# New Bedford Harbor Superfund Site

**U.S. Army Corps of Engineers New England District**

## Final Remedial Action Report for Operable Unit 1 Subtidal Dredging

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## Acronyms and Abbreviations

| | |
|---|---|
| CCA | cable crossing area |
| CAD | confined aquatic disposal |
| CDE | Cornell Dubilier Electronics, Inc. |
| CDF | confined disposal facility |
| cy | cubic yards |
| DDA | Debris Disposal Area |
| DNAPL | dense non-aqueous phase liquid |
| EPA | U.S. Environmental Protection Agency |
| ESD | Explanation of Significant Difference |
| FSP | field sampling plan |
| IA | immunoassay |
| Jacobs | Jacobs Engineering Group, Inc. |
| Lally | Lally Consulting LLC |
| LH | Lower Harbor |
| LHCC | Lower Harbor CAD Cell |
| NAE | U.S. Army Corps of Engineers – New England District |
| NBHSS | New Bedford Harbor Superfund Site |
| OH | Outer Harbor |
| OU | operable unit |
| PCB | polychlorinated biphenyl |
| ppm | parts per million |
| QC | quality control |
| RAL | remedial action limit |
| RAO | remedial action objective |
| ROD | Record of Decision |
| RTK GPS | real-time kinematic global positioning system |
| SES | Sevenson Environmental Services |
| SF | square feet |
| SWAC | spatially weighted average concentration |
| TCL | target cleanup level |
| UH | Upper Harbor |

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# 1. Background

This document serves as the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Final Remedial Action Report (RA Report) for the polychlorinated biphenyl (PCB)-contaminated subtidal sediments of Operable Unit 1 (OU1). The objective of this report is to document the subtidal cleanup activities that were subsequently implemented to meet the requirements of the 1989 Record of Decision (ROD) for OU1 as it pertains to subtidal dredging. Preparation of this document followed the guidance described in *Closeout Procedures for National Priorities List Sites* (EPA, 2011a).

## 1.1 Site Description

New Bedford Harbor (the Site) (Figure 1) was proposed for the Superfund National Priorities List (NPL) in 1982 and finalized on the NPL in September 1983. Pursuant to 40 CFR 300.425 (c)(2), the Commonwealth of Massachusetts nominated the harbor as its priority site for listing on the NPL. The Site is located approximately 55 miles south of Boston, in Bristol County, Massachusetts and is bounded to the east by the Town of Acushnet and Town of Fairhaven; and bounded to the west by the City of New Bedford. The Site covers approximately 18,000 acres, extending from the shallow northern reaches of the Acushnet River Estuary, southward through the commercial harbor of New Bedford and into the adjacent section of Buzzards Bay. Based on the different physiographic, environmental, and man-made features in the harbor, it was subdivided into three sections identified as the Upper Harbor (UH), Lower Harbor (LH), and the Outer Harbor (OH).

The subtidal zone of the UH comprises approximately 200 acres and is bounded to the North by the Wood Street Bridge and to the South by the Coggeshall Street Bridge (Figure 1). The LH comprises approximately 750 acres and is bounded to the north by the Coggeshall Street Bridge and to the south by the New Bedford Hurricane barrier. The OH (approximately 17,000 acres) begins at the Hurricane Barrier and extends southward into Buzzards Bay to an imaginary line extending from Rock Point (the southern tip of West Island in Fairhaven) southwesterly to New Bedford Harbor navigational channel buoy, Buoy C3 and then southwesterly to Mishaum Point in Dartmouth.

## 1.2 PCB Contamination

PCB contamination of the sediments and seafood in and around New Bedford Harbor was first identified in the mid-1970s. Site-specific investigations by the EPA began in 1983 and 1984 including the development of the Remedial Action Master Plan (Weston, 1983) and the Acushnet River Estuary Feasibility Study (NUS, 1984). Additional investigations of the Site continued throughout the rest of the 1980s and early 1990s, including a pilot dredging and disposal study in 1988 and 1989 (Otis et al., 1990), and extensive physical and chemical computer modeling of the Site (Battelle, 1990). These early studies are summarized in the 1990 ROD for the OU2 hot spot areas for the Site (EPA, 1990) and in the 1990 Feasibility Study for the Site (Ebasco, 1990).

Based on the results of these investigations a principal source of PCB contamination in the UH was identified as the former Aerovox Site, located on the northwestern shore of the UH (Figure 2). During operations at this facility (1940s – 1970s), PCB wastes were discharged directly to the UH through open trenches and pipes and indirectly via the City's sewerage system. During the same general time period, inputs of PCBs were also contributed to the Site by operations at the Cornell Dubilier Electronics, Inc. (CDE) facility, located just south of the New Bedford

Hurricane Barrier (Figure 2). Operations at the Aerovox Site resulted in significantly elevated PCB concentrations in subtidal sediments that generally decreased from north to south in the Harbor. UH subtidal sediments contained PCB concentrations that ranged from below detection to more than 10,000 parts per million (ppm) in localized areas. LH subtidal sediments typically had PCB levels ranging from below detection to 100 ppm. PCB concentrations in the OH are generally much lower than in the UH and LH, with only localized areas found to contain PCBs in the 50-100 ppm range.

## 1.3 Operable Units and Administrative Record

Consistent with the distinct remedial issues within the harbor, the EPA had, in the past, divided the Site into three operable units (i.e., OU1, OU2, OU3). An overview of the three OUs is in the following Section 1.3.1. The subtidal dredging described in this report falls under OU1. The remedial goals of the subtidal dredging are described in Section 1.3.2

### 1.3.1 Operable Unit Overview

As originally defined, OU1 consisted of approximately 1,000 acres north of the Hurricane Barrier and two localized areas just south of the hurricane barrier, with PCB concentrations that exceeded 50 ppm in sediment. A ROD for OU1 was issued on September 25, 1998 (EPA 1998). Consistent with CERCLA and its implementation regulations, the Commonwealth of Massachusetts requested that EPA include navigational dredging and disposal activities (i.e., the State Enhanced Remedy [SER]) in the ROD. After public review and comment, EPA integrated the SER into the 1998 ROD. The SER benefits the EPA remedy because navigational dredging removes LH sediment contaminated with PCB and heavy metals that are below EPA's cleanup levels while at the same time authorizing navigational improvements to the harbor. Figure 2 shows the areas dredged thus far or currently being considered under the SER.

Operable Unit 2 (OU2) comprised approximately five-acres of highly contaminated (> 4000 ppm PCBs) subtidal sediment ("Hot Spots") located in the UH. (Attachment 1). A ROD for OU2 was issued in 1990 and following two Explanation of Significant Difference documents (ESDs), an amended OU2 ROD was issued in 1999 (EPA, 1990, 1992, 1995, 1999). Construction activities for OU2 were completed in 2000.

Operable Unit 3 (OU3) encompassed approximately 17,000 acres of the OH, excluding the two small localized areas of contaminated sediment that were included as part of OU 1 (see above). ESD6, issued subsequently in 2017, concluded that the risk posed to human health and the environment by OU3 mainly stemmed from the dissolved portion of PCB flux emanating from the UH and LH, and that the OU1 remedy would be the primary method of achieving risk reduction in OU3. ESD6, therefore, eliminated OU3 and incorporated all of the OH into OU1. All remaining cleanup will be conducted under OU1.

The remedial components for each OU are prescribed in the ROD and six ESD documents. The ESDs are described in the next section.

### 1.3.2 OU1 Remedial Action Objectives and Cleanup Levels

The following three remedial action objectives (RAOs) were identified in the 1998 ROD for the intertidal, subtidal, and saltmarsh areas of OU1:

1) Reduce risks to human health by reducing PCB concentrations in seafood, by lowering PCB concentrations in sediment and in the water column.

2) Reduce human health risks due to dermal contact with or accidental ingestion of PCB-contaminated sediment in shoreline residential or public access areas.

3) Improve the quality of the seriously degraded marine ecosystem by:

   a) reducing the exposure of marine organisms to PCB contaminated sediment while minimizing consequent harm to the environment, and;

   b) reducing surface water PCB concentrations to comply with chronic ambient water quality criteria (AWQC) by reducing PCB sediment concentrations.

As documented in the 1998 ROD, the selected remedy for the intertidal, subtidal, and saltmarsh areas of OU1 consisted of the following:

- Approximately 450,000 cubic yards of sediment [at that time] contaminated with PCBs will be removed. In the UH, north of Coggeshall Street, sediments above 10 ppm PCBs will be removed, while in the LH and in saltmarshes, sediments above 50 ppm will be removed.
- In certain shoreline areas prone to beach combing, sediments between the high and low tide levels will be removed if above 25 ppm PCBs. In areas where homes directly abut the Harbor and where contact with sediment is expected, sediments between the high and low tide levels will be removed if above 1 ppm PCBs.
- Four confined disposal facilities (CDFs) will be constructed to contain and isolate the dredged sediments. Three of these facilities will be in the UH, and one will be in the LH, Archaeological surveys will be performed prior to construction of the CDFs and before dredging is started.
- Once the dredged sediments are placed in the CDFs, the large volumes of water brought in by the dredging process will be decanted and treated to low levels before discharge back to the Harbor.
- Once full, first an interim and then a final cap will be constructed at each CDF. Where possible, cleaner sediment from the Harbor's navigational channels will be used as part of the interim caps.
- The capped CDFs will be monitored and maintained over the long term to ensure their integrity.
- Institutional controls, including seafood advisories, no-fishing signs and educational campaigns will be implemented to minimize ingestion of local PCB-contaminated seafood until PCBs in seafood reach safe levels. State fishing restrictions will also be in effect until such time as the Commonwealth deems it appropriate to amend them. Additional controls will protect the capped CDFs and allow for certain future uses.
- Once completed, the CDFs will be available for beneficial reuse as shoreline open space, parks or, in the case of the LH CDF, a commercial marine facility.
- A review of the Site will take place every five years after the initiation of the remedial action to assure that the remedy continues to protect human health and the environment.

After the 1998 OU1 ROD was issued, the EPA continued to gather additional site information and site-specific insight into the remedial approach. On the basis of this additional information, the 1998 ROD for OU1 was modified by six Explanations of Significant Differences (ESDs). The key changes to the ROD introduced by each of these ESDs are summarized below:

1) ESD1, (EPA, 2001) identified additional intertidal cleanup areas in the UH, reduced the footprint of CDF D[1], revised the CDF D wall design, incorporated the use of mechanical dewatering for the dredged sediment (to reduce disposal volume), and authorized the addition of a rail spur at CDF D for use in the cleanup efforts. ESD1 noted that the total estimated volume of in situ sediment could be as high as 800,000 cubic yards, based on the information at the time. ESD1 also provided for the use of the Pilot CDF at EPA's Sawyer Street facility in New Bedford as an interim TSCA facility for the containment of PCB-contaminated sediment.

2) ESD2 (EPA, 2002), was issued for the OU1 ROD. ESD2 eliminates the construction of CDF D, and instead, selects off-site disposal of dredged and de-watered sediments formerly slated for CDF D. Instead of CDF D, a smaller shoreline facility was identified to be constructed in the same area to support the sediment dewatering building and a rail car (or truck or barge) loading area required for offsite disposal of dredged sediment.

3) ESD3 (EPA, 2010) addressed temporary storage of dredged material in a lined sediment storage cell, Cell #1, at the Sawyer Street facility.

4) ESD4 (EPA, 2011b) modified the OU1 ROD to include the construction and use of a LH confined aquatic disposal (CAD) cell (LHCC) for permanent disposal of approximately 300,000 cubic yards of mechanically dredged sediment with PCB levels above the action levels. ESD4 also increased the estimated the total volume of *in situ* sediment that will be dredged to 900,000 cubic yards. Average sediment PCB levels placed in the LHCC are generally less than 100 ppm.

5) ESD5 (EPA, 2015) modified the remedy for the UH and LH by eliminating the construction of the planned CDFs A, B and modified C and selected off-site disposal of sediment previously slated for disposal in those planned CDFs (EPA, 2015). Through this ESD, EPA confirmed that the Sawyer Street pilot CDF is protective and made it a permanent TSCA disposal facility.

6) ESD6 (EPA, 2017) was signed in September 2017. Based on the results of the 2017 Remedial Investigation of the OH, this ESD expands the OU1 area to include the OU3 area and eliminate the designation "OU3" (see Section 1.3.1). ESD6 does not change any of the remedial components of the OU1 remedy.

The OU1 cleanup standards specific to the subtidal sediments are described in the next section.

### 1.3.3 Subtidal Cleanup Levels

Consistent with the RAOs and the selected remedy described above for OU1, the EPA identified the following target cleanup levels (TCLs) for subtidal and mudflat sediments in the UH and LH.

1) A TCL of 10 ppm total PCBs for subtidal and mudflat sediment in the UH (north of the Coggeshall Street bridge), which held the highest PCB concentrations in the Harbor owing to the proximity of the Aerovox facility. EPA has determined that remedial compliance is best demonstrated by achieving a surface weighted average concentration (SWAC) of 10 ppm or less for PCBs in the upper 0.5 ft of the subtidal and mudflat sediments in the UH.

2) A TCL of 50 ppm PCBs for subtidal and mudflat sediment in the LH (between the Coggeshall Street bridge and the New Bedford Hurricane Barrier). Unlike the UH estuary setting, the LH has a working waterfront and is lined with industrial and commercial facilities.

[1] When the CDF D was repurposed to a dewatering and rail loadout facility, it was called 'Area D', and is shown as Area D on the figures.

In order to meet the UH TCL, kriging based modeling of remedial performance indicated that dredging targeted to a Remedial Action Limit (RAL) of 30 ppm PCBs would achieve a SWAC of <10 ppm PCBs in the subtidal zone of the UH. The RAL approach was used in the UH but was not used in the LH. Sediments exceeding 50 ppm total PCBs were remediated from the LH. The confirmatory sampling results that demonstrate the TCLs were met are discussed in Section 4.3. Much of the LH sediments have been, and continue to be, dredged for navigational purposes as provided in the 1998 ROD SER (see Section 1.3.1 and Figure 2).

### 1.3.4 Dredging and Capping to Reach Subtidal Cleanup Levels

The 1998 ROD remedy specified dredging and containment of PCB-contaminated sediments[2] above TCLs, which served as the cleanup goals for the OU1 subtidal remedial action. The selected remedy provides a permanent solution to the widespread and persistent PCB contamination in the UH and LH sediments. While it does not satisfy the statutory preference for remedies that utilize treatment as a principal element to reduce the toxicity, mobility or volume of hazardous substances, it does permanently isolate these sediments from human and environmental receptors.

Although the selected remedy specified dredging and containment of PCB-contaminated sediments, some areas of the UH and LH were identified where dredging of contaminated sediment proved not to be feasible or advisable. There are seven small areas in the UH (approximately 250,000 square feet [SF] total) where dredging was not advisable or cost-effective due to either the potential to destabilize the shoreline and existing structures or to further release contaminants to the UH. Capping these areas allowed the remainder of the UH final cleanup-pass dredging to proceed to completion pursuant to the 1998 ROD with very limited potential for recontamination. These seven areas are shown in Figure 3.

Very high levels of PCB contamination (including potential dense non-aqueous phase liquid [DNAPL]) were identified in sediment in the subtidal region adjacent to the former Aerovox Site (Figure 3). The former Aerovox Site at 740 Belleville Avenue is to be addressed under separate authority under Massachusetts Ch21E by Massachusetts Department of Environmental Protection (MassDEP). As this action has still not occurred, dredging of these sediments was impracticable due to the depth of contamination and the potential for dredging activities to mobilize high concentrations of relatively immobile PCBs from the adjacent former Aerovox Site into the Harbor environment. In order to implement hybrid subtidal dredging throughout the UH while avoiding the potential for the Aerovox Site to recontaminate the harbor, these sediments were temporarily capped with the "Aerovox Interim Cap" (approximately 138,000 SF) until source control for the adjacent former Aerovox Site is addressed. This action is described further in Section 2 and in the *Final Aerovox Interim Cap Completion Report* (Jacobs, 2019f).

Some mudflats remain undredged due to their inaccessibility from the dredge plant utilized generally for the dredging of subtidal contaminated sediment. Cove 25-32 in Area N and Veranda Inlet (Figure 3) will be addressed under separate intertidal remediation actions and documented in respective RA Reports. These mudflat areas will become part of the subtidal environment after the contaminated mudflat sediment is removed.

The separate capping intertidal remediation actions will be documented in respective RA Reports.

[2] The 1998 ROD specification to place dredged sediments into the four CDFs was changed by ESD2 (August 2002) and ESD5 (July 2015) to allow the Pilot CDF and eliminate all other CDFs in preference for off-site disposal.

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# 2. Construction Activities

This section summarizes the construction activities that were undertaken to implement the RA associated with the contaminated subtidal and mudflat sediments of OU1. Some of the early actions described below include the excavation and disposal of relatively small volumes of intertidal and upland sediments that were remediated as part of the larger effort to dredge contaminated subtidal and mudflat sediments.

## 2.1 Early Actions and Supporting Activities

In 1988 and 1989 a Pilot CDF (also called the Debris Disposal Area [DDA]) (EPA, 2015) was constructed just north of Sawyer Street (Figure 2) (USACE 1990).

