# BLUE HILL HARBOR
# MAINE
# NAVIGATION IMPROVEMENT PROJECT

# APPENDIX H

# SUITABILITY DETERMINATION
# FOR DREDGED MATERIAL DISPOSAL

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CENAE–PDE October 29, 2018

**Memorandum For:** William Bartlett, Project Manager, CENAE-PDP

**Subject:** Suitability Determination for the Blue Hill Harbor Navigation Improvement Project, Blue Hill, Maine.

1. **Summary:**

This memorandum addresses the suitability of material to be dredged from the proposed Blue Hill Harbor Navigation Improvement Project for openwater disposal. The New England District (NAE) of the U.S. Army Corps of Engineers (USACE) finds that sufficient data has been provided to satisfy the evaluation and testing requirements of Section 404 of the Clean Water Act (CWA). Based on an evaluation of the project site and the material proposed to be dredged, portions of these sediments are suitable for placement at the proposed location with the constraints outlined below.

2. **Project Description:**

NAE is evaluating the feasibility of establishing a Federal navigation channel and turning basin in Blue Hill, Maine. The proposed plan includes the construction of an 80 foot wide channel and a one acre turning basin to allow for full time vessel access to the town wharf as shown on Figure 1. The channel would extent 2,500 feet southeast to naturally deep water in the outer harbor and be dredged to -6 feet mean lower low water (MLLW) plus 1 foot of allowable overdepth. This is expected to produce a volume of 73,000 cubic yards of mixed gravel, sand, silt, and clay. The material will be mechanically dredged and suitable material will be placed at the Eastern Passage Disposal Site (EPDS) in Blue Hill Bay. Any material found unsuitable for openwater placement will be placed in a newly constructed confined aquatic disposal (CAD) cell in the inner harbor.

3. **Conceptual Site Model:**

NAE reviewed data from previous environmental investigations, analyzed current and historical land-use around the harbor, and interviewed local officials to develop a conceptual site model (CSM) for the improvement project which is depicted in Figure 2. NAE used the CSM to characterize the system and identify potential sources of contamination and any site-specific contaminants of concern (COCs) to inform the sampling, testing, and analysis of the project site.

Blue Hill Harbor is located in the northwest end of Blue Hill Bay and is separated from the bay by a 300 foot wide passage between Parker Point and Sculpin Point in Blue Hill. The inner harbor contains the town wharf, docks, and loading facilities but is inaccessible to vessel traffic for several hours around low tide every day.

The waters of Blue Hill Harbor and Blue Hill Bay are classified as Class SB by the State of Maine (MEDEP 2012). Designated uses for Class SB waters include contact recreation, fishing, aquaculture, harvesting shellfish, and habitat for fish and marine life. Mill Stream, the major freshwater tributary to the harbor, and all minor tributaries to the harbor are considered Class B (MEDEP 2012). Class B freshwater resources are managed to attain good physical, chemical, and biological water quality.

Land use around the harbor is primarily low density residential houses along with several retail shops, restaurants, and the Blue Hill Memorial Hospital. The Blue Hill Fire Department and municipal waste water treatment plant are located adjacent to the town wharf. There are two automotive garages on Main Street near the head of the harbor that were former gas stations. The Maine Department of Environmental Protection (MEDEP) Environmental and Geographic Analysis Database (EGAD) documented the removal of multiple gasoline and diesel underground storage tanks (USTs) and one reported gasoline discharge from these properties.

NAE proposes to place suitable dredged material from the improvement project at EPDS. EPDS is located in outer Blue Hill Bay approximately 14 miles from Blue Hill Harbor and is monitored by NAE's Disposal Area Monitoring System (DAMOS) Program. The last DAMOS monitoring survey of EPDS was in 2012 after placement of material from the maintenance and improvement dredging of Bass Harbor in 2010-2011 (Carey et al 2013).

NAE proposes to place any unsuitable dredged material from the improvement project into a newly constructed CAD cell in the inner harbor of Blue Hill (Figure 3). CAD cells have been used as a disposal alternative for unsuitable dredged material since the 1980's and are currently in use in multiple harbors in New England and across the country. The technique involves excavating a depression below the seafloor, placing the unsuitable material into the depression, and covering the unsuitable material with a cap layer to contain and sequester the unsuitable material from the environment (Figure 4). Multiple maintenance dredging and navigation improvement projects have utilized CAD cells to successfully manage unsuitable dredged material while limiting environmental risk, material handling, and transportation costs. NAE's DAMOS program has regularly monitored and evaluated CAD cells throughout New England and has documented their stability and performance (USACE 2012a, USACE 2012b, ENSR 2007).

Based on a review of available data, and communication with local officials, NAE determined that there are no known recent spills in the vicinity of the project area other than the UST and gasoline spill history noted above.

Following this Tier 1 review of the site characteristics and the available historical data, NAE assigned the project a low-moderate risk ranking according to the following matrix (adapted from USACE 2014):

| **Rank** | **Guidelines** |
|---|---|
| Low | Few or no sources of contamination. Data available to verify no significant potential for adverse biological effects. |
| Low-Moderate | Few or no sources of contamination but existing data is insufficient to confirm ranking. |
| Moderate | Contamination sources with the potential to produce chemical concentrations that may cause adverse biological effects exist within the vicinity of the project. |
| High | Known sources of contamination within the project area and historical data exist that previously failed biological testing. |

4. **Sampling, Testing, and Analysis:**

NAE prepared a sampling and analysis plan (SAP) for the project on 23 October 2015 based on the low-moderate ranking for the Blue Hill Harbor Navigation Improvement Project. NAE coordinated this plan with the U.S. Environmental Protection Agency Region 1 (USEPA), the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and MEDEP.

On 28 October 2015 NAE collected sediment vibracores from seven locations throughout the proposed dredging area identified as Stations A through G on Figure 1. NAE personnel described each sediment core in the field and composited the length of each individual core for analysis of grain size, total solids, and water content. NAE then composited the core samples according to the plan outlined in the SAP for chemical analysis of the contaminants of concern (COC) specified in the Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters (RIM, USACE/EPA 2004).

The sediments in the outer portion of the proposed channel (Stations A, B, and C) were predominantly poorly graded fine to coarse sands with overlying marine clay deposits. There was fine woody organic debris in all three cores from this area. Core penetration at the inner harbor stations (D, E, F, and G) was limited due to gravel and coarse sand deposits near the sediment surface and was 2.0 feet or less at Stations D, F, and G. Grain size results are presented in Table 1.

