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Draft Closeout Report Upper and Lower Harbor Dredge Areas Disposed of in Lower Harbor Confined Aquatic Disposal Cell During 2016-2018

Revision 1

Environmental Sampling and Analysis
New Bedford Harbor Superfund Site

USACE Contract No. W912WJ-17-D-0003
Delivery Order No. W912WJ17F0021

March 12, 2019

Prepared for

U.S. Army Corps of Engineers
New England District
Concord, Massachusetts

SEMS Doc ID 100011057

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Acronyms

CAD	Confined Aquatic Disposal
CDA	Compliance Demonstration Area
DDR	Dredge Data Report
EPA	U.S. Environmental Protection Agency
FSP	Field Sampling Plan
GPS	Global Positioning System
IA	Immunoassay
JE	Jacobs Engineering
LH	Lower Harbor
LHCC	Lower Harbor CAD Cell
mg/kg	milligrams per kilogram
MU	Management Unit
NAE	New England District
NAVD	North American Vertical Datum
PCB	Polychlorinated biphenyl
RTK DGPS	Real Time Kinematic Differential Global Positioning System
SES	Sevenson Environmental Services, Inc.
Site	New Bedford Harbor Superfund Site, New Bedford, Massachusetts
TCL	Target Cleanup Level
USACE	U.S. Army Corps of Engineers

1. General

Project Title	Environmental Sampling and Analysis at the New Bedford Harbor Superfund Site, New Bedford, Massachusetts
	Task Order No. W912WJ17F0021
Organization	AECOM
Project Manager	Will Humphries
Field Operations Liaison/Field Services Task Leader/ Site Safety and Health Officer	Helen Jones
Address	250 Apollo Drive, Chelmsford, MA 01824
Telephone	207.541.2039 (W. Humphries)
Cellular Phone (Field)	607.229.7790 (H. Jones)
Organization	United States Army Corps of Engineers (USACE) New England District (NAE)
Project Manager	Marie Esten
Engineering Technical Lead	Tony Silva
Address	696 Virginia Road, Concord, MA 01742-2751
Telephone	978.318.8965 (Esten) 978.318.8067 (Silva)

2. Introduction

This Dredge Data Report (DDR) documents the results of the mechanical dredging performed in the New Bedford Harbor during 2016, 2017, and 2018. The areas addressed include:

- Upper Harbor Management Units (MUs) (north of Coggeshall Street) and
- Lower Harbor MUs (south of Coggeshall Street).

Dredged material was disposed of in the Lower Harbor (LH) Confined Aquatic Disposal (CAD) Cell (LHCC). See Figure 1 for the location of all referenced MUs and the LHCC.

Dredging was performed by Sevenson Environmental Services, Inc. (SES) subcontracted by Jacobs Engineering (JE) under U.S. Army Corps of Engineers – New England District (NAE) Interim Remediation Action Contract No. W912WJ-17-C-0009 between March 3, 2016 and April 12, 2017and by Cashman Dredging and Marine Contracting Co. LLC (Cashman) under USACE – NAE Contract No.W912WJ-15-D-0001 between September 13, 2017 and June 13, 2018. The list of MUs dredged and the start and completion dates by MU are presented in Tables 1a and 1b. Figures 1, 2, 3, 4, and 5 show the locations of the dredged MUs.

The primary objective of remedial action in the Upper Harbor (UH) and Lower Harbor (LH) was to remove sediment impacted with polychlorinated biphenyl (PCB) concentrations greater than the site-specific target cleanup levels (TCLs) as established in the 1998 Record of Decision (ROD) for the New Bedford Harbor Superfund Site (EPA, 1998). The TCL in the 1998 ROD for subtidal sediment in the LH is 50 milligrams per kilogram (mg/kg); in the UH the subtidal sediment TCL is 10 mg/kg per the ROD. The approach for demonstrating compliance with TCLs is summarized in Section 3.3.

3. Methods

The process and methods of the mechanical dredging and subsequent verification and confirmatory sampling is described below.

3.1 Precision Dredging Process

Dredging was performed using a mechanical dredge with a hydraulically actuated, sealed environmental bucket. The bucket had hydraulically operated kinematics that produce a level cut with less than one inch variance. The bucket was designed to allow free water atop of the sediments to drain once the bucket is emergent. The dredge was equipped with a real-time kinematic differential global positioning system (RTK DGPS) that provided position accuracy of +/- four inches vertically and +/- six inches horizontally.

In accordance with the Revised Dredge Plan for Mechanical Dredging with CAD Cell Disposal (Jacobs 2016), dredging followed the target elevations, with no under-dredge and a maximum of six inches over-dredge. The bucket was placed with a minimum of 10% overlap based on slope steepness. During the 2017-2018 dredging in the Lower Harbor, step cuts were used to minimize residuals from sloughing in sloped areas. Pre-dredge bathymetric survey data are located in Appendix A and post-dredge bathymetric survey data are located in Appendix B for each MU.

3.2 CAD Cell Disposal

Material dredged from the MUs described in this report was placed in the LHCC. The location of the LHCC is presented on Figure 1 and dredge volumes by MU and dredge contractor are presented in Tables 1a and 1b.

SES mechanically dredged 24 MUs and a total of 117,369 cubic yards (cy) of dredged material from these areas was placed in the LH CAD cell. Sixteen MUs were mechanically dredged by Cashman and placed in the LHCC. A total of 202,306 cy of dredged material were placed in the LHCC from these areas by Cashman (Table 1a).

All of MU25 in the Upper Harbor was initially dredged by SES; a small portion of MU25 was re-dredged by Cashman following the initial verification sampling conducted in that MU. Final dredge volumes were calculated by JE and Cashman based on analysis of pre-dredge and post-dredge bathymetry surveys completed for each management unit. A total of 319,675 cy of dredged material was placed in the LHCC by both JE and Cashman.

Appendix C includes an updated data set of congener results from the various dredge areas prior to remediation. The data were used to calculate an average concentration of 77.6 ppm for material placed in the LHCC. This value does not account for the lower contaminated over-dredge material that was included at the bottom of the dredge prism, so the actual average concentration placed in the LHCC is most likely lower.

3.3 Verification/Confirmatory Sampling Approach

In the Upper Harbor, Remedial Action Levels (RALs) were established for each Compliance Demonstration Area (CDA). RALs are design concentrations selected for individual CDAs used during design of the dredge prism. For the Upper Harbor MUs addressed during this effort, a RAL of 30 mg/kg was selected for MU 25 and a RAL of 10 mg/kg was selected for MU28. The RALs were designed to achieve a PCB surface-weighted average concentration (SWAC) of 10 mg/kg throughout all of the subtidal sediments in the Upper Harbor, complying with the TCL specified in the ROD.

Unlike in the UH where remediation is measured as a SWAC, in the LH the TCL is a “not to exceed” value and must be met for each confirmatory sampling location. The TCL of 50 mg/kg applies to the Lower Harbor (subtidal).

Compliance with the RAL or TCL was established by collection of compliance samples. Compliance,(confirmatory) samples were analyzed by PCB congeners for confirmatory sampling purposes to ensure compliance with the TCLs of 50 mg/kg and 10 mg/kg for Lower Harbor and Upper Harbor subtidal sediments respectively. The confirmatory sampling approach followed the overall approach outlined in the Final Confirmatory Sampling Approach, New Bedford Harbor Superfund Site (FWEC, 2002). Briefly, a statistical approach was used to determine the number of required confirmatory samples for each CDA so that the probability of making decision errors could be adjusted based on site-specific considerations for the CDA. The minimum number of required confirmatory samples was calculated based on the following input parameters:

- projected standard deviation of the post-dredge sediment PCB concentrations;
- acceptable rates for Type I and Type II decision errors (alpha and beta, respectively); and
- width of the "gray region" (delta), which is the range of PCB concentrations just below the TCL within which it may be "too close to call" whether the area is above or below the TCL due to the inherent variability in the sampling data.

The input parameters for subtidal CDA survey designs are provided in the *Subtidal Verification and Confirmatory Sampling Report, 2016-2017 Dredge Seasons* (Battelle, May 2018). Visual Sample Plan2 (VSP) was used to calculate the minimum required number of confirmatory samples for each CDA. The sampling goal "compare average to fixed threshold" was selected assuming a nonparametric, non-symmetrical data distribution. This approach does not require that the confirmatory sample data fit any specified distribution.

Verification samples were collected from each MU using a grid-based sampling design to assess dredging performance. These data were used to evaluate the dredge performance by collecting samples at tighter grid spacing than the confirmatory samples, therefore providing additional assurance the remedial goals were being met. These samples, which were screening level data, were not used for confirmatory purposes. Verification samples were analyzed by PCB immunoassay (IA). The verification sample locations were generated by Battelle in VSP. The grid sizes were determined in collaboration with the U.S. Army Corps of Engineers New England District (USACE NAE) and U.S. Environmental Protection Agency (EPA), with larger grid sizes used for larger MUs.

Verification and confirmatory locations are presented on Figures 4, 5, 6a, 6b, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 16. The results of the confirmatory sampling are presented in Table 2.

4. Conclusions

As of January 2018, remedial action is complete in the subtidal portion of the Lower Harbor, with the exception of an approximately 3,000 square foot area (approximately 280 cubic yards of material) adjacent to the Moby Dick Marina's bulkhead in Fairhaven. This material could not be safely removed because of the poor condition of the bulkhead, but will be removed after the owner repairs the bulkhead. Remedial action is also complete in five management units of the Upper Harbor as shown in figures 2a, 2b and Figure 5. In the Upper Harbor, all of the confirmatory samples in applicable subtidal compliance demonstration areas were below the selected Remedial Action Level of 30 mg/kg in MUs25 26, 28, 29, and 31; the SWAC for each of these MUs was well below the TCL of 10 ppm required for the Upper Harbor as a whole. Based on Confirmatory results, the average post-dredge concentration of PCBs in these Upper Harbor MUs is 2.5 mg/kg.

Furthermore, the TCL of 50 mg/kg has been achieved for all the confirmatory samples collected within each Lower Harbor subtidal CDA and the Lower Harbor as a whole, with the exception of the small area adjacent to the Moby Dick Marina's bulkhead in Fairhaven referenced above. Based on Confirmatory results, the average post-dredge concentration of PCBs in the Lower Harbor MUs sampled is approximately 11.0 mg/kg.

5. References

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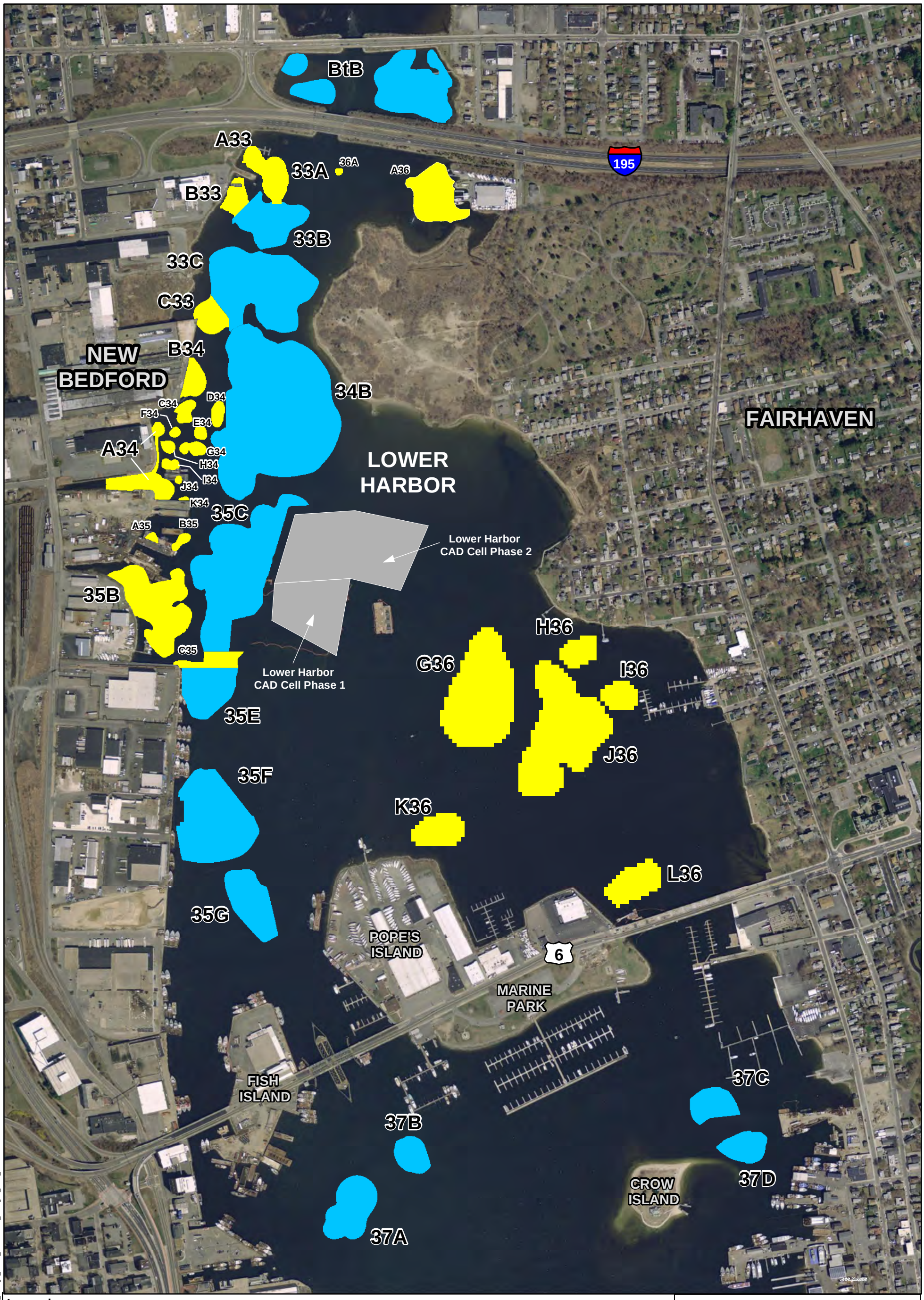
Figures



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Legend

- EPA CAD Cell
- Cashman Dredging
- Jacobs/SES Dredging

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Aerial Photography MASSGIS 2014

JACOBS™

Lower Harbor Dredge Areas by Contractor

New Bedford Harbor Superfund Site

Date: 2/27/2019

Figure 1

Figure 2a. MU 28 Compliance Demonstration Area Verification and Confirmatory Sample Locations

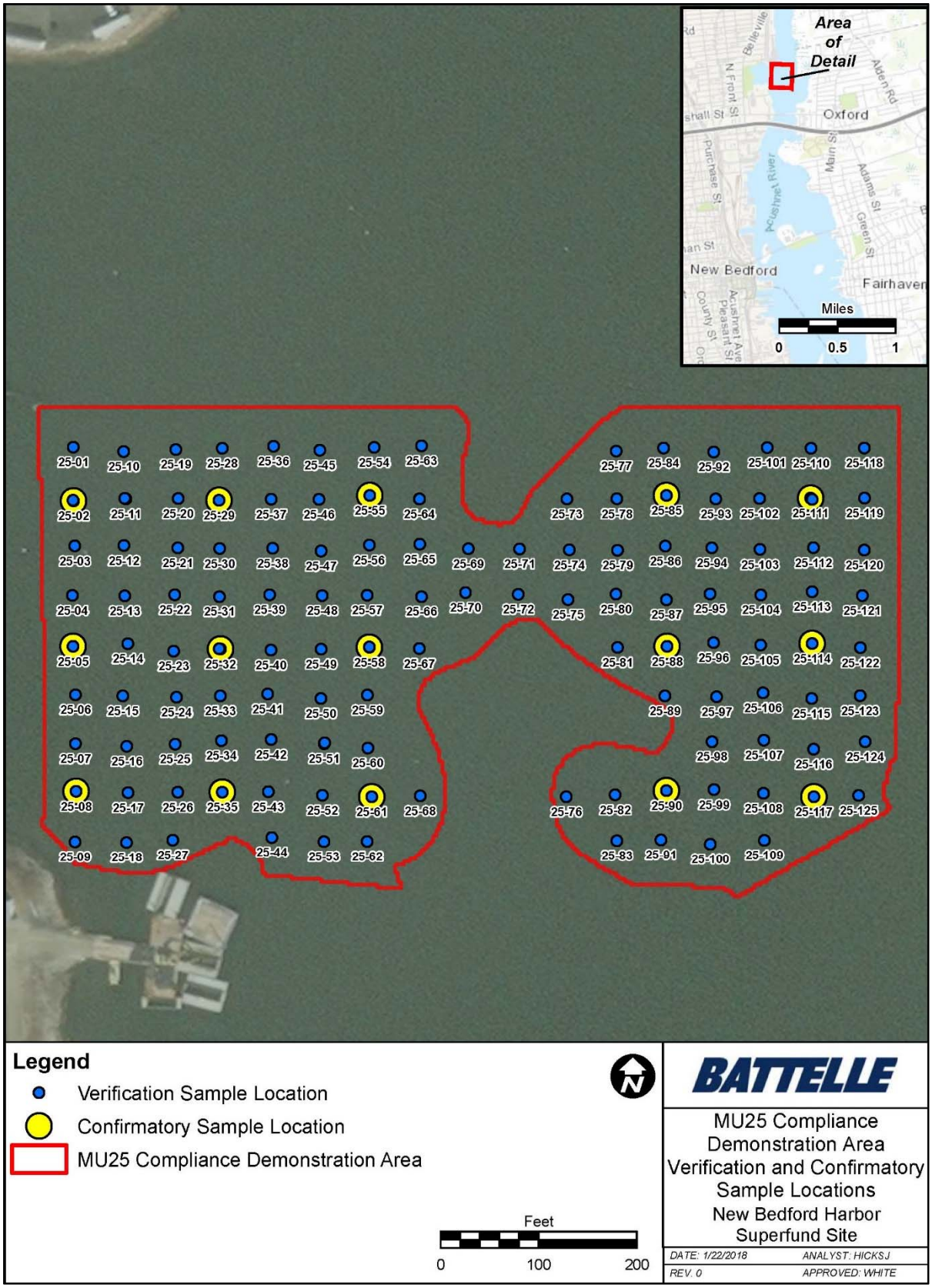


Figure 2b. MU 25 Compliance Demonstration Area Verification and Confirmatory Sample Locations

