Player, Christine

From: Emma Larkin <ELarkin@TigheBond.com>
Sent: Thursday, October 13, 2022 9:39 AM
To: Player, Christine
Cc: Gary Hedman
Subject: [External] Green Harbor DSA - Sampling Results Summary
Attachments: GreenHarbor_DSA_SitePlan.pdf; Table 1 - Summary of Soil Analytical Results.pdf

Good Morning Christine,

We just wanted to provide you with a brief summary of the sampling results from the Green Harbor Dredge Spoils Area (DSA) in Marshfield. We are working on the Sediment Assessment report and aim to have a draft to you next week.

Tighe & Bond submitted a draft Sediment Sampling Plan to MassDEP for review on August 24, 2022 and MassDEP concurred with the proposed sampling approach. On September 7, 2022, Tighe & Bond observed Martin Geo Environmental, LLC of Belchertown, Massachusetts (Martin Geo) complete eight borings (SB-1 through SB-8) utilizing a track-mounted GeoProbe Rig, as follows:

- Three borings (SB-1 through SB-3) were completed within the mounded sediment area present within the DSA. Samples were collected from 0-3 feet below ground surface (bgs) and 5-10 feet bgs from each boring and submitted for laboratory analysis.
- Five borings (SB-4 through SB-8) were completed outside of the mounded area within the DSA. Samples were collected from 0-3 feet bgs from each boring and submitted for laboratory analysis.

In addition to the GeoProbe borings, three shallow hand borings (HB-1 through HB-3) were completed using a hand auger along the top of the DSA berm. Samples were collected from 0-3 feet bgs from each location and submitted for laboratory analysis. For reference, boring locations are shown on Figure 1 (attached).

Each sample was submitted to ESS Laboratory of Cranston, Rhode Island for MCP 14 metals (antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, nickel, selenium, silver, thallium, vanadium, and zinc), extractable petroleum hydrocarbons (EPHs) with 17 polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) congeners, volatile organic compounds (VOCs), and specific conductivity. Laboratory analytical results were compared to the Reportable Concentrations and Method I Standards established in the MCP (RCS-1 Criteria and Method 1 S-1 Standards) and the MassDEP identified background levels for “natural” soil established in MassDEP Technical Update “Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil”.

Laboratory results indicate that no analytes were detected above RCS-1 standards, and the low level detections of metals and/or PAHs were below or at the MassDEP background levels for “natural” soil. In one sample (SB-3), total chromium was detected at a concentration equal to the background levels for “natural” soil, however, this is still considered consistent with background levels. The method reporting limits (MRLs) for antimony, selenium, and thallium were greater than the background levels for “natural” soil. Antimony, selenium, and thallium were not detected above MRLs in the samples which were well below RCS-1 standards. Trace concentrations of PCBs and VOCs were detected in the majority of the samples at levels well below the RCS-1 standards. Additionally, trace concentrations of an EPH carbon range (C_{11}-C_{22} aromatic hydrocarbons) were detected in two samples (HB-2 and HB-3), also at levels below the RCS-1 standards. The laboratory results are summarized on Table 1 (attached).

Based on the analytical results, it is our opinion the sediment/soil quality will not limit grading in the area and the DSA would be permitted for placement of future dredge materials, subject to the 401 Water Quality Certification permitting and review process.

Please let us know if you have any questions.

Thank you,

Emma Larkin
Project Environmental Scientist

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FIGURE 4
ORTHOPHOTOGRAPH

LEGEND

- Soil Borings
- Limit of DSA
- Wetland Flags 100 ft Buffer
- Wetland Flags
- Proposed Limits of Re-Grading For Town Parking
- Town Boundary
- Marshfield FEMA Zones
- Town/Taylor Marine Limits of Dredge Spoils

LOCUS MAP

N

0 50 100
Feet
1:1,500

NOTES

1. Based on MassGIS Color Orthophotography (2019)
2. Wetland Delineation completed by Amory in January 2021

Figure 4
Green Harbor Maintenance Dredging Project
Dredge Spoils Area
Marshfield, Massachusetts

September 2022

Tighe&Bond

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F-5059

TABLE 1
Summary of Soil Analytical Results
Green Harbor DSA
Joseph Driebeck Way
Marshfield, MA
Last Updated: 10/11/2022 (EL)