After issuance of the 1998 OU1 ROD, fencing was erected along sections of the Harbor shoreline where highly contaminated sediments abutted residential and public access areas. Additional "no fishing" signs were also added throughout the site. ESD1 documented the use of the Pilot CDF as an interim TSCA facility for PCB-contaminated sediment. At the time of ESD1, groundwater and air monitoring data, along with surficial soil sampling data and geophysical data, were evaluated and supported the use of the Pilot CDF as an interim TSCA storage facility for PCB-contaminated sediment. ESD1 indicated that groundwater and air monitoring and modeling would continue to confirm the protectiveness of the CDF and that, once all data were in hand, if such data confirmed that the Pilot CDF would be suitable for a permanent CDF, EPA would propose to make the Pilot CDF a permanent TSCA disposal facility.

PCB-contaminated sediment and debris have been disposed at the Pilot CDF over the years. A total of approximately 19,000 cubic yards of materials were disposed in this area from 1989 through 2014. The weighted average PCB concentration overall of the materials disposed is estimated to be on the order of 200-260 ppm, and such materials had *in situ* PCB levels ranging from non-detect to 23,000 ppm. Following completion of remedial dredging activities, the Pilot CDF will require final capping, institutional controls and long-term monitoring and maintenance.

In the early 1990s, the Sawyer Street facility was modified to include a lined holding cell (Cell #1) for the temporary storage of contaminated sediment for sediment removed in the early action activities and used the DDA for temporary debris handling. The DDA (Pilot CDF) was later designated as a permanent TSCA disposal facility in ESD5 (EPA, 2015).

As previously discussed in Section 1, the OU2 "the Hot Spot" remedy comprised the dredging of approximately five acres of highly contaminated (> 4000 ppm PCBs) UH subtidal sediment (Attachment 1). In 1994 and 1995, approximately 14,000 cubic yards of highly PCB-contaminated sediment was dredged from the Hot Spots. These materials were transported to the Pilot CDF where they were temporarily stored and passively dewatered. Transportation of the dewatered Hot Spot sediments to an off-site TSCA permitted hazardous waste disposal facility began in December 1999 and was completed in May 2000 (EPA, 2000). This was followed in 1999 and 2000 by the "Early Action" excavation of approximately 2,500 cubic yards (cy) of highly contaminated sediment along residential shoreline areas in Acushnet. Excavation of these sediments was followed by restoration of the impacted shoreline.

In 2001, to facilitate future full-scale dredging of the UH, a clean corridor was dredged across the UH to relocate and protect thirteen submerged high voltage power cables. The existing cables were de-energized and new cables were run through the corridor. The de-energized cables were later removed in 2015, prior to dredging in the area.

These early action cleanups were followed by the accelerated cleanup of an approximately six acre intertidal and subtidal area located north of the Wood Street bridge (NWS) (Figure 3). The NWS area was not originally considered to be part of the UH and was not shown in the ROD maps. However, in response to comments on the ROD, the area was included in the cleanup. Remediation activities for this area continued in 2002 and 2003 and were completed in 2005 (TTFW, 2005a). Two temporary dams were built to dewater this stretch of the Acushnet river and approximately 15,600 cy of contaminated sediment was mechanically excavated in near-dry conditions. Approximately 2,500 cy of the sediment was vegetated and was trucked off-site for disposal. The remaining excavated soil and sediment was transported to EPA's Sawyer Street facility and placed in Cell #1 for interim storage.

In early 2004, a five-acre sediment dewatering and transfer facility (Area D) with a rail spur to the nearby city rail yard, was completed at the location previously identified for CDF D on Hervey Tichon Avenue in New Bedford (Figure 2). Construction of Area D required the relocation of a former commercial barge pier, two CSOs that discharged to the area, and the installation of a marine bulkhead at the shoreline. In addition, the only suitable location in the Harbor for the relocated barge pier contained thirteen abandoned commercial fishing vessels as well as PCB-contaminated sediments. Removal of the vessels and dredging of the contaminated sediment was completed by fall 2003 (TTFW, 2005b) and construction of the new pier was completed in winter 2005. Other activities completed in 2004 included the construction of marine pipelines and a pumping station used for the hydraulic transport of dredged material to Area D from the UH.

In 2005, a nineteen-acre pilot cap was installed to isolate two localized areas of contaminated sediment identified in the OU 1 ROD (PCBs > 50 ppm) located in the OH, just south of the hurricane barrier (Figure 2). The cap was constructed using clean sand from navigational dredging activities authorized under the SER provisions of the OU 1 ROD. The most recent monitoring data collected (WHG, 2017) indicate that the pilot capping operation has successfully isolated the contaminated sediment. Furthermore, the benthic environment of the cap has been robustly re-colonized, indicating that the ecological impacts of installing the cap were short lived (EPA, 2017).

In early summer 2008, EPA and the US Army Corps of Engineers (USACE) excavated highly contaminated shoreline sediment immediately adjacent to the former Aerovox Site (Figure 3). The area of excavation extended approximately 100 feet inland (westward) from the section of shoreline that forms the eastern border of the former Aerovox property. Consistent with ESD3, the excavated sediment was stabilized with Portland cement and trucked, in water tight containers, to Cell #1 (at the Sawyer Street facility) for temporary disposal. EPA determined that there were no significant risks associated with the temporary disposal of these materials in Cell #1 (EPA, 2010). Annual groundwater and air monitoring conducted at Cell #1 have confirmed there are no significant migration of contaminants from this location. The material in Cell #1 will be removed and disposed at an off-site TSCA-and/or RCRA hazardous waste-permitted facility under the OU1 cleanup plan.

In 2011, EPA signed a Cooperative Agreement with the City of New Bedford Harbor Development Commission for the design and construction of the LHCC (Figure 2). The first phase of the LHCC construction was completed in the spring of 2014 and the second phase was completed in late 2015. A figure showing the fill elevations of the LHCC after filling with OU1 dredge material is provided in Attachment 2.

## 2.2 Full Scale Dredging Activities

Full scale hydraulic dredging of UH subtidal sediments followed by dewatering at Area D and offsite disposal began in 2004 and continued seasonally each year through 2013 at an annual funding rate of $15 million. Due to limited annual funding, the dredging goals from 2004-2013 focused on PCB mass removal. In 2014 the proceeds of a $366.25 million settlement with a major responsible party made acceleration of the cleanup a reality. Extensive data gap sampling in the UH was conducted in order to design the optimum dredge prism to a high degree of accuracy. In 2017 precision mechanical dredge buckets were utilized to reduce over-dredging. The legacy hydraulic dredging system was updated to a "hybrid" system in which the auger dredge was replaced with a high precision dredge bucket and the sediment was processed, dewatered, and shipped offsite for disposal. Lower concentration UH sediments were mechanically dredged with precision environmental dredge buckets and disposed in the LHCC. The combination of additional funding, high precision dredge prism design, high accuracy dredging, and subtidal capping (see Section 1.3.4) allowed the final cleanup pass dredging to meet the TCL.

Similarly, extensive data gap sampling was also conducted in the LH between 2013 and 2015 while the LHCC Phase I and II were being constructed. Precision mechanical environmental dredging buckets were utilized for the dredging of sediment exceeding the LH TCL of 50 ppm, based on the data generated from the data gap samples collected in the LH.

The dredging and capping activities conducted to remediate the subtidal and mudflat sediments in OU1 from 2004 through early 2020 are summarized below. The chronology of dredging milestones and other major events at the Site are presented in Section 3.

### 2.2.1 Upper Harbor Mass Removal Dredging Activities

From 2004 to 2015, hydraulic dredging was the primary method used for mass removal excavation of subtidal and mudflat sediments in the UH. Attachment 1 shows areas and volumes of the early action and mass removal dredging by year. No dredging was performed in the UH in 2016. Extensive sediment sampling was conducted in the UH after the 2014 settlement to precisely locate the extent and depth of impacted sediments in the UH and LH. Hybrid and mechanical dredging using high precision excavators and flat closing mechanical dredge buckets were implemented at the NBHSS from 2016 through early 2020 for cleanup-pass dredging. Dredging activities for subtidal sediments were completed in March 2020.

**2004**

Full-scale hydraulic dredging was conducted from August to November and approximately 12,000 cy of contaminated sediment was remediated. The Desanding Building, including installed equipment, was constructed at Area C to perform separation of coarse and fine materials (e.g. shells, sand, etc.) from the dredge slurry. Due to issues associated with elevated concentrations of hydrogen sulfide in DMU-2 sediments, activities associated with air monitoring and emissions control were also performed at Area C during production operations. Dredging operations in DMU-2 commenced on September 8, 2004 and within approximately half an hour of pumping dredge material to the Desanding Building, significant hydrogen sulfide ($H_2S$) odors accumulated inside that building.

The first engineering control to address the hydrogen sulfide problem was by chemical injection. A pretreatment process using ferric sulfate was developed and installed over the course of the following week (September 13 through September 22, 2004) to minimize $H_2S$ levels in the slurry as described previously. However, due to the variability of the hydrogen sulfide concentrations this control alone was deemed insufficient for adequate protection of the workers or the public.

The second engineering control was the use of local exhaust ventilation at the point of release near the coarse screen shaker. Even with maximum efficiency of the ferric sulfate injection, the unbound hydrogen sulfide portion could still be released at the coarse screens into the enclosed work environment potentially creating a dangerous atmosphere. This is why the ventilation system was deemed necessary. However, further data and engineering design was necessary to provide an adequate ventilation system in order to reduce volatile emissions below exposure limits within the Desanding Building. During the interim, the ferric sulfate injection system, supplied air, and increased air surveillance were utilized until the local exhaust system was designed, installed, and proven (Jacobs, 2004).

**2005-2008**

From 2005 to 2008, full- scale hydraulic dredging was conducted at a limited funding rate of $15 million per year. This level of funding allowed for approximately 2.5 to 3 months (about 40 days) of dredging each year and the removal of approximately 20,000 to 25,000 cy of sediment annually.

**2009**

In 2009, $30 million in supplemental funds were provided for Site cleanup from the American Recovery and Reinvestment Act (ARRA). Consequently, the 2009 dredging season lasted for approximately 5 months (120 days of dredging). Approximately 49,809 cy of sediment was remediated. Not all the ARRA funds were spent in 2009 and the remaining funds were used to extend the 2010 dredge season from 40 days to 59 days. Approximately 26,200 cy of material was excavated in 2010.

**2011-2013**

For years 2011 through 2013, the funding available for dredging activities were again limited to $15 million per year and approximately 40 to 45 days of dredging per year. During this three-year period, approximately 64,571 cy of contaminated sediment and debris was dredged and processed for shipping to an off-site licensed disposal facility.

Additional funding for future Site cleanup was secured in 2013 under a $366.25 million settlement reached with the responsible party. With a portion of these funds, the EPA was able to make significant improvements to the desanding, dewatering, and transportation infrastructure.

**2014**

The additional funding obtained in 2013 enabled the 2014 dredging season to be extended to 118 days. As a result of the upgrades to the desanding, dewatering and transportation infrastructure, the daily dredged volume in 2014, increased to 655 cy/day, approximately 200 cy/day more than the average daily removal rate of 454 cy/day for the years 2005 through 2013 (Jacobs, 2016). In all, approximately 77,312 cy of in situ sediment was hydraulically dredged and processed for off-site disposal.

**2015**

The 2015 Dredge season lasted 84 days. The total volume of in situ sediment excavated was 38,742 cy with an average daily excavation volume of 461 cy/day. More debris and coarse materials were encountered during the 2015 dredge season than was typically found in previous seasons. After the dredged material was processed (e.g., debris removal and desanding), 23,396 tons of filter cake (an average of 278 tons/day) were transported to an off-site TSCA facility for disposal.

### 2.2.2 Cleanup Pass Dredging Activities

Starting in 2015, the project moved into planning the final cleanup pass phase for the subtidal sediments in the UH and LH. In 2015 and 2016 EPA focused on developing an optimized approach to removing the remaining sediments to meet the TCLs for the UH and LH. The LHCC construction was completed in late 2015 and ready for placement operations in 2016. Between March 2016 and March 2020, subtidal sediments were dredged at each management unit (MU) or management area (Area) in the UH (Figure 3) and the LH (Figure 4).

**2015-2016**

#### Dredging Improvements

While hydraulic dredging in 2015, EPA investigated use of immunoassay (IA) for total PCB analysis instead of the conventionally used extraction and analysis methods. A PCB method review and inter-laboratory comparison study performed by Battelle (Battelle 2015) documented the basis for using IA data as a cost-effective analytical method for total PCB concentrations in the Site sediments and provided the relationship between the IA results and the congener results. As a result, the EPA used IA analysis in place of congener analysis for data gap screening samples and verification samples through the completion of the sediment removal action. The use of IA in data gap and verification sampling is described in the next two paragraphs.

The objective of data gap sampling prior to cleanup-pass dredging was to collect subtidal sediment cores for sediment characterization and PCB analysis to supplement historical chemical data and better define contamination depths and concentrations in dredge areas and identify lower concentration sediment suitable for LHCC placement. After core collection and characterization, cores were subsampled in accordance with each area's field sampling plan (FSP). Samples were analyzed for PCBs by two methods: total PCBs via IA and PCB congeners via EPA Method 8270D. Each core was divided into equal 0.5-foot sections based on the visual contamination contact line, if present, and then was subsampled for PCB IA and PCB congener analysis according to the field sampling plans (AECOM, 2020b). The majority of the data gap samples were analyzed using the IA screening method, and key intervals were also analyzed for PCB congeners. IA was used along with congener data, historical data, sediment characteristic data, and quantified data uncertainties to development the cleanup pass target dredge elevations; computer modeling was then used to develop the dredge prisms to achieve a SWAC of < 10 ppm PCBs in the UH subtidal zone and a TCL of 50 ppm PCBs in the LH subtidal zone (Jacobs, 2018a, 2018b, 2019g).

The objective of the verification sampling was to assess dredging performance. Verification samples were collected after dredging at predetermined grid locations. A grid-based sampling design was established in collaboration with the USACE NAE and EPA. IA data were used to evaluate the dredge performance, thereby providing additional assurance the remedial goals were being met. The verification sediment data was used to inform the dredge team where additional dredging was needed in order to meet the RAL objective of 30 ppm total PCB. A conservative value of 20 ppm by IA was used as the criteria to perform additional dredging, based on the site-specific relationship developed for IA and congener results (Battelle, 2015). The IA data was not used for confirmatory purposes.

Ultimately, congener analysis was utilized by the project to show that the TCLs had been met.

The EPA investigated alternative dredging techniques to transition from mass-removal dredging to cleanup-pass dredging. In 2016, Lally Consulting LLC (Lally) was contracted to perform this investigation and evaluation and make recommendations to the EPA for the most economical approach (Lally, 2016). Four candidate dredge techniques were evaluated in-depth by Lally: 1) horizontal auger head hydraulic dredge; 2) swinging ladder hydraulic dredge; 3) precision mechanical dredge with shallow barge sediment transport; and 4) precision mechanical dredge with hydraulic transport. EPA selected the precision mechanical dredge with hydraulic transport technique for cleanup-pass dredging. This technique combined mechanical excavation and hydraulic transport to the same desanding and dewatering plants that were used with the mass removal hydraulic dredging and so was termed the “hybrid’ technique.

The six key aspects of the hybrid technique were:

1) Sediment removal by sealed, level cut clamshell bucket with rotator to allow accurate cuts
2) Real-time kinematic global positioning system (RTK GPS) sensors and heading control, rotation sensors and excavator roll and pitch sensors to allow for accurate positioning of the bucket in both vertical and horizontal space
3) Lane advance by winch and wire rope to reduce sediment resuspension
4) Shallow draft dredge plant suited to the UH bathymetry
5) Ability to convert dredge plant to a debris removal plant or capping barge
6) Predicted production rates to allow subtidal cleanup passes to be completed in 3 years

After the first hybrid dredge area (Cable Crossing Area [CCA]) was completed (Spring 2018), eleven additional dredge system improvements were made during the progression of dredging the I/N and O areas. Improvements were (Jacobs, 2019e):

1) Additional booster pump constructed north of the former Aerovox Site to maintain sufficient hydraulic head in the transport pipeline for the increased distance between the I/N and O Areas to the desanding facility at Area C.
2) Improvements to the grizzly screen by replacing heavy screens with a round bar stock and reducing screen thickness to 3 inches.

3) Improvements to water addition and slurry management on the dredges through installation of flow meters, density meter, and monitoring system.

4) Added new 6-inch high-pressure submersible pump to grizzly spray bar.

5) Improved alignment of dredge discharge piping.

6) Addition of rubber flexible line before hard high-density polyethylene (HDPE) discharge pipeline to booster station.

7) Improvements to the grizzly screen by raising the spray bar.

8) A heavier duty grizzly auger to handle debris without breaking.

9) New chemical injection points at booster pump applying both caustic and ferric injection to assist in filter cake production.

10) An additional ninth filter press to increase Area D's capacity for dewatering sediment.

11) Additional rail cars to handle the increase in production.

The following eight optimizations were completed after the 2019, winter shutdown:

1) Re-built the prime mover booster pump (bearing block replacement) on the Sennebogen 850 dredge barge.

2) Replaced the grizzly screens on both dredge barges.

