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New Bedford Harbor Superfund Site

U.S. Army Corps of Engineers New England District

Final Parcel 265 Intertidal After Action Report

ACE-J23-35BG2000-M17-0025

August 2018

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New Bedford Harbor Superfund Site

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Acronyms and Abbreviations

BOD	Basis of Design
CDA	compliance demonstration area
CDF	Confined Disposal Facility
cy	cubic yards
DDA	Debris Disposal Area
EPA	U.S. Environmental Protection Agency
FSP	Field Sampling Plan
ft.	feet
GPS	global positioning system
Jacobs	Jacobs Engineering Group, Inc.
mg/kg	milligrams per kilogram
MHHW	mean higher-high water
NAE	U.S. Army Corps of Engineers – New England District
NBHSS	New Bedford Harbor Superfund Site
PCB	polychlorinated biphenyl
QAPP	Quality Assurance Project Plan
RBG	risk-based goals
RTK	real-time kinematic
Sevenson	Sevenson Environmental Services, Inc.
TCL	target cleanup level
TSCA	Toxic Substances Control Act
UCL	upper confidence limit

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1. Introduction

Remediation and restoration of Parcel 265 intertidal zone were conducted by Jacobs Engineering Group, Inc. (Jacobs) under U.S. Army Corps of Engineers – New England District (NAE) Interim Remediation Action Contract No. W912WJ-14-D-0002 between January 11, 2016 and June 27, 2016. The primary objective of remedial action at Parcel 265 was to remove soil and sediment with polychlorinated biphenyl (PCB) levels greater than the site-specific target cleanup levels (TCLs) as established in the *1998 Record of Decision for the New Bedford Harbor Superfund Site* (EPA 1998), and to restore the site to baseline or comparable conditions. TCLs established for the Parcel 265 Site are 10 milligrams per kilogram (mg/kg) for mudflats/subtidal areas (regardless of depth), 25 mg/kg for soil and sediment one foot (ft.) deep or less in vegetated marsh areas for recreational users, and 50 mg/kg for soil and sediment deeper than 1 ft. in vegetated marsh areas. A 95% upper confidence limit (UCL) compliance calculation was performed on the final remediated and restored condition of the top foot of the entire Parcel 265 intertidal zone to ensure that PCB concentrations were below the recreational TCL of 25 mg/kg. Parcel 265 is located on the western side of New Bedford Harbor adjacent to the Coggeshall Street Bridge. The site is bounded to the west by the 7-Eleven Store and the overflow parking lot for the Market Basket grocery store. It is bounded on the north by the U.S. Environmental Protection Agency (EPA) New Bedford Harbor Superfund Site (NBHSS) Pilot Confined Disposal Facility (CDF) C, which now serves as the NBHSS project Debris Disposal Area (DDA) (Figure 1-1).

The purpose of this After Action Report is to document the remediation activity and final disposition of the restored Parcel 265 area. Contaminated sediments were removed and the Parcel 265 area was restored according to the *Draft Final Parcel 265 Intertidal Remediation Plan* (Work Plan) [Jacobs 2016].

2. Remedial Activities

The methods used to complete the remedial activities at the site are presented below. All site activities were conducted in accordance with the Work Plan.

2.1 Site Preparation

Sampling of sediment and soil from the subtidal, intertidal, and vegetated areas around Parcel 265 was conducted between 1999 and 2015, which provided the horizontal and vertical boundaries for PCB-contaminated sediment excavation. Figure 2-1 and Table 2-1 present the pre-excavation sampling locations and PCB concentrations in sediments for the Parcel 265 intertidal zone.

Pre-existing conditions at Parcel 265 were documented prior to the initiation of remedial activities to establish baseline conditions for backfill, contouring, and re-establishment of native vegetation. This included a pre-excavation elevation survey of the intertidal area (Figure 2-2). Pre-existing vegetative characteristics, including the type and extent of vegetative cover, were outlined in the *Draft Final Restoration Basis of Design / Design Analysis Report* (FW 2002) [Restoration Basis of Design (BOD)], and the *Final Wetland Delineation and Function and Values Update Memorandum* (AECOM 2015) [Wetland Delineation]. Other pre-excavation preparation activities included the installation of security fencing, site clearing, construction of an access road, and mobilization of equipment.

2.2 Removal of Contaminated Sediments

Excavation was conducted by Sevenson Environmental Services, Inc. (Sevenson) with a track-mounted excavator operated in the intertidal zone and guided by real time kinematic Global Positioning System (RTK GPS) (Figure 2-3). Excavated material was temporarily piled and staged in the intertidal zone near the mean higher-high water (MHHW) elevation to allow water to drain from the sediment prior to loading into trucks.

A total of 4,842 cubic yards (cy) of contaminated sediments was removed from the Parcel 265 intertidal zone during field activities based on estimates derived from the pre-excavation and post-excavation survey data. Contaminated sediments at Parcel 265 were removed between 18 January and 2 March 2016. The limits of excavation are presented on Figure 2-3.

2.3 Environmental Sampling

Post-excavation verification sampling was conducted by an independent party in accordance with the Field Sampling Plan (FSP) Addendum #1 to the *Revised Draft Final Confirmatory Sampling Field Sampling Plan, Lower Harbor Winter 2016 Dredge Areas and Parcel 265* (Battelle 2016a) [Confirmatory Sampling FSP] as well as the *Uniform Federal Policy- Quality Assurance Project Plan* (*QAPP) Addendum* (Battelle 2016b). Verification samples were collected on a 50-ft. grid from a pre-defined mudflat/subtidal compliance demonstration area (CDA) and a saltmarsh CDA. Jacobs screened the verification samples using immunoassay analysis to evaluate whether any further removal of contaminated sediment was required (Figure 2-4).

