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New Bedford Harbor Superfund Site

U.S. Army Corps of Engineers New England District

Final Cable Crossing Area Dredge Data Report

ACE-J23-35BG2000-M17-0066 | 1

September 2019

New Bedford Harbor Superfund Site

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Acronyms and Abbreviations

CCA	cable crossing area
cy	cubic yards
EPA	U.S. Environmental Protection Agency
ft.	foot/feet
IA	immunoassay
Jacobs	Jacobs Engineering Group, Inc.
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
%	percent

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1. Introduction

Hybrid and mechanical dredging of subtidal sediments in the cable crossing area (CCA), 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 between October 2017 and July 2019. The primary objective of the remedial action is removal and offsite disposal of sediment contaminated with polychlorinated biphenyl (PCB) sufficient to meet the overall target cleanup level (TCL) of 10 milligrams per kilogram (mg/kg) for the Upper Harbor as a surface weighted average concentration (SWAC). The subtidal TCL of 10 mg/kg was established in the 1998 Record of Decision (ROD) for the NBHSS (U.S. Environmental Protection Agency [EPA] 1998). The dredging was designed to remove sediment in excess of a remedial action level (RAL) of 30 mg/kg in order to meet the SWAC of 10 mg/kg.

The hydraulic dredging and related activities conducted within the CCA and the post dredge conditions following completion of hybrid dredging were summarized in the Jacobs September 2018 document titled *Final Cable Crossing Area Hybrid Dredge Data Report* (Jacobs 2018). The purpose of this updated dredge data report is to document the mechanical dredging and related activities conducted within the CCA that occurred after the completion of the hybrid dredging. This update also summarizes the post-dredge conditions left following the completion of mechanical dredge activities.

2. Overview

Table 1 provides a summary of metrics documenting the CCA dredge effort.

3. Significant Activities in Cable Crossing Area

To date several major activities have taken place in the CCA on the path to remediation. The first was the construction of a cable crossing conduit in 2001 that allowed electric power cables to cross under the harbor from the Acushnet sub-station on the eastern shore to the western shore in New Bedford. Eversource installed new power cables through the conduit and decommissioned the old cables in 2015. Jacobs and SES removed the de-energized original cables from the harbor during the fall of 2015. Following the removal of the old cables, side-scan and magnetometer data collected in 2014 was reprocessed to identify debris within the CCA. Identified debris was removed during the spring of 2016 to allow for dredging. A sunken wooden shipwreck was discovered in the CCA during debris removal activities. The wreck was removed during the summer of 2017 and documented by the project's archaeologist, David S. Robinson and Associates; documentation was completed during 2018. Following the de-energization of cables, various sampling rounds and surveys were conducted to support dredge plan development. Beginning in October 2017, full-scale dredging of the CCA with the newly constructed hybrid dredge system was initiated following plans described in the Draft Final Upper Harbor Generic Work Plan (Jacobs 2017a) and the Draft-Final Addendum to the Upper Harbor Hybrid Generic Work Plan for the Cable Crossing Area (Jacobs 2017b). Evaluation of dredge prism performance was conducted during the execution of CCA dredging via the periodic collection of verification and confirmatory samples by AECOM per the October 2017 *Upper Harbor Sediment Monitoring Field Sampling Plan Addendum 2 Cable Crossing Area* (AECOM 2017); this activity is discussed further in Section 5.

4. Significant Changes to Cable Crossing Dredge Plan Addendum

The decision to 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. During the fall of 2017, verification sampling conducted in the CCA resulted in approximately 40 percent (%) of the locations requiring re-dredging. To reduce the re-dredge rate, during the winter shutdown, an analysis of verification cores was conducted. The analysis included an evaluation of locations that were found to have either less than or more than 20 mg/kg PCBs by IA analysis against the planned dredge depths and the amount of over-dredge included. This investigation concluded that increasing the over-dredge allowance to 0.4 feet (ft.) from the previous 0.2 ft. had the potential to greatly decrease the return rate going forward. After institution of the change, the return rate dropped from over 40% to approximately 20% during the remainder of the CCA hybrid work from March-June 2018.

Due to operational changes, the layout of the dredge lanes was modified since the release of the CCA work plan (Jacobs 2017b). Figure 1 shows the final modified dredge lane layout employed at the CCA.

Within the CCA are two derelict wooden intake cribs, which were once integral to providing the mills adjacent to the west side of the harbor with river water. Verification samples collected following dredging around these cribs found that the PCB contamination extended beyond the length of the 5-ft. core barrels used to collect the samples. Given this information and previous experience at Parcel 265 where an intake structure was removed and excavated, it was determined that capping the sediments is a protective, cost-effective way to isolate and contain the PCB contaminated sediments. Removal of the wood structures was completed from August 28, 2019 through September 3, 2019, in accordance with the February 2019 Jacobs document titled *Draft Final Crib Demolition Plan Memo* (Jacobs 2019a).

