HALEY ALDRICH

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REPORT ON

NPDES RGP APPLICATION FOR TEMPORARY CONSTRUCTION DEWATERING
34 MARKET STREET
CHELSEA, MASSACHUSETTS

by Haley & Aldrich, Inc.
Boston, Massachusetts

for Environmental Protection Agency (EPA) Region 1
Boston, Massachusetts

File No. 133092-009
September 2020
Revised October 2020

HALEY & ALDRICH, INC.
465 Medford St.
Suite 2200
Boston, MA 02129
617.886.7400

18 September 2020
Revised 1 October 2020
File No. 133092-009

Environmental Protection Agency (EPA) Region 1
5 Post Office Square, Suite 100
Mail Code OEP06-4
Boston, Massachusetts 02129

Attention: Shauna Little

Subject: NPDES RGP Application for Temporary Construction Dewatering
Culvert Replacement Project
34 Market Street
Everett, Massachusetts

Ladies and Gentlemen:

On behalf of our client, DIV BMT, LLC c/o The Davis Companies, Haley & Aldrich, Inc. (Haley & Aldrich) is submitting this application to request authorization under the National Pollutant Discharge Elimination System (NPDES) Remediation General Permit (RGP) for off-site discharge of temporary construction dewatering during construction activities at the planned BMT Culvert Segment Replacement Project (herein referred to as the "Project") located within a portion of properties at 34 Market Street in Everett, Massachusetts and 45 Market Street in Chelsea, Massachusetts. For purposes of this application, these two properties are collectively referred to as the "Property." The Project work area, an approximately 1.34 acre portion of the Property located generally along its eastefchrirn boundary, is referred in this application as the "Site".

Construction dewatering is planned for recharge on-Site, however, in the event that on-Site recharge is not possible, construction dewatering effluent will be treated and discharged off-Site in accordance with a NPDES RGP. A copy of the Notice of Intent (NOI) is included in Appendix A.

General Site Information

SITE CONDITIONS AND HISTORY

The Property consisting of 34 Market Street, Everett, Massachusetts and 45 Market Street, Chelsea, Massachusetts is sometimes known as the Boston Market Terminal ("BMT"). The surrounding structures and land uses are commercial and industrial, consisting of primarily produce wholesalers. The Site locus is shown on Figure 1.

The Project involves work solely related to reconstruction and replacement of the existing subsurface drainage culvert (the "Culvert"). The Culvert extends a total length of approximately 1,620 feet (ft), from an open drainage channel north of the Property that outlets into the existing Culvert, across the Site to beyond the municipal boundary between Everett and Chelsea, where it continues under Market Street in Chelsea to an outfall at the Island End River in Chelsea. The approximately 15.5-ft wide and 9.5-ft tall Culvert was constructed in 1965. The approximately 720-ft section of the Culvert to be reconstructed and replaced is located entirely on the Site. The Culvert is responsive to tidal action from the Island End River, which affects the overall water level in the Culvert at low tide vs high tide. Based on water level measured by Haley & Aldrich and others in the vicinity of the Site, depth to the groundwater table ranges from 3.8 to 12.7 ft. Groundwater generally flows in a south-southwest direction, toward the Island End River and the Mystic River.

On Site, the Culvert is overlain by an asphalt-paved surface and fill material. Depth from ground surface to the top of the Culvert is approximately 6.5 ft. There are currently two open cuts into the Culvert that were the result of collapse and subsequent excavation and repair work. These areas are surrounded by chain-link fencing and/or jersey barriers.

Within the first 720 linear ft of the Culvert, from its inlet in Everett and across the Site to the bend at Market Street in Chelsea, the Culvert has experienced several failures that have been only partially repaired and/or replaced. The most recent structural failures occurred in October 2008, when a partial collapse of the Culvert occurred approximately 260 ft from the Culvert inlet, and in September 2009, when another partial collapse occurred approximately 430 feet from the inlet. The approximate limits of these collapses are shown on Figure 2.

Neither of the recent collapses have been repaired beyond temporary measures implemented to protect public safety and maintain stormwater flows. Since the two aforementioned collapses, vehicular traffic on the Property has been diverted away from areas close to the Culvert. At present, vehicle traffic crossing the Culvert on the Property is routed over two temporary replacement sections.

PROPOSED CONSTRUCTION

Due to the age and degradation of the existing subsurface Culvert structure, the length of this structure that traverses the Site (approximately 720 ft) will be removed and replaced with an open channel (northernmost section) and a new box culvert (southernmost section). The two sections are shown on Figure 2.

The northern 380-ft long portion of the existing subsurface Culvert will be converted to an open channel. The new open channel will be similar in structure to the existing open channel to the north of the Site. The cut of the new open channel will be approximately 55.5 ft wide at the top of the slope and approximately 15 ft wide at the bottom of the channel. Depth from ground surface to the bottom of the channel will be approximately 15 ft. The open channel will be lined with rip rap and geotextile fabric. The center line of the existing Culvert will also be shifted approximately 15 ft to the southwest such that the east bank of the new open channel will be located entirely within the 34 Market Street Property.

The open channel cut will terminate with a "wing wall" construction that will funnel into a new subsurface box culvert. The new box culvert will be installed to replace the southern 340-ft length of the existing Culvert. The new box culvert will be composed of pre-cast concrete and will be 16 ft wide and 12 feet tall with an invert slope from north to south of approximately 2 ft. The new box culvert will be underlain by a 12-inch layer of crushed stone and geotextile fabric and lined with vertical sheeting. The depth from ground surface to top of Culvert will range approximately 4 to 6 ft. An existing gas line will also be relocated over the Culvert.

The Culvert replacement construction will terminate at the Property boundary, at Market Street, between 45 Market Street, Chelsea and the adjacent New England Produce Center property to the south.

To the extent that groundwater dewatering will be required in connection with excavation, the groundwater encountered by construction will be recharged on-Site to the extent possible. In the event that on-Site recharge is not feasible, the dewatering effluent will be treated and pumped into nearby subsurface stormwater drainage catch basins with outfall in the Island End River, the same outfall as the Culvert.

During construction, surface water drainage within the existing Culvert will be bypassed around the work area and returned to the existing Culvert system at a point south of the Site to be discharged to the Island End River outfall. In addition to using a catch basin attached to the Culvert system, a catch basin along Market Street with an outfall to the Island End River will be used as a discharge point. See Figure 2 for proposed discharge points and route.

Temporary construction dewatering is anticipated to occur between October 2020 and September 2021 (a period of approximately 12 months). The EPA will be notified if the construction dewatering schedule extends beyond the projected 12 month period.

REGULATORY STATUS

The Site is located within the limits of a Massachusetts Contingency Plan (MCP) Disposal Site and an area subject to an Activity Use Limitation (AUL) deed restriction. In 1996, the Massachusetts Department of Environmental Protection (MassDEP) assigned Release Tracking Number (RTN) 3-13158 to the Property. The RTN was assigned to the Property for the detections of petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs) in soil at levels above the applicable MCP reporting criteria (RCS-1). RTN 3-13158 achieved a Class C Response Action Outcome (RAO) and Temporary Solution with an AUL in 2005. The AUL requires coverage of the Property with buildings or pavement, and prohibits residential, agricultural, and recreation uses for the Site.

The Site is also located within the limits of Disposal Site RTN 3-36421, which was assigned to the 45 Market Street property for the detection of petroleum hydrocarbons in soil and total cyanide in groundwater at levels above the applicable MCP reporting criteria (RCS-2 and RCGW-2). A Release Notification Form (RNF) for the release was submitted on 14 August 2020.

In addition, three Utility-related Abatement Measures (URAMs) have been conducted at the Property, two of which involved work on the culvert:

1. RTN 3-26020 was assigned to the Property in July 2005 to facilitate the replacement of a sanitary sewer pump (which was abandoned in place) with a gravity-fed pipe adjacent to the east side of the Boston Market Terminal warehouse and approximately 320 ft west of the subsurface culvert. Approximately 250 cubic yards of soil which was disposed of off-Site. Groundwater pumped from the excavation area was managed under a NPDES RGP. A URAM Completion Statement was submitted for RTN 3-26020 in November 2006.
2. RTN 3-31278 was assigned to the Site in 2012 to facilitate the emergency repair of a collapsed section of the drainage culvert in the east side of the Site. The City of Everett conducted the repair work in which approximately 860 tons of soil were removed from the Site (the exact location of the repair work along the culvert is not specified in the associated documents available through the MassDEP online data portal and therefore the approximate limits of RTN 3-31278 are not shown on Figure 2). A URAM Completion Statement was submitted for RTN 3-31278 in April 2013.
3. RTN 3-34317 was assigned to the Site in the summer of 2017 for the repair of the headwall of the drainage culvert at the northeastern Site boundary where the culvert transitioned from an open channel to underground culvert. The City of Everett conducted the repair work. Approximately 1,680 tons of soil was removed from the Site and the approximate limits of RTN 3-34137 are shown on Figure 2. A URAM Completion Statement was submitted to DEP for RTN 3-34317 in September 2017.

Receiving Water Information

Receiving water quality data was collected in support of this NOI on 12 June 2020, the results of which are summarized in Table I. The sample was collected from the Island End River, downstream from the outfall of the subsurface drainage culvert into the Island End River. Receiving water temperature was measured in the field at 17.6 °C, noted on the effluent limitations input calculation page in Appendix B. The laboratory data report is provided in Appendix F.

The receiving water Island End River is part of the Mystic River with Segment ID MA71-03. This segment is at the downstream of Amelia Earhart Dam and is identified as SB (CSO) water. This segment is not an Outstanding Resource Water. As it is estuarine/marine water, there is no Dilution Factor (DF is 0), therefore the calculation for the seven-day-ten-year flow (7Q10) of the receiving water (usually established using the U.S. Geological Survey [USGS] StreamStats program) is not required. The receiving water and dilution factor were confirmed by MassDEP on 22 June 2020. The MassDEP confirmation of the 7Q10 and Dilution Factor are included in Appendix B.

Copies of the “EnterData” and “SaltwaterResults” tabs from the excel file provided as an additional resource by EPA are included in Appendix B and will be transmitted electronically with the NOI. The effluent limitations calculated are included for reference in Table I.

Source Water Information

In April 2020, Haley & Aldrich installed one monitoring well, HA20-C6(OW) shown on Figure 2. To evaluate groundwater (source water) quality at the Site with respect to NPDES RGP dewatering effluent criteria, Haley & Aldrich collected a representative groundwater sample on 12 June 2020 from the monitoring well.

The groundwater sample was sent to a MassDEP-certified laboratory, Alpha Analytical, for analysis of constituents consistent with requirements for a NPDES RGP. The groundwater samples were analyzed for one or more of the following parameters: total petroleum hydrocarbons (TPH), VOCs, semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), Total and Dissolved Metals, and Waste Characteristics.

The data are compared to the applicable 2014 MCP Reportable Groundwater Concentrations (RCGW-2) criteria and the Site-Specific 2017 NPDES RGP Saltwater Effluent Limits concentrations as determined in the WQBEL calculations. The 12 June sampling data exceed the Site-Specific NPDES RGP criteria for total Group I PAHs, total lead, total cyanide, and total suspended solids (TSS). Dissolved lead was not detected. These exceedances will require dewatering treatment, as discussed below.

To further assess the total cyanide detection, Haley & Aldrich collected a second groundwater sample on 26 June 2020 from HA20-C6(OW). The sample was sent to Alpha for TSS and total cyanide analyses. In addition, a portion of the sample was collected at the Site in an unpreserved bottle. This portion of the sample was screened through a 10 µg filter at the lab before testing for total cyanide. Total cyanide was detected in the 26 June groundwater sample at concentrations of 504 ug/l (unfiltered) and 391 ug/l (filtered through a 10-µm filter). Although TSS was detected at 8,300 ug/l, which was an order of magnitude lower than the TSS result of 33,000 ug/l detected in the first groundwater sample, both of the total cyanide results are higher than the total cyanide concentration detected in the first groundwater sample. It appears unlikely that total cyanide will be removed from the source water during dewatering by filtration alone and may require anion resin or similar treatment, as mentioned below.

A summary of the groundwater chemical analytical data is provided as Table I. Copies of the laboratory data reports are provided in Appendix F.

Discharge Information

Dewatering will be conducted from sumps located inside the excavation and is planned to be recharged on-Site to the extent possible. Dewatering is currently anticipated to occur periodically between October 2020 and up to 12 months later. On average, we estimate effluent discharge rates of about 20 to 50 gallons per minute (gpm), with occasional peak flows of up to a maximum of 150 gpm during significant precipitation events.

Construction dewatering under this RGP will include piping and discharging to the existing subsurface stormwater drainage Culvert located on the Site, nearby catch basins that discharge to the Culvert, or nearby catch basins that discharge to the Island End River. As described above, the Culvert travels south

from the Site, under Market Street, and discharges to the Island End River outfall. The proposed discharge route on Site is shown on Figure 2. The proposed discharge routes from the Site, along Market Street, and to the outfall at Island End River are shown on Figure 3.

A Best Management Practices Plan (BMPP), which outlines the proposed discharge operations covered under the RGP, will be available at the Site and is not being submitted with this NOI.

Dewatering Treatment System Information

An effluent treatment system will be designed and implemented by site contractor(s) to meet the applicable 2017 RGP Discharge Effluent Criteria. Prior to discharge, collected water will be routed through a sedimentation tank and bag filters to remove suspended solids and undissolved chemical constituents, as shown on Figure 4. The treatment system also is expected to include granular activated carbon (GAC) and a resin filter for ion exchange, as required to meet the discharge criteria. The use of a resin for ion exchange is a standard treatment for temporary construction dewatering and is not expected to exceed applicable permit limitations and water quality standards or alter conditions in the receiving water. The ion exchange system will be self-contained and resin is not expected to enter the dewatering stream. Product information is included in Appendix C. No additional testing is considered necessary for use of this product or to demonstrate that use of this product will not adversely affect the receiving water.

Treatment Chemicals and Additives

The use of chemicals or additives is not currently planned for the treatment system. If additional treatment is needed to meet necessary effluent limits, a Notice of Change (NOC) will be submitted to the EPA for review and approval, including proposed product information (e.g., Safety Data Sheets, associated hazards, manufacturer, and proper system operation, etc.).

Determination of Endangered Species Act Eligibility

According to the guidelines outlined in Appendix I of the 2017 NPDES RGP, a preliminary determination for the action area associated with this project was established using the U.S. Fish and Wildlife Service (FWS) Information, Planning, and Conservation (IPAC) online system; a copy of the determination is attached in Appendix D. Based on the results of the determination, the project and action area meet FWS Criterion A as no critical habitats have been established to be present within the project action area.

Documentation of National Historic Preservation Act Requirements

Based on a review of the resources provided by the U.S. National Register of Historic Places and a review of the Massachusetts Cultural Resource Information System (MACRIS), no historic properties have been established to be present at the Property; however, the former Naval Hospital at Admirals Hill, which is referenced in the National Register of Historic Places under Reference Number: 73000851, is located along the east bank of the Island End River. Due to the planned treatment process, discharges and

discharge-related activities are not expected to have the potential to affect historic properties downgradient and, accordingly the discharge meets Criterion B. Documentation is included in Appendix E.

Supplemental Information

Owner and operator information are provided below for reference. Christopher Mora, Vice President of Development, is serving as the contact person and Michael Cantalupa, Chief Development Officer, is serving as the signatory.

Owner/Operator:
DIV BMT, LLC C/O The Davis Companies
125 High Street
Boston, MA 02110
Attn: Christopher Mora

Closing

Thank you very much for your consideration. Please feel free to contact us should you wish to discuss the information contained herein or if you need additional information.

Sincerely yours,
HALEY & ALDRICH, INC.

Liza Joyce
Engineer

Ian Phillips, LSP
Principal

Enclosures:

- Table I – Summary of Water Quality Data
- Figure 1 – Project Locus
- Figure 2 – Site Plan
- Figure 3 – Culvert Collapse History and Discharge Route Along Market Street
- Figure 4 – Proposed Treatment System Schematic
- Appendix A – Notice of Intent (NOI)
- Appendix B – Effluent Limitations Documentation
- Appendix C – Additional Treatment Information
- Appendix D – Endangered Species Act Assessment
- Appendix E – National Historic Preservation Act Review
- Appendix F – Laboratory Data Reports

c: DIV BMT, LLC. c/o The Davis Companies (DIV BMT); Attn: Christopher Mora

TABLES

TABLE I
SUMMARY OF WATER QUALITY DATA
34 MARKET STREET
EVERETT, MASSACHUSETTS
FILE NO. 133092-009

LOCATION	2017 NPDES RGP	MassDEP	HA20-C6	HA20-C6	OUTFALL
SAMPLING DATE	Estimated	MCP	6/12/2020	6/26/2020	6/12/2020
LAB SAMPLE ID	Site-Specific	RCGW-2	L2024779-01	L2027207-02	L2024779-02
SAMPLE TYPE	Criteria	2014	WATER	WATER	WATER
Volatile Organics (µg/l)					
1,1,1-Trichloroethane	200	4000	ND(2)	-	-
1,1,2-Trichloroethane	5	900	ND(1.5)	-	-
1,1-Dichloroethane	70	2000	ND(1.5)	-	-
1,1-Dichloroethene	3.2	80	ND(1)	-	-
1,2-Dichlorobenzene	600	2000	ND(5)	-	-
1,2-Dichloroethane	5	5	ND(1.5)	-	-
1,3-Dichlorobenzene	320	6000	ND(5)	-	-
1,4-Dichlorobenzene	5	60	ND(5)	-	-
Acetone	7970	50000	ND(10)	-	-
Benzene	5	1000	ND(1)	-	-
Carbon tetrachloride	4.4	2	ND(1)	-	-
cis-1,2-Dichloroethene	70	20	ND(1)	-	-
Ethylbenzene	*100	5000	ND(1)	-	-
Methyl tert butyl ether	70	5000	ND(10)	-	-
Methylene chloride	4.6	2000	ND(1)	-	-
o-xylene	NA	3000	ND(1)	-	-
p/m-Xylene	NA	3000	ND(2)	-	-
Tert-Butyl Alcohol	120	NA	ND(100)	-	-
Tertiary-Amyl Methyl Ether	90	NA	ND(20)	-	-
Tetrachloroethene	5	50	ND(1)	-	-
Toluene	*100	40000	ND(1)	-	-
Trichloroethene	5	5	ND(1)	-	-
Vinyl chloride	2	2	ND(1)	-	-
Xylenes, Total	*100	3000	ND(1)	-	-
Total BTEX	100	NA	ND	-	-
SUM of Volatile Organic Compounds	NA	NA	NA	-	-
Volatile Organics by SIM (µg/l)					
1,4-Dioxane	200	6000	ND(50)	-	-
Semivolatile Organics (µg/l)					
Bis(2-ethylhexyl)phthalate	101	50000	ND(2.2)	-	-
Butyl benzyl phthalate	NA	10000	ND(5)	-	-
Di-n-butylphthalate	NA	5000	ND(5)	-	-
Di-n-octylphthalate	NA	100000	ND(5)	-	-
Diethyl phthalate	101	9000	ND(5)	-	-
Dimethyl phthalate	NA	50000	ND(5)	-	-
Total Phthalates	190	NA	ND	-	-
Pentachlorophenol	1	200	ND(1)	-	-
Phenol	1080	2	ND(30)	-	-
SUM of Semivolatile Organic Compounds	NA	NA	ND	-	-
Semivolatile Organics by SIM (µg/l)					
Acenaphthene	Group II PAHs	10000	0.395	-	-
Acenaphthylene	Group II PAHs	40	1.98	-	-
Anthracene	Group II PAHs	30	1.84	-	-
Benzo(a)anthracene	1	1000	**2.67**	-	-
Benzo(a)pyrene	1	500	**2.52**	-	-
Benzo(b)fluoranthene	1	400	**2.91**	-	-
Benzo(ghi)perylene	Group II PAHs	20	1.65	-	-
Benzo(k)fluoranthene	1	100	**1.11**	-	-
Chrysene	1	70	**1.96**	-	-
Dibenzo(a,h)anthracene	1	40	0.372	-	-
Fluoranthene	Group II PAHs	200	8.27	-	-
Fluorene	Group II PAHs	40	0.836	-	-
Indeno(1,2,3-cd)pyrene	1	100	**1.7**	-	-
Naphthalene	20	700	3	-	-
Phenanthrene	Group II PAHs	10000	3.94	-	-
Pyrene	Group II PAHs	20	6.16	-	-
SUM of Group I PAHs	1	NA	**13.242**	-	-
SUM of Group II PAHs	100	NA	28.071	-	-
SUM of Semivolatile Organic Compounds (SI	NA	NA	40.918	-	-
Total Petroleum Hydrocarbons (µg/l)					
TPH, SGT-HEM	5000	5000	ND(4000)	-	-
Total Metals (µg/l)					
Antimony, Total	206	8000	ND(40)	-	ND(40)
Arsenic, Total	104	900	25.68	-	ND(10)
Cadmium, Total	10.2	4	ND(2)	-	ND(2)
Chromium, Total	NA	300	ND(10)	-	ND(10)
Copper, Total	242	100000	ND(10)	-	ND(10)
Iron, Total	5000	NA	1050	-	688
Lead, Total	8.5	10	**15.93**	-	ND(10)
Mercury, Total	0.739	20	ND(0.2)	-	ND(0.2)
Nickel, Total	1450	200	ND(20)	-	ND(20)
Selenium, Total	235.8	100	ND(50)	-	ND(50)
Silver, Total	35.1	7	ND(4)	-	ND(4)
Zinc, Total	420	900	ND(100)	-	ND(100)
Inorganic Compounds (mg/L)					
Lead, Dissolved	NA	0.01	ND(0.01)	-	-
Polychlorinated Biphenyls (µg/l)					
Aroclor 1016	0.000064	5	ND(0.25)	-	-
Aroclor 1221	0.000064	5	ND(0.25)	-	-
Aroclor 1232	0.000064	5	ND(0.25)	-	-
Aroclor 1242	0.000064	5	ND(0.25)	-	-
Aroclor 1248	0.000064	5	ND(0.25)	-	-
Aroclor 1254	0.000064	5	ND(0.25)	-	-
Aroclor 1260	0.000064	5	ND(0.2)	-	-
Total PCBs	0.000064	5	ND	-	-

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34 MARKET STREET
EVERETT, MASSACHUSETTS
FILE NO. 133092-009

LOCATION	2017 NPDES RGP	MassDEP	HA20-C6	HA20-C6	OUTFALL
SAMPLING DATE	Estimated	MCP	6/12/2020	6/26/2020	6/12/2020
LAB SAMPLE ID	Site-Specific	RCGW-2	L2024779-01	L2027207-02	L2024779-02
SAMPLE TYPE	Criteria	2014	WATER	WATER	WATER
Microextractables (µg/l)					
1,2-Dibromo-3-chloropropane	NA	1000	ND(0.01)	-	-
1,2-Dibromoethane (Ethylene Dibromide)	0.05	2	ND(0.01)	-	-
General Chemistry (µg/l)					
Chloride	Report	NA	10400000	-	-
Chlorine, Total Residual	50	NA	ND(20)	-	-
Chromium, Hexavalent	323	300	ND(10)	-	ND(10)
Chromium, Trivalent	323	600	ND(10)	-	ND(10)
Cyanide, Total	5	30	**278**	**504**	-
Cyanide, Filtered*	NA	NA	-	**391**	-
Ethanol	Report	NA	21000	-	-
Hardness	NA	NA	3180000	-	1500000
Nitrogen, Ammonia	Report	NA	7080	-	300
pH (H)	NA	NA	8.1	-	7.6
Phenolics, Total	NA	NA	ND(30)	-	-
Total Suspended Solids	30000	NA	**33000**	8300	-

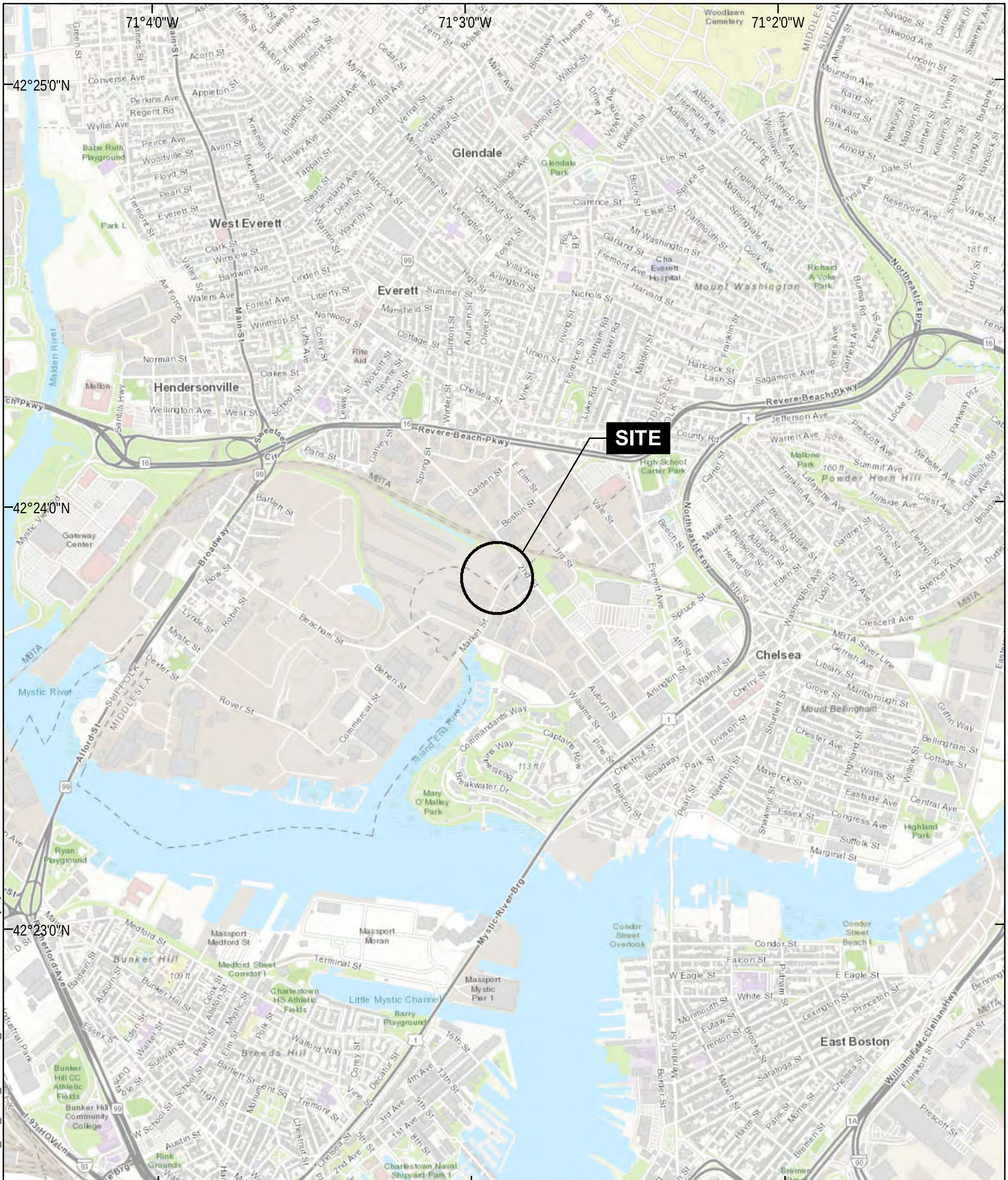
ABBREVIATIONS NOTES:

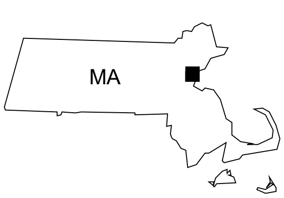
- : Not analyzed
NA: Not Applicable
ug/l: micrograms per liter
SU: Standard Units
ND (2.5): Result not detected above reporting limit (shown in parentheses)

1. Analytes detected in at least one sample are reported herein. For a complete list of analytes see the laboratory data sheets.
2. **Blue bold** values indicate an exceedance of the applicable site-specific 2017 RGP Criteria.

*Filtered through a 10µg filter

FIGURES





MAP SOURCE: ESRI
SITE COORDINATES: 71°2'55"W 42°23'49"N

HALEY ALDRICH

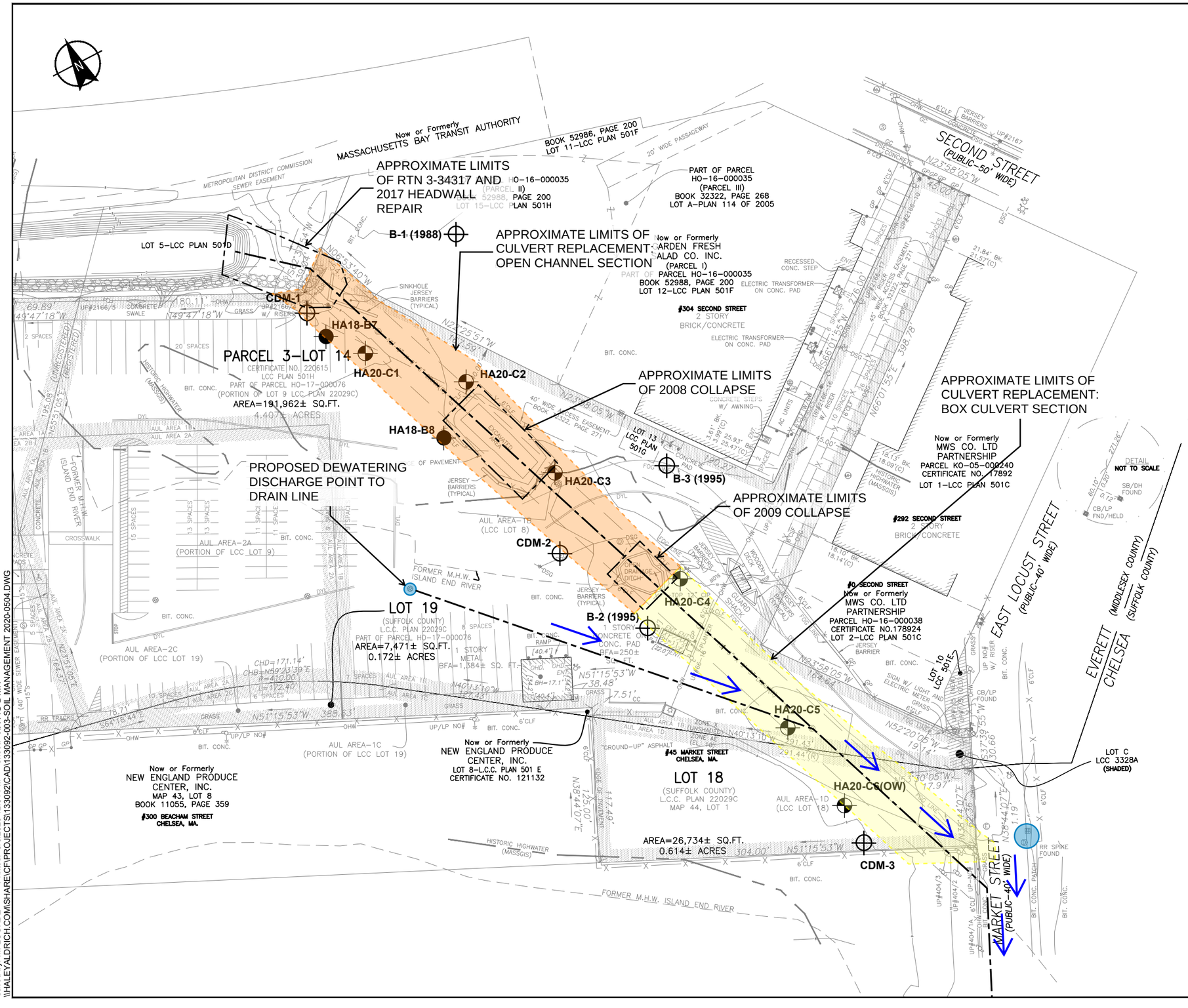
CULVERT RECONSTRUCTION PROJECT
34 MARKET STREET
EVERETT, MASSACHUSETTS

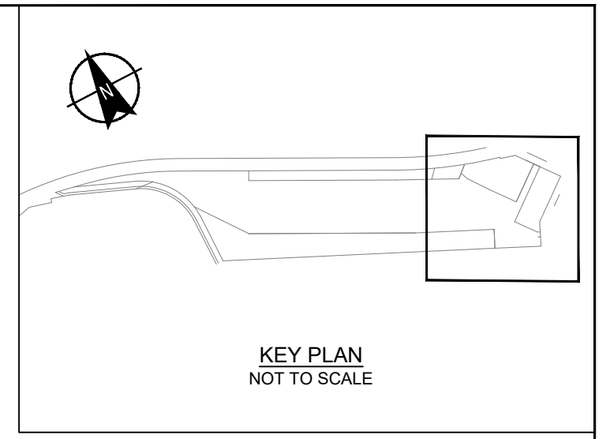
PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT
SEPTEMBER 2020

FIGURE 1

GIS FILE PATH: C:\Users\ajospe\Downloads\133092_005_0001_PROJECT_LOCUS.mxd — USER: ajospe — LAST SAVED: 3/4/2020 7:59:57 AM





NOTES

1. BASE PLAN CREATED FROM ELECTRONIC FILE NAMED "16445-ALTA-2018-12-24.dwg", PROVIDED BY CDM SMITH, AND TRANSMITTED TO HALEY & ALDRICH, INC. JANUARY 2020.

LEGEND

(VARIES) — DESIGNATION AND APPROXIMATE LOCATION OF PREVIOUS BORING PERFORMED BY OTHERS

HA18-B7 — DESIGNATION AND APPROXIMATE LOCATION OF TEST BORING OBSERVED BY HALEY & ALDRICH, INC. NOVEMBER 2018 AND MARCH 2020

HA20-C1 — DESIGNATION AND APPROXIMATE LOCATION OF TEST BORING OBSERVED BY HALEY & ALDRICH, INC. AND DRILLED BY NEW ENGLAND BORING CONTRACTORS BETWEEN 27 APRIL 2020 AND 30 APRIL 2020

(OW) — INDICATES OBSERVATION WELL INSTALLED IN COMPLETED BOREHOLE

APPROXIMATE LOCATION OF UTILITY LINE

PROPOSED DISCHARGE POINTS

PROPOSED DISCHARGE ROUTE

HALEY ALDRICH

CULVERT RECONSTRUCTION PROJECT
34 MARKET STREET
EVERETT, MASSACHUSETTS

SITE PLAN

SCALE: AS SHOWN
SEPTEMBER 2020

FIGURE 2

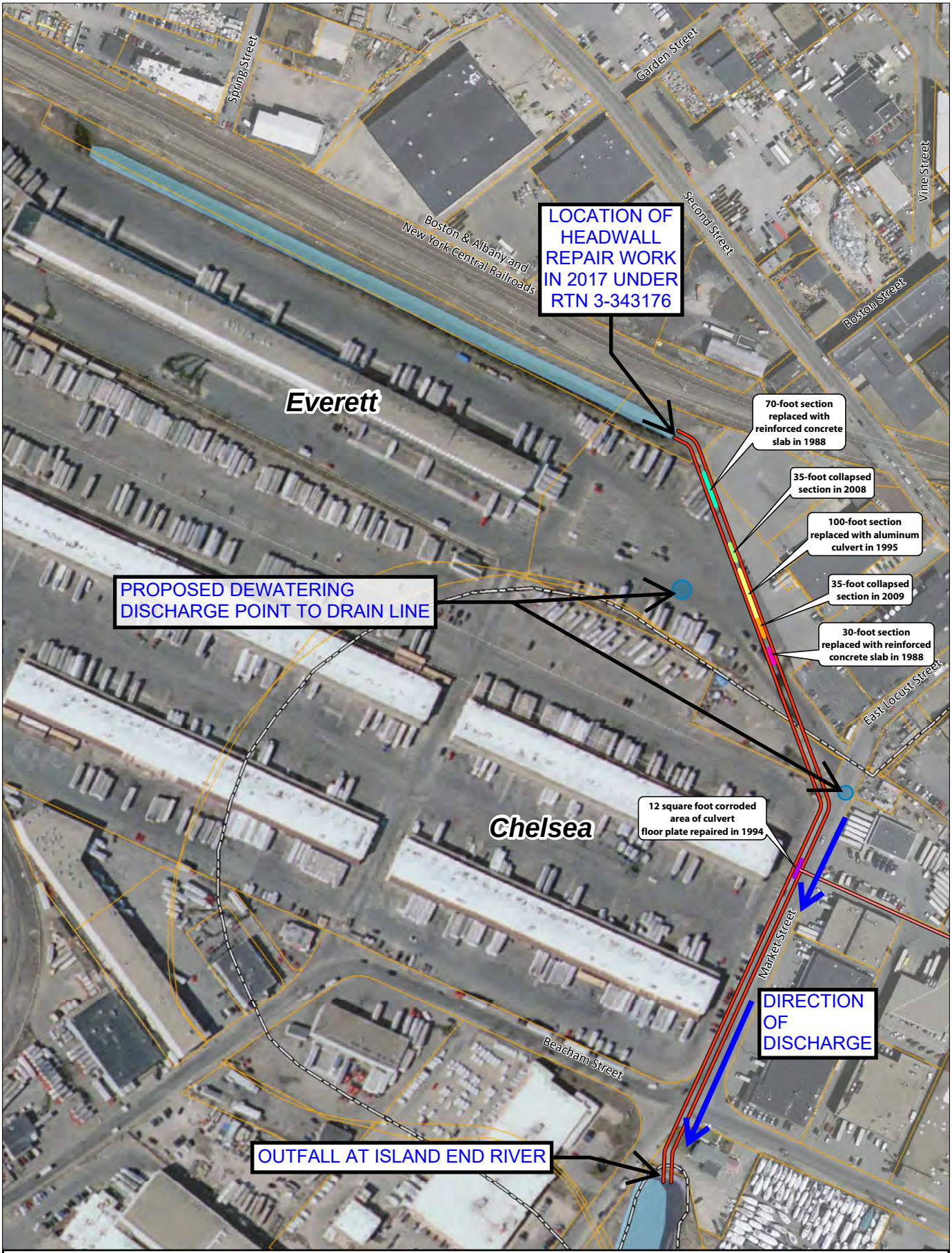


FIGURE 3 - CULVERT COLLAPSE HISTORY AND DISCHARGE ROUTE ALONG MARKET STREET

This Figure was modified by Haley & Aldrich, Inc. from the report titled "Feasibility Study for the Replacement/Rehabilitation of the Market Street Culvert in the Cities of Everett and Chelsea, Massachusetts", prepared by CDM Smith dated August 2010.

