New Bedford Harbor Superfund Site

U.S. Army Corps of Engineers New England District

Final Dredge Area H Hybrid Dredge Data Report

ACE-J23-35BG6000-M17-0020

September 2019

SEMS Doc ID 100012485

New Bedford Harbor Superfund Site

Project No:	35BG6000
Document Title:	Final Dredge Area H Hybrid Dredge Data Report
Document No.:	ACE-J23-35BG6000-M17-0020
Date:	September 2019
Client Name:	U.S. Army Corps of Engineers New England District
Project Manager:	Beth Anderson
Author:	Patrick Curran

Jacobs Engineering

6 Otis Park Drive
Bourne, Massachusetts 02532-3870
United States
T +1.508.743.0214
F +1.508.743.9177
www.jacobs.com

Table of Contents

Figures

Tables

(intentionally blank)

Acronyms and Abbreviations

CR	CR Environmental Inc.
cy	cubic yards
ft.	feet
IA	immunoassay
INO	Dredge areas I, N, and O
Jacobs	Jacobs Engineering Group, Inc.
lb	pound
mg/kg	milligrams per kilogram
NAE	U.S. Army Corps of Engineers – New England District
NBHSS	New Bedford Harbor Superfund Site
PCB	polychlorinated biphenyl
QC	quality control
RAL	remedial action limit
ROD	Record of Decision
SES	Sevenson Environmental Services
SWAC	surface weighted average concentration
TCL	target cleanup level
EPA	U.S. Environmental Protection Agency

(intentionally blank)

1. Introduction

Hybrid dredging of subtidal sediments in Area H, which is located in the Upper Harbor of the New Bedford Harbor Superfund Site (NBHSS) was conducted by Jacobs Engineering Group, Inc. (Jacobs) and Sevenson Environmental Services (SES) under U.S. Army Corps of Engineers – New England District (NAE) Remedial Action Contract No. W912WJ-15-D-0001. Area H dredging was conducted between March 2019 and May 2019, with three additional days of mechanical dredging continuing into July 2019. Dredging of Area H occurred after Areas I, N, and O (INO) and before Area L.

The primary objective of the remedial action was removal and offsite disposal of sediment with polychlorinated biphenyl (PCB) concentrations greater than 30 milligrams per kilogram (mg/kg) to meet the target cleanup level (TCL) of 10 mg/kg as measured as a surface weighted average concentration (SWAC) for the Upper Harbor. This Upper Harbor subtidal TCL of 10 mg/kg was established in the 1998 Record of Decision (ROD) for the NBHSS (U.S. Environmental Protection Agency [USEPA] 1998). The Jacobs sample collection was in accordance with the *Draft Final Upper Harbor Confirmatory Sampling Plan* (Jacobs 2019a). The purpose of this dredge data report is to document the dredging and related activities conducted within Area H, the post-dredge sediment surface elevations, and sediment PCB concentrations remaining at the completion of dredging operations.

2. Overview

Table 1 provides a summary of metrics documenting the dredge effort in Area H. Figure 1 shows elevations of Area H prior to 2019 dredging operations. Figure 2 depicts sediment sample locations which were used to support dredge plan development for Area H. Figure 3 illustrates the dredge plan and intended cut depths.

3. Significant Activities in Area H

Large debris was encountered along the western shoreline of Area H. This material could not be removed with the hybrid system. Therefore, the debris was removed with the PC220 outfitted with a hydraulic rake attachment and placed into scows. Once the debris was cleared, the PC 490, a mechanical dredge, was used to dredge material directly into scows on 18 June 2019 as well as 16 and 17 July 2019. A total of four scows of material was dredged from the shoreline, stabilized with Portland cement and offloaded at the EPA's Sawyer Street Facility.

4. Significant Changes to Area H Dredge Plan Addendum

4.1 Addendum Changes

Mechanical dredging and debris removal were not anticipated in Area H, and therefore not included in the *Draft Addendum to the Upper Harbor Hybrid Generic Work Plan for Area H* (Jacobs, 2018a). The project team formulated a plan to address the debris as described in Section 3. The resulting means and methods of the mechanical dredging and debris removal were added to subsequent dredge plans.