Figure 3 MU33/34 and MU35/37 Compliance Demonstration Areas

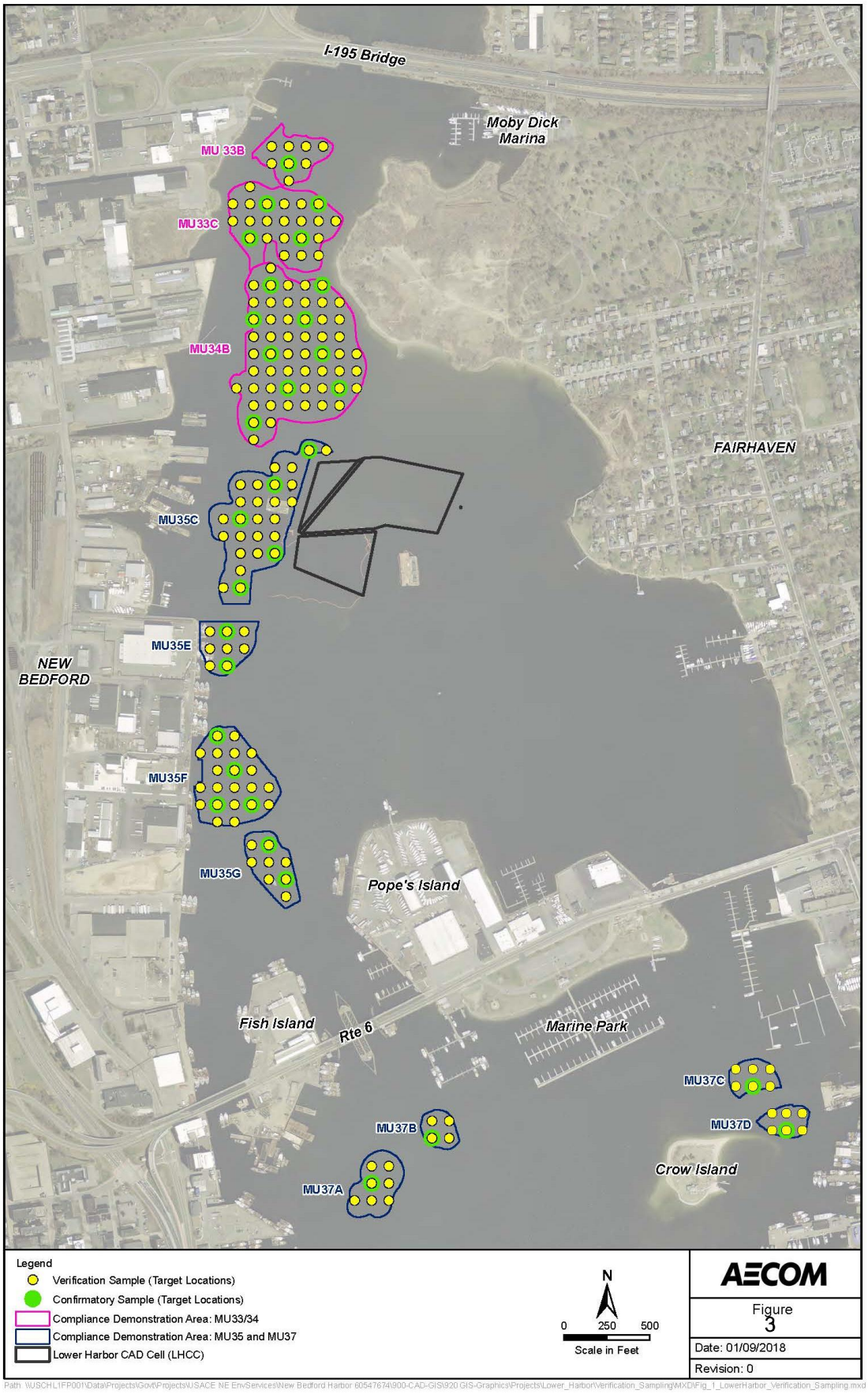
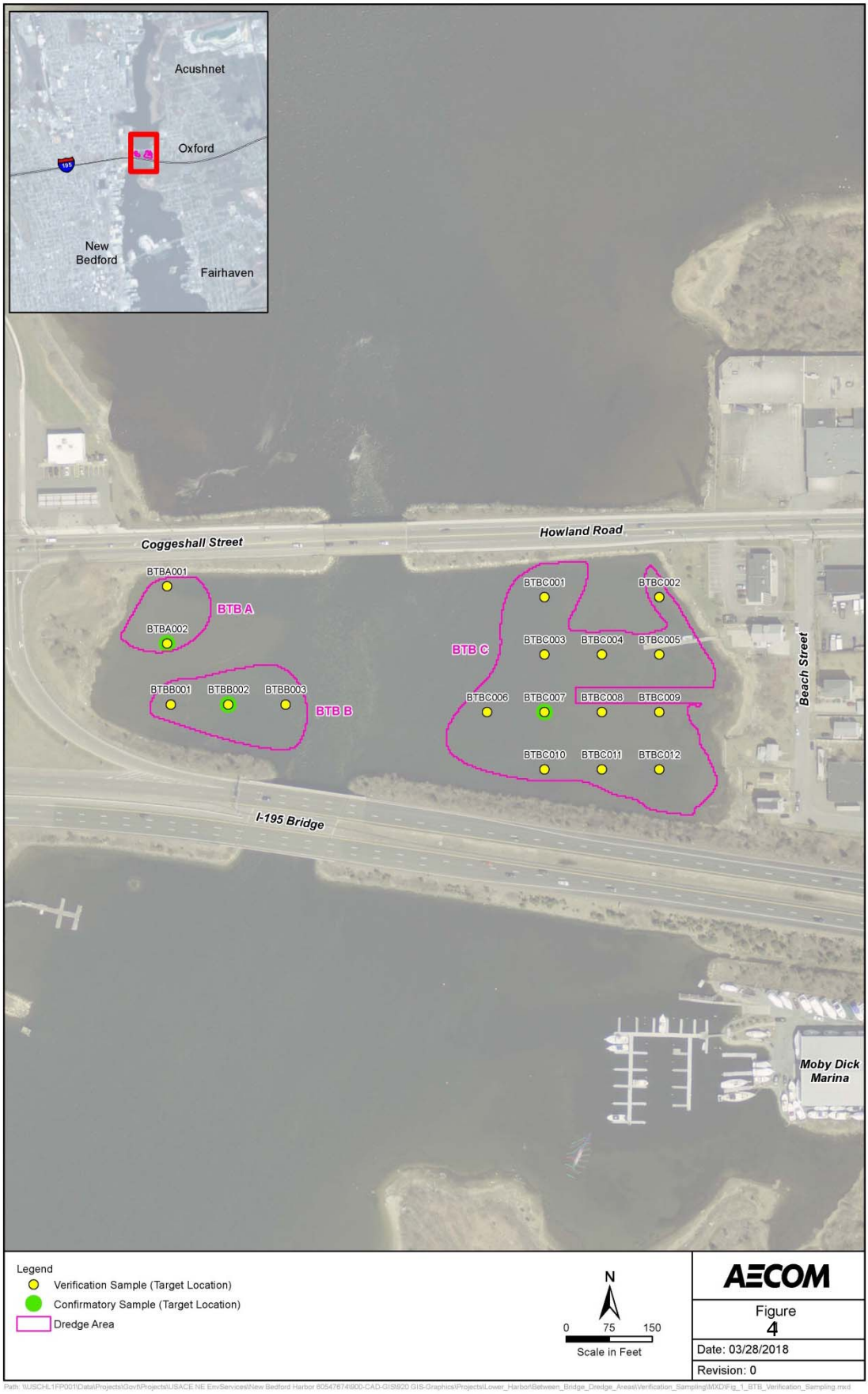
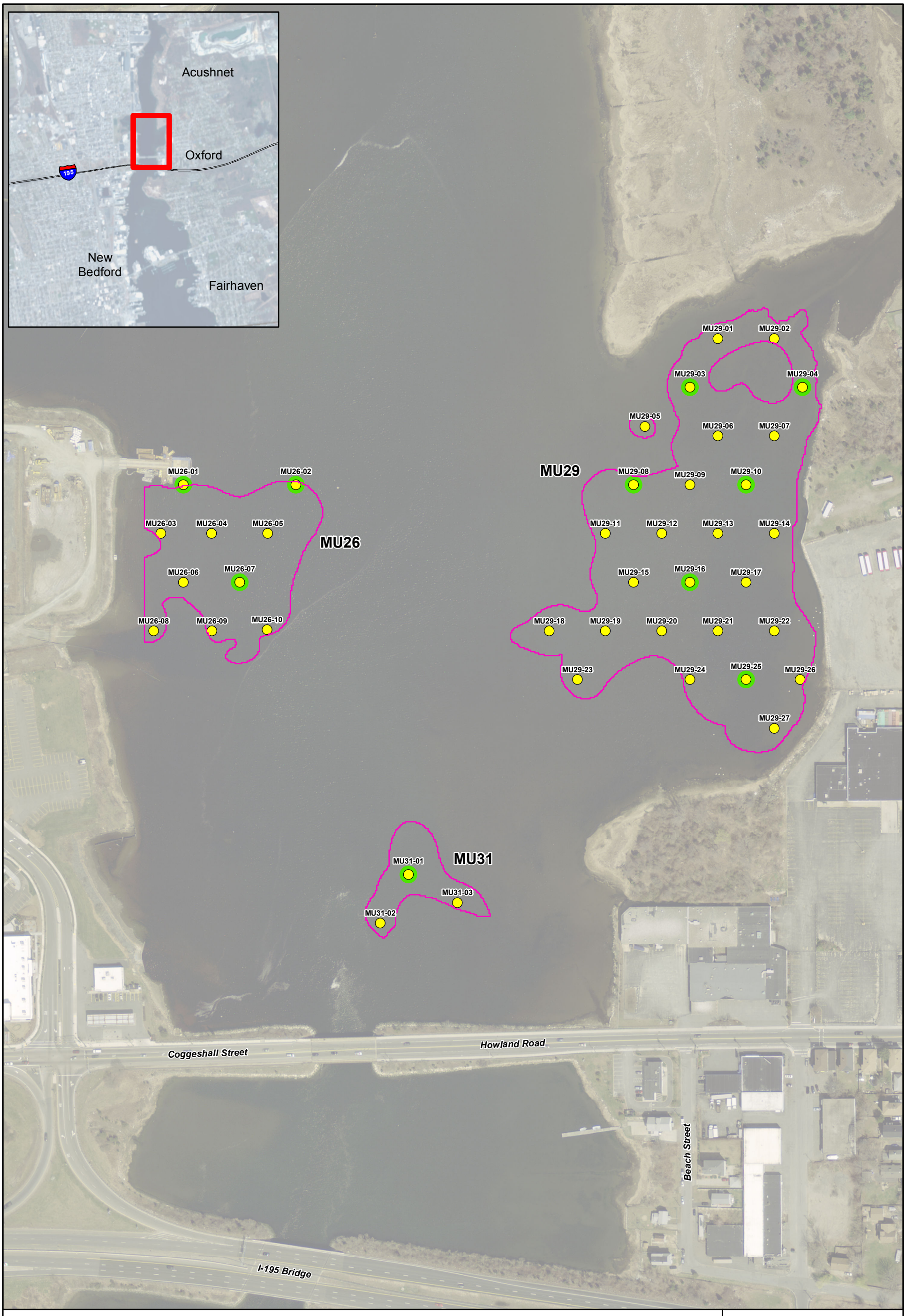


Figure 4 Between the Bridges (BTB) Verification and Confirmatory Sampling Locations





Legend

- Verification Sample (Target Location)
- Confirmatory Sample (Target Location)
- Dredge Boundary

N

0 100 200

Scale in Feet

AECOM

Figure 5

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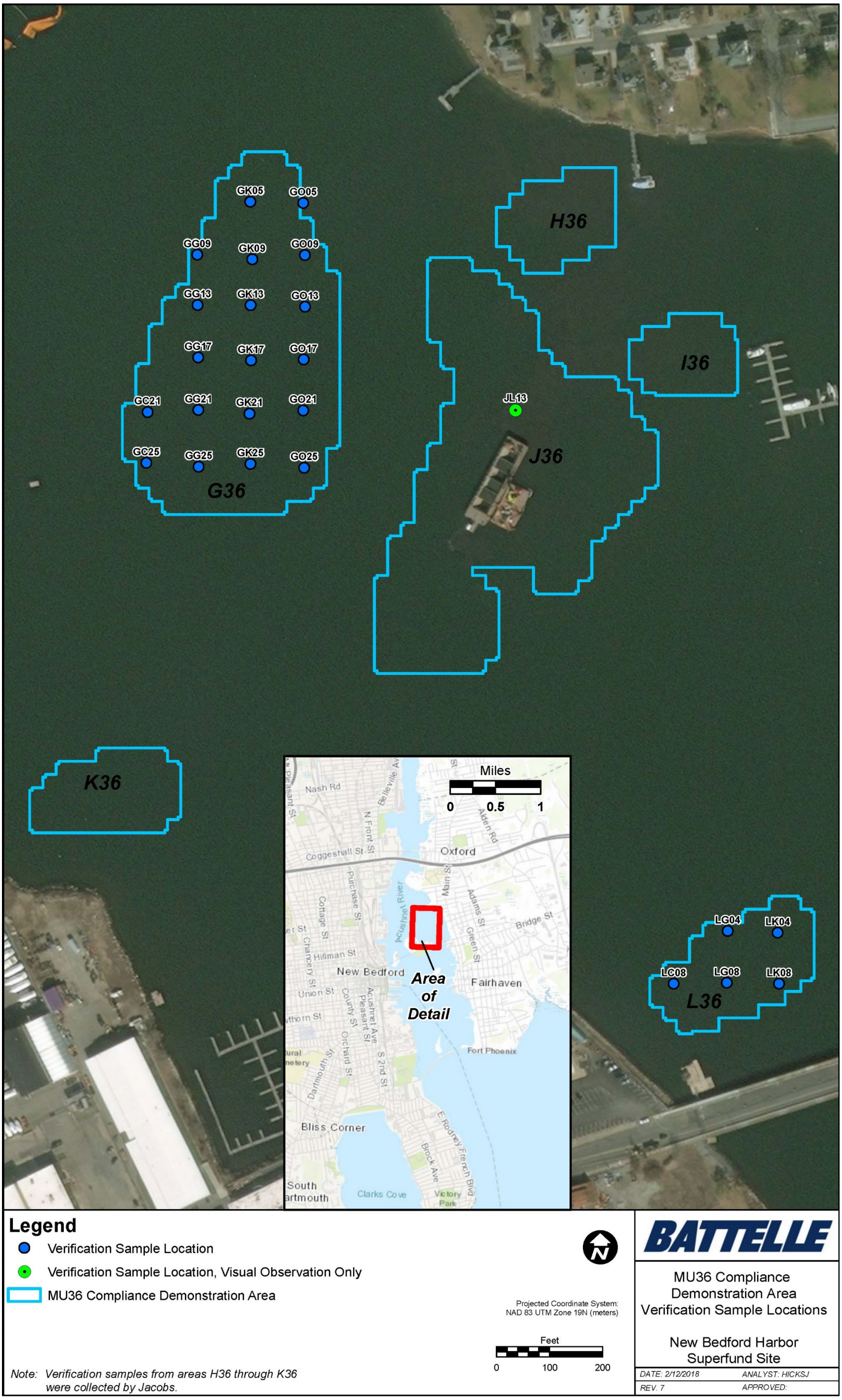


