

**Resource Area Boundary Delineation
137 – 124 Popes Island – Shoreline Resources
New Bedford, Massachusetts**

September 23, 2019

On September 13, 2019, BETA Group, Inc. (BETA) conducted resource area boundary identifications/delineations at 137 - 143 Popes Island in New Bedford, Massachusetts (the Site). This report describes resource areas Subject to Protection under the Massachusetts Wetlands Protection Act (M.G.L. Chapter 131 Section 40 - the Act), City of New Bedford Wetlands Protection Ordinance (Chapter 15, Article 7), the federal Clean Water Act CFR (33 U.S.C. §1251 et seq (1972)), the federal Rivers and Harbors Act (33 U.S.C. 403 (1899)), and the Massachusetts Clean Waters Act (MGL Chapter 21 Section 26-53), that exist on the site and methodology used to delineate their boundaries.

Site Description

The Site is located on the northern portion of Popes Island, off Route 6 in New Bedford, Massachusetts. Popes Island is located within the Acushnet River, west of Fairhaven (Figure 1 – Site Locus) and is bound by commercial and industrial development to the west, by Route 6 to the south, and by the Acushnet River to the north and east (Figure 2 – Environmental Resources Map). The Site is improved by two (2) parking lots connected by a paved driveway and two (2) permanent commercial structures. There is also a temporary structure located in the northeast corner of the Site, a Barge docked on the northern portion of the Site, and a small dock to the east of the Site.

According to the USDA Natural Resources Conservation Service – Soil Survey, mapped soils on the Site and in the vicinity of the Site are classified as Urban Land consisting of fill material. Our field work confirmed the soil types on the Site. The Custom Soil Resource Report for Bristol County, Massachusetts is attached.

State jurisdictional resource areas identified on the Site include Land Subject to Coastal Storm Flowage, Land Subject to Tidal Actions, Land Under the Ocean, Designated Port Area, Coastal Beach, Coastal Bank, Rocky Intertidal Shore, “Fish Run” and Land Containing Shellfish. The MassGIS database was used as the initial step in identifying critical areas on or within proximity of the site that would be examined more closely if construction activities are proposed. The table below describes selected environmentally critical categories as determined through MassGIS.

Table 1. Selected MassGIS Environmental Data Layers

Mapped Resource on or Within Proximity to Site	Yes	No
Area of Critical Environmental Concern		✓
NHESP Certified Vernal Pool		✓
NHESP Potential Vernal Pool		✓
Coldwater Fisheries Resource		✓
NHESP Established Habitat of Rare Wildlife*		✓
NHESP Priority Habitat of Rare Species*		✓
Outstanding Resource Waters		✓
FEMA Flood Zones	✓	
Surface Water Protection Area (Zones A and B)		✓
Interim Wellhead Protection Area		✓

Mapped Resource on or Within Proximity to Site	Yes	No
Zone II Wellhead Protection Area		✓
Tidelands – Chapter 91 Jurisdiction	✓	
Designated Port Area	✓	
CZM Coastal Zone	✓	
Anadromous Fish Presence	✓	
Land Containing Shellfish	✓	

Source: MassGIS

*NHESP Priority Habitat of Rare Species (PH252) and Estimated Habitat of Rare Wildlife (EH269) boundaries are located a minimum of 100 feet from the Project limits.

Jurisdictional Wetland Resource Areas – Massachusetts Wetlands Protection Act

A Site inspection was conducted by BETA's Wetland Scientists on September 13, 2019 to identify and delineate the boundaries of existing wetland resource areas on the Site and in the immediate vicinity of the Site. Resource area boundaries were identified and delineated in accordance with methods developed by the Massachusetts Department of Environmental Protection and Office of Coastal Zone Management's *Applying the Massachusetts Coastal Wetlands Regulations*, dated 2017, as well as definitions set forth in the Wetland Regulations, 310 CMR 10.00. Several Areas Subject to Protection under the Act exist on the Site and are described below.

Land Subject to Coastal Storm Flowage – FEMA AE Zone – 310 CMR 10.04

According to the FEMA Flood Insurance Rate Map (FIRM) community panel number 25005C0393G (Figure 3), dated July 16, 2014, Special Flood Hazard Areas are associated with tidal action for this Site. Portions of the Site are located within Zone AE, defined as an area subject to inundation by the 1% annual chance flood (100-year flood) with a Base Flood Elevation of 6 Feet (NAVD88). In addition, the entirety of Popes Island is located with Zone X, with a Reduced Flood Risk due to the levee located south of the Site. The land below the BFE is defined as Land Subject to Coastal Storm Flowage (LSCSF) and is Subject to Jurisdiction under the Act.