3) Replaced the grizzly auger drive on the Sennebogen 850.

4) Replaced and re-wired the PC490 submersible pump for the grizzly spray bar.

5) Replaced the make-up water seal pump on the prime mover pump on the PC490.

6) Inspected, replaced, and re-calibrated the required sensors on both dredge excavators.

7) Inspected and replaced as necessary the spud and travel winch cables.

8) Replaced the dredge pipeline valves on both the Area C transfer pumps along with preventative maintenance and engine service performed on all motorized plant equipment.

In addition to optimizing the dredge technique, throughout the hybrid dredging work, effort was placed on continuing improvements to sediment collection techniques, chemical analyses and geostatistical interpolation (i.e. kriging), identifying data uncertainty, and shifting from depth-based to elevation-based target definition.

**2017-2020**

### Upper Harbor

Cleanup pass dredging operations were conducted in the UH using a combination of hybrid and mechanical dredging methods. Mechanically dredged sediments were typically transported by scow and placed in the LHCC for ultimate disposal. However, if abundant debris, gravel, or peat were present in the targeted area, the materials were mechanically dredged and taken by scow to the DDA at Sawyer Street and stabilized prior to off-site disposal.

The majority of sediments excavated by the hybrid methods were hydraulically transported (by pipeline) to Area C where they were desanded and then transported (by pipeline) to Area D where they were dewatered. The sand was characterized and shipped to a non-hazardous landfill or a TSCA landfill, depending on the level of PCBs. Overall, approximately 40% of the recovered sand was characterized as TSCA and 60% was characterized as non-hazardous waste. The availability of non-hazardous landfills is greater than TSCA landfills, and also the cost of non-hazardous material disposal is lower than for TSCA materials. Therefore, the importance of characterizing and segregating the desanded material into TSCA and non-hazardous was to provide cost savings to the project. The remaining desanded and dewatered material, called filter cake, was shipped to an off-site TSCA disposal facility.

An estimated total of 344,000 cy of subtidal sediment were dredged from the UH in 2017 through 2020 (Table 1). Of this, approximately 154,000 cy was mechanically dredged and transported by scow to the LHCC or the DDA for disposal. The remaining approximately 190,000 cy was hybrid dredged and generated approximately 6,400 cy of non-hazardous sand, 13,000 cy of TSCA sand, and 120,000 cy of filter cake. The dredging activities for each MU and Area remediated in the UH between 2017 and 2020 are summarized in Table 3. The volumes of material removed by each dredging method and each contractor during this period are presented in Tables 1 and 2. The excavated sediments were disposed in the LHCC.

Remediation by mechanical dredging methods in the UH occurred intermittently between January 16, 2017 and March 2020. The excavated sediments were disposed in the LHCC. Remediation of MU25, MU26, MU 28, MU29 and MU31 in the UH was completed by mechanical dredging methods between January 16, 2017 and June 18, 2019 by Jacobs/SES.

### Lower Harbor

The MUs of the LH were identified on the basis of containing sediments demonstrated to contain > 50 ppm PCBs (Figure 4), the TCL identified in the 1998 ROD. In general, the contaminated sediments within each MU were excavated by a precision mechanical dredge, loaded into small scows, transferred to a larger dump scow, dewatered, and transported to the LHCC for disposal. The LH dredging activities began under a contract with Jacobs Engineering/Sevenson Environmental Services (SES) from March 2016 to January 2017 totaling approximately 78,162 cy; subsequently Cashman Dredging completed LH dredging and LHCC disposal of approximately 172,162 cy from September 2017 to March 2018 under a separate contract with USACE. A total of 251,025 cy of contaminated sediment was removed from the LH and placed in the LHCC (AECOM, 2019b). Table 2 presents the dates of active dredging and the volume of dredged materials for each of the LH MUs.

ESD4 modified the selected remedy to include the LHCC for disposal. The sediment proposed for disposal in the LHCC was described as having PCB concentrations generally less than an average of 100 ppm. Appendix C of the *Final Closeout Report Upper and Lower Harbor Dredge Areas Disposed of in Lower Harbor Confined Aquatic Disposal Cell During 2016-2018* (AECOM 2019b), used the congener dataset from all the data points included in dredge areas that were disposal in the LHCC. The Appendix C table was updated to reflect disposal of additional sediments into the LHCC that occurred after the *Final Closeout Report Upper and Lower Harbor Dredge Areas Disposed of in Lower Harbor Confined Aquatic Disposal Cell During 2016-2018* was written and is included with this RA Report (see Attachment 3). The highest known PCB congener concentration is 480 ppm at sample location S-14D-25-1-00-10. The next highest concentration was 300 ppm at sample location S-14G-36-13-10-20. Eight samples were between 200 ppm up to 300 ppm, and 25 samples were between 100 ppm and 200 ppm.

The remaining 248 samples were below 100 ppm. Therefore, 86% of the samples in this dataset were below 100 ppm. A volume weighted average concentration of the sediment planned for dredging and disposal in the LHCC was estimated from the congener dataset. That volume weighted average is 80.6 ppm. The arithmetic average for the dataset is 56.7 ppm, and the median is 38.1 ppm. Using the congener dataset provides more accurate concentration values that using IA but biases the average high since all samples that recorded values over 100 ppm by IA were subsequently run for full congener analysis, while only some of the samples with values less than 100 by IA were run for full congener analysis, resulting in more of the higher concentration results in the congener data set. 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 estimates is less than 80.6 ppm, and also below the requirement established by ESD4 for material disposed in the LHCC to be less than an average of 100 ppm.

Dredging of MU36 avoided the area within a 30 ft buffer of the Moby Dick bulkhead due to structural concerns with the bulkhead. Subsequent sediment sampling at the marina within the 30 ft buffer was performed in July 2019 by AECOM. The same two analytical methodologies that were used to determine the UH dredge prism were used for this PCB sampling: IA screening level method and the total congener method. Based on the July 2019 sampling, EPA demonstrated that the top zero-to-six inches and six-to-twelve inches of sediment at each of the 18 locations sampled in the vicinity of the bulkhead/shoreline are below the 50 ppm total PCB TCL. The average PCB level in the top foot at these 18 locations is approximately 37 ppm (measured as total congeners). Therefore, the EPA did not dredge within the 30 ft buffer of the Moby Dick bulkhead.

### 2.2.3 Long Term Monitoring and Institutional Controls

After the remedy at New Bedford Harbor is Operational and Functional, the MassDEP will assume any operations and maintenance and responsibility for institutional controls under the terms of the Superfund State Contract, as amended. Details of the institutional controls, such as type and frequency, are included in Attachments 2 and 3 to the *Amendment #3 to the Superfund State Contract for the Response* Related to the *New Bedford Harbor Site, Upper and Lower Harbor Operable Unit (OU1), New Bedford, Massachusetts Operation and Maintenance Plan* (EPA, 2016*)*

# 3. Chronology of Events

The chronology of the major subtidal remedial action events and activities is provided in Section 2.0, subsection 2.2 “Full Scale Dredging Events”. Table 3 summarizes these subtidal remedial action events.

Demobilization activities began in 2019 to remove the equipment used for subtidal hybrid dredging activities. The hybrid dredge and the hydraulic pipelines were demobilized.

Demobilization and decontamination activities are underway at Area C and Area D, and will be the subject of a separate RA Report. The Area D former dewatering facility is slated to be commercially reused by the City of New Bedford.

# 4. Performance Standards and Construction Quality Control

As previously discussed, EPA identified a cleanup standard (TCL < 10 ppm PCBs) for the remediation of subtidal and mudflat sediments in the UH. EPA further determined that remedial compliance for the UH was best demonstrated by achieving a SWAC of 10 ppm or less for PCBs in the upper 0.5 ft of the subtidal and mudflat sediments in the UH. Therefore, a "not to exceed" 50 ppm cleanup level for PCBs was determined to be appropriate for the LH. Owing to the different cleanup standards for the UH and the LH, different confirmatory sampling approaches were used in the UH and LH to demonstrate remedial compliance. To insure remedial compliance, rigorous field and laboratory quality control (QC) was established for all NBHSS data. The field and laboratory QC is documented in the Site *Quality Assurance Project Plan* (AECOM, 2019a), the *Final Closeout Report Upper and Lower Harbor Dredge Areas Disposed of in Lower Harbor Confined Aquatic Disposal Cell During 2016-2018* (AECOM, 2019b), the *Final Upper Harbor Subtidal Verification and Confirmatory Sediment Summary Report* (AECOM, 2020a) and the *Final Upper Harbor Subtidal Data Gap Sediment Summary Report* (AECOM, 2020b). The different verification and confirmatory sampling approaches for the UH and LH are described below.

## 4.1 Upper Harbor Confirmatory Sampling Approach

The dredging activities conducted in the UH between 2016 and 2020 (inclusive), were designed to remove PCB-contaminated sediments from each target area, such that confirmatory sampling would demonstrate that a SWAC of < 10 ppm PCBs was achieved for the entire UH subtidal zone[3]. Some areas within the UH subtidal zone did not require dredging as they were relatively uncontaminated, often with PCB concentrations that were much lower than 10 ppm. Because remediation was not performed in these areas, they were termed, "No Remediation Required Areas" (NRRAs). The NRRAs would be included in the final (post remediation) SWAC calculation for these areas.

Confirmatory samples were collected after the completion of dredging at predetermined locations for the final UH SWAC calculation. The confirmatory sampling grid used for most of the UH (see separate discussion for MU 25 and MU 28 below) followed the *Draft-Final Upper Harbor Confirmatory Sampling Plan* (Jacobs, 2019c), which was based on the *Final Confirmatory Sampling Approach, New Bedford Harbor Superfund Site (*Foster Wheeler Environmental Corporation 2002), which used a statistical approach to determine the number of required confirmatory samples so that the probability of making decision errors could be adjusted based on site specific considerations. This statistical approach was used to determine the minimum number of required confirmatory samples such that the probability of making decision errors could be specified. Based on this statistical analysis, a total of 132 confirmatory samples were collected on a triangular grid system to provide systematic spatial representation of the UH (Figure 5). The starting coordinates of the triangular sampling grid were randomly selected and the typical spacing between the confirmatory locations is approximately 250 ft. Confirmatory samples were collected on the grid nodes that fell within the boundaries of the subtidal area, including former intertidal mudflat areas that were converted to subtidal areas by dredging activities. Ultimately, confirmatory samples were collected from the entire subtidal zone of the UH, including those NRRA areas where no dredging was needed to meet the RAL and the capped areas. The confirmatory locations within capped areas were assigned a PCB concentration of 0.05 ppm. Confirmatory samples were not collected in Cove 25-32 and Veranda Inlet mudflat

[3] The compliance interval is the 0 to 0.5 ft post-dredge sediment interval.

areas, which were inaccessible by dredge (See Section 1). Table 4 provides the location IDs, eastings and northings, and the congener results for the UH confirmatory samples.

The confirmatory locations for MUs 25 and 28 were sampled prior to final development of the UH confirmatory sampling grid described above. The confirmation locations selected for these two MUs were more closely spaced than the grid spacing that used for the rest of the UH (Figure 5). Consequently, a separate SWAC was calculated for each of these two MUs and the results were combined, on an area weighted basis, with the SWAC calculated for the rest of the UH subtidal zone. The calculated SWAC for the entire UH subtidal zone is 2.7 ppm PCBs (Table 5).

UH confirmatory sampling QC is described in Section 4.3.

## 4.2 Lower Harbor Confirmatory Sampling Approach

As previously discussed in Section 1, a "not to exceed" TCL of 50 ppm was implemented for the subtidal sediments of the LH. Full-scale subtidal dredging activities were conducted between 2016 and 2018 to remediate the MUs where data gap sampling identified subtidal sediments containing PCB concentrations exceeding the 50 ppm TCL (Figure 4).

Compliance with the 50 ppm TCL for the LH was demonstrated by the collection of confirmatory samples that were analyzed for PCB congeners by an outside laboratory. The confirmatory sampling approach used a statistical approach to determine the number of required confirmatory samples for each MU such that the probability of making decision errors could be adjusted based on site specific considerations. The statistical input parameters for the LH compliance sampling designs are provided in the *Draft Final Lower Harbor Confirmatory Sampling Plan* (Jacobs, 2019d). The confirmatory sampling locations for the LH are presented on Figure 4. The LH confirmatory sampling results for each LH MU are presented in Table 6.

## 4.3 Confirmatory Sampling Quality Assurance/Quality Control

Details of the confirmatory sampling methods and QC can be found in three AECOM reports, *Final Upper Harbor Subtidal Verification and Confirmatory Sediment Summary Report* (AECOM, 2020a), *Final Upper Harbor Subtidal Data Gap Sediment Summary Report* (AECOM, 2020b), and *Final Closeout Report Upper and Lower Harbor Dredge Areas Disposed of in Lower Harbor Confined Aquatic Disposal Cell During 2016-2018* (AECOM, 2019b). A summary of the methods and QC is provided below.

**PCB Congener Analysis**

The 0 to 0.5 ft intervals from confirmatory cores were analyzed for 209 PCB congeners using EPA Method 8270D. PCB analysis for the 209 congeners was performed by Alpha Analytical in accordance with the UFP-QAPP Addendum (AECOM, 2019a).

In accordance with the QAPP Addendum (AECOM, 2019a), field-based QC samples were collected in the form of replicate cores. Field replicate cores were collected at the same location (within 3 feet of the target) as the parent core. Replicate samples were collected at a frequency of one per 20 samples for each analysis and were sourced from replicate cores that were collected, to the extent possible, at the same time as the parent core (generally within ½ hour of the parent sample) using the same techniques and were analyzed at the same laboratory.

One equipment blank was collected for the entire confirmatory sampling program. An equipment blank sample was collected at the CCA on the same day that a confirmatory location was sampled. The equipment blank sample was submitted to a contract laboratory for PCB congener analysis. The collection of additional equipment blanks in other dredge areas was deemed unnecessary due to the use of piston push coring as the core sampling technique.

**Shipping, Storage and Chain of Custody Transfers**

All samples were kept under chain of custody when being transferred between parties (SOP NBH-G-04). Jacobs received the 4-oz jar for IA analysis and took custody of archive samples. Archive samples were stored on Site in a secure freezer. Confirmatory samples were transported at zero degrees C and under custody seal to Alpha Analytical via laboratory courier. Alpha Analytical received all 8-oz jars for PCB congener analysis.

# 5. Final Inspection

The remedial action objectives identified for the subtidal zone in the 1998 ROD have been achieved. A SWAC of < 10 ppm PCBs has been obtained for the UH (Table 5) and sediments exceeding 50 ppm PCBs have been removed from the LH (Table 6). Demobilization and removal of dredging and sediment processing equipment from the Site is now underway and is mostly complete.

This RA Report describes the completion of subtidal dredging activities with regard to OU1. This does not represent the closeout of construction for the entirety of OU1, and as such no final inspection is required at this time.

Completion of the demobilization of desanding and dewatering plant areas that serviced the hydraulic and later hybrid dredging programs is underway and will be addressed under a separate RA Report in the future. Final inspection activities for the LHCC are covered in Section 6.

# 6. Operations and Maintenance Activities

**Monitoring of Caps**

Remaining space in the LHCC will be utilized by the City of New Bedford under the SER program. Once filled, the LHCC will be allowed to consolidate and then capped. Institutional controls and long-term monitoring plans that include regular inspections will be implemented to ensure the integrity of the capped areas.

**Surface Water Quality Monitoring**

The Surface Water Monitoring Program for New Bedford Harbor will be continued. Water quality in the Harbor will be monitored periodically for a period of time following the cessation of dredging to compare total and dissolved PCB levels at several locations to the ambient PCB water quality standard of 0.03 µg/L

**Institutional Controls and Seafood Monitoring Program**

Until such time as PCB levels in seafood reach the risk-based, Site-specific threshold of 0.02 ppm (or other level if this criterion is updated), institutional controls such as seafood advisories and the placement of no fishing signs will be continued. The state-sanctioned area-by-area fishing restrictions will remain in effect until such time as the Massachusetts Department of Public Health deems it appropriate to amend or remove them. In addition, EPA continues its efforts under a cooperative agreement with the City of New Bedford in which multilingual "Outreach Coordinators" explain the seafood advisories to recreational fishers around the waterfront on behalf of the project.