Capping of these sediments is in the planning stage and is anticipated to be initiated following the completion of subtidal dredging. The capping of the former Crib Cap will follow the procedures outlined in the Jacobs August 2019 document titled *Draft Upper Harbor Permanent Caps Generic Design* (Jacobs 2019b) and the Jacobs 2019 document titled *Draft Crib Cap Location Specific Addendum* (Jacobs 2019c).

5. Confirmatory and Verification Sampling

As stated in Section 1, the TCL for the Upper Harbor is 10 mg/kg PCBs as calculated as a SWAC. In the case of the CCA dredge plan, modeling determined that a RAL of 30 mg/kg would result in a post-dredge environment with a SWAC of <10 mg/kg in the Upper Harbor.

As hybrid dredging of the CCA progressed, AECOM collected verification and confirmation samples from pre-assigned locations from dredged areas (AECOM 2017). 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 ft. of sediment following dredging and analyzed for PCB congeners. A denser grid of verification samples, also collected from the top 0.5 ft. of sediment following dredging and analyzed by IA, was also collected 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. 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 and results are summarized on Figure 2 and in Table 2.

The confirmatory results indicate that CCA contamination levels have been reduced significantly through dredging. Data gap sampling indicated that the contaminated sediment in the CCA had an average PCB concentration of 544 mg/kg before the work began. Dredge confirmatory sampling indicates that the average PCB concentration was lowered to 2.37 mg/kg. This average assumes confirmation sample location CCA-237 is to be capped (Figure 2, Table 2) per the above discussion regarding the crib locations.

6. Summary of Cable Crossing Dredge Activities

A hybrid multibeam/single beam bathymetric survey was completed on August 10, 2017 following debris removal activities to provide the pre-dredge surface elevations to be utilized in the dredge plan (Figure 3). Mobilization of the hybrid mechanical/hydraulic dredge system began during September 2017 with the set-up and assembly of two dredge barges, pipelines and the Manomet North booster pump station. Additionally, maintenance and repair of the desanding, dewatering and water treatment plant was performed during mobilization.

Dredging in the CCA was initiated on October 16, 2017 with a day of system testing, called shakedown. Full-scale dredging was initiated on the following day, October 17. Hybrid dredging continued until a winter shutdown on December 22, 2017. Hybrid dredging resumed operation on March 1, 2018 and continued until May 23, 2018. Beginning thereafter, one dredge was repositioned to dredge a toe trench for a cap north of the CCA. Toe trench dredging was initiated on June 7, 2018 and continued until mid-day June 11 when hybrid dredging resumed in the CCA. Hybrid dredging in the CCA was completed on June 13, 2018. Between June 2018 and July 2019 the sediments not suitable for the hybrid system were mechanically dredged and taken to Area C at Sawyer Street for processing as described below.

A total of 47,458 cubic yards (cy) of PCB-contaminated material was dredged from the CCA, treated and transported offsite for disposal. 1,279 cy of that material were dredged, placed in scows, offloaded at Area C and stabilized with Portland cement prior to disposal, while the balance of the material was dredged via the hybrid system.

Daily single beam surveys were performed by SES with supplemental quality control (QC) surveys performed by CR Environmental on a weekly basis. 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. An example tracking figure is included as Figure 4. Following the completion of hybrid and some mechanical to scow dredging, a post-dredge multibeam survey was conducted on June 19 and 20, 2018 to document post-dredge conditions. This June 19 and 20, 2018 survey focused on the deeper water portions of the CCA following the completion of nearshore mechanical dredging into scows. Supplemental single beam survey data was used to update the post-dredge survey data set and to produce a final post-dredge survey figure for the CCA (Figure 5).

Utilizing sampling and production data, approximately 10.7 tons of PCBs were removed from NBHSS through hybrid dredging of the CCA (Table 3). This estimate is based on analytical data from periodic sampling of sand and filter cake generated during dredging and the weight of filter cake and sand generated. It should be noted that this estimate does not include contributions from the 1,279 cy of material dredged into scows, this represents approximately 2.7% of the CCA dredging by volume. If it is assumed that the material dredged mechanically into scows contained similar contamination levels, then it is estimated that a total of approximately 11 tons of PCBs were removed from the CCA through dredging (Table 1).

7. References

AECOM. 2017 (October). *Upper Harbor Sediment Monitoring Field Sampling Plan Addendum 2 Cable Crossing Area – Draft Final*.

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.

Jacobs Engineering Group Inc. (Jacobs). 2019a (February). *Draft Final Crib Demolition Plan Memo*. ACE-J23-35BG2000-M1-0089.

———. 2019b (August). *Draft Upper Harbor Permanent Caps Generic Design*. ACE-J23-35BG6000-M17-0004.