Figure 6a. MU 36 Compliance Demonstration Area Verification Sampling Locations

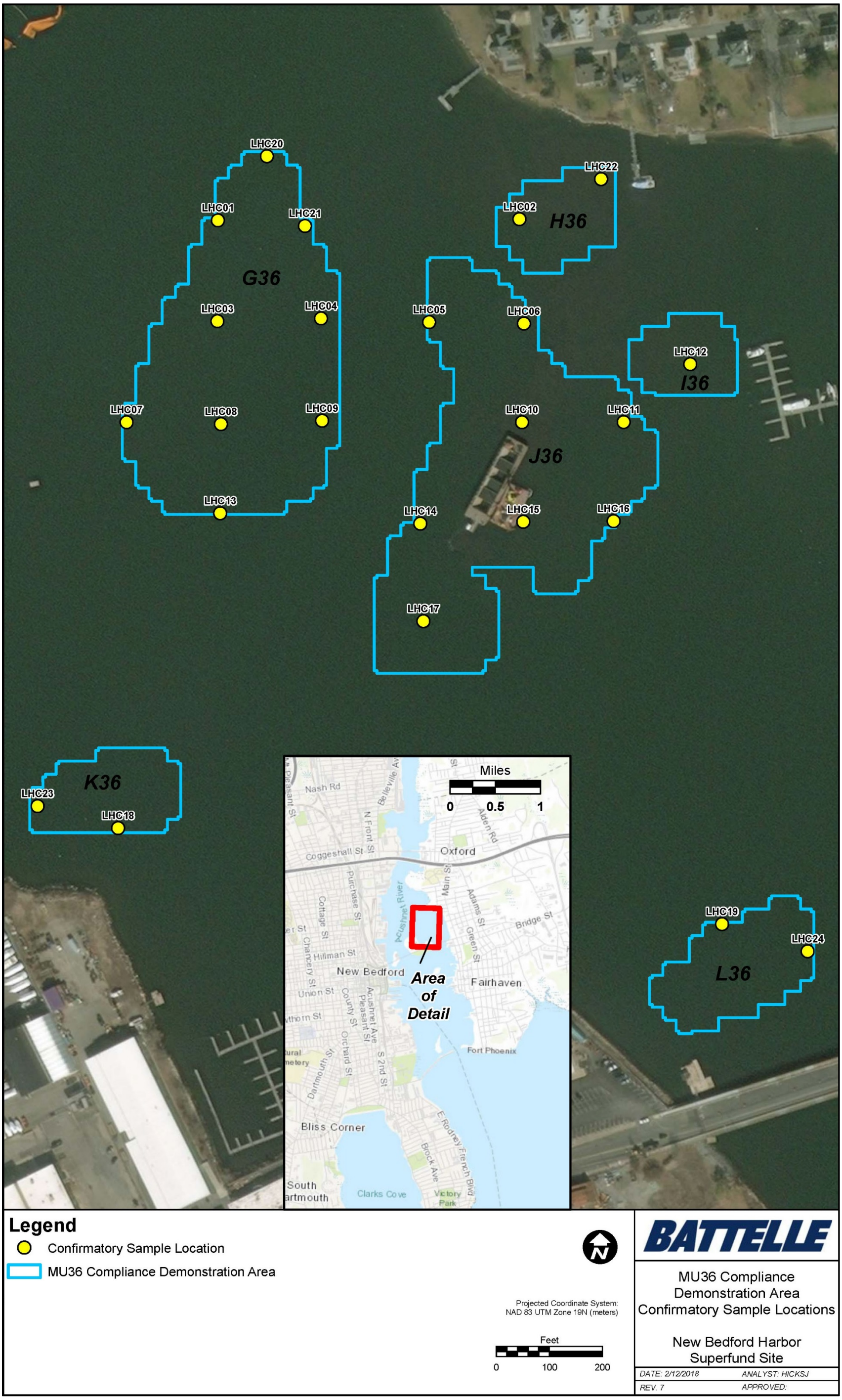


Figure 6b. MU 36 Compliance Demonstration Area Confirmatory Sampling Locations

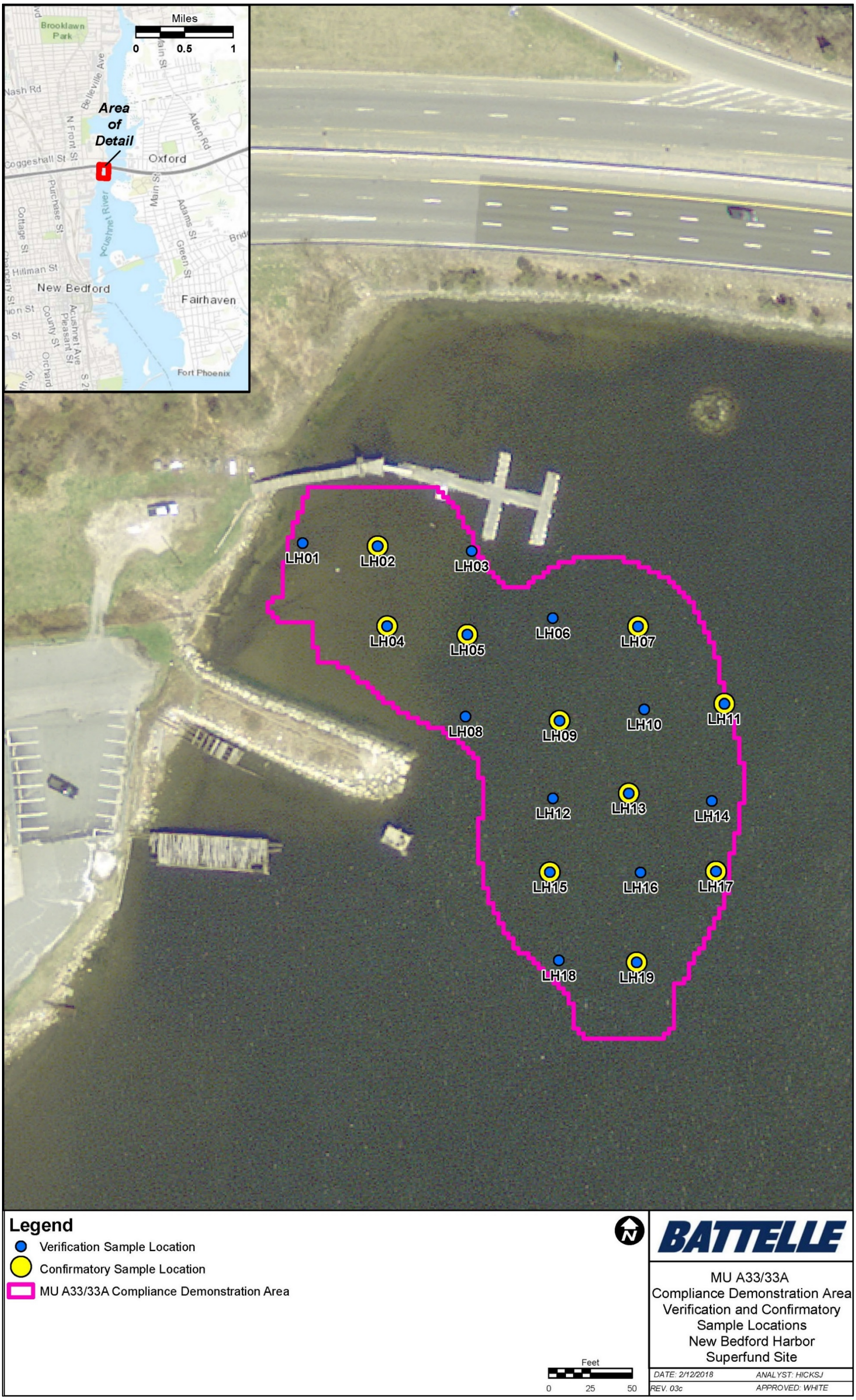


Figure 7. MU A33/33A Compliance Demonstration Area Verification and Confirmatory Sample

Figure 8. Nearshore Compliance Demonstration Area Verification and Confirmatory Sample Locations

Figure 9. Lower Harbor East Compliance Demonstration Area Verification and Confirmatory Sample Locations

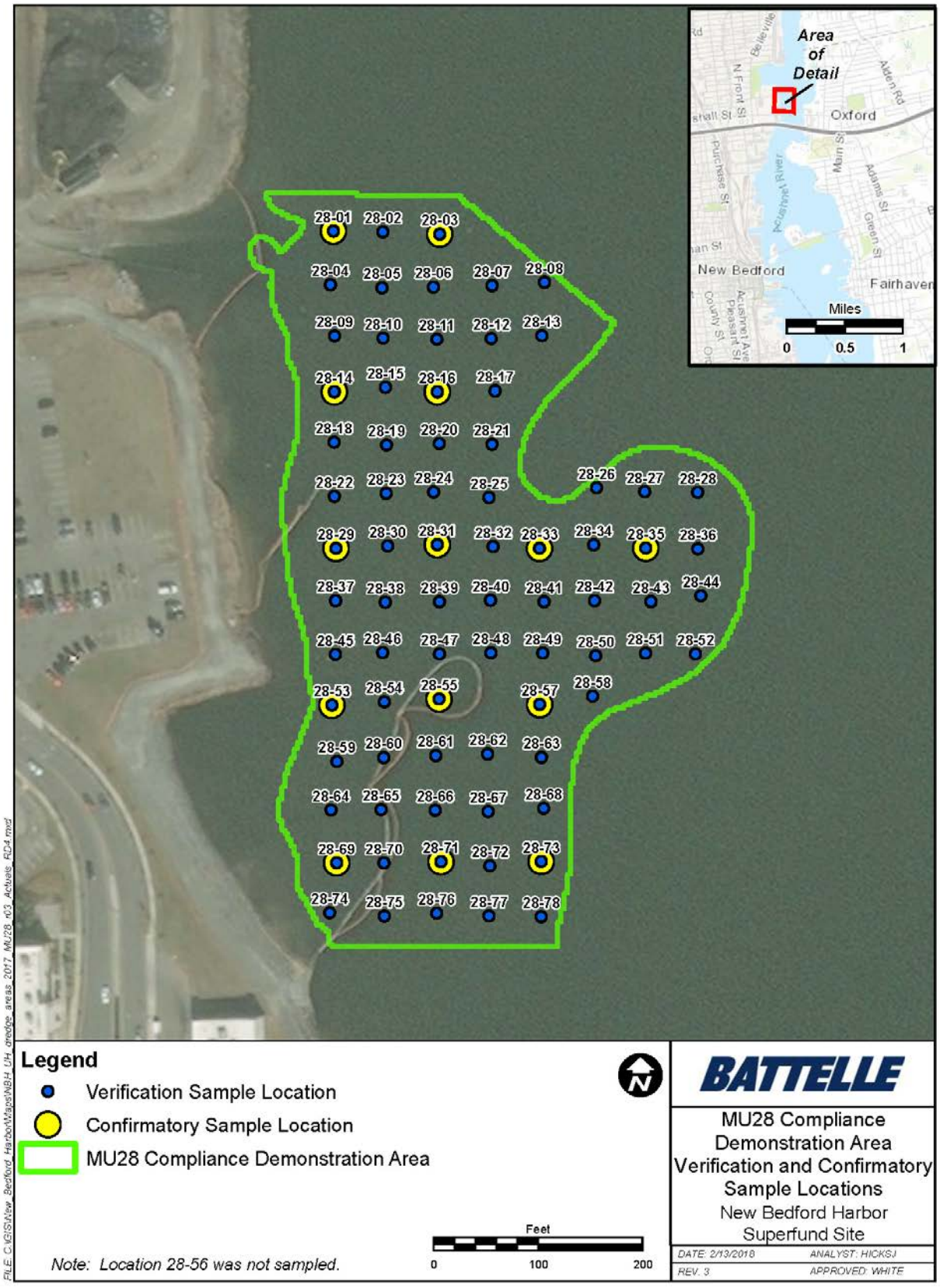


Figure 10. MU 28 Compliance Demonstration Area Verification and Confirmatory Sample Locations

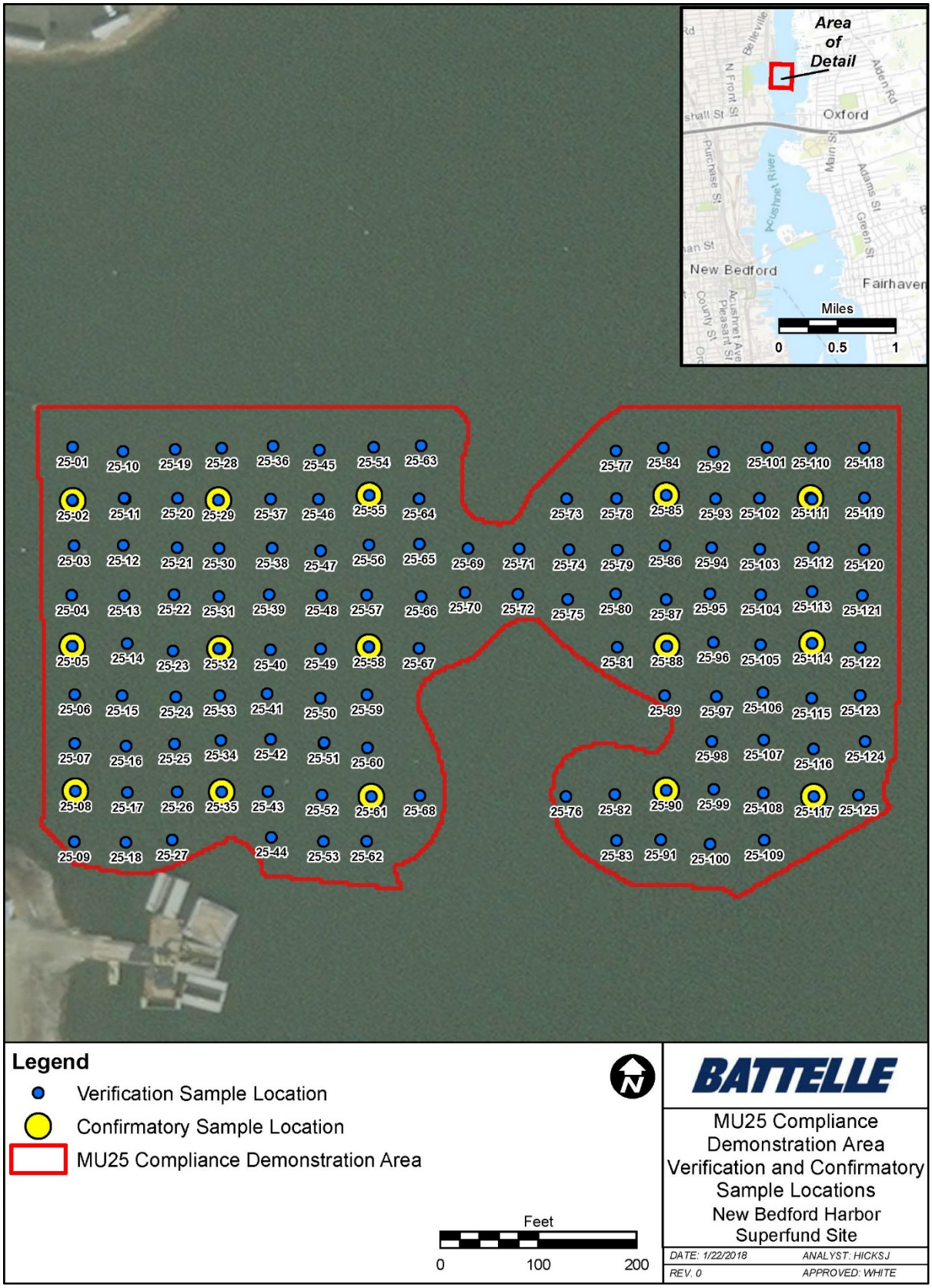


Figure 11. MU 25 Compliance Demonstration Area Verification and Confirmatory Sample Locations