4.2 Dredge Plant and Processing Means

The improvements made to the processing of the dredge slurry during INO operations, as outlined in the *Draft Dredge Areas I/N and O Hybrid Dredge Data Report* (Jacobs 2019b) remained in place for the work completed in Area H.

One booster pump was necessary during operations in Area H. Unlike operations in INO, which required two booster pumps, one at Manomet Street and the second adjacent to the former Aerovox Property, work in Area H only required the booster pump at Manomet Street.

5. Verification and Confirmatory Sampling

As stated in Section 1, the TCL for the Upper Harbor is 10 mg/kg PCBs as measured as a SWAC. In the case of the Area H dredge plan, modeling determined that a remedial action limit (RAL) of 30 mg/kg would result in a post-dredge sediment surface with a SWAC of <10 mg/kg in the Upper Harbor.

As hybrid dredging of Area H progressed, AECOM collected verification sediment samples from pre-assigned locations presented on Figure 4. AECOM conducted the sediment sampling in accordance with the AECOM sampling field sampling plans for the Upper Harbor (AECOM, 2018 and AECOM, 2019). The number of confirmatory samples was statistically determined so that the probability of making decision errors can be controlled and minimized given the management objectives of the Upper Harbor. Confirmatory samples were collected from the top 0.5 feet (ft.) of sediment following dredging and analyzed for PCB congeners. A denser grid of verification samples was also collected from the top 0.5 ft of sediment following dredging, and analyzed for PCBs by immunoassay (IA), to provide additional assurance of reaching the project goals.

The verification samples are not used to calculate the SWAC because they provide screening level data, evaluate dredge performance, and are useful in tracking dredge progress due to the ability to obtain data more rapidly than congener data. The decision the return to a dredge area and re-dredge at a location to achieve the cleanup level was made applying a scaling factor to the verification immunoassay (IA) results to account for the IA uncertainty. For a RAL of 30 mg/kg, verification locations with an IA result of greater than 20 mg/kg were re-dredged. Verification locations that were >20 mg/kg when tested using IA analysis were re-dredged to elevations identified as <20 mg/kg by further analysis of intervals in the verification sample core. Follow up verification sampling was not conducted after re-dredge. When a verification sample appeared to pass the RAL using the IA screening analysis at a confirmatory location, it was sent for confirmatory analysis by congener. The results of confirmatory sampling are summarized in Table 2, and in Figure 5.

A total of seven (7) confirmatory locations were sampled with PCB congener concentrations ranging from 0.05 mg/kg to 19.6 mg/kg (Figure 5, Table 2). Based on the confirmatory results, the average PCB congener concentrations in Area H after dredging was 3.7 mg/kg, which is below the target cleanup level of 10 mg/kg.

6. Summary of Area H Dredge Activities

Dredging in Area H began on 28 March 2019 once dredging was completed in INO. Hybrid dredging activities continued until 17 May 2019. Mechanical dredging was conducted for three days (18 June 2019, 16,17 July 2019) due to large amounts of debris encountered along the shoreline.

Between 28 March 2019 and 17 May 2019, a total of 20,590 cubic yards (cy) of PCB contaminated material was hybrid dredged from Area H, treated and transported offsite for disposal (Table 1). An additional 303 cy of material was dredged mechanically (Table 1), placed into scows, offloaded at Area C, and stabilized with Portland cement prior to being transported to an offsite disposal site.

A hybrid multibeam/single beam bathymetric survey was completed prior to activities to provide the pre-dredge surface elevations utilized in the dredge plan (Figure 1). Daily single beam surveys were performed by SES with supplemental quality control (QC) surveys performed by CR Environmental Inc. (CR) on a weekly basis as dredging progressed. The daily and weekly surveys were used to keep track of volumes dredged and to monitor the accuracy and precision of the dredge system, which were reported daily. Using sampling and production data, it is estimated that 0.61 tons of PCBs were removed from NBHSS during hybrid dredge operations in Area H (Table 1). An additional 0.01 tons were estimated to be removed during the mechanical dredging operations in Area H. The hybrid dredging estimate is based on analytical data from periodic sampling and recorded weights of sand and filter cake produced during dredging operations (Table 3). The quantity of PCBs removed mechanically was based on the volume of material dredged and placed into scows (Table 1), and a conversion factor derived from the hybrid dredging estimate (0.059 cy of dredge material = 1 pound (lb) of PCBs removed).