Land Subject to Tidal Action– 310 CMR 10.04

According to the Statement of Jurisdiction at 310 CMR 10.02 and definition at 310 CMR 10.04, Land Subject to Tidal Action is defined as land subject to the periodic rise and fall of a coastal water body, including spring tides. The limit of this resource area is the extreme high tide elevation.

Land Under the Ocean – 310 CMR 10.26

According to 310 CMR 10.25(2), Land Under the Ocean is defined as the “land extending from the mean low water (MLW) line seaward to the municipality’s jurisdiction and includes estuaries”. Because the Acushnet River is a tidal river, land under this waterbody is, by definition, Land Under the Ocean. According to the Buzzards Bay National Estuary Program’s Tidal Datum Viewer, the modeled the MLW elevation is -1.84 feet (NAVD88) as determined by NOAA’s VDatum software.

Designated Port Area – 310 CMR 10.26

According to 310 CMR 10.26(2), “Designated Port Areas (DPA)” are those areas identified in 301 CMR 25.00: *Designated Port Areas*. These areas are designated by CZM because they are “geographic areas of particular state, regional, and national significance with respect to the promotion of commercial fishing, shipping, and other vessel-related activities associated with water-borne

commerce and the promotion of manufacturing, processing, and production activities reliant upon maritime transportation or the withdrawal or discharge of large volumes of water.”

The Site and all land north of Route 6 on Popes Island are within the limits of a DPA (Figure 4). Activities proposed below the boundary of Land Under the Ocean within a DPA are required to meet additional performance standards.

Coastal Beach – 310 CMR 10.27

According to CMR 10.27(2), the definition of Coastal Beach is unconsolidated sediment subject to wave, tidal and coastal storm action which forms a gently sloping shore of a body of saltwater and includes tidal flats. The area seaward of the Coastal Bank on the Site consists of both natural stones (wave-worked unconsolidated sediment) and man-made (riprap) stone. Therefore, this area is a cobble Coastal Beach. The Coastal Beach extends from the MLW elevation to the toe of the steep rocky slope.

Coastal Bank – 310 CMR 10.30

According to 310 CMR 10.30(2), Coastal Bank is defined as the seaward face or side of any elevated landform, other than a coastal dune, which lies at the landward edge of a coastal beach, land subject to tidal action, or other wetland. Coastal Bank was identified on the Site in accordance with the *Wetlands Program Policy 92-1: Coastal Banks: Definition and Delineation Criteria for Coastal Banks*, issued March 3, 1992.

The Top of Coastal Bank on the Site is where the slope changes from a greater than 4:1 slope on the seaward portion of the Bank to a less than 4:1 slope landward of the Bank because the LSCSF elevation is seaward of this change in topography. The toe of the Coastal Bank is the landward Rocky Intertidal Shore boundary (see below for more details).

Rocky Intertidal Shore – 310 CMR 10.31

Rocky Intertidal Shore is defined as a “naturally occurring rocky area, such as bedrock or boulder-strewn areas between the mean high-water (MHW) line and the mean low water (MLW) line”. Although some of the boulder-like rocks located on the steep banks at the property limits were placed by humans (riprap, granite blocks, concrete slabs, etc.), naturally occurring stones are also “strewn” within this area throughout the Site. Accordingly, this area overlaps with the Coastal Beach onsite.

According to the Buzzards Bay National Estuary Program’s Tidal Datum Viewer, the modeled the MLW elevation is -1.84 feet (NAVD88) and the MHW elevation is 1.76 feet (NAVD88) as determined by NOAA’s VDatum software.

“Fish Run” - 310 CMR 10.35 (Bank of or Land Under the Ocean, Ponds, Streams, Rivers, Lakes or Creeks that Underlie an Anadromous/Catadromous Fish Run)

According to its definition at 310 CMR 10.35, a Fish Run is an area within estuaries, ponds, streams, creeks, rivers, lakes or coastal waters, that is a spawning or feeding ground or passageway for Anadromous or Catadromous fish and which is identified by the Division of Marine Fisheries or has been mapped on the Coastal Atlas of the Coastal Zone Management Program. At this Site, the Coastal Bank boundary is coincident with the Bank of an Anadromous Fish Run.

Land Containing Shellfish – 310 CMR 10.34

Land Containing Shellfish is defined as land under the ocean, tidal flats, rocky intertidal shores, salt marshes and land under salt ponds when any such land contains shellfish. The area below the mean low water elevation is mapped as suitable for Quahog (*Mercenaria merceneria*).