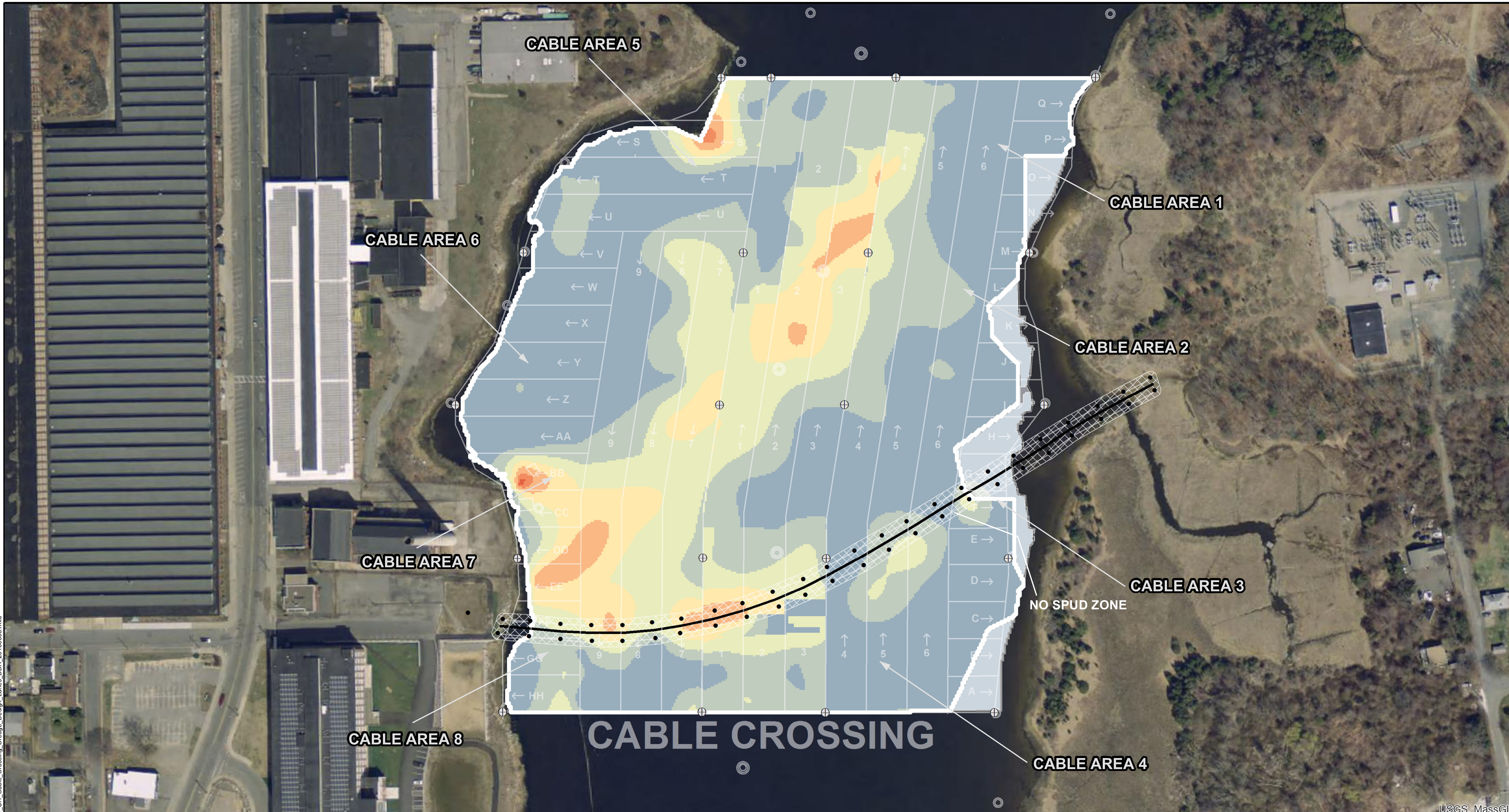
———. 2019c (August). *Draft Crib Cap Location Specific Addendum*. ACE-J23-35BG6000-M17-0007.

———. 2018. (September). *Final Cable Crossing Area Hybrid Dredge Data Report*. ACE-J23-35BG2000-M1-0038.

———.2017a (August). *Draft-Final Upper Harbor Hybrid Generic Work Plan.* ACE-J23-35BG1001-M1-0110|0.

———. 2017b (October) *Draft-Final Addendum to the Upper Harbor Hybrid Generic Work Plan for the Cable Crossing Area.* ACE-J23-35BG1001-M1-0113|1.

Figures



Legend

Thickness of Sediment to Remove, ft

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

Plan Design: RAL 30 mg/kg PCBs

- Cable Crossing Survey Point
- Sheet Pile Anchor Location
- Cable Crossing Centerline
- Cable Crossing Conduit
- No Spud Zone

