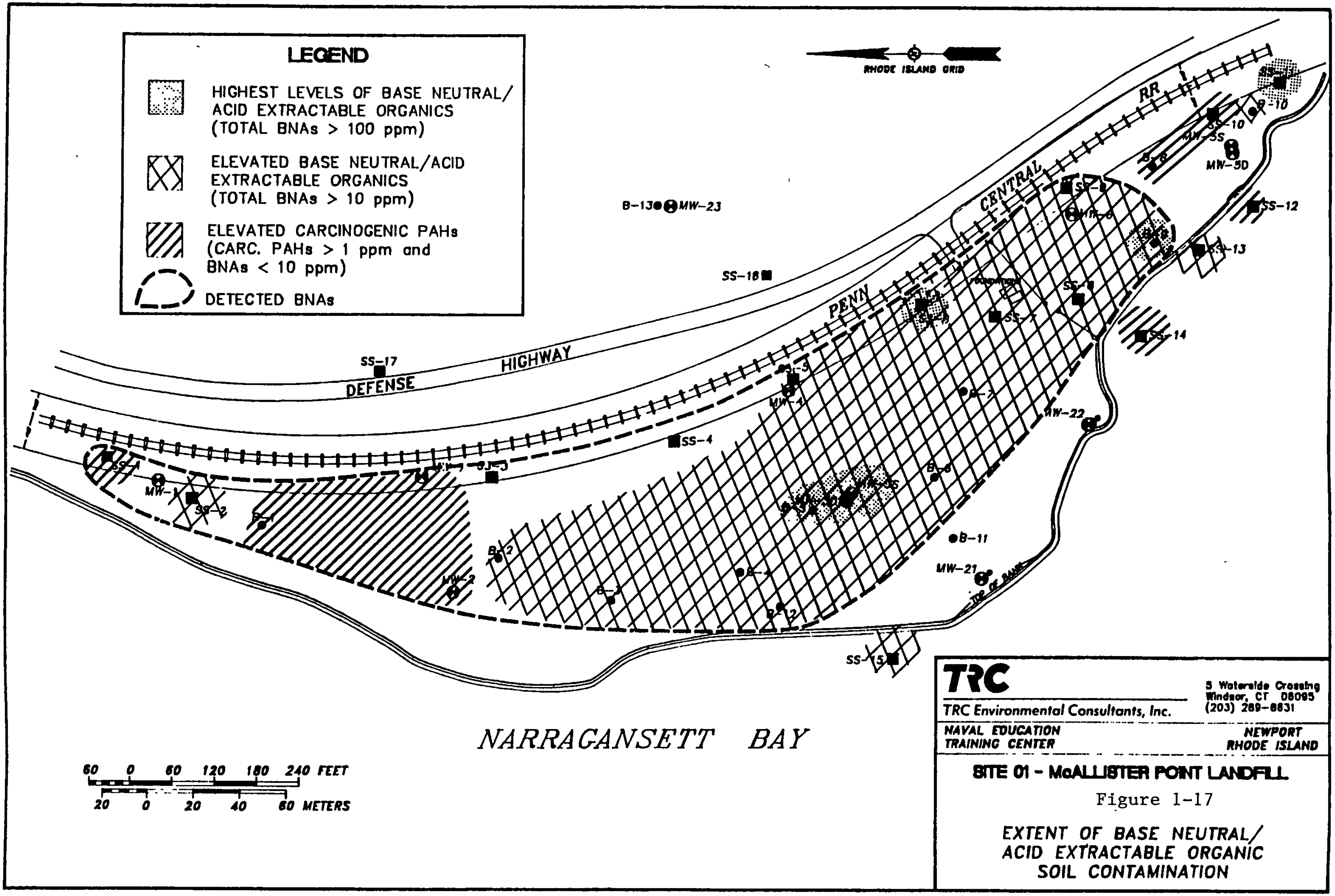