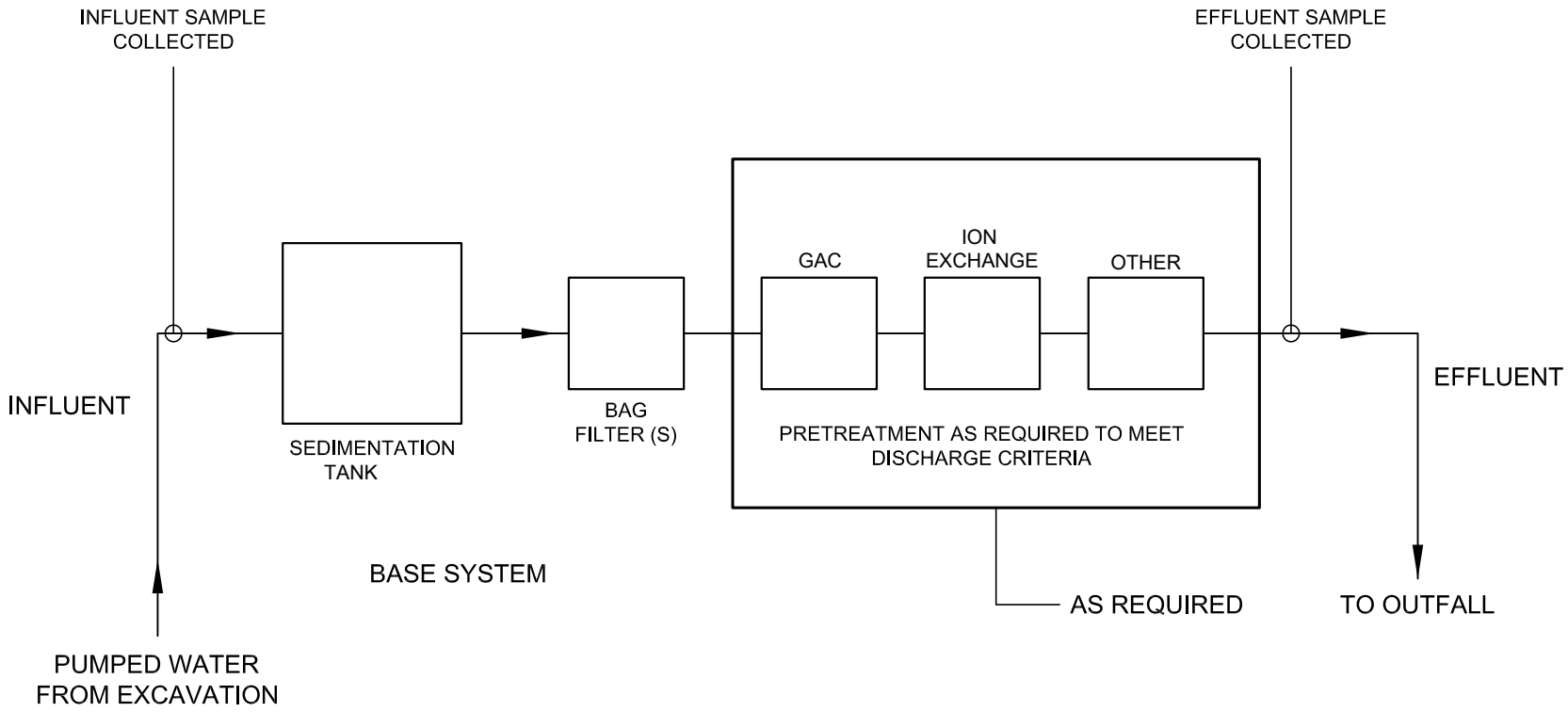
SEPTEMBER 2020

CDM

Market Street Culvert
30" Force Main (Appox Loc)
Hydrological Features
Parcels
Town Boundary

1 inch = 80 feet
0 50 100 150 200 250 Feet

Boston Market Terminal
Market Street Culvert
Collapse and Repair History
Figure 1-2



LEGEND:

DIRECTION OF FLOW

NOTE:

1. DETAILS OF TREATMENT SYSTEM MAY VARY FROM SYSTEM INDICATED ABOVE. SPECIFIC MEANS AND METHODS OF TREATMENT TO BE SELECTED BY CONTRACTOR. WATER WILL BE TREATED TO MEET REQUIRED EFFLUENT STANDARDS.

HALEY ALDRICH

CULVERT RECONSTRUCTION PROJECT
34 MARKET STREET
EVERETT, MASSACHUSETTS

PROPOSED TREATMENT SYSTEM SCHEMATIC

SCALE: NONE
SEPTEMBER 2020

FIGURE 4

APPENDIX A

Notice of Intent (NOI)

II. Suggested Format for the Remediation General Permit Notice of Intent (NOI)

A. General site information:

<table>
<tr><td rowspan="2">1. Name of site:
Culvert Reconstruction Project</td><td colspan="3">Site address: 34 Market Street
Street:</td></tr>
<tr><td>City: Everett</td><td>State: MA</td><td>Zip: 02150</td></tr>
<tr><td rowspan="4">2. Site owner
DIV BMT, LLC C/O The Davis Companies

Owner is (check one): ☐ Federal ☐ State/Tribal ■ Private
☐ Other; if so, specify:</td><td colspan="3">Contact Person: Christopher Mora</td></tr>
<tr><td colspan="2">Telephone: 617-936-4816</td><td>Email: cmora@thedaviscompanies.com</td></tr>
<tr><td colspan="3">Mailing address: 125 High Street
Street:</td></tr>
<tr><td>City: Boston</td><td>State: MA</td><td>Zip: 02110</td></tr>
<tr><td rowspan="4">3. Site operator, if different than owner</td><td colspan="3">Contact Person:</td></tr>
<tr><td colspan="2">Telephone:</td><td>Email:</td></tr>
<tr><td colspan="3">Mailing address:
Street:</td></tr>
<tr><td>City:</td><td>State:</td><td>Zip:</td></tr>
<tr><td colspan="2">4. NPDES permit number assigned by EPA:

NPDES permit is (check all that apply: ■ RGP ☐ DGP ☐ CGP
☐ MSGP ☐ Individual NPDES permit ☐ Other; if so, specify:</td><td colspan="2">5. Other regulatory program(s) that apply to the site (check all that apply):
■ MA Chapter 21e; list RTN(s):
3-13158
☐ NH Groundwater Management Permit or Groundwater Release Detection Permit:
☐ CERCLA
☐ UIC Program
☐ POTW Pretreatment
☐ CWA Section 404</td></tr>
</table>

B. Receiving water information:

1. Name of receiving water(s):	Waterbody identification of receiving water(s):	Classification of receiving water(s):
Island End River	MA71-03	Class SB/CSO

Receiving water is (check any that apply): ☐ Outstanding Resource Water ☐ Ocean Sanctuary ☐ territorial sea ☐ Wild and Scenic River

2. Has the operator attached a location map in accordance with the instructions in B, above? (check one): ■ Yes ☐ No

Are sensitive receptors present near the site? (check one): ☐ Yes ■ No
If yes, specify:

3. Indicate if the receiving water(s) is listed in the State's Integrated List of Waters (i.e., CWA Section 303(d)). Include which designated uses are impaired, and any pollutants indicated. Also, indicate if a final TMDL is available for any of the indicated pollutants. For more information, contact the appropriate State as noted in Part 4.6 of the RGP. Unionized ammonia, DO, fecal coliform, flocculant masses, oil & grease, taste, odor, PCBs in fish tissue, petroleum hydrocarbons, and scum/foam

4. Indicate the seven day-ten-year low flow (7Q10) of the receiving water determined in accordance with the instructions in Appendix V for sites located in Massachusetts and Appendix VI for sites located in New Hampshire.	0.00655 cfs
5. Indicate the requested dilution factor for the calculation of water quality-based effluent limitations (WQBELs) determined in accordance with the instructions in Appendix V for sites in Massachusetts and Appendix VI for sites in New Hampshire.	0

6. Has the operator received confirmation from the appropriate State for the 7Q10and dilution factor indicated? (check one): ■ Yes ☐ No
If yes, indicate date confirmation received: 22 June 2020

7. Has the operator attached a summary of receiving water sampling results as required in Part 4.2 of the RGP in accordance with the instruction in Appendix VIII? (check one): ■ Yes ☐ No

C. Source water information:

1. Source water(s) is (check any that apply):

■ Contaminated groundwater Has the operator attached a summary of influent sampling results as required in Part 4.2 of the RGP in accordance with the instruction in Appendix VIII? (check one): ■ Yes ☐ No	☐ Contaminated surface water Has the operator attached a summary of influent sampling results as required in Part 4.2 of the RGP in accordance with the instruction in Appendix VIII? (check one): ☐ Yes ☐ No	☐ The receiving water ☐ A surface water other than the receiving water; if so, indicate waterbody:	☐ Potable water; if so, indicate municipality or origin: ☐ Other; if so, specify:

2. Source water contaminants: Lead, Group I PAHs, Cyanide, TSS	
a. For source waters that are contaminated groundwater or contaminated surface water, indicate are any contaminants present that are not included in the RGP? (check one): ☐ Yes ■ No If yes, indicate the contaminant(s) and the maximum concentration present in accordance with the instructions in Appendix VIII.	b. For a source water that is a surface water other than the receiving water, potable water or other, indicate any contaminants present at the maximum concentration in accordance with the instructions in Appendix VIII? (check one): ☐ Yes ☐ No
3. Has the source water been previously chlorinated or otherwise contains residual chlorine? (check one): ☐ Yes ■ No	

D. Discharge information

1.The discharge(s) is a(n) (check any that apply): ■ Existing discharge ☐ New discharge ☐ New source	
Outfall(s): Island End River	Outfall location(s): (Latitude, Longitude) 42.394,-71.049
Discharges enter the receiving water(s) via (check any that apply): ☐ Direct discharge to the receiving water ■ Indirect discharge, if so, specify: Pumping into catch basin then traveling in the subsurface drainage culvert along Market Street ☐ A private storm sewer system ■ A municipal storm sewer system If the discharge enters the receiving water via a private or municipal storm sewer system: Owners of the Municipal Storm Sewer System: City of Everett and City of Chelsea Has notification been provided to the owner of this system? (check one): ■ Yes ☐ No Has the operator has received permission from the owner to use such system for discharges? (check one): ■ Yes ■ No, if so, explain, with an estimated timeframe for obtaining permission: Has the operator attached a summary of any additional requirements the owner of this system has specified? (check one): ☐ Yes ■ No	
Provide the expected start and end dates of discharge(s) (month/year): October 2020 to September 2021 Indicate if the discharge is expected to occur over a duration of: ■ less than 12 months ☐ 12 months or more ☐ is an emergency discharge	
Has the operator attached a site plan in accordance with the instructions in D, above? (check one): ■ Yes ☐ No	

<table>
<tr><td>2. Activity Category: (check all that apply)</td><td colspan="2">3. Contamination Type Category: (check all that apply)</td></tr>
<tr><td rowspan="5">☐ I – Petroleum-Related Site Remediation
☐ II – Non-Petroleum-Related Site Remediation
☐ III – Contaminated Site Dewatering
☐ IV – Dewatering of Pipelines and Tanks
☐ V – Aquifer Pump Testing
☐ VI – Well Development/Rehabilitation
■ VII – Collection Structure Dewatering/Remediation
☐ VIII – Dredge-Related Dewatering</td><td colspan="2">a. If Activity Category I or II: (check all that apply)

☐ A. Inorganics
☐ B. Non-Halogenated Volatile Organic Compounds
☐ C. Halogenated Volatile Organic Compounds
☐ D. Non-Halogenated Semi-Volatile Organic Compounds
☐ E. Halogenated Semi-Volatile Organic Compounds
☐ F. Fuels Parameters</td></tr>
<tr><td colspan="2">b. If Activity Category III, IV, V, VI, VII or VIII: (check either G or H)</td></tr>
<tr><td>■ G. Sites with Known Contamination</td><td>☐ H. Sites with Unknown Contamination</td></tr>
<tr><td>c. If Category III-G, IV-G, V-G, VI-G, VII-G or VIII-G: (check all that apply)

■ A. Inorganics
☐ B. Non-Halogenated Volatile Organic Compounds
☐ C. Halogenated Volatile Organic Compounds
■ D. Non-Halogenated Semi-Volatile Organic Compounds
☐ E. Halogenated Semi-Volatile Organic Compounds
■ F. Fuels Parameters</td><td>d. If Category III-H, IV-H, V-H, VI-H, VII-H or VIII-H Contamination Type Categories A through F apply</td></tr>
</table>

4. Influent and Effluent Characteristics

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
A. Inorganics									
Ammonia		✓	1	121,4500	75	7080	7080	Report mg/L	---
Chloride		✓	1	44,33.0	250000	10400000	10400000	Report µg/l	---
Total Residual Chlorine	✓		1	121,4500	20	<20	<20	0.2 mg/L	7.5 ug/L
Total Suspended Solids		✓	2	121,2540	5000	33000	20,650	30 mg/L	---
Antimony	✓		1	3,200.8	40	<40	<40	206 µg/L	NA
Arsenic		✓	1	3,200.8	10	25.68	25.86	104 µg/L	NA
Cadmium	✓		1	3,200.8	2	<2	<2	10.2 µg/L	NA
Chromium III		✓	1	NA	10	600	600	323 µg/L	NA
Chromium VI		✓	1	1,7196A	10	300	300	323 µg/L	NA
Copper	✓		1	3,200.8	10	<10	<10	242 µg/L	NA
Iron		✓	1	19,200.7	100	1050	1050	5,000 µg/L	NA
Lead		✓	1	3,200.8	10	15.93	15.93	160 µg/L	8.5 ug/L
Mercury	✓		1	3,245.1	0.2	<0.2	<0.2	0.739 µg/L	NA
Nickel	✓		1	3,200.8	20	<20	<20	1,450 µg/L	NA
Selenium	✓		1	3,200.8	50	<50	<50	235.8 µg/L	NA
Silver	✓		1	3,200.8	4	<4	<4	35.1 µg/L	NA
Zinc	✓		1	3,200.8	100	<100	<100	420 µg/L	NA
Cyanide		✓	2	121,4500	5	504	391	178 mg/L	1.0 ug/L
B. Non-Halogenated VOCs									
Total BTEX	✓		1	128,624.1	1	<1	<1	100 µg/L	---
Benzene	✓		1	128,624.1	1	<1	<1	5.0 µg/L	---
1,4 Dioxane	✓		1	128,624.1	50	<50	<50	200 µg/L	---
Acetone	✓		1	128,624.1	10	<10	<10	7.97 mg/L	---
Phenol	✓		1	4,420.1	30	<30	<30	1,080 µg/L	NA

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
C. Halogenated VOCs									
Carbon Tetrachloride	✓		1	128,624.1	1	<1	<1	4.4 µg/L	NA
1,2 Dichlorobenzene	✓		1	128,624.1	5	<5	<5	600 µg/L	---
1,3 Dichlorobenzene	✓		1	128,624.1	5	<5	<5	320 µg/L	---
1,4 Dichlorobenzene	✓		1	128,624.1	5	<5	<5	5.0 µg/L	---
Total dichlorobenzene	✓		1	NA	5	<5	<5	763 µg/L in NH	---
1,1 Dichloroethane	✓		1	128,624.1	1.5	<1.5	<1.5	70 µg/L	---
1,2 Dichloroethane	✓		1	128,624.1	1.5	<1.5	<1.5	5.0 µg/L	---
1,1 Dichloroethylene	✓		1	128,624.1	1	<1	<1	3.2 µg/L	---
Ethylene Dibromide	✓		1	14,504.1	0.01	<0.01	<0.01	0.05 µg/L	---
Methylene Chloride	✓		1	128,624.1	1	<1	<1	4.6 µg/L	---
1,1,1 Trichloroethane	✓		1	128,624.1	2	<2	<2	200 µg/L	---
1,1,2 Trichloroethane	✓		1	128,624.1	1.5	<1.5	<1.5	5.0 µg/L	---
Trichloroethylene	✓		1	128,624.1	1	<1	<1	5.0 µg/L	---
Tetrachloroethylene	✓		1	128,624.1	1	<1	<1	5.0 µg/L	NA
cis-1,2 Dichloroethylene	✓		1	128,624.1	1	<1	<1	70 µg/L	---
Vinyl Chloride	✓		1	128,624.1	1	<1	<1	2.0 µg/L	---
D. Non-Halogenated SVOCs									
Total Phthalates	✓		1	129,625.1	2.2	<2.2	<2.2	190 µg/L	NA
Diethylhexyl phthalate	✓		1	129,625.1	2.2	<2.2	<2.2	101 µg/L	NA
Total Group I PAHs		✓	1	129,625.1	0.1	13.242	13.242	1.0 µg/L	---
Benzo(a)anthracene		✓	1	129,625.1	0.1	2.67	2.67	As Total PAHs	0.0038 ug/L
Benzo(a)pyrene		✓	1	129,625.1	0.1	2.52	2.52		0.0038 ug/L
Benzo(b)fluoranthene		✓	1	129,625.1	0.1	2.91	2.91		0.0038 ug/L
Benzo(k)fluoranthene		✓	1	129,625.1	0.1	1.11	1.11		0.0038 ug/L
Chrysene		✓	1	129,625.1	0.1	1.96	1.96		0.0038 ug/L
Dibenzo(a,h)anthracene		✓	1	129,625.1	0.1	0.372	0.372		0.0038 ug/L
Indeno(1,2,3-cd)pyrene		✓	1	129,625.1	0.1	1.7	1.7		0.0038 ug/L

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
Total Group II PAHs		✔	1	129,625.1	0.1	28.071	28.071	100 µg/L	---
Naphthalene		✔	1	129,625.1	0.1	3	3	20 µg/L	---
E. Halogenated SVOCs									
Total PCBs	✔		1	127,608.3	0.2	<0.2	<0.2	0.000064 µg/L	---
Pentachlorophenol	✔		1	129,625.1	1	<1	<1	1.0 µg/L	---
F. Fuels Parameters									
Total Petroleum Hydrocarbons	✔		1	74,1664A	4000	<4000	<4000	5.0 mg/L	---
Ethanol		✔	1	1671A	20000	210000	210000	Report mg/L	---
Methyl-tert-Butyl Ether	✔		1	128,624.1	10	<10	<10	70 µg/L	NA
tert-Butyl Alcohol	✔		1	128,624.1	100	<100	<100	120 µg/L in MA 40 µg/L in NH	---
tert-Amyl Methyl Ether	✔		1	128,624.1	20	<20	<20	90 µg/L in MA 140 µg/L in NH	---
Other (i.e., pH, temperature, hardness, salinity, LC_{50}, additional pollutants present); if so, specify:									
pH		✔	1	121,4500	NA	8.1	8.1		
Hardeness		✔	1	19,200.7	1320	3180000	3180000		
Lead, dissolved	✔		1	3,200.8	10	<10	<10		
Cyanide, filtered		✔	1	121,4500	5	391	391		
MADEP C11-C22 Aromatic		✔	2	98,04-1.1	6690	0	0		

E. Treatment system information

1. Indicate the type(s) of treatment that will be applied to effluent prior to discharge: (check all that apply)

☐ Adsorption/Absorption ☐ Advanced Oxidation Processes ☐ Air Stripping ■ Granulated Activated Carbon ("GAC")/Liquid Phase Carbon Adsorption

■ Ion Exchange ☐ Precipitation/Coagulation/Flocculation ■ Separation/Filtration ☐ Other; if so, specify:

GAC to address PAHs, ion exchange to address metals. Other treatments to be applied as necessary to meet effluent limitations.

2. Provide a written description of all treatment system(s) or processes that will be applied to the effluent prior to discharge.

Prior to discharge, collected water will be routed through a sedimentation tank and bag filters to remove suspended solids and undissolved chemical contaminants. If additional treatment is needed to meet effluent limits, a Notice of Change will be submitted for review and approval. After treatment, constituent concentrations in effluent expected to range from non-detectable to less than effluent criteria. If authorized under the RGP, parameters to be monitored will included one or more VOCs, PAHs, metals/inorganics, pH, and other compounds known or believed present in the source water.

Identify each major treatment component (check any that apply):

■ Fractionation tanks☐ Equalization tank ■ Oil/water separator ☐ Mechanical filter ☐ Media filter

☐ Chemical feed tank ☐ Air stripping unit ■ Bag filter ☐ Other; if so, specify:

Indicate if either of the following will occur (check any that apply):

☐ Chlorination ☐ De-chlorination

3. Provide the **design flow capacity** in gallons per minute (gpm) of the most limiting component. Indicate the most limiting component: Is use of a flow meter feasible? (check one): ■ Yes ☐ No, if so, provide justification:	150 gpm
Provide the proposed maximum effluent flow in gpm.	150 gpm
Provide the average effluent flow in gpm.	50
If Activity Category IV applies, indicate the estimated total volume of water that will be discharged:	NA

4. Has the operator attached a schematic of flow in accordance with the instructions in E, above? (check one): ■ Yes ☐ No

F. Chemical and additive information

1. Indicate the type(s) of chemical or additive that will be applied to effluent prior to discharge or that may otherwise be present in the discharge(s): (check all that apply)

☐ Algaecides/biocides ☐ Antifoams ☐ Coagulants ☐ Corrosion/scale inhibitors ☐ Disinfectants ☐ Flocculants ☐ Neutralizing agents ☐ Oxidants ☐ Oxygen ☐ scavengers ☐ pH conditioners ☐ Bioremedial agents, including microbes ☐ Chlorine or chemicals containing chlorine ☐ Other; if so, specify:

2. Provide the following information for each chemical/additive, using attachments, if necessary:

a. Product name, chemical formula, and manufacturer of the chemical/additive;
b. Purpose or use of the chemical/additive or remedial agent;
c. Material Safety Data Sheet (MSDS) and Chemical Abstracts Service (CAS) Registry number for each chemical/additive;
d. The frequency (hourly, daily, etc.), duration (hours, days), quantity (maximum and average), and method of application for the chemical/additive;
e. Any material compatibility risks for storage and/or use including the control measures used to minimize such risks; and
f. If available, the vendor's reported aquatic toxicity (NOAEL and/or LC50 in percent for aquatic organism(s)).

3. Has the operator attached an explanation which demonstrates that the addition of such chemicals/additives may be authorized under this general permit in accordance with the instructions in F, above? (check one): ☐ Yes ☐ No; if no, has the operator attached data that demonstrates each of the 126 priority pollutants in CWA Section 307(a) and 40 CFR Part 423.15(j)(1) are non-detect in discharges with the addition of the proposed chemical/additive? (check one): ☐ Yes ☐ No

G. Endangered Species Act eligibility determination

1. Indicate under which criterion the discharge(s) is eligible for coverage under this general permit:

■ **FWS Criterion A**: No endangered or threatened species or critical habitat are in proximity to the discharges or related activities or come in contact with the "action area".

☐ **FWS Criterion B**: Formal or informal consultation with the FWS under section 7 of the ESA resulted in either a no jeopardy opinion (formal consultation) or a written concurrence by FWS on a finding that the discharges and related activities are "not likely to adversely affect" listed species or critical habitat (informal consultation). Has the operator completed consultation with FWS? (check one): ☐ Yes ☐ No; if no, is consultation underway? (check one): ☐ Yes ☐ No

☐ **FWS Criterion C**: Using the best scientific and commercial data available, the effect of the discharges and related activities on listed species and critical habitat have been evaluated. Based on those evaluations, a determination is made by EPA, or by the operator and affirmed by EPA, that the discharges and related activities will have "no effect" on any federally threatened or endangered listed species or designated critical habitat under the jurisdiction of the FWS. This determination was made by: (check one) ☐ the operator ☐ EPA ☐ Other; if so, specify:

■ **NMFS Criterion**: A determination made by EPA is affirmed by the operator that the discharges and related activities will have "no effect" or are "not likely to adversely affect" any federally threatened or endangered listed species or critical habitat under the jurisdiction of NMFS and will not result in any take of listed species. Has the operator previously completed consultation with NMFS? (check one): ☐ Yes ■ No

2. Has the operator attached supporting documentation of ESA eligibility in accordance with the instructions in Appendix I, and G, above? (check one): ■ Yes ☐ No

Does the supporting documentation include any written concurrence or finding provided by the Services? (check one): ☐ Yes ■ No; if yes, attach.

H. National Historic Preservation Act eligibility determination

1. Indicate under which criterion the discharge(s) is eligible for coverage under this general permit:

☐ **Criterion A**: No historic properties are present. The discharges and discharge-related activities (e.g., BMPs) do not have the potential to cause effects on historic properties.

■ **Criterion B**: Historic properties are present. Discharges and discharge related activities do not have the potential to cause effects on historic properties.

☐ **Criterion C**: Historic properties are present. The discharges and discharge-related activities have the potential to have an effect or will have an adverse effect on historic properties.

2. Has the operator attached supporting documentation of NHPA eligibility in accordance with the instructions in H, above? (check one): ■ Yes ☐ No

Does the supporting documentation include any written agreement with the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer (TPHO), or other tribal representative that outlines measures the operator will carry out to mitigate or prevent any adverse effects on historic properties? (check one): ☐ Yes ■ No

I. Supplemental information

Describe any supplemental information being provided with the NOI. Include attachments if required or otherwise necessary.

Please refer to attached Haley & Aldrich letter dated September 2020.

Has the operator attached data, including any laboratory case narrative and chain of custody used to support the application? (check one): ■ Yes ☐ No

Has the operator attached the certification requirement for the Best Management Practices Plan (BMPP)? (check one): ■ Yes ☐ No

J. Certification requirement

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

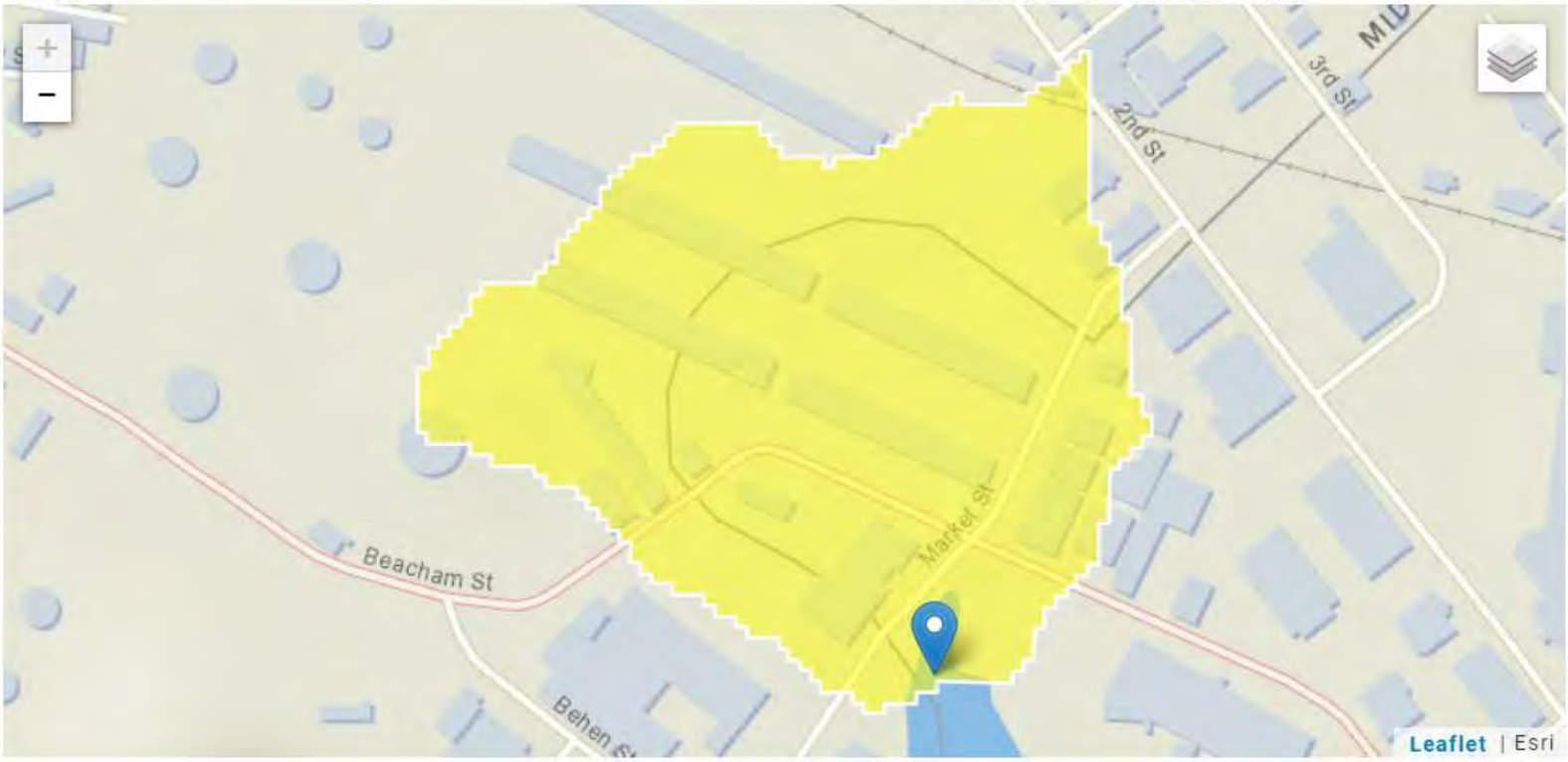
BMPP certification statement:	A BMPP meeting the requirements of this general permit will be implemented upon initiation of discharge and available for review at the site.
Notification provided to the appropriate State, including a copy of this NOI, if required.	Check one: Yes ☐ No ☐ Not Required
Notification provided to the municipality in which the discharge is located, including a copy of this NOI, if requested.	Check one: Yes ■ No ☐
Notification provided to the owner of a private or municipal storm sewer system, if such system is used for site discharges, including a copy of this NOI, if requested.	Check one: Yes ■ No ☐ NA ☐
Permission obtained from the owner of a private or municipal storm sewer system, if such system is used for site discharges. If yes, attach additional conditions. If no, attach explanation and timeframe for obtaining permission.	Check one: Yes ■ No ☐ NA ☐
Notification provided to the owner/operator of the area associated with activities covered by an additional discharge permit(s). Additional discharge permit is (check one): ☐ RGP ☐ DGP ☐ CGP ☐ MSGP ☐ Individual NPDES permit ☐ Other; if so, specify:	Check one: Yes ☐ No ☐ NA ☐
Signature:	Date: 9/18/2020
Print Name and Title:	Michael Cantalupa - Chief Development Officer

APPENDIX B

Effluent Limitations Documentation

StreamStats Report - D1

Region ID: MA
Workspace ID: MA20200619181607235000
Clicked Point (Latitude, Longitude): 42.39372, -71.05009
Time: 2020-06-19 14:17:08 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.1	square miles
BSLDEM250	Mean basin slope computed from 1:250K DEM	0.354	percent
DRFTPERSTR	Area of stratified drift per unit of stream length	1.75	square mile per mile
MAREGION	Region of Massachusetts 0 for Eastern 1 for Western	0	dimensionless

Low-Flow Statistics Parameters[Statewide Low Flow WRIR00 4135]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.1	square miles	1.61	149
BSLDEM250	Mean Basin Slope from 250K DEM	0.354	percent	0.32	24.6
DRFTPERSTR	Stratified Drift per Stream Length	1.75	square mile per mile	0	1.29
MAREGION	Massachusetts Region	0	dimensionless	0	1

Low-Flow Statistics Disclaimers[Statewide Low Flow WRIR00 4135]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Low-Flow Statistics Flow Report[Statewide Low Flow WRIR00 4135]

Statistic	Value	Unit
7 Day 2 Year Low Flow	0.0164	ft^3/s
7 Day 10 Year Low Flow	0.00655	ft^3/s

Low-Flow Statistics Citations

Ries, K.G., III,2000, Methods for estimating low-flow statistics for Massachusetts streams: U.S. Geological Survey Water Resources Investigations Report 00-4135, 81 p.

Application Version: 4.3.11

Hi Kim,

Thank you for the materials you provided. As you also mentioned in the email below that the receiving water Island End River is part of the Mystic River with Segment ID MA71-03. This segment is at the downstream of Amelia Earhart Dam and is identified as SB (CSO) water. I saw the StreamStats report that you provided, but I wasn't able to obtain a 7Q10 on StreamStats for the same lat/long location. But regardless, as it is estuarine/marine water, there will be no dilution factor or DF is 0.

Here is some additional information to use in the NOI:
This segment is not an Outstanding Resource Water. Please note that there is a pathogen TMDL dated October 2018 for this segment that was not listed in the 2016 MA Integrated List of Waters. The link to the pathogen TMDL is here: https://www.mass.gov/doc/final-pathogen-tmdl-report-for-the-boston-harbor-weymouth-weir-and-mystic-watersheds/download.

If this is not a *current* MCP site, then in addition to submitting the NOI to EPA, you need to apply with MassDEP and submit a $500 fee (unless fee exempt, e.g. municipality).

Regarding the MassDEP application, on June 30th we will be transitioning to an online application submittal process where you will set up a user ID and be able to submit NOIs for various projects as well as pay by credit card. We anticipate that at first there will be a learning curve for both users and permitting staff but technical support will be available. You will know when the system has gone "live" when the instructions change on this page: https://www.mass.gov/how-to/wm-15-npdes-general-permit-notice-of-intent.

Please let me know if you have any questions.

Thanks,
Xiaodan

From: Vakalopoulos, Catherine (DEP)
Sent: Monday, June 22, 2020 1:30 PM
To: Ruan, Xiaodan (DEP)
Cc: KScalise@haleyaldrich.com; EJoyce@haleyaldrich.com
Subject: Fw: 7Q10 + Dilution Factor for NPDES NOI - BMT Culvert Project

Hi Kim,
I'm doing ok, hope you are too. I'm forwarding this to Xiaodan who will be able to check this for you.
Cathy

Cathy Vakalopoulos, Massachusetts Department of Environmental Protection
1 Winter St., Boston, MA 02108, 617-348-4026

From: Scalise, Kimberly <KScalise@haleyaldrich.com>
Sent: Friday, June 19, 2020 4:53 PM
To: Vakalopoulos, Catherine (DEP)
Cc: Joyce, Liza
Subject: 7Q10 + Dilution Factor for NPDES NOI - BMT Culvert Project

Hi Cathy,

I hope you're doing well!

We're working on a NPDES NOI for a site near the New England Produce Terminal in Everett/Chelsea. For your review, I've attached the StreamStats reports detailing the 7 Day 10 Year (7Q10) low flow value for our project (listed below) along with the dilution factor calculations. The maximum design flow of the system is 150 GPM, which we've used for the calculation.

I'm not confident that we've pulled a representative StreamStats report given the small drainage area, however, when selecting delineation points further out in the river, an error message was generated: "Delineation and flow statistic computation not allowed here."

Can you please confirm whether these assumptions are appropriate for the project?

Project:
34 Market Street
Everett, MA
Discharge will be to the Island End River via a subsurface stormwater drainage culvert that runs under Market Street. I've attached a graphic for your reference. From the MA Integrated List of Waters (2016) it appears the Island End River is part of the Mystic River Waterbody Segment ID MA71-03.