Aerial Photography MASSGIS 2014

0 150 Feet

1:1,800

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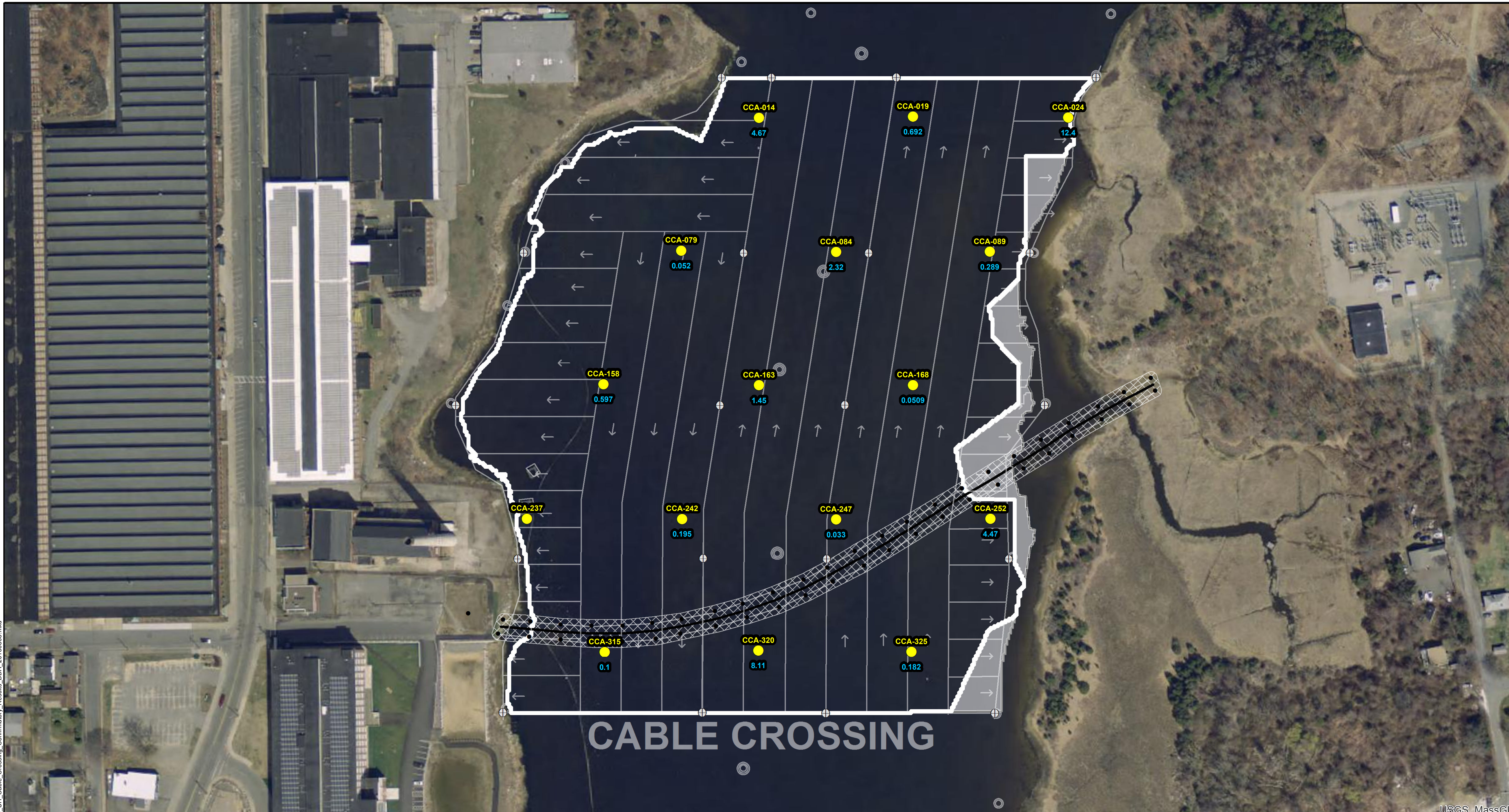
CCA Design with Dredge Lanes

NAME: jpiccuito Date: 8/10/2018

Figure 1



Legend

CCA-315 — Id

Confirmatory Location

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

Note: Confirmatory Location 237 to be capped.