**Table 1. Physical Testing Results from Blue Hill Harbor Sediment Cores (October 2015)**

| Sample ID | % Cobble | % Gravel | % Coarse Sand | % Medium Sand | % Fine Sand | % Total Fines | % Moisture |
|---|---|---|---|---|---|---|---|
| **A** | 0.1 (U) | 0.1 | 2.2 | 6.6 | 21.6 | 69.5 | 55.3 |
| **B** | 0.1 (U) | 0.1 (U) | 1.7 | 3.5 | 7.4 | 87.4 | 51.2 |
| **C** | 0.1 (U) | 1.1 | 1.9 | 4.9 | 12.1 | 80 | 54.5 |
| **D** | 0.1 (U) | 4.4 | 13.2 | 34.8 | 35 | 12.6 | 19.6 |
| **E** | 0.1 (U) | 1.8 | 8.8 | 26.7 | 37.9 | 24.8 | 33.2 |
| **F** | 0.1 (U) | 5 | 14 | 30.6 | 29.8 | 20.6 | 26.8 |
| **G** | 0.1 (U) | 45.9 | 12.4 | 16.7 | 16.2 | 8.8 | 21.4 |

U = Non-detected analytes are reported as the RL and qualified with a "U".

No polychlorinated biphenyls (PCBs) or pesticide analytes were detected above the method detection limit in the harbor samples with the exception of individual compounds in Composite DE. There were detectable concentrations of polycyclic aromatic hydrocarbons (PAHs) and metals in all four composite samples. To examine the harbor concentrations in an ecologically meaningful context, NAE screened the values with Sediment Quality Guidelines (SQGs). Applicable SQG screening values for marine and estuarine sediments are the National Oceanic and Atmospheric Administration (NOAA) effects-range low (ERL) and effects-range median (ERM). ERL/ERM values are empirically derived guidelines that identify contaminant levels that indicate when toxic effects are unlikely (ERL) and when an increased probability of toxic effects is evident (ERM).

No COCs in Composite A or BC exceeded the ERL value as shown on Table 2. All COCs in Composite DE and FG were also below the ERL value with the exception PAHs which were above the ERL in Composite DE and above the ERM in Composite FG (Table 2). This suggests that a toxic response from exposure to sediments from Composite A or BC would be highly unlikely but there is increased potential for a toxic response from exposure to sediments from Composites DE and FG due to elevated PAHs.

**Table 2. Chemical Testing Results from Blue Hill Harbor Sediment Cores and Sediment Quality Guidelines (October 2015)**

| Chemical or Class | ERL | ERM | Unit | COMP A | COMP BC | COMP DE | COMP FG |
|---|---|---|---|---|---|---|---|
| Arsenic | 8.2 | 70 | mg/kg | 4.5 | 7.7 | 5.2 | 6.3 |
| Cadmium | 1.2 | 9.6 | mg/kg | 0.6 | 0.8 | 0.1 | 0.2 |
| Chromium | 81 | 370 | mg/kg | 21.1 | 30.9 | 12.3 | 10.8 |
| Copper | 34 | 270 | mg/kg | 17.6 | 16.5 | 14.3 | 6.9 |
| Lead | 46.7 | 218 | mg/kg | 21.7 | 21.8 | 23.0 | 10.5 |
| Mercury | 0.15 | 0.71 | mg/kg | 0.03 | 0.03 | 0.02 | 0.02 |
| Zinc | 150 | 410 | mg/kg | 54.2 | 64.1 | 40.6 | 37.9 |
| HMW PAH* | 1,700 | 9,600 | µg/kg | 879 | 629 | 3,703 | 20,089 |
| HMW PAH* | 552 | 3,160 | µg/kg | 165 | 123 | 646 | 7,388 |
| Total PCBs* | 22.7 | 180 | µg/kg | 9.36 | 5.99 | 8.03 | 6.17 |
| Total DDT* | 1.58 | 46.1 | µg/kg | 0.8 | 0.7 | 0.9 | 0.5 |

*For total values non-detects calculated as half the reporting limit

NAE reviewed results from the initial round of testing and performed a second sampling effort on 10 May 2016 to better define the vertical and spatial extent of the elevated PAH concentrations around Composites DE and FG. NAE collected push cores at low tide from ten stations in the inner harbor and one location at the mouth of the each of the three tributaries as shown on Figure 5. Similar to the vibracore effort core penetration with this sampling method was limited to approximately 2 feet for this area of the harbor. NAE personnel described the push cores in the field and then collected discrete subsamples for PAH analysis from the top six inches and from six inches to the end of each core. Results from this analysis showed no discernable pattern for the spatial distribution of PAHs in the harbor (Appendix A).

Due to the inability to penetrate inner harbor sediments to the design depth and determine the vertical extent of the elevated PAH concentrations the Town of Blue Hill dug four test pits in October 2016 (Figure 6). The Town's contractor placed timber mats across the harbor at low tide and used an excavator to dig 4-9 foot deep test pits at predetermined locations. NAE personnel were on-site to describe the lithology of the pit walls and subsample the sediment in two foot horizons for PAH analysis. Results from this analysis are presented in Appendix A and showed that the extent of PAH contamination is limited to the upper two feet of the inner harbor sediments.

5. **Evaluation of Dredged Material:**

The placement of sediments at the Eastern Passage Disposal Site is regulated under Section 404 of the Clean Water Act (CWA). Subpart G of the Section 404(b)(1), Guidelines for Specification of Disposal Sites for Dredged or

Fill Material describes the procedures for conducting this evaluation, including any relevant testing that may be required.

The material from the Blue Hill Harbor Navigation Improvement Project was evaluated for placement at EPDS according to §230.61 (Chemical, Biological, and Physical Evaluation and Testing) of the CWA and the Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual (EPA/USACE 1998). The conceptual site model identified the uptake of contaminants from the water column during placement, and the uptake of placed dredged material by benthic organisms, as the primary exposure pathways for the harbor sediments.

NAE evaluated potential water quality effects by modeling the release of contaminants from dredged sediments during the disposal process at EPDS. To determine if the discharge of dredged material would attain compliance with Water Quality Standards, NAE performed a Tier II evaluation following the procedure outlined in the RIM. This evaluation utilizes the Short-Term Fate (STFATE) numerical model to analyze the physical behavior of a disposal cloud as it descends through the water column after release from a barge. Results of the STFATE evaluation predicted that the water column would attain State of Maine Water Quality Standards within four hours of disposal and therefore meet the criteria in the testing protocol.