A spatially-representative subset of the verification samples pre-designated as confirmatory samples in the Confirmatory Sampling FSP was submitted for PCB congeners following excavation to ensure compliance with the applicable TCL. PCB analysis for 139 PCB congeners was performed by an independent party according to the methods outlined in the *QAPP Addendum* (Battelle 2016b). Post-excavation average concentrations were calculated for the Parcel 265 vegetated intertidal (3.8 mg/kg, prior to placement of clean backfill) and mudflat/subtidal areas (34.4 mg/kg), as summarized in Table 2-2.

Confirmatory samples were collected from the area backfilled with at least 1 ft. of material. Two of these sample locations, C14 and C15, were collected from the deep excavation adjacent to the wooden structure and represent areas that have been converted to subtidal. PCB concentrations for C14 and C15 were 122 and 27.9 mg/kg, respectively. Over-excavation was conducted adjacent to the wooden structure in an effort to remove all contaminated sediment; however, excavation ceased at a depth of 14 ft. upon direction of NAE. This area was backfilled with 4 to 5 ft. of stone, and is now a subtidal area with a subaqueous cap, and therefore no longer represents an area with potential dermal contact (Figure 2-5).

To assess recreational dermal exposure to intertidal soils and sediments, a 95% UCL calculation of the mean was performed on the final remediated and restored condition of the top foot of the entire Parcel 265 intertidal zone (i.e., remediated areas as well as areas not requiring remediation). This 95% UCL was calculated to be 3.719 mg/kg, as detailed further in Attachment 1. Verification and confirmation sample data are presented in the *Draft 2017 Intertidal Verification and Confirmatory Report* (Battelle 2018).

Ambient air and particulate monitoring was conducted by an independent party at fixed monitoring locations during Parcel 265 remedial activities in accordance with the *Draft Final Ambient Air Monitoring Plan for*

Remediation Activities (Jacobs 2015). No exceedances to risk-based goals (RBGs) were identified (USEPA 2018).

2.4 Site Restoration

Site restoration activities were completed following the removal of contaminated sediments according to the methods defined in the Work Plan. Restoration activities included backfill, revegetation, and removal of security fencing and an access road. Backfill of excavated areas was performed by Sevenson using fill material from an uncontaminated virgin source as specified in the Work Plan (Figures 2-5 and 2-6).

The plant community composition at the Site was restored on an approximate 1:1 basis, as compared to the *Wetland Delineation* (AECOM 2015). The exception to this restoration ratio is the combination mudflat and beach (subtidal), where the pre-excavation survey (1.29 acres in 2015) and the post-excavation survey (0.283 acres in 2016) differ. The difference is the excavated mudflat areas were not restored, except to establish a stable slope near the low marsh border. A post-excavation wetlands cover map is presented in Figure 2-7.

Site monitoring and maintenance will continue through the first five full growing seasons (Fall 2021) to document the extent to which the wetland restoration and, where applicable, upland restoration goals of the project are being met. The monitoring protocols are described in the Work Plan. Additional site restoration details are provided in Table 2-3.

3. Waste Management

Sediment generated from the Parcel 265 Intertidal Remediation was disposed in accordance with the Toxic Substances Control Act (TSCA). A total of 6,964.08 tons of stabilized sediment generated during the Parcel 265 Intertidal Remediation was transported via truck to Worcester, Massachusetts where it was transloaded to rail to Wayne Disposal, Inc. Site #2 Landfill, operated by US Ecology, Inc. in Belleville, MI.

4. References

AECOM. 2015. *Final Wetland Delineation and Function and Values Update Memorandum*. October.

Battelle. 2016a. *Field Sampling Plan Addendum #1 to the Revised Draft Final Confirmatory Sampling Field Sampling Plan, Lower Harbor Winter 2016 Dredge Areas and Parcel 265.*

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———. 2018. *Draft 2017 Intertidal Verification and Confirmatory Sampling Report, 2016-2017 Dredge Seasons.* New Bedford Harbor Superfund Site, New Bedford, MA. May.

Foster Wheeler (FW). 2002. *Draft Final Restoration Basis of Design/Design Analysis Report.* New Bedford Harbor Superfund Site, New Bedford, MA.

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——— 2015. *Draft Final Ambient Air Monitoring Plan for Remediation Activities*. ACE-J23-35BG1001-M17-0009. New Bedford Harbor Superfund Site. July.

U.S. Environmental Protection Agency (EPA). 1998. Record of Decision for the Upper and Lower Harbor Operable Unit, New Bedford Harbor Superfund Site. September 1998. USEPA Region 1 – New England.

——— 2018. Air Monitoring Data Status as of April 2018. Table E-1, Ambient Air Monitoring Program—Total Detectable PCB Homologues. http://www2.epa.gov/new- bedfordharbor/new-bedford-harbor-cleanup-plans-technical-documents-and-environmental-data

Figures

Pilot CDF Area
Gate
Gate
Sawyer Street
Abandoned CSO
Wooden Wall
Pipeline
Escarpment
Market Basket Parking Lot
Parcel 265
Exposed Drain Tile
MW OWC4
Wooden Structures
Outfall 022
7-Eleven
Exposed Large Rock
Outfall 040
Coggeshall Street
Site Location
USGS, MassGIS

Legend

- Exposed Drain Tile
- City Drainage Outfall
- Dredge Area Q
- Parcel 265 Boundary
- Newly Placed Geotextile Layer and Crushed Stone
- MLLW
- MHHW
- Approximate Geotextile Fabric Line
- Wooden Structures
- Proposed River Walk
- Abandoned CSO
- Pipeline
- Wooden Wall
- Escarpment
- Exposed Large Rock
- Aerial Photography MASSGIS 2014
- Monitoring Well

0 100 Feet

1:900

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Parcel 265 Site and Pre-Excavation Features