Sample Name	MassDEP MCP RCS-1	Natural Background	Units	SB-1	SB-1	SB-2	SB-2	SB-3	SB-3	SB-4	SB-5	SB-6	SB-7	SB-8	HB-1	HB-2	HB-3
Sample Depth				0 - 3 ft	5 - 10 ft	0 - 3 ft	5 - 10 ft	0 - 3 ft	5 - 10 ft	0 - 3 ft	0 - 3 ft	0 - 3 ft	0 - 3 ft	0 - 3 ft	0 - 3 ft	0 - 3 ft	0 - 3 ft
Conductivity 9050																	
Conductivity - Soil Matrix	NS	NS	umhos/cm	59	2,470	62	354	1,600	1,610	224	68	450	657	272	196	120	302
Metals 6010C /6020A/7471B																	
Antimony	20	1	mg/Kg	<2.05	<2.69	<2.15	<2.67	<2.12	<2.91	<2.30	<2.29	<2.23	<2.25	<2.55	<2.38	<2.22	<2.24
Arsenic	20	20	mg/Kg	2.86	4.35	3.24	4.8	2.05	3.95	<0.46	1.98	2.6	2.31	3.19	3.96	2.5	2.48
Barium	1,000	50	mg/Kg	9.76	16.8	8.48	14.5	7.34	13.3	4.24	4.79	8.31	5.95	8.35	14.1	7.18	5.67
Beryllium	90	0.4	mg/Kg	0.18	0.33	0.2	0.32	0.19	0.35	0.09	0.11	0.17	0.11	0.24	0.28	0.12	0.08
Cadmium	70	2	mg/Kg	0.13	0.40	0.13	0.42	0.13	0.41	<0.1	<0.1	0.16	<0.1	0.14	0.36	<0.1	<0.1
Chromium (Total)	100	30	mg/Kg	7.64	21.1	6.31	22.2	6.86	30	5.23	6.75	12	7.39	10.7	20.1	8.37	6.96
Lead	200	100	mg/Kg	16	15.5	14.2	19.2	7.49	24.8	2.37	12.2	7.98	4.89	6.38	16.5	11.3	6.39
Mercury (7471B)	20	0.3	mg/Kg	0.039	0.093	0.025	0.094	0.071	0.117	<0.012	0.034	0.046	0.023	0.026	0.063	0.042	0.043
Nickel	600	20	mg/Kg	3.42	7.59	3.43	7.62	3.68	8.73	3.32	3.2	4.35	3.06	6.32	7.54	3.56	2.73
Selenium	400	0.5	mg/Kg	<2.05	<2.69	<2.15	<2.67	<2.12	<2.91	<2.30	<2.29	<2.23	<2.25	<2.55	<2.38	<2.22	<2.24
Silver	100	0.6	mg/Kg	<0.41	<0.27	<0.43	<0.27	<0.21	<0.29	<0.23	<0.23	<0.22	<0.23	<0.51	<0.24	<0.22	<0.22
Thallium	8	0.6	mg/Kg	<2.05	<2.69	<2.15	<2.67	<2.12	<2.91	<2.30	<2.29	<2.23	<2.25	<2.55	<2.38	<2.22	<2.24
Vanadium	400	30	mg/Kg	11.3	19.3	9.82	18.9	8.93	20.1	9.83	7.79	13.3	10.2	14.4	18.3	11.3	9.36
Zinc	1,000	100	mg/Kg	25.7	49.7	23.5	51.8	19.1	45.4	9.99	12.4	19.9	10.1	20.7	41.5	11.9	9.32
PCB Congeners 8082A																	
BZ-8	NS	NS	mg/Kg	<0.00029	<0.00038	<0.00029	0.00080	<0.00029	<0.00038	<0.00031	<0.00030	<0.00031	<0.00031	<0.00034	<0.00032	<0.00029	<0.00031
BZ-18	NS	NS	mg/Kg	<0.00029	<0.00038	<0.00029	0.00088	<0.00029	<0.00038	<0.00031	<0.00030	<0.00031	<0.00031	<0.00034	<0.00032	<0.00029	<0.00031
BZ-28	NS	NS	mg/Kg	<0.00029	<0.00038	<0.00029	0.00188	<0.00029	0.00086	<0.00031	<0.00030	<0.00031	<0.00031	<0.00034	<0.00032	<0.00029	<0.00031
BZ-44	NS	NS	mg/Kg	<0.00029	0.00056	<0.00029	0.00125	<0.00029	0.00087	<0.00031	<0.00030	<0.00031	<0.00031	<0.00034	<0.00032	<0.00029	<0.00031
BZ-52	NS	NS	mg/Kg	<0.00029	0.00156	<0.00029	0.00239	<0.00029	0.00101	<0.00031	<0.00030	<0.00031	<0.00031	<0.00034	<0.00032	<0.00029	<0.00031
BZ-66	NS	NS	mg/Kg	<0.00029	<0.00038	<0.00029	0.00159	<0.00029	0.00142	<0.00031	<0.00030	<0.00031	<0.00031	<0.00034	<0.00032	<0.00029	<0.00031
BZ-101	NS	NS	mg/Kg	<0.00029	0.00140	<0.00029	0.00342	<0.00029	0.00197	<0.00031	<0.00030	0.00078	<0.00031	<0.00034	0.00079	0.00046	<0.00031