# 7. Contact Information

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**AECOM** – Will Humphries, Project Manager, 207-541-2039 (office), william.humphries@aecom.com

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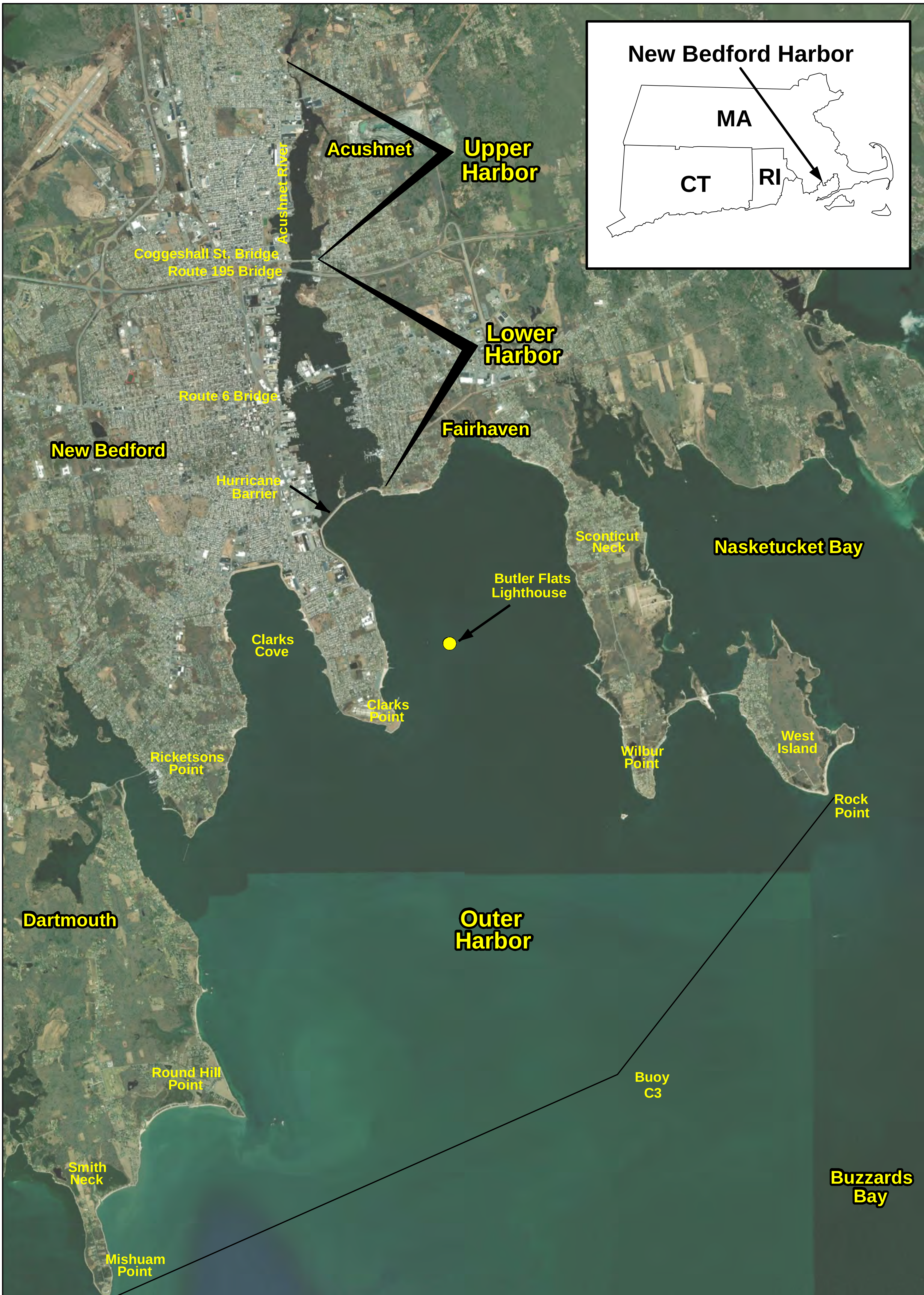
# Figures




**Legend**

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

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*Basemap Reference: Bing Maps Aerial*

Path: Y:\NBH\Projects\358G1001\20200812_Subtidal_RA_Report\ArcGIS\NBH_Site_Map_Subtidal_RA_Report_20200812.mxd

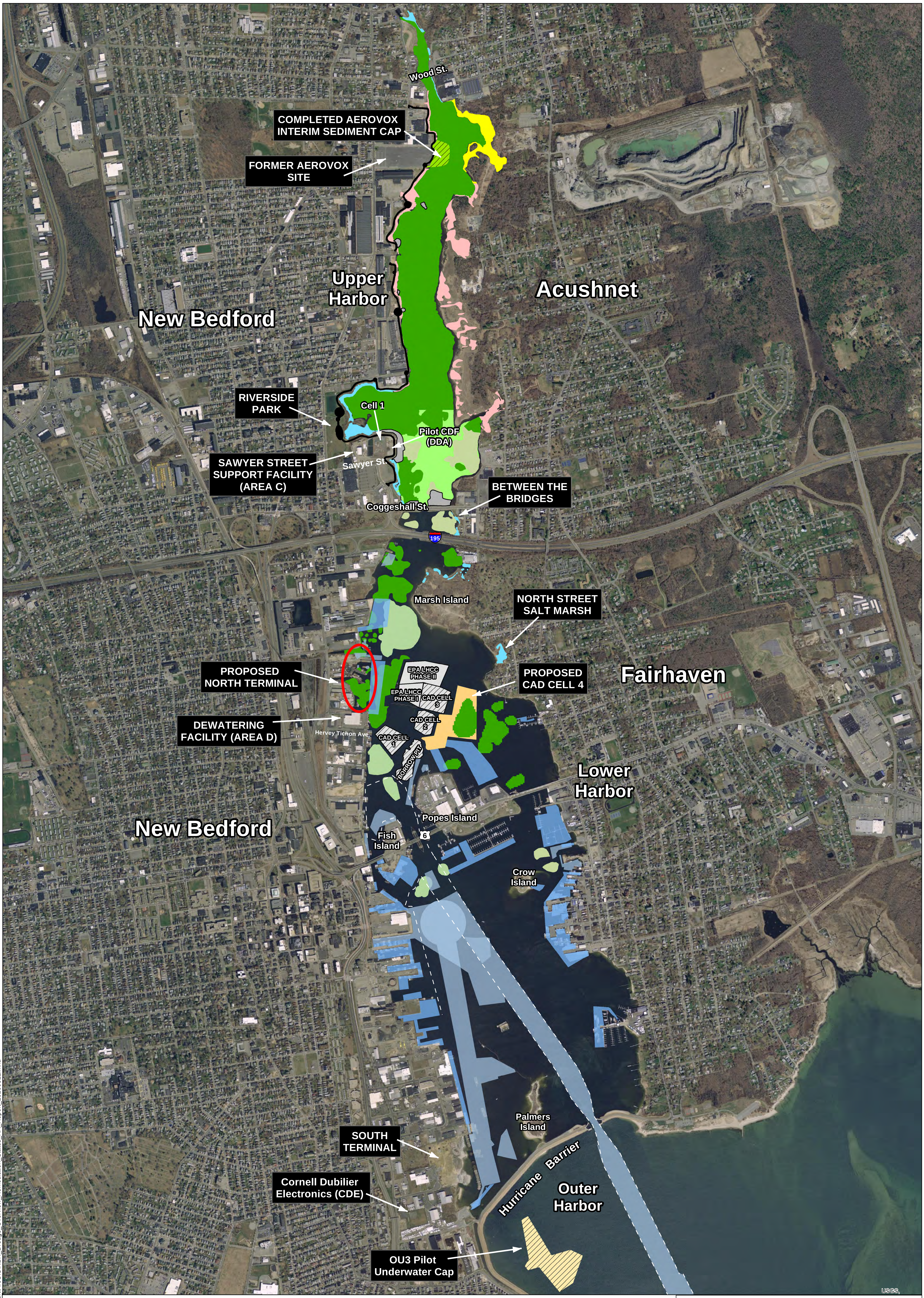
JACOBS

**Site Location Map**

New Bedford Harbor Superfund Site

NAME: jpiccuito Date: 8/11/2020

**Figure 1**




Legend

- Dredging Complete (Jacobs)
- Dredging Complete (Cashman)
- Dredging Complete (City/SER)
- Proposed Phase V Dredging (SER)
- No Remediation Required
- EPA CAD Cell
- Proposed CAD Cell
- Existing CAD Cells and Borrow Pit
- Completed Aerovox Interim Sediment Cap
- OU3 Pilot Underwater Cap
- Intertidal Remediation Completed
- Intertidal Remediation to be Completed
- Intertidal Remediation in Progress
- Currently Proposed Sediment Cover/Capping Areas
- Federal Navigation Channel
- Riverwalk (Proposed)

*Status July 2020*

N

0 0.25 0.5 Miles

*Aerial Photography MASSGIS 2014*

**JACOBS**

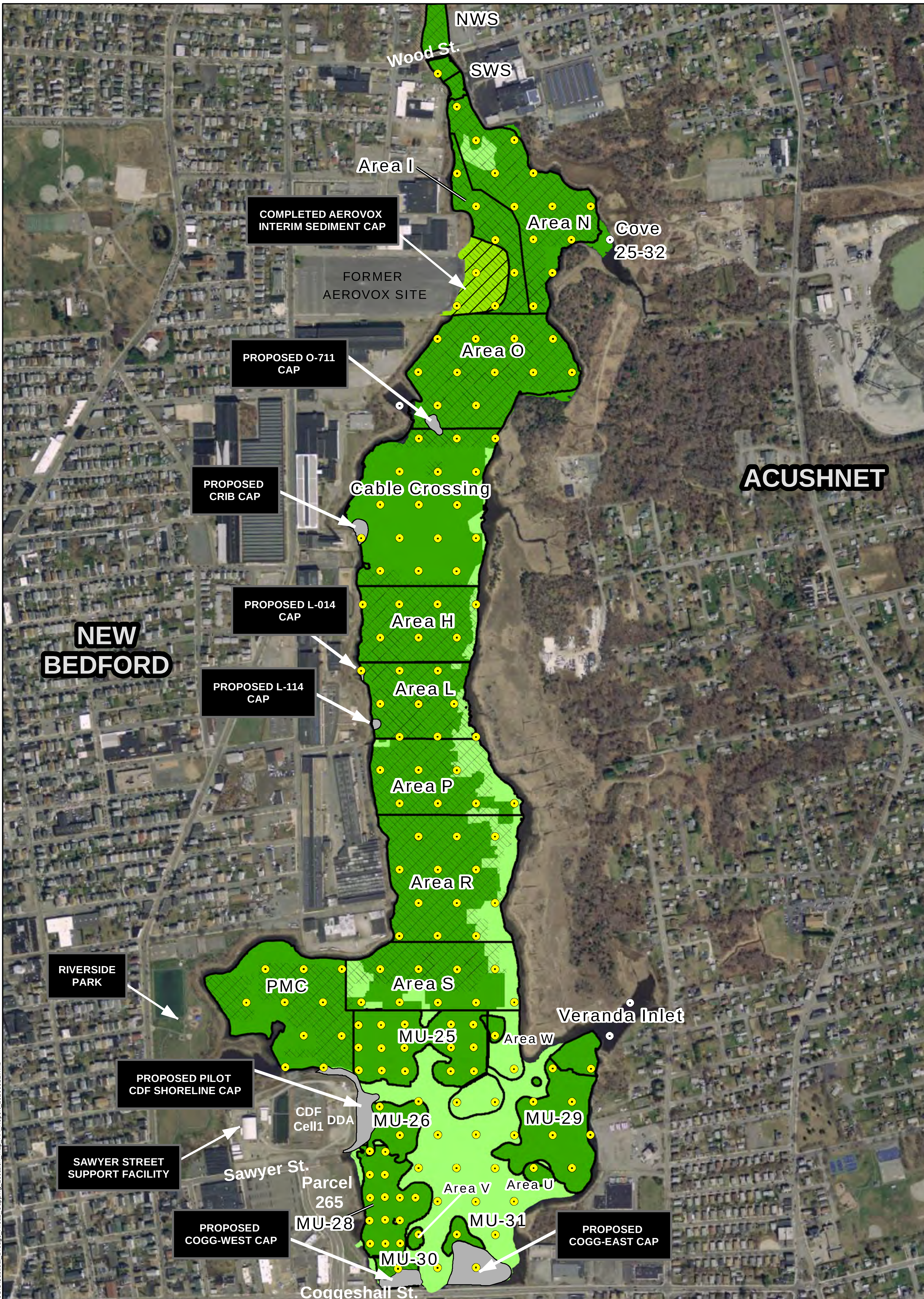
**Overview of New Bedford Harbor**

New Bedford Harbor Superfund Site

NAME: jpiccuito Date: 8/18/2020

**Figure 2**

Path: Y:\NBH\Projects\35BG1001\20200812_Subtidal_RA_Report\ArcGIS\NBH_Dredge_Overview_Remediation_Status_RA_Report_20200812.mxd




**Legend**

- Dredging Complete
- No Remediation Required
- Completed Aerovox Interim Sediment Cap
- Currently Proposed Sediment Cover/Capping Areas
- Mass Removal Dredging 1998 - 2015
- Outstanding Confirmatory Sample Location
- Actual Confirmatory Sample Location

N

0 300 600 Feet

1:7,200

*Aerial Photography MASSGIS 2014*

JACOBS

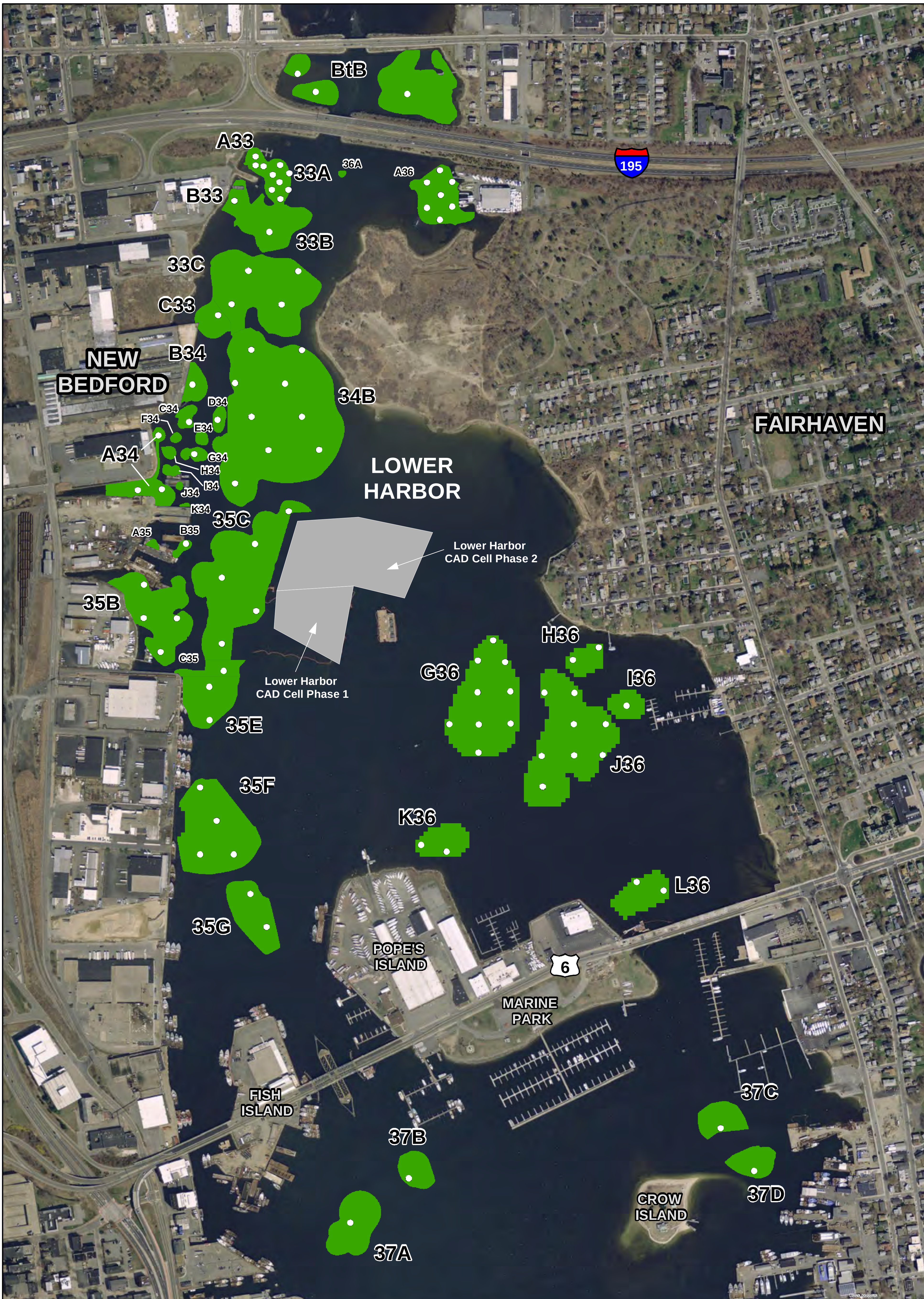
**Upper Harbor Dredge Areas and Caps**

New Bedford Harbor Superfund Site

NAME: jpiccuito Date: 9/21/2020

**Figure 3**

Path: Y:\NBH\Projects\35BG1001\20200812_Subtidal_RA_Report\ArcGIS\Subtidal_Dredge_Areas_Capping_Location_Map_RA_Report_20200812.mxd