NAE evaluated potential effects on the benthic environment through an assessment of the physical and chemical conditions of the proposed dredged material. No PCB or pesticide analytes were detected above the method reporting limit in the harbor sediments with the exception of individual compounds in Composite DE. PAHs and metals were detected in the sediment samples from the harbor but metal concentrations in all composites, and PAH concentrations in Composites A and BC, were below the ERL. These results suggest that a toxic response from exposure to these sediments would be highly unlikely and the material can be considered environmentally acceptable with no further testing.

PAH concentrations were above the ERL in Composite DE and above the ERM in Composite FG which suggests an elevated risk for toxicity from exposure to these sediments. Further sampling of the harbor revealed that the PAH signature is limited to the upper two feet of sediment with non-detect or near non-detect values below that horizon. This equates to approximately 10,500 cubic yards of material from the inner harbor with an increased potential to cause toxicity.

Based on an evaluation of the physical and chemical properties of the proposed dredged material NAE determined that additional testing of the Blue Hill Harbor sediments was not required to confirm the suitability of the material for openwater placement with the exception of the material from the upper two feet of the inner harbor.

6. **Suitability Determination:**

NAE evaluated the sediment from the Blue Hill Harbor Navigation Improvement Project through §230.61 of the CWA and found the material suitable for openwater placement at EPDS with the exception of 10,500 cubic yards of material from the upper two feet of the inner harbor. The sediment from this portion of the harbor is not suitable for openwater placement due to elevated PAH concentrations. NAE proposes to contain the unsuitable material in a newly constructed CAD cell. The material excavated to create the CAD cell is outside of the elevated PAH footprint, adjacent to Composites A and BC, and is suitable for openwater placement at ELDS.

Approximately 10,500 cubic yards of unsuitable dredged material will be disposed in the proposed CAD cell and approximately 8,750 cubic yards of suitable dredged material will be used as the CAD cell cap layer. The remaining 53,750 cubic yards of project material, plus approximately 15,500 cubic yards of material excavated to create the proposed CAD cell, will be placed at EPDS. Bringing the total volume to be placed at EPDS to 69,250 cubic yards.

Copies of this determination were sent to USEPA and Maine DEP who concurred with the findings.

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USACE – New England District

Joseph Mackay
Chief
Environmental Resources Section
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7. **References:**

Carey, D.A.; Hickey, K.; Germano, J.D.; Read, L.B.; Esten, M.E. 2013. Monitoring Survey at the Eastern Passage Disposal Site, October 2012. DAMOS Contribution 194. U.S. Army Corps of Engineers, New England District, Concord, MA.

ENSR 2007. Monitoring Surveys at the Boston Harbor CAD Cells, August 2004. DAMOS Contribution 168. U.S. Army Corps of Engineers, New England District, Concord, MA.

EPA/USACE 2004. Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters. U.S. EPA Region 1, Boston, MA/U.S. Army Corps of Engineers, New England District, Concord, MA.

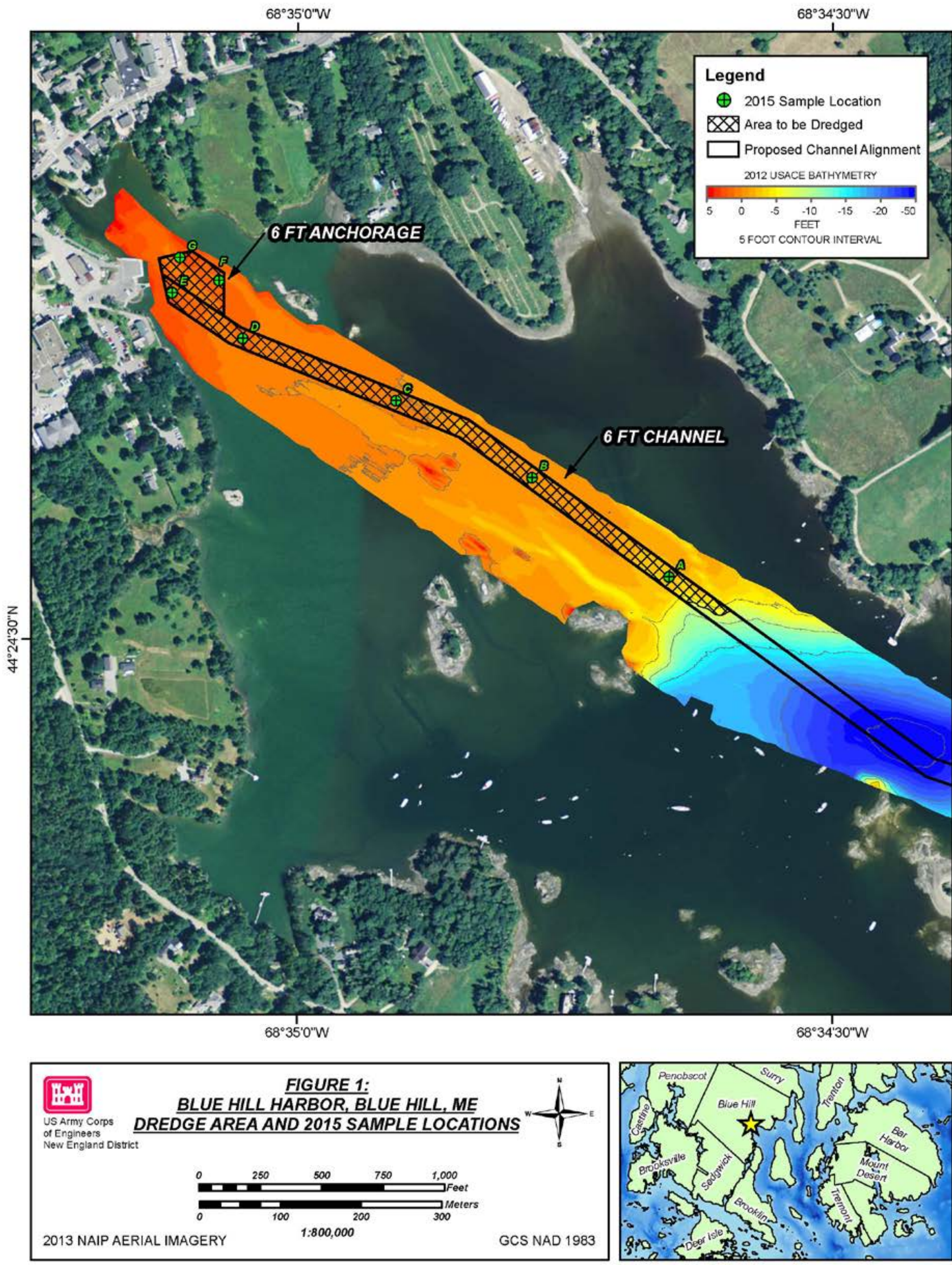
EPA/USACE 1998. Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual. U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology, Washington, D.C./Department of the Army, U.S. Army Corps of Engineers, Operations, Construction and Readiness Division, Washington, D.C.