New Bedford Harbor Superfund Site

NAME: jpiccuito Date: 6/28/2018

Figure 1-1

Path: Y:\NBH\Projects\35BG1001\20180516\ArcGIS\Parcel_265_Site_Location_AAR_20180516.mxd

Gate
Gate
Sawyer Street
Temporary Access Road
Market Basket Parking Lot
Parcel 265
7-Eleven
Coggeshall Street
BH-Q9
BH-C1
BH-Q10
BH-Q3
BH-Q2
BH-Q5
BH-Q1
BH-D1
BH-Q4
BH-Q12
BH-Q11
265-02
265-01
265-03
BH-QE2
BH-Q6
BH-E2
265-04
BH-SOIL1
BH-Q8
BH-Q7
BH-F1
265-06
265-05
265-07
BH-SOIL2
265-08
265-10
265-09
265-11A
265-11
BH-G1
BH-SOIL3
265-12
265-13
265-14
BH4
265-15
265-16
BH-SOIL4
BH-SOIL5
265-17
265-18
265-19
S-3835
265-35
265-36
265-20
265-21
265-22
BH-K1
265-23
265-24
265-26
265-25
265-27
265-34
265-28
265-29
BH8
S-848
265-30
S-3836
265-31
265-32
265-33
S-178
S-849
S-3618
S-850
USGS, MassGIS

Thickness of Sediment to Remove, ft

> 4	2
4	1.5
3.5	1
3	
2.5	

Legend

- Sample Location
- MLLW
- MHHW
- Temporary Access Road
- Approximate Geotextile Fabric Line
- Proposed River Walk
- Dredge Area Q
- Parcel 265 Boundary

Aerial Photography MASSGIS 2014

N

0 100 Feet

1:900

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Parcel 265 Pre-Excavation Contaminant Boundaries

New Bedford Harbor Superfund Site

NAME: jpiccuito Date: 6/28/2018

Figure 2-1

Path: Y:\NBH\Projects\35BG100\20180516\ArcGIS\Parcel_265_Dredge_Boundaries_AAR_20180516.mxd

Gate

Gate

Sawyer Street

Market Basket
Parking Lot

Parcel
265

7-Eleven

Coggeshall Street

0
3
5
2
6
5
4
2
1
5
3
1

Wetland Cover Types

- Low Marsh
- Phragmites Marsh
- Mudflat
- Beach

USGS, MassGIS

Legend

- Dredge Area Q
- Parcel 265 Boundary
- MLLW
- MHHW
- Pre-Excavation Topography (1ft Contour)
- Approximate Geotextile Fabric Line
- Proposed Access Road

Aerial Photography MASSGIS 2014

N

0 100 Feet

1:900

Source: Wetland Delineation and Function and Values Update Memorandum, AECOM, October 2015

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Parcel 265
Pre-Excavation Wetland Cover and Topography

New Bedford Harbor Superfund Site

NAME: jpiccuito Date: 5/17/2018

Figure 2-2

Path: Y:\NBH\Projects\35BG100120180516\ArcGIS\Parcel_265_Wetland_Cover_AAR_20180516.mxd

Gate

Gate

Sawyer Street

Market Basket
Parking Lot

Parcel
265

7-Eleven

Coggesha[illegible] Street

USGS, MassGIS

Legend

MLLW

MHHW

Parcel 265 Boundary

Limits of Excavation

Aerial Photography MASSGIS 2014

N

0 100 Feet

1:900

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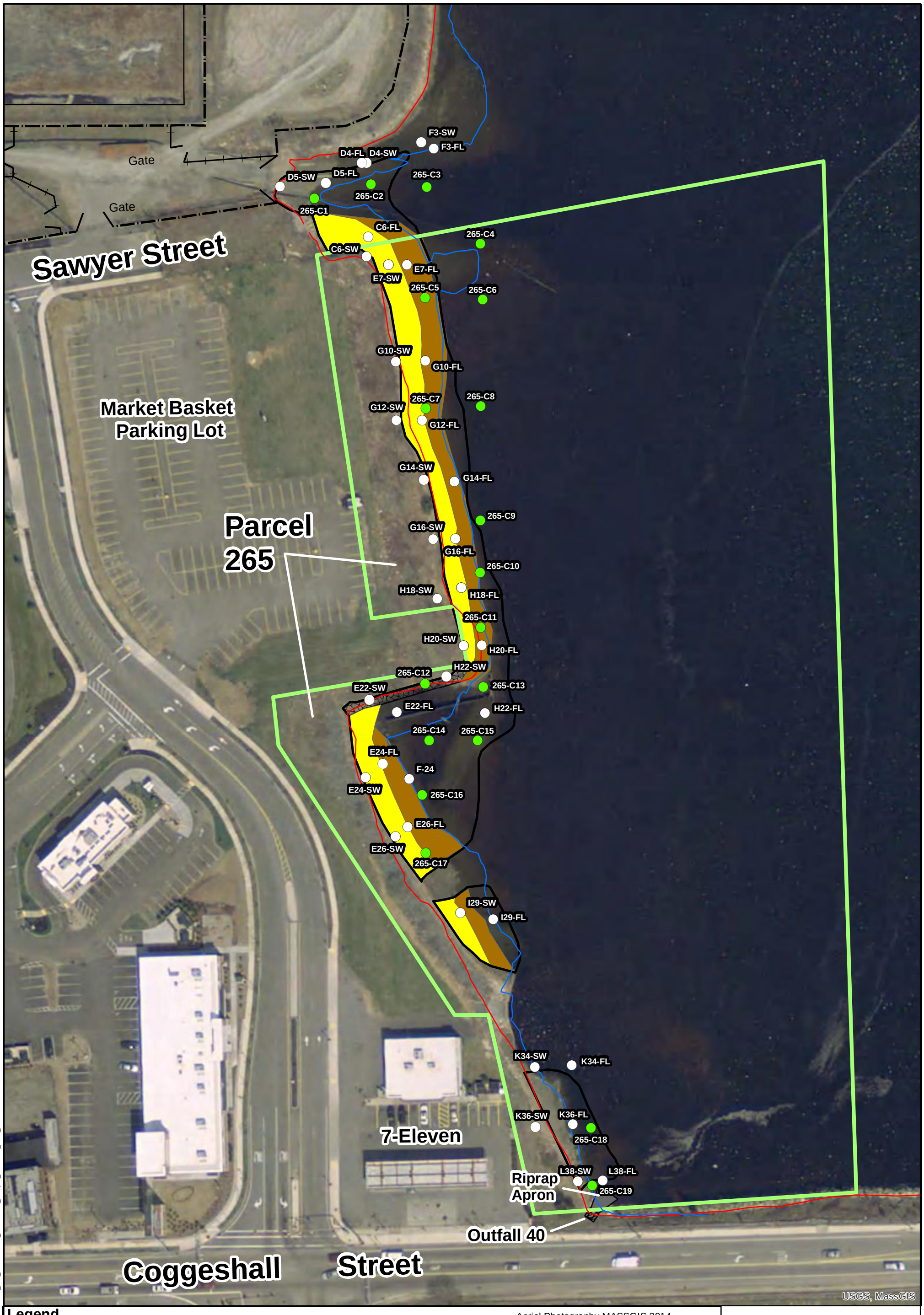
Parcel 265
Limits of Excavation