A final dredge progress drawing from SES is included in Figure 6, which illustrates the completed dredge area. A final bathymetric survey of Area H will be conducted by CR after all Upper Harbor dredging is completed.

7. References

AECOM. 2019 (March). *Upper Harbor Sediment Field Sampling Plan Addendum 12 H Dredge Area – Draft Final*.

——— 2018 (October). *Supplemental Data Gap Sampling for Areas H, L, and P – Memorandum.*

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

Jacobs Engineering Group Inc. 2019a (February). Draft Final Upper Harbor Confirmatory Sampling Plan. ACE-J23-35BG2000-M1-0084|0.

——— 2019b (July). *Draft Dredge Areas I/N and O Hybrid Dredge Data Report*. ACE-J23-35BG6000-M17-0003|0

——— 2018a (February). *Draft Addendum to the Upper Harbor Hybrid Generic Work Plan for Area H*. ACE-J23-35BG2000-M1-0081|0.

Figures

Area H

NOTE:

1. BATHYMETRIC SURVEY DATA FROM OCTOBER 2018 - DATUM (NAVD) 1988 WAS USED TO CREATE; PROCESS AND CALCULATE RESULTS FOR CONTOURS/SURFACES.

USGS, MassGIS

Legend

Dredge Prism Boundary

Pre-Dredge Elevation NAVD88 - ft

-2.9 - -1.8	-8.3 - -7.2
-4.0 - -2.9	-9.4 - -8.3
-5.0 - -4.0	-10.4 - -9.4
-6.1 - -5.0	-11.5 - -10.4
-7.2 - -6.1	

Existing Conditions 1ft Contour

Aerial Photography MASSGIS 2014

0 100 Feet

N

1:1,200

JACOBS

Pre-Dredge Elevation Area H

NAME: jpiccuito Date: 8/26/2019

Figure 1

Path: Y:\NB\HProjects\35BG1001\20190826\ArcGIS\UH_Area_H_Pre_Dredge_Conditions_AAR_DDA_20190826.mxd

Cable Crossing

H108 H31 H1 H103 H96 H97 H3 2017-DG-16 H131 H43 H5 H45 BBB23 H69
H39 HD25 HH25 H2 H95 H4 H123
H102 H107 H101 H94 H6 H42 H73 H72 H70 H71
H66 H104 HL26
HH27
H119 H30 H68 H7 H93 H122 H44 H47
H105 H67 2017-DG-17 2017-DG-18
HD29 H110 HG29 HK29 H100 H9 H10
H120 H8 H46
HE30 H35 H40 H92 H11
H32 H117 H41 H121
H16 H12R H12 H48
H34 H98 H91 H13
H106 H99 H15 H14 H49 H36
H33 HG32
H137 H111 H29R H29 H17 H74 H75
H51 H50
H109 H18 H19 H20 2017-DG-20
H115 H116 2017-DG-19
HD35 HH35 HL35 H57 H130
H136
H54 H37 H58 H127 H60 H21 H129 H62 H63
H52R H52 H22 H56
H124 H90
H55 H87 H23 H126 H61
H113 H86
H112 H24 H78
H89 H25 H64
H38 HF39 2017-DG-21 HL39 H133 H28
H85 H82
H83 H128
H53 H88 H26 H132 H65
H114
H27 2017-DG-22 H125 H76
H84
H135 H81 H80 H59R H59 H79 H77
H118
H134

Area L

USGS, MassGIS

Legend

Subtidal Sampling Location

Pre-Dredge Elevation NAVD88 - ft

-2.9 - -1.8	-8.3 - -7.2
-4.0 - -2.9	-9.4 - -8.3
-5.0 - -4.0	-10.4 - -9.4
-6.1 - -5.0	-11.5 - -10.4
-7.2 - -6.1	