MEDEP 2012. Integrated Water Quality Monitoring and Assessment Report. State of Maine, Department of Environmental Protection. DEPLW-1246.

USACE 2014. Dredged Material Evaluation and Disposal Procedures, User Manual. Dredged Material Management Program, U.S. Army Corps of Engineers, Seattle District.

USACE 2012a. Monitoring Surveys of New England CAD Cells, October 2009. DAMOS Contribution 185. U.S. Army Corps of Engineers, New England District, Concord, MA.

USACE 2012b. Monitoring Survey of the Boston Harbor CAD Cells, November 2009. DAMOS Contribution 186. U.S. Army Corps of Engineers, New England District, Concord, MA.


68°35'0"W
68°34'30"W
44°24'30"N
Legend
2015 Sample Location
Area to be Dredged
Proposed Channel Alignment
2012 USACE BATHYMETRY
5 0 -5 -10 -15 -20 -50
FEET
5 FOOT CONTOUR INTERVAL
6 FT ANCHORAGE
6 FT CHANNEL
A
B
C
D
E
F
G
US Army Corps of Engineers New England District
FIGURE 1:
BLUE HILL HARBOR, BLUE HILL, ME
DREDGE AREA AND 2015 SAMPLE LOCATIONS
0 250 500 750 1,000 Feet
0 100 200 300 Meters
1:800,000
2013 NAIP AERIAL IMAGERY
GCS NAD 1983
Penobscot
Surry
Blue Hill
Trenton
Castine
Brooksville
Sedgwick
Bar Harbor
Mount Desert
Tremont
Brooklin
Deer Isle