Figure 12 MU33 and MU34 Verification and Confirmatory Sampling Locations

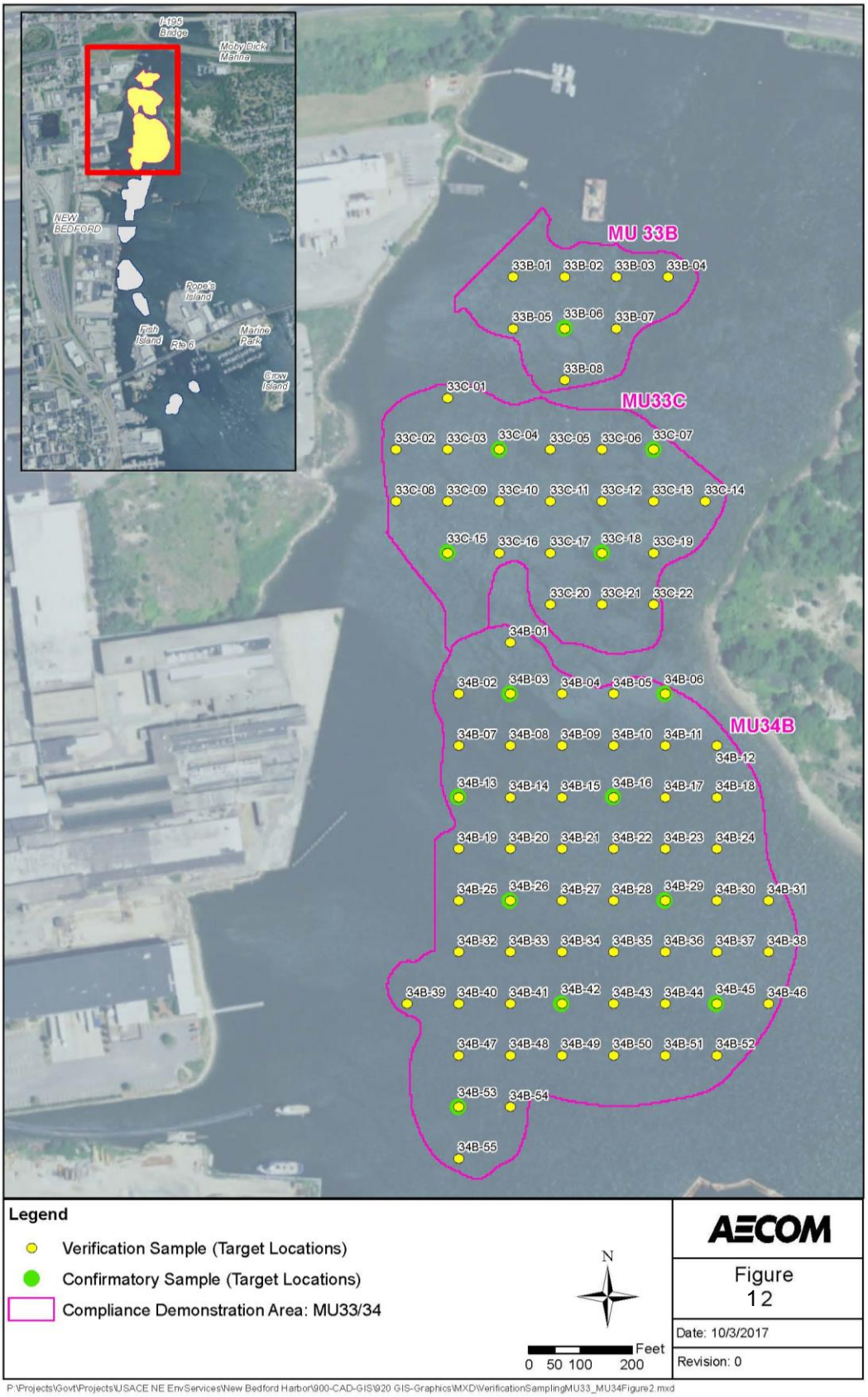


Figure 13 MU35C and MU35E Verification and Confirmatory Sampling Locations

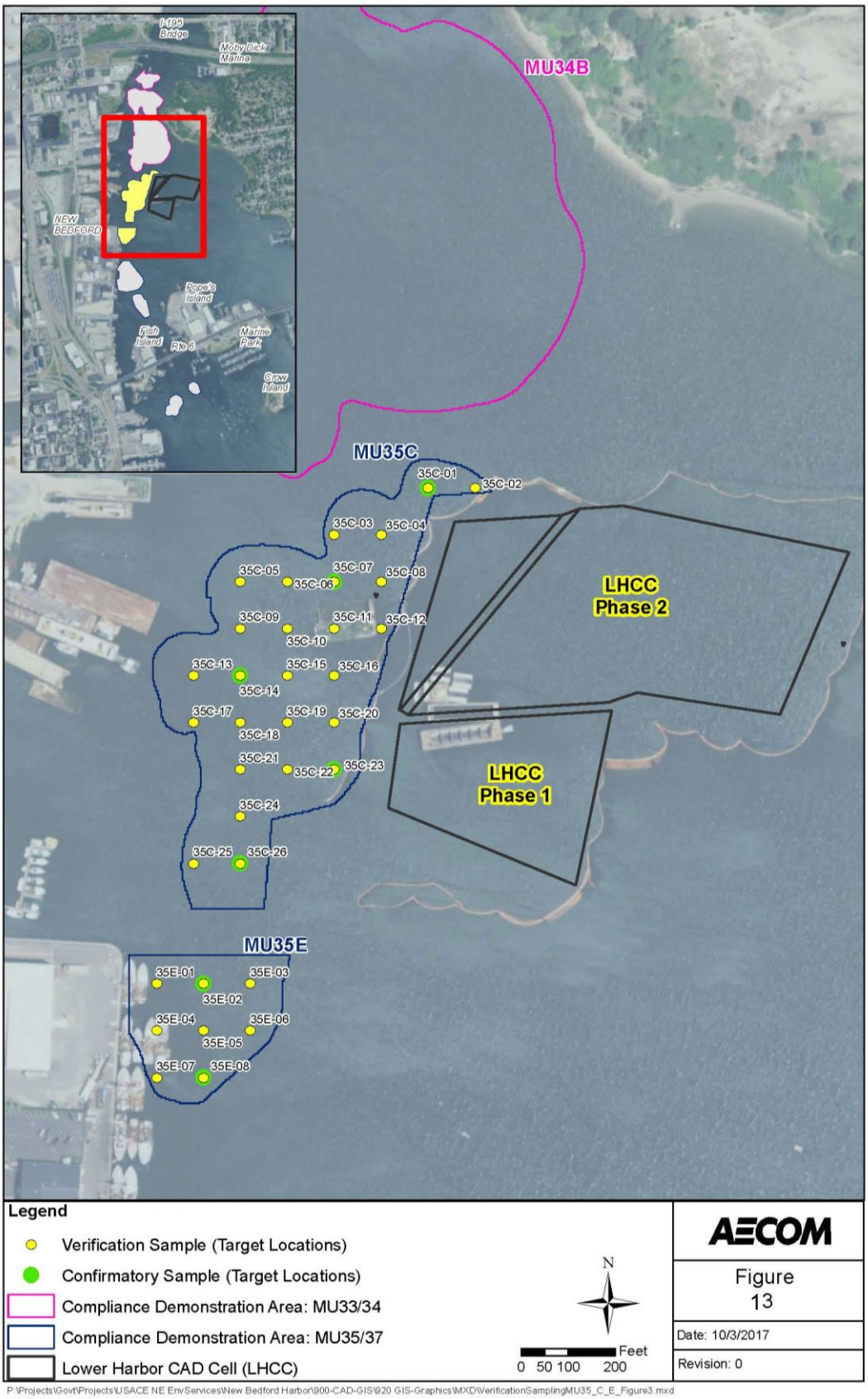


Figure 14 MU35F and MU35G Verification and Confirmatory Sampling Locations

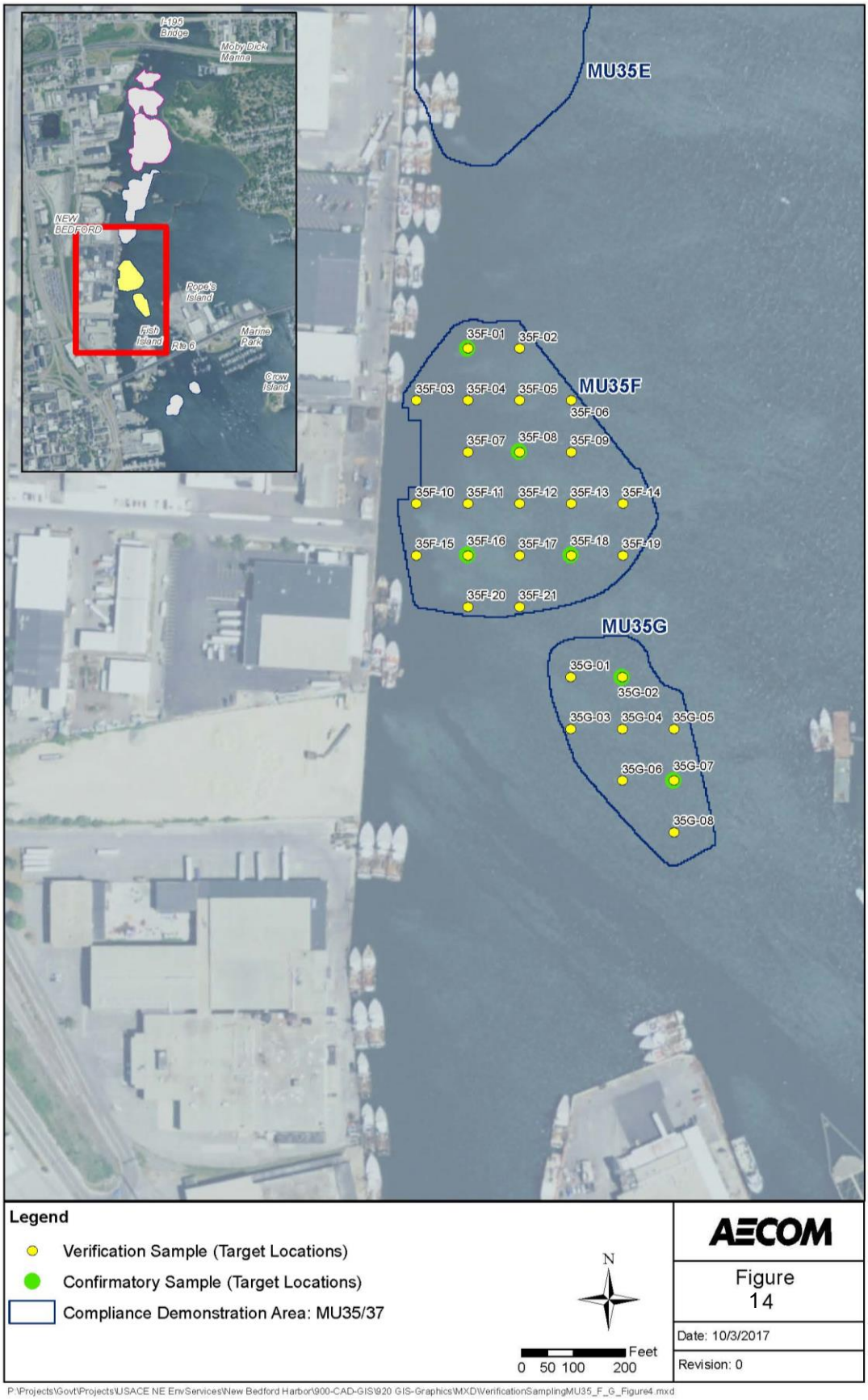
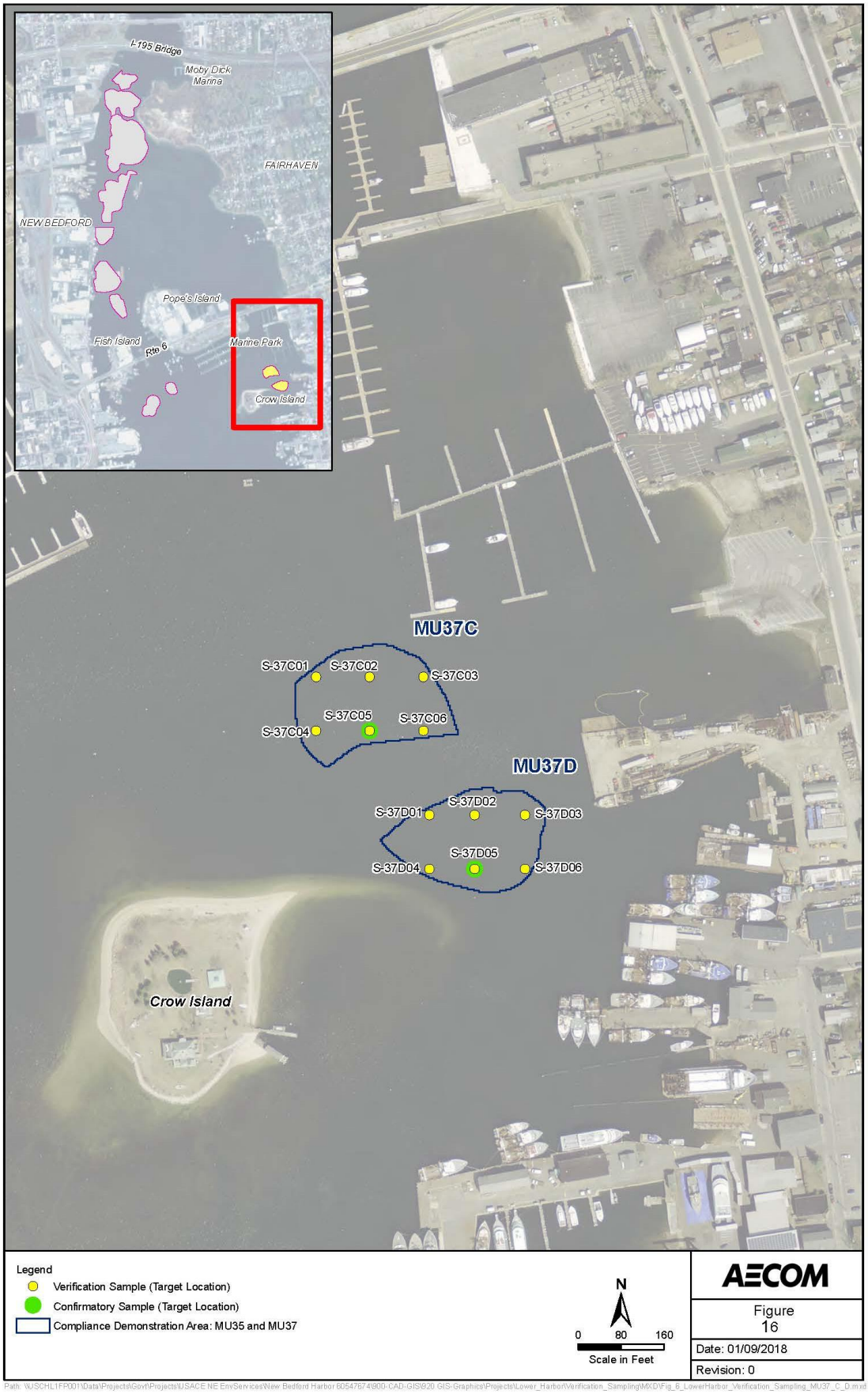


Figure 15 MU37A and MU37B Verification and Confirmatory Sampling Locations

Figure 16 MU37C and MU37D Verification and Confirmatory Sampling Locations



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Tables

Table 1a
Dredged Management Units and Actual Volume by Management Unit

CDA	Dredge Area	Start Date	Completion Date	Actual Volume Dredged (cy)	TCL (mg/kg)	Average Confirmatory Sample Concentration (mg/kg)	Maximum Confirmatory Sample Concentration (mg/kg)
Nearshore	35B	1-Sep-16	20-Sep-16	8,437	50	19.7	34.5
	36A	20-Jul-16	20-Jul-16	140	50	NA	NA
	A34	28-Oct-16	3-Nov-16	6,378	50	14.4	25.4
	A35	19-Oct-16	20-Oct-16	193	50	NA	NA
	B33	28-Jul-16	8-Aug-16	2,111	50	20.0	20.0
	B34	21-Sep-16	23-Sep-16	1,146	50	10.4	10.4
	B35	14-Oct-16	20-Oct-16	372	50	0.358	0.358
	C33	23-Sep-16	28-Sep-16	2,085	50	0.883	0.883
	C34/D34	29-Sep-16	3-Oct-16	1,857	50	15.7	25.5
	C35	28-Oct-16	8-Nov-16	2,581	50	3.75	3.75
	F34/E34/G34	3-Sep-16	9-Nov-16	1,549	50	3.79	3.79
	H34	8-Nov-16	9-Nov-16	199	50	NA	NA
	I34	6-Oct-16	6-Oct-16	697	50	NA	NA
	J34/K34	6-Oct-16	7-Oct-16	165	50	NA	NA
MU A33/33A	A33/33A	1-Jul-16	19-Jul-16	5,502	50	8.91	36.0
Lower Harbor East	A36	14-Dec-16	13-Jan-17	6,682	50	16.3	42.6
MU36	G36	3-Mar-16	25-Apr-16	14,846	50	10.8	35.0
	H36	8-Mar-16	11-Mar-16	2,026	50	16.2	25.8
	I36	23-Mar-16	30-Mar-16	1,345	50	32.5	32.5
	J36	7-Mar-16	30-Mar-16	12,021	50	20.5	30.9
	K36	29-Apr-16	18-May-16	3,558	50	1.71	3.23
	L36	25-Apr-16	24-May-16	4,272	50	5.55	5.95
MU25	MU25	21-Feb-17	12-Apr-17	26,401	10	4.09	17.2
MU28	MU28	16-Jan-17	16-Feb-17	12,806	10	0.935	5.43
JE/SES Subtotal [1]				***117,369***			
MU33	33B	13-Sep-17	1-Oct-17	7,656	50	6.90	8.15
	33C	1-Oct-17	20-Feb-18	17,455	50	2.81	9.49
MU34	34B	13-Oct-17	10-Nov-17	53,594	50	3.25	7.52
MU35	35C	27-Dec-17	31-Jan-17	30,882	50	7.83	18.8
	35E	16-Jan-18	23-Jan-18	10,371	50	9.08	20.1
	35F	24-Nov-17	9-Dec-17	22,633	50	12.5	28.4
	35G	10-Nov-17	24-Nov-17	4,034	50	3.96	5.15
MU37	37A	9-Dec-17	14-Dec-17	7,615	50	12.7	12.7
	37B	14-Dec-17	17-Dec-17	4,254	50	47.3	47.3
	37C	20-Dec-17	22-Dec-17	3,893	50	0.434	0.798
	37D	18-Dec-17	20-Dec-17	2,827	50	7.85	7.85
BtB	BtB	23-Mar-18	20-Apr-18	7,649	50	2.80	6.55
MU25	MU25	1-May-18	3-May-18	1,505	10	4.09	17.2
MU26	MU26	3-May-18	23-May-18	7,346	10	1.79	5.29
MU29	MU29	3-May-18	13-Jun-18	18,553	10	0.805	1.94
MU31	MU31	3-May-18	23-May-18	2,039	10	3.47	3.47
Cashman Subtotal [1]				***202,306***		**8.0**	
Total				**319,675**			

[1]Final dredge volumes calculated by Jacobs Engineering and Cashman Dredging and Marine Contracting Co., LLC based on analysis of pre-dredge and post-dredge bathymetry surveys completed for each management unit.