Cable Crossing Survey Point

Sheet Pile Anchor Location

Cable Crossing Centerline

Cable Crossing Conduit

No Spud Zone

Aerial Photography MASSGIS 2014

0 150

Feet

1:1,800

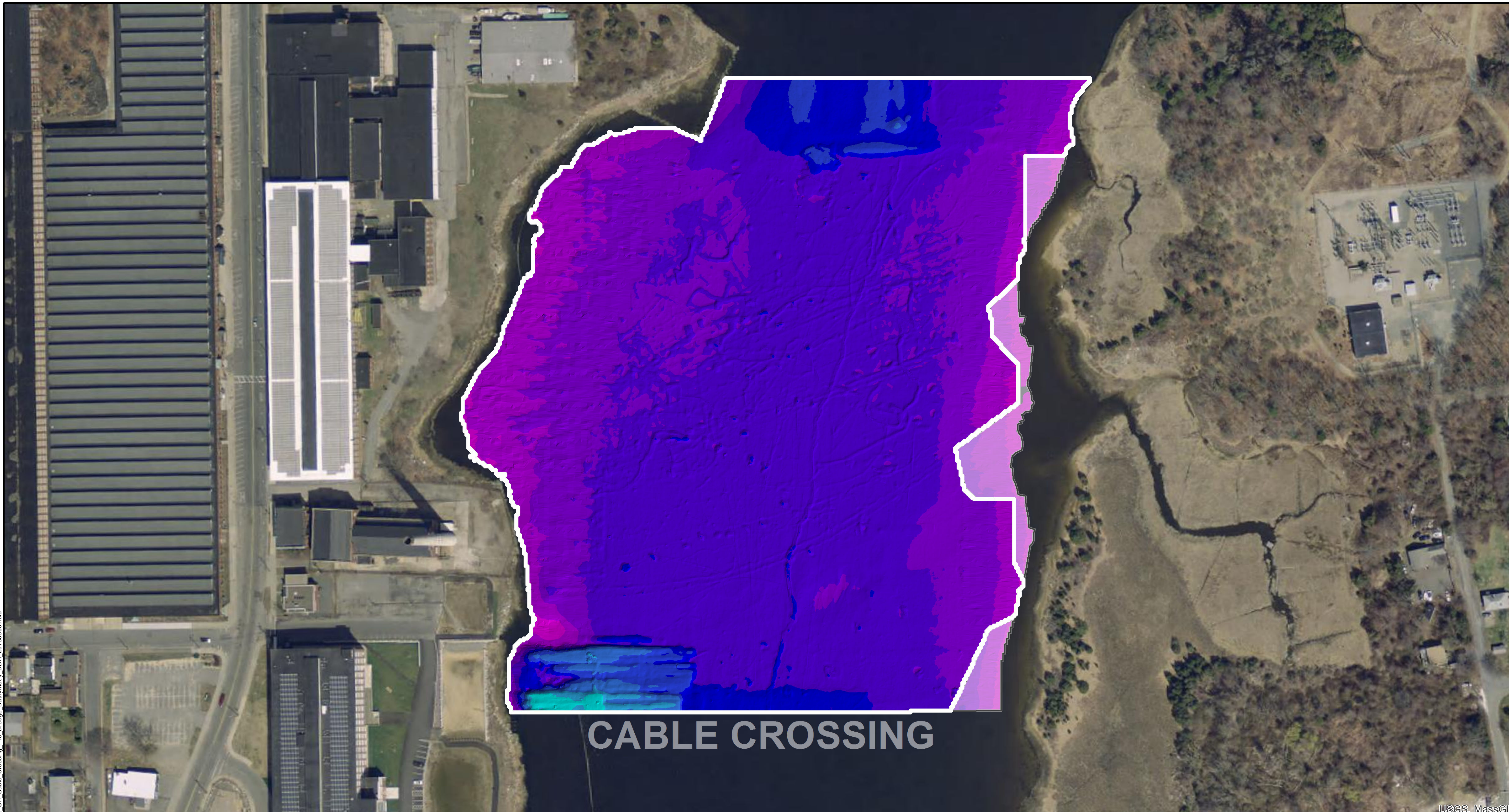
JACOBS

Cable Crossing Area Confirmatory Locations with Results

NAME: jpiccuito Date: 8/10/2018

Figure 2

Path: Y:\NBH\Projects\35BG1001\20180808\ArcGIS\Fig6_UH_Cable_Crossing_Confirmatory_Results_DDA_20180808.mxd



Legend

Pre-Dredge Elevation NAVD88 - ft (Jan 2016)

- -1.972 - -0.985
- -2.959 - -1.972
- -3.947 - -2.959
- -4.934 - -3.947
- -5.921 - -4.934
- -6.908 - -5.921
- -7.896 - -6.908
- -8.883 - -7.896
- -9.87 - -8.883