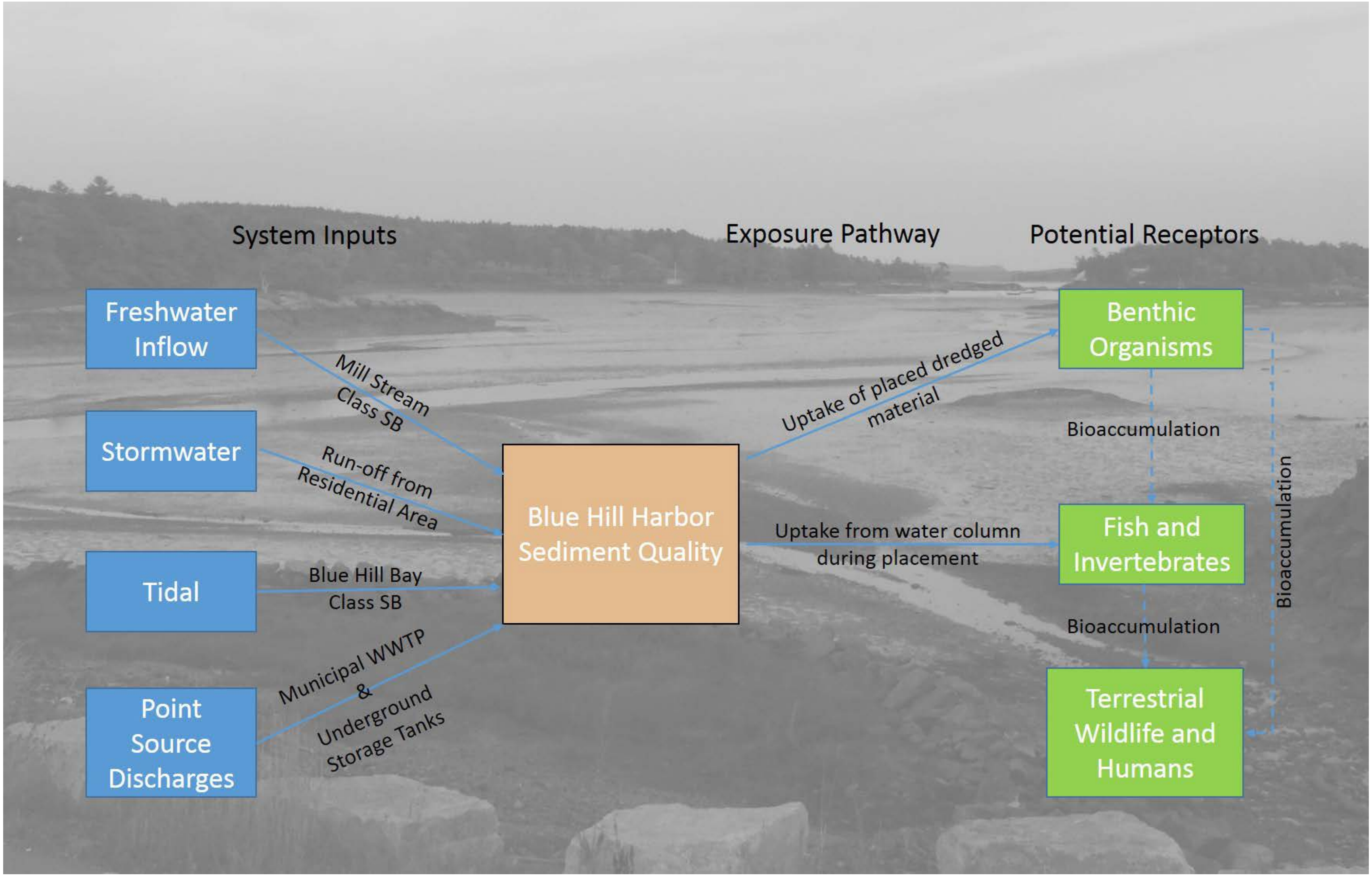



**Figure 2. Blue Hill Harbor Conceptual Site Model**

H-10

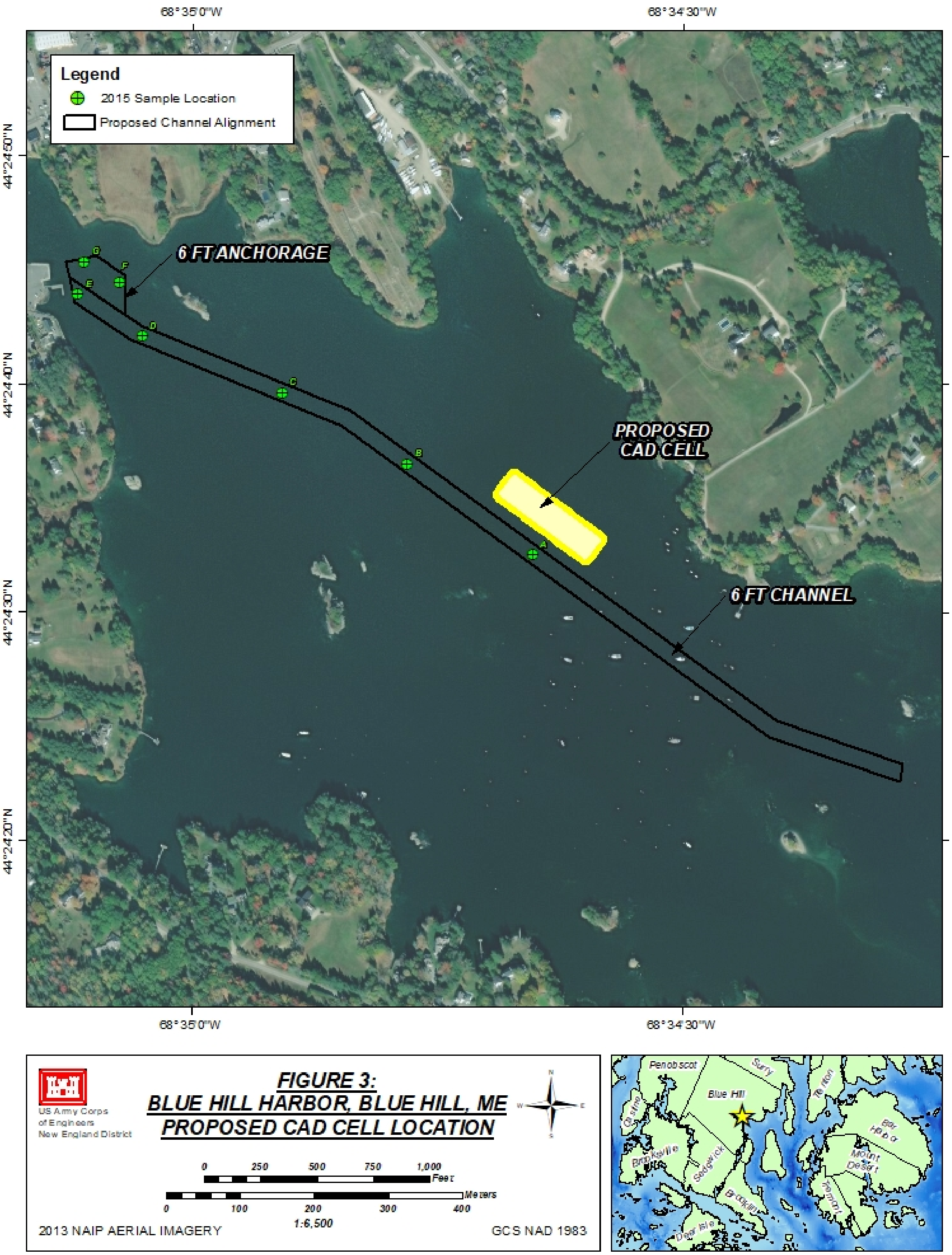
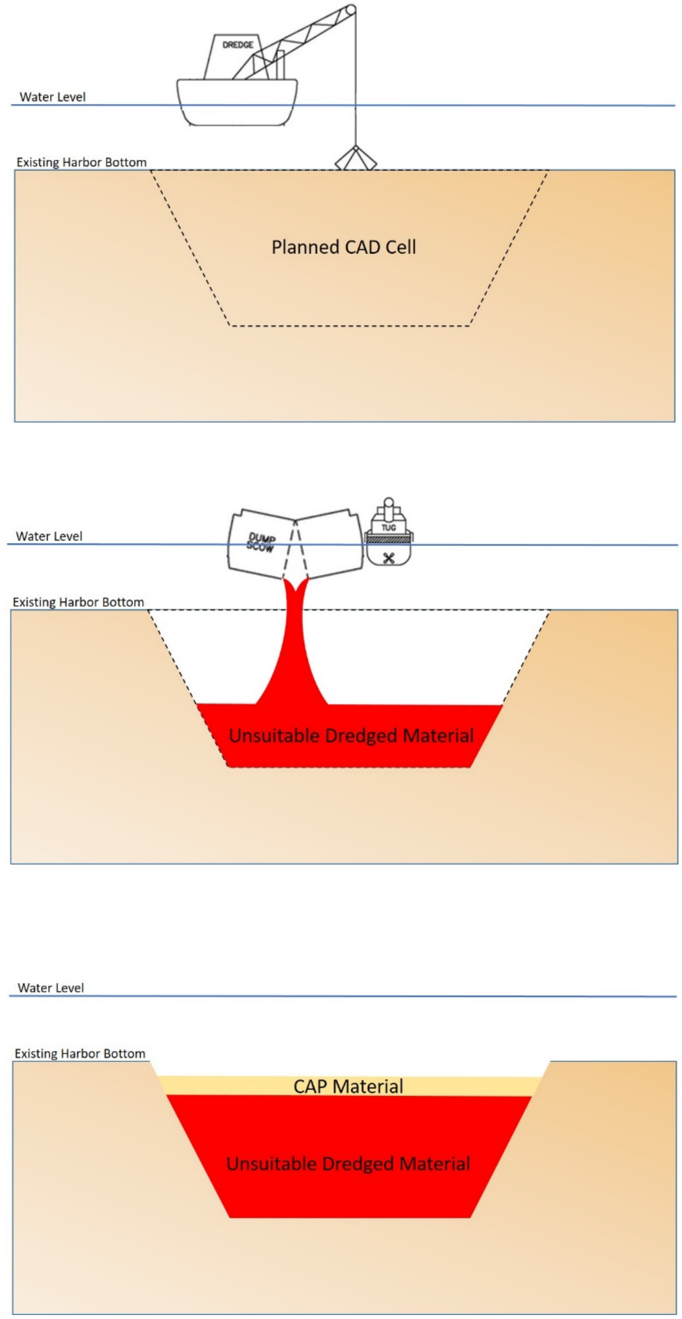