Have a good weekend!
Thank you,
Kim

Kimberly Scalise
Senior Geologist

Haley & Aldrich, Inc.
465 Medford Street | Suite 2200
Boston, Massachusetts 02129

T: 617.886.7416
C: 716.445.1385
www.haleyaldrich.com

Enter number values in green boxes below

Enter values in the units specified

↓	
0	Q_R = Enter upstream flow in **MGD**
0.216	Q_P = Enter discharge flow in **MGD**
0	Downstream 7Q10

Enter a dilution factor, if other than zero

↓	
0	

Enter values in the units specified

↓	
155	C_d = Enter influent hardness in **mg/L** $CaCO_3$
1500	C_s = Enter receiving water hardness in **mg/L** $CaCO_3$

Enter **receiving water** concentrations in the units specified

↓	
7.6	pH in **Standard Units**
17.6	Temperature in **°C**
0.3	Ammonia in **mg/L**
1500	Hardness in **mg/L** $CaCO_3$
0	Salinity in **ppt**
0	Antimony in **µg/L**
0	Arsenic in **µg/L**
0	Cadmium in **µg/L**
0	Chromium III in **µg/L**
0	Chromium VI in **µg/L**
0	Copper in **µg/L**
688	Iron in **µg/L**
0	Lead in **µg/L**
0	Mercury in **µg/L**
0	Nickel in **µg/L**
0	Selenium in **µg/L**
0	Silver in **µg/L**
0	Zinc in **µg/L**

Enter **influent** concentrations in the units specified

↓	
0	TRC in **µg/L**
7.08	Ammonia in **mg/L**
0	Antimony in **µg/L**
25.68	Arsenic in **µg/L**
0	Cadmium in **µg/L**
0	Chromium III in **µg/L**
0	Chromium VI in **µg/L**
0	Copper in **µg/L**
1050	Iron in **µg/L**
15.93	Lead in **µg/L**
0	Mercury in **µg/L**
0	Nickel in **µg/L**
0	Selenium in **µg/L**
0	Silver in **µg/L**
0	Zinc in **µg/L**
278	Cyanide in **µg/L**
0	Phenol in **µg/L**
0	Carbon Tetrachloride in **µg/L**
0	Tetrachloroethylene in **µg/L**
0	Total Phthalates in **µg/L**
0	Diethylhexylphthalate in **µg/L**
2.67	Benzo(a)anthracene in **µg/L**
2.52	Benzo(a)pyrene in **µg/L**
2.91	Benzo(b)fluoranthene in **µg/L**
1.11	Benzo(k)fluoranthene in **µg/L**
1.96	Chrysene in **µg/L**
0.372	Dibenzo(a,h)anthracene in **µg/L**
1.7	Indeno(1,2,3-cd)pyrene in **µg/L**
0	Methyl-tert butyl ether in **µg/L**

Notes:

Freshwater: Q_R equal to the 7Q10; enter alternate Q_R if approved by the State; enter 0 if no dilution factor approved
Saltwater (estuarine and marine): enter Q_R if approved by the State; enter 0 if no entry
Discharge flow is equal to the design flow or 1 MGD, whichever is less
Only if approved by State as the entry for Q_R; leave 0 if no entry

Saltwater (estuarine and marine): only if approved by the State
Leave 0 if no entry

Freshwater only

pH, temperature, and ammonia required for all discharges
Hardness required for freshwater
Salinity required for saltwater (estuarine and marine)
Metals required for all discharges if present and if dilution factor is > 1
Enter 0 if non-detect or testing not required

if >1 sample, enter maximum
if >10 samples, may enter 95th percentile
Enter 0 if non-detect or testing not required

I. Dilution Factor Calculation Method

A. 7Q10

No flow assumed at critical low flow for saltwater unless otherwise approved by the State

B. Dilution Factor

No dilution assumed for saltwater, unless otherwise approved by the State

II. Effluent Limitation Calculation Method

A. Calculate Water Quality Criterion:

Step 1. Not applicable to saltwater

Step 2. Not applicable to saltwater

Step 3. Total recoverable water quality criteria for dissolved metals, calculated as follows:

$$\text{WQC in µg/L} = \frac{\text{dissolved WQC in µg/L}}{\text{dissolved to total recoverable factor}}$$

B. Calculate WQBEL:

Step 1. WQBEL calculated as follows for parameter sampled in and detected in the receiving water:

$$C_d = \frac{Q_r C_r - Q_s C_s}{Q_d}$$

C_r = Water quality criterion in µg/L

Q_d = Discharge flow in MGD

C_d = WQBEL in µg/L

Q_s = Upstream flow (7Q10) in MGD

C_s = Ustream (receiving water) concentration in µg/L

Q_r = Downstream receiving water flow in MGD

Step 2. WQBEL calculated as follows for parameter not sampled in or not detected in receiving water:

$$C_d = (Q_r/Q_d) \times C_r$$

C_r = Water quality criterion in µg/L

Q_d = Discharge flow in MGD

Q_r = Downstream receiving water flow in MGD

C. Determine if a WQBEL applies:

Step 1. For parameter sampled in and detected in receiving water, downstream concentrations calculated as follows:

$$C_r = \frac{Q_d C_d + Q_s C_s}{Q_r}$$

C_r = Downstream concentration in µg/L

Q_d = Discharge flow in MGD

C_d = Influent concentration in µg/L

Q_s = Upstream flow (7Q10) in MGD

C_s = Upstream (receiving water) concentration in µg/L

Q_r = Downstream receiving water flow in MGD

The WQBEL applies if:

1) the projected downstream concentration calculated in accordance with Step 1, above, and the discharge concentration of a parameter is greater than the WQC calculated for that parameter in accordance with II.A, above

AND

2) the WQBEL determined for that parameter in accordance with II.B, above, is less than the TBEL in Part 2.1.1 of the RGP for that parameter. Otherwise, the TBEL in Part 2.1.1 of the RGP for that parameter applies.

Step 2. For a parameter not detected in or not sampled in receiving water, the WQBEL applies if:

1) the discharge concentration of a parameter is greater than the WQBEL determined for that parameter in accordance with II.A or II.B, above;

AND

2) the WQBEL determined for that parameter in accordance with II.A or II.B, above is less than the TBEL in Part 2.1.1 of the RGP for that parameter. Otherwise, the TBEL in Part 2.1.1 of the RGP for that parameter applies.

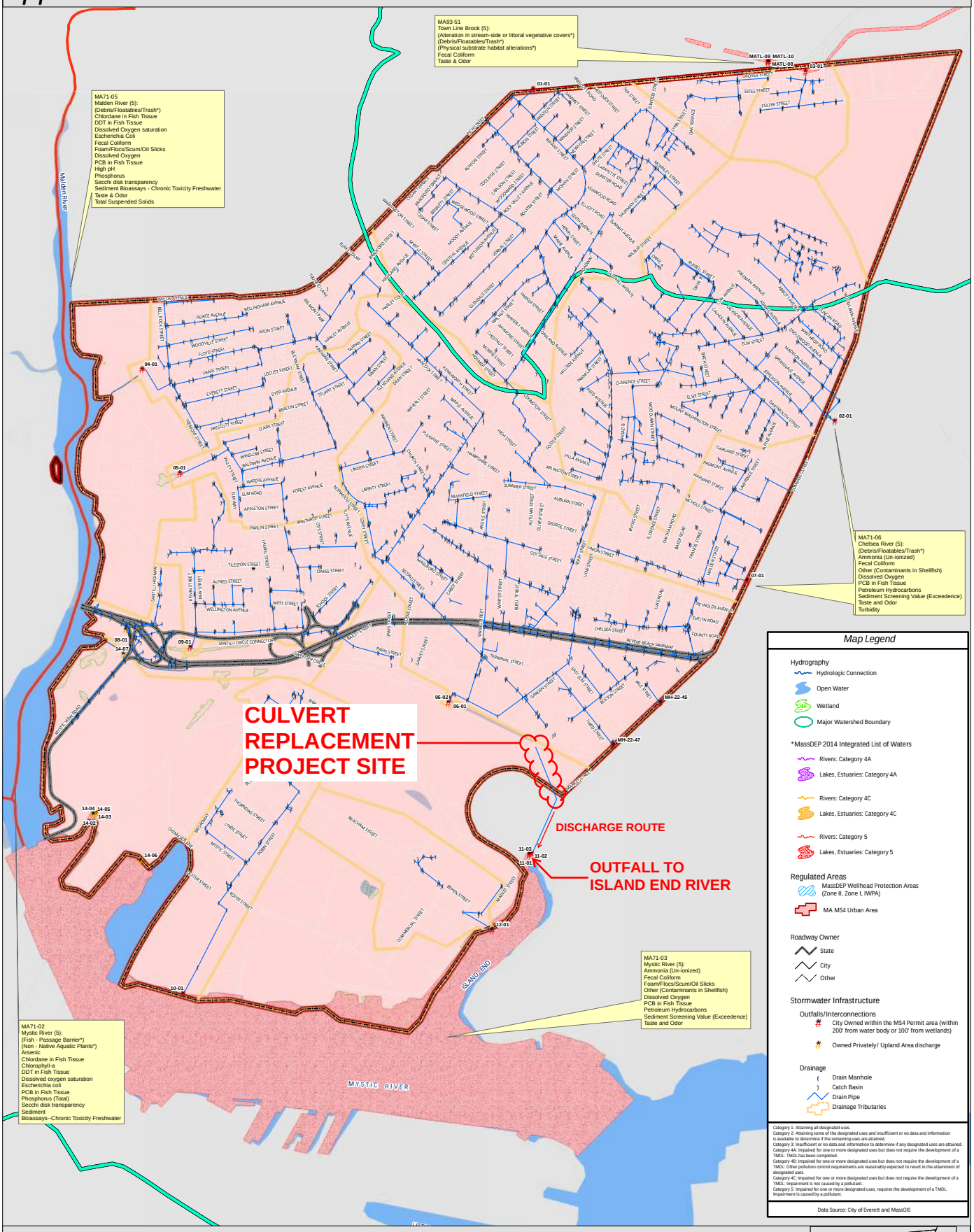
Dilution Factor	0.0					
A. Inorganics	TBEL applies if bolded		WQBEL applies if bolded		Compliance Level applies if shown	
Ammonia	**Report**	mg/L	---			
Chloride	**Report**	µg/L	---			
Total Residual Chlorine	0.2	mg/L	**7.5**	µg/L	50	µg/L
Total Suspended Solids	**30**	mg/L	---			
Antimony	**206**	µg/L	640	µg/L		
Arsenic	**104**	µg/L	36	µg/L		
Cadmium	**10.2**	µg/L	8.9	µg/L		
Chromium III	**323**	µg/L	100.0	µg/L		
Chromium VI	**323**	µg/L	50	µg/L		
Copper	**242**	µg/L	3.7	µg/L		
Iron	**5000**	µg/L	---	µg/L		
Lead	160	µg/L	**8.5**	µg/L		
Mercury	**0.739**	µg/L	1.11	µg/L		
Nickel	**1450**	µg/L	8.3	µg/L		
Selenium	**235.8**	µg/L	71	µg/L		
Silver	**35.1**	µg/L	2.2	µg/L		
Zinc	**420**	µg/L	86	µg/L		
Cyanide	178	mg/L	**1.0**	µg/L	5	µg/L
B. Non-Halogenated VOCs						
Total BTEX	**100**	µg/L	---			
Benzene	**5.0**	µg/L	---			
1,4 Dioxane	**200**	µg/L	---			
Acetone	**7.97**	mg/L	---			
Phenol	**1,080**	µg/L	300	µg/L		
C. Halogenated VOCs						
Carbon Tetrachloride	**4.4**		1.6	µg/L		
1,2 Dichlorobenzene	**600**	µg/L	---			
1,3 Dichlorobenzene	**320**	µg/L	---			
1,4 Dichlorobenzene	**5.0**	µg/L	---			
Total dichlorobenzene	**---**	µg/L	---			
1,1 Dichloroethane	**70**	µg/L	---			
1,2 Dichloroethane	**5.0**	µg/L	---			
1,1 Dichloroethylene	**3.2**	µg/L	---			
Ethylene Dibromide	**0.05**	µg/L	---			
Methylene Chloride	**4.6**	µg/L	---			
1,1,1 Trichloroethane	**200**	µg/L	---			
1,1,2 Trichloroethane	**5.0**	µg/L	---			
Trichloroethylene	**5.0**	µg/L	---			
Tetrachloroethylene	**5.0**	µg/L	3.3	µg/L		
cis-1,2 Dichloroethylene	**70**	µg/L	---			
Vinyl Chloride	**2.0**	µg/L	---			
D. Non-Halogenated SVOCs						
Total Phthalates	**190**	µg/L	---	µg/L		
Diethylhexyl phthalate	**101**	µg/L	2.2	µg/L		

Total Group I Polycyclic Aromatic Hydrocarbons	**1.0**	µg/L	---			
Benzo(a)anthracene	1.0	µg/L	**0.0038**	µg/L	0.1	µg/L
Benzo(a)pyrene	1.0	µg/L	**0.0038**	µg/L	0.1	µg/L
Benzo(b)fluoranthene	1.0	µg/L	**0.0038**	µg/L	0.1	µg/L
Benzo(k)fluoranthene	1.0	µg/L	**0.0038**	µg/L	0.1	µg/L
Chrysene	1.0	µg/L	**0.0038**	µg/L	0.1	µg/L
Dibenzo(a,h)anthracene	1.0	µg/L	**0.0038**	µg/L	0.1	µg/L
Indeno(1,2,3-cd)pyrene	1.0	µg/L	**0.0038**	µg/L	0.1	µg/L
Total Group II Polycyclic Aromatic Hydrocarbons	**100**	µg/L	---			
Naphthalene	**20**	µg/L	---			
E. Halogenated SVOCs						
Total Polychlorinated Biphenyls	**0.000064**	µg/L	---		0.5	µg/L
Pentachlorophenol	**1.0**	µg/L	---			
F. Fuels Parameters						
Total Petroleum Hydrocarbons	**5.0**	mg/L	---			
Ethanol	**Report**	mg/L	---			
Methyl-tert-Butyl Ether	**70**	µg/L	20	µg/L		
tert-Butyl Alcohol	**120**	µg/L	---			
tert-Amyl Methyl Ether	**90**	µg/L	---			

City of Everett, Massachusetts

Storm Sewer Map

Appendix A



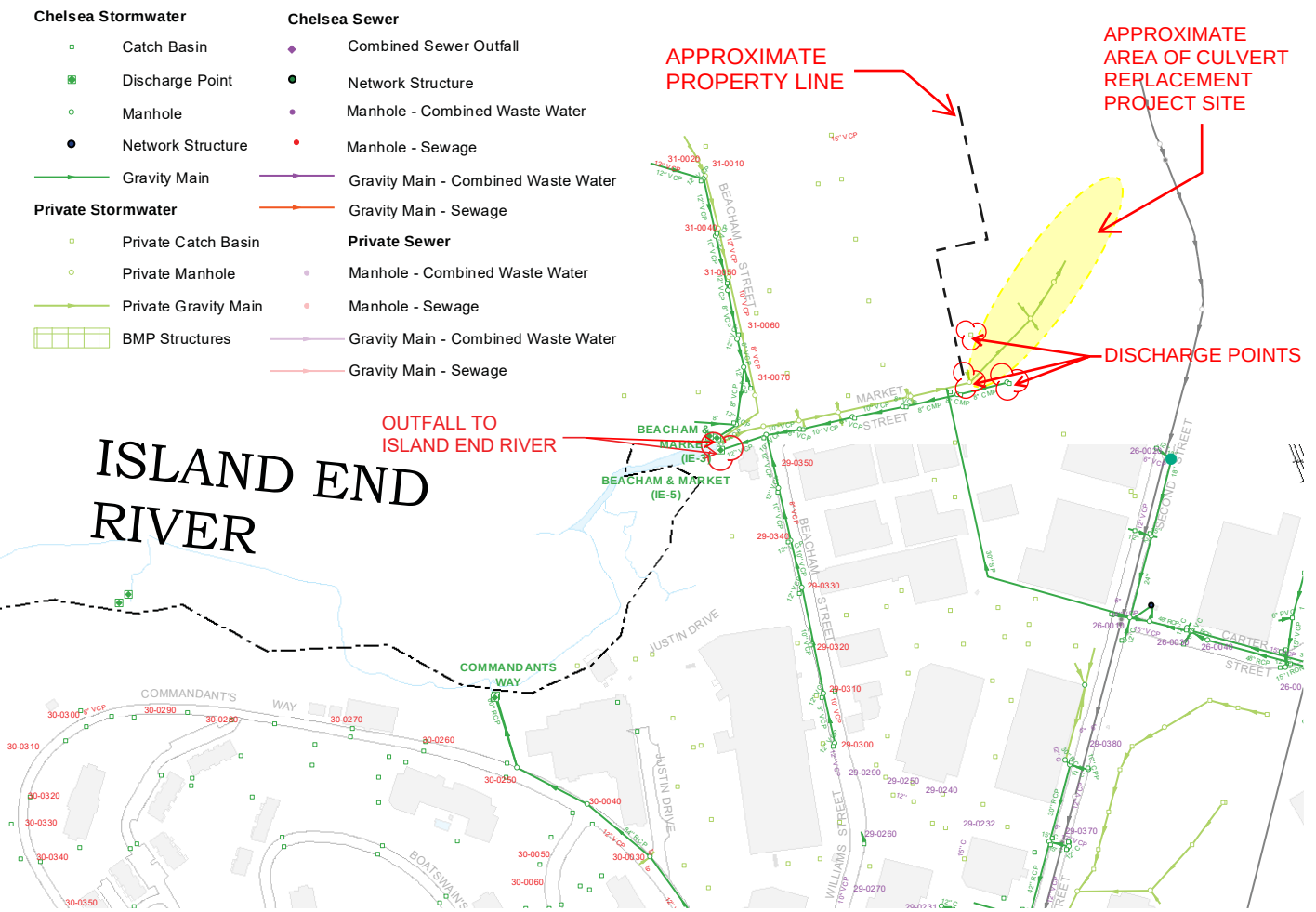
Creation Date: June 2019

This Map is Intended for Planning Purposes Only

BETA

MODIFIED BY HALEY & ALDRICH, INC. FOR NPDES NOI SEPTEMBER 2020

CITY OF CHELSEA, MASSACHUSETTS
MAP OF EXISTING SEWER AND DRAIN SYSTEM



MODIFIED BY HALEY & ALDRICH, INC.
FOR NPDES NOI
SEPTEMBER 2020

APPENDIX C

Additional Treatment Information

89 Crawford Street
Leominster, Massachusetts 01453
Tel: 774.450.7177
Fax: 888.835.0617
www.lrt-llc.net

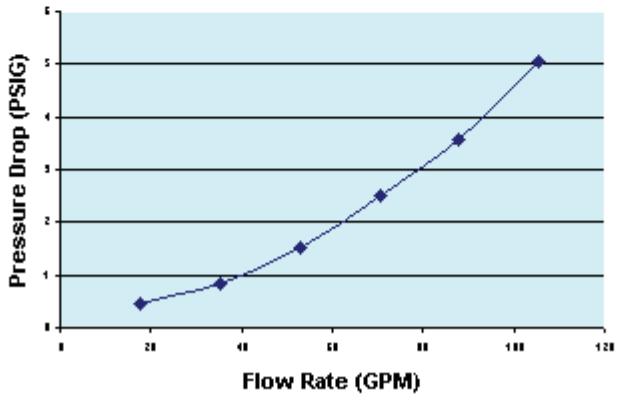
HPAF SERIES FILTERS
MODEL HPAF-2000

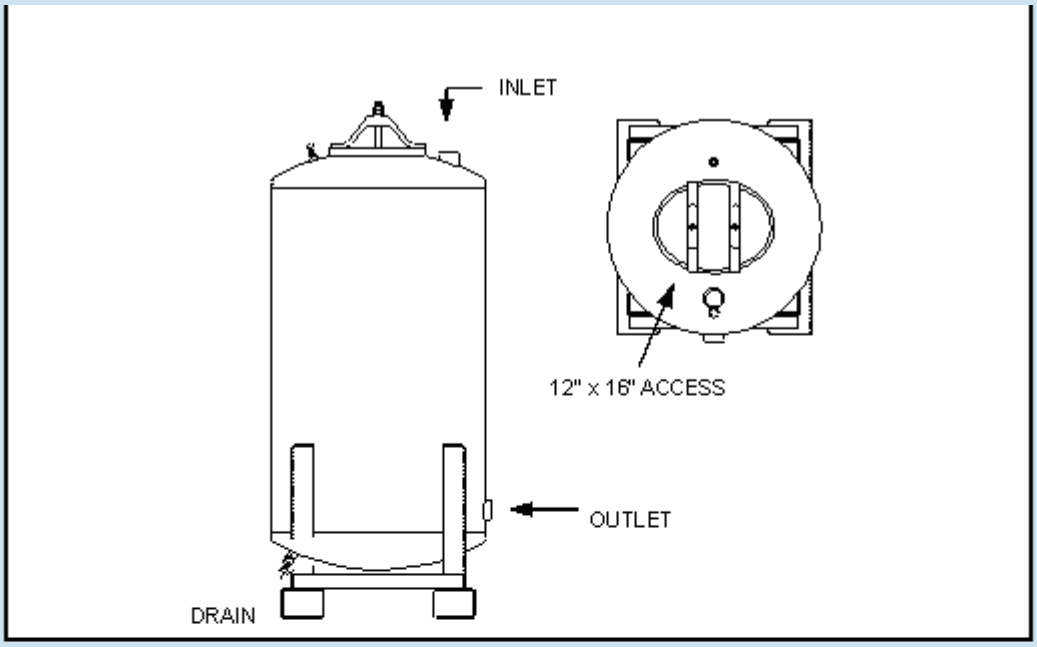
The HPAF-2000 filter is a media filter vessel designed to treat liquid streams. While the typical design application is a activated carbon adsorbtion unit, the filter can easily accommodate many medias. Some applications include:

- Dissolved Organic Removal (Activated Carbon)
- Suspended Solids Removal (Sand Filter)
- Dissolved Minerals (Softener Resin)
- Oil and Grease Removal (Organo-Clays)
- Dissolved and Precipitated Metals Removal
- Special Organics (Resin/Carbon Blend)
- Catalytic Reactor (Chlorine and Peroxide Removal)
- Bio-Remediation Contactor Unit

PRESSURE DROP GRAPH

*(As Filled - 8*30 GAC)*





HPAF-2000 SPECIFICATIONS			
Overall Height	8'6"	Vessel/Internal Piping Materials	CS (SA-36) / SCH 40 PVC
Diameter	48"	Internal Coating	Polyamide Epoxy Resin
Inlet / Outlet (FNPT)	3"	External Coating	Epoxy Mastic
Drain / Vent (FNPT)	3/4" / 1/2"	Maximum Pressure / Temp	75 PSIG / 140° F
GAC Fill (lbs)	2,000	Cross Sectional Bed Area	12.5 FT^2
Shipping / Operational Weight (lbs)	3,020/6,775	Bed Depth/Volume	5.5 FT / 68.7 FT^3

CGS

CATION EXCHANGE RESIN
SOFTENING GRADE
Na FORM

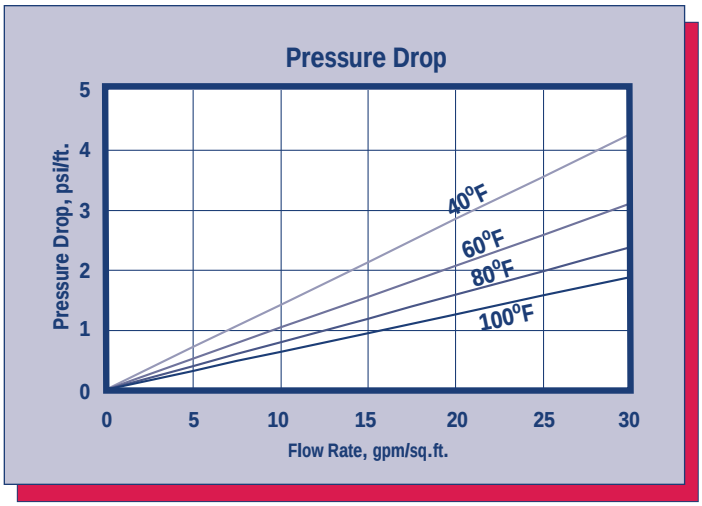
RESINTECH CGS is a high purity, light colored, high capacity, gel type sulfonated polystyrene cation resin supplied in the sodium form as moist, tough uniform spherical beads. *ResinTech CGS* specifically is intended for use in all water softening applications,including beverages, potable water and water used for food processing. It's high capacity and high DVB content provide long life and good chlorine resistance in all potable water applications. (It is also available as a dark colored product *RESINTECH CGS-BL* with identical properties.)

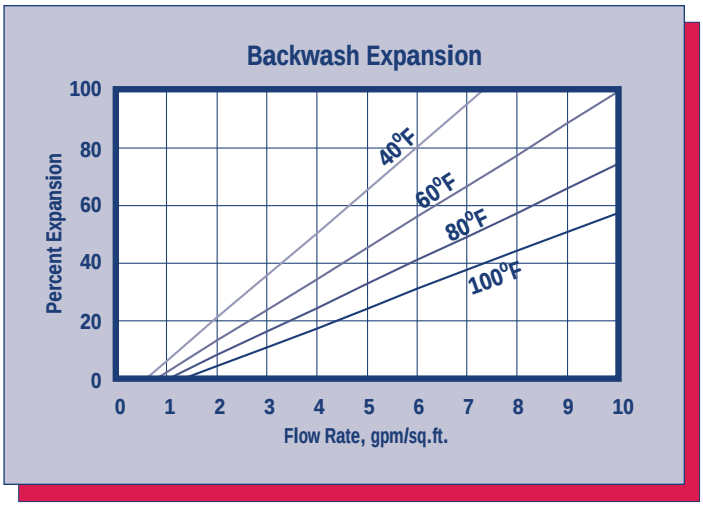
FEATURES & BENEFITS

- **COMPLIES WITH FDA REGULATIONS FOR POTABLE WATER APPLICATIONS**
  Conforms to paragraph 21CFR173.25 of the Food Additives Regulations of the F.D.A.*
- **EXCELLENT REGENERATION EFFICIENCY**
  Virtually the same operating capacity as premium grade *ResinTech CG8-BL*
- **NSF/ANSI-61 VALIDATED**
- **UNIFORM PARTICLE SIZE**
  16 to plus 50 mesh range; gives a LOWER PRESSURE DROP while maintaining SUPERIOR KINETICS.
- **SUPERIOR PHYSICAL STABILITY**
  90% plus sphericity and high crush strengths together with a very uniform particle size provide greater resistance to bead breakage while maintaining low pressure drops.
- **LOW COLOR THROW**

*For potable water applications, the resin must be properly pre-treated, usually by multiple exhaustion and regeneration cycles, to insure compliance with extractable levels.

HYDRAULIC PROPERTIES





PRESSURE DROP - The graph above shows the expected pressure loss per foot of bed depth as a function of flow rate, at various temperatures.

BACKWASH - After each cycle the resin bed should be backwashed at a rate that expands the bed 50 to 75 percent. This will remove any foreign matter and reclassify the bed. The graph above shows the expansion characteristics of *RESINTECH CGS* in the sodium form.

1 Resintech Plaza • 160 Cooper Road • West Berlin,NJ 08091 • Phone:(856)768-9600 • Fax:(856)768-9601 • E-mail:ixresin@resintech.com • Web Site:www.resintech.com

RESINTECH® CGS

PHYSICAL PROPERTIES

Polymer Structure	Styrene Crosslinked with DVB
Functional Group	$R-(SO_3)^-M^+$
Ionic Form, as shipped	Sodium
Physical Form	Tough, Spherical Beads
Screen Size Distribution	16 to 50
+16 mesh (U.S. Std)	< 5 percent
-50 mesh (U.S. Std)	< 1 percent
pH Range	0 to 14
Sphericity	90+ percent
Uniformity Coefficient	Approx. 1.6
Water Retention	
Sodium Form	48 to 54 percent
Solubility	Insoluble
Shipping Weight	
Sodium Form	48 lbs./cu.ft.
Total Capacity	
Sodium Form	1.8 meq/ml min

SUGGESTED OPERATING CONDITIONS

Maximum Temperature	
Sodium Form	250^0 F
Minimum Bed Depth	24 inches
Backwash Rate	50 to 75% Bed Expansion
Regenerant (NaCl or KCl)	
Concentration	10 to 15 percent
Flow Rate	0.5 to 1.5 gpm/cu.ft.
Contact Time	> 20 minutes
Level	4 to 15 pounds/cu.ft.
Displacement Rate	Same as Regen Flow Rate
Volume	10 to 15 gallons/cu.ft.
Fast Rinse Rate	Same as Service Flow Rate
Volume	35 to 60 gallons/cu.ft.
Service Flow Rate	2 to 10 gpm/cu.ft.

OPERATING CAPACITY

Sodium Chloride (NaCl) Regeneration

The sodium cycle operating capacity of *RESINTECH CGS* for hardness removal at various regeneration levels with an influent calcium/magnesium ratio of 2/1 and a hardness level of 500 ppm, as $CaCO_3$, is shown in the following table:

Pounds NaOH/cu.ft.	Capacity Kilograins/cu.ft.
5	20.0
7.5	25.4
10	29.0
15	33.0

Potassium Chloride (KCl) Regeneration

The potassium cycle operating capacity of *RESINTECH CGS* for hardness removal at various regeneration levels with an influent calcium/magnesium ratio of 2/1 and a hardness level of 500 ppm, as $CaCO_3$, is shown in the following table:

Pounds NaOH/cu.ft.	Capacity Kilograins/cu.ft.
5	16.6
7.5	21.8
10	26.6
15	31.2

APPLICATIONS

Softening

RESINTECH CGS is ideally suited for industrial, commercial, or residential softening applications where free chlorine is not present because of its high capacity, uniform particle size and good physical stability.

***CAUTION:DO NOT MIX ION EXCHANGE RESIN WITH STRONG OXIDIZING AGENTS.** Nitric acid and other strong oxidizing agents can cause explosive reactions when mixed with organic materials,such as ion exchange resins.

Material Safety Data Sheets (MSDS) are available for all ResinTech Inc.products.To obtain a copy,contact your local ResinTech sales representative or our corporate headquarters. They contain important health and safety information.That information may be needed to protect your employees and customers from any known health and safety hazards associated with our products.We recommend that you secure and study the pertinent MSDS for our products and any other products being used These suggestions and data are based on information we believe to be reliable.They are offered in good faith.However we do not make any guarantee or warranty.We caution against using these products in an unsafe manner or in violation of any patents;further we assume no liability for the consequences of any such actions.

SBG1

ANION EXCHANGE RESIN TYPE ONE GEL Cl OR OH FORM

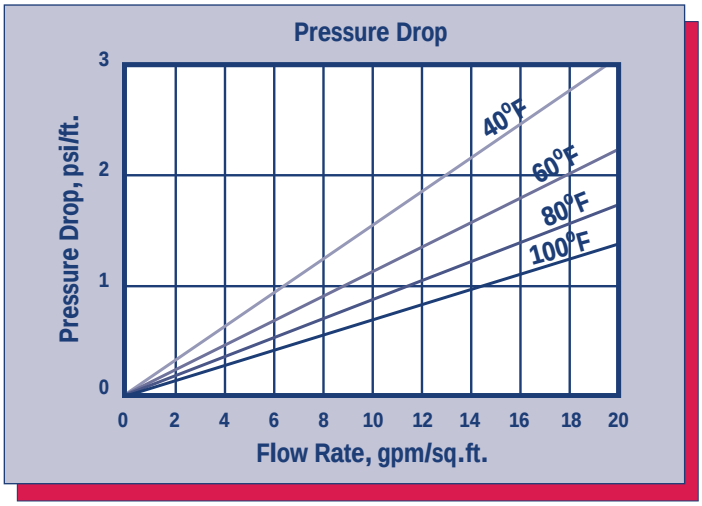
ResinTech SBG1 is a high capacity, shock resistant, gelular, Type 1, strongly basic anion exchange resin supplied in the chloride or hydroxide form as moist, tough, uniform, spherical beads. *ResinTech SBG1* is intended for use in all types of deionization systems and chemical processing applications. It is similar to *ResinTech SBG1P* but has a higher volumetric capacity and exhibits lower TOC leach rates. This makes it the better performer in single use applications such as in cartridge deionization and when high levels of regeneration are used such as in polishing mixed beds. On the other hand, *ResinTech SBG1P* is more resistant to organic fouling and gives higher operating capacities at low regeneration levels such as those used in make up demineralizers.

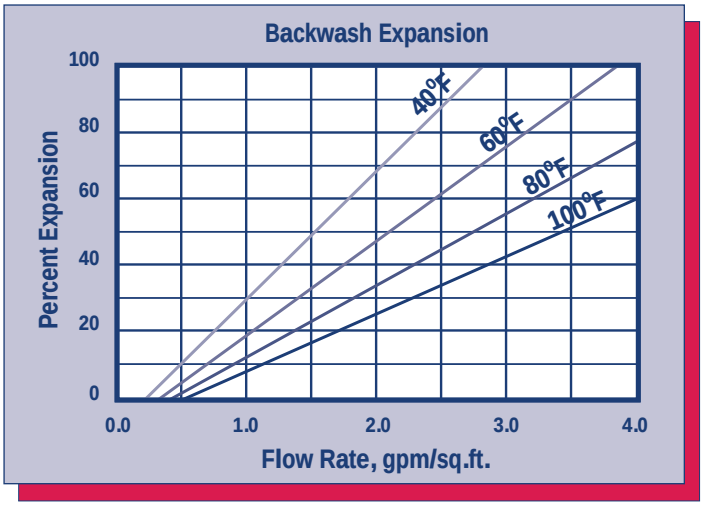
FEATURES & BENEFITS

- **COMPLIES WITH FDA REGULATIONS FOR POTABLE WATER APPLICATIONS.**
  Conforms to paragraph 21CFR173.125 of the Food Additives Regulations of the F.D.A.*
- **HIGH TOTAL CAPACITY**
  Provides longer run lengths in single use applications or where high levels of regeneration are used such as in mixed bed polishers, cartridge demineralizers.
- **UNIFORM PARTICLE SIZE**
  16 to plus 50 mesh range; gives a LOWER PRESSURE DROP while maintaining SUPERIOR KINETICS.
- **SUPERIOR PHYSICAL STABILITY**
- **LOWER TOC LEACH RATE**
  Makes it ideal for polishing mixed beds in wafer washing and other high purity water polishing applications.

*For potable water applications, the resin must be properly pre-treated, usually by multiple exhaustion and regeneration cycles, to ensure compliance with extractable levels.

HYDRAULIC PROPERTIES





PRESSURE DROP

The graph above shows the expected pressure loss per foot of bed depth as a function of flow rate, at various temperatures.

BACKWASH

After each cycle the resin bed should be backwashed at a rate that expands the bed 50 to 75 percent. This will remove any foreign matter and reclassify the bed. The graph above shows the expansion characteristics of *ResinTech SBG1* in the sodium form.

RESINTECH® SBG1

PHYSICAL PROPERTIES

Polymer Structure	Styrene Crosslinked with DVB
Functional Group	R-N-$(CH_3)_3^+$Cl
Ionic Form, as shipped	Chloride or Hydroxide
Physical Form	Tough, Spherical Beads
Screen Size Distribution	16 to 50
+16 mesh (U.S. Std)	< 5 percent
-50 mesh (U.S. Std)	< 1 percent
pH Range	0 to14
Sphericity	> 93 percent
Uniformity Coefficient	Approx. 1.6
Water Retention	
Chloride Form	43 to 50 percent
Hydroxide Form	Approx. 53 to 60 percent
Solubility	Insoluble
Approximate Shipping Weight	
Cl Form	44 lbs/cu.ft.
OH Form	41 lbs/cu.ft.
Swelling Cl- to OH-	18 to 25 percent
Total Capacity	
Cl Form	1.45 meq/ml min
OH Form	1.15 meq/ml min

SUGGESTED OPERATING CONDITIONS

Maximum Continuous Temperature	
Hydroxide Form	140 F
alt Form	170 F
Minimum Bed Depth	24 inches
Backwash Rate	50 to 75 percent Bed Expansion
Regenerant Concentration*	2 to 6 percent
Regenerant Flow Rate	0.25 to 1.0 gpm/cu.ft.
Regenerant Contact Time	At least 40 Minutes
Regenerant Level	4 to 10 pounds/cu.ft.
Displacement Rinse Rate	Same as Regenerant Flow Rate
Displacement Rinse Volume	10 to 15 gals/cu.ft.
Fast Rinse Rate	Same as Service Flow Rate
Fast Rinse Volume	35 to 60 gals/cu.ft.
Service Flow Rates	
Polishing Mixed Beds	3 to 15 gpm/cu.ft.
Non-Polishing Apps.	2 to 4 gpm/cu.ft.

OPERATING CAPACITY

The operating capacity of *RESINTECH SBG1* for a variety of acids at various regeneration levels when treating an influent with a concentration 500 ppm, expressed as $CaCO_3$ is shown in the following table:

Pounds NaOH/ft³	Capacity Kilograms per cubic foot			
	HCl	H_2SO_4	H_2SiO_3	H_2CO_3
4	11.3	14.0	14.7	18.6
6	12.8	16.3	17.3	19.8
8	14.3	13.3	19.5	21.6
10	15.5	20.0	22.2	22.2

APPLICATIONS

DEMINERALIZATION – *RESINTECH SBG1* is highly recommended for use in mixed bed demineralizers, wherever complete ion removal; superior physical and osmotic stability and low TOC leachables are required such as in wafer fabrication and other ultrapure applications.

RESINTECH SBG1 has high total capacity and low swelling on regeneration and provides maximum operating capacity in cartridge deionization applications. It is ideal for single use applications such as precious metal recovery, radwaste disposal and purification of toxic waste streams.