Aerial Photography MASSGIS 2014

0 150 Feet

1:1,800

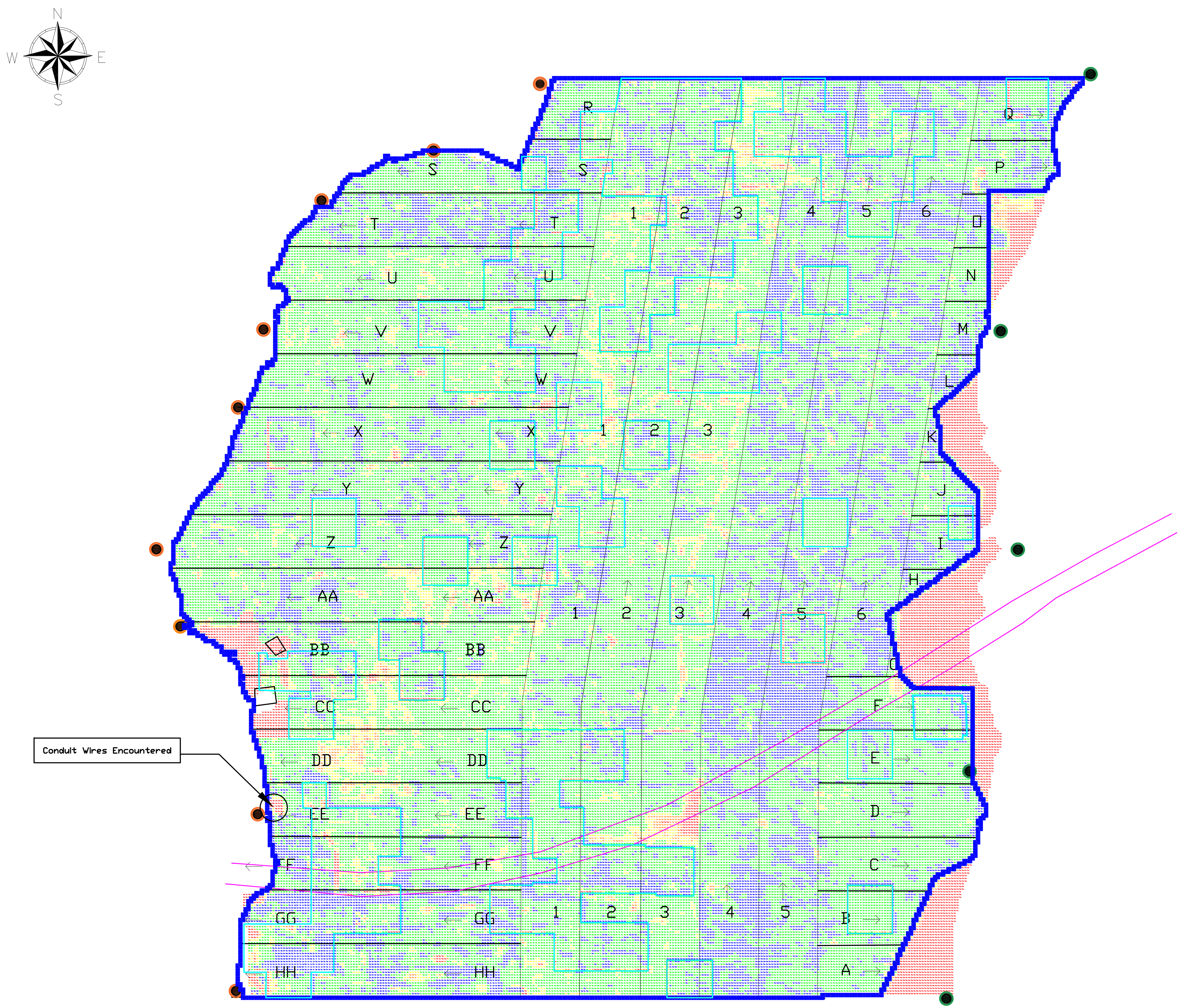
JACOBS®

Pre-dredge Bathymetry

NAME: jpiccuito Date: 8/10/2018

Figure 3

Path: Y:\NBH\Projects\35BG1001\20180808\ArcGIS\Fig2_UH_Cable_Crossing_Pre_Dredge_Bathymetry_DDA_20180808.mxd



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

Debris

- Cobbles/Rock
- Brick
- Concrete Blocks
- Asphalt

NOTES:

1) 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.
2) Design Template updated on 6/10/18 to include high spot targets.