**Legend**

EPA CAD Cell

Dredging Completed

Confirmatory Sample Location

N

0 275 550 Feet 1:6,600

*Aerial Photography MASSGIS 2014*

**JACOBS**™

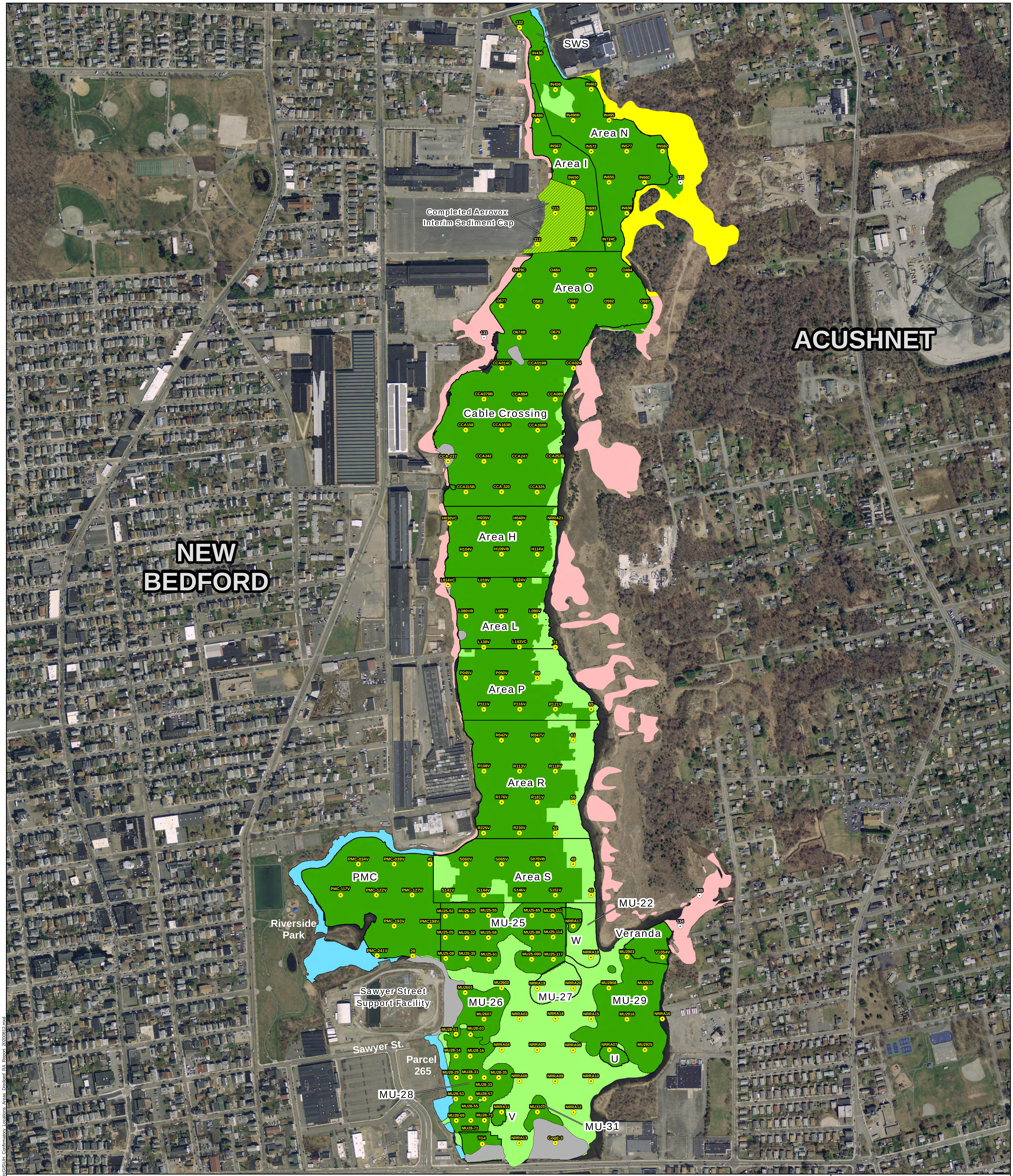
**Lower Harbor Dredge Areas and Confirmatory Sample Locations**

**New Bedford Harbor Superfund Site**

Date: 8/12/2020

**Figure 4**

Path: Y:\NBH\Projects\35BG1001\20200812_Subtidal_RA_Report\ArcGIS\LH_Confirmatory_Locations_Areas_Dredged_RA_Report_20200812.mxd




**Legend**

- Currently Proposed Sediment Cover/Capping Areas
- Completed Aerovox Interim Sediment Cap
- Dredging Completed
- No Remediation Required (Subtidal)
- Intertidal Remediation Completed
- Intertidal Remediation to be Completed
- Intertidal Remediation in Progress
- Outstanding Confirmatory Sample Location
- Actual Confirmatory Sample Location

Note: Intertidal Remediation West Zone 4 and West Zone 5/Veranda are still being finalized and are subject to change.

*Aerial Photography MASSGIS 2014*

***Status 3/31/2020***

0 400 Feet 1:2,550

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**Upper Harbor Dredge Areas and Confirmatory Sample Locations**

New Bedford Harbor Superfund Site

Date: 9/21/2020

**Figure 5**

# Tables

**Table 1**
**Volume of Upper Harbor Dredged Material by Area**

| DredgeArea | Year | Contractor | Hydraulic Volume (cy) | Mechanical Volume (cy) | Hybrid Volume (cy) | Total Volume (cy) | Area (Acres) |
|---|---|---|---|---|---|---|---|
| Hot Spot B | 1994-1995 | TtFW | 2,800 | | | | 0.2 |
| Hot Spot C | 1994-1995 | TtFW | 2,800 | | | | 1.7 |
| Hot Spot D | 1994-1995 | TtFW | 2,800 | | | | 1.2 |
| Hot Spot E | 1994-1995 | TtFW | 2,800 | | | | 0.1 |
| Hot Spot G | 1994-1995 | TtFW | 2,800 | | | | 1.1 |
| OU2 (Hot Spot) Total | | | 14,000 | 0 | 0 | 14,000 | |
| Pilot Study 1 | 1988-1989 | TtFW | 719 | | | | 1.4 |
| Pilot Study 2 | 1988-1989 | TtFW | 2,181 | | | | 0.7 |
| EAA-A | 2001 | TtFW | | 1,500 | | | 0.2 |
| EAA-B | 2001 | TtFW | | 1,500 | | | 0.5 |
| PreDesign Field Test | 2001 | TtFW | | | 1,985 | | 1.0 |
| NWS | 2002-2003 | TtFW | | 15,619 | | | 5.3 |
| North Lobe | 2003 | TtFW | | 1,976 | | | 0.4 |
| North Lobe | 2003 | TtFW | | 1,976 | | | 0.3 |
| Dredge Area A | 2004 | Jacobs/SES | 12,000 | | | | 2.9 |
| Dredge Area A | 2005 | Jacobs/SES | 9,261 | | | | 2.3 |
| Dredge Area B | 2005 | Jacobs/SES | 15,467 | | | | 6.0 |
| North of Wood St | 2005 | Jacobs/SES | 338 | | | | 0.1 |
| North of Wood St | 2005 | Jacobs/SES | 113 | | | | 0.0 |
| Dredge Area B | 2006 | Jacobs/SES | 3,349 | | | | 1.6 |
| Dredge Area A | 2006 | Jacobs/SES | 10,048 | | | | 6.3 |
| Dredge Area C | 2006 | Jacobs/SES | 3,349 | | | | 1.4 |
| Dredge Area D | 2006 | Jacobs/SES | 3,350 | | | | 0.9 |
| Dredge Area G | 2007 | Jacobs/SES | 5,539 | | | | 2.5 |
| Dredge Area H | 2007 | Jacobs/SES | 17,768 | | | | 8.0 |
| Dredge Area I | 2008 | Jacobs/SES | 3,731 | | | | 1.6 |
| Dredge Area I | 2008 | Jacobs/SES | 14,923 | | | | 5.8 |
| Dredge Area I | 2008 | Jacobs/SES | 1,244 | | | | 0.2 |
| Aerovox Excavation | 2008 | Jacobs/SES | 8,532 | | | | 0.9 |
| Dredge Area J | 2009 | Jacobs/SES | 19,591 | | | | 5.8 |
| Dredge Area L | 2009 | Jacobs/SES | 20,639 | | | | 5.1 |
| Dredge Area M | 2009 | Jacobs/SES | 1,709 | | | | 0.9 |
| Dredge Area G | 2009 | Jacobs/SES | 7,870 | | | | 3.4 |
| Dredge Area G | 2010 | Jacobs/SES | 10,381 | | | | 3.7 |
| Dredge Area J | 2010 | Jacobs/SES | 6,635 | | | | 4.2 |
| Dredge Area K | 2010 | Jacobs/SES | 9,003 | | | | 2.9 |
| Dredge Area M | 2010 | Jacobs/SES | 392 | | | | 0.2 |
| Dredge Area K | 2011 | Jacobs/SES | 13,544 | | | | 5.6 |
| Dredge Area N | 2011 | Jacobs/SES | 7,539 | | | | 3.1 |
| Dredge Area G | 2011 | Jacobs/SES | 4,591 | | | | 2.1 |
| Dredge Area Q | 2011 | Jacobs/SES | 400 | | | | 0.0 |
| Dredge Area L | 2012 | Jacobs/SES | 13,268 | | | | 4.3 |
| Dredge Area P | 2012 | Jacobs/SES | 6,234 | | | | 0.7 |
| Dredge Area L | 2013 | Jacobs/SES | 2,095 | | | | 0.7 |
| Dredge Area P | 2013 | Jacobs/SES | 16,900 | | | | 4.2 |
| Dredge Area L | 2014 | Jacobs/SES | 5,271 | | | | 2.3 |
| Dredge Area O | 2014 | Jacobs/SES | 8,066 | | | | 2.8 |
| Dredge Area P | 2014 | Jacobs/SES | 7,696 | | | | 2.3 |
| Dredge Area R | 2014 | Jacobs/SES | 53,122 | | | | 13.5 |
| Dredge Area S | 2014 | Jacobs/SES | 3,157 | | | | 1.0 |
| Dredge Area L | 2015 | Jacobs/SES | 567 | | | | 0.5 |
| Dredge Area H | 2015 | Jacobs/SES | 20,814 | | | | 4.3 |

**Table 1**
**Volume of Upper Harbor Dredged Material by Area**

| DredgeArea | Year | Contractor | Hydraulic Volume (cy) | Mechanical Volume (cy) | Hybrid Volume (cy) | Total Volume (cy) | Area (Acres) |
|---|---|---|---|---|---|---|---|
| Dredge Area P | 2015 | Jacobs/SES | 2,252 | | | | 1.7 |
| Dredge Area T | 2015 | Jacobs/SES | 5,044 | | | | 1.1 |
| Dredge Area S | 2015 | Jacobs/SES | 10,065 | | | | 6.0 |
| OU1 Mass Removal Total | | | 368,756 | 22,571 | 1,985 | 393,312 | |
| Dredge Area MU25 | 2017 | Jacobs/SES | | 27,906 | | | 8.7 |
| Dredge Area MU28 | 2017 | Jacobs/SES | | 12,806 | | | 5.4 |
| Pierce Mill Cove | 2017 | Jacobs/SES | | 13,488 | | | 4.0 |
| Dredge Area MU26 | 2018 | Cashman | | 7,346 | | | 2.2 |
| Dredge Area MU 29 | 2018 | Cashman | | 18,553 | | | 6.9 |
| Dredge Area MU 31 | 2018 | Cashman | | 2,039 | | | 0.7 |
| Cable Crossing Area | 2017-2018 | Jacobs/SES | | 407 | 46,179 | | 18.3 |
| Dredge Area I/N/O | 2018-2019 | Jacobs/SES | | 2,161 | 69,936 | | 31.0 |
| Dredge Area H | 2019 | Jacobs/SES | | 303 | 20,590 | | 8.2 |
| Dredge Area L | 2019 | Jacobs/SES | | 3,579 | 14,386 | | 8.0 |
| Dredge Area P | 2019 | Jacobs/SES | | 5,888 | 12,533 | | 7.2 |
| Dredge Area R | 2019 | Jacobs/SES | | 13,395 | 14,307 | | 12.5 |
| Dredge Area S | 2019-2020 | Jacobs/SES | | 6,303 | 12,387 | | 8.6 |
| Pierce Mill Cove | 2019-2020 | Jacobs/SES | | 31,993 | | | 12.8 |
| Veranda Inlet | 2019-2020 | Jacobs/SES | | 3,752 | | | 1.9 |
| South of Wood Street | 2020 | Jacobs/SES | | 2,016 | | | 0.7 |
| Areas U, V, W | 2020 | Jacobs/SES | | 1,973 | | | 1.3 |
| OU1 Cleanup Pass Total | | | 0 | 153,907 | 190,319 | 344,226 | |
| **Total** | | | | | | **751,538** | **275.7** |

*Total Acreage represents footprint of areas dredged. Portions of some areas were dredged during multiple years.

cy = cubic yards
TtFW = TetraTech-Foster Wheeler
SES = Sevenson Environemntal Services

**Table 2**
**Volume of Lower Harbor Dredged Material by Area**

| 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) |
|---|---|---|---|---|---|---|
| 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 |
| **Lower Harbor Total/Average** | | | **251,025** | | **11.00** | |

**Table 3**
**Chronology of Major Remedial Actions**

| Date | Major Remedial Action Event |
|---|---|
| 1983 | New Bedford Harbor is added to the Superfund National priorities List |
| 1990 | The ROD for the UH “Hot Spot” (OU2) was issued and subsequently modified by two ESDs (1992 and 1995). |
| 1994-1995 | 14,000 cy of Hot Spot sediment, with PCB levels reported as high as ten to twenty percent (100,000 – 200,000 ppm), are dredged from the Upper Harbor. |
| 1998 | The ROD for OU1 was issued and subsequently modified by six ESDs (2001, 2002, 2010, 2011, 2015, and 2017) |
| 1999 | An amended ROD for the HOT Spot (OU2) is issued. |
| 2000 | The Hot Spot Remedy is completed. |
| 2001 | Early Action cleanup is completed on highly contaminated (up to 20,000 ppm) residential properties in Acushnet and New Bedford, MA. |
| 2001 | The relocation of the combined sewer overflow (CSO) at sawyer Street is completed. |
| 2001 | Construction of a clean corridor for the relocation of the submerged power lines in the vicinity of the Hot Spot sediment is completed. |
| 2002 | Removal of thirteen derelict commercial fishing vessels and barges is completed at the former Herman Melville shipyard, to allow for remedial dredging and the relocation of a commercial barge pier. |
| Jun-03 | The six-acre area comprising the North of Wood Street cleanup is completed, removing PCB levels as high as 46,000 ppm from residential and recreational shoreline areas. |
| 2003 | The remedial dredging at the former Herman Melville shipyard is completed. |
| 2003 | The marine bulkhead for the Area D dewatering facility is completed. |
| 2004 | Relocation of two CSOs at Area D is completed. |
| 2004 | Construction of the dewatering facility at Area D is finished. |
| 2004 | Full scale dredging performed in the vicinity of the Aerovox Mill. |
| Jan-05 | Construction of a relocated commercial barge pier and associated navigational channel is completed (relocation necessary to allow Area D). |
| Jul-05 | The pilot underwater cap in the vicinity of the Cornell-Dubilier mill is completed. |
| 2005 | The second annual season of full-scale dredging is performed. |
| Sep-05 | The First Five-Year Review Report for the Site is issued. |
| 2006 | The third annual season of full-scale dredging is performed in area along and immediately north of the former Aerovox facility. |
| 2007 | The fourth season of dredging is performed, focused on two areas: one just north of the former Aerovox facility; the second off shore of the northern Cliftex Mill. |
| 2008 | The fifth season of full scale dredging is performed, including mechanical excavation of the highly contaminated sediment along the former Aerovox facility and hydraulic dredging in Pierce Mill Cove between Sawyer Street and Coffin Avenue. |
| Apr-09 | EPA receives $30 million in funding from the American Recovery and Reinvestment Act (ARRA of the “Recovery Act”), allowing dredging of a larger volume of contaminated sediment from the Upper harbor due to the extension of the dredging season by approximately four extra months in 2009 and one extra month in 2010. |
| 2009 | The sixth season of full-scale dredging is performed in the northern part of the Upper Harbor. |
| 2009 | The first of three historic shipwrecks is discovered during July 2009. Removal of artifacts is completed by November 2009. |
| Sep-10 | The second Five-Year Review Report for the Site is issued. |
| 2010 | The seventh season of full-scale dredging is performed in the northern part of the Upper Harbor. |
| 2011 | The eighth season of full-scale dredging is performed in the Upper Harbor. |
| 2012 | The ninth season of full-scale dredging is performed in the Upper Harbor. |
| Nov-13 | LHCC Phase I construction begins. |
| 2013 | The tenth season of full-scale dredging is performed in the Upper Harbor. |
| | The construction of LHCC Phase I starts in the Lower Harbor. |
| Mar-14 | The eleventh season of full-scale dredging is started in the Upper Harbor. Dredging is conducted for almost 8 months as a result of availability of settlement funding. |
| Jun-14 | LHCC Phase I construction completed. |
| Nov-14 | Construction begins on LHCC Phase II. |
| Feb-15 | The construction of the South Terminal, under the SER, is substantively completed. Mitigation activities and other ancillary activities ongoing. |
| 2015 | The twelfth season of full-scale dredging is conducted from August to December. Sites where dredging is performed include Areas S, P, H, L and T. |
| Sep-15 | The Third Five-Year Review Report for the Site is issued. |
| Dec-15 | Construction of LHCC Phase II is completed. |
| 2015 | The Eversource Cable and Conduit were de-energized and removed from the Cable Crossing Area (CCA) in October and November. |
| 2016 | The 2$^{nd}$ of 3 sunken wooden shipwreck was discovered in the CCA during debris removal activities. |
| 2016 | Mechanical dredging with LHCC disposal begins. Approximately 71,000 cy of sediments from LH nearshore areas of MU33, MU34, MU35, and MU36 are dredged and disposed on if the LHCC using RAC contract by Jacobs/Sevenson. |