FIGURE 3:
BLUE HILL HARBOR, BLUE HILL, ME
PROPOSED CAD CELL LOCATION



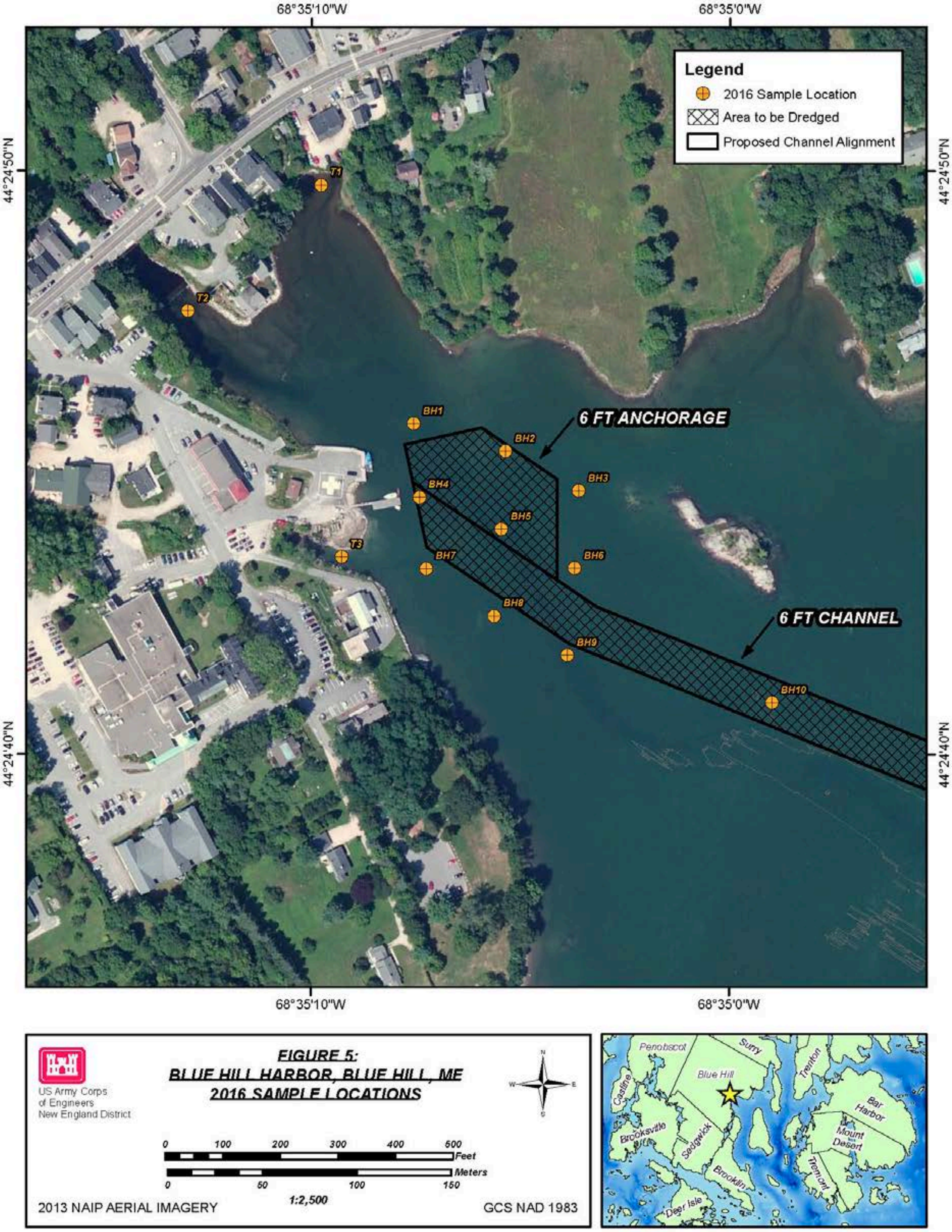

Excavation of planned CAD cell (material will be transported to EPDS)

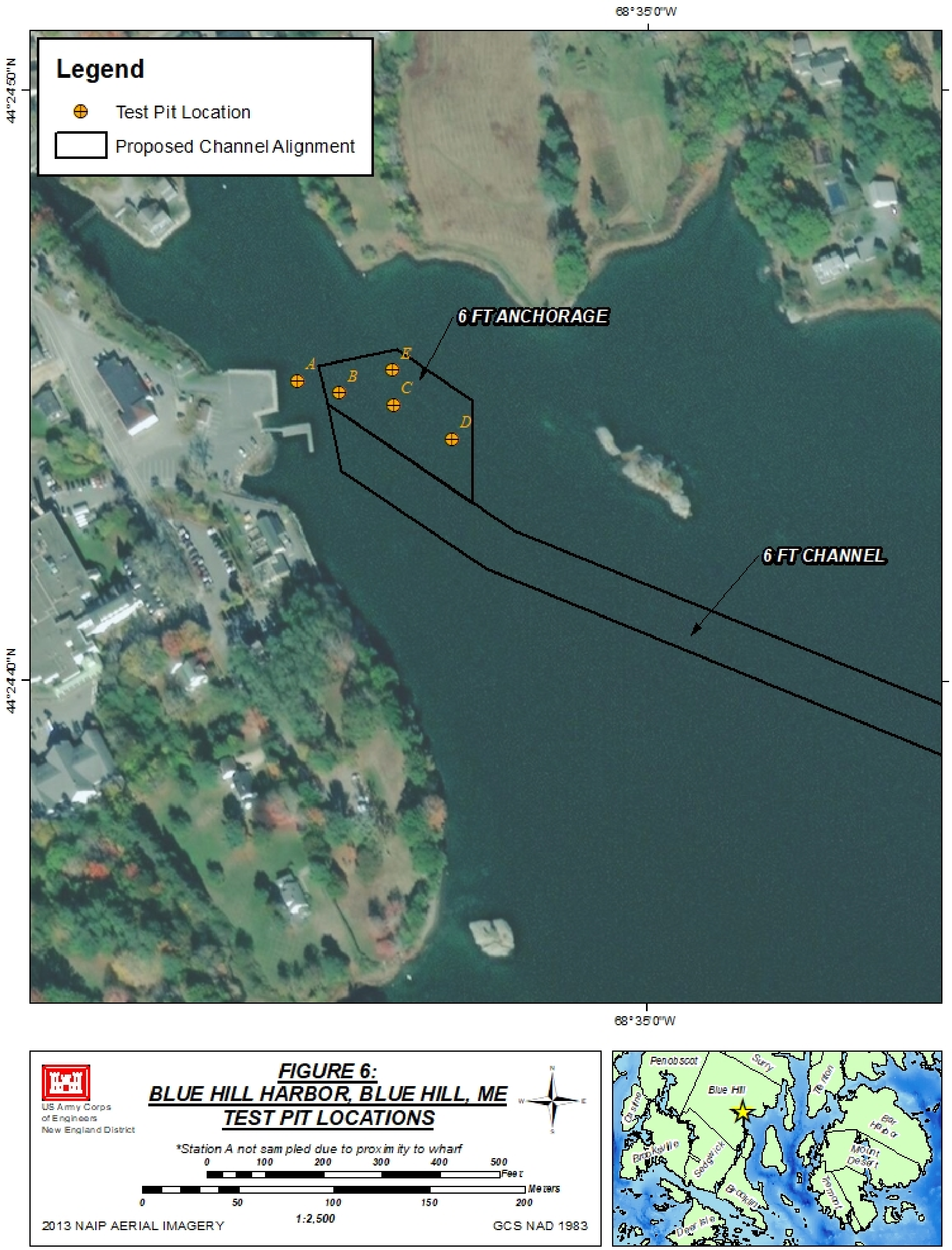
Placement of unsuitable dredged material into the CAD cell using a split-hulled scow