Highly crosslinked Type 1, styrenic anion exchangers have greater thermal and oxidation resistance than other types of strong base resins. They can be operated and regenerated at higher temperatures. The combination of lower porosity, high total capacity and Type 1 functionality make *RESINTECH SBG1* the resin of choice when water temperatures exceed 85°F and where the combination of carbon dioxide, borate and silica exceed 40% of the total anions.

RESINTECH SBG1P and *RESINTECH SBG1* are quite similar; the difference between them is the degree of porosity. *RESINTECH SBG1P* has greater porosity that gives it faster kinetics, and greater ability to reversibly sorb slow moving ions such as Naturally occurring Organic Matter (NOM). At lower regeneration levels and where chlorides make up a substantial portion of the anion load, or where the removal and elution of naturally occurring organics is of concern *RESINTECH SBG1P*, SBACR or SBG2 should be considered. At the higher regeneration levels used in mixed bed polishers *RESINTECH SBG1* provides higher capacity, and the lowest possible TOC leach rates.

Safety Data Sheet

Product Names: SBG1, SBG1-HP, SBG1-UPS, SBG1-C, SBG1-F, SBMP1, SBMP1-UPS, GP-SBA, SBG1P, SBG1P-UPS

(Type I Strong Base Anion Exchange Resin Chloride Form)

Effective date 31 March 2015

Section 1: Identification

1a	Product Names	ResinTech SBG1, SBG1-HP, SBG1-UPS, SBG1-C, SBG1-F, SBMP1, SBMP1-UPS, GP-SBA, SBG1P, SBG1P-UPS
1b	Common Name	Type I Strong base anion resin in the chloride form.
1c	Intended use	All general purpose anion exchanges for general use including salt form and demineralization.
1d	Manufacturer Address	ResinTech, Inc. 160 Cooper Road, West Berlin, NJ 08091 USA
	Phone Email	856-768-9600 ixresin@resintech.com

Section 2: Hazard Identification

2a Hazard classification — Not hazardous or dangerous

Product Hazard Rating	Scale
Health = 0	0 = Negligible
Fire = 1	1 = Slight
Reactivity = 0	2 = Moderate
Special – N/A	3 = High
	4 = Extreme

2b Product description — White, yellow, or orange colored solid beads approximately 0.6 mm diameter with little or no odor.

2c Precautions for use — Safety glasses and gloves recommended. Slipping hazard if spilled.

2c Potential health effects — Will cause eye irritation. Will cause skin skin irritation. Ingestion is not likely to pose a health risk.

2d Environmental effects — This product may alter the pH of any water that contacts it.

Section 2A: Hazard classification UN OSHA globally harmonized system

WARNING

(contains ion exchange resin)

H320: Causes eye irritation

Precautionary Statements

P264: Wash hands thoroughly after handling.

P280: Wear protective gloves/protective clothing/eye protection/face protection

P305+351+338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing.

P333+313: If skin irritation or a rash occurs: Get medical advice/attention.

P337+313: If eye irritation persists get medical advice/attention.

P403+233: Store in a well-ventilated place. Keep container tightly closed.

P411: Store at temperatures not exceeding 50 °C/ 122 °F.

Please refer to the safety data sheet for additional information regarding this product

ResinTech, Inc.
160 Cooper Road
West Berlin, NJ 08091-9234
856 768-9600
Ixresin@resintech.com

Section 3: Composition/ Information on Ingredients

3a	Chemical name	Trimethylamine functionalized chloromethylated copolymer of polystyrene in the chloride form.
3b	Ingredients Trimethylamine functionalized Chloromethlyated copolymer of Styrene and divinylbenzene in the Chloride form	CAS# 60177-39-1 (35 - 65%)
	Water	CAS# 7732-18-5 (35 – 65%)

Section 4: First Aid Measures

4a	Inhalation	No adverse effects expected- normal use of product does not produce odors or vapors.
4b	Skin	Wash with soap and water- seek medical attention if a rash develops.
4c	Eye contact	Wash immediately with water-seek attention if discomfort continues.
4d	Ingestion	No adverse effects expected for small amounts, larger amounts can cause stomach irritation. Seek medical attention if discomfort occurs.

Section 5: Fire Fighting Measures

5a	Flammability	NFPA Fire rating = 1
5b	Extinguishing media	Water, CO2, foam, dry powder.
5c	Fire fighting Procedures	Follow general fire fighting procedures indicated in the work place. Seek medical attention if discomfort continues.
5d	Protective Equipment	MSHA/NIOSH approved self-contained breathing gear, full protective clothing.
5e	Combustion Products	Carbon oxides and other toxic gasses and vapors.
5f	Unusual Hazards	Product is not combustible until moisture is removed. Resin begins to burn at approximately 230º C. Auto ignition can occur above 500º C.

Section 6: Accidental Release Measures

6a	Personal Precautions	Keep people away, spilled resin can be a slipping hazard, wear gloves and safety glasses to minimize skin or eye contact.
6b	Incompatible Chemicals	Strong oxidants can create risk of combustion products similar to burning, exposure to strong bases can cause a rapid temperature increase.
6c	Environmental Precautions	Keep out of public sewers and waterways.
6d	Containment Materials	Use plastic or paper containers, unlined metal containers not recommended.
6e	Methods of Clean-up	Sweep up material and transfer to containers.

Section 7: Handling and Storage

7a	Handling	Avoid prolonged skin contact. Keep resin moist and avoid allowing resin to completely dry.
7b	Storage	Store in a cool dry place (0º to 45º C) in the original shipping container. This product is thermally sensitive and will have reduced shelf life if subjected to extended periods of time at temperatures exceeding 50º C. Although freezing does not usually damage ion exchange resins, avoid repeated freeze thaw cycles.
7c	TSCA considerations	Ion exchange resins should be listed on the TSCA Inventory in compliance with State and Federal Regulations.

Section 8: Exposure Controls/Personal Protection

8a	OSHA exposure limits	None noted.
8b	Engineering Controls	Provide adequate ventilation.
8c	Personal Protection Measures	
	Eye Protection	Safety glasses or goggles.
	Respiratory Protection	Not required for normal use.
	Protective Gloves	Not required for limited exposure but recommended for extended contact.

Section 9: Physical and Chemical Properties

Appearance	Amber, yellow, or red beads approx. 0.6 mm diameter.
Flammability or explosive limits	Flammable above 500º C
Odor	Little or no odor
Physical State	Solid
Vapor pressure	Not available
Odor threshold	Not available
Vapor density	Not available
pH	Near neutral (6 to 8 typical)
Relative density	Approx 710 grams/Liter
Melting point/freezing point	Does not melt, freezes at approx. 0 C
Solubility	Insoluble in water and most solvents
Boiling point	Does not boil
Flash point	Approx 500º C
Evaporation rate	Does not evaporate
Partition Coefficient (n-octonol/water)	Not applicable
Auto-ignition temperature	Approx 500º C
Decomposition temperature	Above 230º C
Viscosity	Not applicable

Section 10: Stability and Reactivity

10a Stability	Stable under normal conditions.
10b Conditions to Avoid	Heat, exposure to strong oxidants.
10c Hazardous by-products	Trimethylamine, charred polystyrene, aromatic acids and hydrocarbons, organic amines, nitrogen oxides, carbon oxides, chlorinated hydrocarbons.
10d Incompatible materials	Strong oxidizing agents, e.g. nitric acid (such as HNO_3)
10e Hazardous Polymerization	Does not occur

Section 11: Toxicological Information

11a Likely Routes of Exposure	Oral, skin or eye contact.
11b Effects of exposure	
Delayed	None known.
Immediate (acute)	None known.
Chronic	None known.
11c Toxicity Measures	
Skin Adsorption	Unlikely, some transfer of acidity is possible.
Ingestion	Oral toxicity believed to be low but no LD50 has been established.
Inhalation	Unknown, vapors are very unlikely due to physical properties (insoluble solid).
11d Toxicity Symptoms	
Skin Adsorption	Mild Rash.
Ingestion	Indigestion or general malaise.
Inhalation	Unknown.
11e Carcinogenicity	None known

Section 12: Ecological information

12a Eco toxicity	Not acutely harmful to plant or animal life.
12b Mobility	Insoluble, acidity or causticity may escape if wet.
12c Biodegradability	Not biodegradable.
12d Bioaccumulation	Insignificant.
12e Other adverse effects	Not Harmful to the environment.

Section 13: Disposal Considerations

13a General considerations	Material is non-hazardous. However, unused material can cause a pH change when wetted.
13b Disposal Containers	Most plastic and paper containers are suitable. Avoid use of unlined metal containers.
13c Disposal methods	No specific method necessary.
13d Sewage Disposal	Not recommended.

13e	Precautions for incineration	May release trimethylamine and toxic vapors when burned.
13f	Precautions for landfills	Resins used to remove hazardous materials may then become hazardous mixtures

Section 14: Transportation Information

14a	Transportation Class	Not classified as a dangerous good for transport by land, sea, or air.
14b	TDG	Not regulated.
14c	IATA	Not regulated.
14d	DOT (49 CFR 172.101)	Not Regulated.

Section 15: Regulatory Information

15a	CERCLA	Not regulated
15b	SARA Title III	Not regulated
15c	Clean Air act	Not regulated
15d	Clean Water Act	Not regulated
15e	TSCA	Not regulated
15f	Canadian Regulations	
	WHMIS	Not a controlled product
	TDG	Not regulated
15g	Mexican Regulations	Not Dangerous

Section 16: Other Information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features. Regulatory requirements are subject to change and may differ from one location to another. It is the buyer's responsibility to ensure that their activities comply with federal, state, and local laws.

16a Date of Revision 31 March 2015

Lockwood Remediation Technologies, LLC

One Controller for the Broadest Range of Sensors.

Choose from 30 digital and analog sensor families for up to 17 di:erent parameters.

Maximum Versatility

The sc200 controller allows the use of digital and analog sensors, either alone or in combination, to provide compatibility with Hach's broad range of sensors, eliminating the need for dedicated, parameter-specific controllers.

Ease of Use and Confidence in Results

Large, high-resolution, transreflective display provides optimal viewing resolution in any lighting condition. Guided calibration procedures in 19 languages minimize complexity and reduce operator error. Password-protected SD card reader o:ers a simple solution for data download and transfer. Visual warning system provides critical alerts.

Wide Variety of Communication Options

Utilize two to five analog outputs to transmit primary and secondary values for each sensor, or integrate Hach sensors and analyzers into MODBUS RS232/RS485, Profibus® DP, and HART networks.

Password protected SD card reader offers a simple solution for data download and transfer, and sc200 and digital sensor configuration file duplication and backup.

Controller Comparison

Features	Previous Models sc100™ Controller	Previous Models GLI53 Controller	sc200™ Controller	Benefits
Display	64 x 128 pixels 33 x 66 mm (1.3 x 2.6 in.)	64 x 128 pixels 33 x 66 mm (1.3 x 2.6 in.)	160 x 240 pixels 48 x 68 mm (1.89 x 2.67 in.) Transreflective	• Improved user interface—50% bigger • Easier to read in daylight and sunlight
Data Management	irDA Port/PDA Service Cable	N/A	SD Card Service Cable	• Simplifies data transfer • Standardized accessories/max compatibility
Sensor Inputs	2 Max Direct Digital Analog via External Gateway	2 Max Analog Depending on Parameter	2 Max Digital and/or Analog with Sensor Card	• Simplifies analog sensor connections • Works with analog and digital sensors
Analog Inputs	N/A	N/A	1 Analog Input Signal Analog 4-20mA Card	• Enables non-sc analyzer monitoring • Accepts mA signals from other analyzers for local display • Consolidates analog mA signals to a digital output
4-20 mA Outputs	2 Standard	2 Standard	2 Standard Optional 3 Additional	• Total of five (5) 4-20 mA outputs allows multiple mA outputs per sensor input
Digital Communication	MODBUS RS232/RS485 Profibus DP V1.0	HART	MODBUS RS232/RS485 Profibus DP V1.0 HART 7.2	• Unprecedented combination of sensor breadth and digital communication options

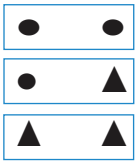
Choose from Hach's Broad Range of Digital and Analog Sensors

Parameter	Sensor	Digital or Analog
Ammonia	AMTAX™ sc, NH4D sc, AISE sc, AN-ISE sc	●
Chlorine	CLF10 sc, CLT10 sc, 9184 sc	●
Chlorine Dioxide	9185 sc	●
Conductivity	GLI 3400 Contacting, GLI 3700 Inductive	▲
Dissolved Oxygen	LDO® Model 2, 5740 sc	●
Dissolved Oxygen	5500	▲
Flow	U53, F53 Sensors	▲
Nitrate	NITRATAX™ sc, NO3D sc, NISE sc, AN-ISE sc	●
Oil in Water	FP360 sc	●
Organics	UVAS sc	●
Ozone	9187 sc	●
pH/ORP	pHD	●
pH/ORP	pHD, pH Combination, LCP	▲
Phosphate	PHOSPHAX™ sc	●
Sludge Level	SONATAX™ sc	●
Suspended Solids	SOLITAX™ sc, TSS sc	●
Turbidity	1720E, FT660 sc, SS7 sc, ULTRATURB sc, SOLITAX sc, TSS sc	●
Ultra Pure Conductivity	8310, 8311, 8312, 8315, 8316, 8317 Contacting	▲
Ultra Pure pH/ORP	8362	▲

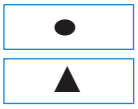
● = Digital ▲ = Analog

Connect up to two of any of the sensors listed above, in any combination, to meet your application needs. The diagrams below demonstrate the potential configurations. Operation of analog sensors requires the controller to be equipped with the appropriate sensor module. Contact Hach Technical Support for help with selecting the appropriate module.

2 Channel Configurations



1 Channel Configurations



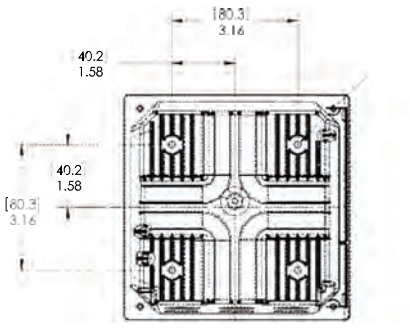
Specifications*

Dimensions (H x W x D)	5.7 in x 5.7 in x 7.1 in (144 mm x 144 mm x 181 mm)
Display	Graphic dot matrix LCD with LED backlighting, transreflective
Display Size	1.9 x 2.7 in. (48 mm x 68 mm)
Display Resolution	240 x 160 pixels
Weight	3.75 lbs. (1.70 kg)
Power Requirements (Voltage)	100 - 240 V AC, 24 V DC
Power Requirements (Hz)	50/60 Hz
Operating Temperature Range	-20 to 60 °C , 0 to 95% RH non-condensing
Analog Outputs	Two (Five with optional expansion module) to isolated current outputs, max 550 Ω , Accuracy: ± 0.1% of FS (20mA) at 25 °C, ± 0.5% of FS over -20 °C to 60 °C range Operational Mode: measurement or calculated value
Analog Output Functional Mode	Linear, Logarithmic, Bi-linear, PID
Security Levels	2 password-protected levels
Mounting Configurations	Wall, pole, and panel mounting
Enclosure Rating	NEMA 4X/IP66
Conduit Openings	1/2 in NPT Conduit
Relay: Operational Mode	Primary or secondary measurement, calculated value (dual channel only) or timer
Relay Functions	Scheduler (Timer), Alarm, Feeder Control, Event Control, Pulse Width Modulation, Frequency Control, and Warning
Relays	Four electromechanical SPDT (Form C) contacts, 1200 W, 5 A
Communication	MODBUS RS232/RS485, PROFIBUS DPV1, or HART 7.2 optional
Memory Backup	Flash memory
Electrical Certifications	EMC CE compliant for conducted and radiated emissions: - CISPR 11 (Class A limits) - EMC Immunity EN 61326-1 (Industrial limits) Safety cETLus safety mark for: - General Locations per ANSI/UL 61010-1 & CAN/CSA C22.2. No. 61010-1 - Hazardous Location Class I, Division 2, Groups A,B,C & D (Zone 2, Group IIC) per FM 3600 / FM 3611 & CSA C22.2 No. 213 M1987 with approved options and appropriately rated Class I, Division 2 or Zone 2 sensors cULus safety mark - General Locations per UL 61010-1 & CAN/CSA C22.2. No. 61010-1

**Subject to change without notice.*

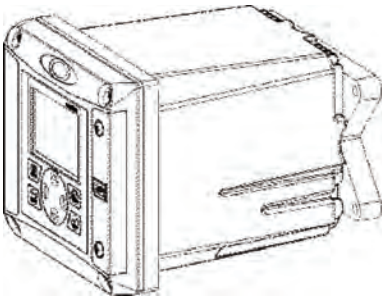
Dimensions

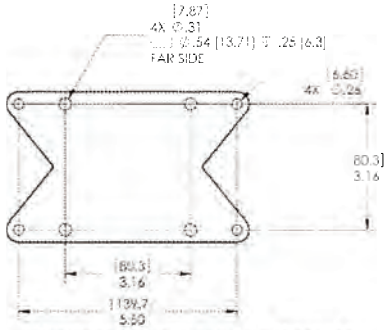
Surface Mounting Dimensions



Mounting Dimensions
(Rear View)

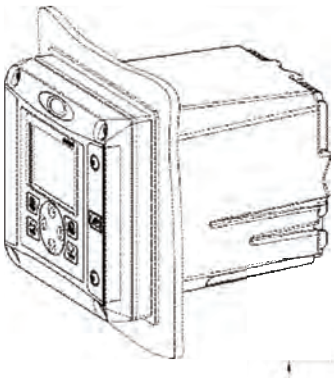
OR

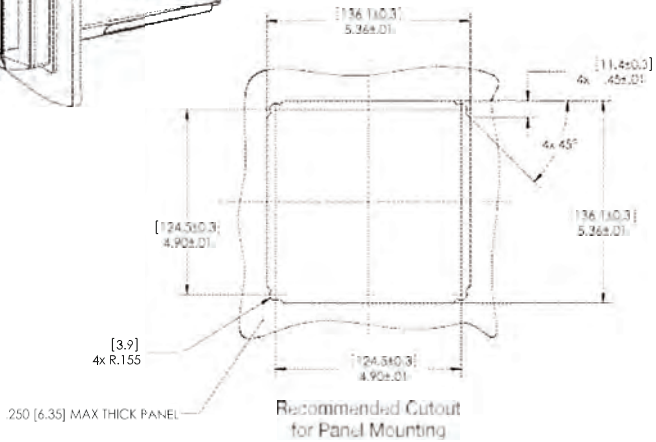




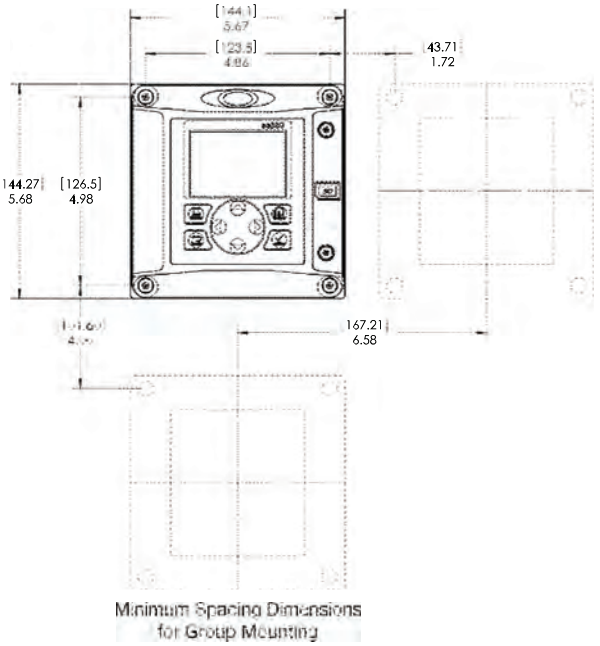
Bracket (supplied) for Surface Mounting
(Not compatible with Weather and Sun Shield
p/n 9220600 when surface mounting.)

Panel Mounting Dimensions



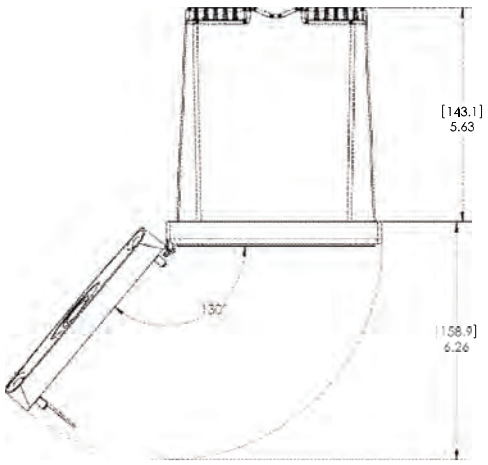


Recommended Cutout
for Panel Mounting

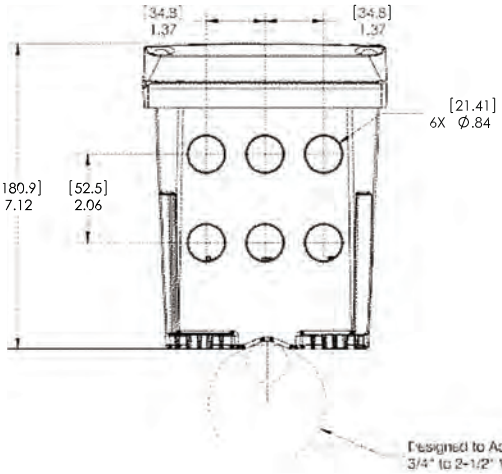


Minimum Spacing Dimensions
for Group Mounting

Top and Bottom Views

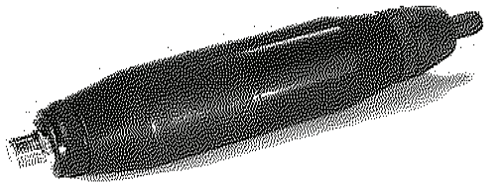


Door Opening Details

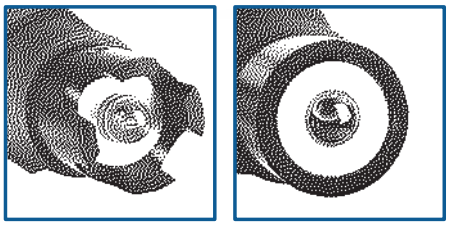


Designed to Accommodate
3/4" to 2-1/2" Vertical or Horizontal Pipe

3/4-inch Combination pH and ORP Sensor Kits



Use the Digital Gateway to make any Hach analog combination pH or ORP sensor compatible with the Hach sc1000 Controller.



Digital combination pH and ORP sensors are available in convertible, insertion, and sanitary mounting styles. Choose from rugged dome electrodes or "easy-to-clean" flat glass electrodes.

Features and Benefits

Low Price—High Performance

These combination sensors are designed for specialty applications for immersion or in-line mounting. The reference cell features a double-junction design for extended service life, and a built-in solution ground. The body is molded from chemically-resistant Ryton® or PVDF, and the reference junction is coaxial porous Teflon®. All sensors are rated 0 to 105ºC up to 100 psig, and have integral 4.5 m (15 ft.) cables with tinned leads. The PC-series (for pH) and RC-series (for ORP) combination sensors are ideal for measuring mild and aggressive media.

Special Electrode Configurations

Sensors with rugged dome electrodes, "easy-to-clean" flat glass electrodes, and even HF (hydrofluoric acid) resistant glass electrodes are available for a wide variety of process solutions.

Temperature Compensation Element Option

The PC-series combination pH sensors are available with or without a Pt 1000 ohm RTD temperature element. The RC-series combination ORP sensors are supplied without a temperature element.

Versatile Mounting Styles

Sensors are available in three mounting styles—convertible, insertion, and sanitary. Please turn to page 3 for more information.

Full-Featured "Plug and Play" Hach sc Digital Controllers

There are no complicated wiring or set up procedures with any Hach sc controller. Just plug in any combination of Hach digital sensors and it's ready to use—it's "plug and play."

One or multiple sensors—The sc controller family allows you to receive data from up to eight Hach digital sensors in any combination using a single controller.

Communications—Multiple alarm/control schemes are available using the relays and PID control outputs. Available communications include analog 4-20 mA, digital MODBUS® (RS485 and RS232) or Profibus DP protocols. (Other digital protocols are available. Contact your Hach representative for details.)

Data logger—A built-in data logger collects measurement data, calibration, verification points, and alarm history.

Specifications*

Most pH applications fall in the 2.5-12.5 pH range. General purpose pH glass electrodes perform well in this range. Some industrial applications require accurate measurements and control at pH values below 2 or above 12. Consult Hach Technical Support for details on these applications.

Combination pH Sensors

Measuring Range
0 to 14 pH

Accuracy
Less than 0.1 pH under reference conditions

Temperature Range
0 to 105ºC (32 to 221ºF)

Flow Rate
0 to 2 m/s (0 to 6.6 ft./s); non-abrasive

Pressure Range
0 to 6.9 bar at 100ºC (0 to 100 psig at 212ºF)

Signal Transmission Distance
100 m (328 ft.) when used with the Hach Digital Gateway and a Hach sc Digital Controller.

1000 m (3280 ft.) when used with the Hach Digital Gateway, Termination Box, and a Hach sc Digital Controller.

Sensor Cable
Integral coaxial cable (plus two conductors for temperature compensator option); 4.5 m (15 ft.) long

Wetted Materials

Convertible style: Ryton® body (glass filled)

Insertion style: PVDF body (Kynar®)

Sanitary style: 316 stainless steel sleeved PVDF body

Common materials for all sensor styles include PTFE Teflon double junction, glass process electrode, and Viton® O-rings

Warranty
90 days

Combination ORP Sensors

Measuring Range
-2000 to +2000 millivolts

Accuracy
Limited to calibration solution accuracy (± 20 mV)

Temperature Range
0 to 105ºC (32 to 221ºF)

Flow Rate
0 to 2 m/s (0 to 6.6 ft./s); non-abrasive

Pressure Range
0 to 6.9 bar at 100ºC (0 to 100 psig at 212ºF)

Signal Transmission Distance
100 m (328 ft.) when used with the Hach Digital Gateway and a Hach sc Digital Controller.

1000 m (3280 ft.) when used with the Hach Digital Gateway, Termination Box, and a Hach sc Digital Controller.

Sensor Cable
Integral coaxial cable; 4.5 m (15 ft.) long; terminated with stripped and tinned wires

Wetted Materials

Convertible style: Ryton® body (glass filled)

Insertion style: PVDF body (Kynar®)

Common materials for all sensor styles include PTFE Teflon double junction, glass with platinum process electrode, and Viton® O-rings

Warranty
90 days

**Specifications subject to change without notice.*

Engineering Specifications

1. The pH sensor shall be available in convertible, insertion or sanitary styles. The ORP sensor shall be available in only convertible or insertion styles.
2. The convertible style sensor shall have a Ryton® body. The insertion style sensor shall have a PVDF body. The sanitary style sensor shall have a 316 stainless steel sleeved PVDF body. Common materials for all sensor styles shall include a PTFE Teflon® double junction, and Viton® O-rings. The pH sensor shall have a glass pH electrode. The ORP sensor shall have a platinum ORP electrode.
3. The convertible style pH sensor shall be available with or without a built-in Pt 1000 ohm RTD temperature element. Insertion and sanitary style pH sensors shall have a built-in Pt 1000 ohm RTD temperature element. Convertible and insertion style ORP sensors shall not have a built-in temperature element.
4. The sensor shall communicate via MODBUS® RS-485 to a Hach sc Digital Controller.
5. The sensor shall be Hach Company Model PC sc or PC-series for pH measurement or Model PC sc or RC-series for ORP measurement.

Dimensions

Convertible Style Sensor

The convertible style sensor has a Ryton® body that features 3/4-inch NPT threads on both ends. The sensor can be directly mounted into a standard 3/4-inch pipe tee for flow-through mounting or fastened onto the end of a pipe for immersion mounting. The convertible style sensor enables inventory consolidation, thereby reducing associated costs. Mounting tees and immersion mounting hardware are offered in a variety of materials to suit application requirements.

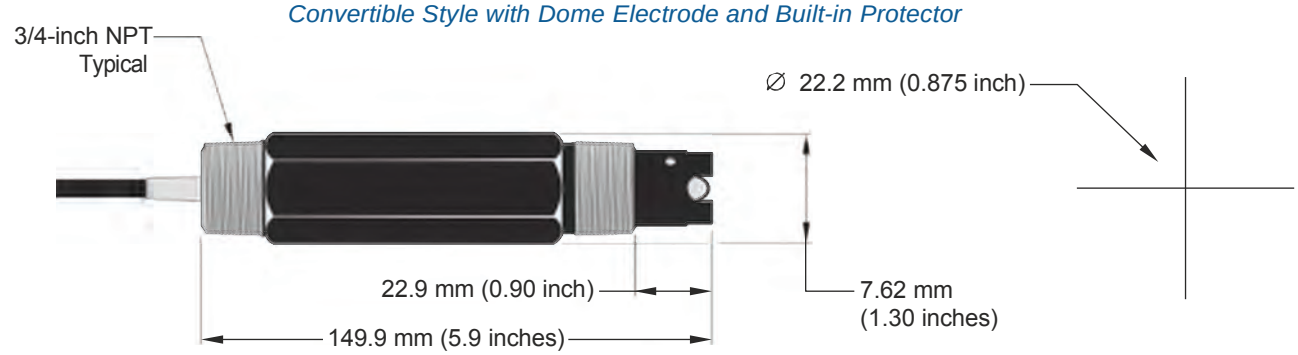
Insertion Style Sensor

Insertion style sensors feature a longer, non-threaded PVDF body with two Viton® O-rings, providing a seal when used with the optional Hach insertion mount hardware assembly. This ball valve hardware enables sensor insertion and retraction from a pipe or vessel without having to stop the process flow.

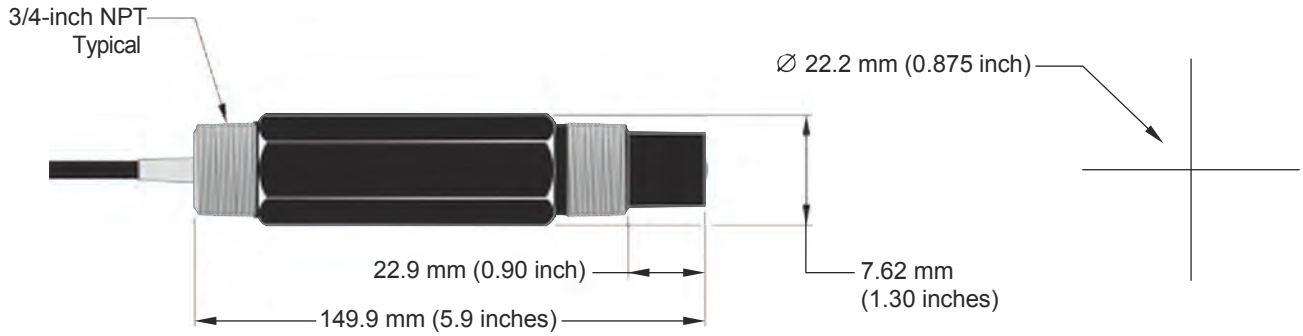
Sanitary Style Sensor

The sanitary style sensor, offered for pH measurement, has a 316 stainless steel-sleeved PVDF body with a 2-inch flange. The sensor mates to a standard 2-inch Tri-Clover fitting. The optional Hach sanitary mounting hardware includes a standard 2-inch sanitary tee, sanitary clamp, and Viton® sanitary gasket.

Convertible Style with Dome Electrode and Built-in Protector



Convertible Style with Flat Electrode



Lockwood Remediation Technologies, LLC

The Pulsatron Series A Plus offers manual function controls over stroke length and stroke rate as standard with the option to select external pace for automatic control.

Ten distinct models are available, having pressure capabilities to 250 PSIG (17 BAR) @ 12 GPO (1.9 lph), and flow capacities to 58 GPO (9.1 lph) @ 100 PSIG (7.0 BAR), with a standard turndown ratio of 100:1, and optional ratio of 1000:1. Metering performance is reproducible to within ± 3% of maximum capacity.

Features

- Manual Control by on-line adjustable stroke rate and stroke length.
- Highly Reliable timing circuit.
- Circuit Protection against voltage and current upsets.
- Solenoid Protection by thermal overload with auto-reset.
- Water Resistant, for outdoor and indoor applications.
- Internally Dampened To Reduce Noise.
- Guided Ball Check Valve Systems, to reduce back flow and enhance outstanding priming characteristics.
- Few Moving Parts and Wall Mountable.
- Safe & Easy Priming with durable leak-free bleed valve assembly (standard).
- Optional Control: External pace with auto/manual selection.

Controls

Manual Stroke Rate

Manual Stroke Length

External Pacing - Optional

External Pace With Stop - Optional (125 SPM only)

Controls Options		
Feature	Standard Configuration	Optional Configuration [1]
External Pacing	--	Auto / Manual Selection
External Pace w/ Stop (125 SPM only)	--	Auto / Manual Selection [2]
Manual Stroke Rate	10:1 Ratio	100:1 Raio
Manual Stroke Length	10:1 Ratio	10:1 Ratio
Total Turndown Ratio	100:1 Ratio	1000:1 Ratio

Note 1: On S2, S3 & S4 sizes only.

Note 2: Not available on 1000:1 turndown pumps.

Operating Benefits

- Reliable metering performance.
- Rated "hot" for continuous duty.
- High viscosity capability.
- Leak-free, sealless, liquid end.

Aftermarket

- KOPkits
- Gauges
- Dampeners
- Pressure Relief Valves
- Tanks
- Pre-Engineered Systems
- Process Controllers (PULSAblue, MicroVision)

Series A Plus
Electronic Metering Pumps

Lockwood Remediation Technologies, LLC

Series A Plus

Specifications and Model Selection

MODEL			LBC2	LB02	LBC3	LB03	LB04	LB64	LBC4	LBS2	LBS3	LBS4
Capacity nominal (max.)		GPH	0.25	0.25	0.42	0.50	1.00	1.25	2.00	0.50	1.38	2.42
		GPO	6	6	10	12	24	30	48	12	33	58
		LPH	0.9	0.9	1.6	1.9	3.8	4.7	7.6	1.9	5.2	9.14
Pressure[3] (max.)	GFPP, PVDF, 316SS or PVC <;N code) wITFE Seats)	PSIG (Bar)	250 (17)	150 (10)	250 (17)	150 (10)	100 (7)	100 (7)	50 (3.3)	250 (17)	150 (10)	100 (7)
	PVC (V code) Viton or CSPE Seats IDegas Liquid End		150 (10)							150 (10)		
Connections:		Tubina	1 14' ID X 3 8' OD						3 8' D X 1 2' OD	1 4' D X 3 8' OD		
		Pioina	1 4' FNPT									
Strokes/Minute		SPM	125							250		

Note 3: Pumps with rated pressure above 150 PSI will be de-rated to 150 PSI Max. when selecting certain valve options, see Price Book for details.

Engineering Data

Pump Head Materials Available:	GFPPL
	PVC
	PVDF
	316 SS
Diaphragm:	PTFE-faced CSPE-backed
Check Valves Materials Available:	
Seats/0-Rings:	PTFE
	CSPE
	Viton
Balls:	Ceramic
	PTFE
	316 SS
	Alloy C
Fittings Materials Available:	GFPPL
	PVC
	PVDF
Bleed Valve:	Same as fitting and check valve selected, except 316SS
Injection Valve & Foot Valve Assy:	Same as fitting and check valve selected
Tubing:	Clear PVC
	White PE

Important: Material Code - GFPPL=Glass-filled Polypropylene, PVC=Polyvinyl Chloride, PE=Polyethylene, PVDF=Polyvinylidene Fluoride, CSPE=Generic formulation of Hypalon, a registered trademark of E.I. DuPont Company. Viton is a registered trademark of E.I. DuPont Company. PVC wetted end recommended for sodium hypochlorite.

Engineering Data

Reproducibility:	+/- 3% at maximum capacity
Viscosity Max CPS:	1000 CPS
Stroke Frequency Max SPM:	125 / 250 by Model
Stroke Frequency Turn-Down Ratio:	10:1 / 100:1 by Model
Stroke Length Turn-Down Ratio:	10:1
Power Input:	115 VAC/50-60 HZ/1 ph
	230 VAC/50-60 HZ/1 ph
Average Current Draw:	
@ 115 VAC; Amps:	0.6 Amps
@ 230 VAC; Amps:	0.3 Amps
Peak Input Power:	130 Watts
Average Input Power @ Max SPM:	50 Watts

Custom Engineered Designs - Pre-Engineered Systems

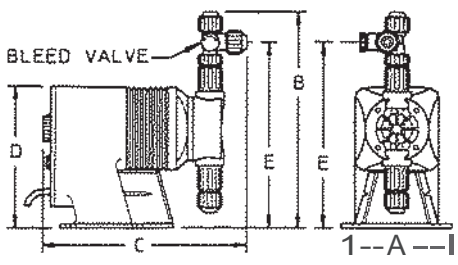
Pre-Engineered Systems

Pulsafeeder's Pre-Engineered Systems are designed to provide complete chemical feed solutions for all electronic metering applications. From stand alone simplex pH control applications to full-featured, redundant sodium hypochlorite disinfection metering, these rugged fabricated assemblies offer turn-key simplicity and industrial-grade durability. The UV-stabilized, high-grade HOPE frame offers maximum chemical compatibility and structural rigidity. Each system is factory assembled and hydrostatically tested prior to shipment.