Aerial Photography MASSGIS 2014

0 75 Feet

N

1:900

JACOBS

Area H Subtidal Sample Locations

NAME: jpiccuito Date: 8/26/2019

Figure 2

Path: Y:\NBH\Projects\35BG100\120190826\ArcGIS\UH_Area_H_Sampling_Locations_1ft_Contours_AAR_DDA_20190826.mxd

Area H

USGS, MassGIS

Legend

Thickness of Sediment to Remove, ft

- > 4
- 3.6 - 4.0
- 3.1 - 3.5
- 2.6 - 3
- 2.1 - 2.5
- 1.6 - 2
- 1.1- 1.5
- 0.5 - 1

Dredge Prism Boundary

Plan Design: RAL 30 mg/kg PCBs

Aerial Photography MASSGIS 2014

0 100 Feet

N

1:1,200

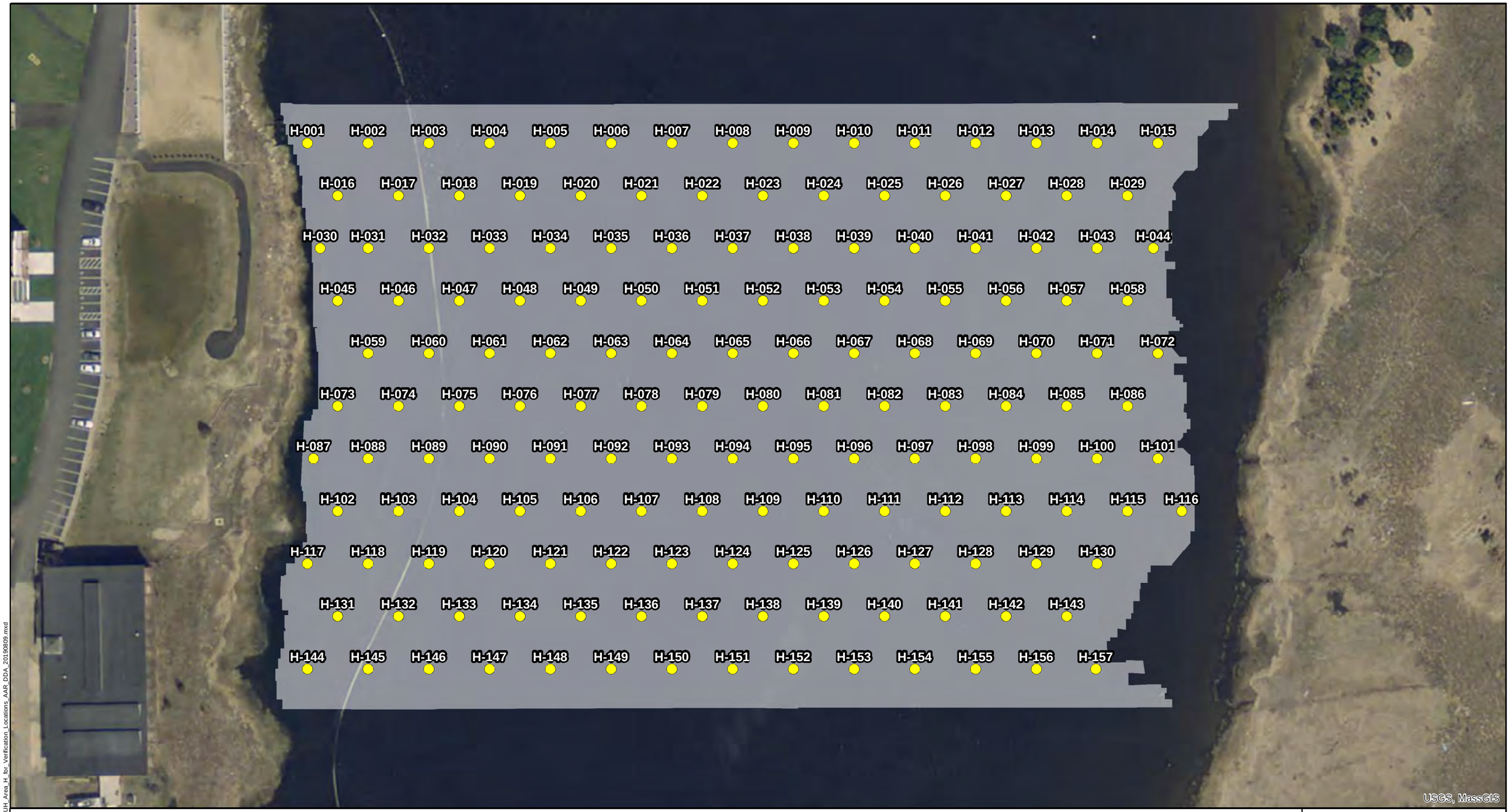
JACOBS

Area H Showing Cut Thickness

NAME: jpiccuito Date: 8/26/2019

Figure 3