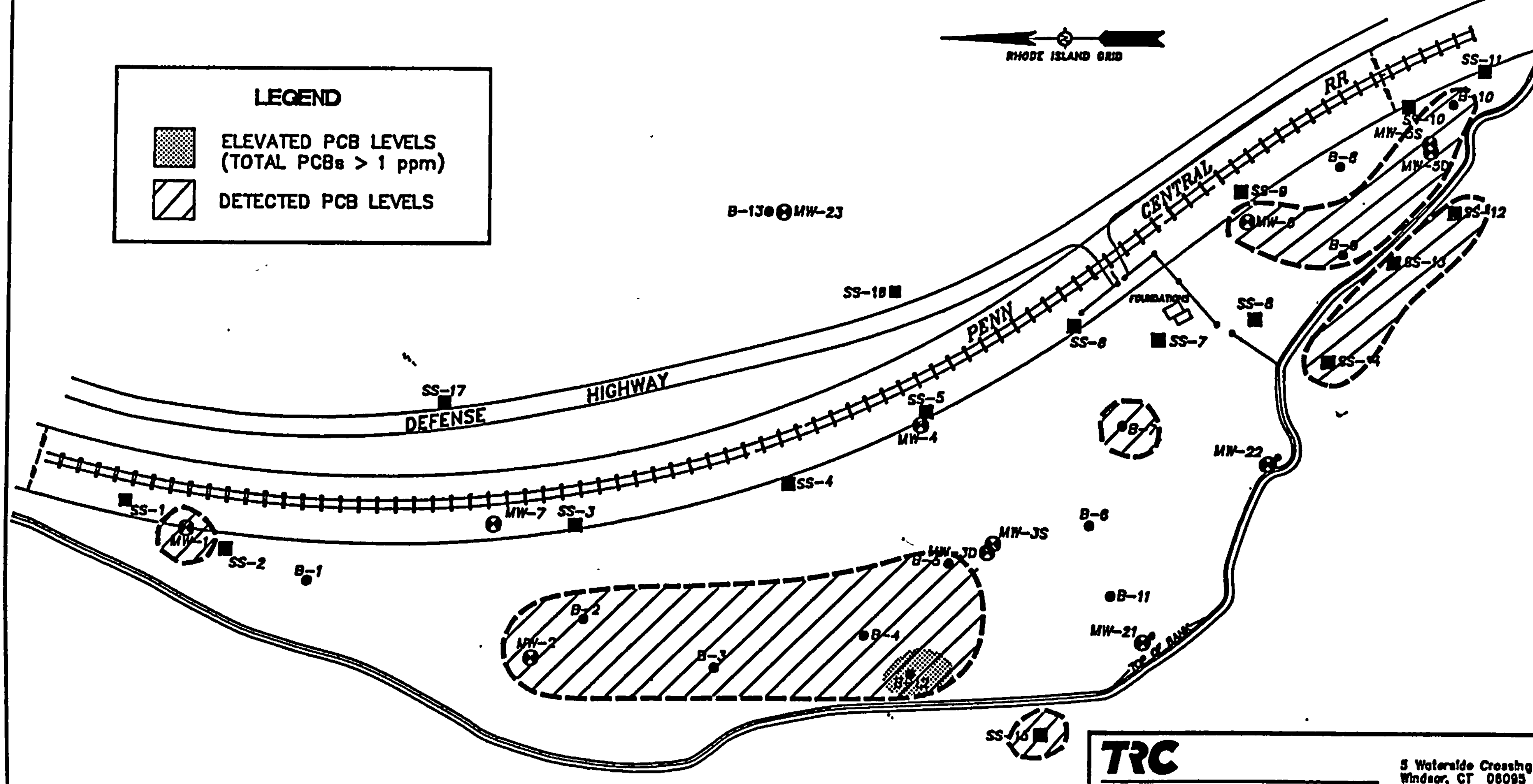