Riverfront Area – 310 CMR 10.58

The Mouth of the Acushnet River has been designated upstream of the Site (Figure 5), therefore there is no Riverfront Area onsite.

Jurisdictional Wetland Resource Areas – City of New Bedford Bylaw

The City of New Bedford Wetlands Administration Bylaw (Chapter 15, Article 7) and regulations maintain the same wetland resource area definitions as provided in the Act for all resource areas, therefore there are no additional resource areas Protected under the Ordinance.

Jurisdictional Wetland Resource Areas – Federal Clean Water Act (Section 404)

The Acushnet River is a “Tidal Waters of the United States” and is therefore subject to the federal Rivers and Harbors Act, 33 U.S.C. 403 (1899) and the federal Clean Water Act, 33 U.S.C. 1251 et seq (1972). According to 33 CFR §328.3(d), Tidal Waters are defined as “waters that rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by hydrologic, wind, or other effects.”

The boundary to “Tidal Waters of the United States” is the High Tide Line (HTL), which is defined at 33 CFR §328.3(c)(7). The boundary of the HTL can be approximated using the “King Tide” elevation, which is approximately 3.2 feet (NAVD88). Construction of any structure in, over, or under tidal waters, or work affecting the course, location, condition, or capacity of tidal waters is Subject to Jurisdiction under Section 10 of the Rivers and Harbors Act. Work that requires filling below the boundary of the HTL onsite is Subject to Jurisdiction under Section 404 of the Clean Water Act.

Jurisdictional Wetland Resource Areas – Massachusetts Clean Waters Act (Section 401)

The limit of jurisdiction under Massachusetts Clean Waters Act (Section 401), as specified in 314 CMR 9.00, is the boundary of federally regulated waters. Exceedances of the jurisdictional threshold under 314 CMR 9.00 require filing for a Water Quality Certification under Section 401.

Jurisdictional Resource Areas – The Massachusetts Public Waterfront Act (Chapter 91)

Any activity that takes place within Flowed Tidelands or Filled Tidelands requires Chapter 91 authorization. Chapter 91 Jurisdiction exists on the Site at the limit of the “Historic High Water” (Figure 3).

Findings and Recommendations

BETA has identified areas Subject to Protection and/or Jurisdiction under the Massachusetts Wetlands Protection Act, New Bedford Wetlands Protection Ordinance, the federal Clean Water Act, and the Massachusetts Clean Waters Act, on or within 100 feet of the Site.

We appreciate the opportunity to provide you with expert wetland services. If you have any questions or need further assistance, please do not hesitate to call us.

September 23, 2019

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Attachments: Figure 1 - Site Locus
Figure 2 – Environmental Resources Map
Figure 3 - FEMA FIRMette
Figure 4 – Designated Port Area Boundary
Figure 5 – Mouth of Coastal River
Photographic Documentation
Custom Soil Report for Bristol County, Massachusetts