New Bedford Harbor Superfund Site

NAME: jpiccuito Date: 5/17/2018

Figure 2-3

Path: Y:\NBH\Projects\35BG1001\20180516\ArcGIS\Parcel_265_Post_Excavtion_Limits_AAR_20180516.mxd



Legend

- Verification (screening) Sample Location
- Confirmation Sample
- Est. MLLW based on Post Bathy Surface
- MHHW
- Parcel 265 Boundary
- Limits of Excavation
- Low Marsh
- Mudflat/Subtidal
- Riprap

Aerial Photography MASSGIS 2014

0 100 Feet

1:900

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Parcel 265 Verification and Confirmation Sample Locations

New Bedford Harbor Superfund Site

NAME: jpiccuito Date: 8/15/2018

Figure 2-4

Path: Y:\NBH\Projects\35BG1001\20180516\ArcGIS\Parcel_265_Confirmation_Verification_Sample_Locations_AAR_20180516.mxd

265-C14

A

A'

5
4
2
5
3
2
5
-1
0
-1
-4
-5
-6
-7
-3
3
-5
2
2
2
2
2
3

Conservation Mix Grasses
Contractors Mix Grasses
American Beach Grass
Low Marsh
Mudflat

Legend

MLLW
MHHW
Parcel 265 Boundary
Post-Excavation Limits
Sub-Aqueous Cap Extent
Riprap
Pre-existing Riprap
Sand and Gravel Cap Limits
Stone Cap Limits
Cross Section Location
Sample Location
Post-Excavation/Restoration Topography (1ft Contour)

Aerial Photography MASSGIS 2014

0 30 Feet

1:360

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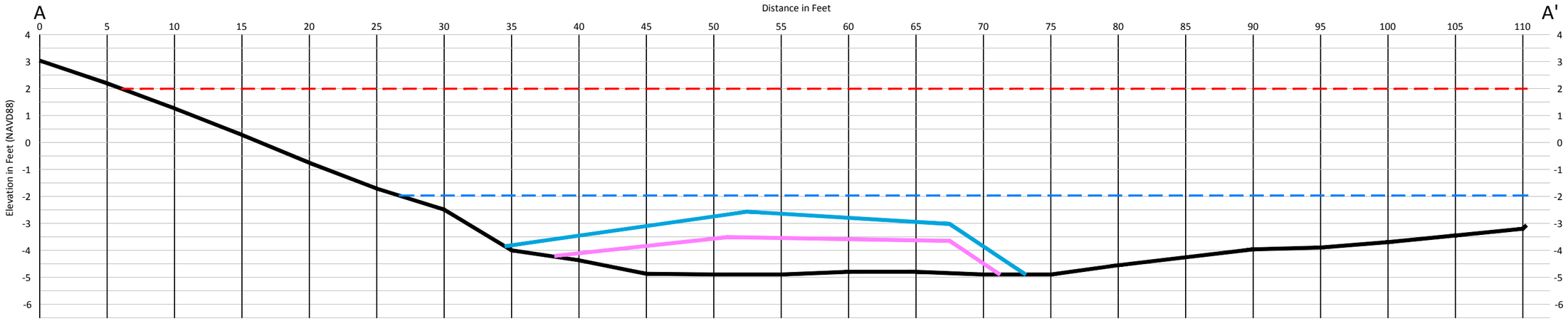
Parcel 265 Record Drawing and Cross Section Location

New Bedford Harbor Superfund Site

NAME: jpiccuito Date: 8/28/2018

Figure 2-5

Path: Y:\NBH\Projects\35BG1001\20180516\ArcGIS\Parcel_265_Record_Drawing_20180828.mxd



Cross Section
A - A'

Legend

- Post Excavation Topography Elevation Line
- Sand and Gravel Layer
- Stone Layer
- MHHW
- MLLW

Elevation Data: NAVD88

Vertical: 1 in. = 4 ft.
0 2 4
0 4 8
Horizontal: 1 in. = 8 ft.

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Parcel 265

Cross Section A-A'

08/15/18

Figure 2-6

last modified: 08/15/18 printed: 08/15/18 by sc

USACE Facility -
103 Sawyer St.