Note: A statistical approach was used to determine the number of required confirmatory samples for each CDA and was based on the overall approach outlined in the Final Confirmatory Sampling Approach, New Bedford Harbor Superfund Site (Foster Wheeler Environmental Corporation [FWEC], 2002), as further described in the Subtidal Verification and Confirmatory Sampling Report 2016-2017 Dredge Seasons (Battelle 2018)

Table 1b

Dredged Management Units and Actual Volume by Upper Harbor/Lower Harbor

Dredge Area	Start Date	Completion Date	Actual Volume Dredged (cy)	TCL (mg/kg)	Average Confirmatory Sample Concentration (mg/kg)	Maximum Confirmatory Sample Concentration (mg/kg)
Upper Harbor						
MU25	21-Feb-17	12-Apr-17	26,401	10	4.09	17.2
MU28	16-Jan-17	16-Feb-17	12,806	10	0.935	5.43
MU25	1-May-18	3-May-18	1,505	10	4.09	17.2
MU26	3-May-18	23-May-18	7,346	10	1.79	5.29
MU29	3-May-18	13-Jun-18	18,553	10	0.805	1.94
MU31	3-May-18	23-May-18	2,039	10	3.47	3.47
Upper Harbor Total/Average			**68,650**		**2.53**	
Lower Harbor						
35B	1-Sep-16	20-Sep-16	8,437	50	19.7	34.5
36A	20-Jul-16	20-Jul-16	140	50	NA	NA
A34	28-Oct-16	3-Nov-16	6,378	50	14.4	25.4
A35	19-Oct-16	20-Oct-16	193	50	NA	NA
B33	28-Jul-16	8-Aug-16	2,111	50	20.0	20.0
B34	21-Sep-16	23-Sep-16	1,146	50	10.4	10.4
B35	14-Oct-16	20-Oct-16	372	50	0.358	0.358
C33	23-Sep-16	28-Sep-16	2,085	50	0.883	0.883
C34/D34	29-Sep-16	3-Oct-16	1,857	50	15.7	25.5
C35	28-Oct-16	8-Nov-16	2,581	50	3.75	3.75
F34/E34/G34	3-Sep-16	9-Nov-16	1,549	50	3.79	3.79
H34	8-Nov-16	9-Nov-16	199	50	NA	NA
I34	6-Oct-16	6-Oct-16	697	50	NA	NA
J34/K34	6-Oct-16	7-Oct-16	165	50	NA	NA
A33/33A	1-Jul-16	19-Jul-16	5,502	50	8.91	36.0
A36	14-Dec-16	13-Jan-17	6,682	50	16.3	42.6
G36	3-Mar-16	25-Apr-16	14,846	50	10.8	35.0
H36	8-Mar-16	11-Mar-16	2,026	50	16.2	25.8
I36	23-Mar-16	30-Mar-16	1,345	50	32.5	32.5
J36	7-Mar-16	30-Mar-16	12,021	50	20.5	30.9
K36	29-Apr-16	18-May-16	3,558	50	1.71	3.23
L36	25-Apr-16	24-May-16	4,272	50	5.55	5.95
33B	13-Sep-17	1-Oct-17	7,656	50	6.9	8.15
33C	1-Oct-17	20-Feb-18	17,455	50	2.81	9.49
34B	13-Oct-17	10-Nov-17	53,594	50	3.25	7.52
35C	27-Dec-17	31-Jan-17	30,882	50	7.83	18.8
35E	16-Jan-18	23-Jan-18	10,371	50	9.08	20.1
35F	24-Nov-17	9-Dec-17	22,633	50	12.5	28.4
35G	10-Nov-17	24-Nov-17	4,034	50	3.96	5.15
37A	9-Dec-17	14-Dec-17	7,615	50	12.7	12.7
37B	14-Dec-17	17-Dec-17	4,254	50	47.3	47.3
37C	20-Dec-17	22-Dec-17	3,893	50	0.434	0.798
37D	18-Dec-17	20-Dec-17	2,827	50	7.85	7.85
BtB	23-Mar-18	20-Apr-18	7,649	50	2.8	6.55
Upper Harbor Totals/Average			**251,025**		**11.00**	
Total			**319,675**			

Table 2
Confirmatory Sampling Results by Management Unit

Compliance Demonstration Area	Station ID	Depth Top (feet)	Depth Bottom (feet)	Sample Date	Sample ID	Confirmatory: Total PCB Congeners[1] (mg/kg)
MU 36	LHC01	0	0.5	6/14/2016	S-16U-LHC01-00-05	1.76
MU 36	LHC02	0	0.5	6/7/2016	S-16U-LHC02-00-05	25.8
MU 36	LHC03	0	0.4	6/14/2016	S-16U-LHC03-00-04	7.25
MU 36	LHC04	0	0.5	6/14/2016	S-16U-LHC04-00-05	35
MU 36	LHC05	0	0.5	6/7/2016	S-16U-LHC05-00-05	20.3
MU 36	LHC06	0	0.5	6/7/2016	S-16U-LHC06-00-05	19.2
MU 36	LHC07	0	0.4	6/14/2016	S-16U-LHC07-00-04	17
MU 36	LHC08	0	0.5	6/14/2016	S-16U-LHC08-00-05	6.21
MU 36	LHC09	0	0.5	6/14/2016	S-16U-LHC09-00-05	2.75
MU 36	LHC10	0	0.5	6/7/2016	S-16U-LHC10-00-05	18.9
MU 36	LHC11	0	0.5	6/7/2016	S-16U-LHC11-00-05	14.5
MU 36	LHC12	0	0.5	6/7/2016	S-16U-LHC12-00-05	32.5
MU 36	LHC13	0	0.5	6/14/2016	S-16U-LHC13-00-05	26.1
MU 36	LHC14	0	0.5	6/7/2016	S-16U-LHC14-00-05	30.9
MU 36	LHC15	0	0.4	6/7/2016	S-16U-LHC15-00-04	17.2
MU 36	LHC16	0	0.5	6/7/2016	S-16U-LHC16-00-05	23.8
MU 36	LHC17	0	0.5	6/7/2016	S-16U-LHC17-00-05	22.8
MU 36	LHC17	0	0.5	6/7/2016	S-16U-LHC17-00-05-REP	17.3
MU 36	LHC18	0	0.5	6/7/2016	S-16U-LHC18-00-05	0.189
MU 36	LHC19	0	0.5	6/7/2016	S-16U-LHC19-00-05	5.95
MU 36	LHC20	0	0.5	6/14/2016	S-16U-LHC20-00-05	0.8
MU 36	LHC20	0	0.5	6/14/2016	S-16U-LHC20-00-05-REP	0.653
MU 36	LHC21	0	0.4	6/14/2016	S-16U-LHC21-00-04	0.557
MU 36	LHC22	0	0.5	6/7/2016	S-16U-LHC22-00-05	6.53
MU 36	LHC23	0	0.4	6/7/2016	S-16U-LHC23-00-04	3.23
MU 36	LHC24	0	0.4	6/7/2016	S-16U-LHC24-00-04	5.15
MU A33/33A	LH02	0	0.5	11/17/2016	S-16N-LH02-00-05	9.21
MU A33/33A	LH04	0	0.5	7/21/2016	S-16L-LH04-00-05	4.93
MU A33/33A	LH04	0	0.5	7/21/2016	S-16L-LH04-00-05-REP	5.28
MU A33/33A	LH05	0	0.5	7/21/2016	S-16L-LH05-00-05	10.6
MU A33/33A	LH07	0	0.5	11/17/2016	S-16N-LH07-00-05	36
MU A33/33A	LH09	0	0.5	7/21/2016	S-16L-LH09-00-05	9.31
MU A33/33A	LH11	0	0.5	11/18/2016	S-16N-LH11-00-05	19.5
MU A33/33A	LH13	0	0.5	7/21/2016	S-16L-LH13-00-05	0.958
MU A33/33A	LH15	0	0.5	7/22/2016	S-16L-LH15-00-05	0.303
MU A33/33A	LH17	0	0.5	7/22/2016	S-16L-LH17-00-05	0.257
MU A33/33A	LH19	0	0.5	7/22/2016	S-16L-LH19-00-05	1.65
Nearshore	35B-02	0	0.5	9/26/2016	S-16S-35B-02-00-05	19.4
Nearshore	35B-02	0	0.5	9/26/2016	S-16S-35B-02-00-05-REP	19.7
Nearshore	35B-08	0	0.5	9/26/2016	S-16S-35B-08-00-05	34.5
Nearshore	35B-10	0	0.5	9/26/2016	S-16S-35B-10-00-05	4.41
Nearshore	35B-13	0	0.5	9/26/2016	S-16S-35B-13-00-05	20.7
Nearshore	A34-01	0	0.5	11/17/2016	S-16N-A34-01-00-05	16.9
Nearshore	A34-04	0	0.5	1/16/2017	S-17J-A34-04-00-05	0.911
Nearshore	A34-06	0	0.5	1/16/2017	S-17J-A34-06-00-05	25.4

Table 2
Confirmatory Sampling Results by Management Unit

Compliance Demonstration Area	Station ID	Depth Top (feet)	Depth Bottom (feet)	Sample Date	Sample ID	Confirmatory: Total PCB Congeners[1] (mg/kg)
Nearshore	B33-05	0	0.5	8/19/2016	S-16G-B33-05-00-05	20
Nearshore	B34-02	0	0.5	10/14/2016	S-16O-B34-02-00-05	10.4
Nearshore	B35-01	0	0.5	11/3/2016	S-16N-B35-01-00-05	0.358
Nearshore	C33-02	0	0.5	10/14/2016	S-16O-C33-02-00-05	0.883
Nearshore	C34-04	0	0.5	10/14/2016	S-16O-C34-04-00-05	5.8
Nearshore	C35-03	0	0.5	11/18/2016	S-16N-C35-03-00-05	3.75
Nearshore	D34-02	0	0.5	10/14/2016	S-16O-D34-02-00-05	25.5
Nearshore	G34-02	0	0.5	10/14/2016	S-16O-G34-02-00-05	3.79
Lower Harbor East	A36-01	0	0.5	12/28/2016	S-16D-A36-01-00-05	12.4
Lower Harbor East	A36-01	0	0.5	12/28/2016	S-16D-A36-01-00-05-REP	5.07
Lower Harbor East	A36-03	0	0.5	12/28/2016	S-16D-A36-03-00-05	24.4
Lower Harbor East	A36-05	0	0.5	1/16/2017	S-17J-A36-05-00-05	42.6
Lower Harbor East	A36-07	0	0.5	2/20/2017	S-17F-A36-07-00-05	31.2
Lower Harbor East	A36-09	0	0.5	1/19/2017	S-17J-A36-09-00-05A	2.33
Lower Harbor East	A36-11	0	0.5	1/16/2017	S-17J-A36-11-00-05	7.06
Lower Harbor East	A36-13	0	0.5	1/16/2017	S-17J-A36-13-00-05	5.06
MU28	28-01	0	0.5	2/20/2017	S-17F-28-01-00-05-A	0
MU28	28-03	0	0.5	2/2/2017	S-17F-28-03-00-05	1.91
MU28	28-14	0	0.5	2/2/2017	S-17F-28-14-00-05	0.892
MU28	28-16	0	0.5	2/2/2017	S-17F-28-16-00-05	0
MU28	28-29	0	0.5	2/8/2017	S-17F-28-29-00-05	1.33
MU28	28-31	0	0.5	2/8/2017	S-17F-28-31-00-05	0.0795
MU28	28-33	0	0.5	2/8/2017	S-17F-28-33-00-05	0.101
MU28	28-35	0	0.5	2/8/2017	S-17F-28-35-00-05	0.092
MU28	28-53	0	0.5	2/14/2017	S-17F-28-53-00-05	0
MU28	28-55	0	0.5	2/14/2017	S-17F-28-55-00-05	5.43
MU28	28-57	0	0.5	2/20/2017	S-17F-28-57-00-05-A	1.72
MU28	28-69	0	0.5	2/20/2017	S-17F-28-69-00-05	0
MU28	28-71	0	0.5	2/20/2017	S-17F-28-71-00-05	0.089
MU28	28-73	0	0.5	2/14/2017	S-17F-28-73-00-05	1.44
MU25	25-02	0	0.5	3/21/2017	S-17M-25-02-00-05	4.49
MU25	25-02	0	0.5	3/21/2017	S-17M-25-02-00-05-REP	1.03
MU25	25-05	0	0.5	3/21/2017	S-17M-25-05-00-05	3.73
MU25	25-08	0	0.5	3/21/2017	S-17M-25-08-00-05	0.87
MU25	25-29	0	0.5	3/31/2017	S-17M-25-29-00-05	0.37
MU25	25-32	0	0.5	3/31/2017	S-17M-25-32-00-05	2.46
MU25	25-35	0	0.5	3/31/2017	S-17M-25-35-00-05	1.13
MU25	25-55	0	0.5	4/12/2017	S-17A-25-55-00-05	0.34
MU25	25-58	0	0.5	4/12/2017	S-17A-25-58-00-05	0.452
MU25	25-61	0	0.5	4/12/2017	S-17A-25-61-00-05	0.964
MU25	25-85	0	0.5	3/31/2017	S-17M-25-85-00-05	10.2
MU25	25-88	0	0.5	4/12/2017	S-17A-25-88-00-05	2.84
MU25	25-90	0	0.5	5/17/2018	S-MU25090-18ADD8-00-05	6.39
MU25	25-111	0	0.5	4/13/2017	S-17A-25-111-00-05	17.2
MU25	25-114	0	0.5	4/13/2017	S-17A-25-114-00-05	12.5
MU25	25-117	0	0.5	4/13/2017	S-17A-25-117-00-05	0.5