Job No: 19.06727.00

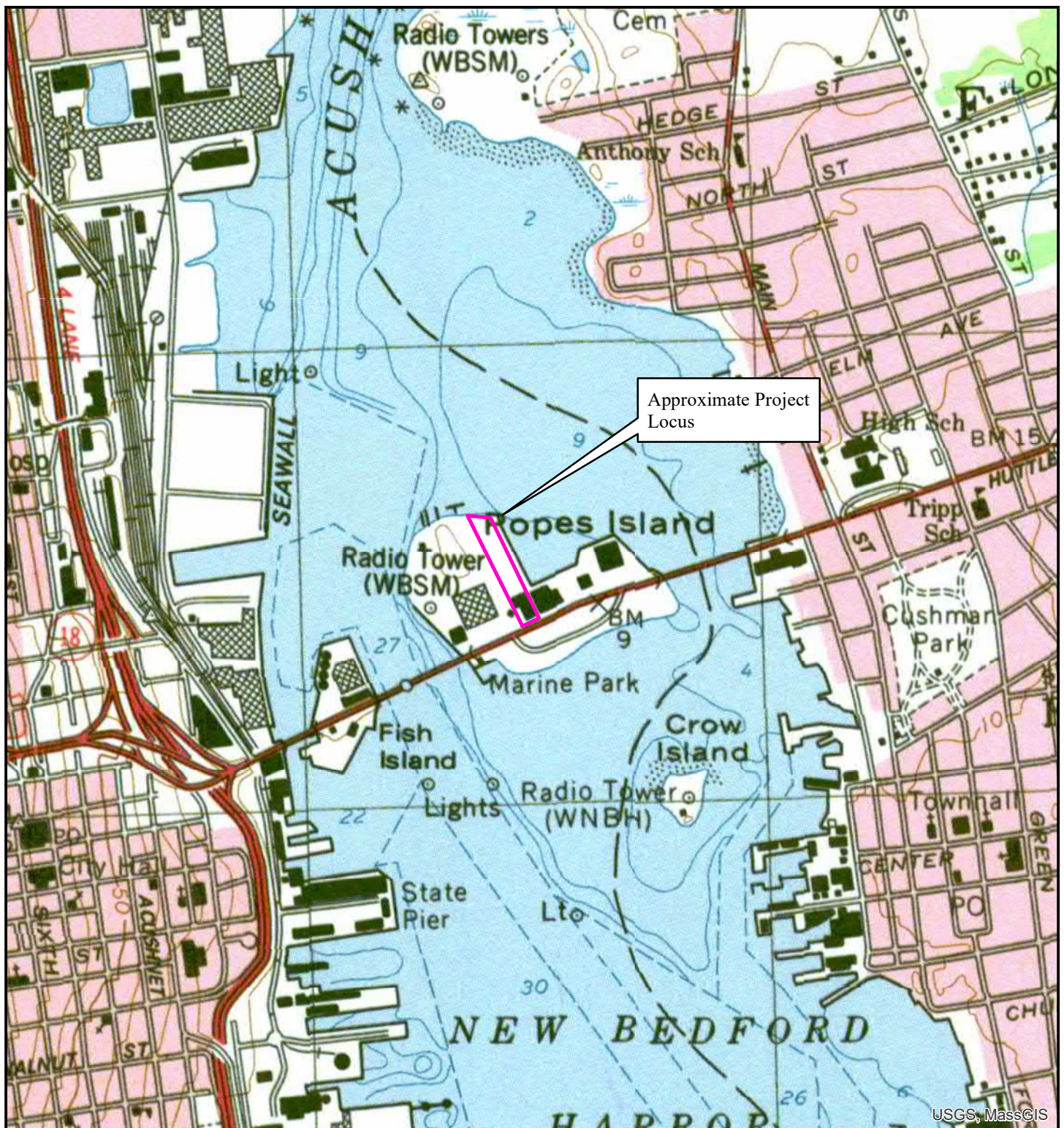
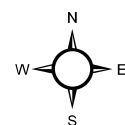


Figure 1 - Site Locus
137 - 143 Popes Island
New Bedford, Massachusetts



Legend

— Approximate Project Locus



0 1,000 2,000
 Feet

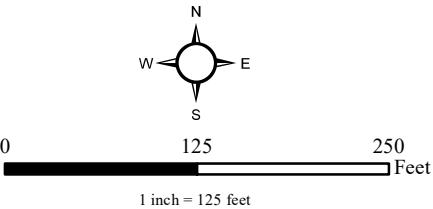
1 inch = 1,000 feet

Figure 2 - Environmental Resources
137 - 143 Popes Island
New Bedford, Massachusetts



Legend

- Approximate Site Locus
- Historic High Water
- Marsh Boundary - seaward
- Contemporary High Water
- Inferred Contemporary High Water
- Inferred Historic High Water
- Marsh/Bog
- Wooded marsh
- Cranberry Bog
- Salt Marsh
- Tidal Flat/Rocky Intertidal Shore
- Beach/Dune
- NHESP Potential Vernal Pool
- NHESP Certified Vernal Pool
- NHESP Priority Habitat of Rare Species
- NHESP Estimated Habitats of Rare Wildlife
- ZONE A
- ZONE B
- ZONE C
- MassDEP IWPA
- MassDEP Zone II
- Outstanding Resource Water



Data Source: MassGIS USGS Color Ortho Imagery (2013/2014), MassGIS Data - Tidlands Jurisdiction (M.G.L. c. 91) (March 2011), MassDEP Wetlands 1:12,000 (2009), NHESP Certified Vernal Pools, NHESP Potential Vernal Pools (2000), NHESP Priority Habitat of Rare Species (2017), NHESP Estimated Habitats of Rare Wildlife (2017), Outstanding Resources Waters (2010), Surface Water Supply Protection Areas (2019), MassDEP Wetland Protection Areas (2019)



ENGINEERING SUCCESS TOGETHER

National Flood Hazard Layer FIRMette



41°38'44.46"N



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
MAP PANELS		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/12/2019 at 2:48:12 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

USGS The National Map: Orthoimagery. Data refreshed April, 2019.