Existing USACE Fence

Drainage Swale

Sawyer Street

Vehicle Gate

City Fencing

Contractor's Seed Mix

Riprap

Drain Pipe

Low Marsh Plantings 12" on Center

Drainage Swale

Riprap Placed During Restoration

Previously Existing Riprap

Unexcavated Area (not restored)

Outfall 22

No Restoration South of this Point due to ongoing City of New Bedford work

Outfall 40

Market Basket Park ng Lot

7-Eleven

Coggesha Street

USGS, MassG S

Legend

- Est. MLLW based on Post Bathy Surface
- MHHW
- Parcel 265 Boundary
- Limits of Excavation
- Sub-Aqueous Cap Extent
- Conservation Mix Grasses
- Contractors Mix Grasses
- American Beach Grass
- Low Marsh
- Mudflat
- Riprap
- Pre-existing Riprap
- Edge of Backfill
- Post-Excavation/Restoration Topography (1ft Contour)
- MU28\Area T Dredge Boundary

Aerial Photography MASSGIS 2014

0 100 Feet

1:900

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Parcel 265
Post-Excavation Restoration

New Bedford Harbor Superfund Site

NAME: jpiccuito Date: 8/30/2018

Figure 2-7

Path: Y:\NBH\Projects\35BG1001\20180516\ArcGIS\Parcel_265_Post_Excavtion_Restoration_AAR_20180828.mxd

Tables

Table 2-1
Pre-Remediation PCB Data Points

Location	Depth Interval (feet)	Collection Date	Area-Specific Shoreline Cleanup Levels[1]	Total PCB [2,4] (mg/kg)	Qual
265-01	0-1	11/20/14	Subtidal	9.6	
265-01	1-2	11/20/14	Subtidal	7.3	
265-02	0-1	11/17/14	Intertidal	20.2	
265-02	1-2	11/17/14	Intertidal	3.4	
265-03	0-1	11/17/14	Subtidal	6.56	
265-03	1-2	11/17/14	Subtidal	4.6	
265-04	0-1	11/20/14	Subtidal	**40**	a
265-04	1-2	11/20/14	Subtidal	3.9	a
265-05	0-1	11/20/14	Subtidal	24.2	
265-05	1-2	11/20/14	Subtidal	9.36	
265-06	0-1	11/11/14	Intertidal	1.6	
265-06	1-2	11/11/14	Intertidal	1.7	
265-07	0-1	11/20/14	Subtidal	**60.0**	
265-07	1-2	11/20/14	Subtidal	**44**	b
265-07	2-3	11/20/14	Subtidal	11	
265-08	0-1	11/11/14	Intertidal	8.35	
265-08	1-2	11/11/14	Intertidal	18	
265-08	2-3	11/11/14	Intertidal	11.1	
265-09	0-1	11/20/14	Subtidal	**71**	
265-09	1-2	11/20/14	Subtidal	**60**	
265-09	2-3	11/20/14	Subtidal	22.3	
265-10	0-1	11/05/14	Subtidal	**27**	
265-10	1-2	11/05/14	Subtidal	**45**	b
265-10	2-3	11/05/14	Subtidal	11.6	
265-11	0-1	11/05/14	Intertidal	6.3	
265-11	1-2	11/05/14	Intertidal	18.0	
265-11	2.0-2.1	11/05/14	Intertidal	37	
265-11A	0-1	11/11/14	Intertidal	6.47	
265-11A	1-2	11/11/14	Intertidal	8.4	
265-12	0-1	11/05/14	Subtidal	**226**	

Table 2-1
Pre-Remediation PCB Data Points

Location	Depth Interval (feet)	Collection Date	Area-Specific Shoreline Cleanup Levels[1]	Total PCB [2,4] (mg/kg)	Qual
265-12	1-2	11/05/14	Subtidal	**88**	
265-12	2-3	11/05/14	Subtidal	**57**	c
265-13	0-1	11/05/14	Intertidal	5.6	
265-13	1-2	11/05/14	Intertidal	16.9	
265-13	2-3	11/05/14	Intertidal	11	
265-14	0-1	11/05/14	Subtidal	**41**	
265-14	1-2	11/05/14	Subtidal	3.58	
265-15	0-1	11/05/14	Subtidal	**37**	
265-15	1-2	11/05/14	Subtidal	**64**	
265-15	2-3	11/05/14	Subtidal	17.7	
265-16	0-1	11/05/14	Intertidal	12	
265-16	1-2	11/05/14	Intertidal	12.0	
265-16	2.0-2.8	11/05/14	Intertidal	16	
265-17	0-1	11/05/14	Intertidal	5.1	
265-17	1-2	11/05/14	Intertidal	ND	
265-18	0-1	11/05/14	Subtidal	**163**	
265-18	1-2	11/05/14	Subtidal	**430**	
265-18	2-3	11/05/14	Subtidal	**378**	c
265-19	0-1	11/05/14	Subtidal	**79**	
265-19	1-2	11/05/14	Subtidal	**336**	
265-19	2-3	11/05/14	Subtidal	**853**	c
265-20	0-1	11/18/14	Subtidal	**391**	
265-20	1-2	11/18/14	Subtidal	6.5	
265-21	0-1	11/06/14	Subtidal	**28**	
265-21	1-2	11/06/14	Subtidal	**214**	
265-21	2-3	11/06/14	Subtidal	**184**	c
265-22	0-1	11/21/14	Subtidal	**21**	b
265-22	1-2	11/21/14	Subtidal	**50**	b
265-22	2-3	11/21/14	Subtidal	8.51	
265-23	0-1	11/06/14	Subtidal	**55**	