**Table 3**
**Chronology of Major Remedial Actions**

| Date | Major Remedial Action Event |
|---|---|
| 2017 | Mechanical dredging LHCC disposal of approximately 46,000 cy of sediments from UH areas MU25 and MU28 using RAC contract; and approximately 155,000 cy of LH deep dredge areas of MU33, MU34, MU35, and MU37 using fixed price contract by Cashman Dredging and Marine. |
| 2017 | The 2nd of 3 wooden shipwrecks was removed from the CCA during the summer and was documented by the project archaeologist. |
| Sep-17 | The newly constructed hybrid mechanical/hydraulic dredge system was mobilized to the CCA. |
| Oct-17 | Full-scale dredging of the CCA using the hybrid dredge system was conducted from October 16, 2017 until winter shutdown on December 22, 2017. |
| Oct-17 | The third and final historic wood shipwreck was discovered during mechanical dredging in the Lower Harbor. |
| Winter/Spring 2018 | Mechanical dredging with LHCC disposal of approximately 47,000 cy of sediments from BtB and UH areas MU25, MU26, MU29, and MU31 using fixed price contract by Cashman Dredging and Marine. |
| Feb-18 | Recovery of artifacts from the third and final historic wood shipwreck completed in the Lower Harbor. |
| Mar-18 | Hybrid dredging of the CCA resumed on March 1, 2018 and continued until early June. A total of 46,179 cy of dredge material were removed during operations at CCA by the hybrid dredge. |
| Jun-18 | On June 19-20, 2018, approximately 1,279 cy of sediment deemed not suitable for hybrid dredging, were mechanically dredged from the CCA. The sediments were placed in scows, transported to Area C, and stabilized with Portland cement prior to disposal. |
| Jun-18 | Hybrid dredging of the INO Areas began in June 2018 and continued until winter shutdown on January 18, 2019. Dredging included buffer zone around the toe of the Aerovox Interim Cap, which was installed shortly thereafter. |
| Sep-18 | Construction the 3 acre, multi-layer, Aerovox Interim Cap commences. |
| Mar-19 | Hybrid dredging of INO resumed on March 15, 2019 and continued until March 27, 2019. Mechanical dredging methods were used from April 8, 2019 to August 19, 2019 to remove near shore materials at INO that contained large amounts of debris. A total of 69,936 yd were removed by dredging during operations in Areas I,N,O. |

## Table 4
## Upper Harbor Confirmatory Sample Results

| Confirmatory Grid ID | Confirmatory Sample Location ID | Confirmatory PCB Concentration (ppm) For UH Locations Outside of MU25 and MU28 |
|---|---|---|
| 131 | IN436 | 0.21 |
| 129 | IN459 | 17.90 |
| 130 | IN463 | 0.12 |
| 126 | IN486 | 0.44 |
| 127 | IN490B | 0.93 |
| 128 | IN495 | 0.25 |
| 122 | IN567 | 0.16 |
| 123 | IN572 | 0.03 |
| 124 | IN577 | 0.02 |
| 125 | IN582 | 1.90 |
| 118 | IN650 | 2.02 |
| 119 | IN655 | 1.83 |
| 120 | IN660 | 1.93 |
| 116 | IN693 | 0.86 |
| 117 | IN698 | 1.07 |
| 114 | IN724C | 0.05 |
| 108 | O479C | 0.86 |
| 109 | O484 Rep | 0.3 |
| 110 | O489 | 0.70 |
| 111 | O494 | 0.11 |
| 103 | O577 | 0.09 |
| 104 | O582 | 4.50 |
| 105 | O587 | 0.64 |
| 106 | O592 Rep | 0.041 |
| 107 | O597 Rep | 0.575 |
| 101 | O674B | 0.01 |
| 102 | O679 | 0.04 |
| 98 | CCA-014 | 4.67 |
| 99 | CCA-019B | 0.69 |
| 100 | CCA-024 | 12.40 |
| 95 | CCA-079B | 0.05 |
| 96 | CCA-084 | 2.32 |
| 97 | CCA-089 | 0.29 |
| 92 | CCA-158 | 0.60 |
| 93 | CCA-163B | 1.45 |
| 94 | CCA-168B | 0.05 |
| 89 | CCA-242 | 0.20 |
| 90 | CCA-247 | 0.03 |
| 91 | CCA-252D | 4.47 |
| 85 | CCA-315B | 0.10 |
| 86 | CCA-320 Rep | 11.155 |
| 87 | CCA-325 | 0.18 |
| 80 | H-114V Rep | 0.0725 |
| 81 | H-030VC | 19.6 |
| 82 | H-035V | 0.054 |
| 83 | H-040 | 0.068 |
| 78 | H-104 | 0.87 |
| 79 | H-109VB | 0.18 |
| 76 | S-L019V | 1.44 |

| MU25 Confirmatory Sample Location | Confirmatory PCB Concentrations (ppm) for MU25 |
|---|---|
| MU25-02 Rep | 4.50 |
| MU25-05 | 3.70 |
| MU25-08 | 0.87 |
| MU25-29 | 0.37 |
| MU25-32 | 2.50 |
| MU25-35 | 1.10 |
| MU25-55 | 0.34 |
| MU25-58 | 0.45 |
| MU25-61 | 0.96 |
| MU25-85 | 10.00 |
| MU25-88 | 2.80 |
| MU25-090 | 6.39 |
| MU25-111 | 17.00 |
| MU25-114 | 12.00 |
| MU25-117 | 0.50 |
| **MU25 SWAC** | **4.23** |

| MU28 Confirmatory Sample Location | Confirmatory PCB Concentrations (ppm) for MU28 |
|---|---|
| MU28-01 | 0.70 |
| MU28-03 | 1.90 |
| MU28-14 | 0.89 |
| MU28-16 | 0.00 |
| MU28-29 | 1.30 |
| MU28-31 | 0.08 |
| MU28-33 | 0.10 |
| MU28-35 | 0.09 |
| MU28-53 | 0.00 |
| MU28-55 | 5.40 |
| MU28-57 | 1.70 |
| MU28-69 | 0.00 |
| MU28-71 | 0.09 |
| MU28-73 | 1.40 |
| **MU28 SWAC** | **0.98** |

**Table 4**
**Upper Harbor Confirmatory Sample Results**

| Confirmatory Grid ID | Confirmatory Sample Location ID | Confirmatory PCB Concentration (ppm) For UH Locations Outside of MU25 and MU28 |
|---|---|---|
| 77 | S-L024V | 5.67 |
| 72 | S-L080VB Rep | 1.5 |
| 73 | S-L085V Rep | 2.117 |
| 74 | S-L090V | 0.002 |
| 69 | S-L138V | 0.011 |
| 70 | S-L143V | 4.68 |
| 44 | S-PMC039V | 4.21 |
| 43 | S-PMC034VB Rep | 2.368 |
| 35 | S-PMC117V | 0.393 |
| 36 | S-PMC122V | 0.148 |
| 37 | S-PMC127VC Rep | 0.081 |
| 32 | S-PMC193V Rep | 0.058 |
| 33 | S-PMC198V | 0.217 |
| 27 | S-PMC241V | 4.53 |
| 45 | S-PMC244V Rep | 0.162 |
| 66 | S-P045V | 1.89 |
| 67 | S-P050V | 3.53 |
| 62 | S-P111V | 0.131 |
| 63 | S-P116V | 0.2 |
| 64 | S-P121VB | 0.152 |
| 59 | S-R042V Rep | 2.097 |
| 60 | S-R047V | 2.45 |
| 56 | S-R108V | 0.001 |
| 57 | S-R113V | 0.00951 |
| 58 | S-R118VB | 0.23 |
| 53 | S-R176V | 5.83 |
| 54 | S-R181V | 0.007 |
| 50 | S-R225V Rep | 3.31 |
| 51 | S-R230V | 1.12 |
| 46 | S-060V Rep | 0.101 |
| 47 | S-065V | 0.197 |
| 38 | S-141V Rep | 0.0432 |
| 39 | S-144V | 0.0136 |
| 40 | S-S146V | 0.000402 |
| 41 | S-S151V | 0.067 |
| 48 | S-S070VB | 0.0002 |
| 21 | MU2601 | 0.01 |
| 22 | MU2602 | 0.09 |
| 15 | MU2607 | 5.28 |
| 30 | MU2903 | 0.52 |
| 25 | MU2908 | 0.90 |
| 26 | MU2910 | 0.03 |
| 19 | MU2916 | 0.65 |
| 14 | MU2925 Rep | 2.185 |
| 5 | MU3101 | 3.47 |
| 16 | NRRA03 | 2.48 |
| 10 | NRRA04 | 11.40 |
| 11 | NRRA05 | 2.68 |
| 12 | NRRA06 | 12.10 |
| 13 | U002V (Formerly NRRA07) | 0.98 |
| 7 | NRRA08 | 2.82 |

## Table 4
## Upper Harbor Confirmatory Sample Results

| Confirmatory Grid ID | Confirmatory Sample Location ID | Confirmatory PCB Concentration (ppm) For UH Locations Outside of MU25 and MU28 |
|---|---|---|
| 8 | NRRA09 | 1.77 |
| 9 | NRRA10 | 2.34 |
| 4 | V003V (Formerly NRRA11) | 0.00 |
| 6 | NRRA12 | 1.42 |
| 2 | NRRA13 | 3.97 |
| 17 | NRRA14 | 8.76 |
| 18 | NRRA15 | 9.87 |
| 20 | NRRA16 | 25.30 |
| 34 | W008V Rep (Formerly NRRA17 | 3.76 |
| 29 | NRRA18 | 2.64 |
| 23 | NRRA19 | 5.57 |
| 24 | NRRA20 | 10.90 |
| 84 | NRRA21 | 4.96 |
| 42 | NRRA22 | 1.61 |
| 49 | NRRA23 | 12.1 |
| 52 | NRRA24 | 11.76 |
| 55 | NRRA25 | 3.45 |
| 61 | NRRA26 | 18.1 |
| 65 | NRRA27 | 7.45 |
| 68 | NRRA28 | 6.04 |
| 71 | NRRA29 | 0.776 |
| 132 | SWS08V | 13.80 |
| 31 | S-V1054 | 0.58 |
| 1 | Cogg West Cap (Formerly TG4) | 0.05 |
| 3 | CogE-3 | 0.05 |
| 28 | Area C Cap (Formerly S-PMC244) | 0.05 |
| 88 | CCA-237 | 0.05 |
| 75 | S-L014V | 0.05 |
| 115 | 115 | 0.05 |
| 112 | 112 | 0.05 |
| 113 | 113 | 0.05 |
| | **Partial UH SWAC** | **2.67** |

**Color Codes**

| | |
|---|---|
| (green) | Locations with replicate analysis; location assigned PCB concentration value that is the average of the sample and replicate |
| (tan) | Cap Areas; location assigned PCB concentration value of 0.05 ppm |
| (yellow) | Average and SWAC values in ppm |

**Table 5**
**Final Upper Harbor SWAC**

| Regions of Upper Harbor Subtidal with Separate SWAC Calculations | SWAC by Region | Area by Region (sq ft) | Total UH Subtidal Area (sq ft) | SWAC Normailzed to Total UH Subtidal Area |
|---|---|---|---|---|
| All UH Excluding MU25 and MU28 | 2.67 | 6907410 | 7521034 | 2.5 |
| MU25 | 4.23 | 378130 | 7521034 | 0.2 |
| MU28 | 0.98 | 235494 | 7521034 | 0.03 |
| | | | Total UH SWAC | 2.7 |

**Table 6**
**Lower Harbor Confirmatory Sample Results**

| 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 |
| 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 |

**Table 6**
**Lower Harbor Confirmatory Sample Results**

| Compliance Demonstration Area | Station ID | Depth Top (feet) | Depth Bottom (feet) | Sample Date | Sample ID | Confirmatory: Total PCB Congeners[1] (mg/kg) |
|---|---|---|---|---|---|---|
| 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 |
| 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 |

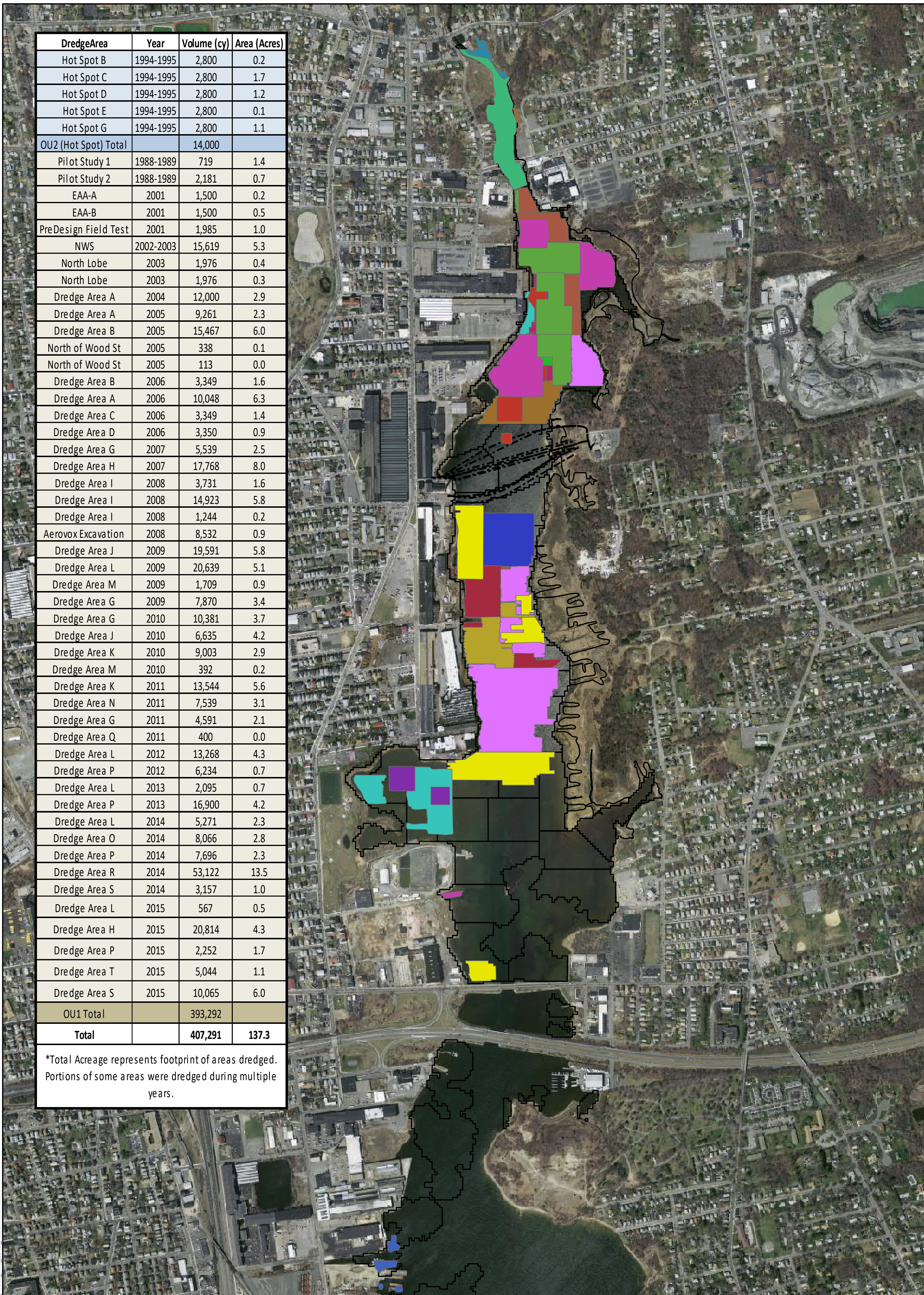
**Table 6**
**Lower Harbor Confirmatory Sample Results**

| Compliance Demonstration Area | Station ID | Depth Top (feet) | Depth Bottom (feet) | Sample Date | Sample ID | Confirmatory: Total PCB Congeners[1] (mg/kg) |
|---|---|---|---|---|---|---|
| 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.