0 250 500 1,000 1,500 2,000 Feet 1:6,000

41°38'17.58"N

70°54'37.38"W



Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114
www.mass.gov/czm

New Bedford-Fairhaven

Designated Port Area (DPA)

For planning purposes only. In the event of conflict between this map and the accompanying written description, CZM shall issue a written clarification pursuant to the Designated Port Area (DPA) regulations at 301 CMR 25.00.



 Point of Beginning

 Designated Port Area Boundary

 Chapter 91 Presumptive Line

 Municipal Boundary

 Assessor's Parcel



Base map: MassGIS 1:5,000 Color Ortho Imagery, 2001.
Map coordinate system: North American Datum of 1983,
Massachusetts State Plane Coordinate System,
Mainland Zone (FIPS zone 2001), meters.

0 250 500 750 1,000
Feet

March 2011

Massachusetts Mouth of Coastal River Maps

M.G.L. c.131, s.40

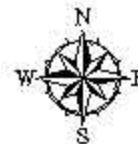
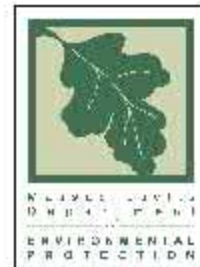
310 CMR 10.58

Town: FAIRHAVEN / NEW BEDFORD

River: ACUSHNET RIVER

March 1, 2005

ID: FAIRHAVEN-NEW BEDFORD MOR-1



Map Legend

- Mouth of River
- Town Boundary
- State Boundary



Mitt Romney, Governor
Ellen Roy Herzfelder, Secretary
Executive Office of the Governor

1:7,500

0 250 500 1,000 1,500 Feet

1 inch equals 625 feet

Mouth of River lines delineated
by DEP Wetlands Program.

Color OrthoPhoto base map from
MassGIS, 2001-2003.

Mass DEP GIS Program

Photo 1



View of the rocky intertidal shore from the dock located to the east of the Site—facing south

Photo 2



View of the rocky intertidal shore from the dock located to the east of the Site—facing north

PHOTOGRAPHIC DOCUMENTATION
137 - 143 Popes Island—Shoreline Resources
New Bedford, Massachusetts
Photographs Documented September 13, 2019

Photo 3



View of the rocky intertidal shore located along the northern limit of the Site— facing northwest

Photo 4



View of the ramp to the barge and building located in the northeast corner of the site— facing east

PHOTOGRAPHIC DOCUMENTATION
137 - 143 Popes Island—Shoreline Resources
New Bedford, Massachusetts
Photographs Documented September 13, 2019

Photo 5



View of where the barge has been docked to the site—facing east

Photo 6



The area that will be trenched within Riverfront Area for installation of the new drainage infrastructure—
facing east

PHOTOGRAPHIC DOCUMENTATION
137 - 143 Popes Island—Shoreline Resources
New Bedford, Massachusetts
Photographs Documented September 13, 2019

Photo 7



View of the existing conditions of the parking area—facing southwest

Photo 8



View of the Coastal Bank at the southeast corner of the site—facing north

PHOTOGRAPHIC DOCUMENTATION
137 - 143 Popes Island—Shoreline Resources
New Bedford, Massachusetts
Photographs Documented September 13, 2019



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Bristol County, Massachusetts, Southern Part**



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.


Custom Soil Resource Report Soil Map



Custom Soil Resource Report


MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)


Soils


 Soil Map Unit Polygons


 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit


 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot


 Sinkhole


 Slide or Slip

 Sodic Spot


 Spoil Area

 Stony Spot


 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals


Transportation

 Rails


 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bristol County, Massachusetts, Southern Part
Survey Area Data: Version 12, Sep 7, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Jul 3, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
602	Urban land	31.2	47.4%
607	Water, saline	34.6	52.6%
Totals for Area of Interest		65.8	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Bristol County, Massachusetts, Southern Part

602—Urban land

Map Unit Setting

National map unit symbol: v5ry

Frost-free period: 120 to 200 days

Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Excavated and filled land

Minor Components

Udorthents

Percent of map unit: 15 percent

Hydric soil rating: Unranked

607—Water, saline

Map Unit Setting

National map unit symbol: v5x5

Frost-free period: 120 to 200 days

Farmland classification: Not prime farmland

Map Unit Composition

Water, saline: 95 percent

Minor components: 5 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Minor Components

Westbrook

Percent of map unit: 5 percent

Landform: Marshes

Hydric soil rating: Yes

References

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Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

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