Path: Y:\NBH\Projects\35BG100\120190826\ArcGIS\UH_Area_H_Dredge_Areas_Cut_Depths_AAR_DDA_20190826.mxd



Legend

- Verification Location
- Dredged Areas

Aerial Photography MASSGIS 2014

0 75 Feet

N

1:900

JACOBS

Area H
Verification Locations

NAME: jpiccuito Date: 8/26/2019

Figure 4

Path: Y:\NB\Projects\35BG1001\20190826\ArcGIS\UH_Area_H_for_Verification_Locations_AAR_DDA_20190809.mxd

Legend

Dredged Areas

H-109 — Id

Confirmatory Location

0.179 — results are the sum of 209 PCB congeners reported in milligrams/kilogram

NRRA = No Remediation Required Area

Aerial Photography MASSGIS 2014

0 75 Feet

1:900

JACOBS

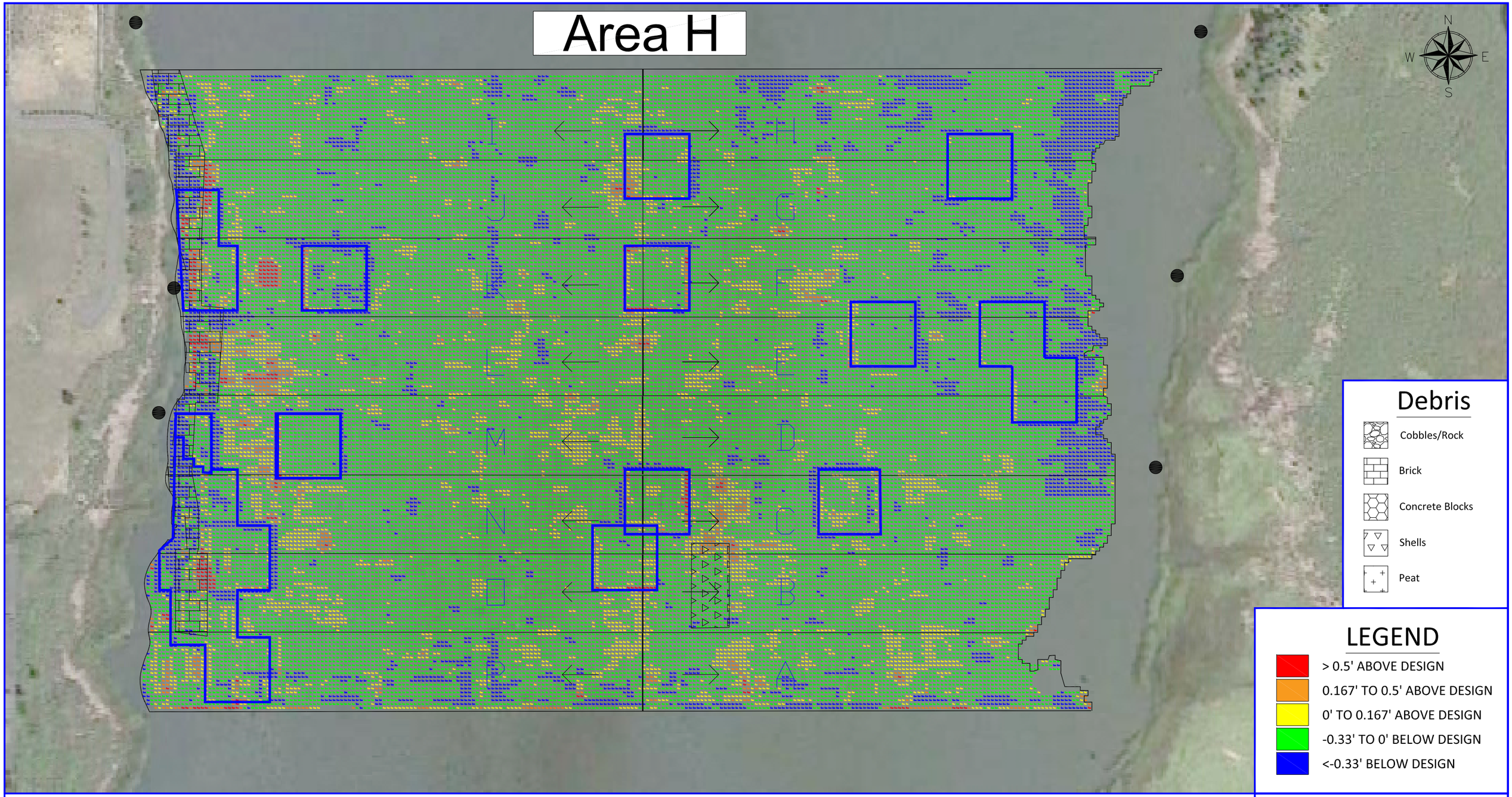
Area H
Confirmatory Locations with Results