Dimensions

Series A PLUS Dimensions (inches)						
Model No.	A	B	C	D	E	Shipping Weight
LB02 IS2	5.0	9.6	9.5	6.5	8.2	10
LBC2	5.0	9.9	9.5	6.5	8.5	10
LBC3	5.0	9.9	9.5	6.5	8.5	10
LB03 IS3	5.0	9.9	9.5	6.5	8.5	10
LB0[illegible]4	5.0	9.9	9.5	6.5	8.5	10
LB64	5.0	9.9	9.5	6.5	8.5	10
LBC4	5.0	9.9	9.5	6.5	8.5	10

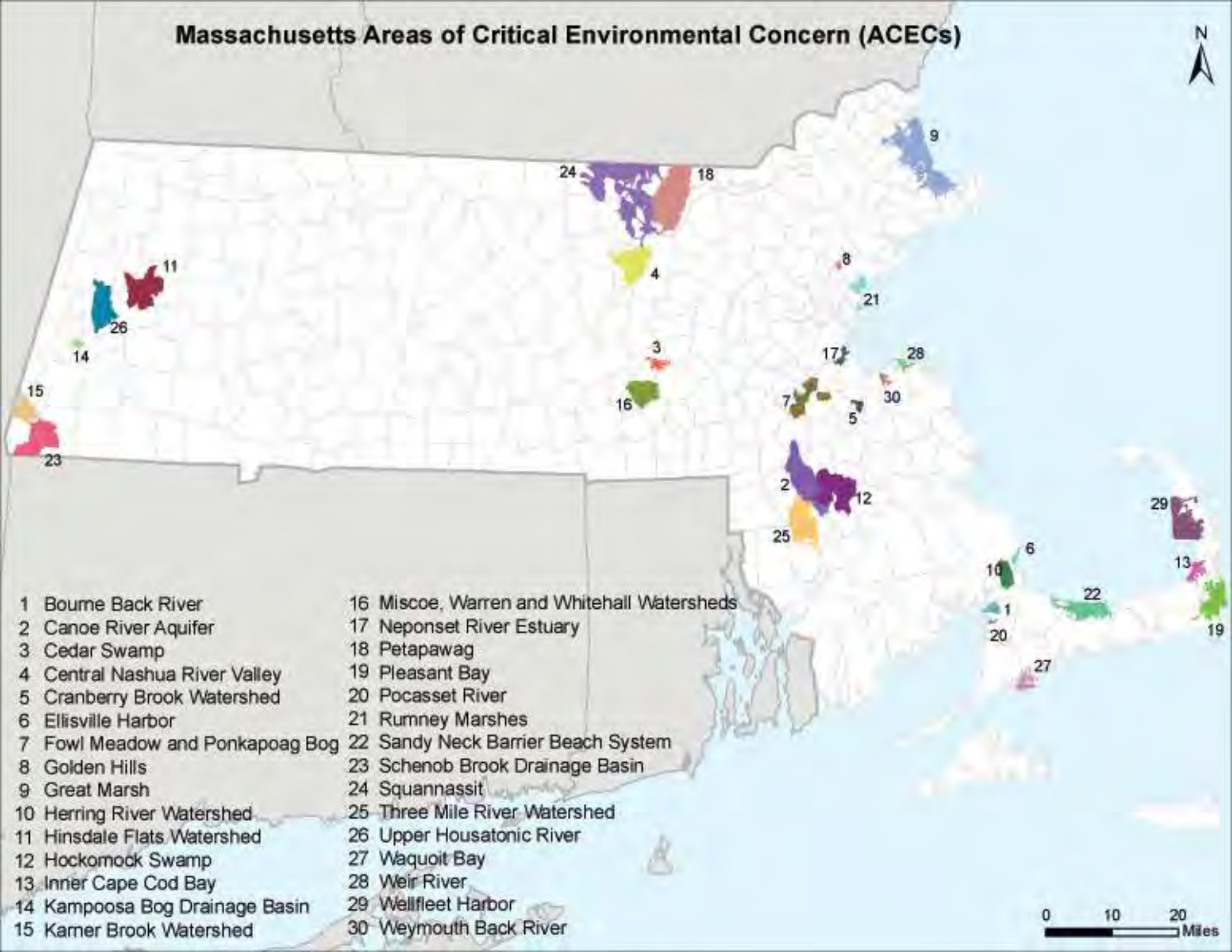
NOTE: Inches X 2.54 cm



APPENDIX D

Endangered Species Act Assessment

Massachusetts Areas of Critical Environmental Concern (ACECs)

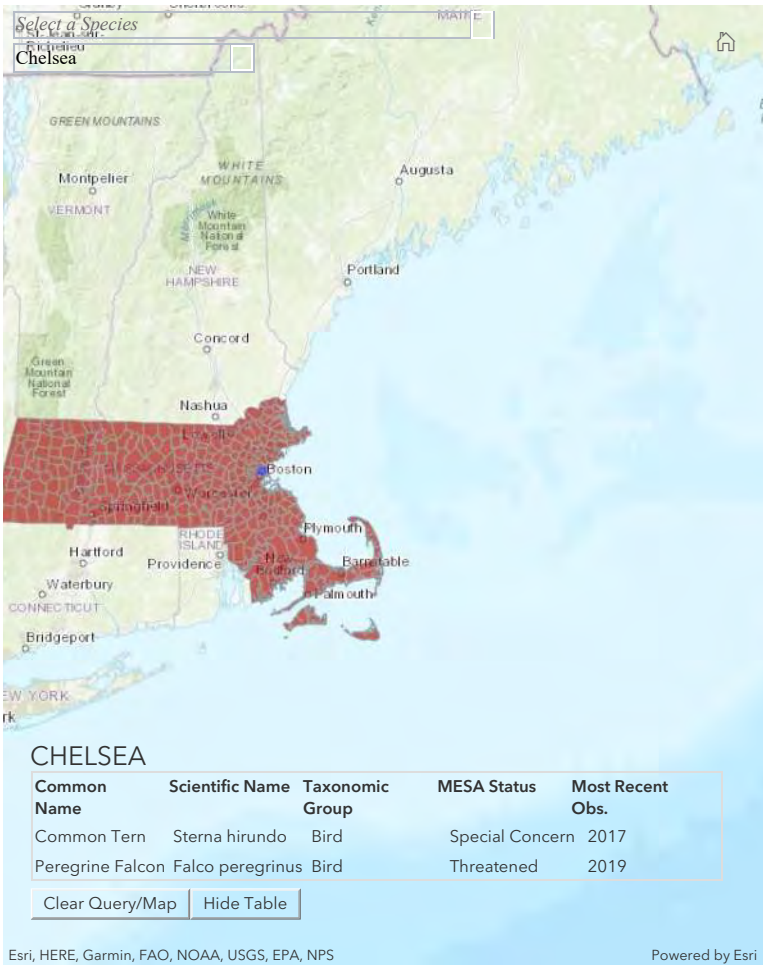


1 Bourne Back River
2 Canoe River Aquifer
3 Cedar Swamp
4 Central Nashua River Valley
5 Cranberry Brook Watershed
6 Ellisville Harbor
7 Fowl Meadow and Ponkapoag Bog
8 Golden Hills
9 Great Marsh
10 Herring River Watershed
11 Hinsdale Flats Watershed
12 Hockomock Swamp
13 Inner Cape Cod Bay
14 Kampoosa Bog Drainage Basin
15 Karner Brook Watershed
16 Miscoe, Warren and Whitehall Watersheds
17 Neponset River Estuary
18 Petapawag
19 Pleasant Bay
20 Pocasset River
21 Rumney Marshes
22 Sandy Neck Barrier Beach System
23 Schenob Brook Drainage Basin
24 Squannassit
25 Three Mile River Watershed
26 Upper Housatonic River
27 Waquoit Bay
28 Weir River
29 Wellfleet Harbor
30 Weymouth Back River

Mass.gov

Rare species viewer

We maintain a list of all documented MESA-listed species observations in Massachusetts. Search this map by common name, scientific name, or town to see where rare species have been observed.



CONTACT

Natural Heritage & Endangered Species Program

Address

MassWildlife Field Headquarters
1 Rabbit Hill Road, Westborough, MA 01581

Directions (https://maps.google.com/?q=1+Rabb

Phone

Main (508) 389-6360 (tel:5083896360)
Open M-F, 8am-4:30pm

Regulatory Review Inquiries

(508) 389-6357 (tel:5083896357)
North/Central/Western Massachusetts

(508) 389-6385 (tel:5083896385)
Southeastern Massachusetts/Cape & Islands

RELATED

List of Endangered, Threatened, and Special Concern species (/info-details/list-of-endangered-threaten

To use this map

1. Select a species from the drop-down menu in the upper left corner. All towns that the species has been observed in will be highlighted on the map. The accompanying table will also show information about the rare species, as well as the complete list of towns with their most recent observation years.
2. Click on a town in the table to highlight it on the map.
3. Select a town from the second drop-down menu in the upper left corner. The town will become outlined on the map and the table will show all rare species observed in that town.
4. Click on *Clear Query/Map* on the bottom left of the table to clear searches and begin again.

Clicking on a column header in the table will sort by that column. Clicking again on the same column heading will reverse the sort order. Toggle between basemaps by clicking the image on the bottom right corner of the map.

This map is updated at regular intervals as new data is accepted and entered into the **Natural Heritage and Endangered Species Program's** (/orgs/masswildlifes-natural-heritage-endangered-species-program) database.

Most recent observation

This field represents the most recent observation of that species in a town. However, because they are rare, many MESA-listed species are difficult to detect even when they are present. Natural Heritage does not have the resources to be able to conduct methodical species surveys in each town on a regular basis. Therefore, the fact that the 'Most Recent Observation' recorded for a species may be several years old should not be interpreted as meaning that the species no longer occurs in a town. However, Natural Heritage regards records older than twenty-five years historic.

For more information about a particular species, view the list of **Natural Heritage fact sheets** (/info-details/list-of-endangered-threatened-and-special-concern-species).

Additional Resources

Request rare species information
(/how-to/request-rare-species-information)

Report rare species & vernal pool observations
(/how-to/report-rare-species-vernal-pool-observations)

Generate a CSV file of the NHESP town list

(https://docs.google.com/spreadsheets/d/e/2PACX-1vRxWPhSYQ7J2btBSc5xsex8syVEobhvDlPJrZRUH5D29ZCLwTmVU09AD2zIT9w-01i-qxBqbjoQcnnk

Did you find what you were looking for on this webpage?

◯ Yes ◯ No

SEND FEEDBACK

Mass.gov

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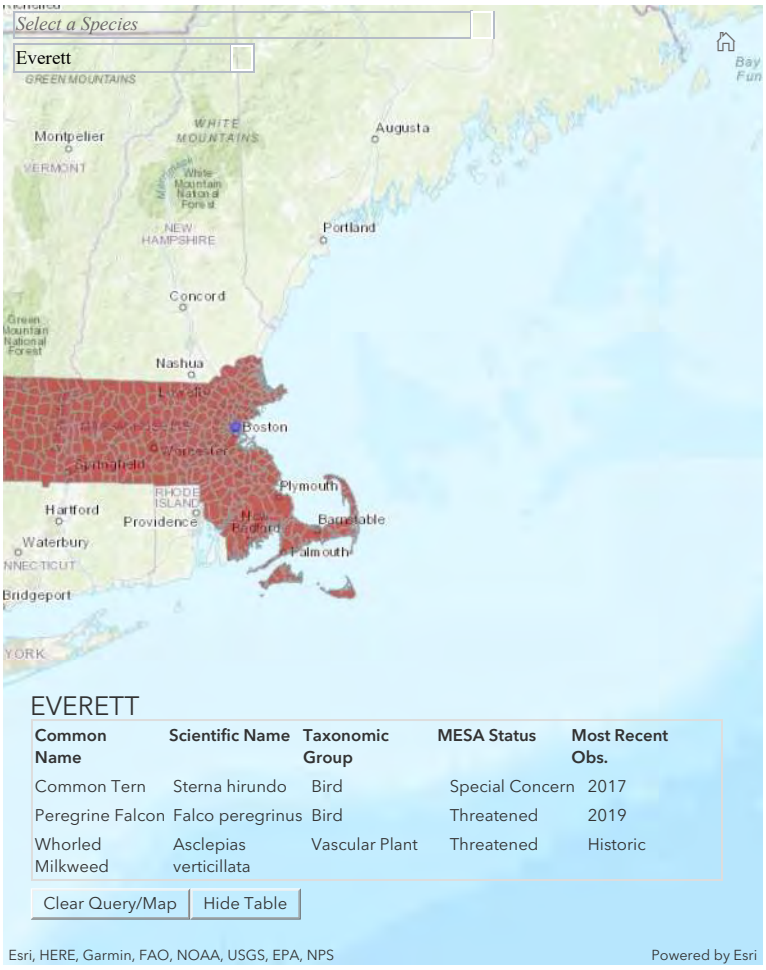

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Did you find what you were looking for on this webpage?

◯ Yes ◯ No

SEND FEEDBACK

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN MASSACHUSETTS

COUNTY	SPECIES	FEDERAL STATUS	GENERAL LOCATION/HABITAT	TOWNS
Barnstable	Piping Plover	Threatened	Coastal Beaches	All Towns
	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	All Towns
	Northeastern beach tiger beetle	Threatened	Coastal Beaches	Chatham
	Sandplain gerardia	Endangered	Open areas with sandy soils.	Sandwich and Falmouth.
	Northern Red-bellied Cooter	Endangered	Inland Ponds and Rivers	Bourne (north of the Cape Cod Canal)
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Berkshire	Bog Turtle	Threatened	Wetlands	Egremont and Sheffield
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Bristol	Piping Plover	Threatened	Coastal Beaches	Fairhaven, Dartmouth, Westport
	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	Fairhaven, New Bedford, Dartmouth, Westport
	Northern Red-bellied Cooter	Endangered	Inland Ponds and Rivers	Taunton
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Dukes	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	All Towns
	Piping Plover	Threatened	Coastal Beaches	All Towns
	Northeastern beach tiger beetle	Threatened	Coastal Beaches	Aquinnah and Chilmark
	Sandplain gerardia	Endangered	Open areas with sandy soils.	West Tisbury
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide

Updated 02/05/2016

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN MASSACHUSETTS

COUNTY	SPECIES	FEDERAL STATUS	GENERAL LOCATION/HABITAT	TOWNS
Essex	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Gloucester, Essex and Manchester
	Piping Plover	Threatened	Coastal Beaches	Gloucester, Essex, Ipswich, Rowley, Revere, Newbury, Newburyport and Salisbury
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Franklin	Northeastern bulrush	Endangered	Wetlands	Montague, Warwick
	Dwarf wedgemussel	Endangered	Mill River	Whately
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Hampshire	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Hadley
	Puritan tiger beetle	Threatened	Sandy beaches along the Connecticut River	Northampton and Hadley
	Dwarf wedgemussel	Endangered	Rivers and Streams.	Hatfield, Amherst and Northampton
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Hampden	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Southwick
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Middlesex	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Groton
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Nantucket	Piping Plover	Threatened	Coastal Beaches	Nantucket
	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	Nantucket
	American burying beetle	Endangered	Upland grassy meadows	Nantucket
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide

Updated 02/05/2016

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN MASSACHUSETTS

COUNTY	SPECIES	FEDERAL STATUS	GENERAL LOCATION/HABITAT	TOWNS
Plymouth	Piping Plover	Threatened	Coastal Beaches	Scituate, Marshfield, Duxbury, Plymouth, Wareham and Mattapoisett
	Northern Red-bellied Cooter	Endangered	Inland Ponds and Rivers	Kingston, Middleborough, Carver, Plymouth, Bourne, Wareham, Halifax, and Pembroke
	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	Plymouth, Marion, Wareham, and Mattapoisett.
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Suffolk	Piping Plover	Threatened	Coastal Beaches	Revere, Winthrop
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Worcester	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Leominster
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide

[1]Migratory only, scattered along the coast in small numbers

-Eastern cougar and gray wolf are considered extirpated in Massachusetts.
-Endangered gray wolves are not known to be present in Massachusetts, but dispersing individuals from source populations in Canada may occur statewide.
-Critical habitat for the Northern Red-bellied Cooter is present in Plymouth County.

Updated 02/05/2016

IPaC Information for Planning and Consultation **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Middlesex and Suffolk counties, Massachusetts

Local office

New England Ecological Services Field Office

(603) 223-2541
(603) 223-0104

70 Commercial Street, Suite 300
Concord, NH 03301-5094

http://www.fws.gov/newengland

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species

[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

THERE ARE NO ENDANGERED SPECIES EXPECTED TO OCCUR AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act

[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE"

	INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
American Oystercatcher Haematopus palliatus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8935	Breeds Apr 15 to Aug 31
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
Black Skimmer Rynchops niger This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5234	Breeds May 20 to Sep 15
Bobolink Dolichonyx oryzivorus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Buff-breasted Sandpiper Calidris subruficollis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9488	Breeds elsewhere
Canada Warbler Cardellina canadensis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10
Dunlin Calidris alpina arcticola This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
King Rail Rallus elegans This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8936	Breeds May 1 to Sep 5
Least Tern Sterna antillarum This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Apr 20 to Sep 10

Lesser Yellowlegs Tringa flavipes — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9679

Long-eared Owl asio otus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3631

Nelson's Sparrow Ammodramus nelsoni — Breeds May 15 to Sep 5
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Prairie Warbler Dendroica discolor — Breeds May 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Purple Sandpiper Calidris maritima — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Red-throated Loon Gavia stellata — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Ruddy Turnstone Arenaria interpres morinella — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Rusty Blackbird Euphagus carolinus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Seaside Sparrow Ammodramus maritimus — Breeds May 10 to Aug 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Semipalmated Sandpiper Calidris pusilla — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Short-billed Dowitcher Limnodromus griseus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9480

Snowy Owl Bubo scandiacus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Whimbrel Numenius phaeopus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9483	Breeds elsewhere
Willet Tringa semipalmata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5
Wood Thrush Hylocichla mustelina This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

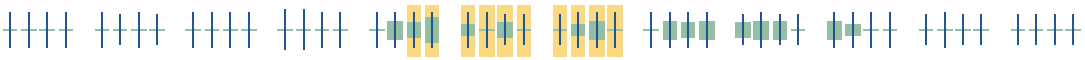
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

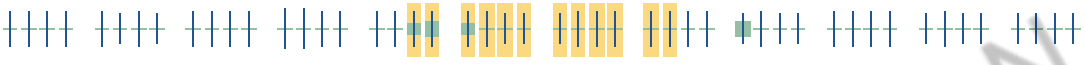
Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Bobolink
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



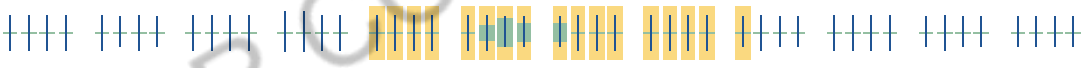
Buff-breasted Sandpiper
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Canada Warbler
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

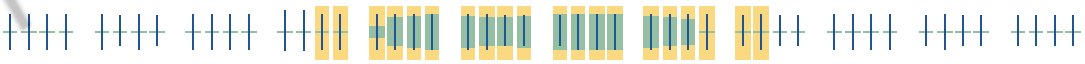


Dunlin
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

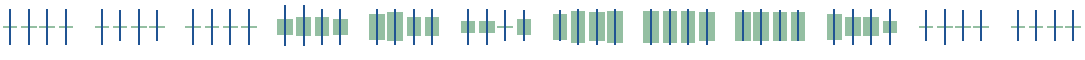
King Rail
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



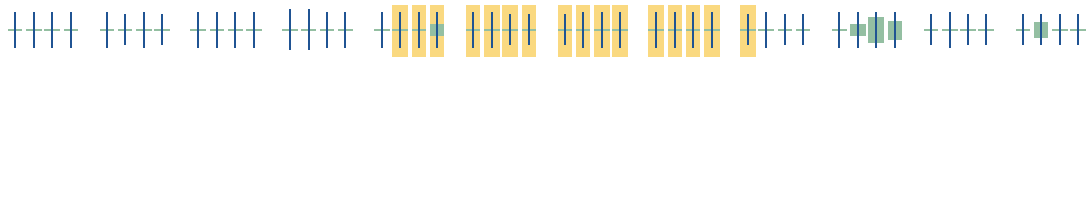
Least Tern
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Lesser Yellowlegs
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Long-eared Owl
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Nelson's Sparrow
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

SPECIES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Prairie Warbler
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Purple Sandpiper
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Red-throated Loon
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Ruddy Turnstone
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Rusty Blackbird
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Seaside Sparrow
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Semipalmated Sandpiper
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

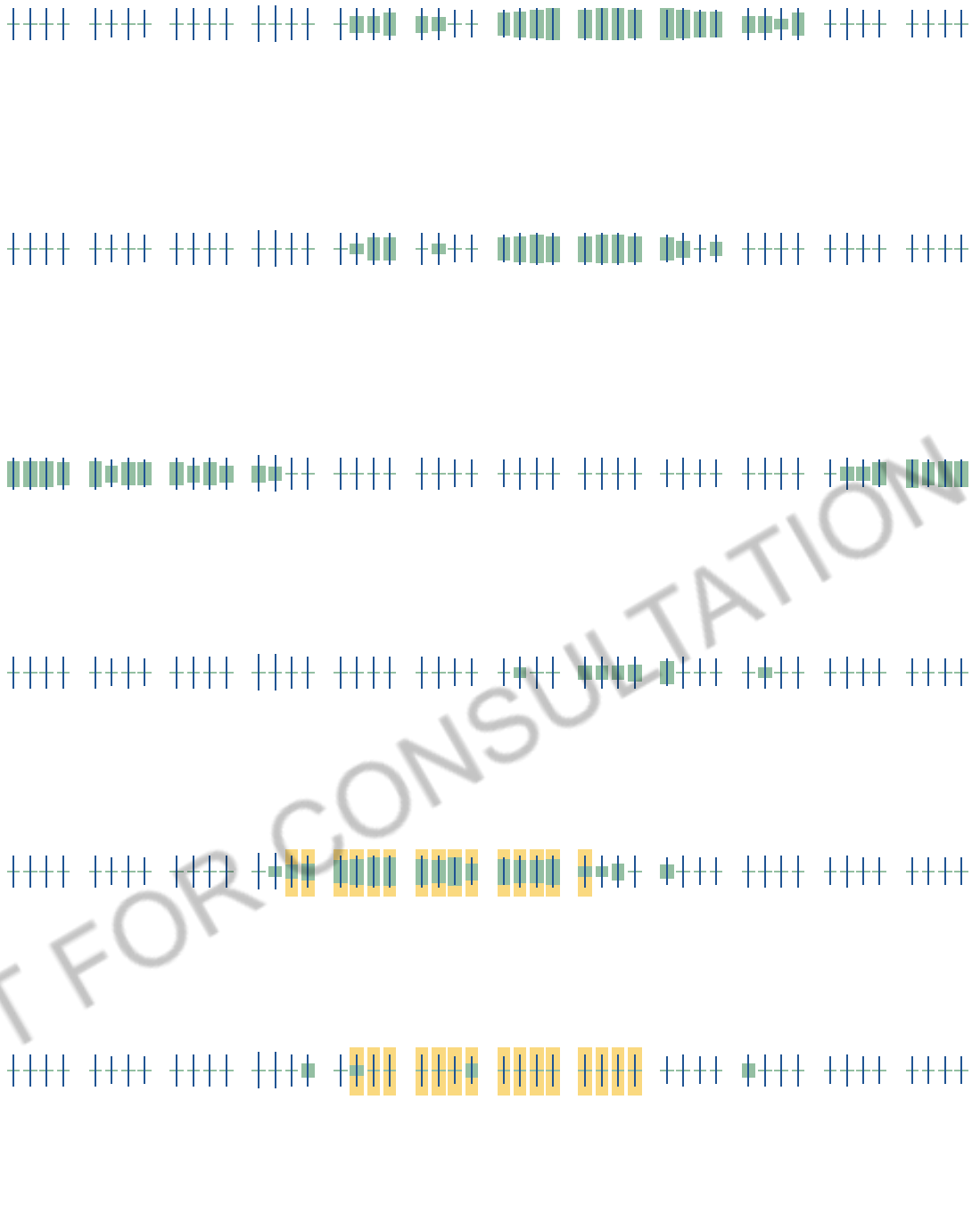
Short-billed Dowitcher
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Snowy Owl
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Whimbrel
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Willet
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Wood Thrush
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review.

Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

ESTUARINE AND MARINE DEEPWATER

E1UBLx

ESTUARINE AND MARINE WETLAND

E2USN

E2EM1P

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or

local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Summary of the MESA list

Taxonomic Group	Endangered	Threatened	Special Concern	TOTALS
Mammals (including 6 whales)	11 (7 FE, 1 FT)	0	3	**14**
Birds (breeding)	9 (1 FE)	8 (1 FT)	10	**27**
Reptiles (including 5 sea turtles)	8 (4 FE, 1 FT)	5 (2 FT)	2	**15**
Amphibians	0	2	2	**4**
Fish	4 (1 FE, 1 FT)	2	4	**10**
Invertebrates (non-marine only)	30 (2 FE, 2 FT)	24	45	**99**
Plants (vascular)	153 (2 FE, 1 FT)	64	41	**258**
TOTALS	**215 (17 FE, 6 FT)**	**105 (3 FT)**	**107 0**	**427 (26 FE or FT)**

FE = species listed under the U.S. Endangered Species Act as Federally Endangered as of February 27, 2012.
FT = species listed under the U.S. Endangered Species Act as Federally Threatened as of April 2, 2015.

List of Vertebrates

Fish

Common Name	Scientific Name	MA Status	Fed Status	Notes
American Brook Lamprey	*Lampetra appendix*	T		
Shortnose Sturgeon	*Acipenser brevirostrum*	E	E	
Atlantic Sturgeon	*Acipenser oxyrinchus*	E	E (CT River), T (Merrimack River)	
Lake Chub	*Couesius plumbeus*	E		
Eastern Silvery Minnow	*Hybognathus regius*	SC		
Bridle Shiner	*Notropis bifrenatus*	SC		
Northern Redbelly Dace	*Phoxinus eos*	E		
Longnose Sucker	*Catostomus catostomus*	SC		
Burbot	*Lota lota*	SC		
Threespine Stickleback	*Gasterosteus aculeatus*	T		Trimorphic freshwater population only.

Amphibians

Common Name	Scientific Name	MA Status	Fed Status	Notes
Jefferson Salamander	*Ambystoma jeffersonianum*	SC		Including triploid and other polyploid forms within the *Ambystoma jeffersonianum* / *Ambystoma laterale* complex.
Blue-spotted Salamander	*Ambystoma laterale*	SC		Including triploid and other polyploid forms within the *Ambystoma jeffersonianum* / *Ambystoma laterale* complex.
Marbled Salamander	*Ambystoma opacum*	T		
Eastern Spadefoot	*Scaphiopus holbrookii*	T		

Reptiles

Common Name	Scientific Name	MA Status	Fed Status	Notes
Loggerhead Seaturtle	*Caretta caretta*	T	T	
Green Seaturtle	*Chelonia mydas*	T	T	
Hawksbill Seaturtle	*Eretmochelys imbricata*	E	E	
Kemp's Ridley Seaturtle	*Lepidochelys kempii*	E	E	
Leatherback Seaturtle	*Dermochelys coriacea*	E	E	

Wood Turtle	*Glyptemys insculpta*	SC		
Bog Turtle	*Glyptemys muhlenbergii*	E	T	
Blanding's Turtle	*Emydoidea blandingii*	T		
Diamond-backed Terrapin	*Malaclemys terrapin*	T		
Northern Red-bellied Cooter	*Pseudemys rubriventris*	E	E	This species is listed by the U. S. Fish and Wildlife Service as P. r. bangsi (Plymouth Redbelly Turtle) in 50 CFR 17.11.
Eastern Box Turtle	*Terrapene carolina*	SC		
Eastern Wormsnake	*Carphophis amoenus*	T		
Eastern Ratsnake	*Pantherophis alleghaniensis*	E		
Copperhead	*Agkistrodon contortrix*	E		
Timber Rattlesnake	*Crotalus horridus*	E		

Birds

Common Name	Scientific Name	MA Status	Fed Status	Notes
Common Loon	*Gavia immer*	SC		
Pied-billed Grebe	*Podilymbus podiceps*	E		
Leach's Storm-petrel	*Oceanodroma leucorhoa*	E		
American Bittern	*Botaurus lentiginosus*	E		
Least Bittern	*Ixobrychus exilis*	E		
Bald Eagle	*Haliaeetus leucocephalus*	T		
Northern Harrier	*Circus cyaneus*	T		
Peregrine Falcon	*Falco peregrinus*	T		
King Rail	*Rallus elegans*	T		
Common Moorhen	*Gallinula chloropus*	SC		
Piping Plover	*Charadrius melodus*	T	T	
Upland Sandpiper	*Bartramia longicauda*	E		
Roseate Tern	*Sterna dougallii*	E	E	
Common Tern	*Sterna hirundo*	SC		
Arctic Tern	*Sterna paradisaea*	SC		
Least Tern	*Sternula antillarum*	SC		
Barn Owl	*Tyto alba*	SC		
Long-eared Owl	*Asio otus*	SC		
Short-eared Owl	*Asio flammeus*	E		
Sedge Wren	*Cistothorus platensis*	E		
Golden-winged Warbler	*Vermivora chrysoptera*	E		
Northern Parula	*Parula americana*	T		
Blackpoll Warbler	*Dendroica striata*	SC		
Mourning Warbler	*Oporornis philadelphia*	SC		
Vesper Sparrow	*Pooecetes gramineus*	T		

Grasshopper Sparrow	*Ammodramus savannarum*	T		
Whip-poor-will	*Caprimulgus vociferus*	SC		

Mammals

Common Name	Scientific Name	MA Status	Fed Status	Notes
Water Shrew	*Sorex palustris*	SC		
Rock Shrew	*Sorex dispar*	SC		
Indiana Myotis	*Myotis sodalis*	E	E	
Small-footed Myotis	*Myotis leibii*	E		
Little Brown Myotis	*Myotis lucifugus*	E		
Tricolored Bat	*Perimyotis subflavus*	E		
Northern Long-eared Bat	*Myotis septentrionalis*	E	T	
Southern Bog Lemming	*Synaptomys cooperi*	SC		
Sperm Whale	*Physeter macrocephalus*	E	E	
Fin Whale	*Balaenoptera physalus*	E	E	
Sei Whale	*Balaenoptera borealis*	E	E	
Blue Whale	*Balaenoptera musculus*	E	E	
Humpback Whale	*Megaptera novaeangliae*	E	E	
Northern Right Whale	*Eubalaena glacialis*	E	E	

List of Invertebrates

Sponges

Common Name	Scientific Name	MA Status	Fed Status	Notes
Smooth Branched Sponge	*Spongilla aspinosa*	SC		

Flatworms

Common Name	Scientific Name	MA Status	Fed Status	Notes
New England Medicinal Leech	*Macrobdella sestertia*	SC		

Snails

Common Name	Scientific Name	MA Status	Fed Status	Notes
New England Siltsnail	*Floridobia winkleyi*	SC		
Coastal Marsh Snail	*Littoridinops tenuipes*	SC		
Slender Walker	*Pomatiopsis lapidaria*	E		
Boreal Marstonia	*Marstonia lustrica*	E		
Boreal Turret Snail	*Valvata sincera*	E		

Mussels

Common Name	Scientific Name	MA Status	Fed Status	Notes
Dwarf Wedgemussel	*Alasmidonta heterodon*	E	E	
Brook Floater (Swollen Wedgemussel)	*Alasmidonta varicosa*	E		
Yellow Lampmussel	*Lampsilis cariosa*	E		
Tidewater Mucket	*Leptodea ochracea*	SC		
Eastern Pondmussel	*Ligumia nasuta*	SC		
Creeper	*Strophitus undulatus*	SC		

Crustaceans

Common Name	Scientific Name	MA Status	Fed Status	Notes
Intricate Fairy Shrimp	*Eubranchipus intricatus*	SC		
Agassiz's Clam Shrimp	*Eulimnadia agassizii*	E		
Northern Spring Amphipod	*Gammarus pseudolimnaeus*	SC		
American Clam Shrimp	*Limnadia lenticularis*	SC		
Taconic Cave Amphipod	*Stygobromus borealis*	E		
Piedmont Groundwater Amphipod	*Stygobromus tenuis tenuis*	SC		
Coastal Swamp Amphipod	*Synurella chamberlaini*	SC		

Dragonflies

Common Name	Scientific Name	MA Status	Fed Status	Notes
Subarctic Darner	*Aeshna subarctica*	E		
Ocellated Darner	*Boyeria grafiana*	SC		
Spine-crowned Clubtail	*Gomphus abbreviatus*	SC		
Harpoon Clubtail	*Gomphus descriptus*	E		
Midland Clubtail	*Gomphus fraternus*	E		
Rapids Clubtail	*Gomphus quadricolor*	E		
Cobra Clubtail	*Gomphus vastus*	SC		
Skillet Clubtail	*Gomphus ventricosus*	T		
Umber Shadowdragon	*Neurocordulia obsoleta*	SC		
Stygian Shadowdragon	*Neurocordulia yamaskanensis*	SC		
Brook Snaketail	*Ophiogomphus aspersus*	SC		
Riffle Snaketail	*Ophiogomphus carolus*	T		
Ski-tipped Emerald	*Somatochlora elongata*	SC		
Forcipate Emerald	*Somatochlora forcipata*	E		
Coppery Emerald	*Somatochlora georgiana*	E		
Incurvate Emerald	*Somatochlora incurvata*	E		
Kennedy's Emerald	*Somatochlora kennedyi*	E		
Mocha Emerald	*Somatochlora linearis*	SC		
Riverine Clubtail	*Stylurus amnicola*	E		
Ebony Boghaunter	*Williamsonia fletcheri*	E		
Ringed Boghaunter	*Williamsonia lintneri*	T		

Damselflies

Common Name	Scientific Name	MA Status	Fed Status	Notes
Tule Bluet	*Enallagma carunculatum*	SC		
Attenuated Bluet	*Enallagma daeckii*	T		
Scarlet Bluet	*Enallagma pictum*	T		
Pine Barrens Bluet	*Enallagma recurvatum*	T		

Beetles

Common Name	Scientific Name	MA Status	Fed Status	Notes
Twelve-spotted Tiger Beetle	*Cicindela duodecimguttata*	SC		
Hentz's Redbelly Tiger Beetle	*Cicindela rufiventris hentzii*	T		
Northeastern Beach Tiger Beetle	*Cicindela dorsalis dorsalis*	E	T	
Bank Tiger Beetle	*Cicindela limbalis*	T		
Cobblestone Tiger Beetle	*Cicindela marginipennis*	E		
Barrens Tiger Beetle	*Cicindela patruela*	E		

Puritan Tiger Beetle	*Cicindela puritana*	E	T	
Purple Tiger Beetle	*Cicindela purpurea*	SC		
American Burying Beetle	*Nicrophorus americanus*	E	E	

Butterflies and Moths

Common Name	Scientific Name	MA Status	Fed Status	Notes
Coastal Heathland Cutworm	*Abagrotis nefascia*	SC		
Barrens Daggermoth	*Acronicta albarufa*	T		
Drunk Apamea Moth	*Apamea inebriata*	SC		
New Jersey Tea Inchworm	*Apodrepanulatrix liberaria*	E		
Hessel's Hairstreak	*Callophrys hesseli*	SC		
Frosted Elfin	*Callophrys irus*	SC		
Bog Elfin	*Callophrys lanoraieensis*	T		
Gerhard's Underwing	*Catocala herodias gerhardi*	SC		
Precious Underwing Moth	*Catocala pretiosa pretiosa*	E		
Waxed Sallow Moth	*Chaetaglaea cerata*	SC		
Melsheimer's Sack Bearer	*Cicinnus melsheimeri*	T		
Chain Dot Geometer	*Cingilia catenaria*	SC		
Unexpected Cycnia	*Cycnia inopinatus*	T		
The Pink Streak	*Dargida rubripennis*	T		
Imperial Moth	*Eacles imperialis*	T		
Early Hairstreak	*Erora laeta*	T		
Persius Duskywing	*Erynnis persius persius*	E		
Sandplain Euchlaena	*Euchlaena madusaria*	SC		
Dion Skipper	*Euphyes dion*	T		
Phyllira Tiger Moth	*Grammia phyllira*	E		
Slender Clearwing Sphinx Moth	*Hemaris gracilis*	SC		
Barrens Buckmoth	*Hemileuca maia*	SC		
Sandplain Heterocampa	*Heterocampa varia*	T		
Buchholz's Gray	*Hypomecis buchholzaria*	E		
Pale Green Pinion Moth	*Lithophane viridipallens*	SC		
Twilight Moth	*Lycia rachelae*	E		
Pine Barrens Lycia	*Lycia ypsilon*	T		
Barrens Metarranthis	*Metarranthis apiciaria*	E		
Coastal Swamp Metarranthis	*Metarranthis pilosaria*	SC		
Northern Brocade Moth	*Neoligia semicana*	SC		
Pitcher Plant Borer	*Papaipema appassionata*	T		
Ostrich Fern Borer	*Papaipema* sp. 2	SC		Undescribed species near P. pterisii
Chain Fern Borer	*Papaipema stenocelis*	T		