BZ-105	NS	NS	mg/Kg	<0.00029	0.00053	<0.00029	0.00163	<0.00029	0.00130	<0.00031	<0.00030	0.00051	<0.00031	<0.00034	0.00038	<0.00029	<0.00031
BZ-118	NS	NS	mg/Kg	<0.00029	0.00090	<0.00029	0.00259	<0.00029	0.00268	<0.00031	<0.00030	0.00069	<0.00031	<0.00034	0.00064	0.00039	<0.00031
BZ-128	NS	NS	mg/Kg	<0.00029	<0.00038	<0.00029	0.00067	<0.00029	0.00086	<0.00031	<0.00030	<0.00031	<0.00031	<0.00034	<0.00032	<0.00029	<0.00031
BZ-138	NS	NS	mg/Kg	0.00064	0.00114	0.00031	0.00401	0.00030	0.00401	<0.00031	0.00087	0.00137	0.00031	<0.00034	0.00186	0.00098	0.00034
BZ-153	NS	NS	mg/Kg	0.00100	0.00125	0.00034	0.00338	<0.00029	0.00398	<0.00031	0.00103	0.00133	<0.00031	<0.00034	0.00164	0.00122	0.00040
BZ-170	NS	NS	mg/Kg	0.00042	<0.00038	<0.00029	0.00073	<0.00029	0.00156	<0.00031	0.00043	<0.00031	<0.00031	<0.00034	0.00052	0.00050	<0.00031
BZ-180	NS	NS	mg/Kg	0.00049	0.00050	<0.00029	0.00129	<0.00029	0.00186	<0.00031	0.00092	0.00058	<0.00031	<0.00034	0.00099	0.00098	<0.00031
BZ-187	NS	NS	mg/Kg	0.00038	0.00045	<0.00029	0.00112	<0.00029	0.00139	<0.00031	0.00064	0.00046	<0.00031	<0.00034	0.00098	0.00068	<0.00031
BZ-195	NS	NS	mg/Kg	<0.00029	<0.00038	<0.00029	<0.00037	<0.00029	<0.00038	<0.00031	<0.00030	<0.00031	<0.00031	<0.00034	<0.00032	0.00034	<0.00031
BZ-206	NS	NS	mg/Kg	<0.00029	<0.00038	<0.00029	<0.00037	<0.00029	0.00040	<0.00031	<0.00030	<0.00031	<0.00031	<0.00034	<0.00032	<0.00029	<0.00031
BZ-109	NS	NS	mg/Kg	<0.00029	<0.00038	<0.00029	<0.00037	<0.00029	<0.00038	<0.00031	<0.00030	<0.00031	<0.00031	<0.00034	<0.00032	<0.00029	<0.00031
Total PCB Congeners	1	NS	mg/Kg	0.00293	0.00829	0.00065	0.02763	0.00030	0.02417	ND	0.00389	0.00572	0.00031	ND	0.00780	0.00555	0.00074
MA EPH Aliphatic/Aromatic Ranges By MA EPH 5/2004																	
Aliphatic Hydrocarbons C9-C18	1,000	NS	mg/Kg	<15.6	<20.9	<16.2	<21.2	<16.8	<21.3	<17.0	<17.0	<17.7	<18.0	<18.4	<18.2	<16.3	<17.0
Aliphatic Hydrocarbons C19-C36	3,000	NS	mg/Kg	<15.6	<20.9	<16.2	<21.2	<16.8	<21.3	<17.0	<17.0	<17.7	<18.0	<18.4	<18.2	<16.3	<17.0
Aromatic Hydrocarbons C11-C22	1,000	NS	mg/Kg	<15.8	<21.0	<16.4	<21.4	<17.0	<21.5	<17.2	<17.2	<17.8	<18.2	<18.5	<18.4	31.6	29.3
Polynuclear Aromatic Hydrocarbons By 8270SIM																	
Acenaphthene	4	0.5	mg/Kg	0.011	0.012	<0.009	<0.011	<0.009	<0.011	<0.009	<0.009	<0.009	<0.010	<0.010	<0.010	<0.009	<0.009
Acenaphthylene	1	0.5	mg/Kg	0.032	<0.011	0.091	<0.011	0.009	<0.011	<0.009	<0.009	<0.009	<0.010	<0.010	<0.010	<0.009	<0.009
Anthracene	1,000	1	mg/Kg	0.035	0.019	0.061	0.012	0.010	0.025	<0.009	<0.009	<0.009	<0.010	<0.010	<0.010	<0.009	<0.009
Benzo(a)anthracene	7	2	mg/Kg	0.200	0.046	0.472	0.051	0.055	0.074	<0.009	0.009	0.025	<0.010	<0.010	0.022	0.014	0.021
Benzo(a)pyrene	2	2	mg/Kg	0.208	0.045	0.481	0.053	0.052	0.061	<0.009	0.010	0.023	<0.010	<0.010	0.024	0.017	0.028