Table 2
Confirmatory Sampling Results by Management Unit

Compliance Demonstration Area	Station ID	Depth Top (feet)	Depth Bottom (feet)	Sample Date	Sample ID	Confirmatory: Total PCB Congeners[1] (mg/kg)
BTB-A	BTBA002	0	0.5	4/23/2018	S-BTBA002-18ADD7-00-05	0.166
BTB-B	BTBB002	0	0.5	4/23/2018	S-BTBB002-18ADD7-00-05	3.69
BTB-C	BTBC007	0	0.5	4/20/2018	S-BTBC007-18ADD7-00-05	0.796
BTB-C	BTBC011	0	0.5	4/23/2018	S-BTBC011-18ADD7-00-05	6.55
MU26	MU2601	0	0.5	6/7/2018	S-MU2601-18ADD9-00-05	0.006
MU26	MU2602	0	0.5	6/7/2018	S-MU2602-18ADD9-00-05	0.085
MU26	MU2607	0	0.5	6/7/2018	S-MU2607-18ADD9-00-05	5.29
MU29	MU2903	0	0.5	6/14/2018	S-MU2903-18ADD9-00-05	0.515
MU29	MU2908	0	0.5	6/14/2018	S-MU2908-18ADD9-00-05	0.895
MU29	MU2910	0	0.5	6/15/2018	S-MU2910-18ADD9-00-05	0.025
MU29	MU2916	0	0.5	6/15/2018	S-MU2916-18ADD9-00-05	0.654
MU29	MU2925	0	0.5	6/12/2018	S-MU2925-18ADD9-00-05	1.94
MU31	MU3101	0	0.5	6/1/2018	S-MU3101-18ADD9-00-05	3.47
33B	33B06	0	0.5	10/6/2017	S-33B06-17ADD1-A	5.64
33B	33B06	0	0.5	10/6/2017	S-33B06-17ADD1-A-REP	8.15
33C	33C04	0	0.5	3/16/2018	S-33C04B-17ADD1-00-05	3.02
33C	33C04	0	0.5	3/16/2018	S-33C04BR-17ADD1-00-05-REP	0.515
33C	33C07	0	0.5	10/23/2017	S-33C07-17ADD1-A	0.584
33C	33C15	0	0.5	10/23/2017	S-33C15-17ADD1-A	9.49
33C	33C18	0	0.5	10/23/2017	S-33C18-17ADD1-A	0.437
34B	34B03	0	0.5	11/30/2017	S-34B03-17ADD1-A	0.814
34B	34B06	0	0.5	11/15/2017	S-34B06-17ADD1-A	2.84
34B	34B06	0	0.5	11/15/2017	S-34B06-17ADD1-A-REP	1.66
34B	34B13	0	0.5	11/30/2017	S-34B13-17ADD1-A	2.78
34B	34B13	0	0.5	11/30/2017	S-34B13-17ADD1-A-REP	3.18
34B	34B16	0	0.5	2/22/2018	S-34B16B-17ADD1-00-05	0.28
34B	34B26	0	0.5	3/26/2018	S-34B26C-17ADD1-00-05	7.52
34B	34B26	0	0.5	3/26/2018	S-34B26CR-17ADD1-00-05-REP	5.65
34B	34B29	0	0.5	11/15/2017	S-34B29-17ADD1-A	4.97
34B	34B42	0	0.5	12/1/2017	S-34B42-17ADD1-A	1.37
34B	34B45	0	0.5	11/15/2017	S-34B45-17ADD1-A	1.38
34B	34B53	0	0.5	12/7/2017	S-34B53-17ADD1-A	6.5
35C	35C01	0	0.5	2/8/2018	S-35C01-17ADD1-00-05	9.31
35C	35C07	0	0.5	2/8/2018	S-35C07-17ADD1-00-05	3.58
35C	35C14	0	0.5	2/22/2018	S-35C14B-17ADD1-00-05	18.8
35C	35C23	0	0.5	2/9/2018	S-35C23-17ADD1-00-05	5.15
35C	35C26	0	0.5	3/16/2018	S-35C26B-17ADD1-00-05	2.29
35E	35E02	0	0.5	1/30/2018	S-35E02-17ADD1-A	1.42
35E	35E08	0	0.5	1/30/2018	S-35E08-17ADD1-A	20.1
35E	35E08	0	0.5	1/30/2018	S-35E08-17ADD1-A-REP	5.71
35F	35F01	0	0.5	12/11/2017	S-35F01-17ADD1-A	16.1
35F	35F08	0	0.5	12/18/2017	S-35F08-17ADD1-A	0.975
35F	35F16	0	0.5	12/18/2017	S-35F16-17ADD1-A	4.35
35F	35F18	0	0.5	3/16/2018	S-35F18B-17ADD1-00-05	28.4
35G	35G02	0	0.5	12/11/2017	S-35G02-17ADD1-A	5.15
35G	35G07	0	0.5	12/11/2017	S-35G07-17ADD1-A	2.77
37A	37A03	0	0.5	12/21/2017	S-37A03-17ADD1-A	12.7
37B	37B03	0	0.5	2/20/2018	S-37B03B-17ADD1-00-05	47.3
37C	37C05	0	0.5	1/16/2018	S-37C05-17ADD1-A	0.798
37C	37C05	0	0.5	1/16/2018	S-37C05R-17ADD1-A-REP	0.0705
37D	37D05	0	0.5	1/16/2018	S-37D05-17ADD1-A	7.85

[1]Sample results collected prior to October 1, 2017 are the sum of 139 PCB congeners while those collected after October 1, 2017 are the sum of 209 PCB congeners; non-detects are set to zero in the sums.

Appendix A
Pre-Dredge Bathymetry

A33
33A
36A
A36
B33
195
C33
B34
NEW BEDFORD
D34
C34
F34
E34
A34
G34
H34
I34
J34
K34
A35
B35
35B
C35
LOWER HARBOR
Lower Harbor CAD Cell Phase 2
Lower Harbor CAD Cell Phase 1
H36
G36
I36
J36
K36
L36
FAIRHAVEN
POPE'S ISLAND
6
MARINE PARK
FISH ISLAND
CROW ISLAND

Path: Y:\NBH\Projects\35BG1001\20181218\ArcGIS\Fig A-1 NBH_Lower_Harbor_Pre_Bathy_CR_Apr_2014_May_2015_AAR_20181218.mxd

Legend

Bathymetry Elevation, MLLW ft

0 - 1.193	-14 - -12	-28 - -26
-2 - 0	-16 - -14	-30 - -28
-4 - -2	-18 - -16	-32 - -30
-6 - -4	-20 - -18	-34 - -32
-8 - -6	-22 - -20	-36.25 - -41
-10 - -8	-24 - -22	
-12 - -10	-26 - -24	

EPA CAD Cell

N

0 275 550 Feet 1:6,600

Aerial Photography MASSGIS 2014

JACOBS™

Lower Harbor IRAC Dredge Areas April 2014 & May 2015 Bathymetry

New Bedford Harbor Superfund Site

Date: 12/21/2018

Figure A-1

Bathymetry (Pre); NAVD88 (ft)

15.5 - 18	-0.4 - 1.0	-6.4 - -5.5	-12.4 - -11.6	-18.4 - -17.6
12.9 - 15.5	-1.2 - -0.4	-7.3 - -6.4	-13.3 - -12.4	-19.3 - -18.4
10.2 - 12.9	-2.1 - -1.2	-8.1 - -7.3	-14.1 - -13.3	-20.1 - -19.3
7.7 - 10.2	-3.0 - -2.1	-9.0 - -8.1	-15.0 - -14.1	-21.0 - -20.1
5.5 - 7.7	-3.8 - -3.0	-9.8 - -9.0	-15.9 - -15.0	-21.9 - -21.0
3.2 - 5.5	-4.7 - -3.8	-10.7 - -9.8	-16.7 - -15.9	-22.7 - -21.9
1.0 - 3.2	-5.5 - -4.7	-11.6 - -10.7	-17.6 - -16.7	-25.1 - -22.7

USGS, MassGIS

Legend

MU-28 Post Dredge Boundary

Aerial Photography MASSGIS 2014

DRAFT

0 100 Feet

1:900

JACOBS

Upper Harbor IRAC Dredge Area MU-28 December 2015 & June 2016 Bathymetry

New Bedford Harbor Superfund Site

NAME: jpiccuito Date: 12/21/2018

Figure A-2

Path: Y:\NBH\Projects\35BG1001\20181218\ArcGIS\Fig A-2 NBH_MU28_Pre_Bathy_CR_Dec_2015_June_2016_AAR_20181218.mxd

Area C

Legend

MU-25 Post Dredge Boundary

Bathymetry (Pre); NAVD88 (ft)

15.5 - 18	-0.4 - 1.0	-6.4 - -5.5	-12.4 - -11.6	-18.4 - -17.6
12.9 - 15.5	-1.2 - -0.4	-7.3 - -6.4	-13.3 - -12.4	-19.3 - -18.4
10.2 - 12.9	-2.1 - -1.2	-8.1 - -7.3	-14.1 - -13.3	-20.1 - -19.3
7.7 - 10.2	-3.0 - -2.1	-9.0 - -8.1	-15.0 - -14.1	-21.0 - -20.1
5.5 - 7.7	-3.8 - -3.0	-9.8 - -9.0	-15.9 - -15.0	-21.9 - -21.0
3.2 - 5.5	-4.7 - -3.8	-10.7 - -9.8	-16.7 - -15.9	-22.7 - -21.9
1.0 - 3.2	-5.5 - -4.7	-11.6 - -10.7	-17.6 - -16.7	-25.1 - -22.7

Aerial Photography MASSGIS 2014

DRAFT

0 100 Feet

1:1,200

JACOBS

Upper Harbor IRAC Dredge Area MU-25 December 2015 & June 2016 Bathymetry

New Bedford Harbor Superfund Site

NAME: jpiccuito Date: 12/21/2018

Figure A-3

Path: Y:\NEH1\Projects\3883G\00\V01\81\ArcGIS\Fin A3 NEH_MU25 Pre_Bathy CR_Dec_2015_June_2016_AAR_20181218.mxd

GENERAL NOTES:

1. THIS HYDROGRAPHIC SURVEY REPRESENTS CONDITIONS EXISTING ON 9/16/17,9/17/17, AND SUPPLEMENTAL DATA COLLECTED ON 9/24/17.

2. THIS HYDROGRAPHIC SURVEY IS INTENDED FOR USE ON THIS PROJECT ONLY, AND IS NOT INTENDED FOR ANY OTHER PROJECT OR PURPOSE WITHOUT WRITTEN PERMISSION FROM STEELE ASSOCIATES, AND THE USACE.

3. MULTIBEAM BATHYMETRIC DATA WAS COLLECTED USING SURVEY VESSEL HAYDEN JANE, AN R2 SONIC 2024 200 KHZ SONAR, A TRIMBLE SPS855 RTK GPS WITH BASE STATION CORRECTIONS, A CODA F175 IMU, DIGIBAR SOUNDCAST, AND HYPACK 2015 FOR DATA COLLECTION AND PROCESSING.

4. SOUNDINGS GENERATED USING MINIMUM 3'X3' DATA, WITH SOUNDINGS PLOTTED ON A 20'X20' GRID. VERTICAL DATUM IS MEAN LOWER LOW WATER (MLLW). THE MLLW ELEVATION FOR NEW BEDFORD INNER HARBOR IS –1.92 FEET NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). BENCHMARK IS BASE STATION POINT (GPS MAG NL) ELEV: 8.87' (MLLW).

5. THE COORDINATE SYSTEM IS THE MASSACHUSETTS MAINLAND STATE PLANE COORDINATE SYSTEM, DATUM: NAD–83, UNITS: US SURVEY FEET.

6. SATELLITE IMAGERY FOR VISUAL REFERENCE ONLY.

APPRX. EPA PIPELINE FROM PLANS

EPA CAD CELL PHASE II

CAD CELL #3

EPA CAD CELL PHASE I

APPRX. PIPELINE LOCATIONS 9/24/17

33B

33C

34B

35C

CONTRACTOR BARGES

SCOW ISLAND

MATCH LINE

SCALE: 1"=100 Feet

US Army Corps of Engineers New England District

No.	Date	By	Description
3	3/27/17	MDS	
2			
1			

Date: 3/27/17 | Job Order: NBHD | Rev #1

Designed by: BRY | Drawn by: BRY | Reviewed by: BRY | Submitted by: BRY

U.S. ARMY NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

STEELE ASSOCIATES
MARINE CONSULTANTS, LLC.

NEW BEDFORD HARBOR
LOWER HARBOR DREDGE AREAS
SUPERFUND SITE SEDIMENT REMOVAL PROJECT
NEW BEDFORD, MASSACHUSETTS

Sheet Reference Number: D–101
Sheet 1 of 3

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D SIZE FINAL DESIGN

Figure A-4

EPA CAD CELL PHASE II

CAD CELL #3

CAD CELL #2

CAD CELL #1

BORROW PIT

APPRX. EPA PIPELINE FROM PLANS

EPA CAD CELL PHASE I

35E

35F

35G

34B

35C

SCOW ISLAND

MOORED VESSELS

MATCH LINE

MATCH LINE

US Army Corps of Engineers New England District

U.S. ARMY NEW ENGLAND DISTRICT CORPS OF ENGINEERS CONCORD, MASSACHUSETTS

STEELE ASSOCIATES MARINE CONSULTANTS, LLC. BOSTON, MASSACHUSETTS

LOWER HARBOR DREDGE AREAS

NEW BEDFORD HARBOR SUPERFUND SEDIMENT REMOVAL PROJECT NEW BEDFORD, MASSACHUSETTS

Designed by: BRY
Drawn by: KT
Checked by: ES
Reviewed by: BRY
Submitted by: BRY

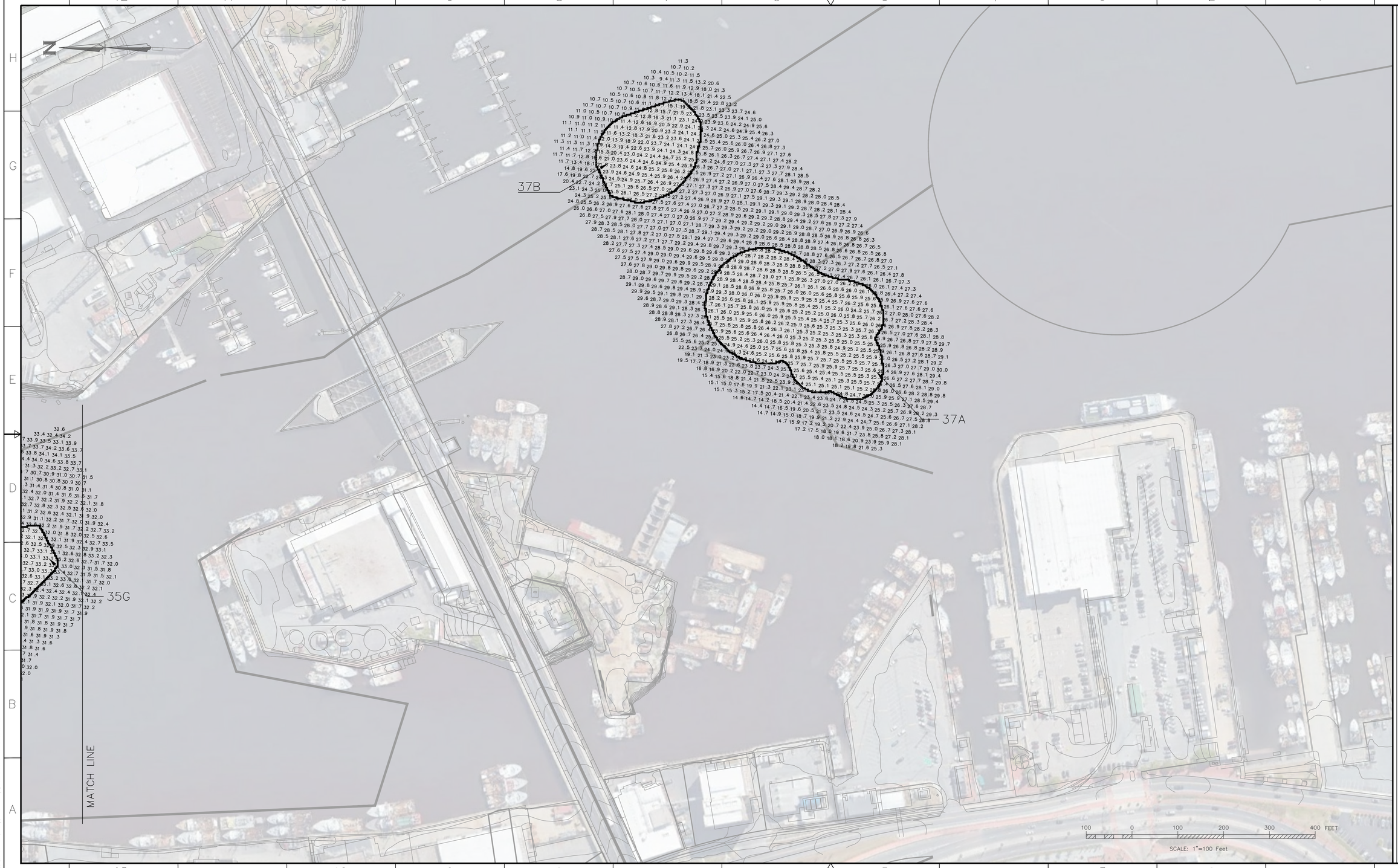
Date: 9/27/07
Job Order: 3670
Rev: #1

Sheet Reference Number: D–102
Sheet 2 of 3

SCALE: 1"=100 Feet

D SIZE FINAL DESIGN

Figure A-5



US Army Corps of Engineers New England District

U.S. ARMY NEW ENGLAND DISTRICT CORPS OF ENGINEERS CONCORD, MASSACHUSETTS

STEELE ASSOCIATES MARINE CONSULTANTS, LLC.