# Attachment 1

## Areas Dredged in Upper Harbor through 2017



| DredgeArea | Year | Volume (cy) | Area (Acres) |
|---|---|---|---|
| Hot Spot B | 1994-1995 | 2,800 | 0.2 |
| Hot Spot C | 1994-1995 | 2,800 | 1.7 |
| Hot Spot D | 1994-1995 | 2,800 | 1.2 |
| Hot Spot E | 1994-1995 | 2,800 | 0.1 |
| Hot Spot G | 1994-1995 | 2,800 | 1.1 |
| OU2 (Hot Spot) Total | | 14,000 | |
| Pilot Study 1 | 1988-1989 | 719 | 1.4 |
| Pilot Study 2 | 1988-1989 | 2,181 | 0.7 |
| EAA-A | 2001 | 1,500 | 0.2 |
| EAA-B | 2001 | 1,500 | 0.5 |
| PreDesign Field Test | 2001 | 1,985 | 1.0 |
| NWS | 2002-2003 | 15,619 | 5.3 |
| North Lobe | 2003 | 1,976 | 0.4 |
| North Lobe | 2003 | 1,976 | 0.3 |
| Dredge Area A | 2004 | 12,000 | 2.9 |
| Dredge Area A | 2005 | 9,261 | 2.3 |
| Dredge Area B | 2005 | 15,467 | 6.0 |
| North of Wood St | 2005 | 338 | 0.1 |
| North of Wood St | 2005 | 113 | 0.0 |
| Dredge Area B | 2006 | 3,349 | 1.6 |
| Dredge Area A | 2006 | 10,048 | 6.3 |
| Dredge Area C | 2006 | 3,349 | 1.4 |
| Dredge Area D | 2006 | 3,350 | 0.9 |
| Dredge Area G | 2007 | 5,539 | 2.5 |
| Dredge Area H | 2007 | 17,768 | 8.0 |
| Dredge Area I | 2008 | 3,731 | 1.6 |
| Dredge Area I | 2008 | 14,923 | 5.8 |
| Dredge Area I | 2008 | 1,244 | 0.2 |
| Aerovox Excavation | 2008 | 8,532 | 0.9 |
| Dredge Area J | 2009 | 19,591 | 5.8 |
| Dredge Area L | 2009 | 20,639 | 5.1 |
| Dredge Area M | 2009 | 1,709 | 0.9 |
| Dredge Area G | 2009 | 7,870 | 3.4 |
| Dredge Area G | 2010 | 10,381 | 3.7 |
| Dredge Area J | 2010 | 6,635 | 4.2 |
| Dredge Area K | 2010 | 9,003 | 2.9 |
| Dredge Area M | 2010 | 392 | 0.2 |
| Dredge Area K | 2011 | 13,544 | 5.6 |
| Dredge Area N | 2011 | 7,539 | 3.1 |
| Dredge Area G | 2011 | 4,591 | 2.1 |
| Dredge Area Q | 2011 | 400 | 0.0 |
| Dredge Area L | 2012 | 13,268 | 4.3 |
| Dredge Area P | 2012 | 6,234 | 0.7 |
| Dredge Area L | 2013 | 2,095 | 0.7 |
| Dredge Area P | 2013 | 16,900 | 4.2 |
| Dredge Area L | 2014 | 5,271 | 2.3 |
| Dredge Area O | 2014 | 8,066 | 2.8 |
| Dredge Area P | 2014 | 7,696 | 2.3 |
| Dredge Area R | 2014 | 53,122 | 13.5 |
| Dredge Area S | 2014 | 3,157 | 1.0 |
| Dredge Area L | 2015 | 567 | 0.5 |
| Dredge Area H | 2015 | 20,814 | 4.3 |
| Dredge Area P | 2015 | 2,252 | 1.7 |
| Dredge Area T | 2015 | 5,044 | 1.1 |
| Dredge Area S | 2015 | 10,065 | 6.0 |
| OU1 Total | | 393,292 | |
| **Total** | | **407,291** | **137.3** |

*Total Acreage represents footprint of areas dredged. Portions of some areas were dredged during multiple years.

Legend

## Areas Dredged through 2015

1988-1989
1994-1995
2001
2002-2003
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015

Management Units
NSTAR Cable Crossing

Note: Dredged in Lower Harbor in 2016

N

0 450 900 Feet

1:10,800

JACOBS®

Areas Dredged in Upper Harbor through 2015

New Bedford Harbor Superfund Site

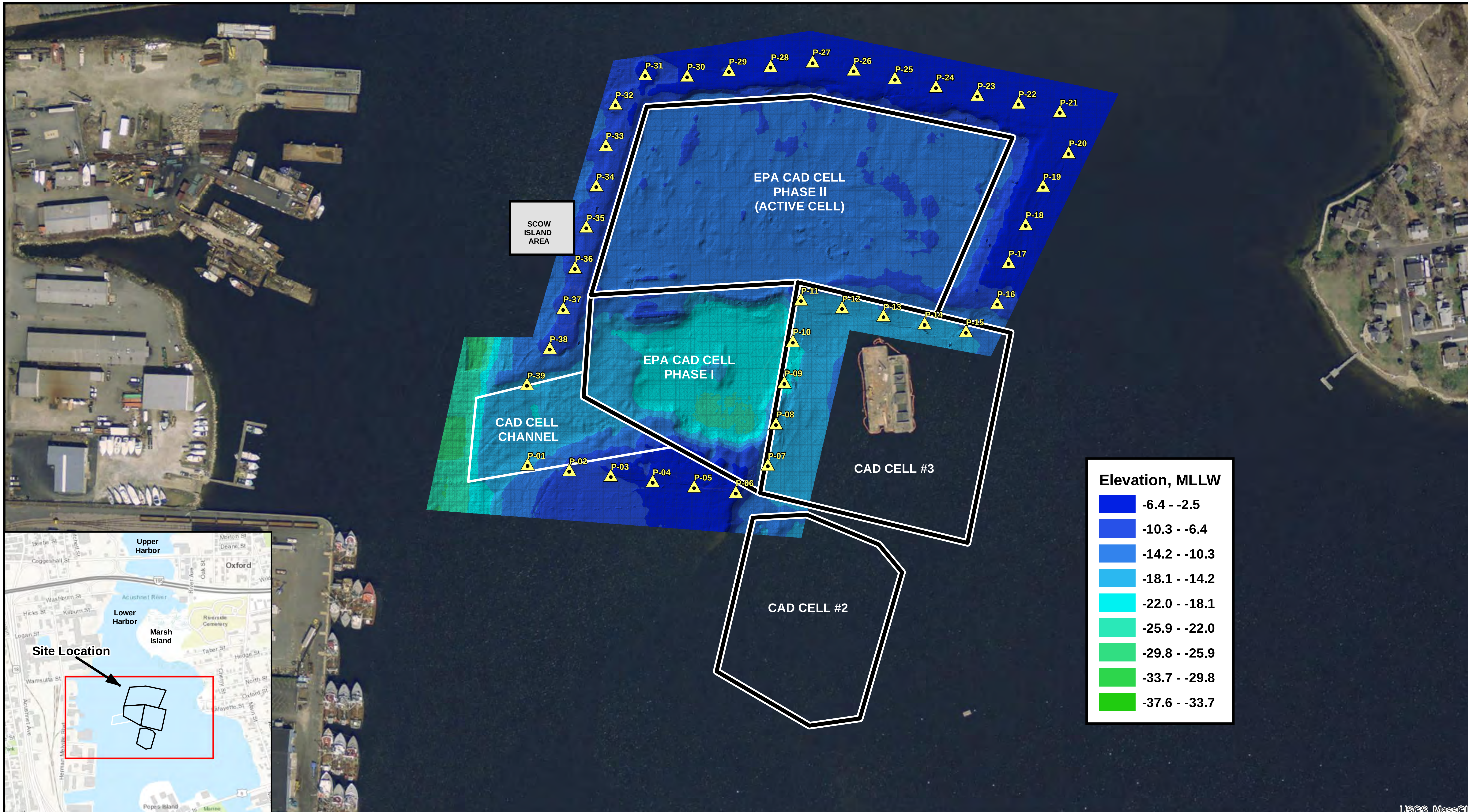
NAME: croberts Date: 9/24/2020

Attachment 1

Path: Y:\Special Assignments\New Bedford Upper Harbor Dredge Areas_thru_2015_Attachment 1.mxd

# Attachment 2

## Sediment PCB Concentration Disposed in LHCC




**Legend**

Pilings

CAD Cell Area

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors,

0 200 400 Feet

Basemap Data Source: MassGIS, ESRI

Survey Date 04/02/2020

**LHCC Fill Elevations after OU1 Dredging Material Placed and Prior to Final SER Filling**

New Bedford Harbor Superfund Site

JACOBS

**Attachment 2**

Path: Y:\NBH\Projects\35BG1001\20200812_Subtidal_RA_Report\ArcGIS\LHCC_Bathy_Final_Survey_20200917_Attachment2.mxd

# Attachment 3

## Lower Harbor CAD Cell Weighted Average PCB Concentration

## Attachment 3
## Lower Harbor CAD Cell Average PCB Concentration

| Dredge Area | Data Gap Sample ID | PCB Concentration (mg/kg) | Dredge Area Weight | Weight Applied (mg/kg) |
|---|---|---|---|---|
| MU25 | S-14D-25-1-00-10 | 480.0 | 0.0720 | 34.5 |
| | S-15A-25-2-00-10 | 21.0 | 0.0720 | 1.5 |
| | S-15A-25-3-00-10 | 140.0 | 0.0720 | 10.1 |
| | S-15A-25-4-00-10 | 260.0 | 0.0720 | 18.7 |
| | S-15A-25-5-00-10 | 240.0 | 0.0720 | 17.3 |
| | S-15A-25-5-10-20 | 280.0 | 0.0720 | 20.2 |
| | S-15A-25-6-00-10 | 240.0 | 0.0720 | 17.3 |
| | S-15A-25-7-00-10 | 10.0 | 0.0720 | 0.7 |
| MU26 | S-15M-26-1-00-10 | 110.0 | 0.0189 | 2.1 |
| | S-15M-26-12-00-10 | 44.0 | 0.0189 | 0.8 |
| | S-MU2646-18FSP8-00-04 | 17.8 | 0.0189 | 0.3 |
| | S-MU2651-18FSP8-06-11 | 86.2 | 0.0189 | 1.6 |
| | S-MU2658-18FSP8-19-24 | 0.05 | 0.0189 | 0.0 |
| | S-MU2668-18FSP8-07-12 | 0.89 | 0.0189 | 0.0 |
| | S-MU2675-18FSP8-18-23 | 0.495 | 0.0189 | 0.0 |
| | S-MU2675-18FSP8-05-08 | 156 | 0.0189 | 3.0 |
| | S-MU2676-18FSP8-06-11 | 0.23 | 0.0189 | 0.0 |
| MU27* | S-15M-27-3-00-10 | 68.3 | 0.0000 | 0.0 |
| MU28 | S-15M-28-9-00-10 | 10.6 | 0.0330 | 0.4 |
| MU29 | S-15M-29-2-00-10 | 45.0 | 0.0479 | 2.2 |
| | S-15M-29-3-00-10 | 32.0 | 0.0479 | 1.5 |
| | S-MU2948-18FSP8-00-05 | 20.2 | 0.0479 | 1.0 |
| | S-MU2949-18FSP8-03-08 | 116 | 0.0479 | 5.6 |
| | S-MU2950-18FSP8-03-08 | 147 | 0.0479 | 7.0 |
| | S-MU2954-18FSP8-00-06 | 10.9 | 0.0479 | 0.5 |
| | S-MU2955-18FSP8-00-04 | 19.2 | 0.0479 | 0.9 |
| | S-MU2955R-18FSP8-00-02-RE | 10.5 | 0.0479 | 0.5 |
| | S-MU2956-18FSP8-00-05 | 28.8 | 0.0479 | 1.4 |
| | S-MU2957-18FSP8-00-05 | 112 | 0.0479 | 5.4 |
| | S-MU2962-18FSP8-00-03 | 17.7 | 0.0479 | 0.8 |
| | S-MU2964-18FSP8-02-07 | 56.5 | 0.0479 | 2.7 |
| | S-MU2965-18FSP8-00-06 | 38.1 | 0.0479 | 1.8 |
| | S-MU2972-18FSP8-02-07 | 17.6 | 0.0479 | 0.8 |
| | S-MU2973-18FSP8-04-09 | 18.5 | 0.0479 | 0.9 |
| | S-MU2978-18FSP8-00-03 | 12.6 | 0.0479 | 0.6 |
| | S-MU2979-18FSP8-00-06 | 68.2 | 0.0479 | 3.3 |
| | S-MU2983-18FSP8-00-05 | 6.6 | 0.0479 | 0.3 |
| | S-MU2984-18FSP8-00-02 | 8.4 | 0.0479 | 0.4 |
| | S-MU2987-18FSP8-00-06 | 25.5 | 0.0479 | 1.2 |
| MU31 | S-14D-31-7A-00-10 | 36.0 | 0.0053 | 0.2 |
| | S-MU3192-18FSP8-03-08 | 9.52 | 0.0053 | 0.1 |
| | S-MU3195-18FSP8-11-16 | 3.7 | 0.0053 | 0.0 |
| | S-MU3199-18FSP8-14-19 | 14.1 | 0.0053 | 0.1 |
| | S-MU31100-18FSP8-15-20 | 0.171 | 0.0053 | 0.0 |
| MU32 (BtB) | S-15A-32-2-00-10 | 170.0 | 0.0197 | 3.4 |
| | S-15A-32-4-00-10-REP | 120.0 | 0.0197 | 2.4 |
| | S-15A-32-7-00-10 | 160.0 | 0.0197 | 3.2 |
| | S-15A-32-12-00-10 | 270.0 | 0.0197 | 5.3 |
| | S-15A-32-14-00-10 | 40.0 | 0.0197 | 0.8 |
| | S-15A-32-14-10-20 | 180.0 | 0.0197 | 3.6 |
| | S-15A-32-14-30-40 | 99.0 | 0.0197 | 2.0 |
| | S-15A-32-17-00-10 | 120.0 | 0.0197 | 2.4 |
| MU33 | S-14Y-33-4-00-07 | 54.0 | 0.0898 | 4.8 |
| | S-14Y-33-5-00-10 | 59.0 | 0.0898 | 5.3 |
| | S-14Y-33-7-00-11 | 59.0 | 0.0898 | 5.3 |
| | S-14A-33-11-00-09 | 49.0 | 0.0898 | 4.4 |
| | S-14Y-33-17-10-20 | 97.0 | 0.0898 | 8.7 |
| | S-14A-33-19-08-18 | 67.8 | 0.0898 | 6.1 |
| | S-14A-33-25-07-17 | 62.0 | 0.0898 | 5.6 |
| | S-14A-33-25-17-27 | 86.0 | 0.0898 | 7.7 |
| | S-14A-33-26-23-33 | 190.0 | 0.0898 | 17.1 |
| | S-14A-33-27-00-07 | 53.0 | 0.0898 | 4.8 |
| | S-14A-33-27-07-17 | 90.0 | 0.0898 | 8.1 |
| | S-14A-33-29-23-33 | 130.0 | 0.0898 | 11.7 |
| | S-14A-33-31-00-10 | 70.0 | 0.0898 | 6.3 |

| Area | Dredged Volume (cy) | Total Volume (cy) | % of Total |
|---|---|---|---|
| MU-25 | 27906 | 387732 | 7.20% |
| MU-26 | 7346 | 387732 | 1.89% |
| MU-27 | 0 | 387732 | 0.00% |
| MU-28 | 12806 | 387732 | 3.30% |
| MU-29 | 18553 | 387732 | 4.79% |
| MU-30 | 0 | 387732 | 0.00% |
| MU-31 | 2039 | 387732 | 0.53% |
| MU-32 (BtB) | 7649 | 387732 | 1.97% |
| MU-33 | 34809 | 387732 | 8.98% |
| MU-34 | 65585 | 387732 | 16.92% |
| MU-35 | 79503 | 387732 | 20.50% |
| MU-36 | 44890 | 387732 | 11.58% |
| MU-37 | 18589 | 387732 | 4.79% |
| L | 3044 | 387732 | 0.78% |
| P | 5888 | 387732 | 1.52% |
| R | 13088 | 387732 | 3.38% |
| S | 6303 | 387732 | 1.63% |
| PMC | 31993 | 387732 | 8.25% |
| Veranda | 3752 | 387732 | 0.97% |
| U, V, W | 1973 | 387732 | 0.51% |
| SWS | 2016 | 387732 | 0.52% |
| Total: | 387731.6 | | 100.00% |