Water-willow Stem Borer	*Papaipema sulphurata*	T		
Spartina Borer	*Photedes inops*	SC		
Mustard White	*Pieris oleracea*	T		
Pink Sallow Moth	*Psectraglaea carnosa*	SC		
Southern Ptichodis	*Ptichodis bistrigata*	T		
Orange Sallow Moth	*Pyrrhia aurantiago*	SC		
Pine Barrens Speranza	*Speranza exonerata*	SC		
Faded Gray Geometer	*Stenoporpia polygrammaria*	T		
Dune Noctuid Moth	*Sympistis riparia*	SC		
Pine Barrens Zale	*Zale lunifera*	SC		True *Z. lunifera,* sensu Schmidt (2010)
Pine Barrens Zanclognatha	*Zanclognatha martha*	SC		

List of Plants

Plants

Taxonomic Group	Common Name	Scientific Name	MA Status	Fed Status	Notes
Adiantaceae (Cliff Ferns)	Fragile Rock-brake	*Cryptogramma stelleri*	E		
Alismataceae (Arrowheads)	Wapato	*Sagittaria cuneata*	T		
Alismataceae (Arrowheads)	Estuary Arrowhead	*Sagittaria montevidensis* ssp. *spongiosa*	E		
Alismataceae (Arrowheads)	Terete Arrowhead	*Sagittaria teres*	SC		
Apiaceae (Parsleys, Angelicas)	Hemlock Parsley	*Conioselinum chinense*	SC		
Apiaceae (Parsleys, Angelicas)	Saltpond Pennywort	*Hydrocotyle verticillata*	T		
Apiaceae (Parsleys, Angelicas)	Canadian Sanicle	*Sanicula canadensis*	T		
Apiaceae (Parsleys, Angelicas)	Long-styled Sanicle	*Sanicula odorata*	T		
Aquifoliaceae (Hollies)	Mountain Winterberry	*Ilex montana*	E		
Araceae (Arums)	Green Dragon	*Arisaema dracontium*	T		
Araceae (Arums)	Golden Club	*Orontium aquaticum*	E		
Araliaceae (Ginsengs)	Ginseng	*Panax quinquefolius*	SC		
Asclepiadaceae (Milkweeds)	Purple Milkweed	*Asclepias purpurascens*	E		
Asclepiadaceae (Milkweeds)	Linear-leaved Milkweed	*Asclepias verticillata*	T		
Aspleniaceae (Spleenworts)	Mountain Spleenwort	*Asplenium montanum*	E		
Aspleniaceae (Spleenworts)	Wall-rue Spleenwort	*Asplenium ruta-muraria*	T		
Asteraceae (Asters, Composites)	Lesser Snakeroot	*Ageratina aromatica*	E		
Asteraceae (Asters, Composites)	Eaton's Beggar-ticks	*Bidens eatonii*	E		
Asteraceae (Asters, Composites)	Estuary Beggar-ticks	*Bidens hyperborea*	E		

Asteraceae (Asters, Composites)	Cornel-leaved Aster	*Doellingeria infirma*	E		
Asteraceae (Asters, Composites)	New England Boneset	*Eupatorium novae-angliae*	E		
Asteraceae (Asters, Composites)	Purple Cudweed	*Gamochaeta purpurea*	E		
Asteraceae (Asters, Composites)	New England Blazing Star	*Liatris scariosa* var. *novae-angliae*	SC		
Asteraceae (Asters, Composites)	Lion's Foot	*Nabalus serpentarius*	E		
Asteraceae (Asters, Composites)	Upland White Aster	*Oligoneuron album*	E		
Asteraceae (Asters, Composites)	Sweet Coltsfoot	*Petasites frigidus* var. *palmatus*	E		
Asteraceae (Asters, Composites)	Sclerolepis	*Sclerolepis uniflora*	E		
Asteraceae (Asters, Composites)	Large-leaved Goldenrod	*Solidago macrophylla*	SC		
Asteraceae (Asters, Composites)	Rand's Goldenrod	*Solidago simplex* ssp. *randii* var. *monticola*	E		
Asteraceae (Asters, Composites)	Eastern Silvery Aster	*Symphyotrichum concolor*	E		
Asteraceae (Asters, Composites)	Crooked-stem Aster	*Symphyotrichum prenanthoides*	SC		
Asteraceae (Asters, Composites)	Tradescant's Aster	*Symphyotrichum tradescantii*	T		
Betulaceae (Birches, Alders)	Mountain Alder	*Alnus viridis* ssp. *crispa*	SC		
Betulaceae (Birches, Alders)	Swamp Birch	*Betula pumila*	E		
Boraginaceae (Borages)	Northern Wild Comfrey	*Cynoglossum virginianum* var. *boreale*	E		
Boraginaceae (Borages)	Oysterleaf	*Mertensia maritima*	E		
Brassicaceae (Mustards)	Lyre-leaved Rock-cress	*Arabidopsis lyrata*	E		
Brassicaceae (Mustards)	Smooth Rock-cress	*Boechera laevigata*	SC		
Brassicaceae (Mustards)	Green Rock-cress	*Boechera missouriensis*	T		
Brassicaceae (Mustards)	Fen Cuckoo Flower	*Cardamine dentata*	T		
Brassicaceae	Purple Cress	*Cardamine douglassii*	E		

(Mustards)					
Brassicaceae (Mustards)	Long's Bitter-cress	*Cardamine longii*	E		
Cactaceae (Cacti)	Prickly Pear	*Opuntia humifusa*	E		
Campanulaceae (Bluebells, Lobelias)	Great Blue Lobelia	*Lobelia siphilitica*	E		
Caprifoliaceae (Honeysuckles)	Hairy Honeysuckle	*Lonicera hirsuta*	E		
Caprifoliaceae (Honeysuckles)	American Twinflower	*Linnaea borealis* ssp. *americana*	SC		
Caprifoliaceae (Honeysuckles)	Snowberry	*Symphoricarpos albus* var. *albus*	E		
Caprifoliaceae (Honeysuckles)	Broad Tinker's-weed	*Triosteum perfoliatum*	E		
Caprifoliaceae (Honeysuckles)	Downy Arrow-wood	*Viburnum rafinesquianum*	E		
Caryophyllaceae (Pinks, Sandworts)	Nodding Chickweed	*Cerastium nutans*	E		
Caryophyllaceae (Pinks, Sandworts)	Michaux's Sandwort	*Minuartia michauxii*	T		
Caryophyllaceae (Pinks, Sandworts)	Large-leaved Sandwort	*Moehringia macrophylla*	E		
Caryophyllaceae (Pinks, Sandworts)	Silverling	*Paronychia argyrocoma*	E		
Celastraceae (Staff Tree Family)	American Bittersweet	*Celastrus scandens*	T		
Chenopodiaceae (Saltworts)	Fogg's Goosefoot	*Chenopodium foggii*	E		
Chenopodiaceae (Saltworts)	American Sea-blite	*Suaeda calceoliformis*	SC		
Cistaceae (Rockroses, Pinweeds)	Beaded Pinweed	*Lechea pulchella* var. *moniliformis*	E		
Clusiaceae (St. John's-worts)	Creeping St. John's-wort	*Hypericum adpressum*	T		
Clusiaceae (St. John's-worts)	Giant St. John's-wort	*Hypericum ascyron*	E		
Clusiaceae (St. John's-worts)	St. Andrew's Cross	*Hypericum stragulum*	E		
Convolvulaceae (Morning Glories)	Low Bindweed	*Calystegia spithamaea*	E		
Crassulaceae (Sedums)	Pygmyweed	*Crassula aquatica*	T		

Cupressaceae (Cedars, Junipers)	Arborvitae	*Thuja occidentalis*	E		
Cyperaceae (Sedges)	Foxtail Sedge	*Carex alopecoidea*	T		
Cyperaceae (Sedges)	Back's Sedge	*Carex backii*	E		
Cyperaceae (Sedges)	Bailey's Sedge	*Carex baileyi*	T		
Cyperaceae (Sedges)	Bush's Sedge	*Carex bushii*	E		
Cyperaceae (Sedges)	Chestnut-colored Sedge	*Carex castanea*	E		
Cyperaceae (Sedges)	Creeping Sedge	*Carex chordorrhiza*	E		
Cyperaceae (Sedges)	Davis' Sedge	*Carex davisii*	E		
Cyperaceae (Sedges)	Handsome Sedge	*Carex formosa*	T		
Cyperaceae (Sedges)	Glaucescent Sedge	*Carex glaucodea*	E		
Cyperaceae (Sedges)	Slender Woodland Sedge	*Carex gracilescens*	E		
Cyperaceae (Sedges)	Gray's Sedge	*Carex grayi*	T		
Cyperaceae (Sedges)	Hitchcock's Sedge	*Carex hitchcockiana*	SC		
Cyperaceae (Sedges)	Shore Sedge	*Carex lenticularis*	T		
Cyperaceae (Sedges)	Glaucous Sedge	*Carex livida*	E		
Cyperaceae (Sedges)	False Hop-sedge	*Carex lupuliformis*	E		
Cyperaceae (Sedges)	Midland Sedge	*Carex mesochorea*	E		
Cyperaceae (Sedges)	Michaux's Sedge	*Carex michauxiana*	E		
Cyperaceae (Sedges)	Mitchell's Sedge	*Carex mitchelliana*	T		
Cyperaceae (Sedges)	Rich Woods Sedge	*Carex oligocarpa*	T		
Cyperaceae (Sedges)	Few-seeded Sedge	*Carex oligosperma*	E		
Cyperaceae (Sedges)	Few-flowered Sedge	*Carex pauciflora*	E		
Cyperaceae (Sedges)	Variable Sedge	*Carex polymorpha*	E		
Cyperaceae	Schweinitz's Sedge	*Carex schweinitzii*	E		

(Sedges)					
Cyperaceae (Sedges)	Dioecious Sedge	*Carex sterilis*	T		
Cyperaceae (Sedges)	Walter's Sedge	*Carex striata*	E		
Cyperaceae (Sedges)	Fen Sedge	*Carex tetanica*	SC		
Cyperaceae (Sedges)	Hairy-fruited Sedge	*Carex trichocarpa*	SC		
Cyperaceae (Sedges)	Tuckerman's Sedge	*Carex tuckermanii*	E		
Cyperaceae (Sedges)	Cat-tail Sedge	*Carex typhina*	T		
Cyperaceae (Sedges)	Engelmann's Umbrella-sedge	*Cyperus engelmannii*	T		
Cyperaceae (Sedges)	Houghton's Flatsedge	*Cyperus houghtonii*	E		
Cyperaceae (Sedges)	Wright's Spike-rush	*Eleocharis diandra*	E		
Cyperaceae (Sedges)	Intermediate Spike-sedge	*Eleocharis intermedia*	T		
Cyperaceae (Sedges)	Tiny-fruited Spike-rush or Spike-sedge	*Eleocharis microcarpa* var. *filiculmis*	E		
Cyperaceae (Sedges)	Ovate Spike-rush or Spike-sedge	*Eleocharis ovata*	E		
Cyperaceae (Sedges)	Few-flowered Spike-sedge	*Eleocharis quinqueflora*	E		
Cyperaceae (Sedges)	Three-angled Spike-sedge	*Eleocharis tricostata*	E		
Cyperaceae (Sedges)	Slender Cotton-grass	*Eriophorum gracile*	T		
Cyperaceae (Sedges)	Dwarf Bulrush	*Lipocarpha micrantha*	T		
Cyperaceae (Sedges)	Capillary Beak-sedge	*Rhynchospora capillacea*	E		
Cyperaceae (Sedges)	Inundated Horned-sedge	*Rhynchospora inundata*	T		
Cyperaceae (Sedges)	Short-beaked Bald-sedge	*Rhynchospora nitens*	T		
Cyperaceae (Sedges)	Long-beaked Bald-sedge	*Rhynchospora scirpoides*	SC		
Cyperaceae (Sedges)	Torrey's Beak-sedge	*Rhynchospora torreyana*	E		
Cyperaceae (Sedges)	Northeastern Bulrush	*Scirpus ancistrochaetus*	E	E	
Cyperaceae	Long's Bulrush	*Scirpus longii*	T		

(Sedges)					
Cyperaceae (Sedges)	Papillose Nut-sedge	*Scleria pauciflora*	E		Includes s.p. var. pauciflora and s.p. var. caroliniana
Cyperaceae (Sedges)	Tall Nut-sedge	*Scleria triglomerata*	E		
Dryopteridaceae (Wood Ferns)	Braun's Holly-fern	*Polystichum braunii*	E		
Dryopteridaceae (Wood Ferns)	Smooth Woodsia	*Woodsia glabella*	E		
Elatinaceae (Waterworts)	American Waterwort	*Elatine americana*	E		
Equisetaceae (Horsetails)	Dwarf Scouring-rush	*Equisetum scirpoides*	SC		
Ericaceae (Laurels, Blueberries)	Pink Pyrola	*Pyrola asarifolia* ssp. *asarifolia*	E		
Ericaceae (Laurels, Blueberries)	One-flowered Pyrola	*Moneses uniflora*	SC		
Ericaceae (Laurels, Blueberries)	Great Laurel	*Rhododendron maximum*	T		
Ericaceae (Laurels, Blueberries)	Mountain Cranberry	*Vaccinium vitis-idaea* ssp. *minus*	E		
Eriocaulaceae (Pipeworts)	Parker's Pipewort	*Eriocaulon parkeri*	E		
Fabaceae (Beans, Peas, Clovers)	Large-bracted Tick-trefoil	*Desmodium cuspidatum*	T		
Fabaceae (Beans, Peas, Clovers)	Wild Senna	*Senna hebecarpa*	E		
Fagaceae (Oaks, Beeches)	Bur Oak	*Quercus macrocarpa*	SC		
Fagaceae (Oaks, Beeches)	Yellow Oak	*Quercus muehlenbergii*	T		
Fumariaceae (Fumitories)	Climbing Fumitory	*Adlumia fungosa*	SC		
Gentianaceae (Gentians)	Andrews' Bottle Gentian	*Gentiana andrewsii*	E		
Gentianaceae (Gentians)	Spurred Gentian	*Halenia deflexa*	E		
Gentianaceae (Gentians)	Slender Marsh Pink	*Sabatia campanulata*	E		
Gentianaceae (Gentians)	Plymouth Gentian	*Sabatia kennedyana*	SC		
Gentianaceae (Gentians)	Sea Pink	*Sabatia stellaris*	E		

Grossulariaceae (Currants)	Bristly Black Currant	*Ribes lacustre*	SC		
Haemodoraceae (Redroots)	Redroot	*Lachnanthes caroliana*	SC		
Haloragaceae (Water-milfoils)	Alternate-flowered Water-milfoil	*Myriophyllum alterniflorum*	E		
Haloragaceae (Water-milfoils)	Farwell's Water-milfoil	*Myriophyllum farwellii*	E		
Haloragaceae (Water-milfoils)	Pinnate Water-milfoil	*Myriophyllum pinnatum*	SC		
Haloragaceae (Water-milfoils)	Comb Water-milfoil	*Myriophyllum verticillatum*	E		
Hydrophyllaceae (Waterleaves)	Broad Waterleaf	*Hydrophyllum canadense*	E		
Hymenophyllaceae (Filmy-ferns)	Appalachian Bristle-fern	*Trichomanes intricatum*	E		
Iridaceae (Irises)	Sandplain Blue-eyed Grass	*Sisyrinchium fuscatum*	SC		
Iridaceae (Irises)	Slender Blue-eyed Grass	*Sisyrinchium mucronatum*	E		
Isoetaceae (Quillworts)	Acadian Quillwort	*Isoetes acadiensis*	E		
Isoetaceae (Quillworts)	Lake Quillwort	*Isoetes lacustris*	E		
Juncaceae (Rushes)	Weak Rush	*Juncus debilis*	E		
Juncaceae (Rushes)	Thread Rush	*Juncus filiformis*	E		
Juncaceae (Rushes)	Black-fruited Woodrush	*Luzula parviflora* ssp. *melanocarpa*	E		
Lamiaceae (Mints)	Purple Giant-hyssop	*Agastache scrophulariifolia*	E		
Lamiaceae (Mints)	Downy Wood-mint	*Blephilia ciliata*	E		
Lamiaceae (Mints)	Hairy Wood-mint	*Blephilia hirsuta*	E		
Lamiaceae (Mints)	Gypsywort	*Lycopus rubellus*	E		
Lamiaceae (Mints)	False Pennyroyal	*Trichostema brachiatum*	E		
Lentibulariaceae (Bladderworts)	Resupinate Bladderwort	*Utricularia resupinata*	T		
Lentibulariaceae (Bladderworts)	Subulate Bladderwort	*Utricularia subulata*	SC		
Liliaceae (Lilies)	Devil's-bit	*Chamaelirium luteum*	E		
Linaceae (Flaxes)	Rigid Flax	*Linum medium* var. *texanum*	T		
Lycopodiaceae (Clubmosses)	Foxtail Clubmoss	*Lycopodiella alopecuroides*	E		

Lycopodiaceae (Clubmosses)	Appalachian Firmoss	*Huperzia appressa*	E		
Lycopodiaceae (Clubmosses)	Mountain Firmoss	*Huperzia selago*	E		
Lythraceae (Loosestrifes)	Toothcup	*Rotala ramosior*	E		
Magnoliaceae (Magnolias)	Sweetbay Magnolia	*Magnolia virginiana*	E		
Melastomataceae (Meadow Beauties)	Maryland Meadow Beauty	*Rhexia mariana*	E		
Moraceae (Mulberries)	Red Mulberry	*Morus rubra*	E		
Nymphaeaceae (Water Lilies)	Tiny Cow-lily	*Nuphar microphylla*	E		
Onagraceae (Evening Primroses)	Many-fruited False-loosestrife	*Ludwigia polycarpa*	E		
Onagraceae (Evening Primroses)	Round-fruited False-loosestrife	*Ludwigia sphaerocarpa*	E		
Ophioglossaceae (Grape Ferns)	Adder's-tongue Fern	*Ophioglossum pusillum*	T		
Orchidaceae (Orchids)	Putty-root	*Aplectrum hyemale*	E		
Orchidaceae (Orchids)	Arethusa	*Arethusa bulbosa*	T		
Orchidaceae (Orchids)	Autumn Coralroot	*Corallorhiza odontorhiza*	SC		
Orchidaceae (Orchids)	Ram's-head Lady's-slipper	*Cypripedium arietinum*	E		
Orchidaceae (Orchids)	Yellow Lady's-slipper	*Cypripedium parviflorum*	E		
Orchidaceae (Orchids)	Showy Lady's-slipper	*Cypripedium reginae*	E		
Orchidaceae (Orchids)	Dwarf Rattlesnake-plantain	*Goodyera repens*	E		
Orchidaceae (Orchids)	Small Whorled Pogonia	*Isotria medeoloides*	E	T	
Orchidaceae (Orchids)	Lily-leaf Twayblade	*Liparis liliifolia*	T		
Orchidaceae (Orchids)	Heartleaf Twayblade	*Listera cordata*	E		
Orchidaceae (Orchids)	Bayard's Green Adder's-mouth	*Malaxis bayardii*	E		
Orchidaceae (Orchids)	White Adder's-mouth	*Malaxis monophyllos* var. *brachypoda*	E		

Orchidaceae (Orchids)	Green Adder's Mouth	*Malaxis unifolia*	T		
Orchidaceae (Orchids)	Southern Twayblade	*Neottia bifolia*	T		
Orchidaceae (Orchids)	Crested Fringed Orchid	*Platanthera cristata*	E		
Orchidaceae (Orchids)	Leafy White Orchis	*Platanthera dilatata*	T		
Orchidaceae (Orchids)	Pale Green Orchis	*Platanthera flava* var. *herbiola*	T		
Orchidaceae (Orchids)	Hooded Ladies'-tresses	*Spiranthes romanzoffiana*	E		
Orchidaceae (Orchids)	Grass-leaved Ladies'-tresses	*Spiranthes vernalis*	T		
Orchidaceae (Orchids)	Cranefly Orchid	*Tipularia discolor*	E		
Orchidaceae (Orchids)	Nodding Pogonia	*Triphora trianthophora*	E		
Oxalidaceae (Wood-sorrels)	Violet Wood-sorrel	*Oxalis violacea*	E		
Poaceae (Grasses)	Annual Peanutgrass	*Amphicarpum amphicarpon*	E		
Poaceae (Grasses)	Purple Needlegrass	*Aristida purpurascens*	T		
Poaceae (Grasses)	Seabeach Needlegrass	*Aristida tuberculosa*	T		
Poaceae (Grasses)	Reed Bentgrass	*Calamagrostis pickeringii*	E		
Poaceae (Grasses)	New England Northern Reedgrass	*Calamagrostis stricta* ssp. *inexpansa*	E		
Poaceae (Grasses)	Tufted Hairgrass	*Deschampsia cespitosa* ssp. *glauca*	E		
Poaceae (Grasses)	Mattamuskeet Panic-grass	*Dichanthelium dichotomum* ssp. *mattamuskeetense*	E		
Poaceae (Grasses)	Commons's Panic-grass	*Dichanthelium ovale* ssp. *pseudopubescens*	SC		
Poaceae (Grasses)	Rough Panic-grass	*Dichanthelium scabriusculum*	T		
Poaceae (Grasses)	Wright's Panic-grass	*Dichanthelium wrightianum*	SC		
Poaceae (Grasses)	Hairy Wild Rye	*Elymus villosus*	E		
Poaceae (Grasses)	Frank's Lovegrass	*Eragrostis frankii*	SC		
Poaceae (Grasses)	Saltpond Grass	*Leptochloa fusca* ssp. *fascicularis*	T		
Poaceae (Grasses)	Sea Lyme-grass	*Leymus mollis*	E		

Poaceae (Grasses)	Woodland Millet	*Milium effusum*	T		
Poaceae (Grasses)	Gattinger's Panic-grass	*Panicum philadelphicum* ssp. *gattingeri*	SC		
Poaceae (Grasses)	Philadelphia Panic-grass	*Panicum philadelphicum* ssp. *philadelphicum*	SC		
Poaceae (Grasses)	Long-leaved Panic-grass	*Panicum rigidulum* ssp. *pubescens*	T		
Poaceae (Grasses)	Drooping Speargrass	*Poa saltuensis* ssp. *languida*	E		
Poaceae (Grasses)	Bristly Foxtail	*Setaria parviflora*	SC		
Poaceae (Grasses)	Salt Reedgrass	*Spartina cynosuroides*	T		
Poaceae (Grasses)	Shining Wedgescale	*Sphenopholis nitida*	T		
Poaceae (Grasses)	Swamp Oats	*Sphenopholis pensylvanica*	T		
Poaceae (Grasses)	Small Dropseed	*Sporobolus neglectus*	E		
Poaceae (Grasses)	Northern Gama-grass	*Tripsacum dactyloides*	E		
Poaceae (Grasses)	Spiked False-oats	*Trisetum spicatum*	E		
Polygonaceae (Docks, Knotweeds)	Pondshore Knotweed	*Persicaria puritanorum*	SC		
Polygonaceae (Docks, Knotweeds)	Strigose Knotweed	*Persicaria setacea*	T		
Polygonaceae (Docks, Knotweeds)	Sea-beach Knotweed	*Polygonum glaucum*	SC		
Polygonaceae (Docks, Knotweeds)	Seabeach Dock	*Rumex pallidus*	T		
Polygonaceae (Docks, Knotweeds)	Swamp Dock	*Rumex verticillatus*	T		
Portulacaceae (Spring Beauties)	Narrow-leaved Spring Beauty	*Claytonia virginica*	E		
Potamogetonaceae (Pondweeds)	Algae-like Pondweed	*Potamogeton confervoides*	T		
Potamogetonaceae (Pondweeds)	Fries' Pondweed	*Potamogeton friesii*	E		
Potamogetonaceae (Pondweeds)	Hill's Pondweed	*Potamogeton hillii*	SC		
Potamogetonaceae (Pondweeds)	Ogden's Pondweed	*Potamogeton ogdenii*	E		
Potamogetonaceae (Pondweeds)	Straight-leaved Pondweed	*Potamogeton strictifolius*	E		
Potamogetonaceae (Pondweeds)	Vasey's Pondweed	*Potamogeton vaseyi*	E		
Ranunculaceae (Buttercups)	Black Cohosh	*Actaea racemosa*	E		

Ranunculaceae (Buttercups)	Purple Clematis	*Clematis occidentalis*	SC		
Ranunculaceae (Buttercups)	Golden Seal	*Hydrastis canadensis*	E		
Ranunculaceae (Buttercups)	Tiny-flowered Buttercup	*Ranunculus micranthus*	E		
Ranunculaceae (Buttercups)	Bristly Buttercup	*Ranunculus pensylvanicus*	SC		
Rosaceae (Roses, Shadbushes)	Small-flowered Agrimony	*Agrimonia parviflora*	E		
Rosaceae (Roses, Shadbushes)	Hairy Agrimony	*Agrimonia pubescens*	T		
Rosaceae (Roses, Shadbushes)	Bartram's Shadbush	*Amelanchier bartramiana*	T		
Rosaceae (Roses, Shadbushes)	Roundleaf Shadbush	*Amelanchier sanguinea*	SC		
Rosaceae (Roses, Shadbushes)	Bicknell's Hawthorn	*Crataegus bicknellii*	E		
Rosaceae (Roses, Shadbushes)	Barren Strawberry	*Geum fragarioides*	SC		
Rosaceae (Roses, Shadbushes)	Sandbar Cherry	*Prunus pumila* var. *depressa*	T		
Rosaceae (Roses, Shadbushes)	Northern Prickly Rose	*Rosa acicularis* ssp. *sayi*	E		
Rosaceae (Roses, Shadbushes)	Northern Mountain-ash	*Sorbus decora*	E		
Rubiaceae (Bedstraws, Bluets)	Northern Bedstraw	*Galium boreale*	E		
Rubiaceae (Bedstraws, Bluets)	Labrador Bedstraw	*Galium labradoricum*	T		
Rubiaceae (Bedstraws, Bluets)	Long-leaved Bluet	*Houstonia longifolia*	E		
Salicaceae (Willows)	Swamp Cottonwood	*Populus heterophylla*	E		
Salicaceae (Willows)	Sandbar Willow	*Salix exigua* ssp. *interior*	T		
Scheuchzeriaceae (Pod-grasses)	Pod-grass	*Scheuchzeria palustris*	E		
Schizaeaceae (Climbing Ferns)	Climbing Fern	*Lygodium palmatum*	SC		
Scrophulariaceae (Figworts)	Sandplain Gerardia	*Agalinis acuta*	E	E	
Scrophulariaceae (Figworts)	Winged Monkey-flower	*Mimulus alatus*	E		

Scrophularceae (Figworts)	Muskflower	*Mimulus moschatus*	T		
Scrophulariaceae (Figworts)	Swamp Lousewort	*Pedicularis lanceolata*	E		
Scrophulariaceae (Figworts)	Hairy Beardtongue	*Penstemon hirsutus*	E		
Scrophulariaceae (Figworts)	Sessile Water-speedwell	*Veronica catenata*	E		
Scrophulariaceae (Figworts)	Culver's-root	*Veronicastrum virginicum*	T		
Sparganiaceae (Bur-reeds)	Small Bur-reed	*Sparganium natans*	E		
Verbenaceae (Vervains)	Narrow-leaved Vervain	*Verbena simplex*	E		
Violaceae (Violets)	Sand Violet	*Viola adunca*	SC		
Violaceae (Violets)	Britton's Violet	*Viola brittoniana*	T		
Viscaceae (Christmas-mistletoes)	Dwarf Mistletoe	*Arceuthobium pusillum*	SC		

MassDEP - Bureau of Waste Site Cleanup

Phase 1 Site Assessment Map: 500 feet & 0.5 Mile Radii

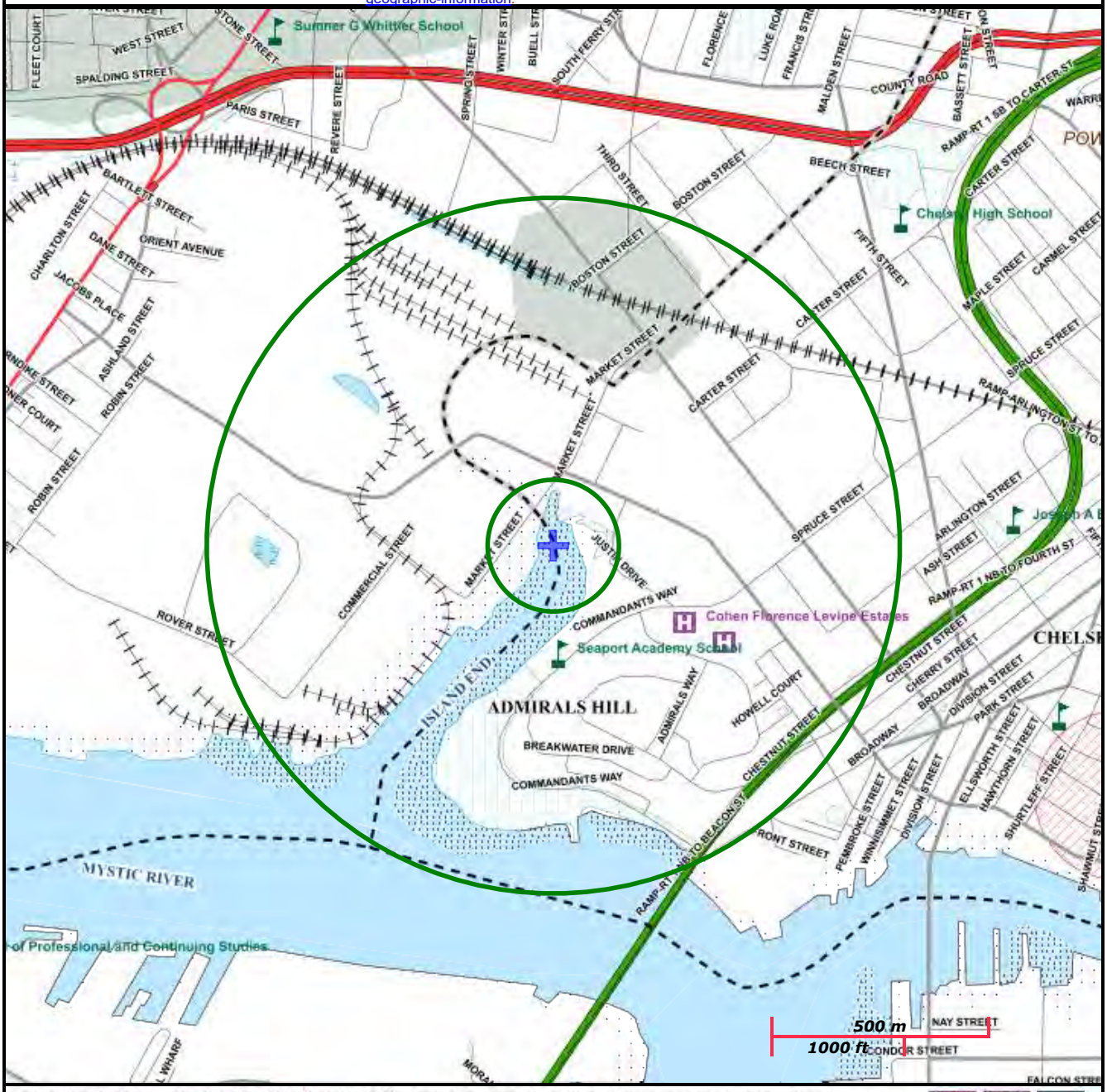
Site Information:

45 MARKET STREET CHELSEA, MA

NAD83 UTM Meters:
4695479mN , 331280mE (Zone: 19)
June 22, 2020

The information shown is the best available at the date of printing. However, it may be incomplete. The responsible party and LSP are ultimately responsible for ascertaining the true conditions surrounding the site. Metadata for data layers shown on this map can be found at: https://www.mass.gov/orgs/massgis-bureau-of-geographic-information.

MassDEP
Commonwealth of Massachusetts
Department of Environmental Protection



Roads: Limited Access, Divided, Other Hwy, Major Road, Minor Road, Track, Trail

Boundaries: Town, County, DEP Region; Train; Powerline; Pipeline; Aqueduct

Basins: Major, PWS; Streams: Perennial, Intermittent, Man Made Shore, Dam

Aquifers: Medium Yield, High Yield, EPA Sole Source

Non Potential Drinking Water Source Area: Medium, High (Yield)

PWS Protection Areas: Zone II, IWPA, Zone A

Hydrography: Open Water, PWS Reservoir, Tidal Flat

Wetlands: Freshwater, Saltwater, Cranberry Bog

FEMA 100yr Floodplain; Protected Open Space; ACEC

Est. Rare Wetland Wildlife Hab; Vernal Pool: Cert., Potential

Solid Waste Landfill; PWS: Com.GW,SW, Emerg., Non-Com.

APPENDIX E

National Historic Preservation Act Review

National Register of Hi...

National Park Service
U.S. Department of the Interior

Public, non-restricted data depicting National Register spatia...

Massachusetts Cultural Resource Information System
MACRIS

MACRIS Search Results

Search Criteria: Town(s): Everett,Chelsea; Resource Type(s): Area, Building, Burial Ground, Object, Structure;

Inv. No.	Property Name	Street	Town	Year
CLS.A	Bellingham Square District		Chelsea	
CLS.B	Chelsea Square Historic District		Chelsea	
CLS.C	Downtown Chelsea Residential District		Chelsea	
CLS.D	Naval Hospital, Boston Historic District		Chelsea	
CLS.E	Metropolitan Park System of Greater Boston		Chelsea	
CLS.F	Heard - Maple Streets Industrial Area		Chelsea	
CLS.G	Marginal Street Industrial Area		Chelsea	
CLS.H	Upper Broadway Industrial Area		Chelsea	
CLS.I	Webster - Spencer Avenues Industrial Area		Chelsea	
CLS.J	Chelsea Garden Cemetery		Chelsea	
CLS.K	Eleanor Street Area		Chelsea	
CLS.L	Fitz Terrace Area		Chelsea	
CLS.M	Soldiers' Home		Chelsea	
CLS.N	Webster Avenue Area		Chelsea	
CLS.O	Chestnut Street Area		Chelsea	
CLS.P	High Street Area		Chelsea	
CLS.Q	Howell Court Area		Chelsea	
CLS.R	Pine Street Area		Chelsea	
CLS.S	Metropolitan Park System of Greater Boston		Chelsea	
CLS.T	Revere Beach Parkway		Chelsea	
CLS.U	Forbes Lithograph Manufacturing Company		Chelsea	
CLS.V	Saint Stanislaus Bishop and Martyr Church Complex		Chelsea	
CLS.W	Winnisimmet Streetscape		Chelsea	
CLS.X	Pembroke Streetscape		Chelsea	
CLS.Y	Williams Street Area		Chelsea	
CLS.Z	School Streetscape		Chelsea	
CLS.AA	Front Streetscape		Chelsea	
CLS.AB	Eldridge Place Streetscape		Chelsea	
CLS.AC	Beacon Street, 5-11		Chelsea	
CLS.AD	Medford Street, 1-35		Chelsea	
CLS.AE	Medford Street, 2-56		Chelsea	
CLS.AF	Beacon Street, 16-22 and Tremont Street, 34		Chelsea	
CLS.AG	Beacon Street, 27-41		Chelsea	
CLS.AH	Beacon Street, 11-21		Chelsea	
CLS.AI	Beacon Street, 50-66		Chelsea	
CLS.AJ	Beacon Street, 24-42		Chelsea	
CLS.AK	Broadway, 49-69		Chelsea	
CLS.AL	Marlboro Streetscape		Chelsea	
CLS.AM	Grove Streetscape		Chelsea	
CLS.AN	Atwood and McManus Box Company		Chelsea	
CLS.602	Naval Hospital Chapel	6 Admirals Way	Chelsea	1945
CLS.607	Cardy, William T. and Sons Paper Box Company	214 Arlington St	Chelsea	1908
CLS.584	Boston Naval Hospital - Quarters A	50 Commandants Way	Chelsea	c 1856
CLS.585	Boston Naval Hospital - Building 1	100 Commandants Way	Chelsea	c 1836
CLS.587	Boston Naval Hospital - Building 3	255 Commandants Way	Chelsea	c 1836
CLS.586	Boston Naval Hospital - Building 2	285 Commandants Way	Chelsea	c 1836
CLS.425	Bennett Houses	9-11 Williams St	Chelsea	r 1860
CLS.292		35 Williams St	Chelsea	
CLS.289		38 Williams St	Chelsea	
CLS.290		40-42 Williams St	Chelsea	
CLS.293		43 Williams St	Chelsea	
CLS.291		88-90 Williams St	Chelsea	
CLS.711	Locke, Edwin House	120 Williams St	Chelsea	r 1845
CLS.611	Southwest Cone Company - Eastern Baking Company	201 Williams St	Chelsea	1916
EVR.A	Liberty Street Area		Everett	
EVR.B	Pleasant View - Villa - Arlington Streets Area		Everett	
EVR.C	Mount Washington		Everett	
EVR.D	Everett Square		Everett	
EVR.E	Everett - Prescott Streets Area		Everett	
EVR.F	Chestnut Streetscape		Everett	
EVR.G	Waverly Streetscape		Everett	
EVR.H	Sherman - Gilmore Streets Area		Everett	
EVR.I	Metropolitan Park System of Greater Boston		Everett	
EVR.J	Hampshire Streetscape		Everett	
EVR.K	Hendersonville		Everett	
EVR.L	Thurman Park		Everett	
EVR.M	Belmont Streetscape		Everett	
EVR.N	Ferry Streetscape		Everett	
EVR.O	Dartmouth Streetscape		Everett	
EVR.P	Cleveland Streetscape		Everett	
EVR.Q	Glendale Streetscape		Everett	
EVR.R	Vernal Streetscape		Everett	
EVR.S	Reynolds Avenue Streetscape		Everett	
EVR.T	Porter Streetscape		Everett	
EVR.U	Broadway - Charlton Street Industrial Area		Everett	
EVR.V	General Electric Company Foundry		Everett	
EVR.W	New England Oil, Paint and Varnish Company		Everett	
EVR.X	Paris - Garvey - Springs Streets Industrial Area		Everett	
EVR.Y	Saint Therese Roman Catholic Church Complex		Everett	
EVR.Z	Metropolitan Park System of Greater Boston		Everett	
EVR.AA	Revere Beach Parkway		Everett	
EVR.AB	Everett Jewish Cemeteries		Everett	
EVR.AC	Glendale Square		Everett	
EVR.AD	Glenwood Cemetery		Everett	
EVR.AE	Woodlawn Cemetery		Everett	
EVR.190	Colonial Beacon Oil Refinery Business Office	30 Beacham St	Everett	1926

APPENDIX F

Laboratory Data Reports

ANALYTICAL REPORT

Lab Number:	L2024779
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Iliana Alvarado
Phone:	(617) 886-7448
Project Name:	BMT-CULVERT
Project Number:	133092-009
Report Date:	06/23/20

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2024779-01	HA20-C6_06122020	WATER	EVERETT, MA	06/12/20 11:15	06/12/20
L2024779-02	OUTFALL_06122020	WATER	EVERETT, MA	06/12/20 12:30	06/12/20

Project Name:	BMT-CULVERT	**Lab Number:**	L2024779
Project Number:	133092-009	**Report Date:**	06/23/20

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	BMT-CULVERT	**Lab Number:**	L2024779
Project Number:	133092-009	**Report Date:**	06/23/20

Case Narrative (continued)

Report Submission

June 23, 2020: This final report includes the results of all requested analyses.