Designed by BRY | Drawn by KT | Reviewed by BRY | Submitted by BRY | Date: 9/27/17 | Task Order: NB70 | Rev. #1 | Job # 3

LOWER HARBOR DREDGE AREAS

NEW BEDFORD HARBOR SUPERFUND SITE SEDIMENT REMOVAL PROJECT NEW BEDFORD, MASSACHUSETTS

Sheet Reference Number: D-103

Sheet 3 of 3

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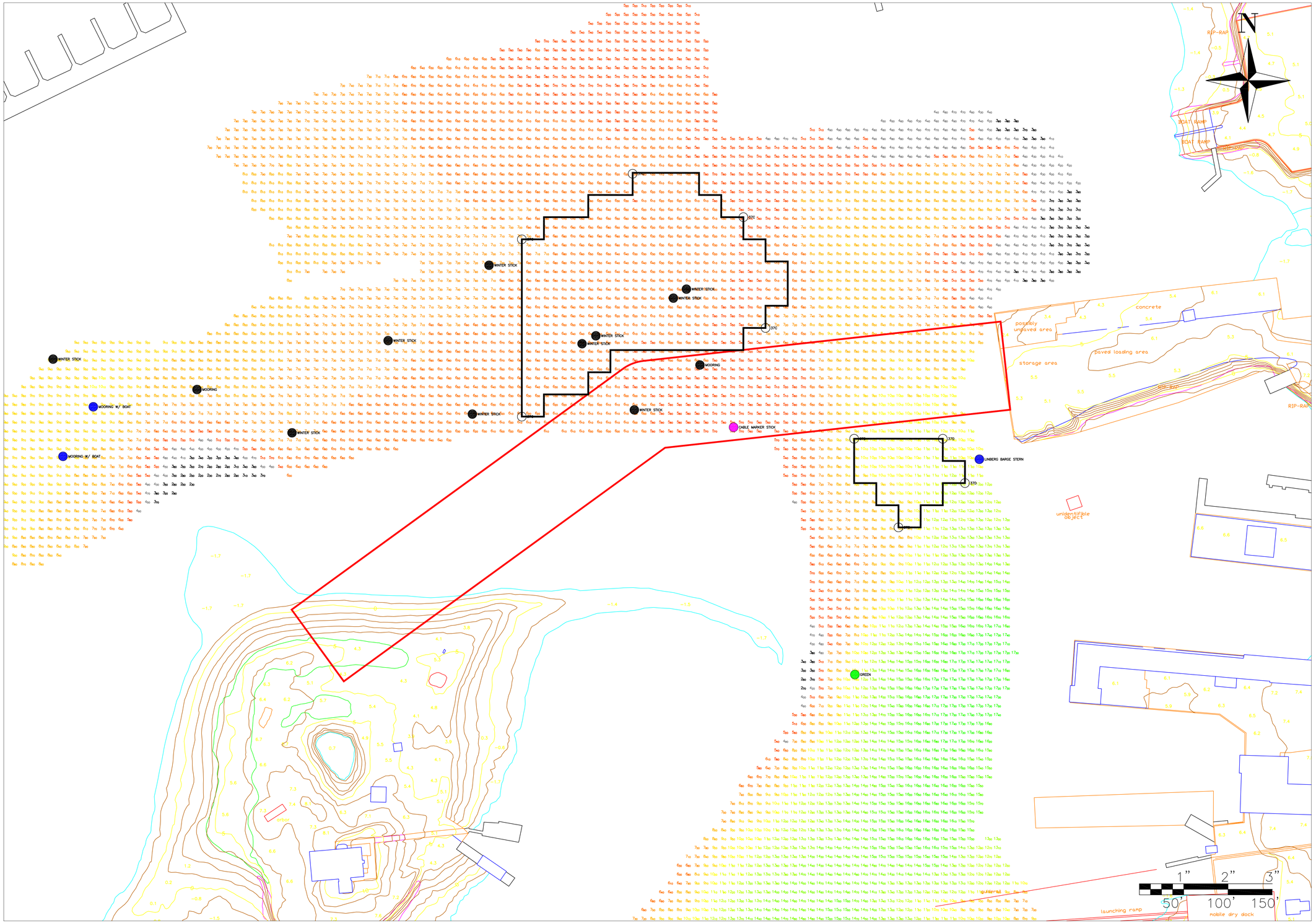
D SIZE FINAL DESIGN

Figure A-6



GENERAL NOTES:

1. SCALES NOTED ARE APPLICABLE TO FULL SIZE (24"X36") DRAWINGS ONLY. SCALE REDUCED DRAWINGS ACCORDINGLY.

SOUNDING SORT:

AVERAGE

No.	Revision/Issue	Date

CASHMAN DREDGING

Drawing Title:

NEW BEDFORD
LOWER HARBOR
DREDGING

PRELIMINARY

DREDGE AREAS

37C & 37D

Date:	Scale:
11/09/17	1" = 50'
Drawn By: KR	Chk'd By: ST
Project: NEW BEDFORD HARBOR	
Sheet Number: 1 of 1	

Dwg No.:

D-37C&D

Figure A-7

NEW BEDFORD HARBOR
LOWER HARBOR MECHANICAL DREDGING
STEELE ASSOCIATES MARINE CONSULTANTS, LLC
DREDGE AREA: BtB AREAS
BEFORE DREDGE PRELIMINARY PLAN
SURVEY DATE: 3/19/18
3'X3' MINIMUM DEPTH, 20-FT SORT

N

BtB A

BtB B

BtB C

Scale: 1 Inch = 40.00 Feet
50 100 200 300 400 Feet

Figure A-8

Appendix B
Post-Dredge Bathymetry

A33
33A
36A
A36
B33
195
C33
B34
NEW BEDFORD
D34
C34
F34
E34
A34
G34
H34
I34
J34
K34
A35
B35
35B
C35
LOWER HARBOR
Lower Harbor CAD Cell Phase 2
Lower Harbor CAD Cell Phase 1
H36
G36
I36
J36
K36
L36
FAIRHAVEN
POPE'S ISLAND
6
MARINE PARK
FISH ISLAND
CROW ISLAND

Path: Y:\NBH\Projects\35BG1001\20181218\ArcGIS\Fig B-1 NBH_Lower_Harbor_Post_Bathy_CR_Jan_Feb_2017_AAR_20181218.mxd

Legend

Bathymetry Elevation, MLLW ft

0 - 1.193	-14 - -12	-28 - -26
-2 - 0	-16 - -14	-30 - -28
-4 - -2	-18 - -16	-32 - -30
-6 - -4	-20 - -18	-34 - -32
-8 - -6	-22 - -20	-36.25 - -41
-10 - -8	-24 - -22	
-12 - -10	-26 - -24	

EPA CAD Cell

N

0 275 550 Feet 1:6,600

Aerial Photography MASSGIS 2014

JACOBS™

Lower Harbor IRAC Dredge Areas Jan 2017 & Feb 2017 Bathymetry

New Bedford Harbor Superfund Site

Date: 12/21/2018

Figure B-1

Bathymetry (Post); NAVD88 (ft)

15.5 - 18	-0.4 - 1.0	-6.4 - -5.5	-12.4 - -11.6	-18.4 - -17.6
12.9 - 15.5	-1.2 - -0.4	-7.3 - -6.4	-13.3 - -12.4	-19.3 - -18.4
10.2 - 12.9	-2.1 - -1.2	-8.1 - -7.3	-14.1 - -13.3	-20.1 - -19.3
7.7 - 10.2	-3.0 - -2.1	-9.0 - -8.1	-15.0 - -14.1	-21.0 - -20.1
5.5 - 7.7	-3.8 - -3.0	-9.8 - -9.0	-15.9 - -15.0	-21.9 - -21.0
3.2 - 5.5	-4.7 - -3.8	-10.7 - -9.8	-16.7 - -15.9	-22.7 - -21.9
1.0 - 3.2	-5.5 - -4.7	-11.6 - -10.7	-17.6 - -16.7	-25.1 - -22.7

USGS, MassGIS

Legend

MU-28 Post Dredge Boundary

Aerial Photography MASSGIS 2014

DRAFT

N

0 100

Feet 1:900

JACOBS

Upper Harbor IRAC Dredge Area
MU-28 April 2017 Bathymetry

New Bedford Harbor Superfund Site

NAME: jpiccuito Date: 12/21/2018

Figure B-2

Path: Y:\NBH\Projects\35BG1001\20181218\ArcGIS\Fig B-2 NBH_MU28_Post_Bathy_CR_April_2017_AAR_20181218.mxd

Area C

Legend

MU-25 Post Dredge Boundary

Bathymetry (Post); NAVD88 (ft)

15.5 - 18	-0.4 - 1.0	-6.4 - -5.5	-12.4 - -11.6	-18.4 - -17.6	
12.9 - 15.5	-1.2 - -0.4	-7.3 - -6.4	-13.3 - -12.4	-19.3 - -18.4	
10.2 - 12.9	-2.1 - -1.2	-8.1 - -7.3	-14.1 - -13.3	-20.1 - -19.3	
7.7 - 10.2	-3.0 - -2.1	-9.0 - -8.1	-15.0 - -14.1	-21.0 - -20.1	
5.5 - 7.7	-3.8 - -3.0	-9.8 - -9.0	-15.9 - -15.0	-21.9 - -21.0	
3.2 - 5.5	-4.7 - -3.8	-10.7 - -9.8	-16.7 - -15.9	-22.7 - -21.9	
1.0 - 3.2	-5.5 - -4.7	-11.6 - -10.7	-17.6 - -16.7	-25.1 - -22.7	

Aerial Photography MASSGIS 2014

DRAFT

0 100 Feet

1:1,200

JACOBS

Upper Harbor IRAC Dredge Area
MU-25 April 2017 Bathymetry

New Bedford Harbor Superfund Site

NAME: jpiccuito Date: 12/21/2018

Figure B-3

Path: Y:\NBH\Projects\358361001\2018\21\ArcGIS\Fig B3 NBH_MU25_Post Bathy_CR_April 2017_AAR_20181218.mxd

GENERAL NOTES

1. THIS HYDROGRAPHIC SURVEY REPRESENTS CONDITIONS EXISTING FROM 5/11/18 THROUGH 6/15/18. BRIDGE TO BRIDGE DREDGE AREAS REPRESENTS CONDITIONS FROM 4/24/18.

2. THIS HYDROGRAPHIC SURVEY IS INTENDED FOR USE ON THIS PROJECT ONLY, AND IS NOT INTENDED FOR ANY OTHER PROJECT OR PURPOSE WITHOUT WRITTEN PERMISSION FROM STEELE ASSOCIATES, AND THE USACE.

3. MULTIBEAM BATHYMETRIC DATA WAS COLLECTED USING SURVEY VESSEL HAYDEN JANE, AN R2 SONIC 2024 200 KHZ SONAR, A TRIMBLE SPS855 RTK GPS WITH BASE STATION CORRECTIONS, A CODA F175 IMU, DIGIBAR SOUNDCAST. SUPPLEMENTAL SINGLE BEAM BATHYMETRIC DATA REQUIRED IN MU29 WAS COLLECTED USING JON BOAT SURVEY VESSEL, AN ODOM CV-100 200 KHZ SONAR, A TRIMBLE SPS855 RTK GPS WITH BASE STATION CORRECTIONS, A CODA F175 IMU, DIGIBAR SOUNDCAST, AND HYPACK 2015 FOR DATA COLLECTION AND PROCESSING.

4. SOUNDINGS GENERATED USING MINIMUM 3'X3' DATA, WITH SOUNDINGS PLOTTED ON A 20'X20' GRID. VERTICAL DATUM IS MEAN LOWER LOW WATER (MLLW). THE MLLW ELEVATION FOR NEW BEDFORD INNER HARBOR IS -1.92 FEET NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). BENCHMARK IS BASE STATION POINT (GPS MAG NL) ELEV: 8.87' (MLLW).

5. THE COORDINATE SYSTEM IS THE MASSACHUSETTS MAINLAND STATE PLANE COORDINATE SYSTEM, DATUM: NAD-83, UNITS: US SURVEY FEET.

6. SATELLITE IMAGERY FOR VISUAL REFERENCE ONLY.

MU25

MU26

MU29

MU31

BRIDGE TO BRIDGE DREDGE AREAS

MATCH LINE

100 0 100 200 300 400 FEET

SCALE: 1"=100 Feet

US Army Corps of Engineers New England District

No.	Description	Date
1		
2		
3		
4		

Designed by: BRY | Date: 8/23/18 | Mods: 0
Dwn by: KT | Ext. by: ES | Tide Station: NB30
Reviewed by: BRY | Rev #1
Submitted by: BRY

U.S. ARMY NEW ENGLAND DISTRICT CORPS OF ENGINEERS CONCORD, MASSACHUSETTS

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UPPER HARBOR DREDGE AREAS

NEW BEDFORD HARBOR SUPERFUND SITE SEDIMENT REMOVAL PROJECT NEW BEDFORD, MASSACHUSETTS

Sheet Reference Number: D-101

Sheet 1 of 4

D SIZE FINAL DESIGN

Figure B-4

GENERAL NOTES:

1. THIS HYDROGRAPHIC SURVEY REPRESENTS CONDITIONS EXISTING FROM 10/5/17 THROUGH 3/24/18.

2. THIS HYDROGRAPHIC SURVEY IS INTENDED FOR USE ON THIS PROJECT ONLY, AND IS NOT INTENDED FOR ANY OTHER PROJECT OR PURPOSE WITHOUT WRITTEN PERMISSION FROM STEELE ASSOCIATES, AND THE USACE.

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6. SATELLITE IMAGERY FOR VISUAL REFERENCE ONLY.

APPRX. EPA PIPELINE FROM PLANS

EPA CAD CELL PHASE II

CAD CELL #3

EPA CAD CELL PHASE I

APPRX. PIPELINE LOCATIONS 9/24/17

33B

33C

34B

35C

MATCH LINE

MATCH LINE

100 0 100 200 300 400 FEET

SCALE: 1"=100 Feet

US Army Corps of Engineers New England District

Date	Description
8/24/18	Issued
8/24/18	Issued
8/24/18	Issued
8/24/18	Issued

Designed by: BRY | Drawn by: AT | Date: 8/24/18
Checked by: ES | Job Order: NEDD
Reviewed by: BRY | Rev: #1
Submitted by: BRY

U.S. ARMY NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

STEELE ASSOCIATES
MARINE CONSULTANTS, LLC.

LOWER HARBOR DREDGE AREAS

NEW BEDFORD HARBOR
SUPERFUND SITE SEDIMENT REMOVAL PROJECT
NEW BEDFORD, MASSACHUSETTS

Sheet Reference Number:
D−102
Sheet 2 of 4

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D SIZE FINAL DESIGN

Figure B-5

EPA
CAD CELL
PHASE II

CAD CELL #3

CAD CELL #2

BORROW PIT

APPRX.
EPA PIPELINE
FROM PLANS

EPA
CAD CELL
PHASE I

35E

35F

CAD CELL #1

35G

34B

35C

MATCH LINE

MATCH LINE

MOORED
VESSELS

100 0 100 200 300 400 FEET

SCALE: 1" = 100 Feet

US Army Corps
of Engineers
New England District

U.S. ARMY NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

STEELE ASSOCIATES
MARINE CONSULTANTS, LLC.

LOWER HARBOR DREDGE AREAS

NEW BEDFORD HARBOR
SUPERFUND SITE SEDIMENT REMOVAL PROJECT
NEW BEDFORD, MASSACHUSETTS

Sheet
Reference
Number:
D-103
Sheet 3 of 4

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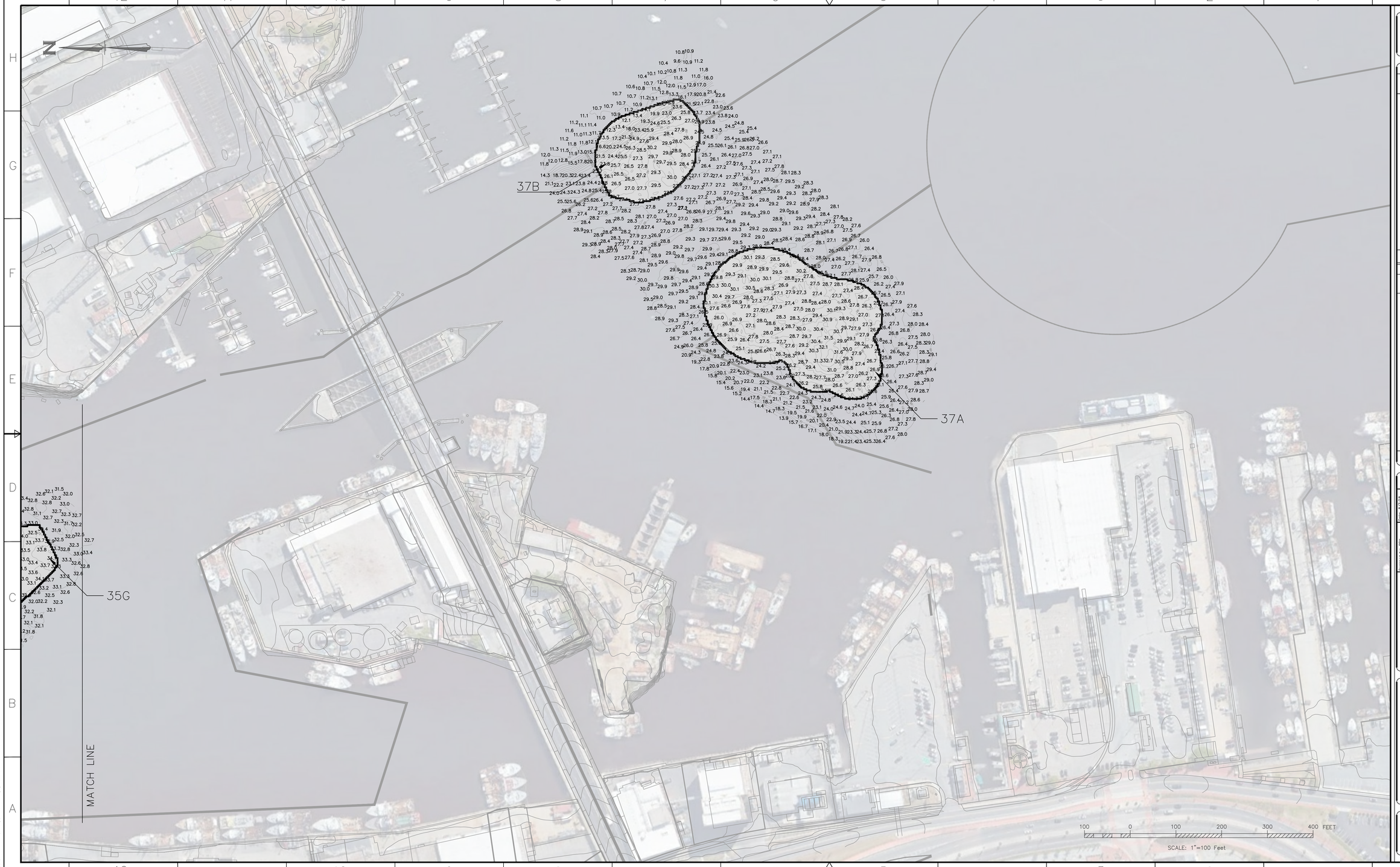
D SIZE FINAL DESIGN

Figure B-6



US Army Corps of Engineers
New England District

Designed by: BRY	Date: 9/13/18	Appd. by
Drn. by: KT	Cor. by: ES	Tab. Order: NBTO
Reviewed by: BRY		Rev. #1
Submitted by: BRY		

U.S. ARMY NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

STEELE ASSOCIATES
MARINE CONSULTANTS, LLC.