0 120 240 Feet

PROGRESS MAP
CABLE CROSSING DREDGE AREA

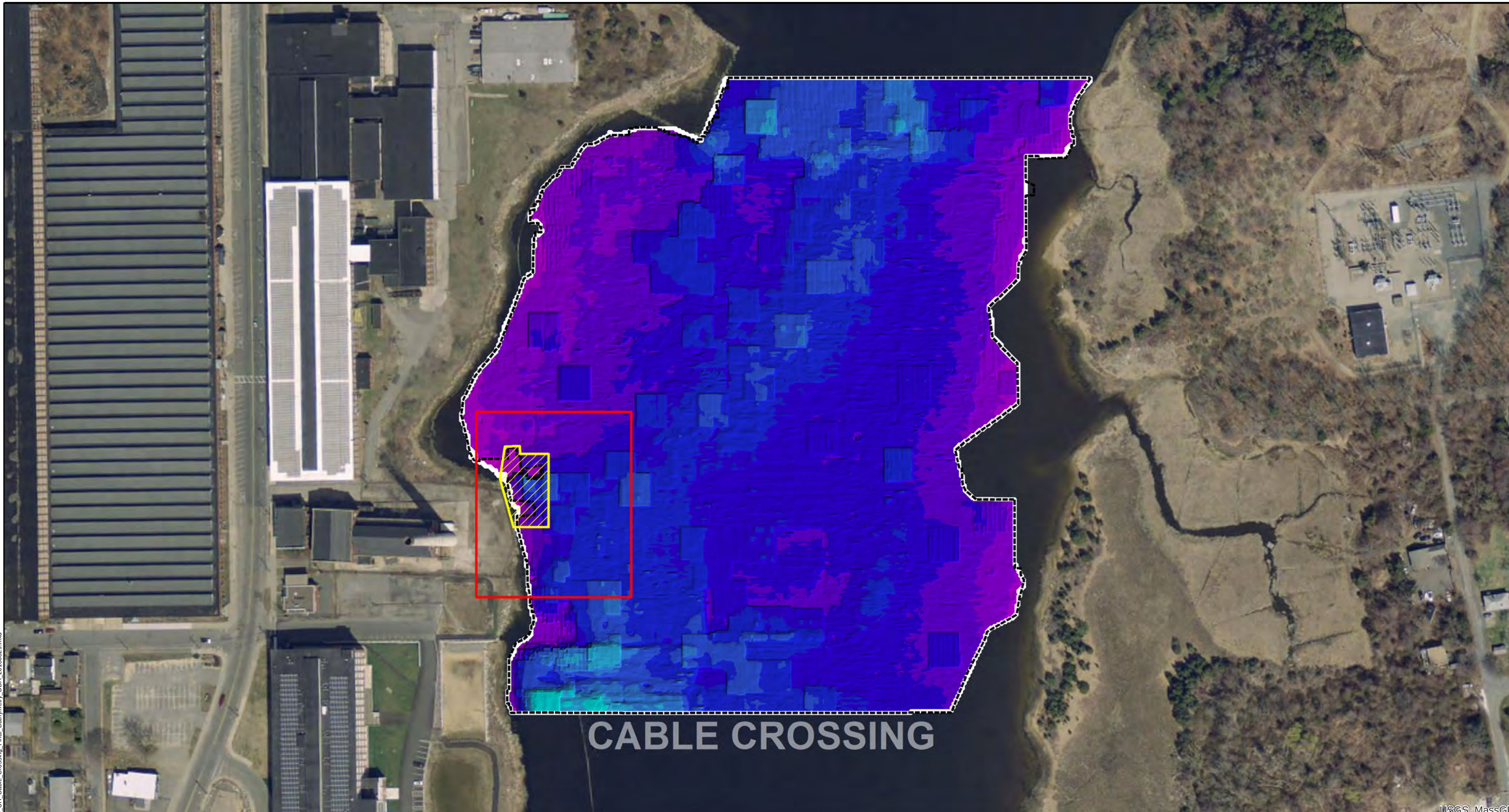
USACE
NEW BEDFORD HARBOR

NEW BEDFORD, MA

SEVENSON ENVIRONMENTAL SERVICES, INC.

Figure 4

DATE:	8-27-19
DRAWN BY:	DEF
CHECKED BY:	_
CAD FILE:	PROGRESS MAP
SCALE:	AS SHOWN



Legend

- Extent of Dredging
- Proposed Cap Limit
- Proposed Cap Plan Area

Post-Dredge Elevation NAVD88 - ft

-2.1 - -1.0	-7.2 - -6.2
-3.1 - -2.1	-8.2 - -7.2
-4.1 - -3.1	-9.2 - -8.2
-5.1 - -4.1	-10.3 - -9.2
-6.2 - -5.1	-11.3 - -10.3

Aerial Photography MASSGIS 2014

0 150 Feet

1:1,800

N

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Interim Final Bathymetry and Proposed Crib Cap Location

NAME: jpiccuito Date: 8/29/2019

Figure 5

Path: Y:\NBH\Projects\35BG1001\20190829\ArcGIS\Fig6_UH_Cable_Crossing_Final_Bathymetry_DDA_20180829.mxd

Tables

Table 1
Summary of CCA Dredge Quantities and Rates

Project Metric	Quantity
Cubic Yards of Sediment Mechanically Dredged via Hybrid System[1]	46,179
Cubic Yards of Sediment Mechanically Dredged into Scows	1,279
Tons of Filter Cake Produced	34,319
Tons of Sand and Oversize Produced at Desander	6,255
Gallons of Water Treated and Discharged	53,793,000
Number of Hybrid Dredge Days	99
Number of Mechanical to Scow Dredge Days	2
Tons of PCBs Removed in Dredged Sediment[2]	11.0
Cubic Yards Dredged per day 10/17/17-12/22/17[3]	437
Cubic Yards Dredged per day 03/01/18-05/23/18[3]	483
Cubic Yards Dredged per day Overall 10/17/18-5/23/18[3]	466

Notes:

1) Quantities include AVX toe trench dredging
2) Please see section 6 of CCA DDR for explanation
3) Production rates do not include shakedown, AVX toe trench or scow dredging

Table 2
CCA Confirmatory Results

Location			PCB Concentration (mg/kg)	Replicate Sample PCB Concentration (mg/kg)
CCA-014	815315.1	2705847	4.67	
CCA-019	815564.7	2705849	0.69	
CCA-024	815816.3	2705848	12.40	
CCA-079	815189.4	2705632	0.05	
CCA-084	815440.2	2705630	2.32	
CCA-089	815689.1	2705630	0.29	
CCA-158	815063	2705416	0.60	
CCA-163	815315	2705414	1.45	
CCA-168	815564.7	2705414	0.05	
CCA-237	814939.2	2705198	see note 1	
CCA-242	815190.7	2705197	0.20	
CCA-247	815440	2705196	0.03	
CCA-252	815690.2	2705197	4.47	
CCA-315	815065	2704981	0.10	
CCA-320	815314	2704984	8.11	14.20
CCA-325	815562.2	2704982	0.18	
Average			2.37	