Table 2-1
Pre-Remediation PCB Data Points

Location	Depth Interval (feet)	Collection Date	Area-Specific Shoreline Cleanup Levels[1]	Total PCB [2,4] (mg/kg)	Qual
265-23	1-2	11/06/14	Subtidal	**98**	
265-23	2-3	11/06/14	Subtidal	8.3	
265-24	0-1	11/06/14	Intertidal	17.5	
265-24	1-2	11/06/14	Intertidal	8.8	
265-25	0-1	11/06/14	Intertidal	**76.6**	
265-25	1-2	11/06/14	Intertidal	5.3	
265-26	0-1	11/06/14	Intertidal	12	
265-26	1-2	11/06/14	Intertidal	1.0	
265-27	0-1	11/21/14	Subtidal	14.9	
265-27	1-2	11/21/14	Subtidal	4.3	
265-28	0-1	11/07/14	Intertidal	**51.3**	
265-28	1-2	11/07/14	Intertidal	0.7	a
265-29	0-1	11/07/14	Subtidal	17	
265-29	1-2	11/07/14	Subtidal	3.4	
265-30	0-1	11/11/14	Subtidal	**178**	
265-30	1-2	11/11/14	Subtidal	**43**	b
265-30	2-3	11/11/14	Subtidal	**67**	c
265-31	0-1	11/20/14	Subtidal	**67**	
265-31	1-2	11/20/14	Subtidal	**63**	
265-31	2.0-2.7	11/20/14	Subtidal	35	
265-32	0-1	11/11/14	Intertidal	11.7	
265-32	1.0-1.5	11/11/14	Intertidal	0.6	
265-33	0-1	11/11/14	Subtidal	**91**	
265-33	1-2	11/11/14	Subtidal	**64**	
265-33	2-3	11/11/14	Subtidal	**55**	c
265-34	0-1	04/27/15	Intertidal	8.1	
265-35	3-4	04/21/15	Subtidal	**768**	
265-35	4-5	04/21/15	Subtidal	**324**	
265-35	5-6	04/21/15	Subtidal	1.8	
265-35	6-6.4	04/21/15	Subtidal	**113**	c

Table 2-1
Pre-Remediation PCB Data Points

Location	Depth Interval (feet)	Collection Date	Area-Specific Shoreline Cleanup Levels[1]	Total PCB [2,4] (mg/kg)	Qual
265-36	3-4	04/27/15	Subtidal	**91.1**	
265-36	4-5	04/27/15	Subtidal	2.6	
265-36	5-6	04/27/15	Subtidal	1.7	
265-36	6-6.2	04/27/15	Subtidal	5.0	
BH4	0-1	11/30/07	Subtidal	**31.2**	
BH4	1-2	11/30/07	Subtidal	6.50	
BH4	2-3	11/30/07	Subtidal	4.16	
BH8	0-1	11/30/07	Intertidal	1.46	
BH8	1-2	11/30/07	Intertidal	0.255	
BH8	2-3	11/30/07	Intertidal	0.286	
BH-E2	0-1	11/03/10	Subtidal	**65.0**	
BH-E2	1-2	11/03/10	Subtidal	ND	
BH-E2	2-3	11/03/10	Subtidal	ND	
BH-E2	3-4	11/03/10	Subtidal	ND	
BH-F1	0-1	10/25/10	Subtidal	23.9	
BH-G1	0-1	10/25/10	Subtidal	**135**	
BH-G1	1-2	10/25/10	Subtidal	0.0192	
BH-K1	0-1	10/25/10	Subtidal	**28.6**	
BH-K1	1-2	10/25/10	Subtidal	**93.6**	c
BH-SOIL1	0-1	10/27/10	Intertidal	4.68	
BH-SOIL1	1-2	10/27/10	Intertidal	2.50	
BH-SOIL2	0-1	10/27/10	Intertidal	2.86	
BH-SOIL2	1-2	10/27/10	Intertidal	4.68	
BH-SOIL3	0-1	10/27/10	Intertidal	2.50	
BH-SOIL3	1-2	10/27/10	Intertidal	1.40	
BH-SOIL4	0-1	10/27/10	Intertidal	5.72	
BH-SOIL4	1-2	10/27/10	Intertidal	5.46	
BH-SOIL5	0-1	10/27/10	Intertidal	0.390	
BH-SOIL5	1-2	10/27/10	Intertidal	ND	
S-178	0-1	10/08/99	Subtidal	**1480**	

Table 2-1
Pre-Remediation PCB Data Points

Location	Depth Interval (feet)	Collection Date	Area-Specific Shoreline Cleanup Levels[1]	Total PCB [2,4] (mg/kg)	Qual
S-178	1-2	10/08/99	Subtidal	**72.8**	
S-178	2-3	10/08/99	Subtidal	**3120**	
S-178	3-4	10/08/99	Subtidal	**936**	c
S-3618	1.4-1.9	09/18/01	Subtidal	**1120**	
S-3618	1.9-2.4	09/18/01	Subtidal	**286**	c
S-3835	0-1	10/17/01	Intertidal	7.80	
S-3836	1.3-1.8	09/27/01	Subtidal	**70.2**	
S-3836	2.3-2.8	09/27/01	Subtidal	0.0780	
S-848	0-1	10/24/00	Intertidal	1.25	
S-848	1-2	10/24/00	Intertidal	0.650	
S-849	0-1	10/24/00	Intertidal	0.135	
S-849	1-2	10/24/00	Intertidal	0.156	
S-850	0-1	10/24/00	Subtidal	**80.6**	
S-850	1-2	10/24/00	Subtidal	25.0	

Notes:

[1] TCLs: Vegetated Intertidal: 25 ppm for 0-1 foot interval, 50 ppm > 1 foot, and Mudflats/Subtidal : 10 ppm

[2] Bold font - Location included in remediation footprint

[3] Total PCB Method: (1) sum of 139 congeners; (2) sum of NOAA 18 congeners X 2.6, (3) im

[4] ND = non detect

a- average of field duplicates/lab replicates

b - IA result less than TCL, but flagged for removal

c - vertical extent of contamination not delineated.