LOWER HARBOR DREDGE AREAS

NEW BEDFORD HARBOR
SUPERFUND SITE SEDIMENT REMOVAL PROJECT
NEW BEDFORD, MASSACHUSETTS

Sheet Reference Number:
D–104
Sheet 4 of 4

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D SIZE FINAL DESIGN

Figure B-7

CHAINAGE OFFSET 2000' EAST

6+00
5+00
4+00
3+00
2+00
1+00
0+00
-1+00
-2+00
-3+00

37C

CUT 92
CUT 93
CUT 94
CUT 95
CUT 96
CUT 97
CUT 98
CUT 99
CUT 100
CUT 101
CUT 102
CUT 103

NO SPUD ZONE
NO SPUD ZONE
NO SPUD ZONE

CROW ISLAND PIPELINE BUFFER

37D

RIP-RAP
BOAT RAMP
concrete
possibly unpaved area
storage area
paved loading area
unidentifiable object
arbor
guiderail
launching ramp
visibility limit
mobile dry dock

N

1" 2" 3"
50' 100' 150'

GENERAL NOTES:

1. SCALES NOTED ARE APPLICABLE TO FULL SIZE (24"X36") DRAWINGS ONLY. SCALE REDUCED DRAWINGS ACCORDINGLY.

HARD / REFUSAL
CLAY
DEBRIS

CUT TABLE			
COLOR	MAX	MINIMUM	
	<	-2.01	
	-2.00	-1.01	
	-1.00	-0.51	
	-0.50	-0.26	
	-0.25	-0.01	SHOAL
	0.00	0.24	GRADE
	0.25	0.49	GRADE
	0.50	0.74	DEEP
	0.75	>	DEEP

SOUNDING SORT:

MINIMUM

No.	Revision/Issue	Date

CASHMAN DREDGING

Drawing Title:

NEW BEDFORD LOWER HARBOR DREDGING

CUT LANES FOR ACCEPTANCE AREA 37C & 37D

SECOND PASS

Date:	Scale:
12/29/17	1" = 50'
Drawn By: KR	Chk'd By: ST
Project: NEW BEDFORD HARBOR	
Sheet Number: 1 of 1	

Dwg No.:

D-37C&D

Appendix C

Updated Data Set

Average Concentration of Material Placed in LHC

APPENDIX C

Transmittal of Updated Dataset including data for Upper Harbor and Areas between the Coggeshall Street and I-195 Bridge for disposal at Lower Harbor Confined Aquatic Disposal Cell (LHCC) (as of November 2018)

EPA is providing the current data set that is being utilized for the delineation of dredge areas that were disposed of in the LHCC. The dataset was updated to include sampling results from the southern end of the Upper Harbor (North of Coggeshall Street).

EPA used the characterization data for estimating the location and depths of dredge materials to be disposed of in the LHCC from the lower harbor and upper harbor. All Immunoassay (IA) sample results in this dataset where the IA sample had a result in excess of 100ppm were run for full congener analysis.

Here is a summary of the updated information EPA is providing on the LHCC project:

1. EPA is providing an updated table characterizing sediments from the Lower and Upper Harbor that were disposed of in the LHCC. This is an update to the table originally provided in July 2015 to the TWG and updated in February 2017. In this 2018 update, additional data from the southern end of the Upper Harbor is included. In cases where congener was run, EPA is relying on the congener result to determine limits of dredging.

2. Dredge volumes for each MU were updated to the actual volume dredged and disposed of in the CAD cell.

3. A table showing weighted average PCB concentration (total congener results) from the dredge areas shown on the maps is included as well. See discussion below.

Levels of PCBs to be disposed of in LHCC based on dataset:

Based on the congener dataset and considering all the data points included in dredge areas for disposal in the Lower Harbor CAD cell, the highest known PCB congener concentration is sample location S-14D-25-1-00-10 at 480 ppm. The next highest concentration was 300 ppm. Six samples were between 200 ppm up to 300 ppm, and 17 samples were between 100 ppm and 200 ppm. The remaining 80 samples were below 100 ppm. Therefore, 76% of the samples in this dataset were below 100ppm.

The congener dataset is biased high since all samples that recorded values over 100 ppm by IA were subsequently run for full congener analysis. A weighted average concentration of the sediment planned for dredging and disposal in the Lower Harbor CAD cell was estimated from the congener dataset. That weighted average is approximately 77.6 ppm. The arithmetic average for the dataset is approximately 71.9 ppm, and the median is approximately 54 ppm.

Taking into account that this congener dataset is biased high and also accounting for the fact that up to six inches of over dredge (into material less than 50 ppm from the strata underlying the dredge prism) was expected, the actual weighted average concentration EPA expects is lower than the estimate provided. It is also below the requirement established by ESD 4 that material disposed in the CAD cell will be generally less than an average of 100 ppm.

STATION_ID	SAMPLE_ID	CONC (mg/kg)	MU Weight	MU Weight Applied (mg/kg)
2014-25-1	S-14D-25-1-00-10	480.0	0.0873	41.9
2014-25-2	S-15A-25-2-00-10	21.0	0.0873	1.8
2014-25-3	S-15A-25-3-00-10	140.0	0.0873	12.2
2014-25-4	S-15A-25-4-00-10	260.0	0.0873	22.7
2014-25-5	S-15A-25-5-00-10	240.0	0.0873	21.0
2014-25-5	S-15A-25-5-10-20	280.0	0.0873	24.4
2014-25-6	S-15A-25-6-00-10	240.0	0.0873	21.0
2014-25-7	S-15A-25-7-00-10	10.0	0.0873	0.9
2014-26-4	S-15M-26-1-00-10	110.0	0.0230	2.5
2014-26-12	S-15M-26-12-00-10	44.0	0.0230	1.0
MU2646	S-MU2646-18FSP8-00-04	17.8	0.0230	0.4
MU2651	S-MU2651-18FSP8-06-11	86.2	0.0230	2.0
MU2658	S-MU2658-18FSP8-19-24	0.05	0.0230	0.0
MU2668	S-MU2668-18FSP8-07-12	0.89	0.0230	0.0
MU2675	S-MU2675-18FSP8-18-23	0.495	0.0230	0.0
MU2675	S-MU2675-18FSP8-05-08	156	0.0230	3.6
MU2676	S-MU2676-18FSP8-06-11	0.23	0.0230	0.0
MU2674	all samples	0	0.0230	0.0
*2014-27-3	S-15M-27-3-00-10	68.3	0.0000	0.0
2014-28-9	S-15M-28-9-00-10	10.6	0.0401	0.4
2014-29-2	S-15M-29-2-00-10	45.0	0.0580	2.6
2014-29-3	S-15M-29-3-00-10	32.0	0.0580	1.9
MU2948	S-MU2948-18FSP8-00-05	20.2	0.0580	1.2
MU2949	S-MU2949-18FSP8-03-08	116	0.0580	6.7
MU2950	S-MU2950-18FSP8-03-08	147	0.0580	8.5
MU2954	S-MU2954-18FSP8-00-06	10.9	0.0580	0.6
MU2955	S-MU2955-18FSP8-00-04	19.2	0.0580	1.1
MU2955R	S-MU2955R-18FSP8-00-02-REP	10.5	0.0580	0.6
MU2956	S-MU2956-18FSP8-00-05	28.8	0.0580	1.7
MU2957	S-MU2957-18FSP8-00-05	112	0.0580	6.5
MU2962	S-MU2962-18FSP8-00-03	17.7	0.0580	1.0
MU2964	S-MU2964-18FSP8-02-07	56.5	0.0580	3.3
MU2965	S-MU2965-18FSP8-00-06	38.1	0.0580	2.2
MU2972	S-MU2972-18FSP8-02-07	17.6	0.0580	1.0
MU2973	S-MU2973-18FSP8-04-09	18.5	0.0580	1.1
MU2978	S-MU2978-18FSP8-00-03	12.6	0.0580	0.7
MU2979	S-MU2979-18FSP8-00-06	68.2	0.0580	4.0
MU2983	S-MU2983-18FSP8-00-05	6.6	0.0580	0.4
MU2984	S-MU2984-18FSP8-00-02	8.4	0.0580	0.5
MU2987	S-MU2987-18FSP8-00-06	25.5	0.0580	1.5
2014-31-7A	S-14D-31-7A-00-10	36.0	0.0064	0.2
MU3192	S-MU3192-18FSP8-03-08	9.52	0.0064	0.1
MU3195	S-MU3195-18FSP8-11-16	3.7	0.0064	0.0
MU3199	S-MU3199-18FSP8-14-19	14.1	0.0064	0.1
MU31100	S-MU31100-18FSP8-15-20	0.171	0.0064	0.0
2014-32-2	S-15A-32-2-00-10	170.0	0.0239	4.1
2014-32-4	S-15A-32-4-00-10-REP	120.0	0.0239	2.9
2014-32-7	S-15A-32-7-00-10	160.0	0.0239	3.8
2014-32-12	S-15A-32-12-00-10	270.0	0.0239	6.5
2014-32-14	S-15A-32-14-00-10	40.0	0.0239	1.0
2014-32-14	S-15A-32-14-10-20	180.0	0.0239	4.3
2014-32-14	S-15A-32-14-30-40	99.0	0.0239	2.4
2014-32-17	S-15A-32-17-00-10	120.0	0.0239	2.9
2014-33-4	S-14Y-33-4-00-07	54.0	0.1089	5.9
2014-33-5	S-14Y-33-5-00-10	59.0	0.1089	6.4
2014-33-7	S-14Y-33-7-00-11	59.0	0.1089	6.4
2014-33-11	S-14A-33-11-00-09	49.0	0.1089	5.3
2014-33-17	S-14Y-33-17-10-20	97.0	0.1089	10.6
2014-33-19	S-14A-33-19-08-18	67.8	0.1089	7.4
2014-33-25	S-14A-33-25-07-17	62.0	0.1089	6.8
2014-33-25	S-14A-33-25-17-27	86.0	0.1089	9.4
2014-33-26	S-14A-33-26-23-33	190.0	0.1089	20.7
2014-33-27	S-14A-33-27-00-07	53.0	0.1089	5.8
2014-33-27	S-14A-33-27-07-17	90.0	0.1089	9.8
2014-33-29	S-14A-33-29-23-33	130.0	0.1089	14.2
2014-33-31	S-14A-33-31-00-10	70.0	0.1089	7.6
2014-34-1	S-14L-34-1-00-10	57.0	0.2052	11.7
2014-34-6	S-14L-34-6-00-12	130.0	0.2052	26.7
2014-34-24	S-14L-34-24-30-43	11.0	0.2052	2.3
2014-34-29	S-14L-34-29-20-30	70.0	0.2052	14.4
2014-34-37	S-14G-34-37-35-47	250.0	0.2052	51.3
2014-34-39	S-14L-34-39-10-20	61.3	0.2052	12.6
2014-35-6	S-14L-35-6-00-10	49.0	0.2487	12.2
2014-35-7	S-14G-35-7-00-10-DUP	38.0	0.2487	9.5
2014-35-7	S-14G-35-7-10-20-DUP	60.0	0.2487	14.9
2014-35-8	S-14L-35-8-00-12	38.0	0.2487	9.5
2014-35-8	S-14L-35-8-12-24	73.0	0.2487	18.2
2014-35-9	S-14L-35-9-00-10	35.0	0.2487	8.7
2014-35-9	S-14L-35-9-10-20	66.0	0.2487	16.4
2014-35-17	S-14L-35-17-00-09	59.0	0.2487	14.7
2014-35-21	S-14G-35-21-00-10	30.0	0.2487	7.5
2014-35-21	S-14G-35-21-10-20	130.0	0.2487	32.3
2014-35-36	S-14G-35-36-10-20	61.0	0.2487	15.2
2014-35-52	S-14G-35-52-00-10	16.0	0.2487	4.0
2014-35-52	S-14G-35-52-10-20	61.0	0.2487	15.2
2014-35-52a	S-15A-35-52-10-20	25.0	0.2487	6.2
2014-35-63	S-14G-35-63-20-30	68.0	0.2487	16.9
2014-35-74	S-14D-35-74-00-10	16.0	0.2487	4.0
2014-35-76	S-14D-35-76-00-10	16.0	0.2487	4.0
2014-36-1	S-14A-36-1-05-15	98.0	0.1404	13.8
2014-36-10	S-14A-36-10-00-06	120.0	0.1404	16.9
2014-36-12	S-14G-36-12-00-12	140.0	0.1404	19.7
2014-36-13	S-14G-36-13-10-20	300.0	0.1404	42.1
2014-36-15	S-14G-36-15-00-06	49.0	0.1404	6.9
2014-36-17	S-14G-36-17-00-08	48.0	0.1404	6.7
2014-36-29	S-14G-36-29-00-05	63.0	0.1404	8.8
2014-36-37	S-14G-36-37-00-10	78.0	0.1404	11.0
2014-36-39	S-14G-36-39-00-10	5.7	0.1404	0.8
2014-36-39	S-14G-36-39-10-20	54.0	0.1404	7.6
2014-36-40	S-14G-36-40-12-20	12.0	0.1404	1.7
2014-36-57	S-14D-36-57-10-20	98.0	0.1404	13.8
2014-36-63	S-14D-36-63-00-10	54.0	0.1404	7.6
2014-36-76	S-14D-36-76-00-10	76.0	0.1404	10.7
2014-37-14	S-14G-37-14-30-40	94.0	0.0581	5.5
2014-37-37	S-14D-37-37-10-20	19.0	0.0581	1.1
2014-37-37	S-14D-37-37-30-40	74.0	0.0581	4.3
				854.0

MU	MU Vol New	Total Vol	% of Total
MU-25	27906	319675	8.73%
MU-26	7346	319675	2.30%
MU-27	0	319675	0.00%
MU-28	12806	319675	4.01%
MU-29	18553	319675	5.80%
MU-30	0	319675	0.00%
MU-31	2039	319675	0.64%
MU-32 (BtB)	7649	319675	2.39%
MU-33	34809	319675	10.89%
MU-34	65585	319675	20.52%
MU-35	79503	319675	24.87%
MU-36	44890	319675	14.04%
MU-37	18589	319675	5.81%
Total:	319675		100.00%

Notes:

(1) Based on the source table for dredge volume, no volume has been added to the CAD Cell from MUs 27, 30 (not dredged)

(2) Between the Bridges (BtB) data are identified in the Volume Calculations as MU32, which was the previous designation for this area.

(3) Blue data added as part of 2018 update

(4) MU volume based on Table 1 in Draft Closeout Report Upper and Lower Harbor Dredge Areas
Disposed of in Lower Harbor Confined Aquatic Disposal Cell During 2016-2018 (AECOM, September 2018).

Notes:

(1) As noted in historical version of this table, IA data is presented for sample S-15M-27-3-00-10, due to no recent congener (Battelle, Sept 2015).

(2) The data provided for samples collected from locations MU26-74 are IA data. IA data was used for locations where no recent congener data was available.

(3) Blue text denotes samples AECOM added to the weighted average data table. All of which were collected following the beginning of October 2017.

(4) Below calculations updated to reflect updated dataset and volumes. Additional deviations from what was done previously denoted by asterisks.

Average = 71.9

Median= 54.0

*Calculation excludes concentrations from MUs 27 and 30

Weighted average = total of weighted concentrations (917.7) / number of MUs (11**)

** 2 of the 13 MUs have no dredge volume associated with them and therefore are not included.

Weighted average = 77.6