June 23, 2020: This is a preliminary report.

The analysis of Ethanol was subcontracted. A copy of the laboratory report is included as an addendum.

Please note: This data is only available in PDF format and is not available on Data Merger.

Total Metals

L2024779-01 and -02 (all samples): The sample has elevated detection limits for all elements, with the exception of iron and mercury, due to the dilution required by matrix interferences encountered during analysis.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Tiffani Morrissey - Tiffani Morrissey

Title: Technical Director/Representative Date: 06/23/20

ORGANICS

VOLATILES

Project Name: BMT-CULVERT
Project Number: 133092-009
Lab Number: L2024779
Report Date: 06/23/20

SAMPLE RESULTS

Lab ID: L2024779-01
Client ID: HA20-C6_06122020
Sample Location: EVERETT, MA
Date Collected: 06/12/20 11:15
Date Received: 06/12/20
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 128,624.1
Analytical Date: 06/14/20 13:17
Analyst: NLK

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	1.0	--	1
1,1-Dichloroethane	ND		ug/l	1.5	--	1
Carbon tetrachloride	ND		ug/l	1.0	--	1
1,1,2-Trichloroethane	ND		ug/l	1.5	--	1
Tetrachloroethene	ND		ug/l	1.0	--	1
1,2-Dichloroethane	ND		ug/l	1.5	--	1
1,1,1-Trichloroethane	ND		ug/l	2.0	--	1
Benzene	ND		ug/l	1.0	--	1
Toluene	ND		ug/l	1.0	--	1
Ethylbenzene	ND		ug/l	1.0	--	1
Vinyl chloride	ND		ug/l	1.0	--	1
1,1-Dichloroethene	ND		ug/l	1.0	--	1
cis-1,2-Dichloroethene	ND		ug/l	1.0	--	1
Trichloroethene	ND		ug/l	1.0	--	1
1,2-Dichlorobenzene	ND		ug/l	5.0	--	1
1,3-Dichlorobenzene	ND		ug/l	5.0	--	1
1,4-Dichlorobenzene	ND		ug/l	5.0	--	1
p/m-Xylene	ND		ug/l	2.0	--	1
o-xylene	ND		ug/l	1.0	--	1
Xylenes, Total	ND		ug/l	1.0	--	1
Acetone	ND		ug/l	10	--	1
Methyl tert butyl ether	ND		ug/l	10	--	1
Tert-Butyl Alcohol	ND		ug/l	100	--	1
Tertiary-Amyl Methyl Ether	ND		ug/l	20	--	1

Project Name: BMT-CULVERT **Lab Number:** L2024779

Project Number: 133092-009 **Report Date:** 06/23/20

SAMPLE RESULTS

Lab ID: L2024779-01 Date Collected: 06/12/20 11:15

Client ID: HA20-C6_06122020 Date Received: 06/12/20

Sample Location: EVERETT, MA Field Prep: Refer to COC

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Pentafluorobenzene	106		60-140
Fluorobenzene	100		60-140
4-Bromofluorobenzene	106		60-140

Project Name: BMT-CULVERT
Project Number: 133092-009
Lab Number: L2024779
Report Date: 06/23/20

SAMPLE RESULTS

Lab ID: L2024779-01
Client ID: HA20-C6_06122020
Sample Location: EVERETT, MA
Date Collected: 06/12/20 11:15
Date Received: 06/12/20
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 128,624.1-SIM
Analytical Date: 06/14/20 13:17
Analyst: NLK

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS-SIM - Westborough Lab						
1,4-Dioxane	ND		ug/l	50	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Fluorobenzene	99		60-140
4-Bromofluorobenzene	116		60-140

Project Name: BMT-CULVERT
Project Number: 133092-009
Lab Number: L2024779
Report Date: 06/23/20

SAMPLE RESULTS

Lab ID: L2024779-01
Client ID: HA20-C6_06122020
Sample Location: EVERETT, MA

Date Collected: 06/12/20 11:15
Date Received: 06/12/20
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 14,504.1
Analytical Date: 06/16/20 15:13
Analyst: AMM

Extraction Method: EPA 504.1
Extraction Date: 06/16/20 14:00

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Microextractables by GC - Westborough Lab							
1,2-Dibromoethane	ND		ug/l	0.010	--	1	A
1,2-Dibromo-3-chloropropane	ND		ug/l	0.010	--	1	A
1,2,3-Trichloropropane	ND		ug/l	0.029	--	1	A

Project Name: BMT-CULVERT
Project Number: 133092-009
Lab Number: L2024779
Report Date: 06/23/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 128,624.1
Analytical Date: 06/14/20 12:19
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1381622-10					
Methylene chloride	ND		ug/l	1.0	--
1,1-Dichloroethane	ND		ug/l	1.5	--
Carbon tetrachloride	ND		ug/l	1.0	--
1,1,2-Trichloroethane	ND		ug/l	1.5	--
Tetrachloroethene	ND		ug/l	1.0	--
1,2-Dichloroethane	ND		ug/l	1.5	--
1,1,1-Trichloroethane	ND		ug/l	2.0	--
Benzene	ND		ug/l	1.0	--
Toluene	ND		ug/l	1.0	--
Ethylbenzene	ND		ug/l	1.0	--
Vinyl chloride	ND		ug/l	1.0	--
1,1-Dichloroethene	ND		ug/l	1.0	--
cis-1,2-Dichloroethene	ND		ug/l	1.0	--
Trichloroethene	ND		ug/l	1.0	--
1,2-Dichlorobenzene	ND		ug/l	5.0	--
1,3-Dichlorobenzene	ND		ug/l	5.0	--
1,4-Dichlorobenzene	ND		ug/l	5.0	--
p/m-Xylene	ND		ug/l	2.0	--
o-xylene	ND		ug/l	1.0	--
Xylenes, Total	ND		ug/l	1.0	--
Acetone	ND		ug/l	10	--
Methyl tert butyl ether	ND		ug/l	10	--
Tert-Butyl Alcohol	ND		ug/l	100	--
Tertiary-Amyl Methyl Ether	ND		ug/l	20	--

Project Name: BMT-CULVERT
Project Number: 133092-009
Lab Number: L2024779
Report Date: 06/23/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 128,624.1
Analytical Date: 06/14/20 12:19
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1381622-10					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Pentafluorobenzene	107		60-140
Fluorobenzene	99		60-140
4-Bromofluorobenzene	106		60-140

Project Name: BMT-CULVERT
Project Number: 133092-009
Lab Number: L2024779
Report Date: 06/23/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 128,624.1-SIM
Analytical Date: 06/14/20 12:19
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01 Batch: WG1381669-4					
1,4-Dioxane	ND		ug/l	50	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Fluorobenzene	99		60-140
4-Bromofluorobenzene	124		60-140

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 14,504.1
Analytical Date: 06/16/20 14:23
Analyst: AMM

Extraction Method: EPA 504.1
Extraction Date: 06/16/20 14:00

Parameter	Result	Qualifier	Units	RL	MDL	
Microextractables by GC - Westborough Lab for sample(s): 01 Batch: WG1382212-1						
1,2-Dibromoethane	ND		ug/l	0.010	--	A
1,2-Dibromo-3-chloropropane	ND		ug/l	0.010	--	A
1,2,3-Trichloropropane	ND		ug/l	0.030	--	A

Lab Control Sample Analysis
Batch Quality Control

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1381622-9								
Methylene chloride	95		-		60-140	-		28
1,1-Dichloroethane	130		-		50-150	-		49
Carbon tetrachloride	100		-		70-130	-		41
1,1,2-Trichloroethane	85		-		70-130	-		45
Tetrachloroethene	105		-		70-130	-		39
1,2-Dichloroethane	90		-		70-130	-		49
1,1,1-Trichloroethane	100		-		70-130	-		36
Benzene	95		-		65-135	-		61
Toluene	95		-		70-130	-		41
Ethylbenzene	90		-		60-140	-		63
Vinyl chloride	80		-		5-195	-		66
1,1-Dichloroethene	100		-		50-150	-		32
cis-1,2-Dichloroethene	110		-		60-140	-		30
Trichloroethene	100		-		65-135	-		48
1,2-Dichlorobenzene	100		-		65-135	-		57
1,3-Dichlorobenzene	95		-		70-130	-		43
1,4-Dichlorobenzene	95		-		65-135	-		57
p/m-Xylene	112		-		60-140	-		30
o-xylene	95		-		60-140	-		30
Acetone	86		-		40-160	-		30
Methyl tert butyl ether	95		-		60-140	-		30
Tert-Butyl Alcohol	100		-		60-140	-		30
Tertiary-Amyl Methyl Ether	85		-		60-140	-		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1381622-9								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Pentafluorobenzene	107				60-140
Fluorobenzene	101				60-140
4-Bromofluorobenzene	108				60-140

Lab Control Sample Analysis

Batch Quality Control

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS-SIM - Westborough Lab Associated sample(s): 01 Batch: WG1381669-3								
1,4-Dioxane	110		-		60-140	-		20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Fluorobenzene	92				60-140
4-Bromofluorobenzene	132				60-140

Lab Control Sample Analysis

Batch Quality Control

Project Name: BMT-CULVERT

Project Number: 133092-009

Lab Number: L2024779

Report Date: 06/23/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Microextractables by GC - Westborough Lab Associated sample(s): 01 Batch: WG1382212-2									
1,2-Dibromoethane	101		-		80-120	-			A
1,2-Dibromo-3-chloropropane	93		-		80-120	-			A
1,2,3-Trichloropropane	93		-		80-120	-			A

Matrix Spike Analysis

Batch Quality Control

Project Name: BMT-CULVERT

Project Number: 133092-009

Lab Number: L2024779

Report Date: 06/23/20

Parameter	*Native Sample*	*MS Added*	*MS Found*	*MS %Recovery*	*Qual*	*MSD Found*	*MSD %Recovery*	*Qual*	*Recovery Limits*	*RPD*	*Qual*	*RPD Limits*	*Column*
Microextractables by GC - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1382212-3 QC Sample: L2023903-01 Client ID: MS Sample													
1,2-Dibromoethane	ND	0.246	0.256	104		-	-		80-120	-		20	A
1,2-Dibromo-3-chloropropane	ND	0.246	0.249	101		-	-		80-120	-		20	A
1,2,3-Trichloropropane	ND	0.246	0.234	95		-	-		80-120	-		20	A

SEMIVOLATILES

Project Name: BMT-CULVERT
Project Number: 133092-009
Lab Number: L2024779
Report Date: 06/23/20

SAMPLE RESULTS

Lab ID: L2024779-01
Client ID: HA20-C6_06122020
Sample Location: EVERETT, MA

Date Collected: 06/12/20 11:15
Date Received: 06/12/20
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 129,625.1
Analytical Date: 06/16/20 16:59
Analyst: SZ

Extraction Method: EPA 625.1
Extraction Date: 06/14/20 04:43

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
Bis(2-ethylhexyl)phthalate	ND		ug/l	2.20	--	1
Butyl benzyl phthalate	ND		ug/l	5.00	--	1
Di-n-butylphthalate	ND		ug/l	5.00	--	1
Di-n-octylphthalate	ND		ug/l	5.00	--	1
Diethyl phthalate	ND		ug/l	5.00	--	1
Dimethyl phthalate	ND		ug/l	5.00	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Nitrobenzene-d5	107		42-122
2-Fluorobiphenyl	96		46-121
4-Terphenyl-d14	91		47-138

Project Name: BMT-CULVERT
Project Number: 133092-009
Lab Number: L2024779
Report Date: 06/23/20

SAMPLE RESULTS

Lab ID: L2024779-01
Client ID: HA20-C6_06122020
Sample Location: EVERETT, MA
Date Collected: 06/12/20 11:15
Date Received: 06/12/20
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 129,625.1-SIM
Analytical Date: 06/15/20 20:44
Analyst: CB
Extraction Method: EPA 625.1
Extraction Date: 06/14/20 04:46

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS-SIM - Westborough Lab						
Acenaphthene	0.395		ug/l	0.100	--	1
Fluoranthene	8.27		ug/l	0.100	--	1
Naphthalene	3.00		ug/l	0.100	--	1
Benzo(a)anthracene	2.67		ug/l	0.100	--	1
Benzo(a)pyrene	2.52		ug/l	0.100	--	1
Benzo(b)fluoranthene	2.91		ug/l	0.100	--	1
Benzo(k)fluoranthene	1.11		ug/l	0.100	--	1
Chrysene	1.96		ug/l	0.100	--	1
Acenaphthylene	1.98		ug/l	0.100	--	1
Anthracene	1.84		ug/l	0.100	--	1
Benzo(ghi)perylene	1.65		ug/l	0.100	--	1
Fluorene	0.836		ug/l	0.100	--	1
Phenanthrene	3.94		ug/l	0.100	--	1
Dibenzo(a,h)anthracene	0.372		ug/l	0.100	--	1
Indeno(1,2,3-cd)pyrene	1.70		ug/l	0.100	--	1
Pyrene	6.16		ug/l	0.100	--	1
Pentachlorophenol	ND		ug/l	1.00	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	60		25-87
Phenol-d6	43		16-65
Nitrobenzene-d5	82		42-122
2-Fluorobiphenyl	91		46-121
2,4,6-Tribromophenol	103		45-128
4-Terphenyl-d14	84		47-138

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 129,625.1
Analytical Date: 06/16/20 10:33
Analyst: SZ

Extraction Method: EPA 625.1
Extraction Date: 06/14/20 04:43

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1381406-1					
Bis(2-ethylhexyl)phthalate	ND		ug/l	2.20	--
Butyl benzyl phthalate	ND		ug/l	5.00	--
Di-n-butylphthalate	ND		ug/l	5.00	--
Di-n-octylphthalate	ND		ug/l	5.00	--
Diethyl phthalate	ND		ug/l	5.00	--
Dimethyl phthalate	ND		ug/l	5.00	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Nitrobenzene-d5	93		42-122
2-Fluorobiphenyl	88		46-121
4-Terphenyl-d14	95		47-138

Project Name: BMT-CULVERT
Project Number: 133092-009
Lab Number: L2024779
Report Date: 06/23/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 129,625.1-SIM
Analytical Date: 06/15/20 20:27
Analyst: CB

Extraction Method: EPA 625.1
Extraction Date: 06/14/20 04:46

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01 Batch: WG1381407-1					
Acenaphthene	ND		ug/l	0.100	--
Fluoranthene	ND		ug/l	0.100	--
Naphthalene	ND		ug/l	0.100	--
Benzo(a)anthracene	ND		ug/l	0.100	--
Benzo(a)pyrene	ND		ug/l	0.100	--
Benzo(b)fluoranthene	ND		ug/l	0.100	--
Benzo(k)fluoranthene	ND		ug/l	0.100	--
Chrysene	ND		ug/l	0.100	--
Acenaphthylene	ND		ug/l	0.100	--
Anthracene	ND		ug/l	0.100	--
Benzo(ghi)perylene	ND		ug/l	0.100	--
Fluorene	ND		ug/l	0.100	--
Phenanthrene	ND		ug/l	0.100	--
Dibenzo(a,h)anthracene	ND		ug/l	0.100	--
Indeno(1,2,3-cd)pyrene	ND		ug/l	0.100	--
Pyrene	ND		ug/l	0.100	--
Pentachlorophenol	ND		ug/l	1.00	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	51		25-87
Phenol-d6	35		16-65
Nitrobenzene-d5	68		42-122
2-Fluorobiphenyl	77		46-121
2,4,6-Tribromophenol	83		45-128
4-Terphenyl-d14	89		47-138

Lab Control Sample Analysis

Batch Quality Control

Project Name: BMT-CULVERT

Project Number: 133092-009

Lab Number: L2024779

Report Date: 06/23/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1381406-2								
Bis(2-ethylhexyl)phthalate	103		-		29-137	-		82
Butyl benzyl phthalate	103		-		1-140	-		60
Di-n-butylphthalate	107		-		8-120	-		47
Di-n-octylphthalate	107		-		19-132	-		69
Diethyl phthalate	98		-		1-120	-		100
Dimethyl phthalate	95		-		1-120	-		183

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Nitrobenzene-d5	101				42-122
2-Fluorobiphenyl	90				46-121
4-Terphenyl-d14	95				47-138

Lab Control Sample Analysis
Batch Quality Control

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS-SIM - Westborough Lab Associated sample(s): 01 Batch: WG1381407-2								
Acenaphthene	82		-		60-132	-		30
Fluoranthene	87		-		43-121	-		30
Naphthalene	79		-		36-120	-		30
Benzo(a)anthracene	89		-		42-133	-		30
Benzo(a)pyrene	89		-		32-148	-		30
Benzo(b)fluoranthene	91		-		42-140	-		30
Benzo(k)fluoranthene	83		-		25-146	-		30
Chrysene	83		-		44-140	-		30
Acenaphthylene	91		-		54-126	-		30
Anthracene	85		-		43-120	-		30
Benzo(ghi)perylene	83		-		1-195	-		30
Fluorene	83		-		70-120	-		30
Phenanthrene	80		-		65-120	-		30
Dibenzo(a,h)anthracene	92		-		1-200	-		30
Indeno(1,2,3-cd)pyrene	110		-		1-151	-		30
Pyrene	86		-		70-120	-		30
Pentachlorophenol	101		-		38-152	-		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS-SIM - Westborough Lab Associated sample(s): 01 Batch: WG1381407-2								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2-Fluorophenol	56				25-87
Phenol-d6	41				16-65
Nitrobenzene-d5	75				42-122
2-Fluorobiphenyl	83				46-121
2,4,6-Tribromophenol	93				45-128
4-Terphenyl-d14	91				47-138

PCBS

Project Name: BMT-CULVERT
Project Number: 133092-009
Lab Number: L2024779
Report Date: 06/23/20

SAMPLE RESULTS

Lab ID: L2024779-01
Client ID: HA20-C6_06122020
Sample Location: EVERETT, MA

Date Collected: 06/12/20 11:15
Date Received: 06/12/20
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 127,608.3
Analytical Date: 06/16/20 05:37
Analyst: CW

Extraction Method: EPA 608.3
Extraction Date: 06/15/20 13:36
Cleanup Method: EPA 3665A
Cleanup Date: 06/15/20
Cleanup Method: EPA 3660B
Cleanup Date: 06/15/20

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Polychlorinated Biphenyls by GC - Westborough Lab							
Aroclor 1016	ND		ug/l	0.250	--	1	A
Aroclor 1221	ND		ug/l	0.250	--	1	A
Aroclor 1232	ND		ug/l	0.250	--	1	A
Aroclor 1242	ND		ug/l	0.250	--	1	A
Aroclor 1248	ND		ug/l	0.250	--	1	A
Aroclor 1254	ND		ug/l	0.250	--	1	A
Aroclor 1260	ND		ug/l	0.200	--	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	57		37-123	B
Decachlorobiphenyl	55		38-114	B
2,4,5,6-Tetrachloro-m-xylene	61		37-123	A
Decachlorobiphenyl	60		38-114	A

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 127,608.3
Analytical Date: 06/16/20 05:49
Analyst: CW

Extraction Method: EPA 608.3
Extraction Date: 06/15/20 13:36
Cleanup Method: EPA 3665A
Cleanup Date: 06/15/20
Cleanup Method: EPA 3660B
Cleanup Date: 06/15/20

Parameter	Result	Qualifier	Units	RL	MDL	Column
Polychlorinated Biphenyls by GC - Westborough Lab for sample(s): 01 Batch: WG1381741-1						
Aroclor 1016	ND		ug/l	0.250	--	A
Aroclor 1221	ND		ug/l	0.250	--	A
Aroclor 1232	ND		ug/l	0.250	--	A
Aroclor 1242	ND		ug/l	0.250	--	A
Aroclor 1248	ND		ug/l	0.250	--	A
Aroclor 1254	ND		ug/l	0.250	--	A
Aroclor 1260	ND		ug/l	0.200	--	A

Surrogate	%Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	65		37-123	B
Decachlorobiphenyl	47		38-114	B
2,4,5,6-Tetrachloro-m-xylene	64		37-123	A
Decachlorobiphenyl	55		38-114	A

Lab Control Sample Analysis

Batch Quality Control

Project Name: BMT-CULVERT

Project Number: 133092-009

Lab Number: L2024779

Report Date: 06/23/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Polychlorinated Biphenyls by GC - Westborough Lab Associated sample(s): 01 Batch: WG1381741-2									
Aroclor 1016	69		-		50-140	-		36	A
Aroclor 1260	62		-		8-140	-		38	A

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	65				37-123	B
Decachlorobiphenyl	44				38-114	B
2,4,5,6-Tetrachloro-m-xylene	66				37-123	A
Decachlorobiphenyl	52				38-114	A

METALS

Project Name: BMT-CULVERT
Project Number: 133092-009
Lab Number: L2024779
Report Date: 06/23/20

SAMPLE RESULTS

Lab ID: L2024779-01
Client ID: HA20-C6_06122020
Sample Location: EVERETT, MA
Date Collected: 06/12/20 11:15
Date Received: 06/12/20
Field Prep: Refer to COC

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.04000	--	10	06/16/20 13:02	06/22/20 20:07	EPA 3005A	3,200.8	AM
Arsenic, Total	0.02568		mg/l	0.01000	--	10	06/16/20 13:02	06/22/20 20:07	EPA 3005A	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00200	--	10	06/16/20 13:02	06/22/20 20:07	EPA 3005A	3,200.8	AM
Chromium, Total	ND		mg/l	0.01000	--	10	06/16/20 13:02	06/22/20 20:07	EPA 3005A	3,200.8	AM
Copper, Total	ND		mg/l	0.01000	--	10	06/16/20 13:02	06/22/20 20:07	EPA 3005A	3,200.8	AM
Iron, Total	1.05		mg/l	0.100	--	2	06/16/20 13:02	06/18/20 19:55	EPA 3005A	19,200.7	BV
Lead, Total	0.01593		mg/l	0.01000	--	10	06/16/20 13:02	06/22/20 20:07	EPA 3005A	3,200.8	AM
Mercury, Total	ND		mg/l	0.00020	--	1	06/16/20 13:58	06/16/20 18:27	EPA 245.1	3,245.1	AL
Nickel, Total	ND		mg/l	0.02000	--	10	06/16/20 13:02	06/22/20 20:07	EPA 3005A	3,200.8	AM
Selenium, Total	ND		mg/l	0.05000	--	10	06/16/20 13:02	06/22/20 20:07	EPA 3005A	3,200.8	AM
Silver, Total	ND		mg/l	0.00400	--	10	06/16/20 13:02	06/22/20 20:07	EPA 3005A	3,200.8	AM
Zinc, Total	ND		mg/l	0.1000	--	10	06/16/20 13:02	06/22/20 20:07	EPA 3005A	3,200.8	AM
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	3180		mg/l	1.32	NA	2	06/16/20 13:02	06/18/20 19:55	EPA 3005A	19,200.7	BV
General Chemistry - Mansfield Lab											
Chromium, Trivalent	ND		mg/l	0.010	--	1		06/22/20 20:07	NA	107,-	

Project Name: BMT-CULVERT
Project Number: 133092-009
Lab Number: L2024779
Report Date: 06/23/20

SAMPLE RESULTS

Lab ID: L2024779-02
Client ID: OUTFALL_06122020
Sample Location: EVERETT, MA
Date Collected: 06/12/20 12:30
Date Received: 06/12/20
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.04000	--	10	06/16/20 13:02	06/22/20 19:12	EPA 3005A	3,200.8	AM
Arsenic, Total	ND		mg/l	0.01000	--	10	06/16/20 13:02	06/22/20 19:12	EPA 3005A	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00200	--	10	06/16/20 13:02	06/22/20 19:12	EPA 3005A	3,200.8	AM
Chromium, Total	ND		mg/l	0.01000	--	10	06/16/20 13:02	06/22/20 19:12	EPA 3005A	3,200.8	AM
Copper, Total	ND		mg/l	0.01000	--	10	06/16/20 13:02	06/22/20 19:12	EPA 3005A	3,200.8	AM
Iron, Total	0.688		mg/l	0.050	--	1	06/16/20 13:02	06/18/20 19:50	EPA 3005A	19,200.7	BV
Lead, Total	ND		mg/l	0.01000	--	10	06/16/20 13:02	06/22/20 19:12	EPA 3005A	3,200.8	AM
Mercury, Total	ND		mg/l	0.00020	--	1	06/16/20 13:58	06/16/20 18:29	EPA 245.1	3,245.1	AL
Nickel, Total	ND		mg/l	0.02000	--	10	06/16/20 13:02	06/22/20 19:12	EPA 3005A	3,200.8	AM
Selenium, Total	ND		mg/l	0.05000	--	10	06/16/20 13:02	06/22/20 19:12	EPA 3005A	3,200.8	AM
Silver, Total	ND		mg/l	0.00400	--	10	06/16/20 13:02	06/22/20 19:12	EPA 3005A	3,200.8	AM
Zinc, Total	ND		mg/l	0.1000	--	10	06/16/20 13:02	06/22/20 19:12	EPA 3005A	3,200.8	AM
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	1500		mg/l	0.660	NA	1	06/16/20 13:02	06/18/20 19:50	EPA 3005A	19,200.7	BV
General Chemistry - Mansfield Lab											
Chromium, Trivalent	ND		mg/l	0.010	--	1		06/22/20 19:12	NA	107,-	

Project Name: BMT-CULVERT **Lab Number:** L2024779

Project Number: 133092-009 **Report Date:** 06/23/20

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-02 Batch: WG1382135-1										
Iron, Total	ND		mg/l	0.050	--	1	06/16/20 13:02	06/18/20 13:59	19,200.7	LC

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Hardness by SM 2340B - Mansfield Lab for sample(s): 01-02 Batch: WG1382135-1										
Hardness	ND		mg/l	0.660	NA	1	06/16/20 13:02	06/18/20 13:59	19,200.7	LC

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-02 Batch: WG1382139-1										
Antimony, Total	ND		mg/l	0.00400	--	1	06/16/20 13:02	06/22/20 15:23	3,200.8	AM
Arsenic, Total	ND		mg/l	0.00100	--	1	06/16/20 13:02	06/22/20 15:23	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	06/16/20 13:02	06/22/20 15:23	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	--	1	06/16/20 13:02	06/22/20 15:23	3,200.8	AM
Copper, Total	ND		mg/l	0.00100	--	1	06/16/20 13:02	06/22/20 15:23	3,200.8	AM
Lead, Total	ND		mg/l	0.00100	--	1	06/16/20 13:02	06/22/20 15:23	3,200.8	AM
Nickel, Total	ND		mg/l	0.00200	--	1	06/16/20 13:02	06/22/20 15:23	3,200.8	AM
Selenium, Total	ND		mg/l	0.00500	--	1	06/16/20 13:02	06/22/20 15:23	3,200.8	AM
Silver, Total	ND		mg/l	0.00040	--	1	06/16/20 13:02	06/22/20 15:23	3,200.8	AM
Zinc, Total	ND		mg/l	0.01000	--	1	06/16/20 13:02	06/22/20 15:23	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Project Name: BMT-CULVERT
Project Number: 133092-009
Lab Number: L2024779
Report Date: 06/23/20

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-02 Batch: WG1382140-1										
Mercury, Total	ND		mg/l	0.00020	--	1	06/16/20 13:58	06/16/20 18:04	3,245.1	AL

Prep Information

Digestion Method: EPA 245.1

Lab Control Sample Analysis

Batch Quality Control

Project Name: BMT-CULVERT

Project Number: 133092-009

Lab Number: L2024779

Report Date: 06/23/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 Batch: WG1382135-2								
Iron, Total	106		-		85-115	-		
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01-02 Batch: WG1382135-2								
Hardness	103		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01-02 Batch: WG1382139-2								
Antimony, Total	87		-		85-115	-		
Arsenic, Total	104		-		85-115	-		
Cadmium, Total	106		-		85-115	-		
Chromium, Total	102		-		85-115	-		
Copper, Total	96		-		85-115	-		
Lead, Total	112		-		85-115	-		
Nickel, Total	101		-		85-115	-		
Selenium, Total	104		-		85-115	-		
Silver, Total	104		-		85-115	-		
Zinc, Total	105		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01-02 Batch: WG1382140-2								
Mercury, Total	110		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1382135-3 QC Sample: L2024572-01 Client ID: MS Sample												
Iron, Total	6.28	1	7.26	98		-	-		75-125	-		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1382135-3 QC Sample: L2024572-01 Client ID: MS Sample												
Hardness	214	66.2	265	77		-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1382135-7 QC Sample: L2024572-02 Client ID: MS Sample												
Iron, Total	9.10	1	9.62	**52**	Q	-	-		75-125	-		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1382135-7 QC Sample: L2024572-02 Client ID: MS Sample												
Hardness	212	66.2	262	76		-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1382139-3 QC Sample: L2024572-01 Client ID: MS Sample												
Antimony, Total	0.00505	0.5	0.5610	111		-	-		70-130	-		20
Arsenic, Total	0.00281	0.12	0.1265	103		-	-		70-130	-		20
Cadmium, Total	ND	0.051	0.05440	107		-	-		70-130	-		20
Chromium, Total	0.00373	0.2	0.2095	103		-	-		70-130	-		20
Copper, Total	0.01495	0.25	0.2623	99		-	-		70-130	-		20
Lead, Total	0.01444	0.51	0.6432	123		-	-		70-130	-		20
Nickel, Total	0.00437	0.5	0.5184	103		-	-		70-130	-		20
Selenium, Total	ND	0.12	0.1249	104		-	-		70-130	-		20
Silver, Total	ND	0.05	0.05214	104		-	-		70-130	-		20
Zinc, Total	0.1115	0.5	0.6464	107		-	-		70-130	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1382139-5 QC Sample: L2024572-02 Client ID: MS Sample									
Antimony, Total	0.00501	0.5	0.5468	108	-	-	70-130	-	20
Arsenic, Total	0.00396	0.12	0.1263	102	-	-	70-130	-	20
Cadmium, Total	0.00023	0.051	0.05431	106	-	-	70-130	-	20
Chromium, Total	0.00661	0.2	0.2089	101	-	-	70-130	-	20
Copper, Total	0.02794	0.25	0.2670	96	-	-	70-130	-	20
Lead, Total	0.02718	0.51	0.6442	121	-	-	70-130	-	20
Nickel, Total	0.01121	0.5	0.5182	101	-	-	70-130	-	20
Selenium, Total	ND	0.12	0.1286	107	-	-	70-130	-	20
Silver, Total	ND	0.05	0.05210	104	-	-	70-130	-	20
Zinc, Total	0.2475	0.5	0.6640	83	-	-	70-130	-	20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1382140-3 QC Sample: L2024680-01 Client ID: MS Sample									
Mercury, Total	0.00027	0.005	0.00532	101	-	-	70-130	-	20

Lab Duplicate Analysis
Batch Quality Control

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1382135-4 QC Sample: L2024572-01 Client ID: DUP Sample						
Iron, Total	6.28	6.05	mg/l	4		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1382135-8 QC Sample: L2024572-02 Client ID: DUP Sample						
Iron, Total	9.10	8.72	mg/l	4		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1382139-4 QC Sample: L2024572-01 Client ID: DUP Sample						
Antimony, Total	0.00505	0.00717	mg/l	**35**	Q	20
Arsenic, Total	0.00281	0.00273	mg/l	3		20
Cadmium, Total	ND	ND	mg/l	NC		20
Chromium, Total	0.00373	0.00332	mg/l	12		20
Copper, Total	0.01495	0.01447	mg/l	3		20
Lead, Total	0.01444	0.01411	mg/l	2		20
Nickel, Total	0.00437	0.00396	mg/l	10		20
Selenium, Total	ND	ND	mg/l	NC		20
Silver, Total	ND	ND	mg/l	NC		20
Zinc, Total	0.1115	0.1093	mg/l	2		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

Parameter	Native Sample	Duplicate Sample	Units	RPD		RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1382139-6 QC Sample: L2024572-02 Client ID: DUP Sample						
Antimony, Total	0.00501	0.00604	mg/l	18		20
Arsenic, Total	0.00396	0.00398	mg/l	0		20
Cadmium, Total	0.00023	0.00021	mg/l	9		20
Chromium, Total	0.00661	0.00508	mg/l	**26**	Q	20
Copper, Total	0.02794	0.02079	mg/l	**29**	Q	20
Lead, Total	0.02718	0.02290	mg/l	17		20
Nickel, Total	0.01121	0.00511	mg/l	**75**	Q	20
Selenium, Total	ND	ND	mg/l	NC		20
Silver, Total	ND	ND	mg/l	NC		20
Zinc, Total	0.2475	0.1518	mg/l	**48**	Q	20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1382140-4 QC Sample: L2024680-01 Client ID: DUP Sample						
Mercury, Total	0.00027	0.00030	mg/l	13		20

INORGANICS
&
MISCELLANEOUS

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

SAMPLE RESULTS

Lab ID: L2024779-01
Client ID: HA20-C6_06122020
Sample Location: EVERETT, MA

Date Collected: 06/12/20 11:15
Date Received: 06/12/20
Field Prep: Refer to COC

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	33.		mg/l	5.0	NA	1	-	06/14/20 14:11	121,2540D	AA
Cyanide, Total	0.278		mg/l	0.005	--	1	06/14/20 13:35	06/15/20 12:50	121,4500CN-CE	LH
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	06/13/20 06:03	121,4500CL-D	JA
pH (H)	8.1		SU	-	NA	1	-	06/13/20 10:39	121,4500H+-B	JA
Nitrogen, Ammonia	7.08		mg/l	0.075	--	1	06/15/20 18:12	06/16/20 00:11	121,4500NH3-BH	AT
TPH, SGT-HEM	ND		mg/l	4.00	--	1	06/18/20 07:30	06/18/20 12:30	74,1664A	DR
Phenolics, Total	ND		mg/l	0.030	--	1	06/15/20 05:05	06/15/20 08:52	4,420.1	MV
Chromium, Hexavalent	ND		mg/l	0.010	--	1	06/12/20 22:50	06/12/20 23:17	1,7196A	AS
Anions by Ion Chromatography - Westborough Lab										
Chloride	10400		mg/l	250	--	500	-	06/15/20 22:38	44,300.0	AT