Figure 1-17

EXTENT OF BASE NEUTRAL/ ACID EXTRACTABLE ORGANIC SOIL CONTAMINATION



LEGEND

- (shaded) ELEVATED PCB LEVELS (TOTAL PCBs > 1 ppm)
- (hatched) DETECTED PCB LEVELS

60 0 60 120 180 240 FEET
20 0 20 40 60 METERS

NOTE: PCBs WERE NOT DETECTED IN ANY ON-SITE SURFACE SOIL SAMPLES; ONLY IN THE SHORELINE SURFACE SOIL SAMPIES.

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Figure 1-18

EXTENT OF PCB SOIL CONTAMINATION

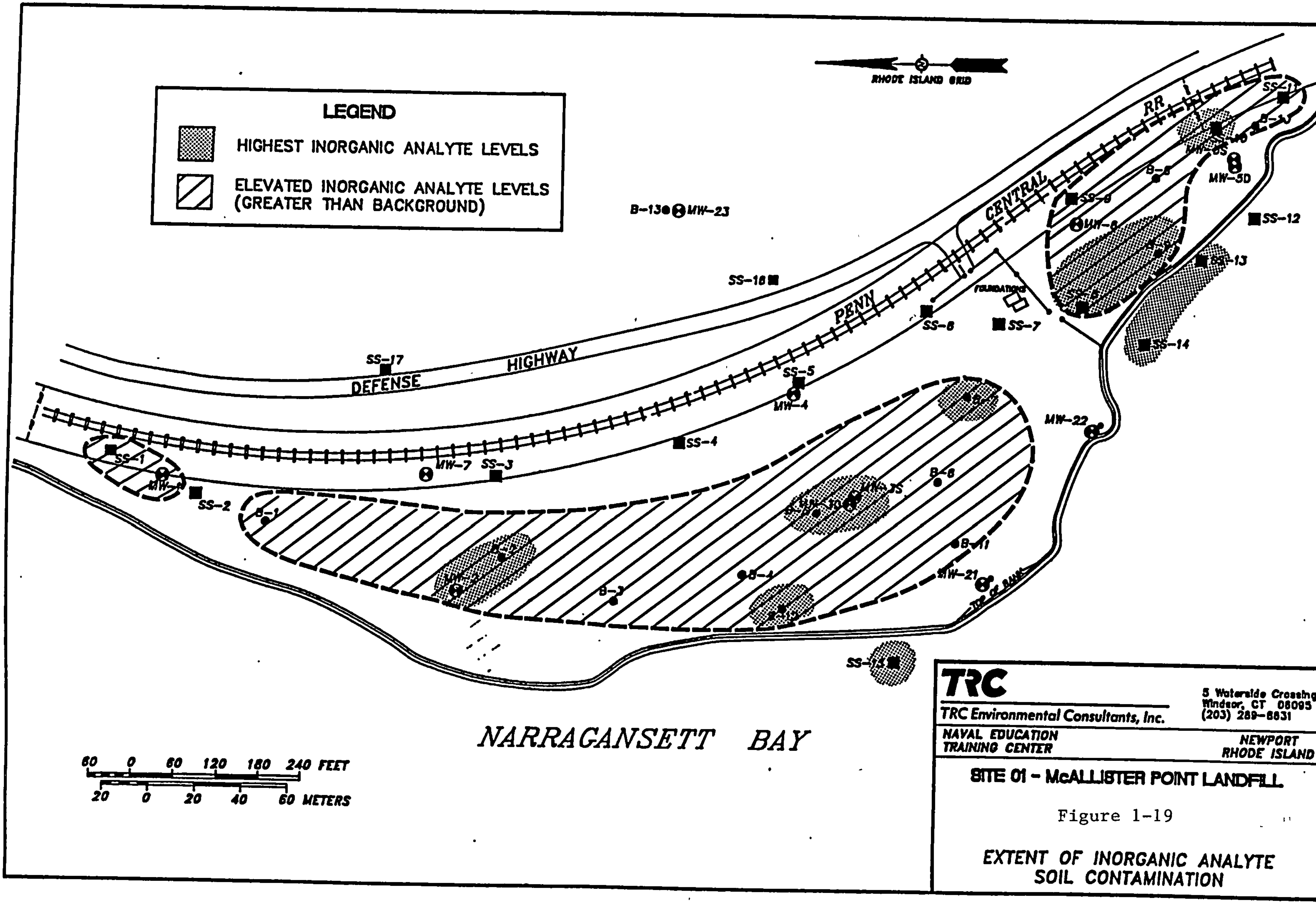

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Figure 1-19

EXTENT OF INORGANIC ANALYTE SOIL CONTAMINATION

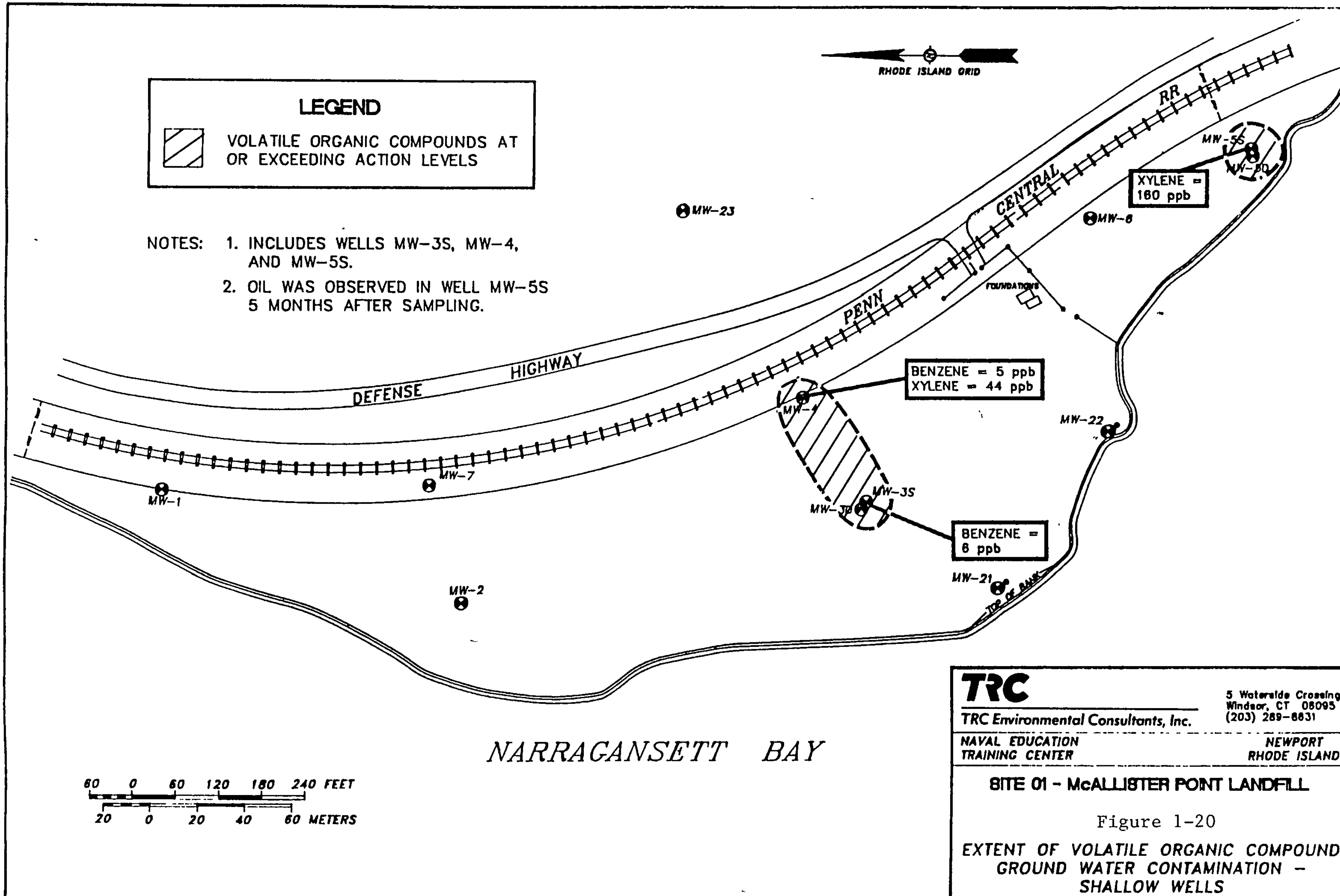