Table 2-2
Post-Excavation PCB Congener Sample Data

Station ID	Sample ID	Field QC Code	Sample Date	Sum 139 PCB Congeners[1] (mg/kg)	Qual	Sum 139 PCB Congener Average[2,3,4] (mg/kg)
Low Marsh: target cleanup level = 25 mg/kg in top 1 ft						
265-C5	S-16M-265-C5-00-10	SA	3/8/2016	4.48		3.8
265-C7	S-16M-265-C7-00-10	SA	3/8/2016	3.81		
265-C11	S-16M-265-C11-00-10	SA	3/8/2016	6.63		
265-C12	S-16M-265-C12-00-10	SA	3/9/2016	3.08		
265-C17	S-16M-265-C17-00-10	SA	3/9/2017	1.12		
Mudflat/Subtidal: target cleanup level = 10 mg/kg						
265-C1	S-16M-265-C1-00-10	SA	3/8/2016	27.4		34.4
265-C2	S-16M-265-C2-00-10	SA	3/8/2016	13.1		
265-C3	S-16M-265-C3-00-10	SA	3/8/2016	40.1		
265-C3	S-16M-265-C3-00-10-REP	REP	3/8/2016	46		
265-C4	S-16M-265-C4-00-10	SA	3/8/2016	23.2		
265-C6	S-16M-265-C6-00-10	SA	3/8/2016	17.8		
265-C8	S-16M-265-C8-00-10	SA	3/8/2016	55.2		
265-C9	S-16M-265-C9-00-10	SA	3/8/2016	35.3		
265-C10	S-16M-265-C10-00-10	SA	3/9/2016	22.5		
265-C13	S-16M-265-C13-00-10	SA	3/9/2016	11.8		
265-C14	S-16M-265-C14-00-10	SA	3/9/2016	122		
265-C15	S-16M-265-C15-00-10	SA	3/8/2016	27.9		
265-C16	S-16M-265-C16-00-10	SA	3/9/2016	0.241		
265-C18	S-16M-265-C18-00-10	SA	3/9/2016	1.01		
265-C19	S-16M-265-C19-00-10	SA	3/8/2016	80.4		

Notes:

[1] Sum of 139 PCB congeners; non-detects are set to zero in the sums.

[2] Field duplicate results are averaged in the compliance calculation.

[3] Low marsh samples listed were covered with clean backfill as part of site restoration.

[4] 10 ppm TCL for mudflats/subtidal is for the entire upper harbor; value is acceptable if 10 ppm TCL is achieved for the entire upper harbor.

U - not detected

ID - identification; QC - quality control; PCB - polychlorinated biphenyl; Qual - qualifier

SA - field sample; REP - field replicate

Table 2-3
Site Restoration Summary

PLANTING DATES (Completed)	
6/27/2016	Hydro seeding completed. (New England Conservation/Wildlife Mix with winter rye at 25 lbs per acre)
7/1/2016	Saltmarsh plugs completed. (11,200 *Spartina alterniflora* 2" plugs, 1,400 *Ammophila brevigulata* 2" plugs)
PHRAGMITES CONTROL	
6/15/2016	Phragmites was removed by the roots after access road was removed. Plant material stored at the CDF.
LOW MARSH AND HIGH MARSH ELEVATIONS (Bottom to Top)	
Low Marsh	From coir log (approximately 0.13') to 1.75'
Beach Grass	1.75' to 4.98'
Conservation Seed Mix	Above 4.98' (New England Conservation/Wildlife Mix mixed with winter rye)
IMPORTED TOPSOIL	
Grain Size	0.053 mm (No. 270 sieve) to 4.76 mm (No. 4 sieve), with 40% measured at 0.500 mm (No. 35 sieve).
Organic Content	3.2%
Quantity	1,148 cubic yards of topsoil (screened loam)
SHORELINE PROTECTION	
Coir log	920 linear feet

Attachment 1

95% Upper Confidence Limit Calculation

95% Upper Confidence Limit (UCL) Calculation for the Parcel 265 Intertidal Remediation Area
New Bedford Harbor Superfund Site
December 27, 2017