Completed CAD cell (cap will be suitable dredged material from the Blue Hill Harbor Navigation Improvement Project)

*Not to scale

**Figure 4. Typical Confined Aquatic Disposal (CAD) Cell Schematic**


68°35'10"W
68°35'0"W
44°24'50"N
44°24'40"N
Legend
2016 Sample Location
Area to be Dredged
Proposed Channel Alignment
T1
T2
T3
BH1
BH2
BH3
BH4
BH5
BH6
BH7
BH8
BH9
BH10
6 FT ANCHORAGE
6 FT CHANNEL
US Army Corps of Engineers New England District
FIGURE 5:
BLUE HILL HARBOR, BLUE HILL, ME
2016 SAMPLE LOCATIONS
0 100 200 300 400 500 Feet
0 50 100 150 Meters
1:2,500
2013 NAIP AERIAL IMAGERY
GCS NAD 1983
Penobscot
Surry
Blue Hill
Trenton
Castine
Bar Harbor
Brooksville
Sedgwick
Mount Desert
Tremont
Brooklin
Deer Isle


68°35'0"W
44°24'50"N
44°24'40"N
Legend
Test Pit Location
Proposed Channel Alignment
6 FT ANCHORAGE
6 FT CHANNEL
A
B
C
D
E
FIGURE 6:
BLUE HILL HARBOR, BLUE HILL, ME
TEST PIT LOCATIONS
US Army Corps of Engineers New England District
*Station A not sampled due to proximity to wharf
0 100 200 300 400 500 Feet
0 50 100 150 200 Meters
1:2,500
2013 NAIP AERIAL IMAGERY
GCS NAD 1983
Penobscot
Surry
Blue Hill
Brooksville
Sedgwick
Deer Isle

# Appendix A

# PAH Results

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## PAH Results from Sediment Push Cores (May 2016)

| PAH | BH-1, 0-6 | BH-1, 6-12 | BH-2, 0-6 | BH-2, 6-14 | BH-3, 0-6 | BH-3, 6-16 | BH-4, 0-6 | BH-4, 6-17 | BH-5, 0-6 | BH-5, 6-18 | BH-6, 0-6 | BH-6, 6-22 | BH-7, 0-6 | BH-7, 6-12 | BH-8, 0-6 | BH-8, 6-28 | BH-9, 0-6 | BH-9, 6-17 | BH-10, 0-6 | BH-10, 6-18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acenaphthene | 9.9(U) | 11.4(U) | 9.73(U) | 7.08(U) | 8.5(U) | 8.72(U) | 23.9 | 12(U) | 6.98(U) | 13.4(U) | 11.4(U) | 12.7(U) | 11.9(U) | 18.8 | 15.2 | 12.7 | 41.3 | 10.6(U) | 11.6(U) | 14.6 |
| Acenaphthylene | 47.8 | 54 | 55.1 | 56.5 | 30.7 | 8.72(U) | 292 | 25.2 | 23.5 | 13.4(U) | 92.1 | 101 | 29.2 | 208 | 147 | 12.8 | 131 | 10.6(U) | 62.2 | 90.8 |
| Anthracene | 77.8 | 64.5 | 37.4 | 38.8 | 24.6 | 8.72(U) | 254 | 27.2 | 45.5 | 13.4(U) | 126 | 70.4 | 41.7 | 163 | 144 | 39.6 | 247 | 10.6(U) | 51.9 | 118 |
| Benz(a)anthracene | 520 | 472 | 372 | 345 | 240 | 8.72(U) | 2460 | 123 | 174 | 14.8 | 821 | 650 | 233 | 1490 | 932 | 122 | 1070 | 10.6(U) | 603 | 776 |
| Benzo(a)pyrene | 403 | 382 | 367 | 349 | 248 | 8.72(U) | 1950 | 120 | 143 | 25.6 | 667 | 637 | 224 | 1320 | 886 | 100 | 895 | 10.6(U) | 618 | 690 |
| Benzo(b)fluoranthene | 390 | 440 | 407 | 372 | 275 | 8.72(U) | 1890 | 119 | 137 | 19.2 | 657 | 596 | 196 | 1320 | 792 | 86.1 | 943 | 10.6(U) | 629 | 718 |
| Benzo(g,h,i)perylene | 255 | 253 | 277 | 249 | 181 | 8.72(U) | 1230 | 81.4 | 97 | 14.2 | 423 | 458 | 148 | 842 | 618 | 57.4 | 508 | 10.6(U) | 384 | 434 |
| Benzo(k)fluoranthene | 432 | 323 | 325 | 304 | 219 | 8.72(U) | 1400 | 98.4 | 110 | 20.5 | 600 | 540 | 219 | 1140 | 831 | 85.2 | 760 | 10.6(U) | 587 | 573 |
| Chrysene | 463 | 435 | 390 | 366 | 258 | 8.72(U) | 2120 | 127 | 154 | 15 | 722 | 669 | 228 | 1380 | 962 | 110 | 1030 | 10.6(U) | 706 | 720 |
| Dibenz(a,h)anthracene | 65.6 | 61.3 | 63.3 | 59 | 44.5 | 8.72(U) | 281 | 23.6 | 21.5 | 13.4(U) | 103 | 101 | 39.5 | 191 | 139 | 19 | 141 | 10.6(U) | 98.7 | 106 |
| Fluoranthene | 1020 | 978 | 749 | 690 | 471 | 8.72(U) | 3940 | 230 | 360 | 18.6 | 1350 | 1130 | 463 | 2740 | 1910 | 209 | 2440 | 10.6(U) | 767 | 1420 |
| Fluorene | 29.5 | 29.1 | 18.4 | 23.8 | 12.2 | 8.72(U) | 104 | 13.7 | 15.6 | 13.4(U) | 47.9 | 39.8 | 12 | 85.8 | 59.5 | 21.7 | 200 | 10.6(U) | 14.5 | 49.5 |
| Indeno(1,2,3-cd)pyrene | 304 | 296 | 313 | 287 | 213 | 8.72(U) | 1300 | 97.8 | 106 | 23.6 | 486 | 496 | 175 | 944 | 687 | 71.2 | 612 | 10.6(U) | 460 | 500 |
| Naphthalene | 9.9(U) | 11.4(U) | 9.73(U) | 11.4 | 8.5(U) | 8.72(U) | 30.6 | 12(U) | 6.98(U) | 13.4(U) | 11.4(U) | 12.7(U) | 11.9(U) | 37.8 | 32.1 | 16.5 | 16.4 | 10.6(U) | 11.6(U) | 16.3 |
| Phenanthrene | 397 | 384 | 274 | 319 | 186 | 8.72(U) | 1180 | 142 | 161 | 13.4(U) | 536 | 616 | 172 | 1280 | 951 | 126 | 1830 | 10.6(U) | 304 | 572 |
| Pyrene | 777 | 766 | 702 | 690 | 410 | 8.72(U) | 4040 | 269 | 317 | 21.7 | 1240 | 1220 | 404 | 2750 | 1840 | 198 | 1840 | 10.6(U) | 788 | 1230 |