NAME: jpiccuito Date: 8/26/2019

Figure 5

Path: Y:\NB\Projects\35BG1001\20190826\ArcGIS\UH_Area_H_Confirmatory_Results_AAR_DDA_20190826.mxd

Area H



Debris

- Cobbles/Rock
- Brick
- Concrete Blocks
- Shells
- Peat

LEGEND

- > 0.5' ABOVE DESIGN
- 0.167' TO 0.5' ABOVE DESIGN
- 0' TO 0.167' ABOVE DESIGN
- -0.33' TO 0' BELOW DESIGN
- <-0.33' BELOW DESIGN

NOTES:

1) Began dredging in Area H on 3-25-19.
2) Began mechanical to scow dredging in Area H on 6-18-19.
3) Bathymetry map compares Design Template vs Survey/Dredge Data. Where positive soundings indicate areas remaining above design template and negative soundings indicate areas below design template.

● Sheet Pile Location

0 70 140 Feet

AREA H FINAL PROGRESS DRAWING

NEW BEDFORD, MA

SEVENSON ENVIRONMENTAL SERVICES, INC.

FIGURE 6

DATE:	7-16-19
DRAWN BY:	DEF
CHECKED BY:	_
CAD FILE:	AREA H PROGRESS MAP
SCALE:	AS SHOWN

Tables

Table 1
Summary of Area H Dredge Quantities and Rates

Project Metric	Quantity
Cubic Yards of Sediment Mechanically Dredged via Hybrid System	20,590
Cubic Yards of Sediment Mechanically Dredged into Scows	303
Tons of Filter Cake Produced (3/28/19 - 5/17/19)	16,838
Tons of Sand and Oversize Produced at Desander (3/28/19 - 5/17/19)	2,329
Gallons of Water Treated and Discharged (3/28/19 - 5/17/19)	18,679,090
Number of Hybrid Dredge Days (3/28/19 - 5/17/19)	31
Number of Mechanical to Scow Dredge Days (6/18, 7/16, 7/17/19)	3
Cubic Yards of Sediment Mechanically Dredged to Scow	303
Tons of PCBs Removed in Dredged Sediment (3/28/19 - 5/17/19)	0.61
Cubic Yards Dredged total (including mechanical to scow)	20,893
Cubic Yards Dredged Average Per Day (Hybrid)	664