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

SAMPLE RESULTS

Lab ID: L2024779-02
Client ID: OUTFALL_06122020
Sample Location: EVERETT, MA

Date Collected: 06/12/20 12:30
Date Received: 06/12/20
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
pH (H)	7.6		SU	-	NA	1	-	06/19/20 05:18	121,4500H+-B	CB
Nitrogen, Ammonia	0.300		mg/l	0.075	--	1	06/15/20 18:12	06/16/20 00:12	121,4500NH3-BH	AT
Chromium, Hexavalent	ND		mg/l	0.010	--	1	06/12/20 22:50	06/12/20 23:18	1,7196A	AS

Project Name: BMT-CULVERT
Project Number: 133092-009
Lab Number: L2024779
Report Date: 06/23/20

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1381158-1										
Chromium, Hexavalent	ND		mg/l	0.010	--	1	06/12/20 22:50	06/12/20 23:16	1,7196A	AS
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1381226-1										
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	06/13/20 06:03	121,4500CL-D	JA
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1381413-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	06/14/20 14:11	121,2540D	AA
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1381444-1										
Cyanide, Total	ND		mg/l	0.005	--	1	06/14/20 13:35	06/15/20 12:22	121,4500CN-CE	LH
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1381544-1										
Phenolics, Total	ND		mg/l	0.030	--	1	06/15/20 05:05	06/15/20 08:40	4,420.1	MV
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1381658-1										
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	06/15/20 18:12	06/15/20 23:26	121,4500NH3-BH	AT
Anions by Ion Chromatography - Westborough Lab for sample(s): 01 Batch: WG1381900-1										
Chloride	ND		mg/l	0.500	--	1	-	06/15/20 17:34	44,300.0	AT
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1383018-1										
TPH, SGT-HEM	ND		mg/l	4.00	--	1	06/18/20 07:30	06/18/20 12:30	74,1664A	DR

Lab Control Sample Analysis

Batch Quality Control

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1381158-2								
Chromium, Hexavalent	101		-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1381226-2								
Chlorine, Total Residual	92		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1381297-1								
pH	100		-		99-101	-		5
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1381413-2								
Solids, Total Suspended	101		-		80-120	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1381444-2								
Cyanide, Total	101		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1381544-2								
Phenolics, Total	93		-		70-130	-		
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1381658-2								
Nitrogen, Ammonia	95		-		80-120	-		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 Batch: WG1381900-2					
Chloride	97	-	90-110	-	
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1383018-2					
TPH	80	-	64-132	-	34
General Chemistry - Westborough Lab Associated sample(s): 02 Batch: WG1383496-1					
pH	100	-	99-101	-	5

Matrix Spike Analysis
Batch Quality Control

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1381158-4 QC Sample: L2024779-02 Client ID: OUTFALL_06122020												
Chromium, Hexavalent	ND	0.1	0.100	100		-	-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1381226-4 QC Sample: L2024724-02 Client ID: MS Sample												
Chlorine, Total Residual	0.23	0.25	0.41	**72**	Q	-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1381444-4 WG1381444-5 QC Sample: L2024458-07 Client ID: MS Sample												
Cyanide, Total	ND	0.2	0.202	101		0.203	102		90-110	0		30
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1381544-4 QC Sample: L2023823-01 Client ID: MS Sample												
Phenolics, Total	ND	0.4	0.42	104		-	-		70-130	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1381658-4 QC Sample: L2024348-01 Client ID: MS Sample												
Nitrogen, Ammonia	0.148	4	3.61	86		-	-		80-120	-		20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1381900-3 WG1381900-4 QC Sample: L2024501-01 Client ID: MS Sample												
Chloride	17.8	4	21.4	90		21.3	**89**	Q	90-110	1		18
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1383018-4 QC Sample: L2021925-141 Client ID: MS Sample												
TPH	ND	19.8	17.3	88		-	-		64-132	-		34

Lab Duplicate Analysis
Batch Quality Control

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1381158-3 QC Sample: L2024779-01 Client ID: HA20-C6_06122020						
Chromium, Hexavalent	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1381226-3 QC Sample: L2024724-01 Client ID: DUP Sample						
Chlorine, Total Residual	0.66	0.66	mg/l	0		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1381297-2 QC Sample: L2024446-03 Client ID: DUP Sample						
pH	7.5	7.4	SU	1		5
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1381413-3 QC Sample: L2024512-01 Client ID: DUP Sample						
Solids, Total Suspended	760	780	mg/l	3		29
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1381444-3 QC Sample: L2024458-07 Client ID: DUP Sample						
Cyanide, Total	ND	0.009	mg/l	NC		30
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1381544-3 QC Sample: L2023823-01 Client ID: DUP Sample						
Phenolics, Total	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1381658-3 QC Sample: L2024348-01 Client ID: DUP Sample						
Nitrogen, Ammonia	0.148	0.122	mg/l	19		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1383018-3 QC Sample: L2021925-140 Client ID: DUP Sample						
TPH	ND	ND	mg/l	NC		34
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG1383496-2 QC Sample: L2025783-01 Client ID: DUP Sample						
pH	7.0	7.1	SU	1		5

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
B	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2024779-01A	Vial Na2S2O3 preserved	B	NA		5.0	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L2024779-01A1	Vial Na2S2O3 preserved	B	NA		5.0	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L2024779-01B	Vial Na2S2O3 preserved	B	NA		5.0	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L2024779-01B1	Vial Na2S2O3 preserved	B	NA		5.0	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L2024779-01C	Vial Na2S2O3 preserved	B	NA		5.0	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L2024779-01C1	Vial Na2S2O3 preserved	B	NA		5.0	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L2024779-01D	Vial Na2S2O3 preserved	B	NA		5.0	Y	Absent		504(14)
L2024779-01D1	Vial Na2S2O3 preserved	B	NA		5.0	Y	Absent		504(14)
L2024779-01E	Vial unpreserved	B	NA		5.0	Y	Absent		SUB-ETHANOL(14)
L2024779-01E1	Vial unpreserved	B	NA		5.0	Y	Absent		SUB-ETHANOL(14)
L2024779-01E2	Vial unpreserved	B	NA		5.0	Y	Absent		SUB-ETHANOL(14)
L2024779-01F	Plastic 250ml NaOH preserved	B	>12	>12	5.0	Y	Absent		TCN-4500(14)
L2024779-01G	Plastic 500ml H2SO4 preserved	B	<2	<2	5.0	Y	Absent		NH3-4500(28)
L2024779-01H	Plastic 120ml unpreserved	B	7	7	5.0	Y	Absent		CL-300(28),HEXCR-7196(1),TRC-4500(1),PH-4500(.01)
L2024779-01J	Plastic 950ml unpreserved	B	7	7	5.0	Y	Absent		CL-300(28),HEXCR-7196(1),TRC-4500(1),PH-4500(.01)
L2024779-01K	Plastic 950ml unpreserved	B	7	7	5.0	Y	Absent		TSS-2540(7)
L2024779-01L	Amber 950ml H2SO4 preserved	B	<2	<2	5.0	Y	Absent		TPHENOL-420(28)
L2024779-01M	Plastic 250ml HNO3 preserved	B	<2	<2	5.0	Y	Absent		HOLD-METAL-DISSOLVED(180)
L2024779-01N	Plastic 250ml HNO3 preserved	B	<2	<2	5.0	Y	Absent		CD-2008T(180),NI-2008T(180),ZN-2008T(180),FE-UI(180),HARDU(180),CU-2008T(180),AG-2008T(180),HG-U(28),SE-2008T(180),AS-2008T(180),SB-2008T(180),PB-2008T(180),CR-2008T(180)

*Values in parentheses indicate holding time in days

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2024779
Report Date: 06/23/20

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2024779-01P	Plastic 250ml HNO3 preserved	B	<2	<2	5.0	Y	Absent		CD-2008T(180),NI-2008T(180),ZN-2008T(180),FE-UI(180),CU-2008T(180),HARDU(180),AG-2008T(180),HG-U(28),SE-2008T(180),AS-2008T(180),SB-2008T(180),CR-2008T(180),PB-2008T(180)
L2024779-01Q	Amber 1000ml HCl preserved	B	NA		5.0	Y	Absent		TPH-1664(28)
L2024779-01R	Amber 1000ml HCl preserved	B	NA		5.0	Y	Absent		TPH-1664(28)
L2024779-01S	Amber 1000ml Na2S2O3	B	7	7	5.0	Y	Absent		PCB-608.3(7)
L2024779-01T	Amber 1000ml Na2S2O3	B	7	7	5.0	Y	Absent		PCB-608.3(7)
L2024779-01U	Amber 1000ml Na2S2O3	B	7	7	5.0	Y	Absent		PCB-608.3(7)
L2024779-01V	Amber 1000ml Na2S2O3	B	7	7	5.0	Y	Absent		625.1-RGP(7),625.1-SIM-RGP(7)
L2024779-01W	Amber 1000ml Na2S2O3	B	7	7	5.0	Y	Absent		625.1-RGP(7),625.1-SIM-RGP(7)
L2024779-01X	Amber 1000ml Na2S2O3	B	7	7	5.0	Y	Absent		625.1-RGP(7),625.1-SIM-RGP(7)
L2024779-02A	Plastic 250ml HNO3 preserved	B	<2	<2	5.0	Y	Absent		CD-2008T(180),NI-2008T(180),ZN-2008T(180),HARDU(180),CU-2008T(180),FE-UI(180),SE-2008T(180),AS-2008T(180),HG-U(28),AG-2008T(180),SB-2008T(180),CR-2008T(180),PB-2008T(180)
L2024779-02B	Plastic 500ml unpreserved	B	7	7	5.0	Y	Absent		HEXCR-7196(1),PH-4500(.01)
L2024779-02C	Plastic 500ml H2SO4 preserved	B	<2	<2	5.0	Y	Absent		NH3-4500(28)

*Values in parentheses indicate holding time in days

Project Name:	BMT-CULVERT	**Lab Number:**	L2024779
Project Number:	133092-009	**Report Date:**	06/23/20

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: Data Usability Report

Project Name:	BMT-CULVERT	**Lab Number:**	L2024779
Project Number:	133092-009	**Report Date:**	06/23/20

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less

Project Name:	BMT-CULVERT	**Lab Number:**	L2024779
Project Number:	133092-009	**Report Date:**	06/23/20

Data Qualifiers

than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Report Format: Data Usability Report

Project Name:	BMT-CULVERT	**Lab Number:**	L2024779
Project Number:	133092-009	**Report Date:**	06/23/20

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

3 Methods for the Determination of Metals in Environmental Samples, Supplement I. EPA/600/R-94/111. May 1994.

4 Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020. Revised March 1983.

14 Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water. EPA/600/4-88/039, Revised July 1991.

19 Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes. Appendix C, Part 136, 40 CFR (Code of Federal Regulations). July 1, 1999 edition.

44 Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, August 1993.

74 Method 1664,Revision A: N-Hexane Extractable Material (HEM; Oil & Grease) and Silica Gel Treated N-Hexane Extractable Material (SGT-HEM; Non-polar Material) by Extraction and Gravimetry, EPA-821-R-98-002, February 1999.

107 Alpha Analytical - In-house calculation method.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

127 Method 608.3: Organochlorine Pesticides and PCBs by GC/HSD, EPA 821-R-16-009, December 2016.

128 Method 624.1: Purgeables by GC/MS, EPA 821-R-16-008, December 2016.

129 Method 625.1: Base/Neutrals and Acids by GC/MS, EPA 821-R-16-007, December 2016.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
EPA TO-12 Non-methane organics
EPA 3C Fixed gases
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

ALPHA ANALYTICAL

Service Centers
Brewer, ME 04412 Portsmouth, NH 03801 Mahwah, NJ 07430
Albany, NY 12205
Tonawanda, NY 14150 Holmes, PA 19043

Page of

Date Rec'd in Lab: 6/12/20

ALPHA Job #: L2024779

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA 02048
320 Forbes Blvd
TEL: 508-822-9300
FAX: 508-822-3288

H&A Information

H&A Client: TDC
H&A Address: 465 Medford Street, #220
Boston, MA 02129
H&A Phone: 617-886-7400
H&A Fax:
H&A Email: iphillips, kscalise

Project Information

Project Name: BMT - Culvert
Project Location: Everett, MA
Project #: 133092-009
(Use Project name as Project #) ☐
Project Manager: I. Alvarado
ALPHAQuote #:

Turn-Around Time

Standard ☑ Due Date:
Rush (only if pre approved) ☐ # of Days:

Deliverables

☑ Email ☐ Fax
☐ EQuIS (1 File) ☑ EQuIS (4 File)
☐ Other:

Billing Information

☐ Same as Client Info
PO #

Regulatory Requirements (Program/Criteria)

EPA NPDES

Note: Select State from menu & identify criteria.

Disposal Site Information

Please identify below location of applicable disposal facilities.

Disposal Facility:
☐ NJ ☐ NY
☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

Please refer to attached NPDES RGP parameters list.
Total NPDES Metals: Sb, As, Cd, Cr, Cu, Fe, Pb, Hg, Ni, Se, Ag, Zn

Please specify Metals or TAL.

ANALYSIS

Sample Filtration
☐ **Done**
☐ **Lab to do**
Preservation
☐ **Lab to do**
(Please Specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	NPDES RGP Parameters + CL-300	Ethanol by 1671	Ammonia Nitrogen - SM 4500	Dissolved NPDES Metals See Note #1	Total Hardness	Total NPDES Metals	pH	Hex. Cr + Tri. Cr	Sample Specific Comments	Total # Bottles
24779-01	HA20-C6_06122020	6/12/20	1115	aq	SRP	x	x	x	x	x		x		1. HOLD, field filtered	28
02	Outfall_06122020	↓	1230	aq	↓			x		x	x	x	x		3

Container Type
Preservative

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Relinquished By:	Date/Time	Received By:	Date/Time
	6/12/20 1330		6/12/20 1540
	6/12/20 1758		6/12/20 1756

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. Alpha Analytical's services under this Chain of Custody shall be performed in accordance with terms and conditions within Blanket Service Agreement# 2015-18-Alpha Analytical by and between Haley & Aldrich, Inc., its subsidiaries and affiliates and Alpha Analytical.

Document ID: 20455 Rev 1 (1/26/2016)

ALPHA ANALYTICAL
World Class Chemistry

Subcontract Chain of Custody

Tek Lab, Inc.
5445 Horsehoe Lake Road
Collinsville, IL 62234-7425

Alpha Job Number
L2024779

Client Information	Project Information	Regulatory Requirements/Report Limits
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Phone: 603.319.5010 Email: mgulli@alphalab.com	Project Location: MA Project Manager: Melissa Gulli **Turnaround & Deliverables Information** Due Date: Deliverables:	State/Federal Program: Regulatory Criteria:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2024779

Report to include Method Blank, LCS/LCSD:

Additional Comments: Send all results/reports to subreports@alphalab.com

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	HA20-C6_06122020	06-12-20 11:15	WATER	Ethanol by EPA 1671 Revision A	

	Relinquished By:	Date/Time:	Received By:	Date/Time:
		6/15/20		
Form No: AL_subcoc				

June 23, 2020

Nichole Hunt
Alpha Analytical
145 Flanders Road
Westborough, MA 01581
TEL: (508) 898-9220
FAX:

RE: L2024779 **WorkOrder:** 20061119

Dear Nichole Hunt:

TEKLAB, INC received 1 sample on 6/16/2020 9:38:00 AM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Marvin L. Darling II

Marvin L. Darling
Project Manager
(618)344-1004 ex 41
mdarling@teklabinc.com

Teklab, Inc.
Environmental Laboratory

Report Contents

http://www.teklabinc.com/

Client: Alpha Analytical
Client Project: L2024779

Work Order: 20061119
Report Date: 23-Jun-2020

This reporting package includes the following:

Teklab, Inc.
Environmental Laboratory

Definitions

http://www.teklabinc.com/

Client: Alpha Analytical
Work Order: 20061119
Client Project: L2024779
Report Date: 23-Jun-2020

Abbr Definition

*	Analytes on report marked with an asterisk are not NELAP accredited
CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
CRQL	A Client Requested Quantitation Limit is a reporting limit that varies according to customer request. The CRQL may not be less than the MDL.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilution factors.
DNI	Did not ignite
DUP	Laboratory duplicate is a replicate aliquot prepared under the same laboratory conditions and independently analyzed to obtain a measure of precision.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample is a sample matrix, free from the analytes of interest,spiked with verified known amounts of analytes and analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MBLK	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	"The method detection limit is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions.
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TIC	Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"
TNTC	Too numerous to count (> 200 CFU)

Qualifiers

# -	Unknown hydrocarbon	B -	Analyte detected in associated Method Blank
C -	RL shown is a Client Requested Quantitation Limit	E -	Value above quantitation range
H -	Holding times exceeded	I -	Associated internal standard was outside method criteria
J -	Analyte detected below quantitation limits	M -	Manual Integration used to determine area response
ND -	Not Detected at the Reporting Limit	R -	RPD outside accepted recovery limits
S -	Spike Recovery outside recovery limits	T -	TIC(Tentatively identified compound)
X -	Value exceeds Maximum Contaminant Level		

Teklab, Inc.
Environmental Laboratory

Case Narrative

http://www.teklabinc.com/

Client: Alpha Analytical
Client Project: L2024779

Work Order: 20061119
Report Date: 23-Jun-2020

Cooler Receipt Temp: 3.0 °C

Locations

Collinsville

Address	5445 Horseshoe Lake Road Collinsville, IL 62234-7425
Phone	(618) 344-1004
Fax	(618) 344-1005
Email	jhriley@teklabinc.com

Springfield

Address	3920 Pintail Dr Springfield, IL 62711-9415
Phone	(217) 698-1004
Fax	(217) 698-1005
Email	KKlostermann@teklabinc.com

Kansas City

Address	8421 Nieman Road Lenexa, KS 66214
Phone	(913) 541-1998
Fax	(913) 541-1998
Email	jhriley@teklabinc.com

Collinsville Air

Address	5445 Horseshoe Lake Road Collinsville, IL 62234-7425
Phone	(618) 344-1004
Fax	(618) 344-1005
Email	EHurley@teklabinc.com

Chicago

Address	1319 Butterfield Rd. Downers Grove, IL 60515
Phone	(630) 324-6855
Fax	
Email	arenner@teklabinc.com

Teklab, Inc.
Environmental Laboratory

Accreditations

http://www.teklabinc.com/

Client: Alpha Analytical
Work Order: 20061119
Client Project: L2024779
Report Date: 23-Jun-2020

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2021	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2021	Collinsville
Louisiana	LDEQ	166493	NELAP	6/30/2021	Collinsville
Louisiana	LDEQ	166578	NELAP	6/30/2021	Collinsville
Oklahoma	ODEQ	9978	NELAP	8/31/2020	Collinsville
Arkansas	ADEQ	88-0966		3/14/2021	Collinsville
Illinois	IDPH	17584		5/31/2021	Collinsville
Kentucky	UST	0073		1/31/2021	Collinsville
Missouri	MDNR	00930		5/31/2021	Collinsville
Missouri	MDNR	930		1/31/2022	Collinsville

Teklab, Inc.
Environmental Laboratory

Laboratory Results

http://www.teklabinc.com/

Client: Alpha Analytical
Work Order: 20061119
Client Project: L2024779
Report Date: 23-Jun-2020
Lab ID: 20061119-001
Client Sample ID: HA20-C6_06122020
Matrix: AQUEOUS
Collection Date: 06/12/2020 11:15

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 600 1671A, PHARMACEUTICAL MANUFACTURING INDUSTRY NON-PURGEABLE VOLATILE ORGANICS								
Ethanol	*	20		**ND**	mg/L	1	06/16/2020 16:19	R278071

Teklab, Inc. Environmental Laboratory

Quality Control Results

http://www.teklabinc.com/

Client: Alpha Analytical
Work Order: 20061119
Client Project: L2024779
Report Date: 23-Jun-2020

EPA 600 1671A, PHARMACEUTICAL MANUFACTURING INDUSTRY NON-PURGEABLE VOLATILE ORG

Batch R278071 **SampType:** MBLK Units **mg/L**
SampID: MBLK-061620

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Ethanol	*	20		**ND**						06/16/2020

Batch R278071 **SampType:** LCS Units **mg/L**
SampID: LCS-061620

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Ethanol	*	20		**210**	250.0	0	83.0	70	132	06/16/2020

Batch R278071 **SampType:** MS Units **mg/L**
SampID: 20061119-001AMS

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Ethanol	*	20		**240**	250.0	0	95.8	70	132	06/16/2020

Batch R278071 **SampType:** MSD Units **mg/L** RPD Limit **30**
SampID: 20061119-001AMSD

Analyses	Cert	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Ethanol	*	20		**210**	250.0	0	83.0	239.6	14.30	06/16/2020

Teklab, Inc.
Environmental Laboratory

Receiving Check List

http://www.teklabinc.com/

Client: Alpha Analytical
Client Project: L2024779

Work Order: 20061119
Report Date: 23-Jun-2020

Carrier: UPS

Completed by: Kim Taylor
On: 16-Jun-2020

Received By: KMT

Reviewed by: Marvin L. Darling
On: 16-Jun-2020

Pages to follow: Chain of custody 1 Extra pages included 0

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C 3.0
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice ☐
Chain of custody present?	Yes ☑	No ☐		
Chain of custody signed when relinquished and received?	Yes ☑	No ☐		
Chain of custody agrees with sample labels?	Yes ☑	No ☐		
Samples in proper container/bottle?	Yes ☑	No ☐		
Sample containers intact?	Yes ☑	No ☐		
Sufficient sample volume for indicated test?	Yes ☑	No ☐		
All samples received within holding time?	Yes ☑	No ☐		
Reported field parameters measured:	Field ☐	Lab ☐	NA ☑	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐		

When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.

Water – at least one vial per sample has zero headspace?	Yes ☑	No ☐	No VOA vials ☐
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	NA ☐
NPDES/CWA TCN interferences checked/treated in the field?	Yes ☐	No ☐	NA ☑

Any No responses must be detailed below or on the COC.

20061119

Subcontract Chain of Custody

Tek Lab, Inc.
5445 Horsehoe Lake Road
Collinsville, IL 62234-7425

Alpha Job Number
L2024779

Client Information	Project Information	Regulatory Requirements/Report Limits
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Phone: 603.319.5010 Email: mgulli@alphalab.com	Project Location: MA Project Manager: Melissa Gulli **Turnaround & Deliverables Information** Due Date: Deliverables:	State/Federal Program: Regulatory Criteria:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2024779

Report to include Method Blank, LCS/LCSD:

Additional Comments: Send all results/reports to subreports@alphalab.com

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
20061119-001	HA20-C6_06122020	06-12-20 11:15	WATER	Ethanol by EPA 1671 Revision A	

3.0°C LT63
ice
ØHSK 6/16/20

	Relinquished By:	Date/Time:	Received By:	Date/Time:
	[signature]	6/15/20	[signature] UPS	6/16/20 0938
Form No: AL_subcoc				

ANALYTICAL REPORT

Lab Number:	L2026730
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Iliana Alvarado
Phone:	(617) 886-7448
Project Name:	BMT-CULVERT
Project Number:	133092-009
Report Date:	06/29/20

Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0141), DoD (L2474), FL (E87814), IL (200081), LA (85084), ME (MA00030), MD (350), NJ (MA015), NY (11627), NC (685), OH (CL106), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #P330-17-00150), USFWS (Permit #206964).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2026730
Report Date: 06/29/20

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2026730-01	HA20-C6_06122020	WATER	EVERETT, MA	06/12/20 11:15	06/12/20

Project Name:	BMT-CULVERT	**Lab Number:**	L2026730
Project Number:	133092-009	**Report Date:**	06/29/20

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Tiffani Morrissey - Tiffani Morrissey

Title: Technical Director/Representative Date: 06/29/20

METALS

Project Name: BMT-CULVERT
Project Number: 133092-009
Lab Number: L2026730
Report Date: 06/29/20

SAMPLE RESULTS

Lab ID: L2026730-01
Client ID: HA20-C6_06122020
Sample Location: EVERETT, MA
Sample Depth:
Matrix: Water

Date Collected: 06/12/20 11:15
Date Received: 06/12/20
Field Prep: Refer to COC

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab											
Lead, Dissolved	ND		mg/l	0.0100	--	10	06/26/20 18:40	06/29/20 10:49	EPA 3005A	3,200.8	AM

Project Name: BMT-CULVERT
Project Number: 133092-009
Lab Number: L2026730
Report Date: 06/29/20

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01 Batch: WG1386335-1										
Lead, Dissolved	ND		mg/l	0.0010	--	1	06/26/20 18:40	06/29/20 09:44	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: BMT-CULVERT

Project Number: 133092-009

Lab Number: L2026730

Report Date: 06/29/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1386335-2								
Lead, Dissolved	110		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2026730
Report Date: 06/29/20

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1386335-3 QC Sample: L2026730-01 Client ID: HA20-C6_06122020												
Lead, Dissolved	ND	0.51	0.4872	96		-	-		70-130	-		20

Lab Duplicate Analysis

Batch Quality Control

Project Name: BMT-CULVERT

Project Number: 133092-009

Lab Number: L2026730

Report Date: 06/29/20

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1386335-4 QC Sample: L2026730-01 Client ID: HA20-C6_06122020						
Lead, Dissolved	ND	ND	mg/l	NC		20

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2026730
Report Date: 06/29/20

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
B	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2026730-01A	Plastic 250ml HNO3 preserved	B	<2	<2	5.0	Y	Absent		PB-2008S(180)

*Values in parentheses indicate holding time in days

Project Name:	BMT-CULVERT	**Lab Number:**	L2026730
Project Number:	133092-009	**Report Date:**	06/29/20

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: Data Usability Report

Project Name:	BMT-CULVERT	**Lab Number:**	L2026730
Project Number:	133092-009	**Report Date:**	06/29/20

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less

Report Format: Data Usability Report

Project Name:	BMT-CULVERT	**Lab Number:**	L2026730
Project Number:	133092-009	**Report Date:**	06/29/20

Data Qualifiers

than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Report Format: Data Usability Report

Project Name:	BMT-CULVERT	**Lab Number:**	L2026730
Project Number:	133092-009	**Report Date:**	06/29/20

REFERENCES

3 Methods for the Determination of Metals in Environmental Samples, Supplement I. EPA/600/R-94/111. May 1994.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
EPA TO-12 Non-methane organics
EPA 3C Fixed gases
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

ALPHA ANALYTICAL

CHAIN OF CUSTODY

Page of

Service Centers
Brewer, ME 04412 Portsmouth, NH 03801 Mahwah, NJ 07430
Albany, NY 12205
Tonawanda, NY 14150 Holmes, PA 19043

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA 02048
320 Forbes Blvd
TEL: 508-822-9300
FAX: 508-822-3288

ate Re in La 6/12/20 ALPHA J # L2 24779

Project Information	
Project Name:	BMT - Culvert
Project Location:	Everett, MA
Project #	133092-009
(Use Project name as Project #)	☐
Project Manager:	I. Alvarado
ALPHAQuote #:	

Deliverables
- ☑ Email
- ☐ a
- ☐ Same as Client Info
- ☐ EQuIS (
- ☑ S (4 e)
- ☐ Other:

PO

Regulatory Re en Pr a Crit
EPA NPDES

Dis sal e Information
Ple ide y below location of app ble posal facilities.

02	Outfall - 06122020	↓	1230	aq	↓			x		x	x	x	x	

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Container Type														
Preservative														

Relinquished By:	Date/Time	Received By:	Date/Time
	6/12/20 1330	MA2	6/12/20 1540
	6/12/20 1758		6/12/20 1756

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. Alpha Analytical's services under this Chain of Custody shall be performed in accordance with terms and conditions within Blanket Service Agreement# 2015-18-Alpha Analytical by and between Haley & Aldrich, Inc., its subsidiaries and affiliates and Alpha Analytical.

Document ID: 20455 Rev 1 (1/26/2016)

26730 X Di

ALPHA ANALYTICAL
World Class Chemistry

Subcontract Chain of Custody

Tek Lab, Inc.
5445 Horsehoe Lake Road
Collinsville, IL 62234-7425

Alpha Job Number
L2024779

Client Information	Project Information	Regulatory Requirements/Report Limits
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Phone: 603.319.5010 Email: mgulli@alphalab.com	Project Location: MA Project Manager: Melissa Gulli **Turnaround & Deliverables Information** Due Date: Deliverables:	State/Federal Program: Regulatory Criteria:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2024779

Report to include Method Blank, LCS/LCSD:

Additional Comments: Send all results/reports to subreports@alphalab.com

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	HA20-C6_06122020	06-12-20 11:15	WATER	Ethanol by EPA 1671 Revision A	

	Relinquished By:	Date/Time:	Received By:	Date/Time:
		6/15/20		
Form No: AL_subcoc				

ANALYTICAL REPORT

Lab Number:	L2027207
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Iliana Alvarado
Phone:	(617) 886-7448
Project Name:	BMT-CULVERT
Project Number:	133092-009
Report Date:	07/01/20

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2027207
Report Date: 07/01/20

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2027207-01	HA20-C6_06262020	WATER	EVERETT, MA	06/26/20 14:15	06/26/20
L2027207-02	HA20-C6_06262020-CY	WATER	EVERETT, MA	06/26/20 14:15	06/26/20

Project Name:	BMT-CULVERT	**Lab Number:**	L2027207
Project Number:	133092-009	**Report Date:**	07/01/20

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	BMT-CULVERT	**Lab Number:**	L2027207
Project Number:	133092-009	**Report Date:**	07/01/20

Case Narrative (continued)

Cyanide, Dissolved

The WG1387166-4 MS recovery, performed on L2027207-02 (HA20-C6_06262020-CY), is outside the acceptance criteria for cyanide (192%); however, the associated LCS recovery is within criteria. No further action was taken.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Michelle M. Morris

Title: Technical Director/Representative Date: 07/01/20

INORGANICS
&
MISCELLANEOUS

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2027207
Report Date: 07/01/20

SAMPLE RESULTS

Lab ID: L2027207-01
Client ID: HA20-C6_06262020
Sample Location: EVERETT, MA

Date Collected: 06/26/20 14:15
Date Received: 06/26/20
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	8.3		mg/l	5.0	NA	1	-	06/29/20 13:34	121,2540D	BA
Cyanide, Total	0.504		mg/l	0.010	--	2	06/28/20 14:00	06/29/20 13:32	121,4500CN-CE	AG

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2027207
Report Date: 07/01/20

SAMPLE RESULTS

Lab ID: L2027207-02
Client ID: HA20-C6_06262020-CY
Sample Location: EVERETT, MA

Date Collected: 06/26/20 14:15
Date Received: 06/26/20
Field Prep: Not Specified

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Cyanide, Dissolved	0.391		mg/l	0.005	--	1	06/29/20 15:50	06/30/20 10:14	121,4500CN-CE	LH

Project Name: BMT-CULVERT
Project Number: 133092-009
Lab Number: L2027207
Report Date: 07/01/20

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1386826-1										
Cyanide, Total	ND		mg/l	0.005	--	1	06/28/20 14:00	06/29/20 11:28	121,4500CN-CE	AG
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1386985-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	06/29/20 13:34	121,2540D	BA
General Chemistry - Westborough Lab for sample(s): 02 Batch: WG1387166-1										
Cyanide, Dissolved	ND		mg/l	0.005	--	1	06/29/20 15:50	06/30/20 10:10	121,4500CN-CE	LH

Lab Control Sample Analysis

Batch Quality Control

Project Name: BMT-CULVERT

Project Number: 133092-009

Lab Number: L2027207

Report Date: 07/01/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1386826-2								
Cyanide, Total	101		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1386985-2								
Solids, Total Suspended	106		-		80-120	-		
General Chemistry - Westborough Lab Associated sample(s): 02 Batch: WG1387166-2								
Cyanide, Dissolved	96		-		90-110	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2027207
Report Date: 07/01/20

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1386826-4 QC Sample: L2026890-02 Client ID: MS Sample												
Cyanide, Total	ND	0.2	0.182	91		-	-		90-110	-		30
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG1387166-4 QC Sample: L2027207-02 Client ID: HA20-C6_06262020-CY												
Cyanide, Dissolved	0.391	0.2	0.776	**192**	Q	-	-		90-110	-		30

Lab Duplicate Analysis

Batch Quality Control

Project Name: BMT-CULVERT

Project Number: 133092-009

Lab Number: L2027207

Report Date: 07/01/20

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1386826-3 QC Sample: L2026890-01 Client ID: DUP Sample						
Cyanide, Total	0.007	0.006	mg/l	2		30
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1386985-3 QC Sample: L2026523-06 Client ID: DUP Sample						
Solids, Total Suspended	33	35	mg/l	6		29
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG1387166-3 QC Sample: L2027207-02 Client ID: HA20-C6_06262020-CY						
Cyanide, Dissolved	0.391	0.440	mg/l	12		30

Project Name: BMT-CULVERT
Project Number: 133092-009

Lab Number: L2027207
Report Date: 07/01/20

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2027207-01A	Plastic 250ml NaOH preserved	A	>12	>12	5.2	Y	Absent		TCN-4500(14)
L2027207-01B	Plastic 950ml unpreserved	A	7	7	5.2	Y	Absent		TSS-2540(7)
L2027207-02A	Plastic 500ml unpreserved	A	7	7	5.2	Y	Absent		SCN-4500(14),FILTER(1)
L2027207-02X	Plastic 250ml NAOH preserved Filtrates	A	NA		5.2	Y	Absent		SCN-4500(14)

*Values in parentheses indicate holding time in days

Project Name:	BMT-CULVERT	**Lab Number:**	L2027207
Project Number:	133092-009	**Report Date:**	07/01/20

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: Data Usability Report

Project Name:	BMT-CULVERT	**Lab Number:**	L2027207
Project Number:	133092-009	**Report Date:**	07/01/20

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less

Report Format: Data Usability Report

Project Name: BMT-CULVERT
Project Number: 133092-009
Lab Number: L2027207
Report Date: 07/01/20

Data Qualifiers

than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Report Format: Data Usability Report

Project Name: BMT-CULVERT
Project Number: 133092-009
Lab Number: L2027207
Report Date: 07/01/20

REFERENCES

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
EPA TO-12 Non-methane organics
EPA 3C Fixed gases
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

ALPHA ANALYTICAL

Westborough, MA 01581, 8 Walkup Dr., TEL: 508-898-9220, FAX: 508-898-9193
Mansfield, MA 02048, 320 Forbes Blvd, TEL: 508-822-9300, FAX: 508-822-3288

Service Centers
Brewer, ME 04412 · Portsmouth, NH 03801 · Mahwah, NJ 07430 · Albany, NY 12205 · Tonawanda, NY 14150 · Holmes, PA 19043

Page 1 of 1

Date Rec'd in Lab: 6/26/20

ALPHA Job #: L2027207

Project Information
- Project Name: BMT - Culvert
- Project Location: Everett, MA
- Project #: 133092-009
- (Use Project name as Project #) ☐
- Project Manager: I. Alvarado
- ALPHAQuote #:

Deliverables
- ☑ Email
- ☐ Fax
- ☐ EQuIS (1 File)
- ☑ EQuIS (4 File)
- ☐ Other:

Billing Information
- ☐ Same as Client Info
- PO #

H&A Information
- H&A Client: TDC
- H&A Address: 465 Medford St, #2200, Boston, MA 02129
- H&A Phone: 6178867400
- H&A Fax: iphillips@haleyaldrich.com;
- H&A Email: kscalise@haleyaldrich.com

Turn-Around Time
- Standard ☐
- Rush (only if pre approved) ☑
- Due Date:
- # of Days: 3

Regulatory Requirements (Program/Criteria)

Note: Select State from menu & identify criteria.

Disposal Site Information

Please identify below location of applicable disposal facilities.

Disposal Facility: ☐ NJ ☐ NY ☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

Note #1: sample collected in unpreserved bottle ~~and field filtered~~ Filter at Lab using 10 micron filter per instructions by K. Salac

Please specify Metals or TAL.

Sample Filtration: ☐ Done ☐ Lab to do
Preservation: ☐ Lab to do
(Please Specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	Depth	Total Cyanide (4500-CN)	Total Suspended Solids	Sample Specific Comments	Total Bottles
7207-01	HA20-C6_06262020	6/26/20	1415	AQ	SRP	----	X	X		2
7207-02	HA20-C6_06262020-CY	↓	↓	AQ	SRP	----	X		See Note #1	1
Container Type							P	P		
Preservative							E/A	A		

Preservative Code: A = None, B = HCl, C = HNO_3, D = H_2SO_4, E = NaOH, F = MeOH, G = $NaHSO_4$, H = $Na_2S_2O_3$, K/E = Zn Ac/NaOH, O = Other

Container Code: P = Plastic, A = Amber Glass, V = Vial, G = Glass, B = Bacteria Cup, C = Cube, O = Other, E = Encore, D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	6/26/20 1500	[signature] AAL	6/26/20 1600
[signature] AAL	6/26/20 1620	[signature]	6/26/20 1620
[signature]	6/26/20 1740	[signature]	6/26/20 1745

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. Alpha Analytical's services under this Chain of Custody shall be performed in accordance with terms and conditions within Blanket Service Agreement# 2019-22-Alpha Analytical by and between Haley & Aldrich, Inc., its subsidiaries and affiliates and Alpha Analytical.

Document ID: 20455 Rev 3 (1/7/2019)