All units in µg/kg

Non-detected analytes are reported as the RL and qualified with a “U”

## PAH Results from Sediment Test Pits (October 2016)

| PAH | B-1 (0-2') | | B-2 (2-4') | | C-1 (0-2') | | C-2 (2-4') | | C-3 (4-7') | | D-1 (0-2') | | D-2 (2-4') | | D-3 (4-6') | | D-4 (6-9') | | E-1 (0-2') | | E-2 (2-4') | | E-3 (4-6') | | E-4 (6-8') | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2-Methylnaphthalene | 10.3 | U | 5.76 | U | 5.52 | U | 8.29 | U | 8.8 | U | 9.17 | U | 5.78 | U | 6.39 | U | 6.37 | U | 9.22 | U | 8.09 | U | 7.58 | U | 8.12 | U |
| Acenaphthene | 10.3 | U | 5.76 | U | 5.52 | U | 8.29 | U | 8.8 | U | 9.17 | U | 5.78 | U | 6.39 | U | 6.37 | U | 9.22 | U | 8.09 | U | 7.58 | U | 8.12 | U |
| Acenaphthylene | 10.3 | U | 5.76 | U | 5.52 | U | 8.29 | U | 8.8 | U | 45.2 | | 5.78 | U | 6.39 | U | 6.37 | U | 9.22 | U | 8.09 | U | 7.58 | U | 8.12 | U |
| Anthracene | 10.3 | U | 5.76 | U | 16.8 | | 8.29 | U | 8.8 | U | 27.6 | | 5.78 | U | 6.39 | U | 6.37 | U | 9.22 | U | 8.09 | U | 7.58 | U | 8.12 | U |
| Benz(a)anthracene | 50.6 | | 13.4 | | 76.6 | | 8.29 | U | 8.8 | U | 321 | | 11.1 | | 6.39 | U | 6.37 | U | 21 | | 8.09 | U | 7.58 | U | 8.12 | U |
| Benzo(a)pyrene | 46.2 | | 14.3 | | 82.8 | | 8.29 | U | 8.8 | U | 408 | | 12.3 | | 6.39 | U | 6.37 | U | 24.5 | | 8.09 | U | 7.58 | U | 8.12 | U |
| Benzo(b)fluoranthene | 39.3 | | 11.8 | | 73.2 | | 8.29 | U | 8.8 | U | 395 | | 10.6 | | 6.39 | U | 6.37 | U | 21 | | 8.09 | U | 7.58 | U | 8.12 | U |
| Benzo(g,h,i)perylene | 24.8 | | 8.38 | | 43.7 | | 8.29 | U | 8.8 | U | 246 | | 7.42 | | 6.39 | U | 6.37 | U | 14.6 | | 8.09 | U | 7.58 | U | 8.12 | U |
| Benzo(k)fluoranthene | 39.6 | | 12.9 | | 74.3 | | 8.29 | U | 8.8 | U | 283 | | 11.4 | | 6.39 | U | 6.37 | U | 21.9 | | 8.09 | U | 7.58 | U | 8.12 | U |
| Chrysene | 50.4 | | 20 | | 82 | | 8.29 | U | 8.8 | U | 415 | | 13.7 | | 6.39 | U | 6.37 | U | 25.5 | | 8.09 | U | 7.58 | U | 8.12 | U |
| Dibenz(a,h)anthracene | 10.3 | U | 5.76 | U | 12 | | 8.29 | U | 8.8 | U | 56.7 | | 5.78 | U | 6.39 | U | 6.37 | U | 9.22 | U | 8.09 | U | 7.58 | U | 8.12 | U |
| Fluoranthene | 80.9 | | 22.3 | | 154 | | 8.29 | U | 8.8 | U | 659 | | 23.2 | | 6.39 | U | 6.37 | U | 41.8 | | 8.09 | U | 7.58 | U | 8.12 | U |
| Fluorene | 10.3 | U | 5.76 | U | 5.52 | U | 8.29 | U | 8.8 | U | 12.4 | | 5.78 | U | 6.39 | U | 6.37 | U | 9.22 | U | 8.09 | U | 7.58 | U | 8.12 | U |
| Indeno(1,2,3-cd)pyrene | 26 | | 9.23 | | 52.9 | | 8.29 | U | 8.8 | U | 265 | | 8.06 | | 6.39 | U | 6.37 | U | 16 | | 8.09 | U | 7.58 | U | 8.12 | U |
| Naphthalene | 10.3 | U | 5.76 | U | 5.52 | U | 8.29 | U | 8.8 | U | 9.17 | U | 5.78 | U | 6.39 | U | 6.37 | U | 9.22 | U | 8.09 | U | 7.58 | U | 8.12 | U |
| Phenanthrene | 36.4 | | 13.8 | | 61.6 | | 8.29 | U | 8.8 | U | 224 | | 12.9 | | 6.39 | U | 6.37 | U | 13.5 | | 8.09 | U | 7.58 | U | 8.12 | U |
| Pyrene | 83.9 | | 24 | | 135 | | 8.29 | U | 8.8 | U | 638 | | 22.2 | | 6.39 | U | 6.37 | U | 47.7 | | 8.09 | U | 7.58 | U | 8.12 | U |

All units in µg/kg
Non-detected analytes are reported as the RL and qualified with a “U”