## Attachment 3
## Lower Harbor CAD Cell Average PCB Concentration

| Dredge Area | Data Gap Sample ID | PCB Concentration (mg/kg) | Dredge Area Weight | Weight Applied (mg/kg) |
|---|---|---|---|---|
| MU34 | S-14L-34-1-00-10 | 57.0 | 0.1692 | 9.6 |
| | S-14L-34-6-00-12 | 130.0 | 0.1692 | 22.0 |
| | S-14L-34-24-30-43 | 11.0 | 0.1692 | 1.9 |
| | S-14L-34-29-20-30 | 70.0 | 0.1692 | 11.8 |
| | S-14G-34-37-35-47 | 250.0 | 0.1692 | 42.3 |
| | S-14L-34-39-10-20 | 61.3 | 0.1692 | 10.4 |
| MU35 | S-14L-35-6-00-10 | 49.0 | 0.2050 | 10.0 |
| | S-14G-35-7-00-10-DUP | 38.0 | 0.2050 | 7.8 |
| | S-14G-35-7-10-20-DUP | 60.0 | 0.2050 | 12.3 |
| | S-14L-35-8-00-12 | 38.0 | 0.2050 | 7.8 |
| | S-14L-35-8-12-24 | 73.0 | 0.2050 | 15.0 |
| | S-14L-35-9-00-10 | 35.0 | 0.2050 | 7.2 |
| | S-14L-35-9-10-20 | 66.0 | 0.2050 | 13.5 |
| | S-14L-35-17-00-09 | 59.0 | 0.2050 | 12.1 |
| | S-14G-35-21-00-10 | 30.0 | 0.2050 | 6.2 |
| | S-14G-35-21-10-20 | 130.0 | 0.2050 | 26.7 |
| | S-14G-35-36-10-20 | 61.0 | 0.2050 | 12.5 |
| | S-14G-35-52-00-10 | 16.0 | 0.2050 | 3.3 |
| | S-14G-35-52-10-20 | 61.0 | 0.2050 | 12.5 |
| | S-15A-35-52-10-20 | 25.0 | 0.2050 | 5.1 |
| | S-14G-35-63-20-30 | 68.0 | 0.2050 | 13.9 |
| | S-14D-35-74-00-10 | 16.0 | 0.2050 | 3.3 |
| | S-14D-35-76-00-10 | 16.0 | 0.2050 | 3.3 |
| MU36 | S-14A-36-1-05-15 | 98.0 | 0.1158 | 11.3 |
| | S-14A-36-10-00-06 | 120.0 | 0.1158 | 13.9 |
| | S-14G-36-12-00-12 | 140.0 | 0.1158 | 16.2 |
| | S-14G-36-13-10-20 | 300.0 | 0.1158 | 34.7 |
| | S-14G-36-15-00-06 | 49.0 | 0.1158 | 5.7 |
| | S-14G-36-17-00-08 | 48.0 | 0.1158 | 5.6 |
| | S-14G-36-29-00-05 | 63.0 | 0.1158 | 7.3 |
| | S-14G-36-37-00-10 | 78.0 | 0.1158 | 9.0 |
| | S-14G-36-39-00-10 | 5.7 | 0.1158 | 0.7 |
| | S-14G-36-39-10-20 | 54.0 | 0.1158 | 6.3 |
| | S-14G-36-40-12-20 | 12.0 | 0.1158 | 1.4 |
| | S-14D-36-57-10-20 | 98.0 | 0.1158 | 11.3 |
| | S-14D-36-63-00-10 | 54.0 | 0.1158 | 6.3 |
| | S-14D-36-76-00-10 | 76.0 | 0.1158 | 8.8 |
| MU37 | S-14G-37-14-30-40 | 94.0 | 0.0479 | 4.5 |
| | S-14D-37-37-10-20 | 19.0 | 0.0479 | 0.9 |
| | S-14D-37-37-30-40 | 74.0 | 0.0479 | 3.5 |
| Area L | S-L010-18FSP6-05-10 | 57.8 | 0.0078 | 0.5 |
| | S-L026-18FSP6-00-06 | 61.0 | 0.0078 | 0.5 |
| | S-L028-18FSP6-00-05 | 34.6 | 0.0078 | 0.3 |
| | S-L029-18FSP6-00-05 | 29.2 | 0.0078 | 0.2 |
| | S-L030-18FSP6-05-10 | 63.8 | 0.0078 | 0.5 |
| | S-L037-18FSP6-07-12 | 59.5 | 0.0078 | 0.5 |
| | S-L055-18FSP6-00-05 | 23.2 | 0.0078 | 0.2 |
| | S-L069-18FSP6-23-28 | 30.9 | 0.0078 | 0.2 |
| | S-L136-18FSP6-00-05 | 24.7 | 0.0078 | 0.2 |
| Area P | 18FSP6-00-04 | 24.8 | 0.0152 | 0.4 |
| | 18FSP6-00-06 | 26.9 | 0.0152 | 0.4 |
| | 18FSP6-07-12 | 11.9 | 0.0152 | 0.2 |
| | 18FSP6-05-10 | 7.3 | 0.0152 | 0.1 |
| | 18FSP6-00-05 | 48.8 | 0.0152 | 0.7 |
| | 18FSP6-00-04 | 4.6 | 0.0152 | 0.1 |
| | 18FSP6-03-08 | 38.3 | 0.0152 | 0.6 |
| | S-P097-18FSP6-00-05 | 43.7 | 0.0152 | 0.7 |
| | S-P110-18FSP6-10-15 | 14.5 | 0.0152 | 0.2 |
| | S-P112-18FSP6-00-04 | 4.4 | 0.0152 | 0.1 |
| | S-P114-18FSP6-00-05 | 47.6 | 0.0152 | 0.7 |

## Attachment 3
## Lower Harbor CAD Cell Average PCB Concentration

| Dredge Area | Data Gap Sample ID | PCB Concentration (mg/kg) | Dredge Area Weight | Weight Applied (mg/kg) |
|---|---|---|---|---|
| Area R | S-R020-18FSP7-00-05 | 8.8 | 0.0338 | 0.3 |
| | S-R021-18FSP7-00-05 | 49.7 | 0.0338 | 1.7 |
| | S-R027-18FSP7-00-05 | 31.0 | 0.0338 | 1.0 |
| | S-R036R-18FSP7-00-06-REP | 48.3 | 0.0338 | 1.6 |
| | S-R037-18FSP7-00-04 | 8.9 | 0.0338 | 0.3 |
| | S-R041-18FSP7-06-11 | 24.7 | 0.0338 | 0.8 |
| | S-R043-18FSP7-00-05 | 39.7 | 0.0338 | 1.3 |
| | S-R051-18FSP7-07-12 | 38.1 | 0.0338 | 1.3 |
| | S-R054-18FSP7-08-13 | 11.7 | 0.0338 | 0.4 |
| | S-R057-18FSP7-21-26 | 21.3 | 0.0338 | 0.7 |
| | S-R059-18FSP7-00-06 | 66.8 | 0.0338 | 2.3 |
| | S-R060-18FSP7-07-12 | 44.5 | 0.0338 | 1.5 |
| | S-R063-18FSP7-00-05 | 33.1 | 0.0338 | 1.1 |
| | S-R067-18FSP7-08-13 | 38.3 | 0.0338 | 1.3 |
| | S-R072-18FSP7-00-05 | 9.8 | 0.0338 | 0.3 |
| | S-R079-18FSP7-14-19 | 0.0 | 0.0338 | 0.0 |
| | S-R085-18FSP7-13-18 | 36.9 | 0.0338 | 1.2 |
| | S-R086-18FSP7-14-19 | 15.6 | 0.0338 | 0.5 |
| | S-R087-18FSP7-09-14 | 21.6 | 0.0338 | 0.7 |
| | S-R090-18FSP7-06-11 | 37.8 | 0.0338 | 1.3 |
| | S-R094-18FSP7-06-11 | 46.5 | 0.0338 | 1.6 |
| | S-R095-18FSP7-00-05 | 18.4 | 0.0338 | 0.6 |
| | S-R101-18FSP7-00-04 | 8.9 | 0.0338 | 0.3 |
| | S-R102-18FSP7-00-03 | 7.0 | 0.0338 | 0.2 |
| | S-R103-18FSP7-16-21 | 27.1 | 0.0338 | 0.9 |
| | S-R108-18FSP7-00-05 | 18.3 | 0.0338 | 0.6 |
| | S-R109-18FSP7-00-04 | 10.6 | 0.0338 | 0.4 |
| | S-R110-18FSP7-10-15 | 7.3 | 0.0338 | 0.2 |
| | S-R112-18FSP7-00-05 | 21.4 | 0.0338 | 0.7 |
| | S-R115-18FSP7-08-13 | 0.0 | 0.0338 | 0.0 |
| | S-R116-18FSP7-00-05 | 7.9 | 0.0338 | 0.3 |
| | S-R119-18FSP7-00-04 | 36.9 | 0.0338 | 1.2 |
| | S-R123-18FSP7-00-05 | 60.7 | 0.0338 | 2.0 |
| | S-R124-18FSP7-10-15 | 0.1 | 0.0338 | 0.0 |
| | S-R128-18FSP7-00-05 | 50.1 | 0.0338 | 1.7 |
| | S-R129-18FSP7-00-05 | 33.2 | 0.0338 | 1.1 |
| | S-R130-18FSP7-00-05 | 45.6 | 0.0338 | 1.5 |
| | S-R131-18FSP7-00-05 | 58.4 | 0.0338 | 2.0 |
| | S-R134-18FSP7-12-17 | 32.9 | 0.0338 | 1.1 |
| | S-R141-18FSP7-00-05 | 25.7 | 0.0338 | 0.9 |
| | S-R145-18FSP7-00-05 | 20.5 | 0.0338 | 0.7 |
| | S-R146-18FSP7-00-05 | 15.0 | 0.0338 | 0.5 |
| Area S | S-S5004-18FSP7-00-06 | 35.3 | 0.0163 | 0.6 |
| | S-S5009-18FSP7-11-16 | 30.0 | 0.0163 | 0.5 |
| | S-S5010-18FSP7-06-11 | 6.2 | 0.0163 | 0.1 |
| | S-S5016-18FSP7-00-05 | 17.2 | 0.0163 | 0.3 |
| | S-S5017-18FSP7-09-14 | 31.4 | 0.0163 | 0.5 |
| | S-S5020-18FSP7-08-13 | 19.0 | 0.0163 | 0.3 |
| | S-S5021-18FSP7-09-14 | 57.3 | 0.0163 | 0.9 |
| | S-S5022-18FSP7-23-28 | 38.9 | 0.0163 | 0.6 |
| | S-S5024-18FSP7-07-12 | 24.6 | 0.0163 | 0.4 |
| | S-S5028-18FSP7-00-03 | 39.9 | 0.0163 | 0.6 |
| | S-S5032-18FSP7-23-28 | 38.1 | 0.0163 | 0.6 |
| | S-S5038-18FSP7-22-27 | 16.7 | 0.0163 | 0.3 |
| | S-S5041-18FSP7-00-05 | 21.1 | 0.0163 | 0.3 |
| | S-S5048-18FSP7-00-05 | 12.2 | 0.0163 | 0.2 |
| | S-S5069-18FSP7-06-11 | 20.3 | 0.0163 | 0.3 |
| | S-S5075-18FSP7-06-11 | 23.3 | 0.0163 | 0.4 |
| | S-S5076-18FSP7-00-05 | 26.4 | 0.0163 | 0.4 |
| | S-S5082-18FSP7-26-31 | 118.0 | 0.0163 | 1.9 |

## Attachment 3
## Lower Harbor CAD Cell Average PCB Concentration

| Dredge Area | Data Gap Sample ID | PCB Concentration (mg/kg) | Dredge Area Weight | Weight Applied (mg/kg) |
|---|---|---|---|---|
| PMC | S-PMC023-18FSP7-00-05 | 38.5 | 0.0825 | 3.2 |
| | S-PMC026-18FSP7-08-13 | 1.8 | 0.0825 | 0.2 |
| | S-PMC030-18FSP7-06-11 | 4.7 | 0.0825 | 0.4 |
| | S-PMC035-18FSP7-07-12 | 31.6 | 0.0825 | 2.6 |
| | S-PMC036-18FSP7-00-05 | 110.0 | 0.0825 | 9.1 |
| | S-PMC039-18FSP7-06-11 | 0.9 | 0.0825 | 0.1 |
| | S-PMC040-18FSP7-18-23 | 115.0 | 0.0825 | 9.5 |
| | S-PMC041-18FSP7-16-21 | 34.7 | 0.0825 | 2.9 |
| | S-PMC042-18FSP7-26-31 | 120.0 | 0.0825 | 9.9 |
| | S-PMC043-18FSP7-06-11 | 65.3 | 0.0825 | 5.4 |
| | S-PMC044-18FSP7-06-11 | 94.1 | 0.0825 | 7.8 |
| | S-PMC046-18FSP7-08-13 | 138.0 | 0.0825 | 11.4 |
| | S-PMC048-18FSP7-07-12 | 72.9 | 0.0825 | 6.0 |
| | S-PMC049-18FSP7-08-13 | 96.1 | 0.0825 | 7.9 |
| | S-PMC050-18FSP7-08-13 | 40.1 | 0.0825 | 3.3 |
| | S-PMC051-18FSP7-11-16 | 11.9 | 0.0825 | 1.0 |
| | S-PMC052-18FSP7-06-11 | 93.7 | 0.0825 | 7.7 |
| | S-PMC055-18FSP7-16-21 | 51.3 | 0.0825 | 4.2 |
| | S-PMC057-18FSP7-21-26 | 44.9 | 0.0825 | 3.7 |
| | S-PMC058-18FSP7-09-14 | 56.5 | 0.0825 | 4.7 |
| | S-PMC061-18FSP7-24-29 | 14.2 | 0.0825 | 1.2 |
| | S-PMC063-18FSP7-06-11 | 223.0 | 0.0825 | 18.4 |
| | S-PMC065-18FSP7-08-13 | 11.6 | 0.0825 | 1.0 |
| | S-PMC065R-18FSP7-13-18-RE | 19.5 | 0.0825 | 1.6 |
| | S-PMC067-18FSP7-09-14 | 9.2 | 0.0825 | 0.8 |
| | S-PMC069-18FSP7-07-12 | 13.6 | 0.0825 | 1.1 |
| | S-PMC070-18FSP7-09-14 | 33.2 | 0.0825 | 2.7 |
| | S-PMC071-18FSP7-08-13 | 53.8 | 0.0825 | 4.4 |
| | S-PMC072-18FSP7-23-28 | 28.2 | 0.0825 | 2.3 |
| | S-PMC074-18FSP7-08-13 | 68.6 | 0.0825 | 5.7 |
| | S-PMC078-18FSP7-00-05 | 11.2 | 0.0825 | 0.9 |
| | S-PMC079-18FSP7-00-05 | 34.4 | 0.0825 | 2.8 |
| | S-PMC080-18FSP7-13-18 | 50.3 | 0.0825 | 4.2 |
| | S-PMC082-18FSP7-06-11 | 35.3 | 0.0825 | 2.9 |
| | S-PMC084-18FSP7-25-30 | 82.2 | 0.0825 | 6.8 |
| | S-PMC085-18FSP7-21-26 | 20.8 | 0.0825 | 1.7 |
| | S-PMC087-18FSP7-16-21 | 12.1 | 0.0825 | 1.0 |
| | S-PMC088-18FSP7-08-13 | 70.0 | 0.0825 | 5.8 |
| | S-PMC091-18FSP7-08-13 | 21.7 | 0.0825 | 1.8 |
| | S-PMC093-18FSP7-10-15 | 33.1 | 0.0825 | 2.7 |
| | S-PMC095-18FSP7-20-25 | 52.4 | 0.0825 | 4.3 |
| | S-PMC097-18FSP7-00-05 | 97.1 | 0.0825 | 8.0 |
| | S-PMC098-18FSP7-12-17 | 13.5 | 0.0825 | 1.1 |
| | S-PMC113-18FSP7-10-15 | 19.8 | 0.0825 | 1.6 |
| | S-PMC119-18FSP7-08-13 | 14.7 | 0.0825 | 1.2 |
| Veranda Inlet | INT348 | 30.6 | 0.0097 | 0.3 |
| | S-163 | 1.2 | 0.0097 | 0.0 |
| | S-3589 | 1.5 | 0.0097 | 0.0 |
| | INT345 | 95.7 | 0.0097 | 0.9 |

## Attachment 3
## Lower Harbor CAD Cell Average PCB Concentration

| Dredge Area | Data Gap Sample ID | PCB Concentration (mg/kg) | Dredge Area Weight | Weight Applied (mg/kg) |
|---|---|---|---|---|
| U | NRRA-07 | 26.7 | 0.0051 | 0.1 |
| | MU2987 | 25.5 | 0.0051 | 0.1 |
| V | NRRA-11 | 42.7 | 0.0051 | 0.2 |
| W | NRRA-17 | 24.8 | 0.0051 | 0.1 |
| SWS | SWS002 | 135.0 | 0.0052 | 0.7 |
| | SWS004 | 172.0 | 0.0052 | 0.9 |
| | FS-38 | 33.0 | 0.0052 | 0.2 |
| | C015-055 | 140.0 | 0.0052 | 0.7 |
| | SWS005 | 69.0 | 0.0052 | 0.4 |
| | S-NWS01 | 239.0 | 0.0052 | 1.2 |
| | SWS006 | 134.0 | 0.0052 | 0.7 |
| | SWS007 | 97.0 | 0.0052 | 0.5 |
| | SWS009 | 121.0 | 0.0052 | 0.6 |
| | SWS014 | 42.0 | 0.0052 | 0.2 |
| | | | | 954.0 |

**Average =** **57.0**
**Median=** **38.1**
**Volume Weighted Average =** 86.7 *Calculation excludes concentrations from MUs 27 and 30

Volume weighted average = total of weighted concentrations (954.0) / number of MUs (11**)
** 2 of the 13 MUs have no dredge volume associated with them and therefore are not included.

Notes:
(1) 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). and post-dredge bathymetric surveys for Dredge Areas L, P, R, S, PMC, Veranda, U, V, W and SWS
(2) 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).
(3) 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) The data provided for SWS samples are IA data with a correction facor of 1.5 applied by Lally Inc. to design dredge prism.
(5) Based on the source table for dredge volume, no volume has been added to the CAD Cell from MUs 27, 30 (not dredged).
(6) Between the Bridges (BtB) data are identified in the Volume Calculations as MU32, which was the previous designation for this area.
(7) Below calculations updated to reflect updated dataset and volumes. Additional deviations from what was done previously denoted by asterisks.