Table 2
Area H Confirmatory Sample Summary

Area	Location	Sample	Easting	Northing	Total PCB Congeners (mg/kg)	Replicate Sample PCB Concentration (mg/kg)
H	30	S-H030VC-19ADD12-00-05	814949.78	2704764.63	19.6	
H	35	S-H035V-19ADD12-00-05	815189.24	2704764.63	0.0544	
H	40	S-H040V-19ADD12-00-05	815439.24	2704764.63	0.0687	
H	104	S-H104V-19ADD12-00-05	815064.24	2704548.12	0.877	
H	109	S-H109VB-19ADD12-00-05	815314.24	2704548.12	0.179	
H	114	S-H114V-19ADD12-00-05	815564.24	2704548.12	0.105	0.0369
H	NRRA-21	S-NRRA21-18ADD6-00-05	815689.24	2704764.63	4.96	
AVERAGE					**3.7**	

Table 3
Mass of PCBs Removed in Filter Cake and Oversized Material

Filter Cake		
Sample ID	**Total PCB mg/kg [1]**	**% Solid**
V2-20180503-01	47	60
V2-20180506-01	23.9	61
V2-20180508-01	26.9	60
V2-20180508-02	34.4	61
V2-20190328-01	49	57
V2-20190329	53	60
V2-20190401	76	57
V2-20190402-01	65	59
V2-20190402-02	50	58
V2-20190404	73	56
V2-20190405-01	61	58
V2-20190408	68	57
V2-20190409-01	89	57
V2-20190409-02	68	58
V2-20190411-01	71	57
V2-20190412-01	56	56
V2-20190416-01	62	56
V2-20190417-01	71	58
V2-20190418-01	71	58
V2-20190419-01	53	59
V2-20190419-02	62	60
V2-20190423-01	75	62
V2-20190424-01	91	60
V2-20190424-02	88	62
V2-20190425-01	115	59
V2-20190426	69	61
V2-20190429	73	62
V2-20190430-01	67	61
V2-20190430-02	81	60
V2-20190502-01	64	62
V2-20190509-01	66	61
V2-20190509-02	46	60
V2-20190510-01	38.9	61
V2-20190513-01	20.1	58
V2-20190514-01	28.9	60
V2-20190515-01	63	59
V2-20190516-01	65	58
Average	**61.7**	**59**

Sand and Oversized		
Sample ID	**Total PCB mg/kg [1]**	**% Solid**
V1-040319	17.2	86
V1-040919-01	39.3	86
V1-040919-02	31.4	82
V1-041219-01	19.2	86
V1-041719-01	4.6	91
V1-041719-02	9.2	86
V1-042919-01	10.9	88
V1-042919-01	3.4	86
V1-042919-02	13.4	88
V1-042919-02	4.5	88
V1-042919-03	14.2	88
V1-042919-03	4.8	89
V1-050219-01	3.71	91
V1-050219-02	5.5	86
V1-050219-03	3.6	91
V1-050819-01	5.9	86
V1-050819-02	3.48	89
V1-050919-01	5.4	86
V1-051019-01	5.4	90
V1-051519-1	5.6	86
V1-051519-2	6.7	84
Average	**10.4**	**87**

Total tons of wet sand and oversized	2,329	wet tons [2]
Total tons of dry sand and oversized	2,033	dry tons [3]
Total kilograms sand and oversized	1,844,202	dry kg
Calculated kilograms aroclor removed	12	kg
Calculated tons of Aroclor removed	0.014	tons

Total tons of wet filter cake	16,838	wet tons [2]
Total tons of dry filter cake	9,962	dry tons [3]
Total kilograms of dry filter cake	9,037,127	dry kg
Calculated kilograms of Aroclor removed	557	kg
Calculated tons of Aroclor removed	0.6	tons

Notes:
[1] Total Aroclor concentration reported on a dry weight basis.
[2] Wet weight of cake, sand, and oversize material taken from 2018-2019 Production Quantities, Table 1.
[3] Dry weight of filter cake and sand calculated with outside laboratory average percent solids values.
kg = kilograms
mg/kg = milligrams per kilogram
% = percent
Note: Does not include mechanical dredging