Study ID	Station ID	Sample Date	Northing	Easting	Total PCB Concentration[1] 0-1 foot interval (mg/kg)	Comment
NBHINT2014	265-02	11/17/2014	2701118.0	814853.0	0.01	Excavated and backfilled, low marsh
NBHINT2014	265-03	11/17/2014	2701103.0	814902.0	0.01	Excavated and backfilled, mudflat
NBHINT2014	265-04	11/20/2014	2701087.0	814901.0	0.01	Excavated and backfilled, mudflat
NBHINT2014	265-05	11/20/2014	2701042.0	814899.0	0.01	Excavated and backfilled, mudflat
NBHINT2014	265-07	11/20/2014	2701009.0	814903.0	0.01	Excavated and backfilled, mudflat
NBHINT2014	265-08	11/11/2014	2700974.0	814872.0	8.35	Not excavated, upland
NBHINT2014	265-11A	11/11/2014	2700942.0	814885.0	6.47	Not excavated, upland
NBHINT2014	265-24	11/6/2014	2700646.0	814865.0	0.01	Excavated and backfilled, low marsh
NBHINT2014	265-25	11/6/2014	2700610.0	814885.0	0.01	Excavated and backfilled, low marsh
NBHINT2014	265-28	11/7/2014	2700558.0	814929.0	0.01	Excavated and backfilled, low marsh
NBHCNF2016	265-C5	3/8/2016	2701080.3	814900.2	0.01	Excavated and backfilled, mudflat
NBHCNF2016	265-C7	3/8/2016	2700985.5	814901.0	0.01	Excavated and backfilled, mudflat
NBHCNF2016	265-C11	3/8/2016	2700798.5	814947.8	0.01	Excavated and backfilled, mudflat
NBHCNF2016	265-C12	3/9/2016	2700750.1	814900.3	0.01	Excavated, backfilled with rip rap
NBHCNF2016	265-C17	3/8/2016	2700605.9	814901.1	0.01	Excavated and backfilled, mudflat
POST2007	BH4	11/30/2007	2700856.0	814932.0	0.01	Excavated and backfilled, mudflat
POST2007	BH8	11/30/2007	2700545.0	814927.0	0.01	Excavated and backfilled, low marsh
NBHMON2010	BH-F1	10/25/2010	2701033.0	814918.0	0.01	Excavated and backfilled, mudflat
NBHMON2010	BH-G1	10/25/2010	2700917.0	814932.0	0.01	Excavated and backfilled, mudflat
NBHMON2010	BH-SOIL1	10/27/2010	2701075.0	814831.0	4.68	Not excavated, upland
NBHMON2010	BH-SOIL2	10/27/2010	2701002.0	814841.0	2.86	Not excavated, upland
NBHMON2010	BH-SOIL3	10/27/2010	2700911.0	814869.0	2.50	Not excavated, upland
NBHMON2010	BH-SOIL4	10/27/2010	2700832.0	814887.0	5.72	Not excavated, upland
NBHMON2010	BH-SOIL5	10/27/2010	2700771.0	814906.0	0.390	Not excavated, upland
PHASEII	S-848	10/24/2000	2700399.0	814999.0	1.25	Not excavated, mudflat
PHASEII	S-849	10/24/2000	2700299.0	815002.0	0.135	Not excavated, upland
PHASE3D	S-3835	10/17/2001	2700734.0	814838.0	7.80	Not excavated, upland
Maximum					**8.35**	
Mean					**1.49**	
95% UCL[2]					**3.72**	

Notes:

[1] Total PCB is the sum of NOAA 18 congeners X 2.6 correction factor for samples collected from 2000-2010 and sum of 139 PCB congeners for samples collected from 2014-2016; non-detects counted as zero in the sums. A concentration of 0.01 mg/kg was assumed for backfilled areas.

[2]Non-parametric, distribution-free UCL: 95% Chebyshev (Mean, Sd) UCL, calculated in ProUCL Version 5.0.00.

FILE: C:\GIS\New_Bedford_Harbor\Maps\Base_Parcel_265_PCB_actuals_r05_2017.mxd

Legend

- MLLW
- Restored Low Marsh
- Restored Mud Flat
- Lot 265 Boundary (1/25/2000 Survey)
- Sawyer Street Facility
- Sampling Location

Feet
0 25 50

BATTELLE

Parcel 265
Intertidal Sample Locations

New Bedford Harbor
Superfund Site

DATE: 12/20/2017	ANALYST: HICKSJ
REV. 05	APPROVED: WHITE

Attachment: ProUCL Output for the Parcel 265 Intertidal Remediation Area

UCL Statistics for Uncensored Full Data Sets

User Selected Options

Date/Time of Computation	12/20/2017 10:54
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	200000%

tPCB (ppm)

General Statistics

Total Number of Observations	27	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	0.01	Mean	1.494
Maximum	8.35	Median	0.01
SD	2.653	Std. Error of Mean	0.511
Coefficient of Variation	1.776	Skewness	1.665

Normal GOF Test

Shapiro Wilk Test Statistic	0.624	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.923	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.365	Lilliefors GOF Test
5% Lilliefors Critical Value	0.171	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	2.364	95% Adjusted-CLT UCL (Chen-1995)	2.508
		95% Modified-t UCL (Johnson-1978)	2.392

Gamma GOF Test

A-D Test Statistic	3.885	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.882	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.394	Kolmogrov-Smirnoff Gamma GOF Test
5% K-S Critical Value	0.185	Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics

k hat (MLE)	0.24	k star (bias corrected MLE)	0.238
Theta hat (MLE)	6.23	Theta star (bias corrected MLE)	6.281
nu hat (MLE)	12.95	nu star (bias corrected)	12.84
MLE Mean (bias corrected)	1.494	MLE Sd (bias corrected)	3.063
		Approximate Chi Square Value (0.05)	5.785
Adjusted Level of Significance	0.0401	Adjusted Chi Square Value	5.484

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	3.315	95% Adjusted Gamma UCL (use when n<50)	3.497

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.678	Shapiro Wilk Lognormal GOF Test
5% Shapiro Wilk Critical Value	0.923	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.394	Lilliefors Lognormal GOF Test
5% Lilliefors Critical Value	0.171	Data Not Lognormal at 5% Significance Level
Data Not Lognormal at 5% Significance Level		

Lognormal Statistics

Minimum of Logged Data	-4.605	Mean of logged Data	-2.582
Maximum of Logged Data	2.122	SD of logged Data	2.808

Assuming Lognormal Distribution

95% H-UCL	76.9	90% Chebyshev (MVUE) UCL	7.175
95% Chebyshev (MVUE) UCL	9.395	97.5% Chebyshev (MVUE) UCL	12.47
99% Chebyshev (MVUE) UCL	18.53		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	2.333	95% Jackknife UCL	2.364
95% Standard Bootstrap UCL	2.297	95% Bootstrap-t UCL	2.816
95% Hall's Bootstrap UCL	2.302	95% Percentile Bootstrap UCL	2.356
95% BCA Bootstrap UCL	2.54		
90% Chebyshev(Mean, Sd) UCL	3.025	95% Chebyshev(Mean, Sd) UCL	3.719
97.5% Chebyshev(Mean, Sd) UCL	4.682	99% Chebyshev(Mean, Sd) UCL	6.573

Suggested UCL to Use

99% Chebyshev (Mean, Sd) UCL	6.573

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.