Benzo(b)fluoranthene	7	2	mg/Kg	0.306	0.066	0.663	0.073	0.071	0.096	<0.009	0.012	0.031	<0.010	<0.010	0.036	0.016	0.027
Benzo(g,h,i)perylene	1,000	1	mg/Kg	0.140	0.025	0.303	0.036	0.032	0.036	<0.009	<0.009	0.013	<0.010	<0.010	0.016	0.012	0.020
Benzo(k)fluoranthene	70	1	mg/Kg	0.108	0.022	0.247	0.025	0.024	0.035	<0.009	<0.009	0.011	<0.010	<0.010	0.012	0.015	0.025
Chrysene	70	2	mg/Kg	0.237	0.054	0.479	0.060	0.054	0.113	<0.009	0.010	0.026	<0.010	<0.010	0.031	0.021	0.036
Dibenz(a,h)anthracene	0.7	0.5	mg/Kg	0.030	<0.011	0.069	<0.011	0.009	<0.011	<0.009	<0.009	<0.009	<0.010	<0.010	<0.010	<0.009	0.010
Fluoranthene	1,000	4	mg/Kg	0.404	0.115	0.759	0.106	0.104	0.110	<0.009	0.015	0.053	0.011	0.012	0.048	0.032	0.056
Fluorene	1,000	1	mg/Kg	0.017	0.017	0.028	<0.011	<0.009	0.012	<0.009	<0.009	<0.009	<0.010	<0.010	<0.010	<0.009	<0.009
Indeno(1,2,3-cd)pyrene	7	1	mg/Kg	0.132	0.029	0.293	0.037	0.032	0.040	<0.009	<0.009	0.016	<0.010	<0.010	0.018	0.011	0.019
Methylnaphthalene, 2-	0.7	0.5	mg/Kg	<0.008	<0.011	<0.009	<0.011	<0.009	<0.011	<0.009	<0.009	<0.009	<0.010	<0.010	<0.010	<0.009	<0.009
Phenanthrene	10	3	mg/Kg	0.153	0.060	0.194	0.045	0.046	0.076	<0.009	<0.009	0.031	<0.010	<0.010	0.026	0.020	0.039
Pyrene	1,000	4	mg/Kg	0.374	0.114	0.799	0.115	0.104	0.108	<0.009	0.016	0.047	0.011	0.013	0.050	0.030	0.056
Naphthalene	4	0.5	mg/Kg	0.009	0.018	0.013	0.013	<0.009	0.013	<0.009	<0.009	<0.009	<0.010	<0.010	<0.010	<0.009	<0.009
VOCs by 8260B																	
Acetone	6	NS	mg/Kg	<0.0465	0.144	<0.0403	0.524	<0.0379	0.633	<0.0351	<0.0424	<0.0566	<0.0406	<0.0520	<0.0481	<0.0528	<0.0604
Carbon disulfide	100	NS	mg/Kg	<0.0046	0.0118	<0.0040	<0.0051	<0.0038	<0.0055	<0.0035	<0.0042	<0.0057	<0.0041	<0.0052	<0.0048	<0.0053	<0.0060
Isopropyltoluene, 4- (p-cymene)	100	NS	mg/Kg	<0.0046	<0.0047	<0.0040	<0.0051	<0.0038	<0.0055	<0.0035	0.0179	<0.0057	<0.0041	<0.0052	<0.0048	<0.0053	<0.0060
Methyl Ethyl Ketone (MEK; 2-Butanone)	4	NS	mg/Kg	<0.0465	<0.0469	<0.0403	0.0792	<0.0379	0.0857	<0.0351	<0.0424	<0.0566	<0.0406	<0.0520	<0.0481	<0.0528	<0.0604
VOCs (Total)	NS	NS	mg/Kg	ND	0.1558	ND	0.603	ND	0.719	ND	0.0179	ND	ND	ND	ND	ND	ND

RCS-1 - MCP RCS-1 Reportable Concentrations Criteria from the Massachusetts Department of Environmental Protection Massachusetts Contingency Plan. Effective 04/25/2014 and updates.
COMM 97-001 Lined Landfill Criteria current from Policy #COMM-97-001: Reuse & Disposal of Contaminated Soil at Massachusetts Landfills. Effective August 15, 1997.
Natural Background from MassDEP Identified Background Levels in Soil, "Technical Update: Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil". Dated May 23, 2002.
Shaded results indicate an exceedance of one or more criteria.
Black numbers indicates result detected above method reporting limit (MRL).
Only VOC parameters reported above reporting limits are summarized above.