Notes:

1 CCA-237 and vicinity to be capped during future work.

Table 3
Mass of PCBs Removed in Sand, Oversize and Filter Cake

Sand Sample ID (sand generated at Desanding Facility)	TotalPCBs (mg/kg)	% Solids
V1-102417-1	116	79
V1-102417-2	94	79
V1-102417-3	109	81
V1-103117-1	291	79
V1-103117-2	286	78
V1-110917-1	356	76
V1-110917-2	540	75
V1-120417-1	263	81
V1-120417-2	286	85
V1-120417-3	69	84
V1-120417-4	138	86
V1-120817-1	263	91
V1-120817-2	286	87
V1-120817-3	199	84
V1-121417-1	47	91
V1-121417-2	170	81
V1-121417-3	64	88
V1-122117-1	319	88
V1-030918-1	146	85
V1-030918-2	29	84
V1-030918-3	139	86
V1-031918-1	33	86
V1-031918-2	74	92
V1-032618-1	51	88
V1-032618-2	39	89
V1-032618-3	44	90
V1-032918-1	72	90
V1-032918-2	50	85
V1-040218-1	147	85
V1-040218-2	83	87
V1-040218-3	95	86
V1-040418-1	23	92
V1-040418-2	21	90
V1-040418-3	109	88
V1-041218-1	32	83
V1-041218-2	104	91
V1-041218-3	172	92
V1-041218-4	33.5	83
V1-042318-1	18.6	88
V1-042318-2	25.2	89
V1-042318-3	23.4	90
V1-042318-4	19.3	89
V1-042718-1	50.7	89
V1-042718-2	8.3	93
V1-042718-3	21.8	92
V1-042718-4	32.2	89
V1-050318-1	14.2	89

Filter Cake Sample ID (filter cake generated at Dewatering Facility)	Total PCBs (mg/kg)	% Solids
V2-20171019	180	62
V2-20171024	300	62
V2-20171025	742	58
V2-20171027	1050	58
V2-20171101	1210	55
V2-20171102	1030	57
V2-20171103	1080	57
V2-20171107	1330	56
V2-20171108	1740	55
V2-20171109	1150	57
V2-20171115	940	59
V2-20171116	1560	57
V2-20171127	407	58
V2-20171129	540	59
V2-20171129-FD	610	58
V2-20171204	196	58
V2-20171206	700	58
V2-20171207	720	57
V2-20171211	550	57
V2-20171213	610	57
V2-20171214	311	52
V2-20171219-01	760	52
V2-20171219-02	810	54
V2-20171220	740	55
V2-20171222	850	55
V2-20180306	418	61
V2-20180309-1	151	61
V2-20180309-2	192	57
V2-20180315	177	58
V2-20180316	217	58
V2-20180319	102	58
V2-20180320	206	58
V2-20180326-1	206	57
V2-20180327	410	54
V2-20180328	470	55
V2-20180329	550	58
V2-20180330	590	59
V2-20180402	590	58
V2-20180404	690	57
V2-20180406	1040	56
V2-20180410	1310	56
V2-20180411	312	58
V2-20180413	102	60
V2-20180417	183	61
V2-20180419	281	60
V2-20180427-1	58	58
V2-20180427-2	141	58

Table 3
Mass of PCBs Removed in Sand, Oversize and Filter Cake

Sand Sample ID (sand generated at Desanding Facility)	TotalPCBs (mg/kg)	% Solids
V1-050318-2	13.6	92
V1-050318-3	18.4	93
V1-050718-1	7.2	95
V1-050718-2	23.2	91
V1-050718-3	9.3	94
V1-051018-1	28.7	91
V1-051518-1	24.3	93
V1-051518-2	34.3	82
V1-052118-1	60.0	85
V1-052218-1	33.4	80
V1-052218-2	102.0	76
V1-052418-1	47.5	88
Average PCBs	102	87

Filter Cake Sample ID (filter cake generated at Dewatering Facility)	Total PCBs (mg/kg)	% Solids
V2-20180430	166	56
V2-20180501	128	60
V2-20180504-1	71	60
V2-20180504-2	97	61
V2-20180508	50	60
V2-20180509	82	60
V2-20180511	150	61
V2-20180518-1	113	62
V2-20180518-2	67	62
V2-20180521-1	72	62
V2-20180521-2	268	59
V2-20180523	450	59
V2-20180524	111	58
Average PCBs	506	58

Total tons of damp sand	6,452.3
Total tons of dry sand	5,591.6
Total kilograms of dry sand	5,072,641.8
Calculated kilograms of Aroclor removed	516.5
Calculated tons of Aroclor removed	0.6

Total tons of damp filter cake	34,389.3
Total tons of dry filter cake	19,940.1
Total kilograms of dry filter cake	18,089,322.7
Calculated kilograms of Aroclor removed	9,146.3
Calculated tons of Aroclor removed	10.1