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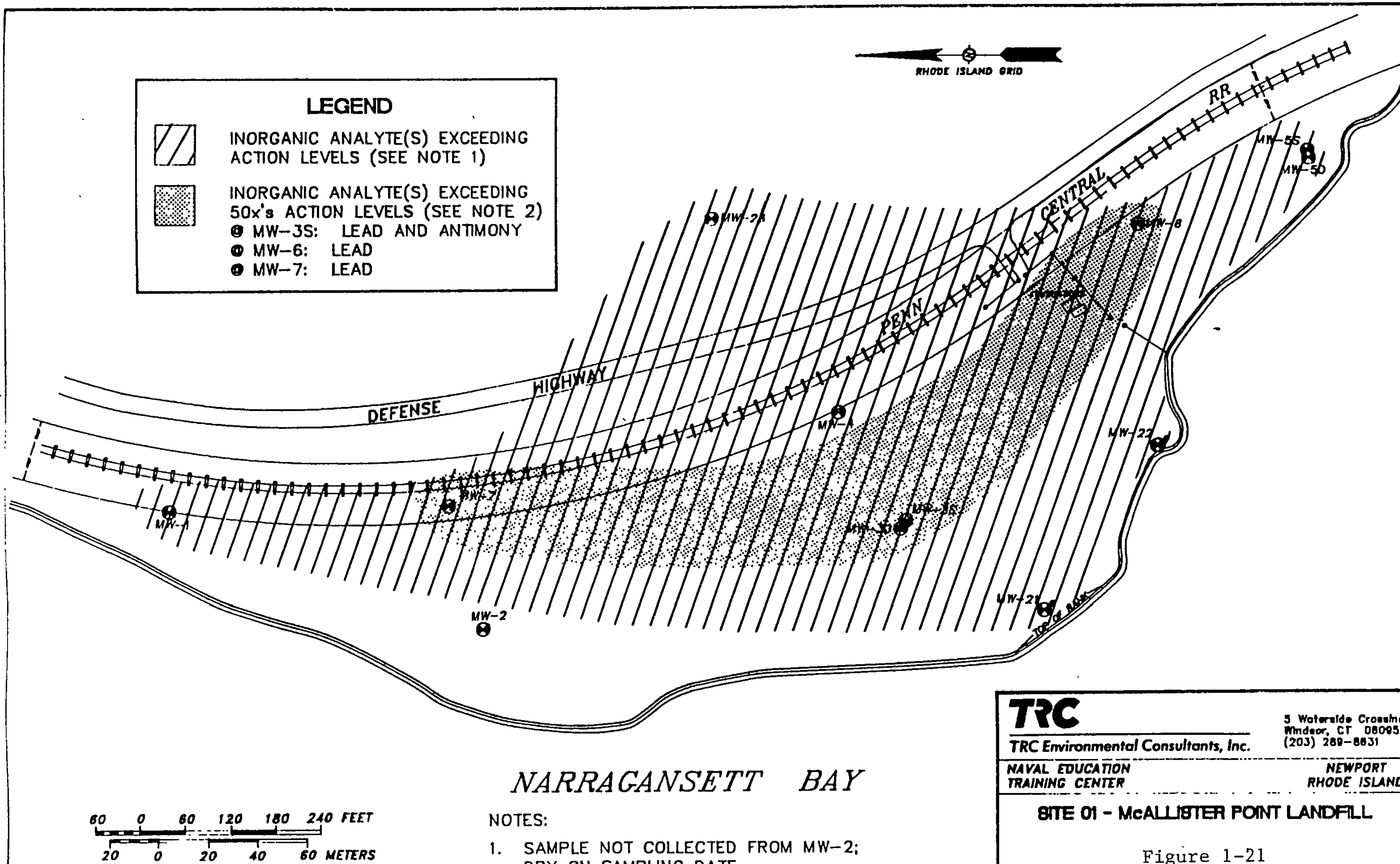
Figure 1-20

EXTENT OF VOLATILE ORGANIC COMPOUND GROUND WATER CONTAMINATION - SHALLOW WELLS



NOTES:

1. SAMPLE NOT COLLECTED FROM MW-2; DRY ON SAMPLING DATE.
2. ALUMINUM, IRON AND MANGANESE ALSO EXCEEDING 50x's ACTION LEVELS IN MOST WELLS.

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Figure 1-21

EXTENT OF INORGANIC ANALYTE GROUND WATER CONTAMINATION

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May 14, 1993

Mr. Franco La Greca
U.S. Navy, Northern Division
10 Industrial Highway
Code 1823, Mail Stop 82
Lester, PA 19113-2090

RE: DRAFT Chapters 1 and 2
Focused Feasibility Study
Site 01 - McAllister Point Landfill
Naval Education and Training Center
TRC Project No. 14300-N41-10

Dear Mr. La Greca:

Submitted herewith are two (2) DRAFT copies of Chapters 1 and 2 of the Focused Feasibility Study for Site 01 - McAllister Point Landfill, at the Naval Education and Training Center. This document is being provided for your review and comment.

Should you have any questions regarding this submittal, please do not hesitate to call.

Very truly yours,

TRC ENVIRONMENTAL CORPORATION

Jean M. Oliva

Jean M. Oliva, P.E.
Feasibility Study Manager

w/encl.

cc: R. Smith, TRC